SiEUGreen
Sino-European innovative green and smart cities

Sino-European Innovative Green and Smart Cities

Deliverable 1.2

Baseline study including key indicators and development of a typology

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Disclaimer

SiEUGreen

The project has received funding from the European Union's Horizon 2020 Research, and Innovation programme, under grant Agreement N 774233 and from the Chinese Ministry of Science and Technology.

Throughout SiEUGreen's implementation, EU and China will share technologies and experiences, thus contributing to the future developments of urban agriculture and urban resilience in both continents.

The project SiEUGreen aspires to enhance the EU-China cooperation in promoting urban agriculture for food security, resource efficiency and smart, resilient cities.

The project contributes to the preparation, deployment and evaluation of showcases in 5 selected European and Chinese urban and peri-urban areas: a previous hospital site in Norway, community gardens in Denmark, previously unused municipal areas with dense refugee population in Turkey, big urban community farms in Beijing and new green urban development in Changsha Central China.

A sustainable business model allowing SiEUGreen to live beyond the project period is planned by joining forces of private investors, governmental policy makers, communities of citizens, academia and technology providers.

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[1] **PU** = Public
PP = Restricted to other programme participants (including the Commission Services)
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Abbreviations

BUMP	Beijing Urban Master Plan
BOLUP	Beijing Overall Land Use Plan
CAP	Common Agriculture Policy
IUA	Intra-urban agriculture
FSv	Food Sovereignty
LEADER	"Liaison Entre Actions de Développement de l'Économie Rurale", meaning 'Links between the rural economy and development actions'.
NIBIO	Norwegian Institute of Bio economy Research
NMBU	Norwegian University of Life Sciences
PUA	Peri-urban Agriculture
PURPLE	Peri-Urban Regions Platform Europe
RA	Rural Agriculture
SDPUAB	Special Socio-economic Development Plan for urban agriculture in Beijing
SME	Small Medium Enterprises
UA	Urban Agriculture
URA	Urban Roof-top Agriculture
WW	World War

EXECUTIVE SUMMARY

Urban Agriculture (UA) is multifunctional (e.g. social, ecological) and multi-purpose (e.g. recreation, self-supply, profit) practice that involves different actors and implies on a variety of development options. UA can have a great impact on other domains of the urban system such as urban food supply system and sustainable urban development. Typologies have been found to be a useful tool to deal with this complexity. They provide a means to unpack the different dimensions of UA, reducing the complexity and diversity of cases into a smaller number of more intelligible types. This is appreciated by policymakers as it reduces the variety of empirical evidence and facilitates the design of policy recommendations.

The current report develops a theoretical and methodological framework that sustains a coherent Urban Agriculture (UA) typology that covers the specificities of the different SiEUGreen showcases - Aarhus, Hatay, Fredrikstad, Beijing and Changsha. The study begins with a literature review to gain a broad understanding of UA. This includes a discussion of the purpose of UA through different periods of time and across different institutional settings and cultures. The differences between the purposes and functions of UA initiatives in the Global South[1] and the Global North[2] are highlighted showing that in the Global South UA is often seen as a means of survival and providing a living, and a response to food insecurity and in the Global North the most prominent motivations are preservation and development of green spaces, promoting urban sustainability, contribution to physical and mental wellbeing, as well as effects on the community and social integration, e.g. of minorities or migrants.

The narrative then turns to the European and Chinese contexts, with an overview of how UA is addressed in the political discourse and planning systems in both cases. In Europe, UA seems to fall between different policy areas and has not been institutionalised within the EU administration level. In China, increasing urban-rural integration is high on the agenda and UA has been considered as an effective approach to reduce urban and rural disparities and is promoted especially in the peri-urban areas.

[1] The Global South includes Africa, Latin America, and developing Asia including the Middle East.
[2] The Global North includes the United States, Canada, Europe, Japan, South Korea, Australia and New Zealand

Afterwards, theoretical considerations to develop a SiEUGreen typology gain attention. Among the four SiEUGreen pillars - food security, resource efficiency and societal inclusion – land is deemed the core issue as it enables and/or constrains UA practices. Assuming this, UA is understood having three dimensions: spatial, functional and institutional. The spatial dimension considers the type of land on which UA takes place, with the most fundamental distinction being between peri-urban agriculture (PUA) and intra-urban agriculture (IUA). The functional dimension refers to the practices behind UA initiatives and is associated with the technological choices and operational aspects and the institutional dimension acknowledges governance in terms of the constellations of actors that are involved practices of UA. As the availability and security of urban land for agriculture are closely interlinked with **ownership** this aspect is also taken into consideration in the development of the typology.

The case of Aarhus Municipality in Denmark provides the testing ground for the typology. The city has become known for its bottom-up initiatives involving UA due to the 'Taste Aarhus' Program and is currently home to over 280 UA initiatives. The methodology includes the inventory and mapping the Taste Aarhus gardens. Data concerning the UA initiatives were collected from the Taste Aarhus website and the Taste Aarhus Team, resulting in a database containing 280 UA initiatives. UA initiatives were then classified according to the attributes under the land-use dimensions of UA - spatial, functional and institutional. Classification under the spatial dimension (location) occurred with the help of web-mapping tools using a photointerpretation technique. The functional and the institutional dimensions and ownership were discerned based on the web descriptions and (as required) consultation with the Taste Aarhus Team. Following this, a categorisation of the UA initiatives was made with the goal of understanding the frequency of occurrence for each dimension in the Aarhus case. This process resulted in the identification of six types of institutional arrangements that better describe the UA practices in Aarhus showcase.

Based on these types, a cross-case typology for SiEUGreen and indicators were proposed. This process, however, required some adjustments, to acknowledge the characteristics of all SiEUGreen showcases. This implied understanding the UA dimensions within a continuum. For example, for the spatial dimension the categories 'peri-urban' and 'intra-urban' were conceived as the extremes of the 'continuum', but 'in-between' these limits other particularities such as UA performed in 'leftover spaces' of the city could be recognised. These adjustments allowed positioning all the SIEUGreen showcases on a common framework, which has enabled:

- Improving the 'dialogue' between the SiEUGreen showcases,
- Informing strategies for engagement of stakeholders,
- Assisting knowledge exchange between the showcases, and
- Advising business models.

The study concludes with the proposal of indicators for measuring the potential contribution of the SiEUGreen showcases for each of UA pillars - land use, food security, resource efficiency and societal inclusion. The list of qualitative and quantitative indicators is suggested based on data availability for each showcase.

1 Background for the study

This report (D1.2) presents the baseline study including key indicators and development of a typology. It builds on the findings of D1.1 – 'Maps of quantitative and qualitative data for the showcase in Aarhus, Hatay and Fredrikstad' - and contains a comprehensive conceptual framework about UA including a comparative perspective across different institutional settings and cultures.

In D1.1, the mapping of the showcases was structured around four pillars: (i) land use; (ii) food security; (iii) resource efficiency and (iv) societal inclusion. In D1.2 great focus is placed on land use issues and a literature review on the institutional dynamics including how land is planned, regulated and owned (formal and informal institutional), how the land is used (functional), and where UA is located (spatial) is carried out.

As seen in D1.1. the study of the SiEUGreen showcases – Aarhus, Hatay, Fredrikstad, Beijing and Changsha - has followed an open and explorative approach. This approach has been adopted due to the diversity of the showcases and as a means to cope with the lack of common information among them. For example, Aarhus has a comprehensive digital database on urban resources (e.g. land use) but in Hatay, such data still lacks. The implementation of UA in Aarhus is also quite advanced in comparison to other cases, such as Fredrikstad which is in an early phase of development. These aspects were crucial to use Aarhus showcase as a pilot to develop a methodology that works in varying urban contexts, and, to provide a cross-case typology for SiEUGreen.

In summary, this report delivers:

(i) a comprehensive conceptual framework about UA;

(ii) the study of Aarhus showcase as a pilot to develop a methodology that works in varying urban context and

(iii) A cross-case typology for SiEUGreen

The findings of this deliverable are an important input for D1.4. 'Guidelines for a new interactive impact assessment approaches' and will also inform other WPs in the SiEUGreen Project (e.g. WP3 – showcase deployment, WP4 – International knowledge transfer and WP5-Business modelling and sustainability)

1.1. Methodology

The collection of data, to perform the activities mentioned above included, the following methods: (i) literature review; (ii) in-depth semi-structured interviews with key informants and (iii) field visits.

A **literature review** was conducted to gain a broad understanding of UA. In order to capture the full range of academic and grey literature, searches were conducted through academic databases (e.g. Scopus), Google Scholar and Google. Some of the searched terms included: 'UA land conflicts'; 'UA typologies'; 'UA technologies'; 'UA in local planning', 'mapping UA', 'assessing UA', etc. The relevance to the topic; the age of the article – preferably less than five years and, to some extent, sources that reported work undertaken in Europe and China were some of the criteria to select the literature.

The stories of the showcases have been informed by a wide range of sources. Among these, the review of relevant government documents (e.g. urban development plans), digital sources (e.g. Taste Aarhus website) social media (e.g. Facebook pages of UA initiatives in Aarhus, engagement in the women's cooperative WhatsApp group); media sources (e.g. leaflets with description of Changsha project, newspapers articles) have allowed to gather different perspectives (e.g. UA practitioners, planners) on the showcases. Interviews and observations carried out during study visits were also important sources for collecting information.

With the aim of obtaining similar information across the showcases, interview templates were developed targeting particular actors (e.g. planners, developers, UA practitioners). These questions can be seen in Appendix A – Interviews templates. Both, skype and face-to-face interviews, were conducted with actors from all the showcases. The interviewees were contacted by email and the subject of the interview was clarified beforehand. However, in the interest of collecting spontaneous verbal and non-verbal responses and cues (in face-to-face conversations) the questions, in most of the cases, were not revealed before the interview.

Most of the interviews with actors from Aarhus and Fredrikstad showcases were conducted in English, but few of them were in Danish and Norwegian. In this case, an interpreter helped. With few exceptions, the assistance of translators was also needed for the interviews undertaken with actors from Hatay and China. All the interviews were recorded and transcribed. The audio and text files were then sent to the interviewees for evaluation, i.e. their approval/restriction of the use of the information.

During the field studies in Aarhus and Fredrikstad, several ad-hoc interviews weres resourceful to get the perspectives and opinions of UA practitioners in Aarhus and people who live or work in the nearby area where Cicignon Park will be developed. A list with the names, affiliation as well as the period where the interviews were undertaken can be found in Appendix B – List of informants.

Field studies were conducted in all the showcases. The opportunity to visit the different cities, observe the local people and perceive how different individuals and groups interact with their environments, was resourceful to deepen the understanding of the showcases. For example, the opportunity to attend the Annual Meeting of the Women's Cooperative and visiting some of the green-houses where they grow food revealed how UA can fulfil different roles in the life of these women. UA is a mean of improving their economic situation and a chance for them to engage and participate in larger social and political networks.

Needless to mention that the engagement of the Chinese partners in the SiEUGreen consortium in January and the field study in March 2019 have been an important step to get a better knowledge of the showcases in Beijing and Changsha. Appendix C – Agendas of the study visits, describes the activities carried out during the field study to the different showcases. Table 1 lists the number and type of interviews undertaken in each showcase and provides a short description of the field study.

Table 1: Data collection methods for the showcases

Showcase	Interviews	Field study
Aarhus	- 3 skype interviews - 7 face-to-face – semi-structured interviews - 3 face-to-face -ad hoc interviews	- Two days field trip to Aarhus including visits to 10 gardens (April 2018) - Two days field trip to Aarhus including visits to a therapy garden and peri-urban site in which UA serve educational purposes (October 2018)
Hatay	- 7 skype interviews - 7 face-to-face semi-structured interviews	- Four days field visit to Antakya and Samandag in Hatay (November 2018)
Fredrikstad	- 6 face-to-face semi-structured interviews - 4 face-to-face ad hoc interviews	- Half-day visit to Fredrikstad in Beijing (January 2018) - Two-day field trip (October 2018)
Sanyuan Farm in Beijing	- 6 face-to-face semi-structured interviews	- Half-day visit to the Sanyuan Farm (February 2018) - Two days field trip to Beijing (March 2019)
Changsha	- 4 face-to-face semi-structured interviews	- Two-day field trip to Futiancangjun project (March 2019)

1.2. The SiEUGreen showcases

Aarhus is the second-largest municipality in Denmark and it is well-known for its bottom-up initiatives involving UA. The 'Taste Aarhus' [3] program has been a key driver of the implementation of more than 200 UA initiatives around the city. The program is managed by Aarhus Municipality partially through self-funding (€1 million) and partially through funding provided by Nordea Bank (€1 million, 2015-2018). The main question the program address is 'How can cities create more socially inclusive places and communities when focusing on edible nature and urban farming?' Taste Aarhus uses UA as a tool to bring people together, activate underutilised spaces around the city and engage people in the practice of growing their own food. As part of making Aarhus an edible city, the municipality raises awareness about eatable resources in the city, using signs identifying herbs and/or vegetables, found in forests, public spaces and beaches, that could be incorporated in daily diets (see Image 1). UA is also used by schools, health care, hospitals as a means to engage different social groups in UA initiatives (see Image 2)

Image 1: Taste Brabrandstien
Source: Aarhus Municipality

Image 2: UA initiative for people with disabilities
Source: Aarhus Municipality

In Aarhus, UA is also seen as opportunities for new forms of engagement with the political ecology of the city (Davidson, 2017). In this regard, any person in the city is eligible to start up

[3] http://smagpaaaarhus.dk/

an initiative. Only two requirements are necessary: the institution of a democratic structure consisting of a chairperson, treasurer and three other decision-makers and organising two events per year that are open to the public. The latter is a means of giving back to the community for the privilege of using public land. This programme has enabled engaging people in a variety of ways, with some gardens strengthening bonds between acquaintances and others creating new bonds between previous strangers. Beyond, social interaction has also encouraged lively and safer public spaces. (see Image 3 and Image 4)

Image 3: Implementation of a flowerbed in the Churchyard
Source: Aarhus Municipality

Image 4: Starting up phase of UA in a small community

Hatay is Turkey's seventh-most densely populated province located in the southern part of the country. The proximity of Hatay Province to the Syrian border has had a strong influence on population development in recent years, leading to a sharp increase in the number of inhabitants, particularly in border municipalities. The rapidly increasing population places a burden on the Hatay's economy which largely depends on agriculture. In Antakya, the capital of the province, a greenhouse with 2000 m^2 of floor area is under construction in the peri-urban area. With financial support from EU, this investment is expected to become a demo and pilot area to test the potential of aquaponics, hydroponics and vertical gardening systems to produce food in the region. Hatay Municipality owns the land where this green-house is being built, and the master plan for the surrounding area includes housing development as well as the support areas (e.g. pavilions, parks) to host the Expo Hatay 2021[4]. Figure 1

[4] http://expo2021hatay.com/home-2/

illustrates the master plan and identifies the EXPO area which accounts for 300 ha of the development. Figure 2 indicates the location of the greenhouse in relation to the EXPO area.

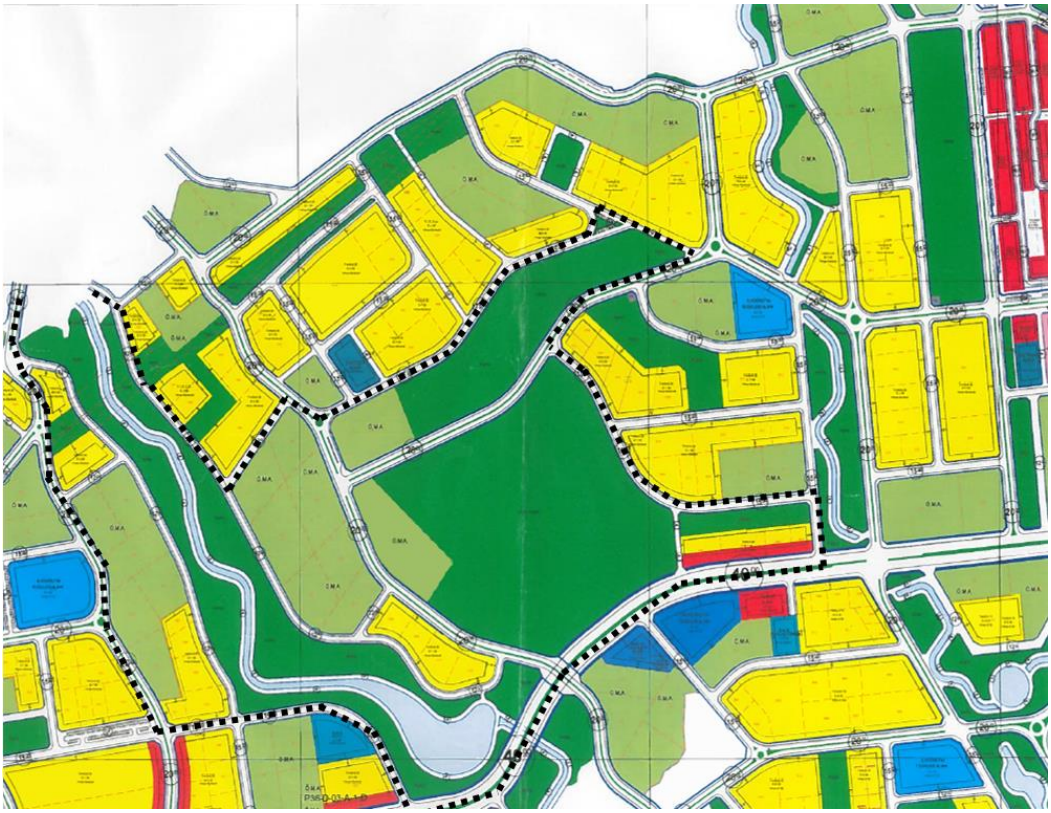


Figure 1: Master Plan for Expo area and location of SiEUGreen green-house
Source: Hatay Municipality

Figure 2: EXPO Hatay area
Source: Hatay Municipality

In addition to this investment, a great number of UA initiatives around the region is supported by the 'Women's cooperative', which is managed by an entrepreneur with the support of Hatay Municipality. Having access to a plot of land in a peri-urban area with the minimum area of 360 m^2 and be a woman in financial and social vulnerability (e.g. widows, unemployed husbands, kids enrolled in schools) are the conditions to become part of this cooperative. The municipality provides the material to build up middle-sized greenhouses (6x30 meters) in the backyard of the private houses (see Image 5). The production harvest from half of the floor area of the greenhouses belongs to the cooperative and the other half to the women, who consume or sell the products in the local market. In many cases, flowers are cultivated and used by the Municipality in the parks and squares of the city. Currently, 250 women are part of the cooperative, most of whom have previous experience with farming. Image 6 shows the annual meeting of the Women's cooperative held in Antakya in November 2018.

Image 5: Greenhouse - Women's cooperative

Image 6: Annual meeting – Women's cooperative

Fredrikstad, in Norway, is a showcase for retrofitting, transforming a former hospital complex into a residential and commercial area, called Cicignon Park. The hospital - Østfold Hospital, located in downtown Fredrikstad, has a property portfolio of 55000 m^2 and a plot area of 35000 m^2. In December 2014, Nordic Group Development AS bought the hospital and construction of Cicignon Park has started in October 2018. The private developer's visions for Cicignon Park are (1) high environmental profile, (2) high architectural quality, and (3) high level of satisfaction on a European scale.

Figure 3 shows the master plan, for the area identifying the two hospital buildings that will be maintained and refurbished. The 85,000 m^2 of the built-up area will offer apartments of different sizes and a school. As the architect, responsible for the design of the project has said, there are still uncertainties in relation to the number of apartments as the population density of the area is still in discussion with the local authorities. UA is planned to be implemented in private (balconies) and semi-public spaces (roof-tops and between buildings). At least 15

residential units that will be implemented in the refurbished hospital buildings (see Image 7) will be equipped with dry toilets. The project has a great focus on the treatment of greywater, blackwater and organic waste. For example, the waste from the older hospital building will be treated in bioreactor and part of this waste will become fertiliser that will be used to grow food in the balconies, rooftops and in the green-house that will be implemented in a common area of the development. With the implementation of innovative technologies, the project has the ambition of producing more energy (especially from waste treatment) than it will consume and, by doing so, is expected to become a showcase of circularity of resources. Figure 4, illustrates how the refurbished hospital buildings will look like at the end of the development.

Figure 3: Cicignon Park master plan
Source: Nils Torps Architecture

Image 7: A hospital buildings that will be refurbished

Figure 4: View of Cicignon Park
Source: Nils Torps Architecture

Sanyuan Farm, the showcase situated in the metropolitan area of **Beijing**, was founded in 1949 and then merged with the Beijing Dongbeiwang Farm in 1957. The farm is state-owned belonging to the Beijing Agricultural Group Co. Ltd. It consists of two parts – West and East District, with a total area of 667 000 m^2. In the West District (333 500 m^2) green-houses managed by the farm produce fresh vegetables and flowers that are consumed in Beijing. The manager of the farm said that the vegetables produced in these green-houses were previously only available in South China.

The total area of the East District is around 333 500 m^2 hectares. As illustrated in Image 8 this District has different functions. The cherry forest (around 26 700 m^2) and flower field are managed by the farmers and the products are sold on the market. The rented land (165 000 m^2) was implemented in 2008. In this area plots of land (50 and 80 m^2) are rented out (250 and 500 Euros per year) for residents who want to have the experience to grow food. Image 9 and Image 10 illustrate the two types of plots available for rent. According to the manager of the farm, this area attracts mainly highly educated, middle-class people. Currently, around 1300 households are engaged in UA practices in this site.

Image 8: Overall plan for Sanyuan Farm East District

Image 9: Plots of 50 m² of rented land

Image 10:Plots of 80m² of rented land

In recent years, Sanyuan farm has combined UA with tourism, technology, and education. In this respect, a green-house that showcases different technologies has been implemented in 2012. Besides illustrating and providing consultancy to other companies on the potentialities of a soilless and hydroponic technology, the green-house also hosts school kids. After experiencing UA (e.g. planting trees) in other areas of the farm these kids are welcome to the green-house where they cook a meal and learn about how to grow food. The farm also offers the opportunity for tourists to 'pick' the food cultivated in the site. Sanyuan Farm's vision is to demonstrate resource-efficient UA and a healthy happy-life style. Image 11 and Image 12 provide internal views of the greenhouse.

Image 11: Green-house – Sinyuan Farm

Image 12: Hydroponic technology – Sinyuan Farm

Changsha is the capital of Hunan province one of the most densely populated provinces in China. As such, it faces an enormous environmental challenge regarding food supply with long transport distance. The real estate project - Futiancangjun (formerly named Hemeixingcheng) project, approved by the Changsha Urban and Rural Planning Bureau and located in the Green Controlling Area of the city will showcase SiEUGreen technologies. The development covers an area of 320 000 m^2 with a total construction area of 700 000 m^2. The entire development consists of 35 buildings with 16 to 18 floors each and around 100 apartments per building. The entire development will become home for 3500 families. Figure 5 illustrates the masterplan for the area with the identification of different phases of development. Phase I is almost completed and 935 apartments will be delivered on June 2019. Phase II is under construction and 1 200 apartments are expected to be delivered to the public on April 2020. Phase III has not started yet, but the remaining 1 000 residential units are planned to be finalised by January 2022. As Image 13 illustrates all the buildings are similar and offer apartments with build-up areas of 70, 100, 120 and 180 m^2. As the real state manager says the different size of the apartments has been proposed to attract families with different needs but is expected that people living in the area will have a similar income. Besides the residential buildings, a kindergarten, primary school, junior school and a park have been built and a shopping mall is also planned. The school has been an important aspect to successfully sell all the apartments from phase I and II in just one day.

As Figure 5 shows, SiEUGreen technologies will be implemented in one of the buildings. Some of the toilets will be equipped with technology that lowers the water flow for flushing. This technology will showcase alternative ways of waste treatment and eventually recycled into fertilizers for UA. This building is already under construction and can be seen in Image 14. In relation to UA, 100 devices that enable grow food in balconies will be offered free of charge to residents who want to grow part of their food intake.

This development has ambitious goals of going beyond traditional farming and contributing to producing food locally in an environmentally friendly manner (e.g. zero transport). These goals, however, seem quite difficult to be reached given the scale of the development (build-up area and populational density).

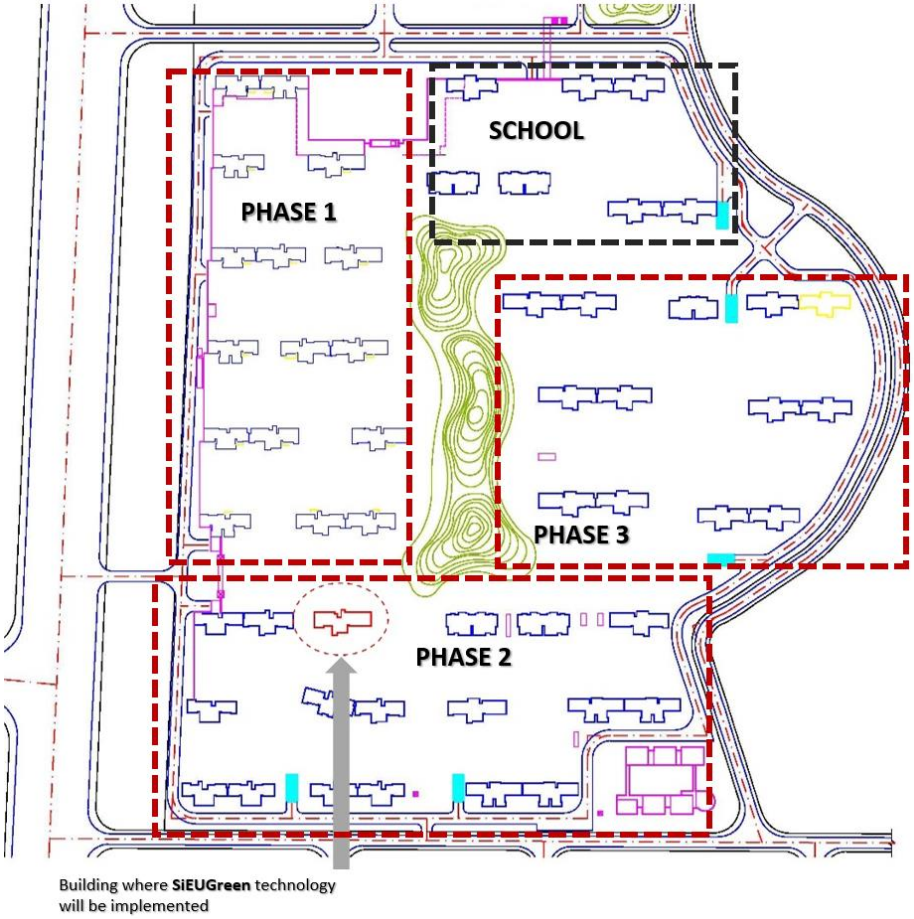


Figure 5: Master Plan of Futiancangjun project
Source: Hunan Hengkai Environmental Protection Science & Technology Investment Co. Ltd (Hhepsti)

Image 13: Model of Futiancangjun project

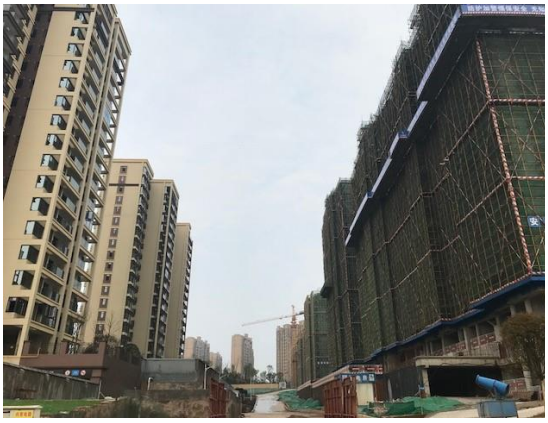


Image 14: Phase I and phase II (in construction)

Having briefly described the SiEUGreen showcases, the section that follows discusses worldwide perspectives on UA and further provides a short overview of how UA is addressed in political and planning systems in the EU and China.

