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Zwischenbericht, ZHAW Institut für Nachhaltige Entwicklung, 31. August 2017

SMART URBAN ISLE (SUI)

SMART BIOCLIMATIC LOW-CARBON URBAN AREAS AS INNOVATIVE ENERGY ISLES

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Content

1 Aims of the project

The Smart Urban Isle (SUI) project intends to move forward with urban energy savings and decentralisation of renewable energy generation. Based on a three cornerstones procedure, the SUI project aims at a whole new urban planning that allows cities to grow in a sustainable way [1].

A SUI is defined as ‘areas around a public building, which make use of the synergies between different (building) functions and of the scale advantages for energy (storage) solutions’. These areas can consist of 10 – 1000 buildings; the optimal scale will be evaluated, and will depend on different (technological) solutions.

Consequently, we develop an innovative new concept for city planning, where cities are arranged and grow through small integrated areas. The project is formed by three complementary and integrated blocks: mini networks, bioclimatic and responsive building design and management platform. The mini networks include decentralised renewable energy generation, energy storage and distribution, and consider integration of (electrical) mobility. Bioclimatic design of buildings (and urban planning) with optimal integration with the mini-network will be developed, using the public building as an example. An energy management system to control and optimize energy flows will be carried out taking into account innovative ICT measures.

This project is intended to be adapted to larger scales by connecting several SUIs within neighbourhoods, districts or cities. We consider an applied research and implementation approach to fully develop every aspect of the SUI concept. In this way, we conceive innovative and technological solutions which make the smart integrated city come true.

To achieve these goals, municipalities such as Amsterdam, Winterthur, Zurich, Limassol, Iasi, Granada, Güssing through ecoEnergyLand and Santa Cruz de Tenerife work hand in hand by implementing the SUI outcomes. Technology and industrial partners such as Implenia, Losinger-Marazzi and Anerdgy play an important role to reinforce the solution by reflecting the findings with real world challenges. The project results aim at the enhancement of the energy savings and efficiency in the urban fabric. To achieve this, SUI project relies on already existing data upon renewable energy islands and the increase of the energy efficiency on urban environments. On the other hand, urban areas account for 60 to 80% of global energy consumption and around the same share of CO_2 emissions. The SUI project aims to reduce energy consumption and thus, CO_2 emissions.

1.1 Project Partners (main):

TU Delft, the Netherland

Cyprus University of Technology, Cyprus

Middle East Technical University, Turkey

Technical University Iasi, Romania

ZHAW Zurich University of Applied Sciences, Switzerland

European Centre for Renewable Energy, Austria

1.2 Project Schedule

Project Start: March 2016

Project Duration: 28 months

Project End: June 2018

2 Current state of research

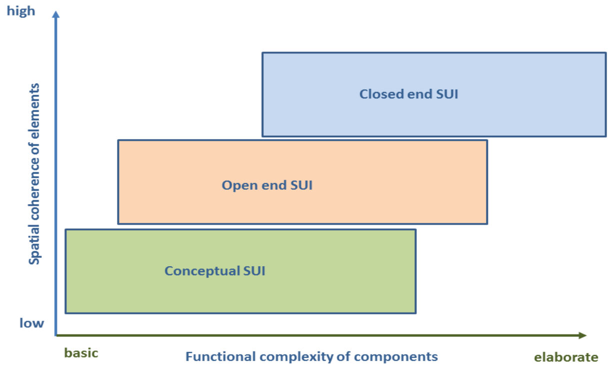
2.1 Smart Urban Isle Mini-networks

The following activities, according to the description of work proposed, have been developed so far.

2.1.1 Task 4.1 Concept development

Inventory of boundary conditions: buildings types, climate:

- A template was developed to describe all case studies in a common way. The template includes the necessary information to develop common guidelines for different kinds of case studies, according to climate, building type, area density etc.



- Three different types (

  Figure 1) of a SUI as used in this study were elaborated. A more detailed description will be available in the final report.

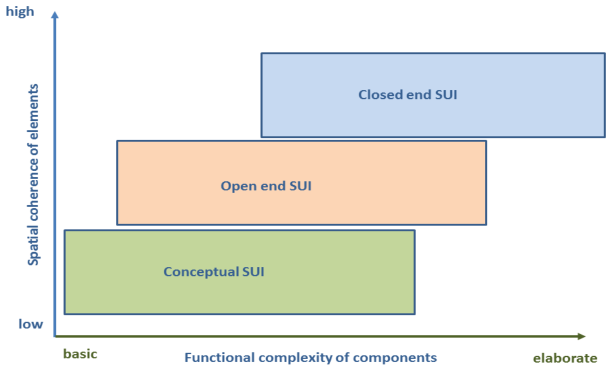


Figure 1: Three different types of a SUI

Overview of network technologies focussed on production from solar and wind energy:

- An extensive technology inventory was developed, including over 200 technologies suitable for SUI mini networks. The technologies are described in a large excel file, with relevant information to enable a quick scan of which technology is suitable in which case study type. The information includes i.a.: basic function (for example: electricity production); technology type (e.g. wind energy); power capacity, etc.).
- The technology inventory will be one of the tools that can be used in the developments of a SUI mini network concept (part of D4.1 and D4.2 as well).

Development of mini network concepts, based on standardised cases (from a few buildings to 100 and 1000 buildings):

- For the development of mini network concepts a stepwise approach was agreed on with all partners during the Amsterdam meeting in October 2016. At this moment the first 3 case study analyses (Haarlem NL, Winterthur CH and Güssing AT) are being developed.

