



Food Systems in European Cities

Deliverable 4.4 – Joint report on implementation of the pilots

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Executive summary

The main objective of FoodE is to involve European local initiatives in the design, implementation and monitoring of environmentally, economically and socially sustainable City/Region Food Systems (CRFS).

WP4 aims to implement newly designed pilot projects or improve and integrate already existing projects in the City-Region Food System landscape with innovative food production systems, technologies, business models, social innovations.

In the first phase, FoodE launched open “calls for ideas” (or “FoodE challenges”, D4.1) where the civil society and relevant food-chain stakeholders were asked to actively contribute to the co-design, improvement and/or integration of local food system projects identified in EU cities (pilot case studies). Based on the successful outcomes of the co-creation process (D4.2), each local FoodE partner proceeded with the executive design of the final pilot project to be implemented (D4.3).

The current deliverable contains the individual reports of the 15 FoodE pilot projects implemented in the 11 EU cities. The following aspects are included: background information on the pilots’ sites, description of the main facilities, infrastructures, production systems, equipment as well as services and activities offered by the multi-functional pilot initiatives. Additionally, it includes an indication of the skills and competences that were required for project design and implementation, and it outlines how the pilot will be managed during and after the FoodE lifespan. Lastly, it includes an overview of the ecosystem services provided by the pilot initiatives, analyzed from the perspective of CRFS practitioners. The reports are based on the former executive plans (D4.3), elaborated by the respective pilot teams and supervised by the task leader (WR).

Each CRSF initiative will be subsequently monitored (T4.4) and will provide new data and indicators to validate and refine the first version of sustainability framework assessment (WP2), and will contribute to the definition of key sustainability indicators and business models (WP5) for the replication and up-scaling of sustainable CRFS in different European contexts (WP6).



1. Introduction: general section

Today's society is facing a range of socio-ecological challenges connected with urbanization, such as social segregation, public health concerns, resource depletion and consequences of climate change [1, 2]. Conventional food systems are increasingly vulnerable to present and future disruptions, prompting us to change the way we produce, consume, and think about food. In recent years, systemic solutions that offer multifunctional benefits, such as urban agriculture (UA), have been increasingly considered as sustainable practices that help addressing the complexity of societal challenges and urban food systems. Research and implementation of these systems in the local-regional landscape has shown how they can fulfil multiple functions and produce a range of market and non-market goods and services, positively impacting the city-region environment in the social, economic and environmental dimensions of sustainability. Impacts include for example: increase of the availability of fresh, nutritious food, contribution to urban renewal, social inclusion, job creation, environmental and food education, and promotion of local economies. City/Regions are thus composed of mixed patterns between commercial realities, based on market and profit interests (e.g., commercial urban farms) as well as non-commercial realities, driven by other beneficial dimensions such as self-sufficiency (e.g., individuals produce and consume at the micro level) and socio-cultural interests (e.g., community gardens) [3]. Furthermore, such local food systems may integrate different degree of technologies and control of the production systems or may adopt more nature-based, low-input solutions.

The diversity of European cities and regions creates barriers to the demonstration of systemic food-related innovative approaches valuable in such a variable range of contexts. While numerous innovative City-region Food System projects (CRFS) are found in the different corners of Europe, their replicability and adaptability to the different contexts is hindered by the lack of critical mass of studies and business cases. Failures in CRFS projects are often associated, for example, with inadequate technological sizing or inappropriate business models. In addition, the adoption of top-down policies has often limited the large-scale uptake of sustainable CRFS, limiting the possibility for citizens and communities to choose their own strategies for the local environment, whereas grassroots initiatives may have a great and positive impact on the long-term viability of CRFS projects [4, 5]. In recent years, several cities have promoted policies for citizen active participation in the co-design of innovative CRFS initiatives (e.g., "Parisculteur" in Paris, "Bilancio Partecipativo" in Bologna, or "Sprouting Oslo" in Oslo). However, these initiatives were only local, limited to few CRFS typologies, and often poorly accompanied by effective dissemination measures for wider adoption by other European cities.

The main objective of FoodE is to accelerate the growth of City/Region food systems (CRFS) by bringing local initiatives across Europe together, as well as co-developing and disseminating a range of tools, co-designed with citizens, academia and relevant CRFS stakeholders, to ensure that the most up-to-date cross-sectorial knowledge is applied.

Specifically, WP4 aims to implement newly designed pilot projects or improve and integrate already existing projects in the CRFS landscape with innovative food production systems, technologies, business models, social innovations. Considering the diversity between EU regions, the locations for pilot projects involve urban, rural and coastal regions in Mediterranean (Italy, Spain), Eastern (Slovenia, Romania), Central (Germany, Netherlands, France) and Northern (Norway) Europe. A co-design and cross pollination process is adopted and fosters the innovation of existing CRFS initiatives and the creation of new business-oriented pilot cases. This relies on participatory processes actively involving the civil society and relevant food chain stakeholders in the definition of priorities and optimal features to be implemented in all partner regions. Based on the outcomes of the co-design activities, the CRFS projects will be implemented and subsequently monitored and evaluated for their environmental, societal and economic sustainability.