2 Historical perspective on UA in different cultural contexts and spatial planning systems

In a historic perspective, there has been strong support for UA in many countries in the world associated with times of crisis and food shortages, particularly during and after the World War (WW) I and II. The governments encouraged the working-class population to establish allotments on public spaces and similar practices by providing garden plots and seeds. In the UK, allotment gardens played a crucial role in providing food to people during WWII. According to the estimations, UA accounted for ca. 10% of the UK's food by weight and about half of the nation's fruit and vegetables by 1944 (EPRS, 2017). Thus, UA was mainly seen as a means to promote food security during difficult times.

Throughout time, UA has emerged from a means of survival and self-supply in times of crises to a multifunctional land use practice resulting in several benefits on a societal, economic, ecologic and cultural level (Piorr et al, 2018). Since the 1970s' environmental, climate change and health concerns have triggered the expansion of organic farming and over the next decades, UA reacted to emerging trends such as leisure, healthy nutrition and biodiversity (Lohrberg et al., 2016).

On the one hand, there is an increasing demand for seasonal, organic and locally grown foods from urban dwellers – especially from wealthy and middle-class consumers – which give rise to small-scale farms in peri-urban areas dedicated to supplying nearby cities and towns. This process has contributed to the expansion of small-scale sustainable farming in proximity to the city, which enables direct food linkages to cities. On the other hand, urban growth creates demand for residential and business development. These two processes simultaneously promote and constrain the development of UA and alternative food networks in general (Jarosz, 2008).

An increased focus on UA over the past years has also been enabled by the technological innovation in alliance with architecture, making it possible to practice e.g. vertical farming (Curry et al., 2014) and integrate UA in development of new residential areas.

Significant differences between the Global South[5] and the Global North[6] exist **today** when it comes to the purposes and functions of UA initiatives. In the Global South, similarly to post-war Europe, UA is more often seen as a means of survival and providing a living, and a response to food insecurity (Lohrberg et al., 2016; Opitz et al., 2016). Food security alone is rarely an argument for promoting UA initiatives in the Global North. Here, the most prominent motivations for supporting UA practices are preservation and development of green spaces, promoting urban sustainability (aesthetical values for housing neighbourhoods), contribution to physical and mental wellbeing, recreational benefits as well as effects on the community (social interaction and civic engagement) and social integration, e.g. of minorities or migrants (Piorr et al., 2018).

On the other hand, the popularisation of UA in the Global North has been criticised for its unintentional contribution to the neoliberal restructuring of cities by shifting the responsibility for food production from the state to the individual /collective level (Rosol, 2010). Other negative connotations associated to UA include arguments about how food networks are often constructed as 'white spaces' that overlooks the meaning and knowledge of UA from other cultures (Guthman, 2008), as well discussions about how the focus on the local scale can reduce food justice to a spatial problem preventing addressing macro-scale structures mediating food access (Born and Purcell, 2006), to name a few.

Looking at the examples of UA initiatives in the countries of the Global South, UA development on Cuba is among the examples that are often brought up to demonstrate how UA can be used as an effective strategy for responding to a food security crisis. The collapse of the Soviet Union ended the extensive trade between the countries and generated massive disruptions in the urban food system. Triggered by the lost imports and the loss of earnings from their exports, UA was supported on Cuba as a combination of social awareness, scientific innovation and political will. From 1997 to 2003, UA grew an average of 38% annually in Havana. Much of the production has taken place in 'organoponicos', which are raised beds with integrated organic matter that can be constructed on almost any plot of land. Municipalities have

[5] The Global South includes Africa, Latin America, and developing Asia including the Middle East.
[6] The Global North includes the United States, Canada, Europe, Japan, South Korea, Australia and New Zealand

developed UA programmes and the territory allocated to UA has grown considerably. In 2009, a new programme to promote PUA was developed which allowed for even greater access to land in peripheral areas through laws promoting the conversion of idle land to productive uses. Today, UA covers more than 35,000 ha within the area of Havana (including nearby rural areas) (Lohrberg et al., 2016; Taylor Lovell, 2010).

In China, agricultural self-sufficiency has been strongly promoted since the 1950s, as a measure to decrease reliance on external food supplies. Until the late 1970s, several major cities in China relied on food supply from their own rural and peri-urban districts. From the 1980s, the industrialisation process brought about a rapid expansion of major cities and construction in rural districts with shrinking agricultural land and rising food insecurity among the outcomes (Lang and Miao, 2013).

In modern-day China, UA mainly takes place in the peri-urban areas, with a strong emphasis on economic and enterprise development due to its potential to enhance the income and employment opportunities of peri-urban farmers and villagers moving to cities (Lang and Miao, 2013; RUAF, 2016). It makes peri-urban areas planning-wise interesting as the interface between urbanity and rurality, as urban landscapes are used as sites to develop initiatives around agriculture that are more typical of rural values.

Intra-urban agriculture was introduced in Beijing and Shanghai in the early 1990s. UA in intra-urban areas is closely linked with agritourism (e.g. “pick your own fruit” in urban agriculture parks) (RUAF, 2016) and promoting local food production is not yet among the main motivations. In Fangshan district in Beijing, the government has supported the development of UA since 2008 with the goal of promoting tourism and supporting local food production (Lang and Miao, 2013). In recent years, several organic diversified farms and extensive greenhouses have emerged throughout the city. In Shanghai, UA contributes to ca 60% of the vegetables and 90% of the eggs consumed by the residents (Taylor Lovell, 2010). Other Chinese cities such as Ningbo, Hangzhou and Wuhan have also introduced initiatives supporting UA (Lang and Miao, 2013).

The Chinese scholars associate UA with the use of modern technology, large scale and intensive production, and considerable profits (Zhu, 2016). The middle and upper-class constitute the main consumer groups of the UA produce in China. Thus, there is an emphasis on the production of high-end products rather than on feeding the poor.

Among the examples of UA initiatives from the Global North are the multifunctional communal food gardens in Berlin’s suburb of Marzahn, where UA is delivering several

different functions besides food production, including the integration of migrants. While the volume of food produced might be marginal, UA as a social phenomenon reinforces local social cohesion. In the city of Utrecht, Netherlands, food policy is used as a tool to reduce social inequality. The city incentivized vulnerable groups in the society to participate in UA and school and hospital food provisioning and generating economic opportunities from these activities (FAO, 2018a). In Amsterdam, the capital city of the Netherlands, about 350 ha of land us used for urban gardens (Taylor Lovell, 2010).

Vancouver is a good example of a city that has adopted a comprehensive Food Strategy which integrates the multitude of food policy initiatives in the city into one overarching document that ensures that a systemic view is taken to all actions. Further, the City's food systems goals are aligned with broader City policies and priorities which enables to achieve more impactful results (FAO, 2018). In Vancouver, the adoption of the *Rezoning Policy for Sustainable Large Development* has led to new food growing spaces, orchards and community kitchens incorporated into the design and planning of new buildings. UA was further supported through zoning and licence bylaw changes (FAO, 2018b). This approach, together with the adoption of Vancouver Food Strategy, is believed to have contributed a cultural shift among the city staff and developing a deeper appreciation of the role that UA can play in city-building (FAO, 2018b). Montreal is another example from Canada that contains 97 community gardens consisting of more than 8 000 separate plots. In Montreal, the contribution of UA to community socialising and empowerment has been particularly acknowledged (Taylor Lovell, 2010).

The city of Seattle, USA, is brought up as a good practice in connection with integrating food justice in its programmes by using a so-called **equity lens**. In Seattle, the municipal government staff used an 'equity lens' to better target their UA policies and programming to benefit low-income populations of colour. The city implemented a new community garden and farm investments in neighbourhoods with a high proportion of low-income people of colour and has developed a more culturally inclusive communications strategy (Horst et al., 2017).

Staff support and grants to community groups are among other known strategies to foster UA and are provided in Seattle, whereas in Chicago there is a land trust funded by the city that was created to purchase properties to protect them as community gardens (Horst et al., 2017).

In Southern Europe, Rome and Barcelona are among the prominent examples when it comes to a number of UA initiatives. There are over 1,200 garden plots covering 0.65% of the land area in Terrassa municipality of the Metropolitan Region of Barcelona that supply a large share of vegetable needs among the households (Taylor Lovell, 2010). In Rome, a multifunctional agricultural cooperative, the Agricoltura Nuova, was established in 1977. It occupies approximately 250 ha to the south of Rome and is one of Italy's first initiatives in social agriculture using educational and environmental activities aiming at strengthening a bond between the territory and the citizens who live there. The cooperative sells its food directly to the local markets and runs several social integration projects (EPRS, 2017).

2.1. Policy background: UA in the EU and China

This section aims to present a short overview of how UA is addressed in the political discourse and planning systems in the EU and China. Despite the growing interest in UA and PUA the existing policies in the EU usually do not sufficiently target UA and PUA (Piorr et al., 2018). In the EU policy context, UA appears to fall between different policy areas and it has not been institutionalised within the EU administration level. UA is currently neglected by the Common Agricultural Policy (CAP), which is the main policy for farming and food production in the EU. CAP is structured in two pillars which concern to production support to farmers (I) and rural development (II). Being small and diffuse, UA does not explicitly fit under the CAP Pillar I, as CAP support can be provided to holdings sized one hectare or more. Neither is UA eligible for Pillar II funding, as it is not regarded as a rural activity (Curry et al., 2014; EPRS, 2017; Piorr et al., 2018). Peri-urban areas can be excluded from eligibility for LEADER projects[7], due to the population density (Piorr et al., 2018). Overall, the conditions for UA and PUA in Europe differ depending on how the individual Member States implement the CAP (measures planned, envisaged budget and the definition of rural) (Piorr et al., 2018).

With a few exceptions, the rural development programmes of the Member States do not provide support for UA due to being insufficiently rural (Curry et al., 2014; EPRS, 2017). Despite a lack of explicit support for UA included in the EU rural development policy 2007-2013 and 2014-2020, UA could be supported in the framework of that policy in specific cases,

[7] LEADER is a local development method which has been used for 20 years to engage local actors in the design and delivery of strategies, decision-making and resource allocation for the development of their rural areas. LEADER is implemented under the national and regional Rural Development Programmes (RDPs) of each EU Member State, co-financed from the European Agricultural Fund for Rural Development (EAFRD)

e.g. when UA was located on land fulfilling the eligibility criteria established by the Member States (EPRS, 2017; Piorr et al., 2018). The aid could be in a form of e.g. modernisation of agricultural holdings, development of new products and technologies in the agricultural and food sector etc. However, it is important to note that none of the available measures is targeted directly towards fostering UA.

At the same time, given its multifunctional nature, UA is not solely identified with 'agricultural' policy but might be placed within a full spectrum of other policies, e.g. those supporting social innovation and territorial cohesion at the intra-regional scale. The EU policy for SMEs is another important policy that has high relevance to UA due to its small-scale nature. According to Curry et al. (2014), this policy constituted a barrier to the progress of UA enterprises, however, due to heavy bureaucratic and regulatory burden implied on small producers. In a similar manner, some other policies, such as policies on food safety, agricultural product quality and consumer rights and safety may impede urban food production for commercial purposes (Curry et al., 2014). Urban food is also neglected in the European cultural policy "despite its common use in reasserting local identity through local and regional food marketing" (Curry et al., 2014). UA is also under-considered in climate change adaptation policies.

In general, the sectoral organisation of EU policies gives some policies a spatial fix based on territorial dichotomies (e.g. urban versus rural or advanced versus less-favoured). As described above, agricultural policy in the EU tends to be seen as rural, rather than having both rural and urban elements. This also applies to land use planning policies in Europe that are often criticised for being focused on urban or rural interests rather than their interrelationships or intersections (Curry et al., 2014).

The importance of changing the relationship between urban areas and their hinterland has gained more prominence in the EU policy discourse in recent years, with attention being paid to brownfield sites within the urban envelope, the peri-urban fringe of cities and in connection with the issue of shortening of food chains (Curry et al., 2014). All in all, the UA and PUA require more political recognition. Curry et al. (2014) and Piorr et al. (2018) suggest that UA may benefit from EU policy approach shifting from a sectorial mind-set to a more holistic and cross-sectoral policy approach; and place-based policies that are tailored to particular places and specific UA conditions (Curry et al., 2014).

How to achieve the necessary integration of UA across the EU policy areas is among the challenges for UA in the future. How UA will be acknowledged in the modernisation of CAP

and cohesion policy post-2020 remains to be seen (EPRS, 2017). In the public consultation process for the coming CAP the issue of UA and PUA was not addressed (Piorr et al., 2018).

At the same time, UA should not only be understood as a subject to higher governance levels, such as EU and national levels, where sectoral policies have partially failed to integrate UA (Piorr et al., 2018). The role of local and Community-led local development (CLLD) approaches in putting UA on the agenda should not be underestimated. Cities and municipalities have many tools at hand to promote UA, such as implementing food strategies and using programmatic, planning/regulatory and policy mechanisms.

The current **Chinese planning system** contains three types of plans: socio-economic development plan (known as a 'Five-Year Plan'), land use plan, and urban and rural development plan. According to a review of the planning system in China by Zhu, (2016), there is no urban land-use category for urban agriculture or agricultural activities in inner-urban areas, which may hamper the development of intra-urban agriculture in China. UA in intra-urban areas can be regarded as illegal in some cases, e.g. rooftop gardening requires permission from relevant authorities. In most cases, the planners and authorities have quite neutral attitudes towards the development of intra-urban agriculture in China, without considerable opposition nor support to it (Zhu, 2016).

At the same time increasing urban-rural integration is high on the agenda of the Chinese government. In connection to this, UA has been considered as an effective approach to reduce urban and rural disparities and is promoted in the peri-urban areas in particular (Zhu, 2016).

Figure 6 shows how some elements of UA are influenced by the planning documents in China. It illustrates, for instance, that the socio-economic development plan can influence the location, scale, infrastructure, and all the elements of production and post-production related to UA. The land-use plan has an impact on location and area for UA, while the urban and rural development plan can impact on location, area, infrastructure, site plan, and all the elements of post-production (Zhu, 2016).

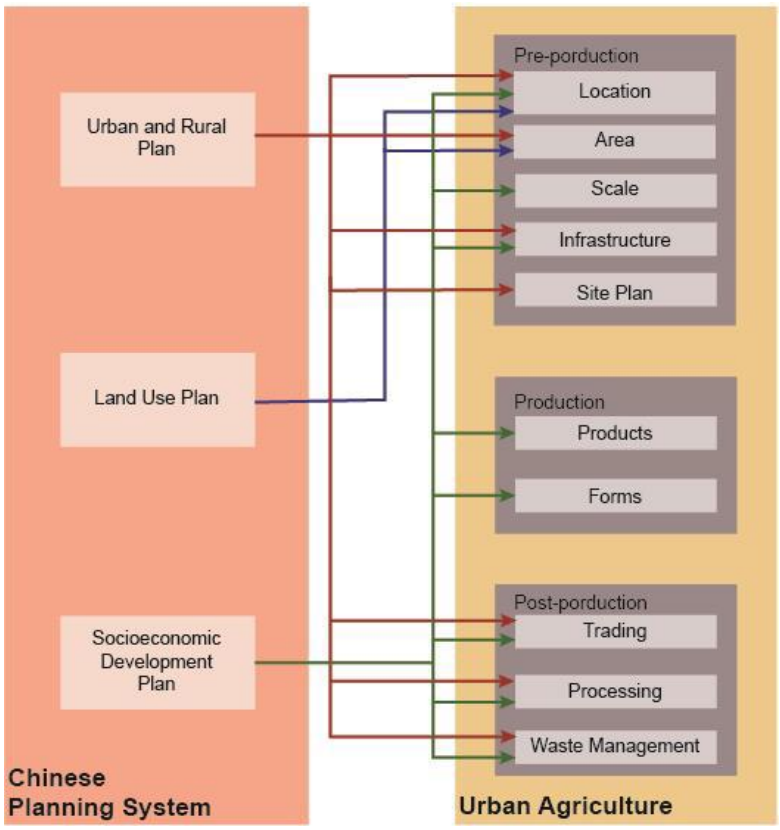


Figure 6: Interrelations between the Chinese planning system and UA
Source: Zhu, 2016

3 Theoretical considerations for SiEUGreen UA typology

3.1. The added value of typologies to understand UA

As suggested above UA is a quite complex phenomenon since it is multifunctional (e.g. social, ecological) and multi-purpose (e.g. recreation, self-supply, profit) practice that involves different actors and, as such, implies on a variety of development options (Krikser et al., 2016). Thereby UA has a great impact on other domains of the urban system such as urban food supply system and sustainable urban development to name a few. Given this complexity, UA typologies have been increasingly used to systematise knowledge on the impacts that agriculture can have in cities, and they have been helpful supporting theory building and informing decision-making processes.

Despite suggesting classification and simplification of the reality into 'types', typologies are more than just classification; when well-developed, they support theory-building. They indicate how different variables behave in combination with each other. It is about creating a model to reduce the complexity and diversity of cases into a smaller number of more intelligible types. This is especially appreciated by policymakers as it reduces the complexity of empirical evidence and enables to pave the way for recommendations.

Krikser et al., (2016) highlight that typologies are also developed for operational purposes. Clustering knowledge, typologies facilitate the communication of complex ecological and socio-economic systems, and can, for example, support decision making. As Doty and Glick (1994) put it 'typologies are conceptually derived and should identify a set of ideal types that must be capable of supporting predictions regarding certain specific variable'. Paidi et al., (2010) suggest four steps for the development of robust typologies, that can support theory building,: (1) *Clarify and limit the purpose of a typology (*describe the theories that the typology relies on); (2) *Identify and define concepts (*definition of the set of types and the importance of each construct for each type); (3) *Explain relationships (*describes how and why the pattern of concepts within a type results in the specified level of the dependent variable) and (4) *Make predictions (*estimates the relationships between the ideal types and the dependent variables).

Focusing on the governance perspective, Krikser et al (2016) identified nine types of UA based on three structural attributes: distribution of the produced goods based on the distance where the food is grown and where it is consumed (micro, meso, and macro), actors involved (individuals and private households, represented formal/informal associations and start-ups, and companies), and interests behind the UA initiatives (self-supply, socio-cultural, and

commercial). As shown in Figure 7 from the combinations of these variables three aggregated types are identified: (i) the 'ideal types' (defined by the main driver of the UA – e.g. self-supply, socio-cultural and commercial); (ii) the 'subtypes' (related to the ideal type but with some additional characteristic that are not part of the ideal type) and (iii) the 'mixed types' (that combine only two major interests).

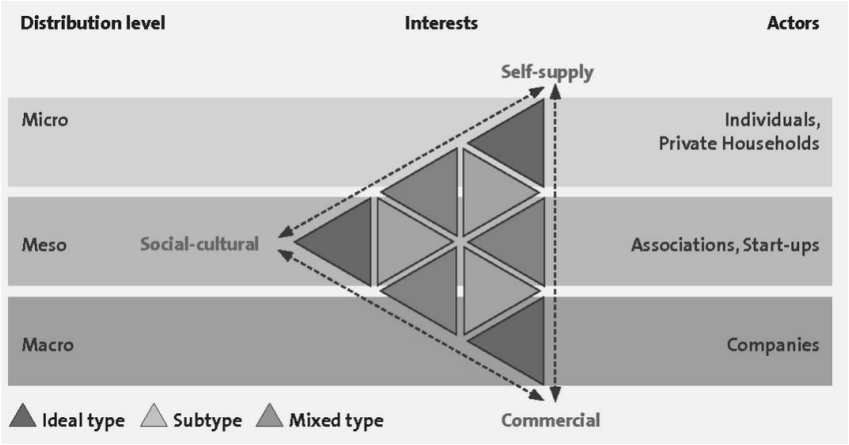


Figure 7: Subtypes and mixed types of UA
Source: *Krikser et al., 2016*

Applying a two-step cluster analysis to divide the data on a scale from purely social interests to purely economic interests, this typology was empirically tested in 52 UA initiatives in Germany. This study has improved the understanding of UA and provided a relevant approach for decision making for stakeholders, planners and policymakers.

In the EU's COST project, the typology for urban agriculture in Europe was developed making a distinction between urban farming and urban gardening (see Figure 8). In the case of urban gardening, the typology differentiates between urban gardening for individual production (e.g. allotments and family gardens) and collective production including educational, therapeutic and community gardens. In the case of urban farming, the typology includes on-site experiences (e.g. leisure and educational gardens), and others that include local food farms. Local food and environmental farms aim at fostering a more direct link with their consumers are examples of short food-supply chains (Simin-Rojo et al., 2016; EPRS, 2017).

Figure 8: Distinction between urban farming and urban gardening

Source: COST, 2016

Investigating the differences between urban food gardening and urban farming and their respective subtypes, this study was relevant to demonstrate the diversity of types of UA in Europe contributing to the process of distinguishing which types may play a significant role in public policies and city-regional strategies. As Figure 9 shows this typology has uncovered (and drawn the interrelation between) several aspects, such as: who may be involved, in different types of UA practices (e.g. private garden – social farm), where the location in the city may be and, by inferring so, which type of regulations (urban planning and or agricultural policy) the UA may be subject of.

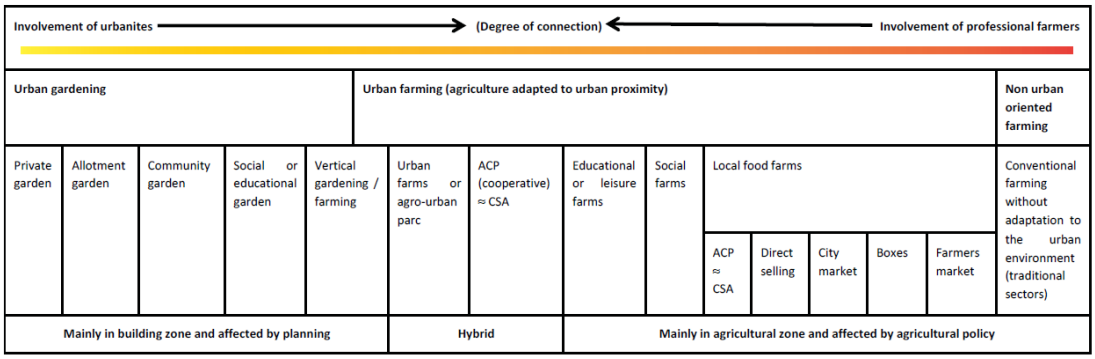


Figure 9: Typology of urban agriculture initiatives

Source: COST, 2016

These studies illustrate how typologies help to uncover aspects of UA by drawing relationships between different variables. In SiEUGreen project, the search for patterns from observations of the showcases and the development of explanations for these patterns seem to be an appropriated method to deal with the variety of the showcases. This inductive approach is expected to assist in drawing similarities and differences between the cases and may inform the endeavour of knowledge exchange between the cases.

3.2. SiEUGreen UA framework

In D1.1. the European showcases were described and discussed considering four pillars: land use, food security, resource efficiency and societal inclusion. This framework was useful to draw similarities and differences between the cases and has also indicated that issues related to access and availability of land lay at the core of UA debate. As stated in D1.1. the land is discussed in relation to three dimensions: spatial, functional and institutional (see Figure 10). Roughly speaking, the spatial dimension acknowledges the location of sites for UA (e.g. peri-urban and intra-urban), the functional addresses how land is used for agriculture (e.g. on-plot, off plot) and thus includes technologies employed to grow food. The official perspective includes the formal framework at different levels of governance that regulate the practices of UA and non-official are informal means – not safeguard by law – of supporting UA. Figure 10 illustrates the interrelations between these dimensions.

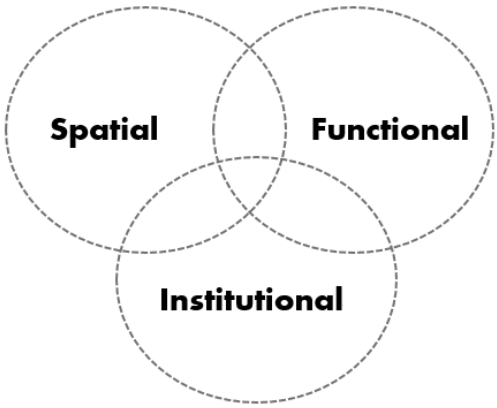


Figure 10: Land use dimensions

As Figure 10 indicates the land-use dimensions are interrelated. For example, the land regulations, programs and strategies (institutional) are likely influencing the availability of urban land for agriculture (spatial). The location and size of the land for UA will probably affect how agriculture will be performed. In this respect, the use of pallets or growing food in balconies is usually a way of performing agriculture in densely populated urban areas.

What is suggested here is that these interrelations could be discussed in relation to the other UA pillars: food security, resource efficiency and societal inclusion. As Figure 11 proposes, one could assume that the interface between the land-use dimensions (spatial, functional and institutional) is likely delivering a particular type of UA that may respond differently to issues related to the other pillars: food security, resource efficiency and societal inclusion.