2.1.2 Task 4.2 Concept analysis

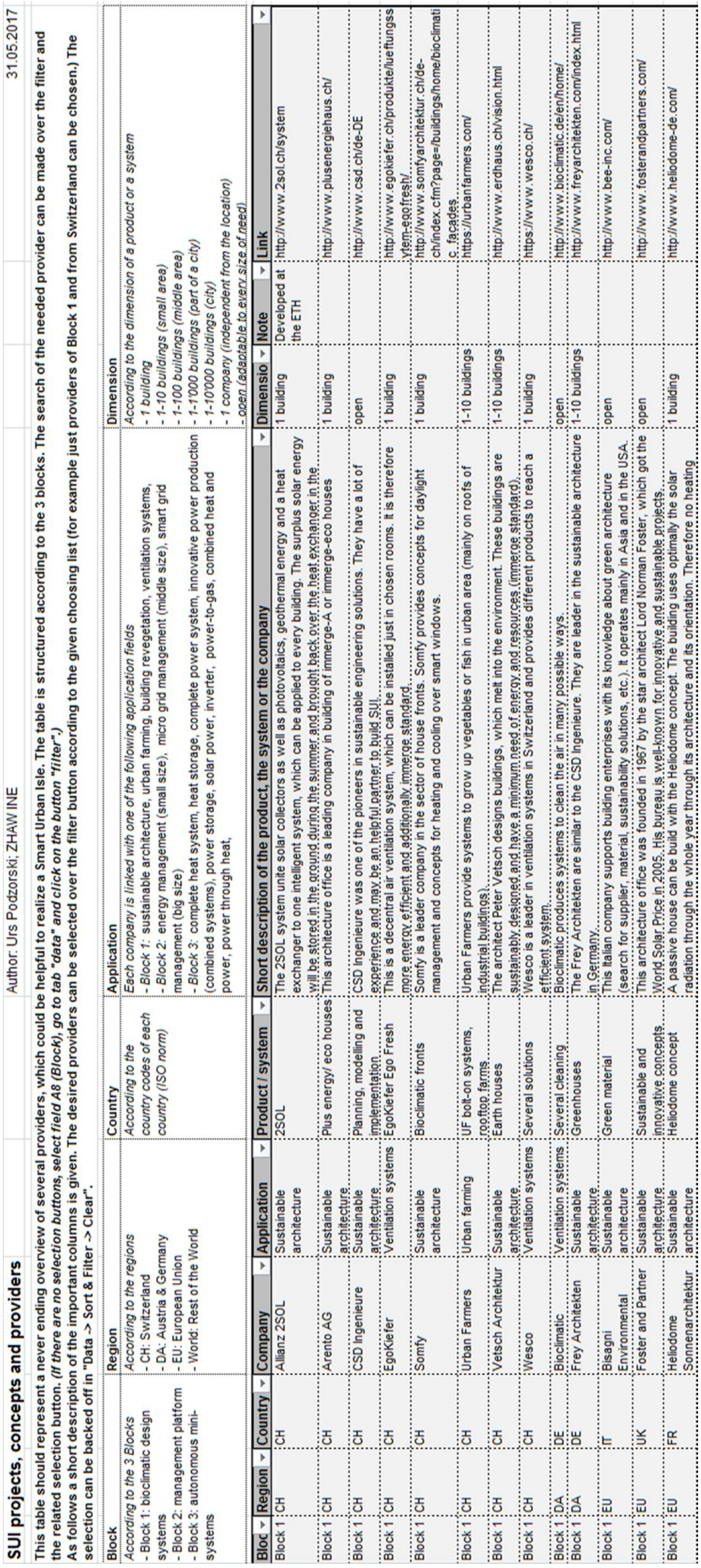
- Concept analysis on key performance indicators (KPI's)
- KPI's for energy were developed by WP4, but not yet applied to the case studies, since these are not yet finished
- Guidelines and recommendations for requirements on and relation with blocks 2 and 3
- A handbook for developing SUI is being developed

2.2 Developed Tools

Subsequent the so far developed and adapted tools are listed. The tools are not jet completely finalized. To keep it simple some images of the tools are shown. The whole tools will be available at the end of the project and some of them can be found in the annex.

2.2.1 Inventory File

In a first step an „Inventory File“ (Figure 2) was developed [2] [3]. In this file currently available technologies and companies in association with renewable energy technologies were collected always with the focus of possible contribution to a SUI.



SUI projects, concepts and providers — Author: Urs Podzorski; ZHAW INE — 31.05.2017

This table should represent a never ending overview of several providers, which could be helpful to realize a Smart Urban Isle. The table is structured according to the 3 blocks. The search of the needed provider can be made over the filter and the related selection button. *(If there are no selection buttons, select field A8 (Block), go to tab "data" and click on the button "filter".)*
As follows a short description of the important columns is given. The desired providers can be selected over the filter button according to the given choosing list (for example just providers of Block 1 and from Switzerland can be chosen.) The selection can be backed off in "Data -> Sort & Filter -> Clear".

Block	Region	Country	Application	Dimension
According to the 3 Blocks - Block 1: bioclimatic design systems - Block 2: management platform - Block 3: autonomous mini-systems	*According to the regions* - CH: Switzerland - DA: Austria & Germany - EU: European Union - World: Rest of the World	*According to the country codes of each country (ISO norm)*	*Each company is linked with one of the following application fields* - *Block 1:* sustainable architecture, urban farming, building revegetation, ventilation systems, - *Block 2:* energy management (small size), micro grid management (middle size), smart grid management (big size) - *Block 3:* complete heat system, heat storage, complete power system, innovative power production (combined systems), power storage, solar power, inverter, power-to-gas, combined heat and power, power through heat,	*According to the dimension of a product or a system* - *1 building* - *1-10 buildings (small area)* - *1-100 buildings (middle area)* - *1-1'000 buildings (part of a city)* - *1-10'000 buildings (city)* - *1 company (independent from the location)* - *open (adaptable to every size of need)*