The pilot activities will serve as demonstration and first application in the market and social context of innovative solutions. Their potentials and models for their replicability and sustainability will be assessed,

considering both the social and technological innovation components, and engaging different food actors in measuring environmental, societal and economic benefits of the proposed solutions.

1.1 WP4 structure

Work package 4 is structured in four stages, that include the launch of the “FoodE challenges” for the co-design of innovative pilot projects in pre-selected locations, on both established or newly implemented CRFS projects (T4.1), the finalization of the executive projects of the best selected ideas (T4.2), the timely implementation of the pilot project in EU cities (T4.3) and the citizen-driven monitoring and assessment of the project outcomes (T4.4). Figure 1 is a visual representation of WP4’s main tasks.

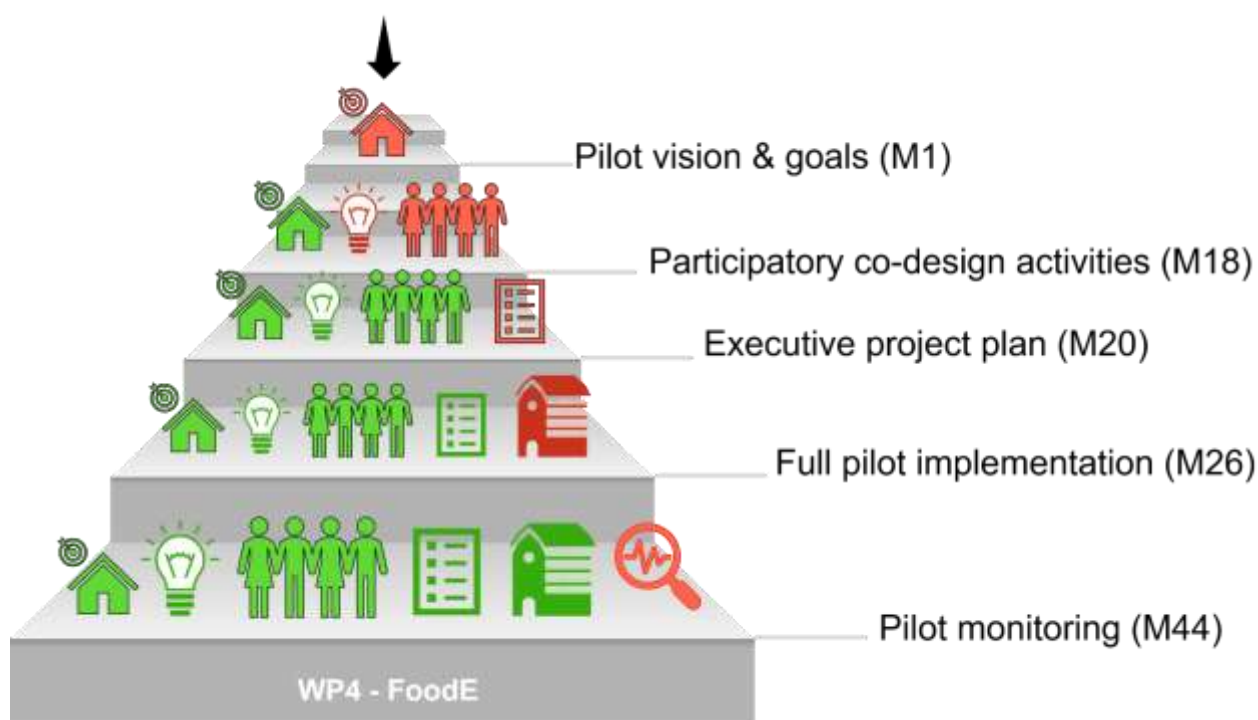


Figure 1. Visual representation of WP4’s main tasks from the Pilot project perspective. In brackets the deadline for the completion of the activity, expressed in project month.

The current deliverable presents the individual reports on the 15 CRFS pilot projects implemented in the 11 European cities (T4.3). The reports are based on the former executive plans (D4.3), elaborated by the respective pilot teams and supervised by the task leader (WR).

1.2 Towards community-driven food systems: design and implementation of 15 case studies in European cities

Identification of pilot case studies

The FoodE consortium identified 15 City-Region Food System (CRFS) initiatives located in 11 European cities to serve as pilot case studies. Cities to host the pilots were intended to be representative of the socio-cultural and geographical diversity of European regions and were identified on the basis of both the availability of space and equipment and the level of technological readiness (TRL), as well as the existence of previous initiatives to be integrated. However, these initiatives had to be designed or improved by integrating technological solutions, environmental innovations, business models and social structure.