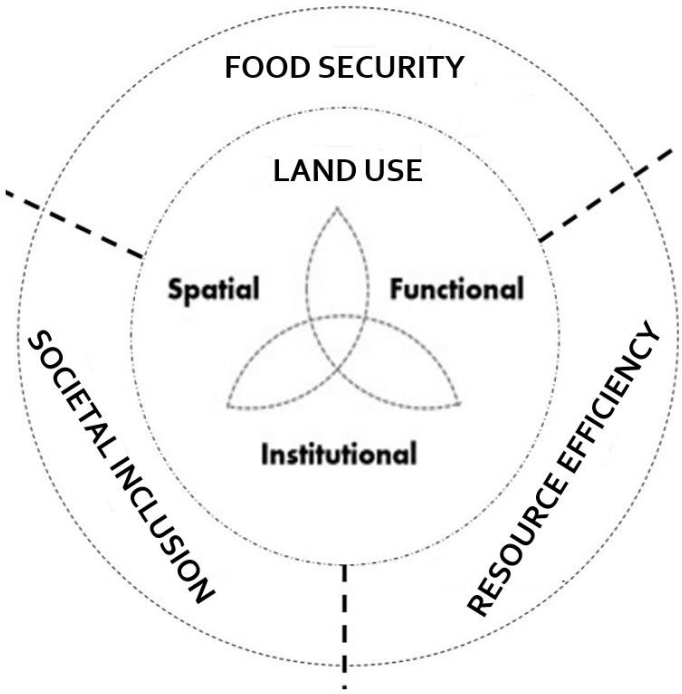


Figure 11: SiEUGreen framework

Some of these aspects are discussed further in Section 5. Nevertheless, they are not tested in this report but will be further examined in the D1.4 which will investigate and propose guidelines for new interactive impact assessment of UA in social and economic terms.

At this moment, however, is worth reminding how the SiEUGreen project understands the contribution of UA for the other pillars. According to FAO, (2006) **food security** '*exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life'*. In addition to the challenges posed by this broad and intangible definition, food security is experienced at a household or individual level but the factors that contribute to it are complex and multi-scalar (Pérez-Escamilla and Segall-Corrêa, 2008). As discussed in D1.1. many of the indicators to evaluate the security of food can only be obtained and verified at the national level. When it comes to understanding food security at an urban, or even regional level a more qualitative approach is required. In this respect, the concept of 'food sovereignty' (FSv) seems more appropriate. This concept promotes the transformation of the dominant food system and claims 'the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems' (Binimelis et al., 2014)

When it comes to **resource efficiency**, UA can contribute to improved handling and circulation of water and nutrients. By acting as a sink for organic waste (e.g. through composting) and

filtering water in soils, UA practices can lead to more closed nutrient and water cycles. UA may also reduce energy use through heat regulation (cooling and reducing the heat-island effects) (Piorr et al., 2018). Urban agriculture can also play an important role in reducing the effects of climate change by enhancing water storage and infiltration (thus reducing runoff, floods and landslides) and reducing urban heat and CO2 emission (by capturing CO2, enhanced evapotranspiration and providing shade), if productive green open spaces are maintained in the urban landscape when the city expands (green fingers, green belts, etcetera) (RUAF, 2016). In some cases, local food can have a lower carbon-footprint than internationally traded food, although it is not a general rule (Morgan, 2015). In SiEUGreen UA has been proposed as a strategy to promote **resource efficiency**, mitigating environmental impacts, promoting green growth and moving towards a circular economy. As a starting point to investigating this claim, the findings from D1.1. indicated considerable differences between the European showcase locations when it comes to resource efficiency. Within the SiEUGreen project, the implementation of innovative green technologies will be key to making resource efficiency a reality through UA. Monitoring the contribution of these technologies to the showcases' performances on environmental indicators throughout the SiEUGreen project period will be vital to developing an improved of the resource efficiency component of UA. On-site measurements and small-scale experiments would also be useful in drawing more concrete conclusions.

Societal inclusion is one of the benefits commonly claimed to be achieved through UA (Corcoran and Kettle, 2015; Davidson, 2017). Some studies argue that UA has enabled new forms of social engagement and created institutional conditions that can disrupt conventional agri-food systems (Davidson, 2017), others claim that UA has been an arena for challenging stereotypes, exchanging knowledge and pull-down social barriers (Corcoran and Kettle, 2015). Social inclusion is a rather complex and vast matter that is context-dependent and influenced by the constellation of stakeholders who take part in the UA initiative. **Societal inclusion** can be understood in terms of three dimensions: social, economic and political. Social dimension refers to the potential of UA to reduce social marginalisation of certain vulnerable groups. It can be addressed at the individual, community and societal levels. At the individual level, UA may strengthen the social 'bonds' by creating a sense of common identity.UA could also be a mean of 'bridging' individuals from different social groups and, by doing this, it would foster social integration of marginalised groups. At the community level, UA may foster community capital and strengthening neighbourly ties. It is seen as a strategy to revitalise degenerated neighbourhoods by increasing neighbourhood pride.

The economic dimension of societal inclusion relates to the capacity of UA to addressing urban poverty and providing additional household income or savings due to local food production. The political dimension concerns the capability of people to participate in making collective decisions about matters that affect their lives. As seen in D1.1 the Women's Cooperative in Hatay provide examples of the different dimensions of societal inclusion. A member of the cooperative who also takes part in the board highlighted the opportunity the cooperative has given her to become politically active. The tasks of managing, deliberating and collaborating with other members has been, in her opinion, a great experience. The Women's Cooperative also challenges the gender conditions of the local labour market, as the female employment rates in Hatay as well as in Turkey is considerably low compared to that of males. The cooperative fosters the involvement of women in the local economy, enabling them to support their households. In this respect, UA seems to be a mean for social and economic empowerment.

Having briefly reviewed the four pillars on which UA practices stands or contributes the following sections present arguments, supported by the literature, that confirm the relevance of land issues for the practice of UA.

3.3. Land: the core issue for UA

The limited access to land for those who would like to practice UA and the lack of security of tenure on that land (especially if there are competing uses of land) are among the key constraints to the widespread adoption of UA (Taylor Lovell, 201; Viljoen et al., 2015). Land for UA is often relegated to the lowest priority due to preference given to "highest and best use" that rules land-use planning (Fernandez Andres, 2017), and is commonly viewed by planners as "a placeholder or interim use" (Horst et al., 2017).

In general, there is a relatively limited amount of land permanently protected for UA, especially if compared with other land uses, such as playgrounds and parks. In many cities, the demand for community garden space is higher than the supply (Horst et al., 2017). At the same time, UA itself can contribute to the valorisation of urban areas by increasing the area's attractiveness for new residents resulting in gentrification.

Access to land for UA and land tenure conditions differ spatially and will be addressed in the following section on spatial aspects. In addition to the spatial dimension, the availability and security of urban land for agriculture is closely interlinked with **ownership** and is very much related to market forces, including the real estate markets of cities, with UA being displaced as investment interest increases (Opitz et al., 2015). This perspective is shared by Wekerle and

Classens, (2015), who argue that property right and security of tenure continue to be the key policy and political issue for UA. Public land is usually the main issue upon which people struggle to maintain UA. In many cases, the tension between the right of urban residents to open space and community amenities and the rights to access land for food production versus the potential financial gains from land development is at stake. This issue highlights tensions between 'the right to the city' claimed by people and the 'right of the city' to make the best choice to safeguard the public good.

Rather than focusing on public land, Wekerle and Classens, (2015), focus on the agrarian potential of privately-owned land. In this respect usufruct rights are shown as a mean that enables renegotiating access to land for agriculture based on relations of trust between individuals rather than public battles over land lost.

3.3.1. Spatial aspects

A fundamental distinction is often made between intra-urban and peri-urban agriculture (PUA). The former involves food production in an urban area while the latter takes place on the fringes of the cities, described as the transition zones between urban and rural areas, and is often performed by professional farmers on land that has often already been used for farming for years (EPRS 2017). The main differences between the two types relate to the scale of activities undertaken, the legal status, contractual arrangements, land use and types of cultivation practices.

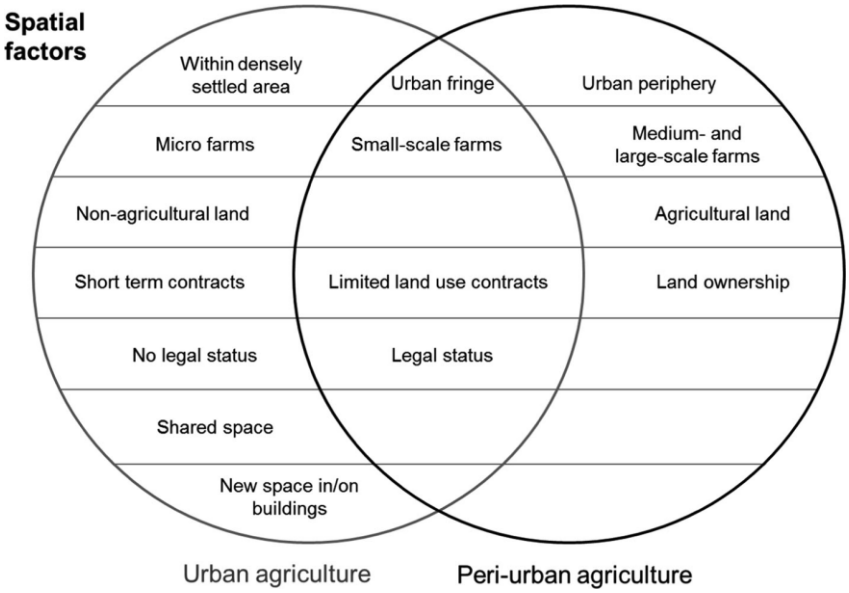


Figure 12: Differences and common features of urban and peri-urban agriculture

Source: Opitz et al. (2015)

As Figure 12 illustrates the location seems to have a great influence shaping different UA practices. Nevertheless, Opitz et al., (2016) claim that the geographical position of UA is not

the only aspect to distinguish UA from PUA. The authors make a comparison between UA and PUA along three dimensions: spatial, ecological and socio-economic. The **spatial** deals with the pressure on land for the performance of agriculture and includes issues related to location, the scale of production, land use category, duration of land use contracts and legal status. The **ecological addresses** the site conditions, specifically in relation to use of the soil, recycling management, water management. The **social and economic** dimension regards to the integration to society and market and approaches issues of related to the level of professionalism of those who perform UA, their motivations as well as how different networks of actors perform UA.

The authors conclude that UA is **micro-to small-scale** agriculture that cultivates **non-agricultural land** predominantly within the densely settled area of cities. Motivation generally comes from the individual, and as such the operations are run by **non-professiona**l activists. On the other hand, PUA is **small-to large-scale** agriculture that cultivates **agricultural land** predominantly at the fringes of cities. It is first and foremost economically motivated and is operated by **professionals** with medium to large distribution pathways from direct marketing up to global value chains. The differences in the socio-economic status and backgrounds of UA practitioners in relation to the spatial location of agriculture is also discussed in another study (EPRS 2017). This research also shares the perspective that while UA is commonly performed by local residents without any formal agricultural knowledge and education, PUA is mainly carried out by professional farmers, with knowledge about the modern management practices, and to some extent 'lifestyle or hobby farmers' – urban dwellers whose main income is generated outside the farm activities.

As mentioned above, **access to land and land tenure** conditions differ spatially. Within the **urban fringe**, the land is often owned by the municipality or by private investors which results in short-term renting contracts and predominantly temporary use agreements. This prevents investments and limits access to loans. This also affects the farms' investment decisions (e.g. adopting sustainable practices or planting long-term crops) and survival strategies, such as limiting cultivation to short-cycle crops that best fits the insecure use of land (Opitz et al., 2015). In these circumstances, it is common for farmers to adopt strategies based on the elements of sharing economy and community financing models that make it possible to preserve land resources for small scale agriculture (e.g. community-supported agriculture-CSA) (Piorr et al., 2018).

Many farmers in peri-urban areas have better access to land and more secure tenure conditions. The agricultural **land for PUA** is generally present as a distinct land-use category in the zoning plans and has often already been used for agriculture in the past. At the same zoning does not necessarily protect agricultural land from being built upon and continued urban sprawl goes hand in hand with loss of peri-urban agricultural land (Mok et al., 2014). Pressure on open space and farmland associated with land conversion to urban use as a consequence of urbanisation and urban sprawl are among the key threats to PUA (EPRS 2017).

Opitz et al., (2016) also highlight that UA and PUA's actual contribution to **food security**, providing culturally acceptable, nutritionally adequate food at all times varies significantly. For example, UA predominantly meets household-level requirements, and it only manages to produce culturally acceptable food for a limited target group that is not generally the group of people most in need. Thereby limitation in providing food security is influenced by a low level of processing, the low level of professionalism and ability to produce food for a limited target group.

Conversely, **PUA** performs well in providing nutritionally adequate food and, by providing animal products, it delivers a wider range of products than UA. Furthermore, the conditions of PUA to provide a larger quantity of food are better than in UA because of the professionalism and comparatively high stability of the agricultural unit.

The spatial distinction is also present when discussing **ecological issues** related to soil contamination in UA and PUA. There are considerably higher concerns about the soil quality in intra-urban areas and associated risks to public health from the use of pesticides, biological contamination from using drainage runoff and raw sewage to irrigate. There is also fear about the quality of food produced in densely populated areas which are likely to be exposed to more pollution than peri-urban areas (Bourque, 2000).

Piorr et al. (2018) argue that regardless of the technology used, maintenance of commercial traditional farms in peri-urban areas is hardly economically viable. In order to be profitable, farms have to adopt specialisation or strategies that are based on intensification of production with reduced area demands (e.g. horticulture) or diversification of their production, including increased service orientation. As a result, specialised food production and diversified on-farm activities are more common in peri-urban areas than in rural areas (Piorr et al., 2018). This development is also a response to the growing demand for fresh, organic and locally produced food from urban dwellers. The spatial proximity between farmers and consumers has facilitated the evolvement of alternative food networks in peri-urban areas, characterised by

shorter transport distances and fuel consumption and direct marketing. Direct marketing allows bypassing the middlemen in the distribution chain that enables farmers to keep more profit and build trust with consumers (Jarosz, 2008).

Text-box 1: Spatial dimension: key lessons from the literature and reflection on the showcases

	Location	
	Peri-urban	**Intra-urban**
Resource efficiency	Higher professionalism of farmers and often better access to high-tech methods may result in the adoption of more resource-efficient technologies and methods of UA. The larger contribution due to the generally larger scale of UA initiatives. E.g. Greenhouse in Hatay.	Generally, less focus on resource efficiency among small-scale hobby farmers. The higher focus on new residential and commercial areas where UA and green infrastructure are integrated into planning, e.g. Fredrikstad
Food security	Peri-urban UA is likely to take place in extensive areas, so it may address food security concerns. In the case of Beijing UA in peri-urban areas has provided vegetables that were only available in the South of China. Women's Cooperative in Hatay is a good example of increased food security among the vulnerable groups in society.	Micro-scale production does not effectively address food security issues but can be a good way to increase the food security of single households. Higher risks for contamination and pollution in urban areas that may affect the quality of food, and thus affect food security.
Societal inclusion	Generally, lower participation of marginalized communities in PUA than in UA due to PUA is often driven by the commercial interest. Pursuing community development objectives are also less common in PUA. Women's Cooperative in Hatay is a good example of the contribution of PUA to the economic inclusion by providing opportunities for socially disadvantaged women to receive income from sales of produce Sharing economy model in peri-urban areas in Aarhus (Braband)	Strong contribution to societal inclusion, especially its social pillar. As the case of Aarhus shows intra-urban UA is a mean to reactivate underutilized spaces of the city, improve safety in urban environments while bringing people together and strengthening community development.

3.3.2. Functional aspects

Functional aspects refer to *how* land is used for agriculture, associated primarily with the technological choices and operational aspects. Functional aspects do not refer only to land as such since they also include the potential of the built environment to embrace agriculture (i.e. vertical agriculture – in facades, rooftops, balconies, etc.), as well as water bodies.

Piorr et al. (2016) divide the cultivation methods of UA and PUA into **low-tech hobby gardening**, including micro-scale, allotments, pots, seedbeds or balconies and zero-acreage farming, and **high-tech intensive** vegetable or livestock production which includes soil-based practices and hydroponics. Zero-acreage farming includes all types of building-related food production: rooftop gardens, rooftop greenhouses, balconies, edible walls or indoor farming that does not require additional land. Zero-acreage farming methods may be also regarded as

high-tech intensive with employing more sophisticated growing methods, e.g. light-emitting diodes (LED) in vertical farming, allowing for cultivation in areas where the number of sunlight hours is limited (Molin and Martin, 2018).

In this section, we add a new category of the cultivation methods of UA and PUA and describe zero-acreage farming as a stand-alone method due to its relevance from the land-use perspective. Thus, the distinction is made between **zero-acreage farming** (both soil-based and soil-free, low and high-tech), **low-tech hobby gardening (mainly ground-based but also includes balconies)** and the **high-tech ground-based farming** which refers to high-tech intensive ground-based methods including vertical farming and hydroponics.

The choice of the technology and method of UA practice depends on a variety of factors such as the purpose of a UA practice (e.g. commercial, leisure, educational), land and site characteristics, and perhaps the most important, access to financial capital and knowledge. The spatial allocation can also be a decisive factor. **Intra-urban** agriculture involves many forms and practices, ranging from using a variety of urban spaces (e.g. temporary use of construction sites, leftover public spaces) to kitchen and community gardens and even zero acreage UA that takes place within the built environment. While intra-urban agriculture is often characterised by using low-tech methods, the use of high-tech practices is more common in the **peri-urban** areas.

From the land-use perspective, **zero-acreage farming** is the least land-intensive farming method. Considering land scarcity in the cities and the vast potential of unused urban spaces, such as vacant buildings or rooftops, zero-acreage farming is a promising method of urban food provision (Thomaier et al., 2014). Hydroponic or aquaponic techniques are especially suitable for buildings since the weight of the soil can endanger the buildings' stability (Opitz et al., 2015).

As opposed to ground-based farming, long-term or unlimited leases are common in case of zero-acreage farming due to reduced land-use competition. This is an important argument in favour of zero-acreage farming. At the same time competition with other types of use may occur, e.g. in countries that have financial incentives for landlords to install roof-based solar panels (ibid.).

Besides reducing arable land consumption, zero-acreage farming is advocated for its high potential to contribute to urban **resource efficiency** by e.g. improving building's energy efficiency (cooling effect in summer, insulate against cold, reduced heat losses) reducing water consumption due to rainwater harvesting and using organic waste for composting

(Thomaier et al., 2014). Vertical farming and hydroponics, which are increasingly applied in commercial projects, also has good potential to reduce resource consumption, particularly energy and water. Aquaponic and hydroponic cultivation is considered to be more efficient in their use of water due to the continuous reuse of water (Piorr et al. 2018). However, the initial costs of installations, a need for technical knowledge and increased energy costs in comparison to conventional cultivation are among the drawbacks (Molin and Martin, 2018).

When it comes to the **contribution of zero-acreage farming to food security and societal inclusion**, there is a considerable difference between developed and developing countries. While small-scale subsistence rooftop gardening plays an important role in providing fresh food to families in developing countries, zero-acreage farming in developed countries is geared to the qualitative improvement of food systems rather than to securing basic food supply for low-income residents. Zero-acreage farming products in developed countries often sell at high-level prices (in case of commercial farms) and are thus not necessarily within everyone's reach. This situation may be a result of higher obstacles faced by the zero-acreage farming implementation, including more rigid technical constraints and regulatory frameworks in developed countries (Thomaier et al., 2014).

Moreover, the analysis by Thomaier et al. (2014) shows that zero-acreage farming is mainly initiated by businesses and institutions, and the bottom-up engagement is not common. One of the reasons for it could be restricted access to buildings and rooftop spaces among the general population. As a result, the contribution of zero-acreage farming to the community-building and societal inclusion objectives may be limited.

Some studies revealed that although expensive, the UA methods that allow to cultivate produce on rooftop and vertical gardens, such organoponics, hydroponics or aeroponics, could be more feasible solutions for urban areas with poor condition of the soil and could be a good solution for the lack of sunlight (Altieri et al., 1999; Corbould, 2013; Angotti, 2015 in Fernandez Andres, 2017). At the same time, the plants are exposed to harsh conditions on rooftops (wind exposure, drought and extreme temperature fluctuations), which limits the planting palette to tolerant species such as herbs (Taylor Lovell, 2010).

Similar conclusions can be drawn when looking at the **high-tech intensive ground-based farming**, namely that it is more likely to be carried out by the professional farmers rather than hobby gardeners and that it is more frequently based on the long-term or permanent rental agreements for land use, as more certainty and stability is required due to high initial investment costs. Also, the maintenance of these systems requires specific knowledge,

experience and even engineering skills which may be not suitable for hobby or community gardeners (Piorr et al., 2018).

While high-tech intensive methods have a number of advantages, such as potentially higher yields and increased resource efficiency, these methods are usually capital intensive and require technical knowledge to be able to make use of the new techniques and equipment available (Molin and Martin, 2018; Piorr et al., 2018).

In addition, the diffusion of high-tech UA methods may be hindered by other challenges, such as their potentially **lower consumer acceptance and legislation** (to be discussed in the next section). Modern farming methods, such as hydroponics and soil-free farming are often perceived as 'not natural' with anticipated low quality of the products and potential health risks due to urban contamination. Those forms of UA that show a high production potential face particularly low acceptance due to their technological and production intensity (Piorr et al., 2018).

Low-tech hobby gardening and community gardening are among less sophisticated urban types of UA initiatives. These initiatives are often low-cost which is partly explained by a lack of permanent rental agreements and hence, no planning security for several growing seasons. Raised beds, plastic boxes or similar are often used for food cultivation due to contamination of the soil in urban areas. These practices are also mobile and can be easily moved to a new location (Piorr et al., 2018).

Low-tech hobby gardening is common in Northern Europe among the so-called 'lifestyle farmers', who get their income from other sources and UA is not an economic activity for them (Piorr et al., 2018). Among the advantages of the low-tech UA technologies is their affordability and ability to reach diverse types of community actors, including lower-income groups, thereby making them more socially inclusive and having a broader impact on the social wellbeing of the city.

The literature research tried to identify which technological choices and methods of UA have the highest contribution to resource efficiency, food security and societal inclusion. When it comes to food security and societal inclusion, no simple answer can be given, as an array of contextual factors appear to play an important role besides the technology, including the purpose of initiatives (commercial or social), access to knowledge and education, geography (developing vs developed country), etc. When it comes to the role of technology in achieving resource efficiency, the more technologically advanced methods generally result in increased

circularity and savings of external inputs such as water and nutrients, if compared to low-tech hobby gardening.

Text-box 2: Functional dimension: key lessons from the literature and reflection on the showcases

	Zero-acreage farming	**High-tech ground-based farming**	**Low-tech hobby gardening**
Resource efficiency	Reduced consumption of arable land; increased building's energy efficiency; reduced water input; increased energy consumption in case of in-door installations. Increasing building's energy efficiency is among the objectives in Fredrikstad	Reduced water consumption and input of pesticides and nutrients, especially in soil-free methods such as hydroponics, but often increased energy consumption (especially in in-door installations). Use of organic waste for compost. Aquaponics, hydroponics and vertical gardening systems are considered as resource-efficient and will be tested in Hatay.	Climate regulating, infiltration of rainwater, reducing CO_2 footprint by decreasing transportation distance A high contribution to the urban environmental sustainability in Aarhus; UA as green corridors for bees and animals. Potential contribution to resource efficiency by promoting local food consumption and production.
Food security	Good potential to contribute to urban food security due to higher yield production. However, targeting middle- to high-income groups, and securing basic food supply for low-income residents is not a priority. Increasing food security is not high on the agenda in Fredrikstad	Good potential to contribute to urban food security due to higher yield production.	Good potential to contribute to food security among the low-income population through increasing food affordability, accessibility and nutritional quality. Aarhus: A high contribution to promoting healthy diets and lifestyles and knowledge about food production, while less focus on food security as such.
Societal inclusion	Commercial profit-oriented activities with a low level of community engagement. Regulatory barriers and restricted access to buildings may limit citizen engagement. In some cases, used as means of education – teaching values associated with local and sustainable food production and healthy nutrition. The contribution of UA to the societal inclusion in Fredrikstad is to be seen. Potentially benefiting only privileged and high-income inhabitants. A high potential contribution to community building and neighbourhood development by creating common meeting spaces and meaningful joint activities.	Commercial profit-oriented activities. High initial costs of installations, a need for technical knowledge and increased energy costs are among the drawbacks for citizen engagement.	High level of social engagement, community-oriented, recreational. Offering new opportunities for social integration, e.g., for disadvantaged people. Aarhus: societal inclusion is the core element and objective of the UA practices.

3.3.3. Institutional aspects

Institutional aspects of the use of land for UA can be discussed considering a formal and informal perspective. The formal perspective includes the official framework (e.g. official policies and laws, regulations, land-use zoning, meanwhile leases) introduced by different official institutions that regulate the practices of UA. The informal perspective includes non-

official – not safeguard by law – of supporting UA, such as city-wide food plans and UA strategies, the implementation of public programmes promoting UA (e.g. Taste Aarhus) and incentives that increase allotment provision.

In addition to top-down planning and support, the importance of civil society and market stakeholders in driving UA initiatives has been widely acknowledged (Casazza and Pianigiani, 2016; Lohrberg et al., 2016). In fact, UA sector in Europe is characterised by bottom-up initiatives, most of them informal, fragmented and voluntary (Lohrberg et al., 2016). Networks, associations and other types of private and civil society actors are increasingly involved in promoting UA initiatives.

Lohrberg et al. (2016) describe the **governance** processes of UA in terms of the constellations of actors that are involved practices of UA. They distinguish four types of partnerships, two of which constitute bottom-up initiatives:

- top-down planning initiatives that are coordinated within the local government. Such practices often thrive on the involvement of civil society actors;
- top-down planning initiatives that include market or society actors as equal partners. In this cooperation, the local government often provides support to UA through the provision of land, resources and infrastructure;
- bottom-up initiatives relying on support from public actors. Public support is provided as the initiatives can deliver public goods and services, e.g. health and educational services;
- bottom-up initiatives run entirely by market or civil society stakeholders without a connection to public stakeholders.

According to Lohrberg et al. (2016) there are clear weaknesses in relation to the governance and policy context of UA in the EU (read more in Policy background: UA in the EU and China2.1), with national government playing no major role in promoting UA and a lack of strategic engagement from the municipalities. Despite the criticism, UA appears to gain considerably more attention in the local agendas, if compared to the EU and national level. This can also be seen when looking at four types of partnerships described above, with local governments and civil society actors playing a major role in the governance processes of UA.

Having an enabling or hindering institutional framework has a strong impact on the choice of UA technology and methods (**functional**). The choice of technology is closely linked with access to land and tenure conditions, as the lack of formal and secure tenure and protection of land for UA may become a barrier for long-term commitments (e.g. practices embracing higher resource efficiency) and financial investments (e.g. in technology)(Fernandez Andres, 2017; Opitz et al., 2016: 201; Viljoen et al., 2015).