Bloc	Region	Country	Company	Application	Product / system	Short description of the product, the system or the company	Dimensio	Note	Link
Block 1	CH	CH	Allianz 2SOL	Sustainable architecture	2SOL	The 2SOL system unite solar collectors as well as photovoltaics, geothermal energy and a heat exchanger to one intelligent system, which can be applied to every building. The surplus solar energy will be stored in the ground during the summer and brought back over the heat exchanger in the	1 building	Developed at the ETH	http://www.2sol.ch/system
Block 1	CH	CH	Arento AG	Sustainable architecture	Plus energy/ eco houses	This architecture office is a leading company in building of immerge-A or immerge-eco houses	1 building		http://www.plusenergiehaus.ch/
Block 1	CH	CH	CSD Ingenieure	Sustainable architecture	Planning, modelling and implementation	CSD Ingenieure was one of the pioneers in sustainable engineering solutions. They have a lot of experience and may be an helpful partner to build SUI.	open		http://www.csd.ch/de-DE
Block 1	CH	CH	EgoKiefer	Ventilation systems	EgoKiefer Ego Fresh	This is a decentral air ventilation system, which can be installed just in chosen rooms. It is therefore more energy efficient and additionally immerge standard.	1 building		http://www.egokiefer.ch/produkte/lueftungssystem-egofresh/
Block 1	CH	CH	Somfy	Sustainable architecture	Bioclimatic fronts	Somfy is a leader company in the sector of house fronts. Somfy provides concepts for daylight management and concepts for heating and cooling over smart windows.	1 building		http://www.somfyarchitektur.ch/de-ch/index.cfm?page=/buildings/home/bioclimatic_facades
Block 1	CH	CH	Urban Farmers	Urban farming	UF bolt-on systems, rooftop farms	Urban Farmers provide systems to grow up vegetables or fish in urban area (mainly on roofs of industrial buildings).	1-10 buildings		https://urbanfarmers.com/
Block 1	CH	CH	Vetsch Architektur	Sustainable architecture	Earth houses	The architect Peter Vetsch designs buildings, which melt into the environment. These buildings are sustainably designed and have a minimum need of energy and resources (immerge standard).	1-10 buildings		http://www.erdhaus.ch/vision.html
Block 1	CH	CH	Wesco	Ventilation systems	Several solutions	Wesco is a leader in ventilation systems in Switzerland and provides different products to reach a efficient system.	1 building		https://www.wesco.ch/
Block 1	DA	DE	Bioclimatic	Ventilation systems	Several cleaning	Bioclimatic produces systems to clean the air in many possible ways.	open		http://www.bioclimatic.de/en/home/
Block 1	DA	DE	Frey Architekten	Sustainable architecture	Greenhouses	The Frey Architekten are similar to the CSD Ingenieure. They are leader in the sustainable architecture in Germany.	1-10 buildings		http://www.freyarchitekten.com/index.html
Block 1	EU	IT	Bisagni Environmental	Sustainable architecture	Green material	This Italian company supports building enterprises with its knowledge about green architecture (search for supplier, material, sustainability solutions, etc.). It operates mainly in Asia and in the USA.	open		http://www.bee-inc.com/
Block 1	EU	UK	Foster and Partner	Sustainable architecture	Sustainable and innovative concepts	This architecture office was founded in 1967 by the star architect Lord Norman Foster, which got the World Solar Price in 2005. His bureau is well-known for innovative and sustainable projects.	open		http://www.fosterandpartners.com/
Block 1	EU	FR	Heliodome Sonnenarchitektur	Sustainable architecture	Heliodome concept	A passive house can be build with the Heliodome concept. The building uses optimally the solar radiation through the whole year through its architecture and its orientation. Therefore no heating	1 building		http://www.heliodome-de.com/

Figure 2: Extract of „Inventory File“

2.2.2 Technology Matrix

In a second step an existing “Technology Matrix” (cf. Figure 3) was adapted to the conditions of a SUI [4]. In this matrix the “basic needs” of a SUI are visible and a first rough selection of suitable technologies can be made. The preselection is based on SUI on-site conditions.