Looking at the spatial dimension of land use, **intra-urban agriculture** is in many cases performed on land that is not agriculturally zoned. In most countries in Europe, US and Canada there is no category for UA in municipal zoning plans due to agriculture been historically regarded as a ‘‘rural’’ activity by urban planners. As a result, UA is rarely controlled or protected, which makes it difficult to resolve land-use conflicts (Opitz et al., 2015). While the agricultural **land for PUA** is generally present as a distinct land-use category in the zoning plans, zoning does not necessarily protect agricultural land from being built upon and other consequences of urban sprawl (Mok et al., 2014).

In addition to differences in zoning practices of the agricultural land in intra-urban and peri-urban areas, there are other examples of how regulatory framework differs **spatially**. For example, Opitz et al. (2016) argue that due to missing legal status and control mechanisms for agriculture in intra-urban areas, the risks of pests and contamination are incapable to be traced. This, in turn, may limit UA contribution to food security. Conversely, in peri-urban areas standards and controls exist to avoid pest and contamination risks.

Looking at the functional aspects of UA, legislation is among the barriers for the diffusion and acceptance of **soilless high-tech UA methods**, such as hydroponics and aquaponics. Most soilless growing systems cannot be certified as organic yet, as organic labelling is currently based on a soil ecosystem only (Piorr et al., 2018). On the one hand, a lack of organic label may further exacerbate distrust in high-tech UA methods among the consumers considering a high demand and acceptance of organic products among the customers. On the other hand, given the complex and costly procedures of organic certification, small-scale farmers may be reluctant to apply for organic certification.

The widespread adoption of zero-acreage farming is also hindered by rigid technical constraints and regulatory frameworks, especially in developed countries (Thomaier et al., 2014). These constraints primarily refer to rooftop farming practices due to restricted access to buildings and rooftop spaces among the general population.

Institutional support for UA at the local level in Europe and China

In the previous sections, it was discussed that access to **land and tenure** conditions are among the main factors that enable or constrain the widespread adoption of UA (Taylor Lovell, 201; Viljoen et al., 2015). Thus, securing land availability and tenure are also at the core of the institutional support for UA. These are the central themes of the major strategies (both formal

and informal) introduced by local governments and city administrations in support of UA (Lohrberg et al., 2016; Piorr et al., 2018):

- Removing regulatory barriers and restrictions that stem from other policy fields;
- Facilitating land access through e.g. modifying the zoning codes for allowing food growing activities or adoption of a formal UA land use zone;
- Recognising UA as a development strategy and not as a temporary activity. This can be done by e.g. developing city-wide food plans (e.g. London and Amsterdam), plans that focus specifically on UA (e.g. Rotterdam) or the inclusion of UA into comprehensive plans (e.g. thematic sections on UA in Malmö). Cities can also create public structures, for example, city departments for food or food policy councils (e.g. Rome, Zaragoza, Berlin).

Removing regulatory barriers and adopting supportive policies for UA are among the most common planning strategies in place to foster UA development. It is also common for local authorities to promote UA as a temporary activity on vacant or derelict land or buildings and the use of incidental open space in open space areas, where this does not conflict with other policy objectives or land-use priorities. Other strategies include reduced utility fees and taxes, as well as offering funding, loans, land and infrastructure (Horst et al., 2017). Below is an overview of the commonly used **formal and informal planning instruments that cities can use to promote UA** based on examples from Europe, North America and China.

Introducing amendments of **zoning and building codes** have been described among the effective support measures for removing restrictions on UA (especially in peri-urban areas) which enable to e.g. legalise beekeeping and poultry in urban areas, as well as cultivation of crops and food-producing plants (Horst et al., 2017). In Geneva, for example, the green belt surrounding the urban area that has been widely used for agricultural purposes has been safeguarded through spatial planning and zoning (Piorr et al., 2018). In Copenhagen, planners have developed a finger plan that is a strategy to protect agriculture in the peri-urban area. Allotments in Europe are forms of urban gardens that are legally fixed in zoning plans (Opitz et al., 2015).

In Germany, specific **laws** exist that prevent a transformation of allotments into residential areas in times of increasing land prices (Piorr et al., 2018). Several good examples of institutional support to UA can be found in the UK. For example, *Planning for Health Supplementary Planning Document* in the Darwen Borough Council promotes the **protection of existing allotments** and community food growing space and provides for **the creation of new spaces** (Marceau, 2018). The *Local Plan Policy 46* by the Hull City Council supports the use of **land for UA on vacant or derelict land and buildings** as well as housing estate greenspace and any new developments (Hamer, 2017).

Brighton and Hove have adopted a non-binding planning advisory document titled "*Food Growing and Development Planning Advice Note"* that facilitates and promotes the incorporation of community food growing into **new commercial and residential developments.** This is the first document of this kind in the UK. Since 2011, when it was adopted, the share of the residential developments proposing UA has increased from 1% to over 40% (Marceau, 2018; Viljoen et al., 2015). Moreover, UA is included in a **Sustainability Checklist for Planning applications** in Brighton and Hove City Council, making it compulsory for developers of residential buildings (new and conversions) to complete a Checklist which includes a section on food growing (Marceau, 2018).

Protection and preservation of land in a form of **agricultural parks** has been a widely practised strategy to reduce the pressure of increasing urbanisation on urban and peri-urban green spaces in cities all over Europe, e.g. Dublin, Milan, Sofia or Warsaw (Piorr et al., 2018). Agricultural Parks is a planning approach with a clear area designation, usually encompassing project-based activities. "Advantage of the park concept is the strong identity-building and placemaking, which contributes to public awareness-raising of the value of UA and PUA" (Piorr et al., 2018: 52).

In the city of Ghent, Netherlands, **a food strategy** titled *Gent en garde* was launched in 2013 which aims to develop a sustainable food system for the city. Moreover, UA is promoted in the *Ghent's Climate Plan 2014-2019*. The plan envisages providing space for UA, support for schools willing to initiate urban farming projects and linking urban farming projects with social employment (EPRS, 2017).

The local authorities can promote and enable community UA by adopting **policies that increase allotment provision, promote edible landscapes and make available green and brownfield sites** (Marceau, 2018). Increasing allotments provision and community food growing spaces are among the measures envisaged in the Aberdeen City Council's *Local Outcome Improvement Plan*. The city council is also developing Aberdeen's Food Growing Strategy, which stems from the Community Empowerment Act in Scotland (2015). The Empowerment Act requires each local authority to prepare a food-growing strategy for its area, to identify land that may be used as allotment sites, for community growing and describe

how the authority intends to increase provision for community growing, in particular in socioeconomically disadvantaged areas[8] (Sustainable Food Cities, 2018).

Also in other parts of the UK a number of initiatives were introduced to promote food growing in the cities, such as *Growing Communities Strategy 2012-2022* in Belfast that facilitates access to UA and integrates green space provision in planning; a 10 year Allotment Strategy in Brighton & Hove (2014) that includes various support measures to food growers; and the Local Plan developed by the Lambeth Council that promotes the use of land and buildings as new allotments, orchards and for local food growing spaces. The plan supports "the temporary use of vacant or derelict land or buildings and the use of incidental open space on housing estates and other open space areas, where this does not conflict with other policy objectives or land-use priorities." (Lambeth Council, 2013: 9).

The acknowledgement of the **multifunctional character** of UA and PUA in the land use planning and zoning practices is crucial, due to the role that UA plays in water management, recreation, maintaining landscape and biodiversity, buffer zones, etc. A good example of land use planning based on a mix of land uses can be found in the Netherlands, where a plan for mixed land use in the Upper Bieslande polder in the city of Deltf was developed in 1996. Before the realisation of the plan, the farmers operating in the area had one-year leases from the municipality of Delft, which was a reason for uncertainty and dissatisfaction. In 1995, the farmers and a planner initiated a discussion on a new plan for land use, suggesting ecological development and management of the ditches to regulate water levels. The plan was approved and envisaged combined land use functions, including organic farming, recreation area, nature re-development, natural water treatment and awareness-raising and educational function. Besides the benefits for the city and the residents, the plan has delivered extra income for farmers in a form of subsidies from the local water board for their contribution to the water management. This case shows that UA is much more than only food production and these additional benefits should be emphasised in communication with the planners (Deelstra et al., 2001).

Still, **little long-term security** is among the limitations in the Dutch example, as the plan envisages a 12-year lease contract. Providing a firmer legal basis for UA and enabling

[8] for more info read here:
http://sustainablefoodcities.org/Portals/4/Documents/Aberdeen%20Food%20Growing%20Strategy.pdf

multifunctional land use practices through increasing integration of planning and policy between levels of government and between different types of organisations are among the key recommendations from the Delft case on how to succeed with multifunctional land use planning (Deelstra et al., 2001). A similar approach was adopted in the city of Almere in the Netherlands, where the municipal authorities developed a planning framework which encourages the mix of land uses for agriculture, leisure, ecology and water retention in and near to the build-up area (Van der Valk, 2012). This example has attracted a lot of interest from other cities in Europe.

Meanwhile, **leases** can be provided by the local authorities to facilitate the use of derelict land or buildings in order to provide multiple economic, social and environmental benefits (Marceau, 2018). For example, public authorities in Cardiff promote increased public access to community growing spaces by leasing land and providing meanwhile use of land to local growing projects (Marceau, 2018).

Among the examples of institutional support to UA at the local level in China are planning documents for **Beijing municipality**. UA is addressed in the Beijing Urban Master Plan 2006-2020 (BUMP), Beijing Overall Land Use Plan 2006-2020 (BOLUP), and Special Socio-economic Development Plan for urban agriculture in Beijing 2010-2015 (SDPUAB). BUMP prescribes a spatial allocation of UA initiatives in Beijing to the mountainous regions because of the rich natural resources and tourism development. The plan also promotes the expansion of UA as a form of a green corridor between regions or functional areas. Intra-urban agriculture does not find support in the BUMP, however. The BOLUP addresses UA mainly through setting land use indexes, conserving and prescribing agricultural land, and arranging green space system. This plan has an impact on the location and area used for UA in Beijing (Zhu, 2016).

The SDPUAB is the main guiding document for UA in Beijing today. The plan incorporates three elements, namely the functional aspects of UA (e.g. community gardens), its spatial location and the purpose of UA (e.g. food production, demonstration, recreation). Among the main goals for the expansion of UA in Beijing are enhancing food security, encouraging multi-functional collaboration, environmental preservation, agroindustrial development and increasing farmers' income. Beijing and its nearby districts are divided into 4+1 zones (intra-urban agriculture zone, suburban urban agriculture zone, plain urban agriculture zone, mountainous urban agriculture zone and agricultural cooperation zone) each prescribing different functions and types of UA (Zhu, 2016).

Among the main motivations for UA expansion in Beijing are to bridge the gap between rural and urban areas, to address the issues of water and land shortages and limit environmental degradation. Promoting the multifunctional nature of UA is emphasised in the planning documents for Beijing (Zhu, 2016).

Civil-society organisations and networks (bottom-up initiatives)

In recent years, the paradigm in the food system has shifted from a state-centred approach to an actor-based perspective and the importance of giving priorities to local dimension, bottom-up initiatives, low-input methods and local food production (Horst et al., 2017). The increasing involvement of civil society actors in food movements has been observed. For instance, food justice and food sovereignty movements promote principles of putting people who produce, distribute and consume food at the heart of food systems and policies Urban agriculture is not a replacement to the agri-food businesses, it is part of the solution.

UA is often characterised as a bottom-up process initiated by individuals, community groups, associations, non-governmental organisations or other similar interest groups without formal support (Bourque, 2000; Cunk et al., 2017). Civil society is thus an important promoter of UA and plays a central role in the governance of UA initiatives, especially in countries and areas with a lack of institutional support for UA. Among the examples of organisational and social forms of citizens-driven UA are community-supported agriculture, community composting and gardening, guerrilla gardening and squat farming.

Jardins Partegés in Paris is an example of community gardens that started as an autonomous and illegal movement, as citizens took possession of urban lots for farming. Later, the public administration of Paris introduced a legal framework and procedure to authorize forms of community and shared gardens in urban empty lots. Over 50 community gardens were created and managed by neighbourhood associations on small plots of land based on the agreement with the municipality.

UA bottom-up initiatives that ensure support and institutionalisation from the authorities achieve the best outcomes, however. Hernberg (2013: 35) argues that “the best results are achieved when decision-making and citizens’ ideas are allowed to interact and grow together in symbiosis”.

Networks are composed of different groups of stakeholders, e.g. an umbrella or supporting organisations, public bodies and institutions, neighbours, visitors and volunteers (Opitz et al., 2016). Forming networks of relationships between individuals and with organizations can

facilitate action towards achieving mutual benefits and goals. National and international networks promoting UA can play an important role in mobilising various stakeholders and increasing their engagement and commitment. Networks can also be an effective approach to solving land-use conflicts (Opitz et al., 2016). Among the examples of the international networks that promote UA are the Food Systems Network[9] under C40 cities, the Sustainable Food Cities Network covering the UK cities[10] and PURPLE network[11] consisting of peri-urban regions' stakeholders.

Text-box 3: Institutional dimension: key lessons from the literature and reflection on the showcases

	formal institutional support	informal institutional support	bottom-up initiatives (civil society and networks)
Resource efficiency	Zoning and regulations may help to secure access to land and long-term tenure conditions, especially in peri-urban areas. This is a precondition for deploying more resource-efficient technologies and practices that require commitment and financial investments. Regulations making it compulsory for developers of residential buildings to include UA promotes resource efficiency in buildings. Zero-acreage farming is among the most resource-efficient UA methods. Its widespread adoption would be enabled by removing rigid technical constraints and reviewing regulatory frameworks. These constraints primarily refer to rooftop farming practices due to restricted access to buildings and rooftop spaces among the general population.	Strategies and plans that promote the incorporation of community food growing and green spaces into new commercial and residential developments may contribute to increased resource efficiency.	Relatively low resource efficiency, as it is usually pursued at small scale as it has to be managed by a single person or by groups of people and implies low tech traditional agricultural technologies.
Food security	Introduction of standards and controls to avoid pest and contamination risks of UA in intra-urban areas would help to increase food security. Due to missing legal status and control mechanisms for agriculture in intra-urban areas, the risks of pests and contamination are incapable to be traced. This, in turn, may limit UA contribution to food security.	Food strategies and UA programmes can contribute to food security by e.g. promoting UA in the socioeconomically disadvantaged areas. Promoting edible landscapes in Aarhus increases residents' knowledge about local food that can be included in their diet	Relatively low contribution to food security, unless it is the explicit purpose of the initiative, as e.g. in case of Women's Cooperative in Hatay.

[9] https://www.c40.org/networks/food_systems
[10] http://sustainablefoodcities.org
[11] www.purple-eu.org

Societal inclusion	Official rules and regulations protecting land for UA or removing barriers for UA do not explicitly promote societal inclusion but can facilitate it. E.g. protection of allotments is an effective strategy for promoting societal inclusion at the city level.	Food strategies and UA programmes aiming to increase allotments provision and community food growing spaces are effective tools for promoting societal inclusion, e.g. by linking urban farming with social employment and by addressing socioeconomically disadvantaged areas. Taste Aarhus is an effective programme promoting societal inclusion mainly by strengthening community interaction and development.	While the volume of food produced might be marginal, UA as a social phenomenon reinforces local social cohesion and societal inclusion.

4 SiEUGreen UA typology: a methodological framework

As described in D1.1, mapping of quantitative and qualitative data for each of the showcase locations, among the five SiEUGreen showcases in Europe, Turkey and China, Aarhus showcase presents a great diversity in the way that UA is performed and documented. Therefore, Aarhus was selected as the basis to identify different types of UA initiatives. As Figure 13 illustrates, the Aarhus UA typology will be compared and discussed in relation to the other SiEUGreen showcases, and adjustments will be made in order to develop a comprehensive SiEUGreen UA typology that includes the particularities of all the showcases.

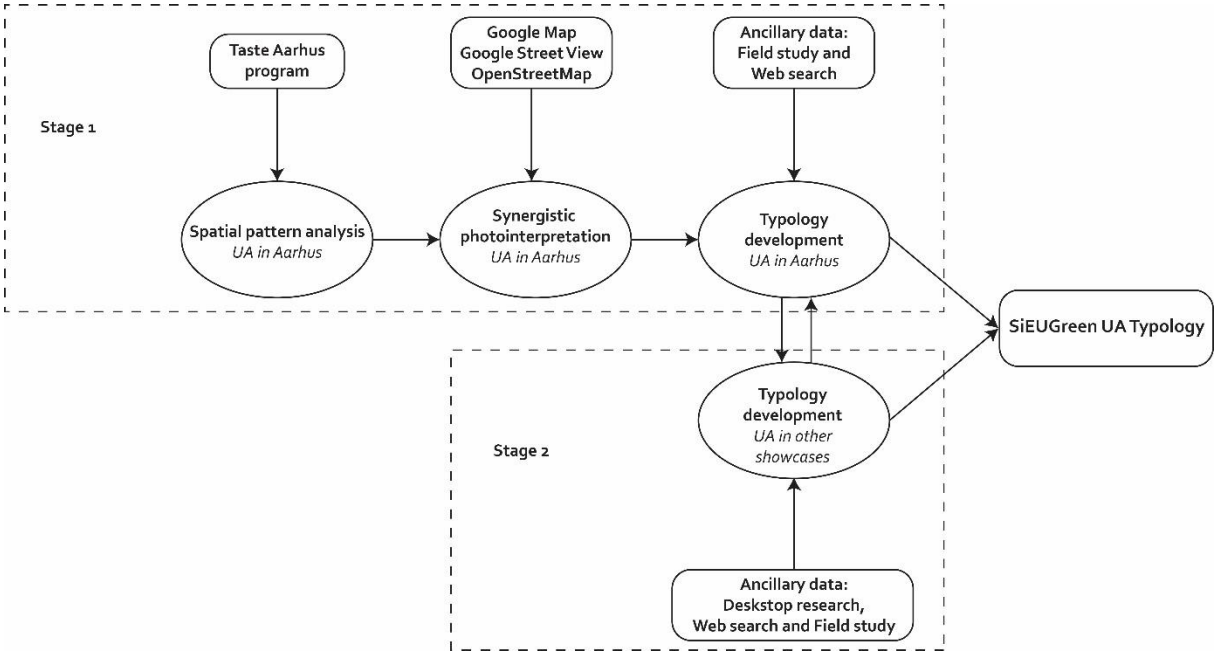


Figure 13: Methodology framework for UA typology development

4.1. UA typology derived from Aarhus showcase

The development of Aarhus typology was inspired by the study of Pulighe and Lupia (2016). Applying photo-interpretation of Google Earth imagery combined with data from free and openly available web-mapping services (Google Maps, Google Street View and Microsoft Bing Maps), this study mapped the spatial patterns of UA initiatives in Rome municipality. This framework is useful to map UA in medium-sized municipalities and, therefore is suitable to describe the UA initiatives and further develop the UA typology in Aarhus. Two-step methodology was applied to develop the UA typology for Aarhus: spatial pattern analysis and synergistic photointerpretation, as shown in Figure 13.

4.1.1. Mapping process of UA

Information about the UA initiatives in Aarhus was gathered with the assistance of Aarhus municipality especially the Taste Aarhus Program team. From the website Taste Aarhus[12] information about 73 UA initiatives (e.g. location, purpose, activities, practitioners) was gathered.

There were, however, a large number of UA initiatives (164) not published on the website. In this case, the Taste Aarhus Program team helped to create a database with relevant information about these initiatives. In this database, 127 UA initiatives were performed in collaboration with other public actors (e.g. education and health departments, e.g. hospital, elderly care, schools) or civic organisations (e.g. NGOs that support disadvantaged social groups). In these initiatives, UA was introduced with the purpose of enabling all people, regardless of their physical, mental or social condition to engage in UA practices. To keep the privacy of these social groups, the information was not openly accessible to the public. The remaining 37 UA initiatives of this database did not have any sensitive information but were not yet updated in the Taste Aarhus website.

Having the database harmonised, the next step was to map the UA initiatives. This procedure was a multi-step and interactive procedure which consists of both quantitative and qualitative methods, and, as shown in Table 2, can be divided into 3 main steps: (1) preparing, (2) locating and (3) classifying.

Table 2: Description of the methodology

Method	**Quantitative**		**Qualitative**
Step	Preparing	Locating	Classifying
Platform	OpenStreetMap	QGIS 2.18.13	Taste Aarhus website & Project manager's input
Dataset/ sub-step	Export the osm. file of Aarhus municipality	Import the osm. file Insert Google Satellite Map and open Google Street View Create the UA initiative layer Locate and add UA initiatives Add attributes	Read the UA initiative description individually Classify the types Online interview the organizer via Facebook Collect ancillary information, i.e., from the field trip in Aarhus
Scale	Aarhus municipality	Aarhus municipality	Individual UA initiatives

[12] http://smagpaaaarhus.dk/

In the preparing step, the municipality shapefile (osm.file) that contains geo-coded infrastructure information in the municipality, was exported from OpenStreetMap and imported to QGIS. This procedure facilitated locating the UA initiatives, which were then identified with the help of web-mapping tools. After locating all the 237 UA initiatives they were classified according to attributes related to the land-use dimensions of UA - spatial, functional and institutional. Thereby, spatial location (where UA is performed, e.g. peri-urban), functional (how UA is performed, e.g. technology deployed to grow food) and institutional (who performs UA, e.g. people, public actors) as well as land ownership (e.g. public, private) were the main attributes selected to develop a UA typology for Aarhus. This choice is in line with the theoretical argument presented in Section 3. Table 3 lists and defines each attribute used to characterise the UA initiatives in Aarhus.

Table 3: Definition of attributes describing UA in Aarhus

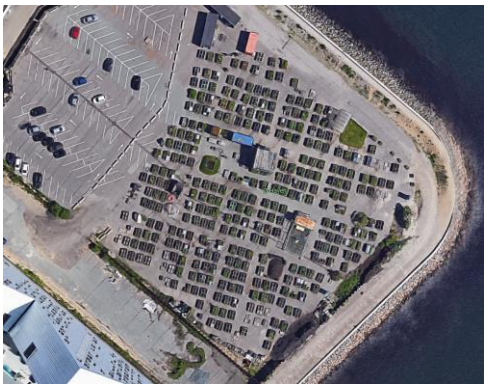
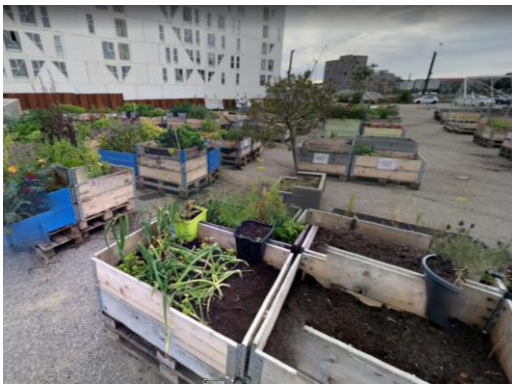
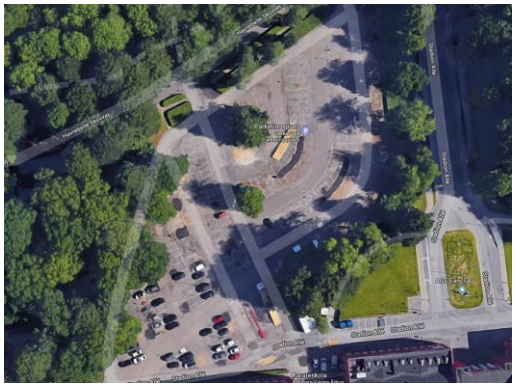
Attribute (abbr.)	Definition	Land use dimension
Common indicator 1: Land ownership (LANDOWN)	The ownership of the land where UA is taking place: LANDOWN 1 – Public land; LANDOWN 2 – Semi-public land; LANDOWN 3 – Private land.	Land use
Common indicator 2: Spatial location (LOC)	Spatial distribution of sites for UA: LOC 1 – Transition spaces; LOC 2 – Leftover spaces; LOC 3 – Between buildings; LOC 4 – Peri-urban; LOC 5 – Edible.	Spatial
Common indicator 3: Management (MANAGE)	Operational and management model of UA: MANAGE 1 – Bottom-up; MANAGE 2 – Local government + other actors; MANAGE 3 – Local government.	Institutional
Common indicator 4: Technology (TECH)	Agricultural technology implemented on site: TECH 1 – High-level technology; TECH 2 – Low-level technology.	Functional
Additional indicator I: Land price (LANDPRI)	A proxy attribute has been applied since the land price data are difficult to obtain, which is the housing price (dkk/m2). An average of the nearest 3 housing properties to every initiative has been recognized and the average housing price around each initiative was calculated accordingly.	Functional/Spatial
Additional indicator II: Accessibility (ACCE)	General public access to UA initiatives: ACCE 0 – open and inclusive to all; ACCE 1 – open, but not actively inviting; ACCE 2 – only accessible for people invited or living there.	Institutional

As described in D1.1, UA initiatives in intra-urban areas of Aarhus occupy different types of spaces: transitional spaces, leftover spaces, between buildings and edible spaces. **Transitional spaces** are spaces 'in development' (e.g. construction sites) so UA is used as a temporary activity with the aim of attracting people from the surrounding areas. The PIER2 Haven and Ø-Haven, located in the harbour area of Aarhus are two examples of this type of space (see Appendix D – Glossary of UA initiatives in Aarhus, for further explanation on this initiatives).

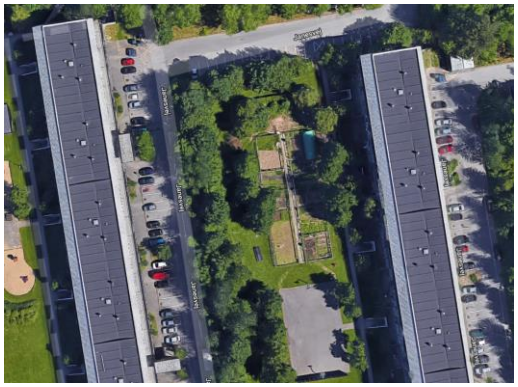
Leftover spaces are fragments of public spaces that do not have a clear function. In Aarhus, the municipality and practitioners take advantage of this sort of spaces to initiate UA activities. UA takes place for example in the leftover land within a parking lot (Stadion P-plads) and the lawn slope in a churchyard (Liv på Kirkegården). **Between buildings** refer to vacant semi-public spaces within residential areas, which are the most common spaces for intra-urban UA in Aarhus. In general, these three categories correspond to UA practices taking place in more densely populated intra-urban areas. **Peri-urban agriculture** refers to the UA initiatives located in the fringe of cities with a less dense population. **Edible spaces** are public areas where eatable resources can be found. Aarhus municipality identifies these eatable resources using signs to inform people about either uncultivated/wild (forest, beaches) or cultivated (apple trees) by the municipality and people. It can take place in any location of the city.