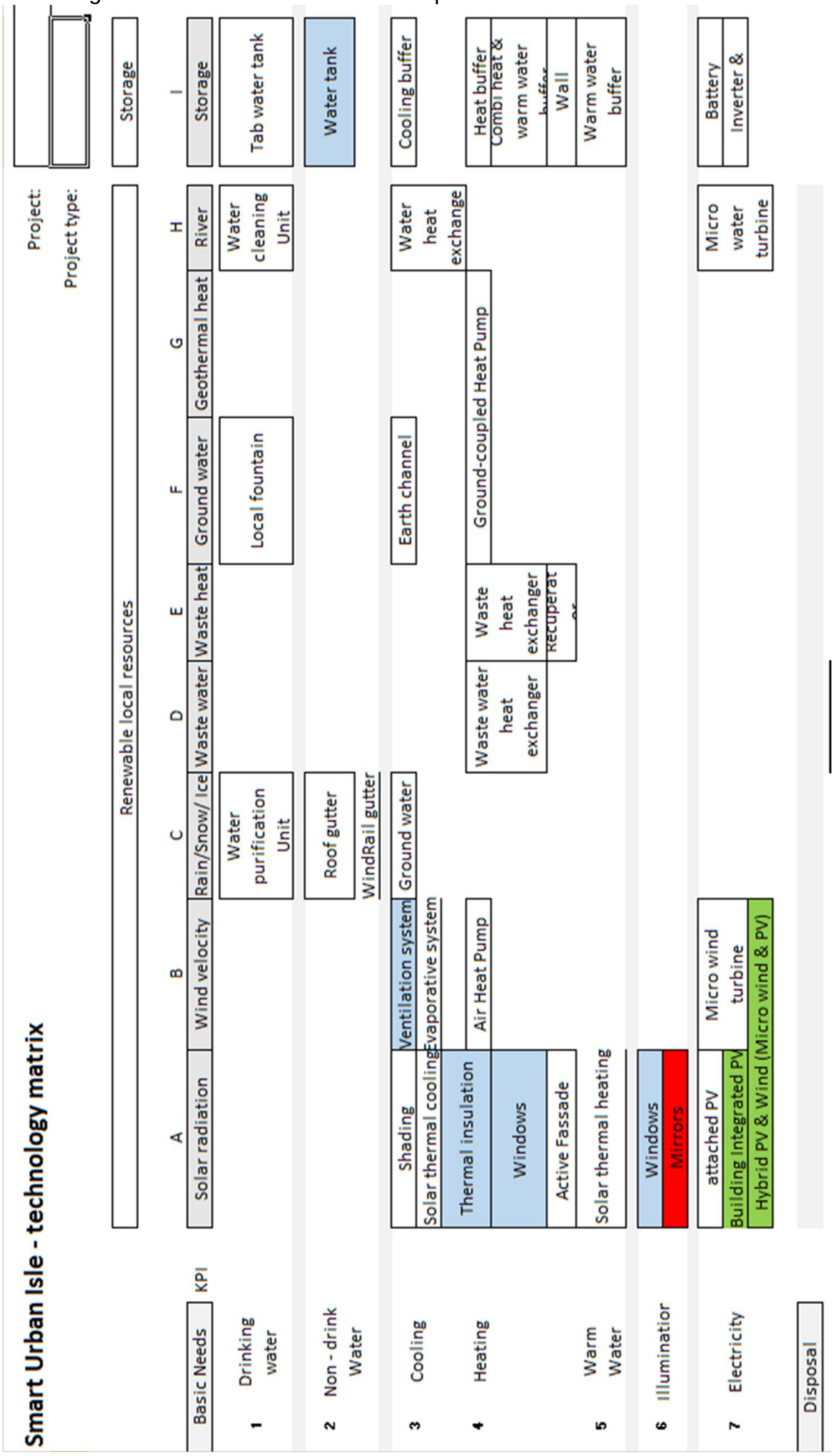


Figure 3: Extract of "Technology Matrix" (Koehler, 2016)

2.2.3 SWOT File

As tool to support the selection of best fitting technologies for a specific SUI a "SWOT File" (Figure 4) was developed [5] [6].

Case study: Werk 1, Sulzer Areal, Winterthur, Switzerland — **Partner:** Implenia

Cooling

Renewable local resources

Solar radiation		*Wind velocity*		*Rain/Snow/Ice*	
Shading		***Ventilation system***		***Ground water***	
> no energy needed > low installation costs	> small cooling effect > space requirement (e.g. planting)	> a passive cooling system needs no power (just the clever handling of the inhabitants)	***> active ventilation needs (lot of) power*** > ceiling vents can cause noise emissions > active ventilation needs constant maintenance	> constant cooling > high efficiency > low operation costs	> high investment costs > need of additional space > additional power for the heat pump needed
> avoidance of a cooling system > a good performance can be reached with minimal resources	> at very high temperature level too low cooling effect > aesthetic design can suffer	> the combination of active and passive ventilation leads to a good performance	> complex systems are needed for big buildings	> several systems available for every size and demand ***> use of groundwater permitted (maximum refrigerating capacity 50 kW)***	> complex licensing procedure
Solar thermal cooling		***Evaporative system***			
> no emissions > silent operation > low operating costs	> complex installation (solar collector, pipelines, ventilation system) > high investment costs > not adaptable to special conditions	> low installation costs (1/2 of a refrigerated air conditioning) > low operation costs (1/8 of a refrigerated air conditioning)	> frequent maintenance because of rusting and corrosion ***> the system must be drained and winterized in winter to protect it from freeze damage***		
> je higher the temperature the better the performance	> difficult to find a company, which delivers such a system > shading of the solar modules reduces the performance ***> the space on the roofs***	> provides humidity as well, which increases comfort > the pad can remove contaminations in the supply air	***> humidity may be a problem in humid regions (Winterthur)*** > humid conditions can reduce the performance		

Figure 4: Extract of "SWOT File" (Podzorski, 2017)

2.2.4 Key Performance Indicators (KPIs)

To be able to measure the performance of a SUI a list of suitable KPIs (Figure 5) was developed [7] [8] [9].

Category	Subcatergory	Evaluation criteria	Very good	Aplicable
Energy	**Fraction of renewables locally produced**	On-Site Energy (power) production (PV) in %	X	
		On-Site Energy (power) production (Wind) in %	X	
		On-Site Energy (power) production (water) in %	X	
		On-Site Energy (heat) production (solar) in %	X	
		On-Site Energy (heat) production (biogas) in %	X	
		On-Site Energy (heat) production (wood) in %	X	
		On-Site Energy (heat) production (geothermal) in %	X	
	Fraction of autonomy	Total energy demand of buildings (primary energy demand)		X
		Heat demand: amount and load (Energy usage: heat)		X
		Electricity consumption: amount and load (Energy usage: power)		X
		Autarky / local energy balancing (% of time and hours of only fossil fuel supply per year [h])		X
		% regional sustainably produced		X
		% locally and sustainably produced		X
		Monitoring: Energy production, consumption and storage (in total)		X
		Monitoring: Energy production & consumption (for each apartment, building or system)		X
		Average power (energy/heat) failure household/a		X
		Energy storage (power)		X
		Energy storage (heat)		X
		Energy distribution (power)		X
		Energy distribution (heat)		X
	CO2 emissions and primary energy (European	Total CO_2 emission of the area	X	
		Total energy-input in the area (heat and electricity separate)	X	
Comfort	**Within buildings**			
	Thermal comfort	Room temperature in °C (summer)	X	
		Room temperature in °C (winter)	X	
		Thermal transmittance in W/m²K	X	
		Mean radiation temerature	X	
		Air velocity cm/s	X	
		Relative humidity in %	X	
		Thermal bridges in °C	X	
	Noise	Acoustic insulation		X
		Noise level in dB (A)		X

Figure 5: Extract of KPI list

2.2.5 Area crosslinking tool thermic

To be able to build a SUI, the usable on-site sources and the later user mix need to match as good as possible. To give a hand in this direction an “Area crosslinking tool thermic” (Figure 6 and 7) was developed [10] [11]. With the help of this tool the different user categories according to SIA 2040 can be selected and percental distributed in a way, that the thermal balance over one year is as balanced as possible.

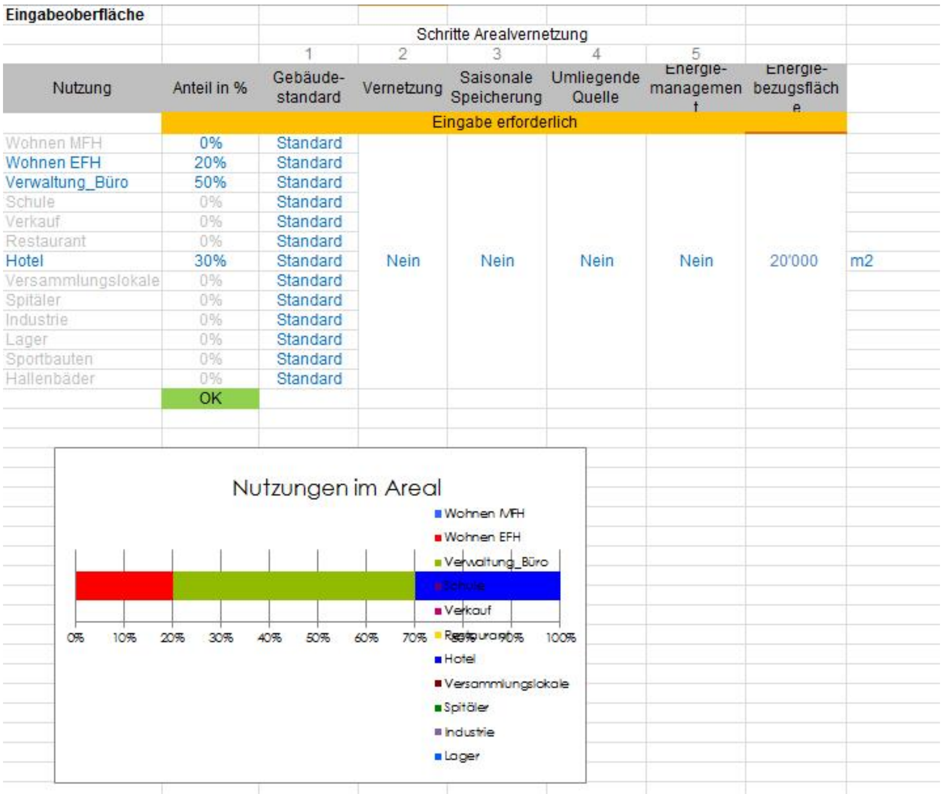


Figure 6: Extract "Area crosslinking tool thermic" input mask (Braumandl, 2017)

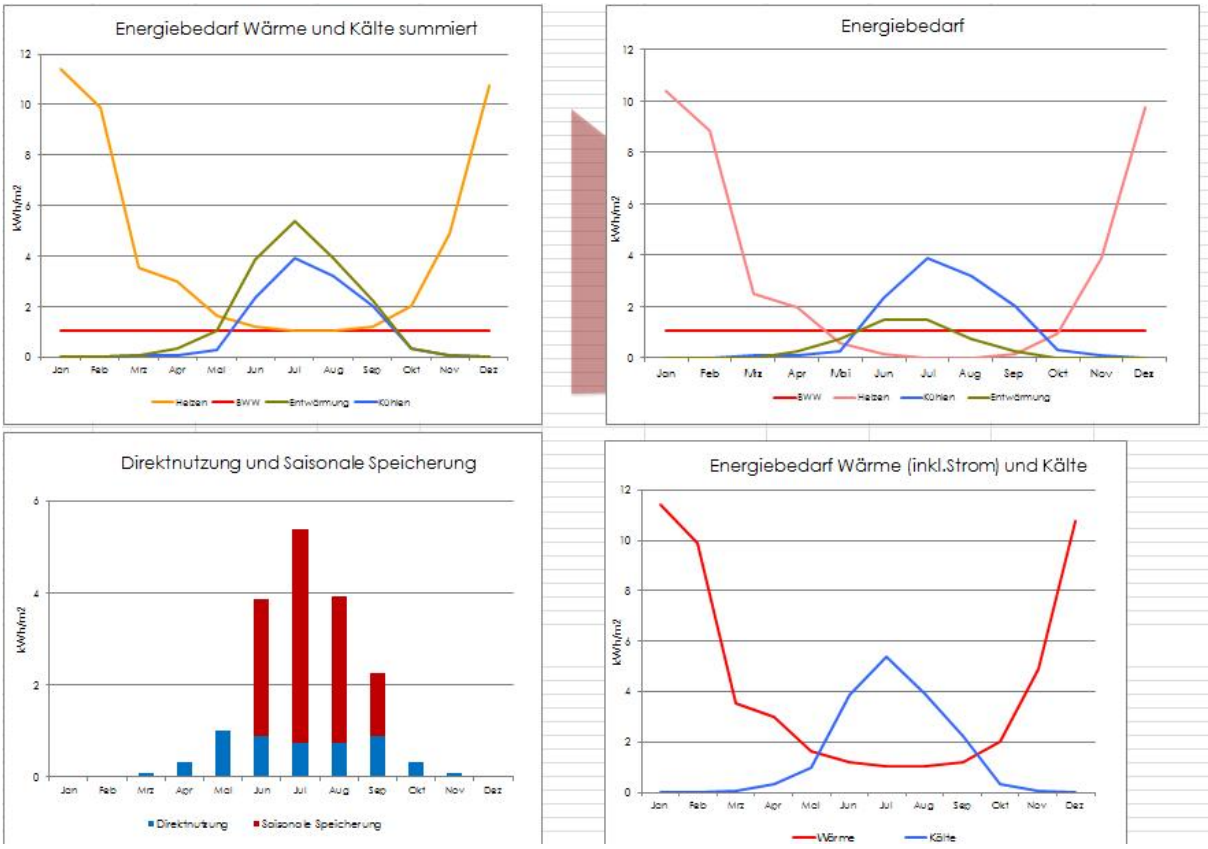


Figure 7: Example of evaluation "Area crosslinking tool thermic" (Braumandl, 2017)

2.2.6 Area crosslinking tool power

In a further step the “Area crosslinking tool thermic” (Figure 8 and 7) was refined and adapted to the tool “Area crosslinking tool power” (Figures 8 and 9) [12], [13]. With this tool now it is possible to optimise the user mix and power consumption according to on-site sources wind [14] and solar.