To acknowledge these different spaces synergistic photo-interpretation was used (Pulighe and Lupia, 2016). This technique is more accurate since it allows recognizes and classify the UA sites from Google Map with the help of Google Satellite Map and Goggle Street View. Table 4 shows visual examples of snapshots for the five types of UA spatial location detected by web-mapping tools.

Table 4: Snapshot examples of spatial locations of UA initiatives in Aarhus

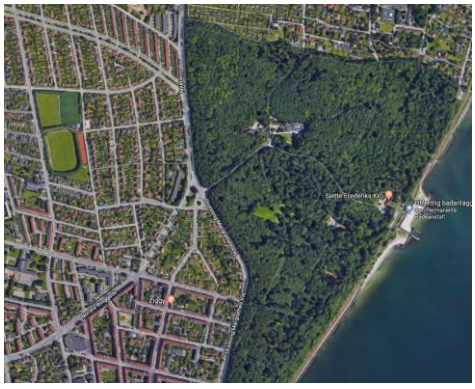
	Google Satellite Map	Google Street View / Photos
Transition spaces		
Leftover spaces		

Between buildings



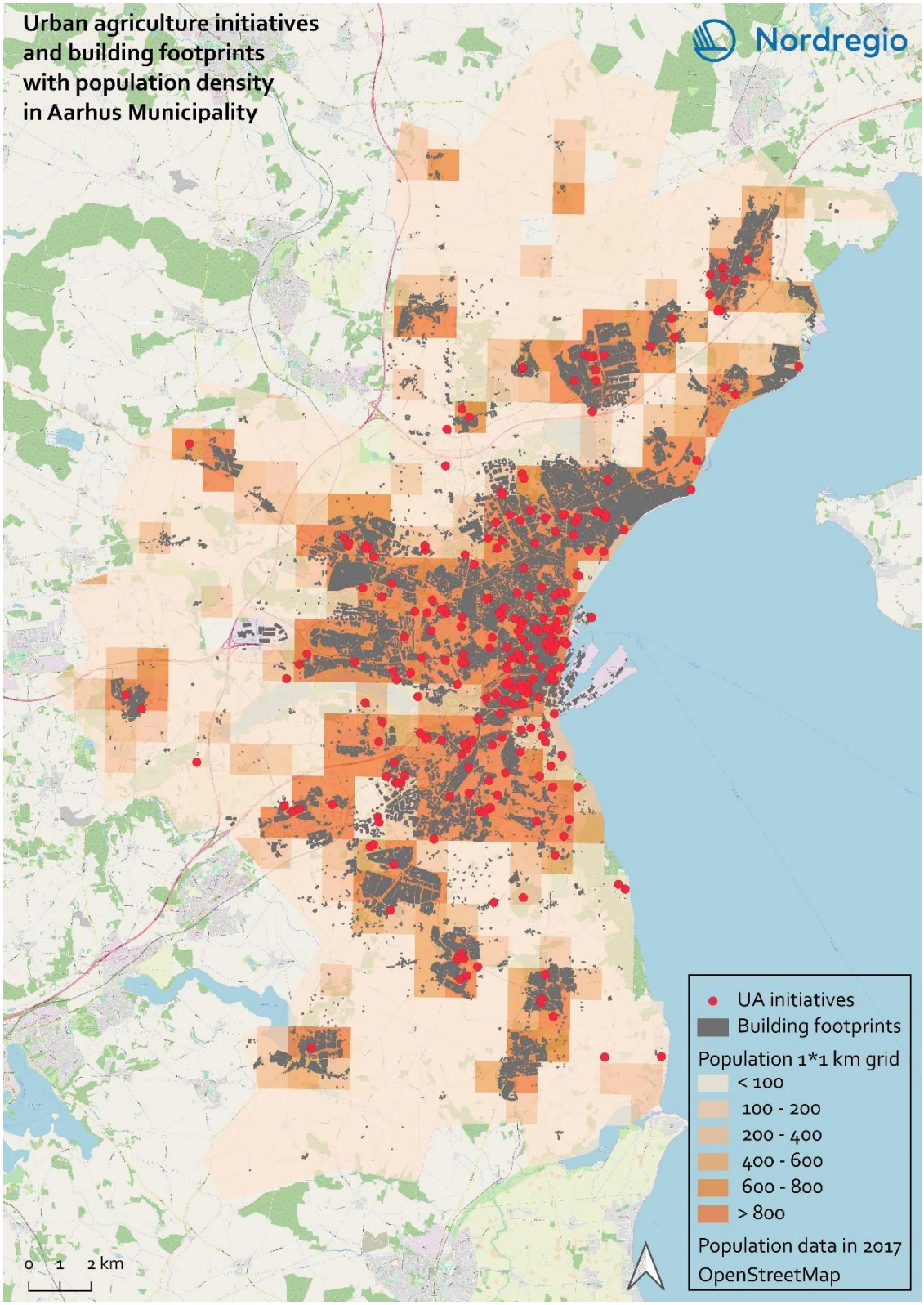

Peri-urban


Edible




The sample of UA initiatives gathered during a study visit to Aarhus in April 2018 was very useful to identify these different spaces (see Appendix D – Glossary of UA initiatives in Aarhus for a description of the visited UA initiatives during this visit). After analysing the location of all UA initiatives, using photo interpretation, few of them remained uncertain. A meeting with the Taste Aarhus management team during another study visit to Aarhus in October 2018, was an important step to clarify the doubts as well as an opportunity to visit some of the UA initiatives that were implemented in cooperation with other public actors (e.g. UA in health cares, schools). Appendix E- UA initiatives in Aarhus – data base) presents a comprehensive overview of the database about the UA initiatives in Aarhus Municipality. Based on these data, a series of analysis has been carried out for a better understanding of the UA initiatives in

Aarhus. Map 1 shows the location of all 237 UA initiatives in relation to the degree of urbanization in Aarhus Municipality.

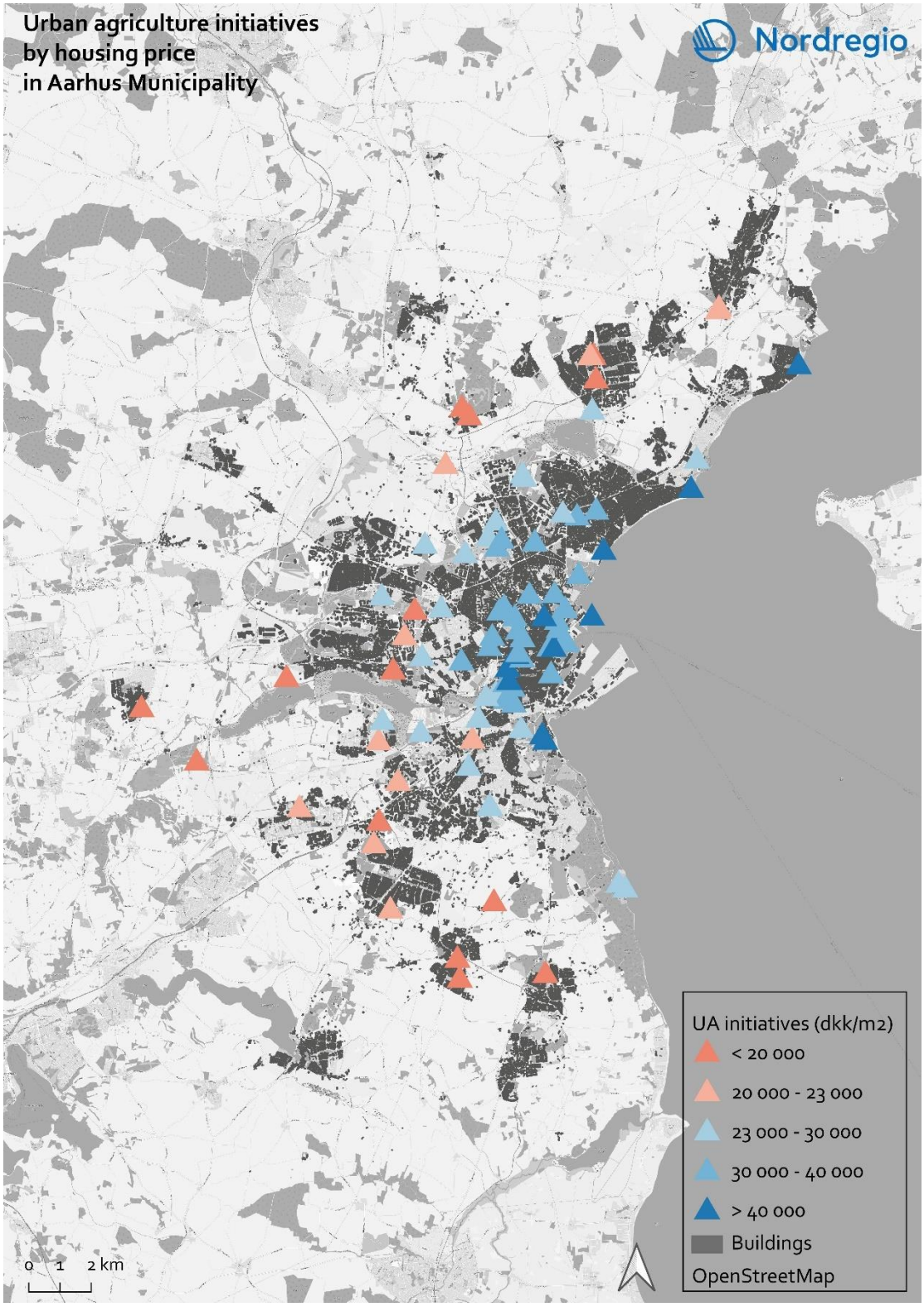


Map 1: UA initiatives & building footprints with population density in Aarhus

The scattered pattern of initiatives showed in Map 1, suggests that UA is not an exclusive activity for some resourceful communities or neighbourhoods in Aarhus but is rather a phenomenon that supports the development of inclusive cities. Most UA initiatives are located in proximity to building infrastructure. In fact, only a few initiatives are located at the fringe of the city. This has triggered discussions about the value of land in which UA is performed in Aarhus. To address this issue, an analysis of housing price, as a proxy indicator of land price, was thus carried out for the 73 UA initiatives listed on Taste Aarhus programme's website.

The average of three housing prices located in the surroundings of the UA initiative was obtained consulting the Danish property trading website Boligsiden [13]. Built on this information the average housing property price (dkk/m^2) around each initiative was calculated accordingly. As stated in this website, the average sold price for housing property in July 2018 in Aarhus was around 23 000 dkk/m^2. Map 2 illustrates the housing price surrounding the UA initiatives compared to the average housing price in Aarhus.

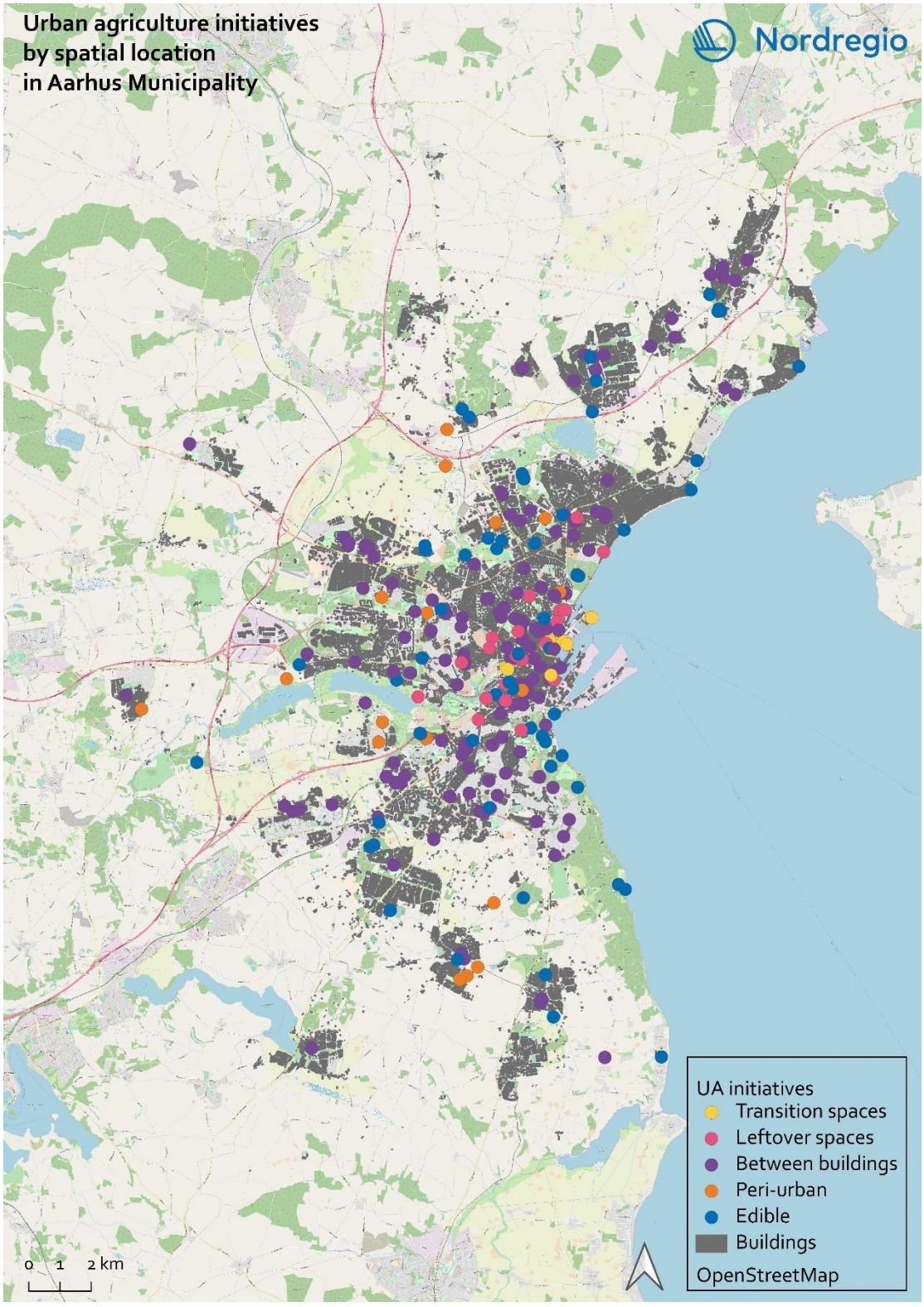
[13] https://www.boligsiden.dk/



Map 2: Property price in the proximity of UA initiatives in Aarhus

As Map 2 shows the land price exceeds the average in some areas alongside the coast and in the inner urban core and, as expected, the land price drops in peri-urban areas. The interesting pattern that this map reveals is the great number of UA initiatives takes place in areas where the land has a higher price. There are, however, many other aspects that play a role in the

configuration of this pattern, such as the creative way in which land in Aarhus has been used for UA. This aspect can be seen in Map 3, that describes which type of spaces the UA initiatives occupy.



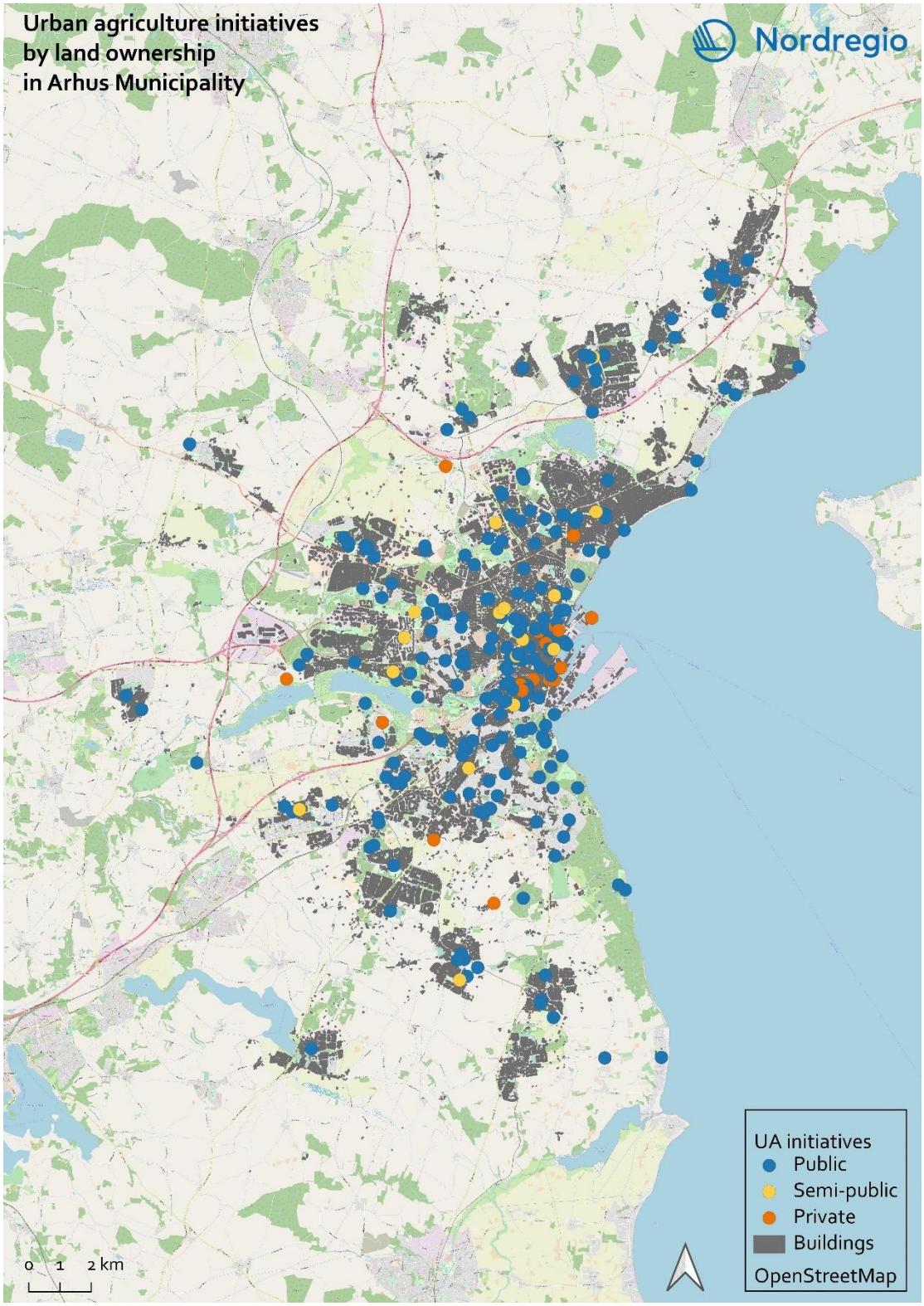
Map 3: Spatial location of UA initiatives in Aarhus

In Map 3, the scattered pattern of 'edible spaces' suggests that Taste Aarhus Programme is doing a good job in communicating the edible resources around the city.

UA initiatives in between buildings are also noteworthy. It does not mean, however, that people are growing food in the semi-public spaces of their communities. Many initiatives that have been categorised under this label correspond to UA initiatives in which Taste Aarhus has partnered other public actor (e.g. schools, health care) and, therefore, they take place around or in between buildings.

UA initiatives taking place in 'left-over' and 'transitional' spaces also deserve some consideration. As shown in the map these initiatives take place in densely populated parts of the city, suggesting that the Programme succeeds encouraging people to grow food in limited spaces in the city where land is scarce. One should also note that left-over spaces are public areas while transitional spaces may be also private (e.g. construction sites).

To further address the ownership of the land where UA activities take place, the initiatives have been re-classified into three types: public, semi-public and private ownership. Public ownership includes all the public spaces, such as parks, schools and libraries. Semi-public accounts for space within residential areas or that belonging to local landowners' associations, and private for land that belongs to the private sector. Map 4 illustrates to whom the land in which the UA initiatives take place belongs.



Map 4: Land ownership of UA initiatives in Aarhus

As shown in Map 4, most UA initiatives take place on public land. This was expected given the large number of edible resources across the municipality (see Map 3). In addition, the municipality supports UA initiatives in institutions like schools, elderly care homes and hospitals contributing to the predominance of public land ownership. On the other hand, semi-public and private land ownership cannot be overlooked for UA development, especially in the inner city. Regardless of the ownership, it seems that UA is practised in a land that is not suitable for other uses, or in the transition to be used for other uses (e.g. UA in construction sites).

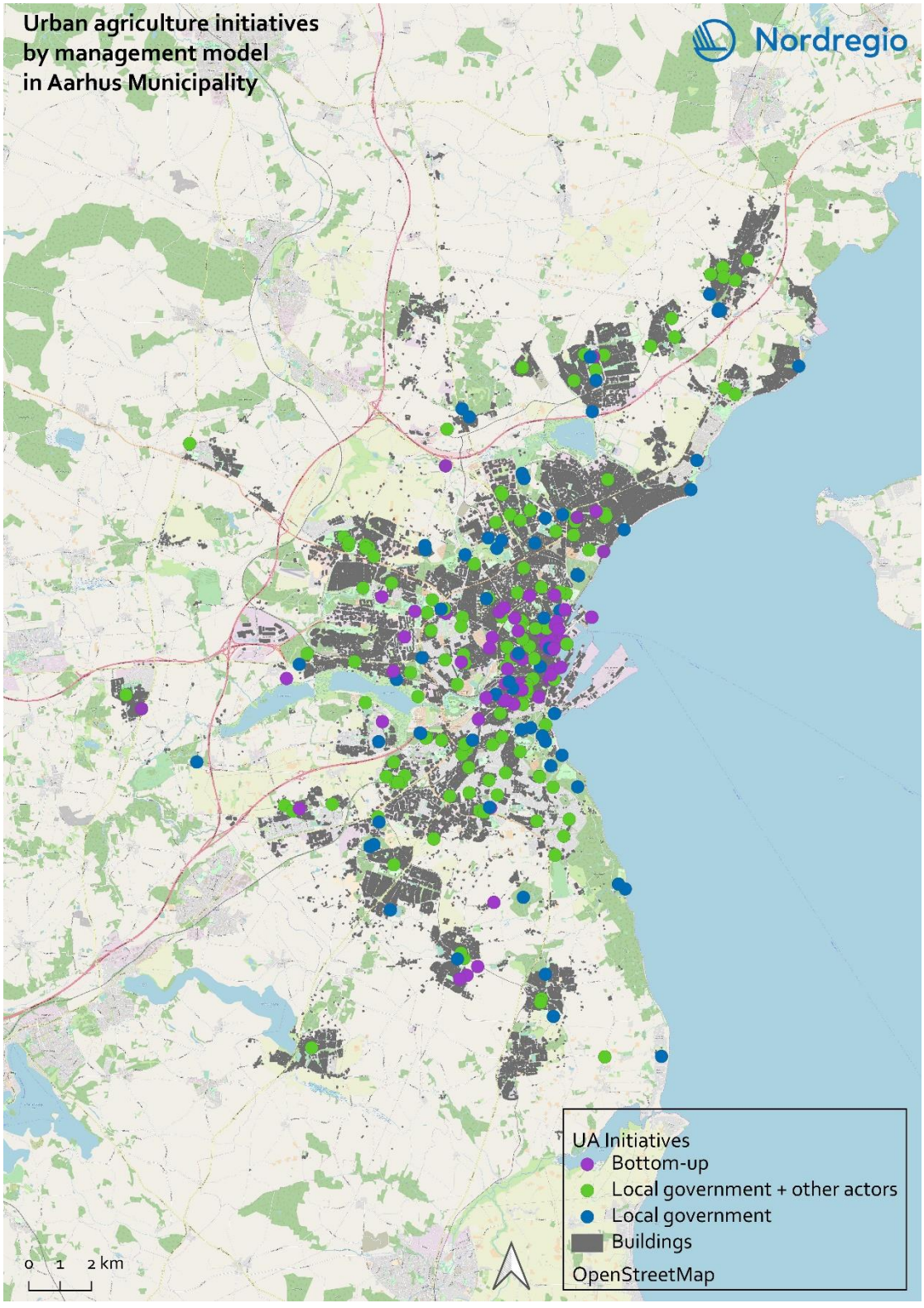
In this respect, who has initiated and is involved in the management of the UA initiatives are relevant. Inspired by the categorization proposed by (Lohrberg et al., 2016) described in Section 3.3.3, three types of management were identified for the UA initiatives in Aarhus. These are:

(i) *Bottom-up with the support of the local government:* encompass the UA practices that were initiated by people with the support of Taste Aarhus Programme;

(ii) *Top-down coordinate within the local government:* correspond to the initiatives that are managed by the Taste Aarhus Program (e.g. information about edible sources in the city)

(iii) *Top-down coordinated by the local government and other actors (other public actors, civil society organisations):* regards to initiatives that Taste Aarhus Programme partner with other public actors (e.g. school, health services) and/or civil society organisations.

Map 5 illustrates these different types of management.