Arealnutzung: Berechnungstool elektrischer Energieflüsse

	1) PV-/ und Energiebezugsfläche	
Energiebezugsfläche	116191	m^2
Installierte PV-Leistung		
Südausrichtung	532	kWp
West- oder Ostausrichtung	0	kWp
Fassadenintegriert	0	kWp
Erzeugte Energie PV-Anlage	532000	kWh/Jahr

2) Nutzungskategorie	3) Nutzung in %	4) Gebäudestandard	5) Heiztechnologie	6) Kühltechnologie
Wohnen MFH	72%	Minergie - P	Fernwärme	Split Klima
Wohnen EFH	0%	Zielwert	Erdregister - Wärmepumpe	Split Klima
Verwaltung_Büro	0%	Zielwert	Erdregister - Wärmepumpe	Split Klima
Schule	18%	Minergie - P	Fernwärme	Split Klima
Lebensmittelverkauf	3%	Minergie - P	Fernwärme	Split Klima
Fachgeschäft	7%	Minergie - P	rnwärme	Split Klima
Restaurant	0%	Zielwert	Erdregister - Wärmepumpe	Split Klima
Hotel	0%	Standard	Erdregister - Wärmepumpe	Split Klima
Versammlungslokale	0%	Zielwert	Erdsonden-Wärmepumpe	Split Klima
Spitäler	0%	Zielwert	Erdsonden-Wärmepumpe	Split Klima
Industrie	0%	Standard	Erdregister - Wärmepumpe	Split Klima
Lager	0%	Bestand	Erdregister - Wärmepumpe	Split Klima
Sportbauten	0%	Zielwert	Erdregister - Wärmepumpe	Split Klima
Hallenbäder	0%	Standard	Erdregister - Wärmepumpe	Split Klima
	OK			

Figure 8: Extract "Area crosslinking tool power" input mask (Baumann & Meier, 2017)

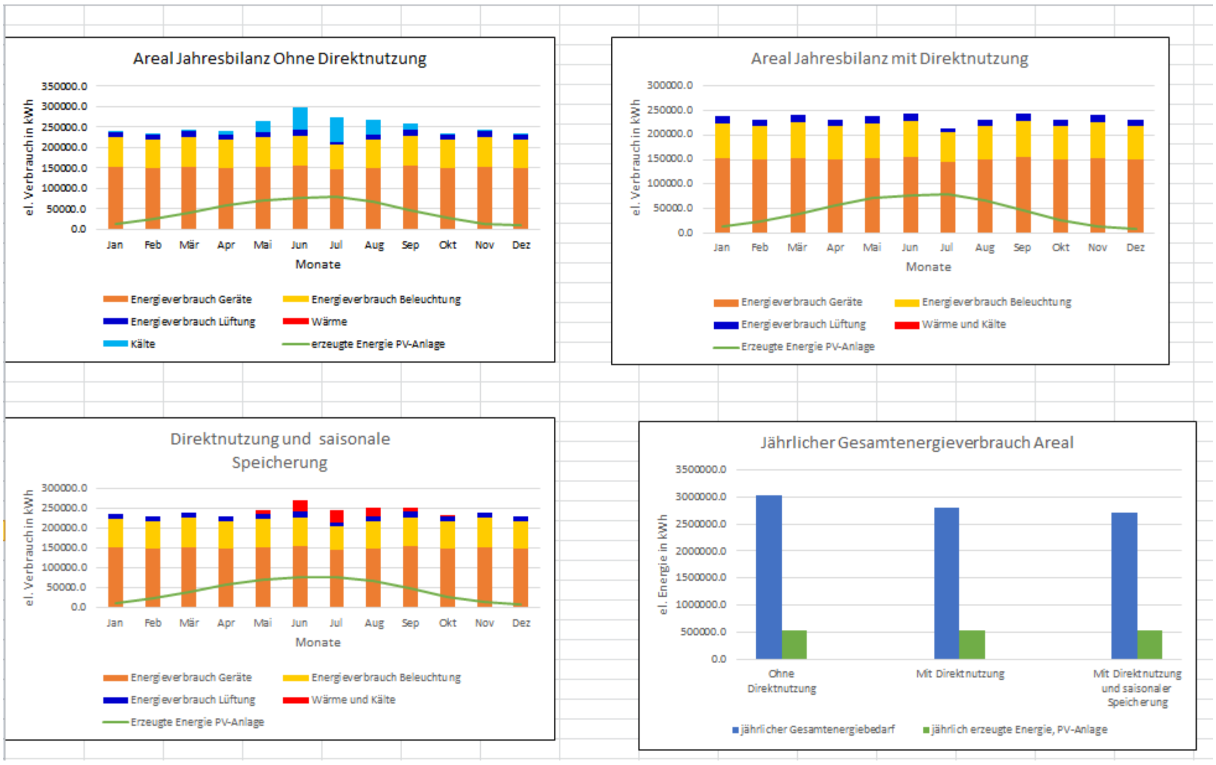


Figure 9: Example of evaluation "Area crosslinking tool power" (Baumann & Meier, 2017)

2.2.7 Crosslinking level

As each SUI is different and has to deal with different circumstances, different depths of crosslinking are possible (Figure 1014) [11].

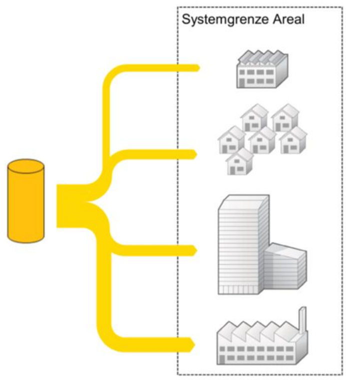


Figure 10: Initial position, all energy is comming from outside the area boundery

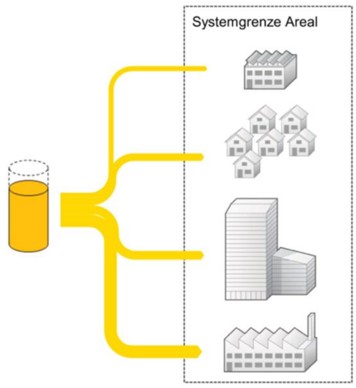


Figure 11: 1. Step, improving energy efficiency of buildings and infrastructure

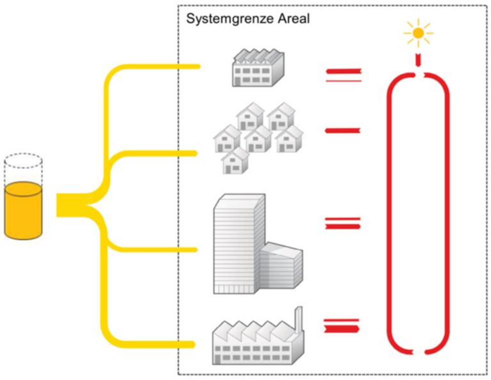


Figure 12: 2. Step, crosslinking energy sources within the area

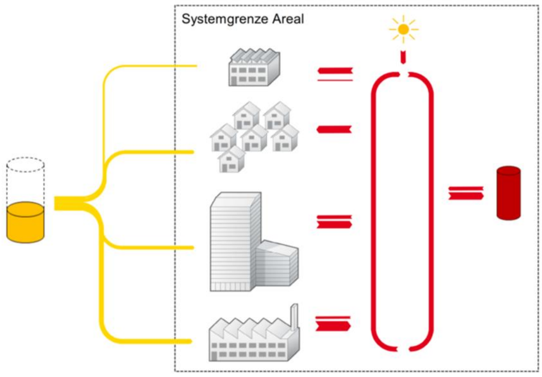


Figure 13: 3. Step, integration of seasonal storage

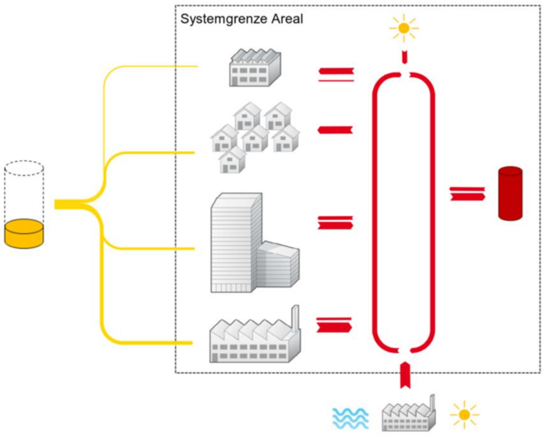


Figure 14: 4. Step, complement of energy inputs with regional renewable energy sources

2.3 Further deliverables generated so far.

The progress so far has generated the deliverables shown in Table 1. Final deliverables in the Annex.

Table 1: Generated deliverables during project

No. of deliverable	Name of deliverable
D 1.1	Domain requirements specification
D 1.2	Domain operational models design
D 1.3	Cross models design
D 1.4	Key Performance Indicators
D 2.1	Energy Profile of the SUI
D 2.2	Series of energy efficient conservation interventions and their impact
D 2.3	Results of the validation of the SUI concept [still pending]
D 3.1	Software concept
D 3.2	Platform prototype tested for individual scenarios [still pending]
D 4.1	Concepts for smart mini networks for given situations [still pending]
D 4.2	Guidelines on how to develop smart mini networks for a given area that is to become a SUI [still pending]
D 4.3	Proof of concept of mini networks in detail (simulated results) [still pending]
D 6.1	Dissemination plan and results

2.3.1 Description of work

WP 1 – Smart Urban Isle Concept and Scenarios

Task 1.1 studied specific needs of each domain (bioclimatic architecture, management platform and renewable energy) on each participating country (Spain, The Netherlands, Cyprus, Turkey, Romania, Austria and Switzerland). A deep legislation analysis was made so that domain-based, cross-domain operation and business analysis can be undertaken.

Task 1.2 dealt with common issues that attach the global SUI concept and divided in two categories: technical and non-technical. As a result of the analysis done of the identified challenges, a list of initial requirements was generated. Each expert field (bioclimatic architecture, management platform and mini-networks) has its own indicators allowing an easy comparison between them.

In task 1.3 several approaches were analysed in order to achieve a complete and functional relation between the three domains involved in the SUI formation. First, a conceptual framework was defined in order to address the sequence of actions that need to be carried out. Finally, a list of tasks was developed to be performed during the implementation stage.

Task 1.4 defined key performance indicators to take into account the SUI conceptual framework defined in the previous tasks. The main goal of these indicators is to quantify the interaction between buildings and their surroundings in terms of energy and microclimatic effects. As a result, the SUI readiness of an area and its buildings will be addressed.

WP 2 – Smart Urban Isle Bioclimatic design and mobility

Task 2.1 concerning the Bioclimatic analysis of the selected Urban Isle and the focus-building has been completed for some of the case studies; others are ongoing. In this regard, the following activities have been undertaken:

- Determining the human comfort conditions in the building has been completed. The information for the envelope performance of the building (air-tightness (infiltration), thermal bridges, air and water leakages and heat transfer) are still being collected. The energy profile of the building (kWh/m^2 and CO_2 emissions) is under development.
- Developing an energy profile of the area (energy consumption, thermal comfort, and CO_2 emissions) has been done through simulations in the proposed new neighbourhoods and through energy simulations and/or energy audits of the existing pilot neighbourhoods. Also, the materiality and geometry of the area have been documented.
- Evaluation of the mobility impact on the energy profile is underway.
- The heat island effect will be cited in the deliverable from other studies and correlated with the CO_2 emissions and the geometry and materiality of the area.

With regard to task 2.2 concerning the bioclimatic measures for the SUI and the focus-building.