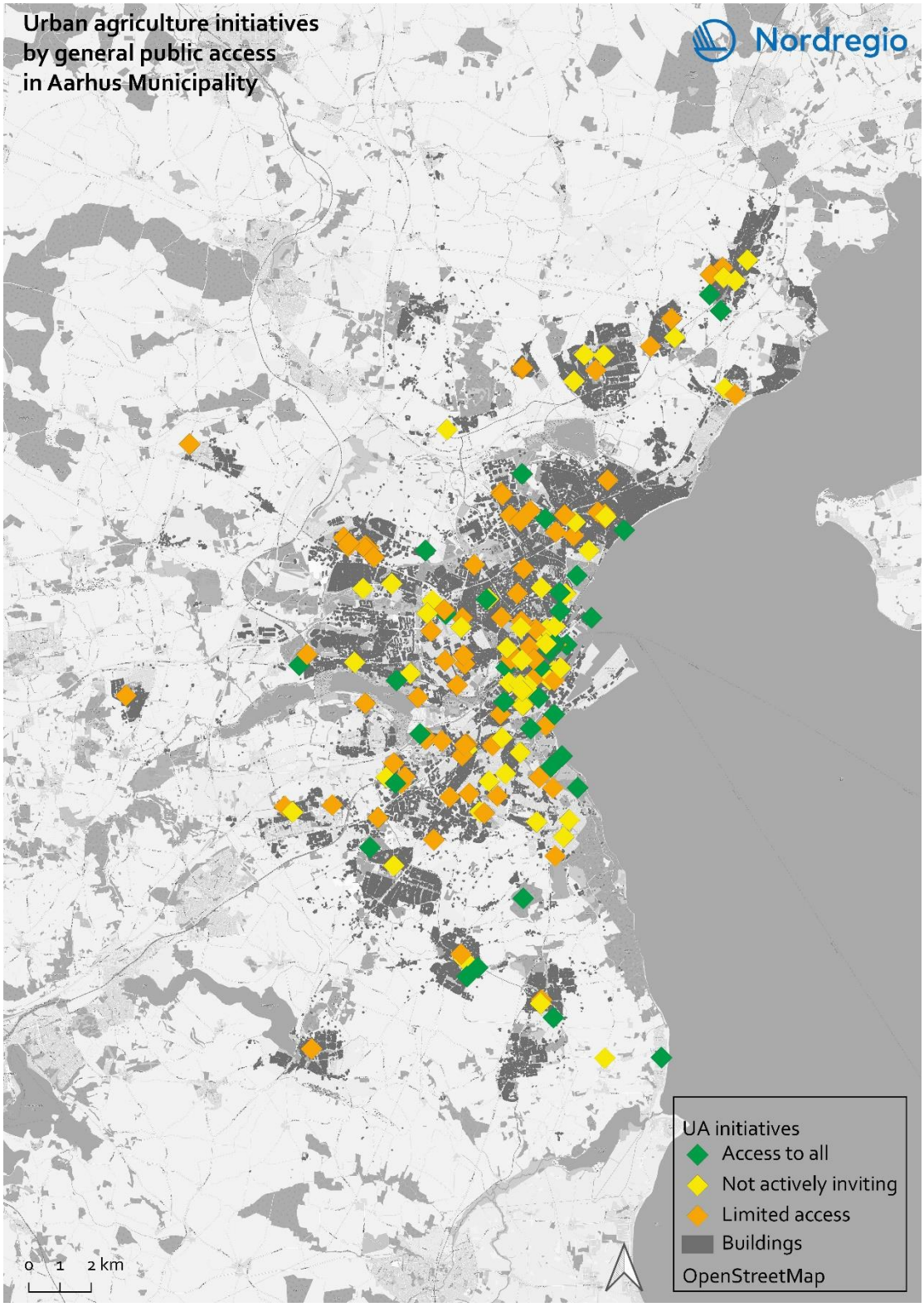


Map 5: Management model of urban agriculture initiatives in Aarhus

As seen in Map 5, UA initiatives that include partnerships between Taste Aarhus Programme and other public actors (UA initiatives within schools, health cares) and civil society organisations are the most common type of management. As argued in section 3.3, this is likely to be related to land ownership, as public actors are empowered to provide access to land for UA. Furthermore, the strong power of the local level and trust in public institutions also contributes to public sector play an important role in UA.

An example of a successful partnership between Taste Aarhus and civil society, the Braband association includes more than 100 families that grow food in greenhouses located in the peri-urban area of Aarhus. Another example is the World of Gardens, in which the local association supports UA, gathering people from different nationalities (see Appendix D – Glossary of UA initiatives in Aarhus - for further description of these initiatives). As already pinpointed the role of Taste Aarhus Programme is also noticeable in communicating the value of UA as can be seen in all number of initiatives that have been maintained by the Programme. Bottom-up initiatives are not as many as others. Nevertheless, they are also significant and play an important role to bring attention to the possibilities of having UA in central areas of the city.

The interaction between people and UA is thus an important aspect that has been encouraged by the Programme Taste Aarhus. Nevertheless, several UA initiatives are not entirely open and accessible to the general public. Some of the reasons that may restrain the access of the general public to some UA initiatives are the location of UA initiatives in private land, inside hospitals and schools, or preserving the privacy of vulnerable groups involved in UA. The restriction of access is thus an important aspect to verify, thereby the UA initiatives in Aarhus were classified into three types: (i) those which are open and inclusive, and everyone is welcome to visit; (ii) those which are accessible but not inviting people to engage with and (iii) those with limited access. Map 6 provides an overview of which initiatives the general public have or not access to.



Map 6: General public access to UA initiatives in Aarhus

4.1.2. Aarhus UA typology

The main assumption behind the development of the SiEUGreen UA typology is that land issues lie at the core of UA practice. As presented in previous sections of this report, these issues have been discussed according to three dimensions: spatial, functional and institutional.

Given this, the spatial dimension of UA initiatives in Aarhus goes further than the location of UA initiatives in peri-urban and/or intra-urban areas including specificities of implementation of UA in particular places of the city (e.g. transitional spaces, between buildings, leftover spaces as well as edible spaces) (see Map 3). When it comes to the functional dimension, most UA initiatives in Aarhus deploy low-tech agricultural practices (e.g. pallets, on plot farming or small-scale greenhouse). The institutional dimension accounts for those involved in the initiatives and thus, it refers to the type of management, as illustrated in Map 5.

In addition to these dimensions, land ownership was also deemed important for the typology. As previously suggested, the public ownership plays an important role in providing security of land for UA in Aarhus (see Map 4)

Regardless of the importance of land price for UA practices, this attribute was not included in the typology development, considering the lack of data for the other showcases. Figure 14 illustrates the attributes taking into consideration to develop the UA typology for Aarhus

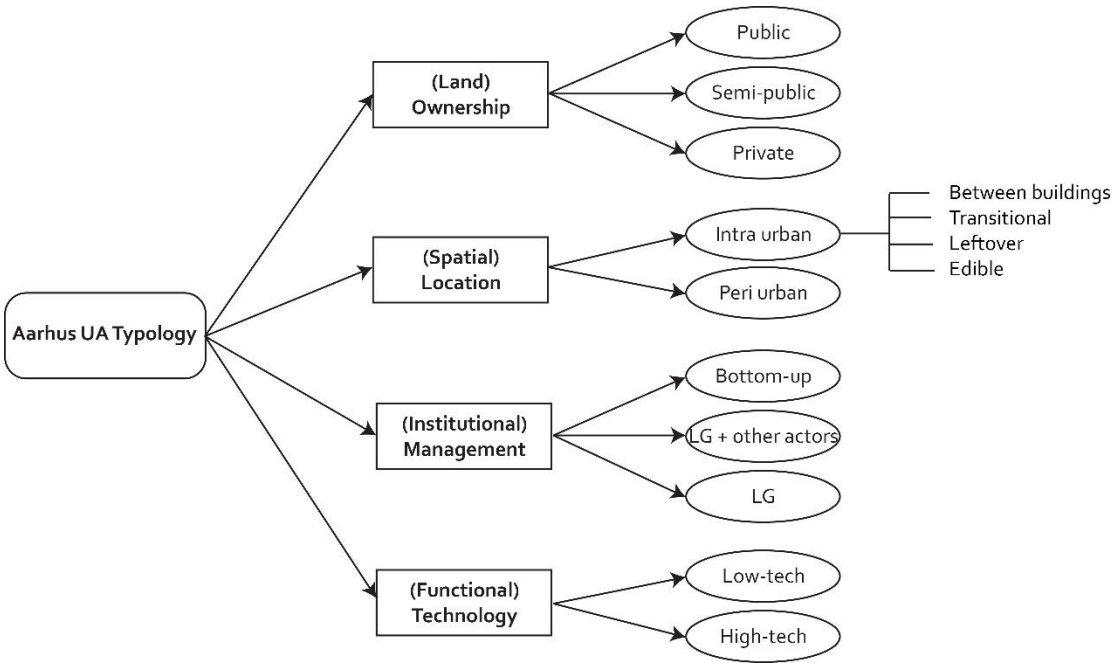


Figure 14: Attributes considered to develop a UA typology for Aarhus

Having identified the attributes, the next step concerned to verify the frequency of how the different attributes related to each other. This allowed the identification of particular

arrangements or patterns between the attributes, which were ultimately acknowledged as types of UA initiatives in Aarhus. Table 5 lists and describes the seven different types.

Table 5: Typology for UA initiatives in Aarhus Municipality

	UA type description	Nº	%
1	Public, Intra urban (Between buildings), Top-down LG + other actors, Low-tech	127	53,6
2	Public, Intra urban (Edible), Top-down within local government, Low-tech	59	24,9
3	Public, Intra urban (Leftover), Bottom-up + TA, Low-tech	13	5,5
4	Public, Intra urban (Transitional), Bottom-up + TA, Low-tech	17	7,2
5	Semi-public, Intra urban (Between buildings), Bottom-up + TA, Low-tech	10	4,2
6	Private, Peri urban, Bottom-up + TA, Low-tech	4	1,7
7	Public, Peri-urban, Top-down LG + other actors, Low-tech	7	2,9
	TOTAL	**237**	**100**

From Table 5, it can be learned that most of the initiatives take place in public land in intra-urban spaces. 78,5% of UA practices are top-down initiatives being little more than half (53,6%) driven by the municipality in partnership with other public actors or civil society associations and almost ¼ of the total initiatives (24,9%) have been entirely managed (initiated and maintained) by the Programme Taste Aarhus.

Almost 19% of the initiatives (44) are bottom-up initiatives. From this, 40 of them take place in intra-urban spaces and only four in peri-urban areas. This finding suggests that people driven UA initiatives may have an impact in making the intra-urban environments more alive and the usefulness of UA as a mean of recycling underutilised spaces. The pattern of land ownership of bottom-up initiatives is quite diverse with 30 UA initiatives taking place in public land, 10 in semi-public, common spaces within residential areas and four in private land. It is striking the small number of peri-urban UA initiatives, only 11, being one-third of them taking place in private land with bottom-up management and the other two-thirds in public land and managed by other public actor or civil society association with the support of Taste Aarhus Programme.

Generally, can be said that the typology has unveiled how UA is inserted in intra-urban structures through the utilisation of public land. The municipality has a great impact on the share of UA initiatives in Aarhus. A close interlink between public and civil society actors ensures that UA thrive (more than half of the initiatives) and approximately ¼ of them account for public information on edible resources in the city. This may suggest that UA is a phenomenon that relies extensively on public support.

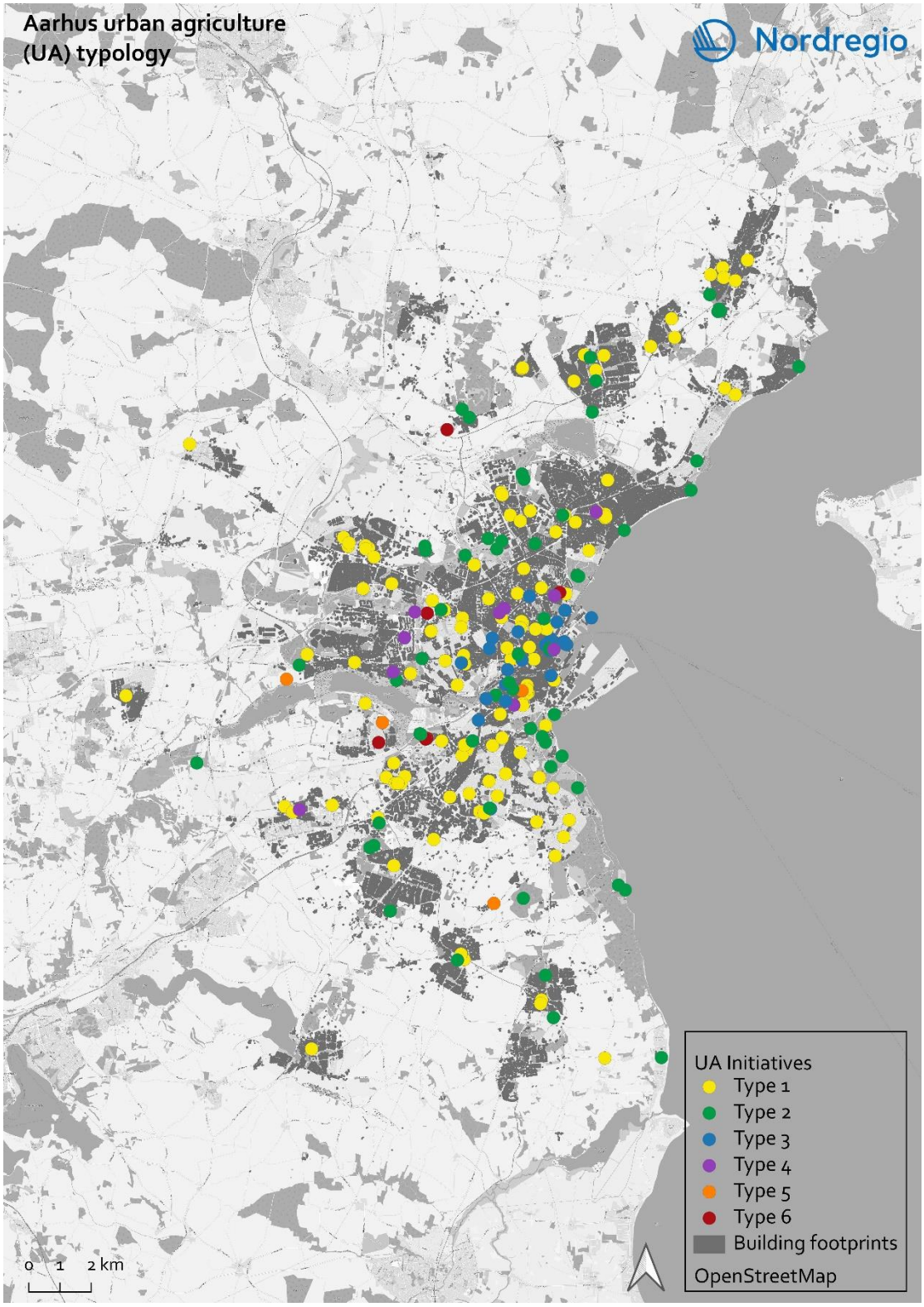
A close look at the different types also pinpointed the need to merge two categories. The differentiation between types 3 and 4 relies only on the intra-urban spaces that UA take place – in type 3 in leftover spaces and in type 4 in transitional spaces. The conclusions drawn from this difference are not so significant since the main lesson learned with both types is the

possibility to reactivate underutilised spaces of the city. Given this argument, the UA types have been reduced to six instead of seven. Table 6 lists and describes the six types.

Table 6: Aarhus UA types – revised version

	UA type description	Nº	%
1	Public, Intra urban (Between buildings), Top-down LG + other actors, Low-tech	127	53,6
2	Public, Intra urban (Edible), Top-down within local government, Low-tech	59	24,9
3	Public, Intra urban (Leftover + transitional), Bottom-up + TA, Low-tech	30	12,7
4	Semi-public, Intra urban (Between buildings), Bottom-up + TA, Low-tech	10	4,2
5	Private, Peri urban, Bottom-up + TA, Low-tech	4	1,7
6	Public, Peri-urban, Top-down LG + other actors, Low-tech	7	2,9
	TOTAL	**237**	**100**

Map 7 illustrates the location of the different types in Aarhus municipality



Map 7: Spatial location of Aarhus UA typology

Having defined, Aarhus UA typology the following section reflects how this typology addresses (or not) the particularities of the other SiEUGreen showcases.

4.2. SiEUGreen UA typology

The development of Aarhus typology was a great exercise to better understand UA practices in Aarhus. Nevertheless, due to the specificities of this showcase, the types identified for Aarhus do not acknowledge the characteristics of the other showcases. As seen in Table 6, four out of six types acknowledge different modalities relate to the spatial dimension of intra-urban agriculture (e.g. leftover, transitional) which is not very relevant for the other showcases. Furthermore, the deployment of low-tech technologies does not match the high technologies that will be deployed in the other showcases. This indicates that UA at the urban level needs to be understood in terms of a range of diverse initiatives. Table 7, provides an overview of the other SiEUGreen showcases in relation to the land-use dimensions.

Table 7: Overview of SiEUGreen showcases in the relation of land use dimensions

Showcase	Initiative	Spatial	Institutional	Functional	Land ownership
Hatay	Women's' cooperative	Peri-urban	Cooperative	Low- tech	Private
	Green-house	Peri-urban	Public	High- tech	Public
Fredrikstad	Cicignon Park	Intra-urban	Private – mix?	High-tech	Private
Beijing	Green-house	Peri-urban	Public	Low and High-tech	Public
Changsha	Futiancangjun development	Intra-urban	Private	High- tech	Private
Aarhus	Taste Aarhus Programme	Intra and peri-urban	Public, private actors	Low-tech	Public, private, semi-public

As can be seen in Table 7, the cases are quite different from each other. Given these differences, some adjustments were necessary to enable the inclusion of the characteristics of all SiEUGreen showcases. These adjustments included the simplification of attributes and the inclusion of new ones. Inspired by COST, (2016), the strategy of simplifying but, at the same time, including the most significant particularities of all SiEUGreen showcases required conceiving each UA dimensions within a continuum. This meant that the divides (e.g. peri-urban / intra-urban) settled the limits (two extremes) of the 'continuum', but 'in-between' these limits many particularities could be acknowledged.

Regarding the spatial dimension 'peri-urban and intra-urban attributes are the main attributes to characterize all the showcases. Within this 'continuum' the sub-categorization of intra-urban spaces (e.g. left-over spaces) may not be directly addressed but are not omitted. Fredrikstad and Changsha' showcases also include zero acreage UA (e.g. UA in balconies, roof-tops) which was not acknowledged in the Aarhus typology. But, as shown in Figure 15, conceiving the UA dimensions as a continuum allows the inclusion of all these particularities.

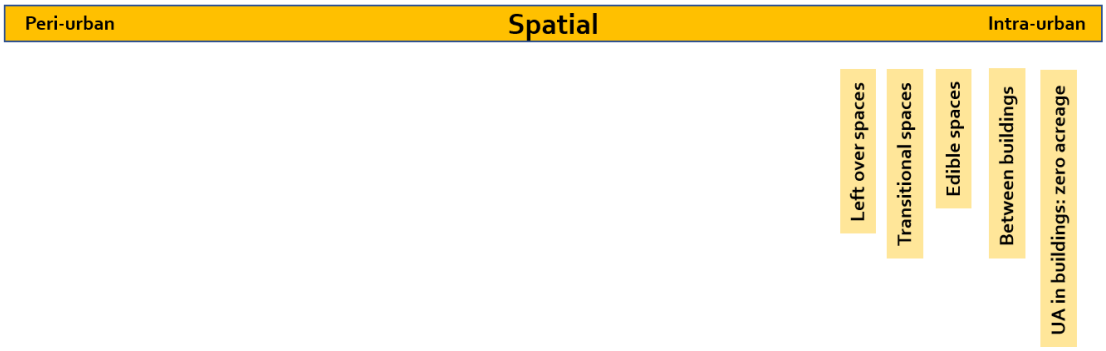


Figure 15: Spatial dimension continuum

In relation to the functional dimension, the introduction of high tech as a category in the typology was necessary to acknowledge the implementation of sophisticated techniques (e.g. hydroponics, aquaponics) that will be deployed in the other showcases. As argued above and showed in Figure 16, the interim between the low-tech and high tech allows acknowledging different technologies.

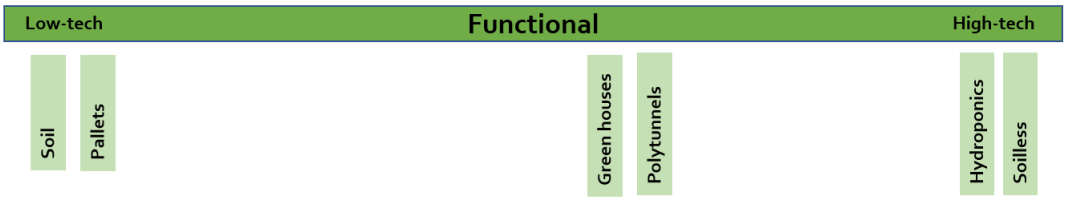


Figure 16: Functional dimension continuum

Although, most of the categories used to describe the institutional dimension in Aarhus case find correspondence with the other showcases was needed to include an extra category to be able to describe the developments that will take place in Fredrikstad and Changsha, in which the private sector has a quite important role. Table 8 describes the final categories.

Table 8: Institutional attributes

Attribute	Aarhus	Hatay	Fredrikstad	Beijing	Changsha
Bottom-up with support of local government	X				
Top-down coordinated within local government	X			X	
Top-down coordinated local government and other actors (other public actors + social enterprise + civil society organisation)	X	X		X	
*Top-down planning initiatives that include market actors			X		X

*New category added

Following the same reasoning above, all the categories of the institutional dimension were also placed within a 'continuum' delimitated by 'bottom-up' and 'top-down' (see Figure 17)

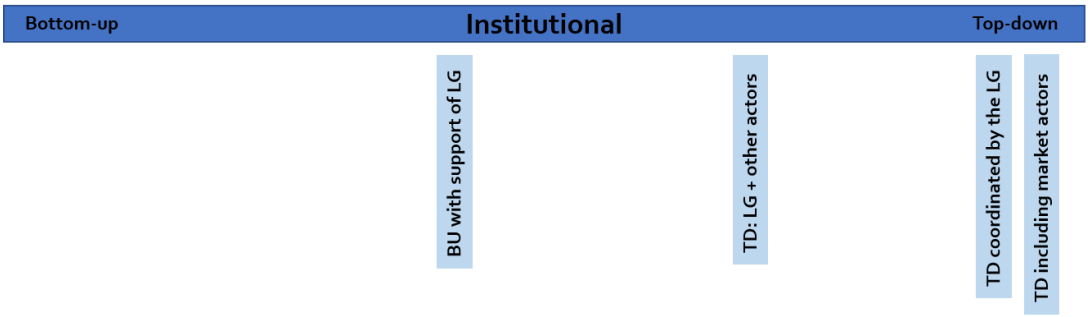


Figure 17: Institutional dimension continuum

As shown in Figure 18, the categories addressing land ownership ranged from private to public land. Within this spectrum, semi-private ownership seen in UA initiatives in Aarhus can be accredited.

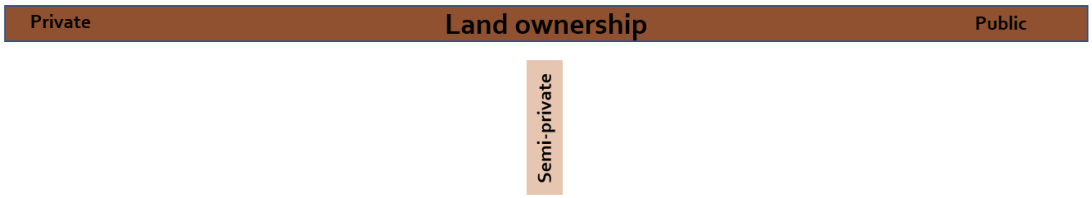


Figure 18: Land ownership continuum

The in-depth study of the UA initiatives in Aarhus showcase was very useful to uncover correlations between different UA dimensions. For example, this study revealed that most of the UA initiatives performed in intra-urban spaces take places in public land while peri-urban UA was carried out in private land. Similar interrelations could be drawn from the functional and institutional dimensions. Aarhus UA initiatives suggested that bottom-up initiatives deploy low-tech technology. Figure 19 shows how the UA dimensions could relate to each other.

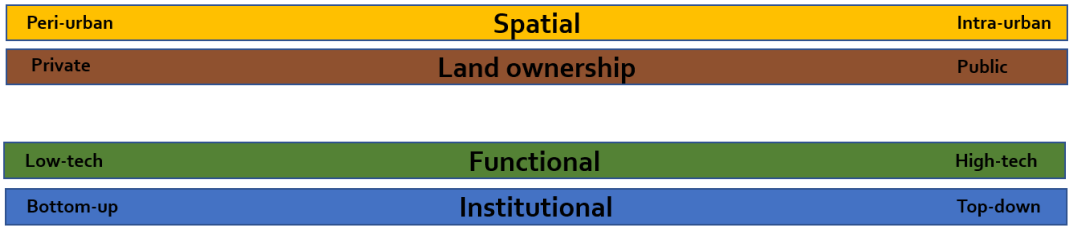


Figure 19: Combining the different UA dimensions

Despite these assumptions holding true for some of the SiEUGreen showcases (e.g. the green-houses of women's' cooperative takes place in private land located in the peri-urban area of Antakya), there are exceptions. The green-house in Hatay is being built in public land located in the fringe of Antakya. Similarly, Futuancangjun project, in Changsha is an investment located within the city (intra-urban) that uses private land. Given these specificities, and

keeping the concept of representing the UA initiatives within a continuum all the SiEUGreen showcases can be acknowledged (and plotted) in the framework illustrated Figure 20

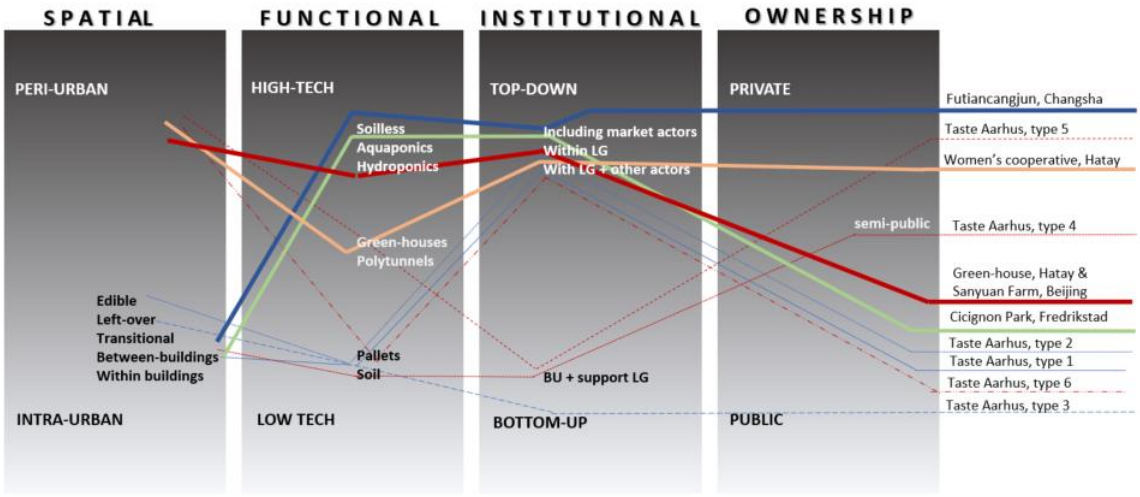


Figure 20: SiEUGreen typology

As Figure 20 shows this framework allows 'situating' all SiEUGreen showcases while acknowledging their specificities.

Four additional types can be added to the Aarhus typology. Among these, one of them includes the characteristics of both Sanyuan Farm in Beijing and the green-house in Hatay. The types describing Cicignon Park in Fredrikstad and Futuancangjun in Changsa differs only in respect of land ownership. While in Futuancangjun project, the developer bought the land from the government in Cicignon Park the developer has bought the right to build in the land but not the land as such, so despite being used by a private actor the land remains public. This difference in legislation, however, does not play a critical role for UA.

Among the SiEUGreen types, there is a balance between UA initiatives located in peri-urban as well as intra-urban spaces. Aarhus is the showcase that present initiatives in both peri-urban and intra-urban environments. Nevertheless, the latter accounts for the greater number of initiatives.