- Proposing a set of sustainable and energy efficient conservation interventions for the building, based on data acquired with data-loggers as well as user satisfaction surveys is underway. Due to practical reasons the blower test has been replaced with thermal imaging in some case studies.
- As a next step, developing a feasibility study of each measure in terms of reduction of the energy consumption, its economic viability and its sustainability impact using the adequate software, will be started.

With regard to task 2.3 concerning the simulation of the SUI and the focus-building to determine the prevailing conditions, the following work has been completed for most case studies:

- The building and surrounding area (SUI) has been modelled and simulated with accurate weather data to determine the base case scenario and will now be compared with the real-time data gathered in task 2.1; thereafter the model will be adjusted and validated. The proposed measures will then be incorporated into the model to determine the most efficient scenario for implementation.

Work on task 2.4 concerning the testing and tangible validation of the concept has yet to be started, since it is tied to the results of the previous tasks.

WP 3 – Smart Urban Isle Management System

Task 3.1 defined detailed requirements of the system. It was collected information about sensors (mainly smartphones), to obtain different types of information (to be finally decided in collaboration with WP 2 and WP 4 partners). The complete version of the SUI Energy Management System (SEMS) is developed around different mathematical models which try to reproduce the human behaviour, as analytical models, probability based approaches or knowledge based approaches (cf. figure 15). Sensors (e.g. placed on electrical installations, such as PV production, storage, meteo data) will collect data to be introduced in the management platform (e.g. aggregation and statistics in dashboards). Actuators will feed from this data to act through the algorithms and rules defined. Finally, dashboards will show the data flow (warnings, bugs, mistakes, …) according to specific indicators and parameters. This will allow to perform SUI key operational parameters optimization (i.e. deviation report). A subsequent simulation of decisions can result from priority logic inter KPI correlation (incl. non-measurable values). Decision making is supported through KPI vs simulation (action plan).

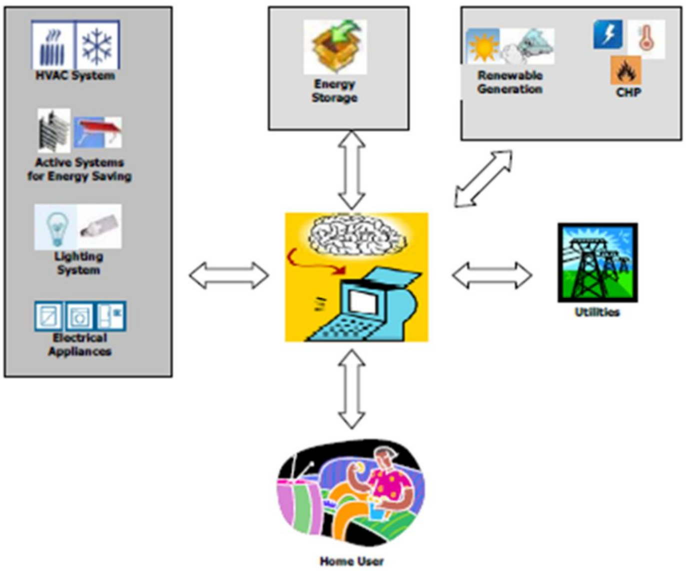


Figure 16: Basic idea of the SUI Energy Management System (SEMS)

In task 3.2, the management system of the platform was designed. A versatile architecture using smartphones as sensors throughout the SUI is comprised by blocks of information. Each block of information is related to a specific measure, being able to have (each block) several entries.

In task 3.3, the platform system was developed [15]. Different modules were developed to, for instance, store information (DB), logical interpretation (LOGIC), and collection of data from mobile systems and data transmission. In order to test the technology framework, a validation demo was carried out. In this demo, it was selected “gps”, “signal”, “lag” and “calls” as information blocks and each one of them has one entry.

Task 3.4 has developed a user interface containing a public and a private area where only authenticated users can access to restricted information. Different API methods were implemented for communication between modules and systems, as well as for collecting and distributing data.

WP 4 – Smart Urban Isle Mini-networks

See: 2.1 Smart Urban Isle Mini-networks

WP6 – Dissemination & Exploitation

Task 6.1 is related with the best means to disseminate the SUI results to a widest audience as possible, including technical, scientific and society. The dissemination actions have been undertaken by all project partners. A general record was kept to easily quantify the impact of the SUI project.

Task 6.2 addresses the current market outlook in different sectors. Initial user requirements have been analysed to start developing the strategy and business model for future exploitation.

WP7 – Project Management & Coordination

The main objective of task 7.1 was to ensure the successful realisation of the foreseen activities and objectives of SUI. In deliverable D7.1 (Project Presentation), a presentation of the project was made. This presentation was used in the opening event of introduction to JPI Urban Europe projects in Amsterdam. Deliverable D7.2 (Project Management & Quality Control Plan) defines the requirements of the project in detail and ensures the alignment of general communication rules, quality control processes, work planning and procedures, as well as technical support for the archiving of documentations.

In task 7.2 a Consortium Agreement was established. This agreement settles different procedures and tools to perform fast and effective communication in the project. Management activities were also undertaken such as: preparation and organization of project meetings, writing of meeting minutes, follow-up meetings (mostly audio conferences).

Task 7.3 is related to project and cost reporting. Regarding project reporting, templates, a document repository and periodic reports were generated to successfully monitor the project. On the other hand, due to this is a project where each partner has been funded by their respective national funding agencies, each partner established their own clear reporting structure and process for the whole duration of the project [16].

3 Outlook 2017

Future steps are to validate and test the developed tools on the basis of existing buildings (Technopark) or areas that stay in the planning phase (Werk 1). The goal of this testing is to find weak points in the tools and to eliminate them. Further a SUI “Hand Book” will be developed to give a helping hand if a SUI is going to be developed. In order to generate a user friendly and practice-oriented handbook a close collaboration with Implenia and Losinger Marrazzi is performed. Thanks to this cooperation constant feedback out of the praxis and especially experience out of the 2000 Watt certifying process helps improving the handbook.

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