Top-down initiatives driven by private investors, in the showcases of Fredrikstad and Changsha, may suggest that UA is becoming a label for urban sustainability. In both cases, the use of high technologies seems promising overcoming tensions between different uses of land in densely populated areas. In these developments, UA will be implemented in common green areas but mainly within private residential units (zero acreage). The performance of both investments in engaging coming residents in UA practices remains to be seen. Despite this uncertainty, both showcases offer a new perspective, in which urban development might go

hand in hand with the practice of UA. Still worth to highlight that this 'new perspective on UA', has been driven by private actors with a great focus on the use of private spaces for UA. This responds to new demands for sustainable living among the middle and upper class.

Except for the UA initiatives in the Women's' cooperative in Hatay, the Futuancangjun project in Changsha, and type 5 in Taste Aarhus, in the remaining types, UA is performed in public spaces. This may indicate that public land is still the major resource for UA in cities.

As can be seen in Figure 20 the public sector is the main coordinator of UA initiatives. It has different roles in facilitating access to land, removing legal barriers, promoting UA as development strategy (e.g. Taste Aarhus Programme), supporting financially (e.g. construction of the green-houses in women's cooperative) and building partnerships with civil society (e.g. Taste Aarhus).

Taste Aarhus ambition of creating more socially inclusive places and communities, through edible resources and urban farming relies on the proliferation of UA across the city. In this respect, the quantity and the spread location of UA initiatives seem to play an important role. Thereby, and in contrast with the other showcases, Taste Aarhus deploys low technologies, making it possible for all communities' members to be engaged.

A lesson learned from the development of this typology is that UA at the urban level needs to be understood in terms of a range of diverse initiatives. This typology, however, can accommodate the diversity of the cases while providing a framework that allows analysing the cases by highlighting their similarities and differences.

5 Concluding remarks and next steps

The SiEUGreen typology has reduced the complexity and diversity of cases into a smaller number of more intelligible types and, by doing this, has improved the 'conversation' between the different showcases. The discussion above proves to be relevant for many reasons other than just describing the cases and highlighting their similarities and differences. For example, this typology can inform strategies for engagement of stakeholders, assist knowledge exchange between the showcases, and advise business models.

The development of Cicignon Park in Fredrikstad could be inspired by the example of using transitional spaces in Aarhus (e.g. UA occupying temporary construction sites such as Pier 2). Allocating pallets in the construction site and inviting the local community to engage in UA practices seems a successful strategy to involve people and popularise the area. This shows the potential of UA to make otherwise unattractive sites a place of social interaction. One could argue that the temporary use of the land for UA might be also beneficial for the investor, who enjoys the status of contributing to 'greening' the city.

The women's initiative in Hatay is one example of a new business model that arises from the increasing demand for seasonal, organic and locally grown food from urban dwellers and the demand of consumers to have knowledge about the origin of the food they eat. In relation to resource efficiency, this business model also contributes to reducing transport emissions by shortening the distances between producers and consumers.

By providing a structured conversation between the cases, the typology could also be the first step for initiating **knowledge exchange** among the cases.

When it comes to food security, resource efficiency and societal inclusion, there is a lack of strong evidence suggesting that a specific spatial or technological arrangement can deliver significantly better or worse UA outcomes. This means that there is no typical or uniform good practice model for UA, but it can take various forms, types and functions (Lohrberg et al., 2016; RUAF, 2016) and the knowledge and insight are usually gained from the case study analyses.

For example, as argued by Lohrberg et al. (2016), the scale of the initiative should not be equated with a larger **societal impact**. Even small initiatives on a piece of vacant land in the inter-urban area could involve a large share of residents and have a higher contribution to resource efficiency and societal inclusion, as compared to a larger peri-urban farm that operates in isolation with the poor engagement of citizens.

The spatial aspects of UA may have an impact on food security and societal inclusion in several ways. Food security refers to the state where all the members of a community have access to ‘‘culturally acceptable, nutritionally adequate food through local, nonemergency sources at all times’’ (Opitz et al., 2015). When looking at food security from the perspective of food availability (one of the pillars of food security), then **PUA** may have a larger potential impact on food security than **UA** due to larger size of the plots, typically wider range of products cultivated, the application of more advanced technology (functional dimension) and higher level of professionalism which results in higher yields per farm (Opitz et al, 2015). From this perspective, a Greenhouse in Hatay and a Women’s cooperative may have the highest contribution to food security among all the showcases. The Turkish showcases aim at producing high yields in order to be economically profitable and benefit the disadvantaged communities. At the same time, the **size of yield** does not guarantee food for the disadvantaged inhabitants and it does not necessarily contribute to food accessibility and affordability which are the other two pillars of food security. The initiatives in Hatay address these issues by engaging the disadvantaged women and refugees in UA practices.

While UA is frequently associated with **societal inclusion** due to its perceived benefits for health, skill-building and jobs, contribution to community development and food security, this assumption should be taken with caution (Horst et al.,2017). In fact, UA may reinforce and deepen societal inequities by benefitting more privileged communities and resourced organisations, as well as contributing to marginalisation and even displacement of socioeconomically disadvantaged households. For instance, UA can further exacerbate the processes of gentrification, as UA projects can make affordable neighbourhoods more attractive to economically advantaged groups, which in turn increases the cost of living and leads to gentrification (e.g. in Vancouver) (Safransky, 2014). In cities such as New York, it was found that community gardens contribute to higher home prices (Horst et al., 2017).

When it comes to **food security**, UA may not be an effective strategy to increase food security for people who lack access to land, good growing conditions and skills needed to practice UA (EPRS, 2017). This suggests that **spatial characteristics** (e.g. neighbourhood characteristics such as community members profile and land price) of UA initiatives may have an impact on food security and societal inclusion.

These are relevant aspects to consider when looking at the Fredrikstad showcase that is located in a high-cost area with a high land price and the exclusive apartments will be affordable only for the rich. This context questions the potential of this showcase to contribute

to societal inclusion. Although there are no known plans to this end to engage vulnerable groups in UA activities in Fredrikstad, this potential can be explored through the educational initiatives that will be coordinated by NMBU and NIBIO in the site. The innovative waste treatment based on circularity will fulfil educational purposes to the students from the University as well as to the general public. By targeting students and other interested community actors the educational courses could contribute to a higher societal inclusion.

Ensuring societal inclusion has been the cornerstone of Taste Aarhus programme. It promotes UA 'for all' – for people with different interests and backgrounds, ambition levels, physical and economic possibilities; and UA is used as a tool to strengthen the community spirit and engagement. Also, in terms of the functional aspects (technology), Taste Aarhus initiatives focus on low-tech methods, thereby ensuring their affordability and wider application by all society members. UA initiatives in Aarhus are spread across the city (see Map 1) and are not designated to some specific neighbourhoods. Also, the profile of the practitioners is highly diverse, in terms of gender, age and socioeconomic status. The impact of UA on land prices or triggering gentrification have not been observed possibly due to the widespread nature of the initiatives (geographically and spatially).

A **functional dimension** may also be important to consider when striving to achieve social inclusion and food security objectives. While high-tech intensive methods of farming may result in potentially higher yields and increased resource efficiency, the associated high costs and specific knowledge required to implement them may grant access to such technologies only by the privileged groups, thereby reinforcing societal inequalities. There is a strong link between the functional dimension and resource efficiency outcomes. Functional aspects of UA and managerial practices play a decisive role in enabling or hindering increased resource efficiency.

Fredrikstad is among the inspirational examples of a multi-storey housing/residential area aiming to achieve high resource-efficiency performance by deploying high-tech innovations and technologies in the field of water and sewage treatment management. This showcase is primarily seen as a test-bed for the environmental technologies that contribute to increasing resource efficiency and circularity. The contribution of UA to food security and societal inclusion is less evident and could be further promoted.

While it remains unclear to what extent materials are recycled on-farm, the recycling of organic materials, such as manure or plant residues, is a common practice among the majority of urban farmers (Piorr et al. 2018), regardless their spatial allocation.

Finally, it is important to acknowledge that the success of UA initiatives and their potential to contribute to food security and societal inclusion objectives is attributed to the enabling institutional framework, ensuring both formal and informal institutional support, and facilitating different types of partnerships and actors' constellations. All showcases have been to some extent supported by the public institutions, either financially, strategically, or by removing barriers for UA practices.

These reflections about the contribution of UA for the other pillars (food security, resource efficiency and societal inclusion) and their relation to the SiEUGreen typology are to be further explored in D1.4 which will investigate guidelines for interactive impact assessment of UA in social and economic terms.

5.1. Indicators

The research carried out in D1.1. discussed the relevant quantitative data sets available at the national, regional and municipal level for the showcase locations. In this deliverable (D1.2) we developed a theoretical and methodological framework that sustains a coherent UA typology that covers the specificities of the different showcases. In D1.4. that refers 'to innovative guidelines for interactive impact assessment of UA in social and economic terms, a further data collection is likely to be more fine-grained, honing in on specific geographical areas, or even sites, and engaging in a more meaningful way with stakeholders and participants.

The goals identified through D1.1 will continue to guide data collection throughout the SiEUGreen project, though they may, of course, be refined based on new knowledge as it is acquired. Table 9 provides an overview of these goals (as refined based on the findings of D1.1) alongside recommendations for data collection going forward.

Table 9: UA pillars, goals, potential methods and indicators

Pillar	SiEUgreen related goals	Potential methods
Land use	- Secure land for UA - Increase land efficiency for UA - Identifying the potential and hindrances for UA - Create greener urban landscapes – securing political and institutional support & monitoring	- Detailed spatial analysis targeted to relevant locations - Interviews with planners and other relevant professionals (local level)
Food security	- Increase access to high-quality food that is healthy, nutritious and contamination-free - Increase understanding of the contribution of UA to the urban food system	- Participants surveys - Interviews with planners and other relevant professionals (local level)

Resource efficiency	- Mitigate environmental impacts through UA implementing novel technologies - Promote resource efficiency in relation to UA applying quantitative measures - Increase understanding of the contribution of UA to a circular economy and green growth	- Small-scale experiments - On-site measurements - Monitoring of technology implementation
Societal inclusion	- Increase understanding of the social and economic potentials of UA - Improve access to recreational activities - Increase social cohesion - Create jobs - Increase knowledge of organic gardening practices - Improve the quality of life - Improve social, economic and cultural governance of UA - Improve children's knowledge of healthy food - Increase social capital through UA	- Participant surveys and interviews (targeted and longitudinal) - Collection of demographic data from participants accompanying any other data collection - Stakeholder mapping

Having reflected on the potential methods used to address the goals related to each of the UA pillars, Table 10 lists some of the indicators for measuring the potential contribution of the SiEUGreen showcases for the each of UA pillars. The listed qualitative and quantitative indicators are suggested based on data availability for each showcase. The data availability will be further investigated through communications with the stakeholders from each showcase.

Table 10: Indicators for each showcase

Pillar	Aarhus	Hatay	Fredrikstad	Beijing	Changsha
Land use	Housing prices as an indication of land price; UA location in relation to population density; UA location in relation to building footprints; Spatial distribution of UA initiatives; Land ownership of UA sites;	Land used for UA (m^2) Land ownership Spatial distribution of UA initiatives; Land ownership of UA sites;	Land used for UA (m^2) Zero acreage UA (m^2) Spatial distribution of UA initiatives; Land ownership of UA sites; UA location in relation to population density;	Land used for UA (m^2) Spatial distribution of UA initiatives; Land ownership of UA sites;	Zero acreage UA (m^2) Spatial distribution of UA initiatives; Land ownership of UA sites;
Food security / sovereignty	Information on edible resources in the city;	Volume of food production; Household expenditure on food;	Household expenditure on food;	Volume of food production; Household expenditure on food;	Household expenditure on food;
*Resource Efficiency	Technology deployment (specific for each technology type)	Technology deployment (specific for each technology type)	Technology deployment (specific for each technology type)	Technology deployment (specific for each technology type)	Technology deployment (specific for each technology type)
Societal Inclusion	Number of UA initiatives; Number of people involved in UA initiatives; General public access (being able to engage) to UA; Management type of UA; Number of followers of UA initiatives in social media; Number of visitors of Taste Aarhus website and Green embassy. Socio-economic, gender and age profile of UA practitioners;	Number of UA initiatives; Number of people involved in UA initiatives (women from the cooperative and employees of the green-house); General public access (being able to engage) to UA; Income from sales; Number of jobs created; Number of refugees engaged in the green-house; Number of educational activities in the green-house;	General public access (being able to engage) to UA; Housing price; Number of educational activities in the green-house;	General public access (being able to engage) to UA; Number of educational activities in the green-house;	General public access (being able to engage) to UA; Housing price;

*Resource efficiency indicators will be specified in WP2

As shown in Table 10 of the limitations for using the suggested indicators is the lack of comparable data across the cases.

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7 Appendixes

7.1. Appendix A – Interviews templates

Stakeholder: planner

- Could you generally explain how is the planning system in Turkey? (i.e. how is the relationship between the national, regional and local levels of planning? In Sweden, for example, the local level has a very strong power of decision. How is it in Turkey? Which level holds the power: what can the regional and local level do?
- Do you know how national policies regard urban and rural planning? (i.e. are there any plan and/or policies at the national level that links rural and urban planning in Turkey?
- In a region like Hatay that has a strong agricultural profile (produces fruits and veggies in large scale, how do you see the role of urban agriculture?
- Do the planning documents at the local level make any linkages between urban, rural and environmental planning? For example, do any plan emphasize the role of UA for the environment or for producing food close to the consumption markets in cities?
- From which year is the last version of your urban plan for the development? How often is it revised?
- How is the process of making/revising the urban plan for the development? Who is involved? Is there public participation in the process?
- What is the focus of the urban development plan? Economic and infrastructure developments and/or socio-ecological problems are also highlighted on the agenda?
- How do the plan regard land use? Is there zoning that specifies where houses, industries, should be in the city? Does the plan also pinpoint activities allowed/forbidden in the different zones? If yes, how is the agriculture activity regarded in the plan?
- In the local planning documents can one see initiatives promoting and integrating urban agriculture in city planning, zoning and building standards?
- Is there any attempt including urban and peri-urban agriculture and forestry in land use planning, city climate change adaptation and disaster risk reduction?
- How do the government/or legal documents acknowledge UA (poor, good understanding; support of UA)? How do official documents address UA (as mean to overcome poverty, an activity to be carried out by a professional, a mean to promote inclusion, as a strategy for climate/resilience, etc.)?
- What are the incentives/ restrictions for UA? Is there 'legal/planning' mechanisms (laws, restrictions, etc.) that guarantee urban land for agriculture?
- Do planning documents at local level addresses 'land security' for urban agriculture? If yes, how?
- What is the relationship between food system planning and urban planning?

Stakeholder: expert with knowledge in agriculture, food systems, food security

- Can you tell us about how the food system is managed in Turkey? What types of actors are involved in the policymaking process? At what level/s of government do different responsibilities sit? What is the role of local and regional governments? How does food system planning, and urban planning interact? (A food system is the path that food travels from field to fork. It includes all the activities involved in the production, processing, transporting, consumption and disposal of food.)

- How is the policy regarding locally produced food? Does the government offer any support? For example, is there any incentive to implement preferential public food procurement for the public sectors (hospitals, schools, offices)? Any tax or other types of incentives offered for businesses who use locally produced food?
- How is the situation for Turkey with relation to food security (e.g. imports versus exports; stability of relationships with food-importing nations)? What are the main concerns in the short, medium and long term? How do you regulate food security?
- Do you have a national policy to support the more resource-efficient products and services related to UA?
- How is national policy/municipal legislation regarding waste treatment, e.g., disposal of electrical and electronic equipment (e-waste), waste separation, wastewater treatment, etc.? Do you have a supportive policy for renewable energy used in UA?

Regional level

- How is the situation for Hatay Region with relation to food security? How much of the food consumed in the region is produced locally? Where does the rest of the food come from? Does the region export food? How stable is this supply currently and what factors are likely to influence it in the short, medium and long-term future? What are the key concerns related to food security in the region?
- Are there any concerns related to the contamination of food? What about other aspects of quality?
- How hard/easy is it to get access to fresh food in the region? Physical accessibility (e.g. grocery stores, markets)? What about price - how does fresh food (e.g. fruits, vegetables, meat) compare to other types of food? Are there particular challenges in different neighbourhoods/areas in accessing fresh food?
- What are the main challenges low-income groups face with respect to accessing high-quality, nutritious food? What is the potential for UA to address food security concerns for low-income groups?
- How are urban farming practices regulated with relation the food standards and quality? What are the challenges for regulation in this space? What improvements are necessary?
- How do you see the potential for UA to contribute to food security in the Hatay Region in the short, medium and long term? What steps are necessary to ensure this potential is reached OR to increase this potential (if it is seen as low)?
- Do you have the policy to support implementing innovative agricultural technology on-site? If yes, please elaborate. (Green, blue, yellow)
- Is there any local recycling system at the household level?
- Do you have plants producing renewable energy? What is the energy structure consumed on-site (fossil fuel, biogas, biomass, etc.)?

Stakeholder: UA practitioner who works closely with the showcase

- How did this initiative emerge? (LU)
- What will be grown at the showcase location? Who will have access to the food, and how? (FS)
- Will there be any animals or insects involved (e.g. hens, bees)? (FS)
- How did you (your association) have got the right to use the land for UA? (LU)
- Did you (your association) face any conflicts /incentives to get access to this land for UA? (LU)
- Which stakeholders are represented in the project? What groups do they represent? (SI)

- Which is the actor's role ('stake') in UA? For example: (SI)
- Do they produce/ process or sell food?
- Do they facilitate residents' access to food (administrator)?
- Do they have other interests (e.g. politicians who want to get votes by supporting UA; a developer who wants to profit of 'green labels', etc.
- What decision-making structures exist/are anticipated with relation to the showcase? (SI)
- What are the competences of the different actors? (SI)
- Who holds the most of information/power? (SI)
- Who can take decisions? (SI)
- Who are the stakeholders affected by decisions? (SI)
- Highlight changes in the network of stakeholders in the different phases of implementation (planning, implementation and operation). Different diagrams should be drawn?? (SI)
- What are the main challenges low-income groups face with respect to accessing high-quality, nutritious food? What is the potential for UA to address food security concerns for low-income groups?
- How are urban farming practices regulated with relation the food standards and quality? What are the challenges for regulation in this space? What improvements are necessary?
- How resource efficiency regarding waste management, water management, and energy pattern will be/has been improved through new technologies in Hatay? How does wastewater treatment look like? Do you have any embedded energy-recycling system in your newly developed properties/gardens? How do you reuse greywater? What are the energy production and consumption pattern (what comes in and what come out? What is the material production/consumption pattern (what comes in and what comes out)?
- Will you/citizens choose more resource-efficient products and services? Do you/citizens recycle in daily life, or is there waste classification system at the household level (food waste, paper, plastic, metal, etc.)? Do you/citizens have any household agricultural equipment (balcony garden, etc.)?

Stakeholder **business manager** (Beijing)

- How did this initiative emerge? (LU)
- What will be grown at the showcase location? Who will have access to the food, and how? (FS)
- Will there be any animals or insects involved (e.g. hens, bees)? (FS)
- How did you (your association) have got the right to use the land for UA? (LU)
- Did you (your association) face any conflicts /incentives to get access to this land for UA? (LU)
- Which stakeholders are represented in the project? What groups do they represent? (SI)
- Which is the actor's role ('stake') in UA? For example: (SI)
- Do they produce/ process or sell food?
- Do they facilitate residents' access to food (administrator)?
- Do they have other interests (e.g. politicians who want to get votes by supporting UA; a developer who wants to profit of 'green labels', etc.
- What decision-making structures exist/are anticipated with relation to the showcase? (SI)

- What are the competences of the different actors? (SI)
    a. Who holds the most of information/power? (SI)
    b. Who can take decisions? (SI)
    c. Who are the stakeholders affected by decisions? (SI)
    d. Highlight changes in the network of stakeholders in the different phases of implementation (planning, implementation and operation). Different diagrams should be drawn?? (SI)
- What are the main challenges low-income groups face with respect to accessing high-quality, nutritious food? What is the potential for UA to address food security concerns for low-income groups?
- How are urban farming practices regulated with relation the food standards and quality? What are the challenges for regulation in this space? What improvements are necessary?
- How resource efficiency regarding waste management, water management, and energy pattern will be/has been improved through new technologies in Hatay? How does wastewater treatment look like? Do you have any embedded energy-recycling system in your newly developed properties/gardens? How do you reuse greywater? What are the energy production and consumption pattern (what comes in and what come out? What is the material production/consumption pattern (what comes in and what comes out)?
- Will you/citizens choose more resource-efficient products and services? Do you/citizens recycle in daily life, or is there waste classification system at the household level (food waste, paper, plastic, metal, etc.)? Do you/citizens have any household agricultural equipment (balcony garden, etc.)?

Stakeholder technology provider (Beijing – Green Valley Sprouts - and Changsha)

- How did you get engaged in the project?
- What is your responsibility for the project?
- What are the technologies that will be implemented in each showcase Cicignon Park and Changsha? Who has decided which technologies?
- How have these technologies been selected for these cases?
- How beneficial are they for the resource efficiency of the developments?
- What would be the approximate cost for the implementation of these technologies?
- Understanding that the success of the implementation of the technologies is dependent on the residents' behaviour, do you have any strategy to accomplish it?
- How do you see the differences and similarities between Fredrikstad and Changsha showcases?
- In your opinion in which of the showcases the technologies will be easily implemented and assimilated by the target groups? Justify your opinion

Stakeholder: Architect and developer Changsha

- How did you get engaged in the project; open competition?
- What were the main ideas of the project?
- How has the Fredrikstad municipality influenced the project?
- How many proposals were made for the area?
- Has UA changed the conception of the project? If yes, in what way?
- What is the program of the project? The number of apartments, built square meters?
- What is the profile of the resident of Cicignon Park?

- Have you faced any challenge (resistances to the project)? If yes, please describe.
- Have you used any participatory technique when designing the project (e.g. surveys about neighbours' expectation)?
- Was it difficult, sensitive to deal with an area (hospital) that people may feel attached to? How? Give examples.
- How the idea of the project came about?
- Who has been involved in the development of the project? Tell a story!
- What were the main ideas of the project? Have they changed?
- How was the engagement of the Cicignon Park in the SiEUGreen project?
- What are the implications of the engagement in the SiEUGreen project (financial, responsibilities,
- When was UA introduced as an important factor in the project?
- What were the main challenges to developing the project?
- What will be the average cost of the sqm?
- Who is the target public?

Interview with neighbours – Fredrikstad

- Are you informed about the development of Cicignon Park in your Neighborhood?
- If you are, can you please describe what you know about the project?
- How do you feel about it? Do you think this development will be good for you and for your neighbourhood? Why?
- What are the positive aspects of the development of this area? (vibrant, valorization of your own house)
- What are the negative aspects of the development of this area? (gentrification, raising taxes, pollution, etc.)
- Has your opinion been asked about this development? (by the municipality, by the architects, by the developer)
- Have you participated in any public discussion about the development?
- Regarding UA, would you mind living close to an area with bees and cultivation of vegetables and fruits? Please justify your answer

7.2. Appendix B – List of informants

Table 11: List of informants by showcases

Interviewee' name	Affiliation	Interviewed in
Aarhus Showcase		
*Interviewee AA1	Manager of Taste Aarhus Programme	April and October 2018
Interviewee AA2	Civil servant at Taste Aarhus Programme	April 2018
Interviewee AA3	Civil servant at Taste Aarhus Programme	October 2018
* Interviewee AA4	Chef of Aarhus Planning Department	May 2018
** Interviewee AA5	Initiated one of the UA practices: Søvangens Boligforening	April 2018
* Interviewee AA5	Coordinator of Braband UA initiative: Fællesgartneriet	*May 2018 and October 2018
**Anonymous AA1	Coordinator of UA 'Life in the churchyard'	April 2018
**Anonymous AA2	Lady who has a plot in Braband UA initiative	April 2018
Interviewee AA6	Planner from Aarhus Municipality	October 2018
Interviewee AA7	Manager of Korsager Home	October 2018
Interviewee AA8	Naturecollaboration	October 2018
Hatay Showcase		
* Interviewee HA1	Food engineer, Hatay Municipality	*April 2018
*Anonymous HA1	Faculty Member in Hatay Mustafa Kemal University, City and Regional Planning Department	*April 2018
* Interviewee HA2	Member of Women's' cooperative	*May 2018
* Interviewee HA3	Entrepreneur of Women's Cooperative	*April, *May and November 2018
* Interviewee HA4	Chef of the department of parks and green areas in Hatay	November 2018, January 2019
* Interviewee HA5	International Office Hatay Municipality	April 2018 and November 2018
* Interviewee HA6	International Office Hatay Municipality	November 2018
Interviewee HA7	Planner Hatay Municipality	November 2018
Interviewee HA8	Planner Hatay Municipality	November 2018
Interviewee HA9	Botanic Metropolitan - Hatay Municipality	November 2018
Interviewee HA10	Samandag Municipality Director	November 2018
Fredrikstad Showcase		
Interviewee FR1	Nordic Group Holdings, janitor of Cicignon Park	January and October 2018
**Anonymous FR1	Women who worked in the surroundings of Cicignon Park	October 2018
**Anonymous FR2	Senior walking around the area	October 2018
Interviewee FR2	Fylke in Oslo	October 2018
Interviewee FR3	Planner at Fredrikstad Kommun	October, 2018
Interviewee FR4	Aacqua	October 2018
Interviewee FR5	Nils Torps Architecture	October 2018
** Interviewee FR6	Owner of Café Cicignon	October 2018
** Interviewee FR7	An employee in a clinic close to Cicignon Park and a resident of the surroundings	October 2018
Interviewee FR8	Nordic Group Holdings	October 2018
**Anonymous FR3	Two teenagers in the mall	October 2018
Beijing Showcase		
Interviewee BE1	Professor of CASS	March 2019
Interviewee BE2	Director of Sanyuan Farm	March 2019
Interviewee BE3	Director of Photon	March 2019
Interviewee BE4	Director of Beijing Green Valley Sprouts Co Ltd	March 2019
Interviewee BE5	Professor of CAAS	March 2019
Interviewee BE6	Senior engineer of Hunan Hengkai Environmental Protection Science & Technology Investment Co.Ltd (Hhepsti)	March 2019

Changsha Showcase		
Interviewee CH1	Engineer of Hunan Hengkai Environmental Protection Science & Technology Investment Co.Ltd (Hhepsti)	March 2019
Interviewee CH2	Engineer of Hunan Hengkai Environmental Protection Science & Technology Investment Co.Ltd (Hhepsti)	March 2019
Interviewee CH3	Salesperson of Futiancangjun Property	March 2019
Interviewee CH4	Salesperson of Futiancangjun Property	March 2019

*Interviews performed by skype
**Ad hoc interviews

7.3. Appendix C – Agendas of the study visits

Table 12: Agendas of the fieldwork

Aarhus: study visit in April 2018	
Date	**Activities**
16.04.2018	12:00 – 18:00 Bike tour to the following UA initiatives: - Pier 2 Harbour Garden - Coffee grounds to Gourmet - The Dome of Visions - Riis Forest - The Orchard of Skovvejen - Life on the churchyard - Greenhousery
17.04.2018	9:00 – 15:00: Study visit to the following UA initiatives - Fællesgartneriet. - Verdenshavernes Venner – The Gardens of the World - Søvangens Boligforening - Den Grønne Ambassade - The Green Embassy
Fredrikstad: study visit in October 2018	
Date	**Activities**
22.10.2018	9-11: Visit A-AQUA in the morning 14-16: Visit NIELSTORP+Arkitekter in the afternoon
23.10.2018	Visit Fredrikstad Kommune whole day 16-18: Meet planner in Fredrikstad Kommune
24.10.2018	10-12: Meet planner from NG Development AS in the morning 13:30 -: Meet Ellen Marie Fylkemannen
Aarhus: study visit in October 2018	
Date	**Activities**
25.10.2018	9.00 – 11.30: Meeting inside with staff from Taste Aarhus Programme 13:00- 14:00: Visit Korsager Home 14:30 – 16:00: Guided tour to Visit Nature collaboration 14.30
26.10.2018	9.00 – 10.00: - Meeting an urban planner 10:00 – 12:00: Meeting with UA practitioner/manager of Fællesgartneriet.
Hatay: study visit in November 2018	
Date	**Activities**
17.11.2018	15:35 Arrival to Hatay/ Airport-Hotel Transfer
18.11.2018	14:00 – 15:30: Interview with expert, botanic Metropolitan - Hatay Municipality 16:00- 18:00: Interview with a politician, Samandag Municipality Director
19.11.2018	10:00 12:30: Annual meeting 'Women's cooperative' 12:30 – 13:00: Meeting with Hatay mayor 13:00 – 15:00: Interview with Entrepreneur of Women's Cooperative and the Chef of the department of parks and green areas in Hatay 15:00 - 18:00: Visit women's cooperative greenhouses
20.11.2018	09:00 10:00: Interview planner Antakya 10:00-11:45: Meeting SiEUGreen and Hatay Municipality 13:30-15:00: Technical visit to the area where the green-house is being built
21.11.2018	10:00-12:30: Project Technical Meeting 14:45: Airport Transfer for Departure to İstanbul
Beijing and Changsha: study visit in March 2019	
Date	**Activities**
25.03.2019	8:30: 12:30 - Guided tour – Sanyuan Farm - Interview with the business manager - Interview with the director - Guided tour at the showcase 14:00 – 15:30: Visit *Beijing Photon Science & Technology Co., Ltd* - Interviews with the director *16:00 – 18:30: Visit Beijing* Green Valley Sprouts Co Ltd - Interviews with the director

26.03.2019	8:30 – 14:00 – Workshop with CASS and other Chinese partners - Present and discuss the D1.1 (Maps of quantitative and qualitative data for each of the showcases location) that was handed into the EU Commission in June 2018. The Chinese cases of Beijing and Changsha were not acknowledged in this report. Thereby the aim of this workshop was to present how Nordregio handled this task - Gather information for D1.2: Typologies and Indicators of UA
27.03.2019	Travel to Changsha
28.03.2019	8:30 – 12:00 – Visit Hunan Hengkai Environmental Protection Science & Technology Investment Co.Ltd (HHEPSTI) 14:00 – 15:30: Interview with the engineers 15:30 – 17:30 – Guided tour at the showcase
29.03.2019	Guided tour to Changsha

7.4. Appendix D – Glossary of UA initiatives in Aarhus

Table 13: Descriptions of the UA initiatives - field visit, April 2018

Garden	Description
#1 Pier 2 Harbour Garden Start date: 2017	The community garden PIER2 was formed in 2017 by a group of enthusiastic citizens and consists of approx. 45 small gardens built up of pallet frames. In addition, the community has established pleasant common areas, both for members of the community garden and others who are passing by to Aarhus Harbour. The community garden is temporary as it is located on a building site on Pier 2.
#2 Coffee grounds to Gourmet Start date: 2015	From Coffee grounds to Gourmet is a group, who will create a fungus experiment and grow oyster hats in coffee grounds at Aarhus harbour.
#3 The Dome of Visions Start date: 2015	The Dome of Visions project is about putting action into words and following through on new ideas in construction and urban thinking and planning. The dome is intended specially to inspire and to challenge regarding the solutions for the climate challenges to come.
#4 Riis Forest Start date: 1395 (oldest forest in Aarhus)	In the year of 1395, Her Majesty Queen Margrethe the 1st determined the demarcation of the common field at which the southern part of Riis Forrest (Riis Forest) went to the town of Aarhus. The northern part of the forest was presented to the town by His Majesty King Christian the 3rd in 1542. The main purpose of the forest is still to be a recreative area for the citizens of Aarhus city and the suburbs. Visitors are welcome in Riis Forrest 24 hours and all months the year. The forest consists of varied vegetation as well as a good system of paths and smaller roads. The herb ramsløg /rams fill the air and is closely connected to the identification of the City of Aarhus.
#5 The Orchard of Forrestvejen Start date: 2015	A group of neighbours on the Forrestvejen wanted to change an unused piece of land behind their houses. If it was cleaned for scrub and weed, apple trees could be planted for everyone's joy. It happened, and the neighbours have made a small community. They plant trees and take care of them until they grow big enough to give apples to everyone.
#6 Life on the churchyard Start date: 2016	Citizens and the cemetery manager in the municipality of Aarhus, in close dialogue, have established an area that invites the surrounding community to enjoy more edible and inspiring spaces on a sloping area at the backside of the cemetery. The establishment is of course in respect of tombs and other visitors at the cemetery.
#7 Greenhousery Start date: 2017	In the early spring of 2017, 20 people created a nice community garden to grow tomatoes, cucumbers and chilli in this big old greenhouse, which was not used for production anymore. There is room both outside and inside for many kinds of plants and activities. The Greenhousery borrows the greenhouse from the municipality.
#8 Fællesgartneriet Brabrand Start date: 2014	The community garden Brabrand lies in the scenic area of Årslev Engsø approx. 8 km. from Aarhus C. On the open air and in two large greenhouses, 100 families and individuals cultivate everything from marigolds to tomatoes and lemons. Due to the growing of greenhouses, the group can grow all year round and harvest crops several times a year. They have a strong community and hold more annual events of both professional and social nature. SiEUGreen technology to be implemented: Toilets
#9 Søvangens Boligforening Start date: April 2018	This is one of the newest gardens and is going to be a garden community made up of residents on the housing estate.

#10 Verdenshavernes Venner – The Gardens of the World Stat date: pre-dates Taste Aarhus	The Gardens of the World are community gardens in the areas of Gellerupparken and Toveshøj. In all places, herbs, flowers and vegetables are grown for decoration and use. The gardens form a framework for community, not only for those who help to grow but also for the area's other residents. SiEUGreen technology to be implemented: Polytunnels

Table 14: Descriptions of Taste Aarhus initiatives included in the field visit – October 2018

Garden	Description
Korsager Home	Korsagergården is a therapy home with 14 apartments and one common house for the residents. There is also a courtyard with a lawn and a greenhouse. Residents are expected to take as much responsibility for their own lives as possible, including asking for help when he/she needs it. It is about creating your own life on your own terms. Cooperation is expected at the home between the residents and staff members, and everyone is respected. It has autonomy and individual opinion about what is a good life matter.
Naturecollaboration	It is a nature centre with ecological principles where lots of livestock are kept, including sheep's, chickens, rabbits, horses, bees, etc. The place is part of the Children and Youth Department and offers activities for both day-care and schools in Aarhus Municipality. Daycare and primary school can register for various activities, e.g., bird watching, honey sledding, watering, the wild Viking life. As a citizen, you can grow in your own garden and cook in the outdoor kitchen.

7.5. Appendix E- UA initiatives in Aarhus – data base

Name	Land Ownership 1=public; 2=semi-public; 3=private	Spatial 1=transitional; 2=leftover;3=between buildings;4=peri;5=edible	Management 1=people;2=institutional;3=municipality	Land tenure 0=not lease (free or only open to certain people); 1=lease; 2=partly lease	Average Housing Price dkk/m2	Greenhouses 0=no greenhouses (open air); 1=with greenhouse	Functional	Aarhus UA types
PIER2 Haven - PIER2 Habor Garden (2016)	1	1	1	1	34037	0	Pallets	3
Kulhaverne	1	1	1	1	39732	0	Pallets	3
aGROhaven	2	3	1	0	36757	0	On plot, permaculture	4
Riis Skov - Riis Forest	1	5	3	0	38449	0	Nature	2
Katedralskolens plantekasser	2	3	1	0	41888	0		4
Liv på Kirkegården- Life on the churchyard (2016)	1	2	1	0	36603	0		3
Æblehaven ved Donbækhuse	1	5	3	0	49960	0		2
Driveriet – fællesskab i stort drivhus - Greenhouse (2017)	1	2	1	1	34731	1		3
Vilde æbler Moesgaard Strand	1	5	3	0	23815	0		2
Den Grønne Ambassade - The Green Embassy-blomsterne	1	5	3	0	36537	0		2
Drivhus ved Bøgeskovgård	1	3	2	0	21930	1		1
Urteeng i Tranbjerg Skov1	1	5	3	0	20286	0		2
Bomgårdshaven i Mårslet	1	5	3	0	18359	0		2
Bær, nødder og frugter lige om lidt i Østerby Mose	1	5	3	0	21084	0		2
Byvangen, playground	1	5	3	0	22505	0		2
Urteeng i Høskoven	1	5	3	0	23955	0		2
Langenæsparken	1	5	3	0	27015	0		2
Skovvejens æblelund - The Orchard of Skovvejens (2015)	1	2	1	1	39238	0	Orchard	3
Verdenshaverne - The Gardens of the World (2012) - Gelleruphaven	2	3	1	1	22437	1	Getting poly through SiEUGreen	4
Verdenshaverne - The Gardens of the World (2012) - Toveshøjhaven	2	3	1	1	16259	1		4
Fællesgartneriet Brabrand - Større fællesskab - Greenhouse (2014)	3	4	1	1	19225	1		5
Bavnebakkens frugtlund	2	3	1	0	20385	0		4
Grønt område i Stavtrup	1	4	3	0	22827	0	Playground	6
Frugtplantage i Stavtrup	3	4	1	0	26464	0		5
Lokalcenter Marselis	2	3	1	0	34677	0		4
Fra Grums til Gourmet - Coffee grounds to Gourment (2015)	1	1	1	1	34037	1	growing house	3
Lej en køkkenhave i Hørret	3	4	1	0	18833	0		5
Havefællesskabet i Marselisborg Hospitalspark	1	2	1	1	31762	0		3
Chr. Kiers Plads	1	5	3	0	33776	0		2
Frederiksbjerg Byhaver	1	2	1	1	30811	0	Grow in pallets	3
Cyanidhaven	1	2	1	0	25182	0		3

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Bærbuske i Langenæsparken	1	2	1	1	24864	0		3
Vokseværket	1	1	1	1	43513	0	Pallets	3
Oasen	1	2	1	1	36971	0	Pallets	3
Bede i Botanisk Have	1	2	1	2	38457	0		3
Gårdhave skaber nabosnak	2	3	1	0	30688	1	Pallets	4
Møllevangens Byhave	2	3	1	0	31351	0	Pallets and hens	4
Åkrogen – hvad du kan finde her	1	5	3	0	51530	0		2
Æblelund at Egå Marina	1	5	3	0	28509	0		2
Urteenge i Skødstrup Skov	1	5	3	0	21365	0		2
Hasselhegn i Skødstrup Skov	1	5	3	0	20155	0		2
Skæring Hede og Mindelunden	1	5	3	0	47037	0		2
Æblehaven i Lystrup	1	5	3	0	20424	0		2
Lystrup Skovbryn	1	5	3	0	18714	0		2
Lystrups frugt- og nøddehegn	1	5	3	0	25216	0		2
Lisbjerg Skovbryn	1	5	3	0	19056	0		2
Æbler i Lisbjerg Skov	1	5	3	0	19056	0		2
Urteeng i Mollerup Skov	1	5	3	0	26636	0		2
Mollerup Skovbryn	1	5	3	0	25483	0		2
Danmarks (måske) længste jordbærbed	1	5	3	0	29969	0		2
Æbler i Vestereng Skov	1	5	3	0	30531	0		2
Æblelund på Vestereng	1	5	3	0	31152	0		2
Æblelunden i Skejby	1	5	3	0	26047	0		2
Vorrevangsparken – en ukendt perle	1	5	3	0	30694	0		2
Frugtlund i Vejlby	1	5	3	0	28472	0		2
Fortegårdens fælleshaver	2	3	1	0	33860	0		4
Urteeng i Brendstrup Skov	1	5	3	0	23333	0		2
Søhaven i Søvangen	2	3	1	0	19301	0	pallets	4
Smag på kirsebær ved Silkeborgvej/Ringvejen	1	5	3	0	24671	0		2
Haven i krattet	1	2	1	1	30613	0		3
Åby Park	1	2	1	1	31619	0		3
Brabrandstien – en frugthave	1	5	3	0	37119	0		2
Engdalgårdsparken i Beder	1	5	3	0	18314	0		2
Frugtbuske Moesgaard Strand	1	5	3	0	27631	0		2
Vegan Community Garden	1	2	1	1	25299	0		3
Holme Byparks frugthave	1	5	3	0	24579	0		2
Smag på skoven i Åbo	1	5	3	0	18750	0		2
Sletvej Æbleskov	1	5	3	0	19217	0		2
Frederiksbjerg Bypark	1	5	3	0	42543	0		2
Vild smag i Vennelystparken	1	5	3	0	40077	0		2
Æblelund i Ryparken	1	5	3	0	23224	0		2
Rømerhaven	1	5	3	0	49963	0		2
Greenshare Community Garden	1	2	1	1	32791	0		3

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Name	Land Ownership 1=municipality; 2=state; 3=private	Spatial 1=transitional; 2=leftover;3=between buildings;4=peri;5=edible	Management 1=people;2=institutional;3=municipality	Land tenure 0=not lease (free or only open to certain people); 1=lease; 2=partly lease	This is an alternative to colomn F: Is there an explicit contract on the use of the area framing gardens? Yes=0, No=1	I have changed the categories to fit thess other places.Accessability; 0=open and inclusiv to all; 1=open, but not actively inviting; 2=only access for people invited or living there	Greenhouses 0=no greenhouses (open air); 1=with greenhouse	Functional	Aarhus UA types
Byager Skov	1	5	3	0	1	0	0	Forrest	2
Hasselhegn i offentlig skov	1	5	3	0	1	0	0	Forrest	2
Skovenge i Mollerup	1	5	3	0	0	0	0	Forrest	2
Skovenge i Skødstrup	1	5	3	0	0	0	0	Forrest	2
Skovenge i Brendstrup	1	5	3	0	0	0	0	Forrest	2
Skovenge i Tranbjerg	1	5	3	0	0	0	0	Forrest	2
Skovenge i Høskoven	1	5	3	0	0	0	0	Forrest	2
Skovbryn i Havreballe	1	5	3	0	1	0	0	Forrest	2
Skovbryn i Thorsskov	1	5	3	0	1	0	0	Forrest	2
Skovbryn i Hestehaven	1	5	3	0	1	0	0	Forrest	2
Skovbryn i Skødstup	1	5	3	0	1	0	0	Forrest	2
Skovbryn i Hørretskov	1	5	3	0	1	0	0	Forrest	2
Skovbryn i Riis skov	1	5	3	0	1	0	0	Forrest	2
Brabrand/Gellerup egekrat	1	5	3	0	1	0	0	Forrest	2
Ajstrup Strand	1	5	3	0	1	0	0	beach	2
Strandvejen, hybenkrat	1	5	3	0	1	0	0	beach	2
Strandvejen, strandkål	1	5	3	0	1	0	0	beach	2
Fortevej, hyben i parken	1	5	3	0	1	0	0	park	2
Sødalsskolen	1	3	2	0	1	1	0	plantet in the soil	1
Bofællesskabet i Elev 1	1	3	2	0	1	2	0	plantet in the soil	1
Det socialpsykiatriske bosted Provstebakken	1	3	2	0	1	2	1	plantet in the soil	1
Aktivitetscenteret Skovlund	1	3	2	0	1	2	0	pallets and smaller trees	1
Aktivitetshuset Havkærparken	1	3	2	0	1	2	0	plantet in the soil	1
Aktivitetstilbuddet Kileparken	1	3	2	0	1	2	0	plantet in the soil	1
Behandlingshjemmet Dalgaarden, Højbjerg	1	3	2	0	1	2	0	pallets	1
Bocenter Syd Grundtvigsvej 16	1	3	2	0	1	2	0	pallets	1
Bofælleskabet i Skødstrup - special	1	3	2	0	1	2	0	pallets	1
Bofællesskab i Hjortshøj	1	3	2	0	1	2	0	pallets	1
Bofællesskabet Hestehavevej 1	1	3	2	0	1	2	0	pallets	1
Bofællesskabet i Skødstrup hus 4	1	3	2	0	1	2	0	pallets	1
Bofællesskabet Stenhøj Beder	1	3	2	0	1	2	0	pallets	1
Bofællesskabet Søndervangen	1	3	2	0	1	2	0	pallets	1
Botilbuddet Windsor	1	3	2	0	1	2	0	pallets	1
Børnenes jord frugthave	1	3	2	0	1	0	0	trees plantet in soil	1
Center for bostøtte i eget hjem - Sletten Hasselager	1	3	2	0	1	2	0	pallets	1

Haslekollegiet	1	3	2	0	1	1	0	pallets	1
Kilebo, Tilst	1	3	2	0	1	2	0	pallets	1
Langkærparken, Tilst	1	3	2	0	1	2	0	pallets	1
Lyngå-kollegiet	1	3	2	0	1	2	0	pallets	1
Opgangsbofællessakb Nagelsvej Højbjerg	1	3	2	0	1	2	0	pallets	1
Opgangsbofællesskab Grundtvigsvej 14	1	3	2	0	1	2	0	pallets	1
Bofællesskabet MARS, CBH centrum	1	3	2	0	1	2	0	pallets	1
Ryhave kollegiet	1	3	2	0	1	2	0	pallets	1
Soras-kollegiet	1	3	2	0	1	2	0	pallets	1
Stefanshjemmet,	1	3	2	0	1	2	0	pallets	1
Ungetilbuddet Malmøgade 7	1	3	2	0	1	2	0	pallets	1
Børnegården Sct. Anna	1	3	2	0	1	1	0	pallets	1
Børnehuset Ajstrupvej	1	3	2	0	1	1	0	pallets	1
Børnehuset Alsvej	1	3	2	0	1	1	0	pallets	1
Børnehuset Bulderby	1	3	2	0	1	1	0	pallets	1
Børnehuset Pilehaven	1	3	2	0	1	1	0	pallets	1
Børnehuset Søsterhøj	1	3	2	0	1	1	0	pallets	1
DII 2-Kløveren	1	3	2	0	1	1	0	pallets	1
DII Børnenes Have	1	3	2	0	1	1	0	pallets	1
DII Tumlehuset	1	3	2	0	1	1	0	pallets	1
Græsbakken	1	3	2	0	1	1	0	pallets	1
Legehuset	1	3	2	0	1	1	0	pallets	1
NJ. Fjordsgadesskolen Nordlys	1	3	2	0	1	1	0	pallets	1
NJ. Fjordsgadesskolen Regnbuerne	1	3	2	0	1	1	0	pallets	1
NJ. Fjordsgadesskolen Stjerneskud	1	3	2	0	1	1	0	pallets	1
Rundhøjskolen	1	3	2	0	1	1	0	plantet in the soil	1
Vuggestuen Ankersgade	1	3	2	0	1	1	0	pallets	1
Vuggestuen Bjørnbaksvej	1	3	2	0	1	1	0	pallets	1
Vuggestuen Aarhusbo	1	3	2	0	1	1	0	pallets	1
DII Tumlehøjen	1	3	2	0	1	1	0	pallets	1
Klubberne Holmesøndergård	1	3	2	0	1	1	0	pallets	1
Børnehaven i Højvang	1	3	2	0	1	1	0	pallets	1
Klasse A Stensagerskolen	1	4	2	0	0	2	0	plantet in the soil	6
Klasse B Stensagerskolen	1	4	2	0	0	2	0	plantet in the soil	6
Klasse C Stensagerskolen	1	4	2	0	0	2	0	plantet in the soil	6
Engdalsskolen	1	3	2	0	1	1	0	plantet in the soil	1
Langagerskolen	1	3	2	0	1	2	0	plantet in the soil	1
Kompetencecenter Nord	1	3	2	0	1	2	0	plantet in the soil	1
Steen Billes Torv	1	4	2	0	0	0	0	pallets	6
Lisbjerg Skole 'Green Zone'	1	4	2	0	1	1	0	plantet in the soil	6
Straksaktiveringen	1	3	2	0	1	2	0	pallets	1

Bofællesskabet Hestehavevej 2	1	3	2	0	1	2	0	pallets	1
Botilbud Tilst Søndervej	1	3	2	0	1	2	0	pallets	1
Bofællesskabet Albertsvænge	1	3	2	0	1	2	0	pallets	1
Bofællesskabet Elev 2	1	3	2	0	1	2	0	pallets	1
Børnetilbuddet Bøgholt	1	3	2	0	1	2	0	pallets	1
Bostedet Korsagergården	1	3	2	0	1	2	1	plantet in the soil	1
Bofællesskabet Sletten	1	3	2	0	1	2	0	pallets	1
Bøgeskovgaard, aktivitetscenter park	1	3	2	0	1	0	1	plantet in the soil	1
Opgangsbofælleskab Grundtvigsvej	1	3	2	0	1	2	0	pallets	1
Bofælleskabet Skejbyhave	1	3	2	0	1	2	0	plantet in the soil	1
Samsøgade skole	1	3	2	0	1	2	0	pallets	1
Kvindehuset Viby	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Borgvold	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Carl Blochsgade	1	3	2	0	1	2	0	applejuiceproduction	1
Plejehjemmet Husumvej	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Hjortshøj	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Jasminvej	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Koltgården	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Næshøj	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Sabro	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Sandkåsvej	1	3	2	0	1	2	1	plantet in the soil	1
Plejehjemmet Solbjerg	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Tranbjerg	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Vejlbygade	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Vestervang 42	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Vestervang 44	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Vidtskuevej	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Vikærgården	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Åbygård	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Skelagervej	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Bøgeskovhus	1	3	2	0	1	2	1	plantet in the soil	1
Plejehjemmet Cereshuset	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Demens Centrum Aarhus	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Egely	1	3	2	0	1	2	0	plantet in the soil	1
Hasle Plejehjem	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Hedevej	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Hørgården 15 og 19	1	3	2	0	1	2	0	plantet in the soil	1

Plejehjemmet Kildevang	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Kløvervangen	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Madsbjerg	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Sct Olaf	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Skæring	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Søholm	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Sønderskovhus	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Thorsgården	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Fortegården	1	3	2	0	1	2	0	plantet in the soil	1
Plejehjemmet Fuglebakken	1	3	2	0	1	2	0	plantet in the soil	1
DII Spiren	1	3	2	0	1	1	0	pallets	1
dagplejen, Skødstrup Dagtilbud	1	3	2	0	1	1	0	pallets	1
Hurlumhejhuset	1	3	2	0	1	1	0	pallets	1
Holmevejs vuggestue	1	3	2	0	1	1	0	pallets	1
Børnehaven Svend-Åge	1	3	2	0	1	1	0	pallets	1
DII Væksthuset	1	3	2	0	1	1	0	pallets	1
Skjoldhøjskolen	1	3	2	0	1	1	0	pallets	1
børnehuset Vilhelm Becks vej	1	3	2	0	1	1	0	pallets	1
Amaliegården	1	3	2	0	1	1	0	pallets	1
DII Hasselhaven	1	3	2	0	1	1	0	pallets	1
Gårdhaven Rosenstien 2	1	3	2	0	1	1	0	pallets	1
Børnehaven Jasminvej	1	3	2	0	1	1	0	pallets	1
Kernehuset	1	3	2	0	1	1	0	pallets	1
DII Stationsvangen og Satellitten	1	3	2	0	1	1	0	pallets	1
Frederiksbjerg Dagtilbud	1	3	2	0	1	1	0	pallets	1
Vuggestuen Baunes Plads	1	3	2	0	1	1	0	pallets	1
Vuggestuen Marselisparken	1	3	2	0	1	1	0	pallets	1
Børnehuset Søsterhøj	1	3	2	0	1	1	0	pallets	1
Børnehuset Deruda	1	3	2	0	1	1	0	pallets	1
Lystrup Elsted dagpleje	1	3	2	0	1	1	0	pallets	1
Børnehuset Olympia	1	3	2	0	1	1	0	pallets	1
Børnehuset Stenvej	1	3	2	0	1	1	0	pallets	1
Plejehjemmet Sifsgård	1	3	2	0	1	2	0	plantet in the soil	1
Heimdal	1	3	2	0	1	2	0	plantet in the soil	1
Tuestenhuse	1	3	2	0	1	2	0	plantet in the soil	1
Botilbud Grundvigsvej 10	1	3	2	0	1	2	0	pallets	1

Ingerslevs Boulevard	3	4	1	0	1	1	0	plantet in the soil	5
Byttevæg v. Ø-Haven	1	1	1	0	1	0	0	construction	3
Bautavej, Administration	1	4	2	0	1	1	0	trees plantet in soil	6
Kulbroens venners have	1	1	1	0	1	0	0	Big containers	3
Cykelhave Bispetorvet	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave Cachill, Studsgade 17	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave Kvindemuseet	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave Mejlgade 8	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave RisRas Mejlgade 24	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave Skumhuset, Badstuegade 1	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave Teatertorvet, Graven 15	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave Under Masken, Bispegade 3	1	1	1	0	1	0	0	small moveable garden	3
Cykelhave White Elephant, Graven 30	1	1	1	0	1	0	0	small moveable garden	3
Dome of Visions, udearealet	1	1	1	0	1	0	1	plantet in the soil	3
Cykelhave Badstuegade 1	1	1	1	0	1	0	0	small moveable garden	3

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SiEUGreen

Sino-European innovative green and smart cities

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