Community-designed systems

For the purpose of co-design, FoodE adopted a community-designed approach that considers the needs and desires of the end-users and CRFS stakeholders as well as local needs and available resources. This bottom-up process, centered in communities’ power, may have a positive impact on the long-term sustainability of CRFS

projects and stimulate a discussion on how their resilience can be re-conceptualized and promoted on global and local scales [4, 6, 7]. To date, FoodE involved more than 1300 participants in the co-design and co-creation process of the CRFS pilot initiatives. The participants included different types of stakeholders and representatives of the civil society: students, academics, citizens, private companies and entrepreneurs, associations (e.g., parents', producers', citizens' associations etc.), chefs, CRFS employees, public authorities, schools, NGOs, media and financial investors. Co-design and co-creation process occurred within the framework of several initiatives (already existing or purposely organized): student competitions (hackathons, local challenges), student projects, assignments, surveys (e.g., questionnaires, interviews), workshops, and focus groups. In particular, the participants were asked to define priorities and optimal features to be implemented in the CRFS, contribute to the ideation and conceptualization phases and/or submit executive projects. Different outputs were created according to the types of activities such as: project proposals, small-scale prototypes, digital tools, reports produced based on material gathered through focus group discussions, open events, workshops, survey results and interviews (D4.2). The main co-design targets are summarized and displayed in Figure 2.

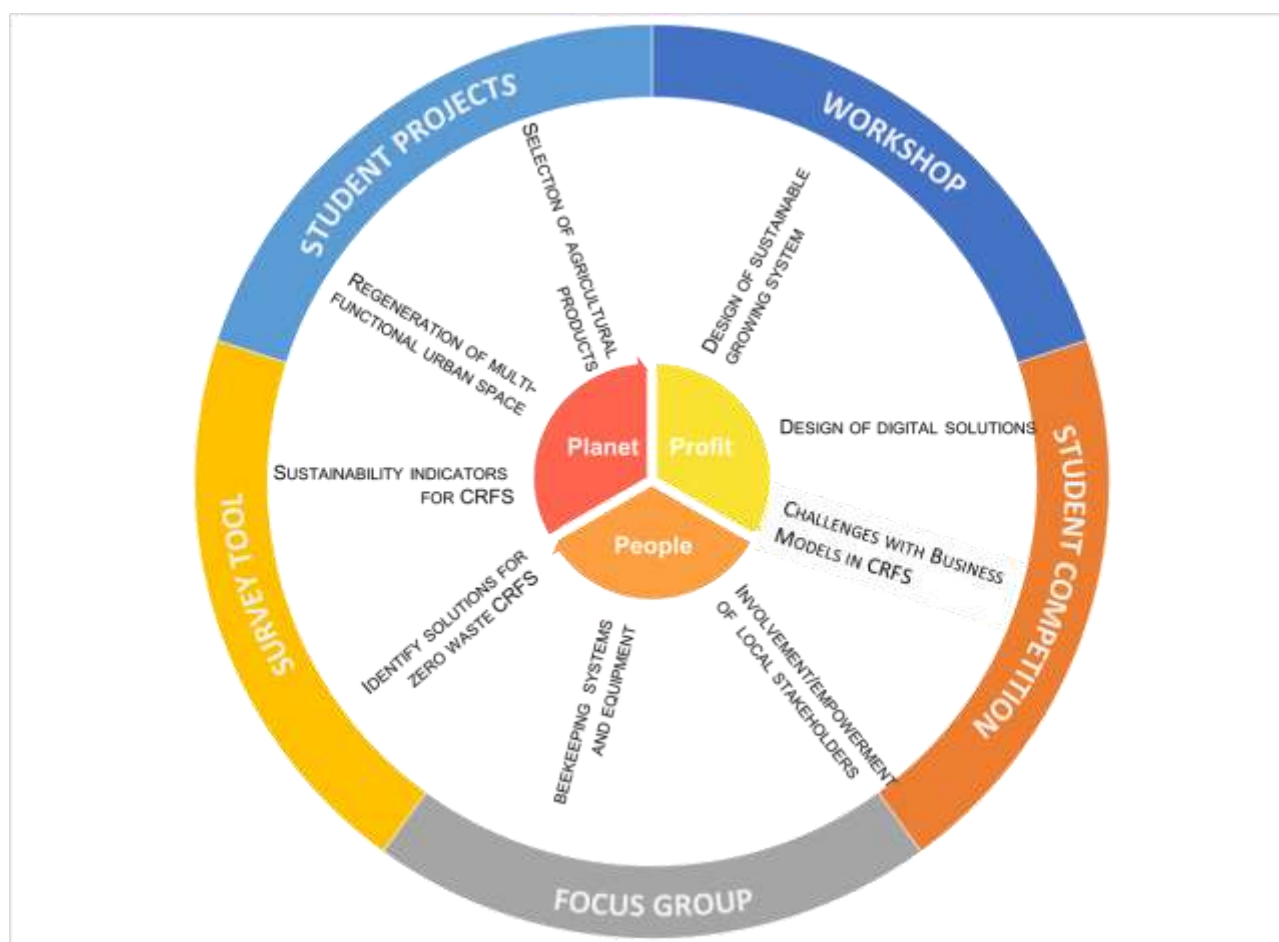


Figure 2. Main targets undergoing co-design process within FoodE Pilots.

Pilot project implementation

Based on the CRFS pilot goals and visions as well as the outcomes of the participatory co-design activities (D4.2), the 15 FoodE pilot projects were implemented in the 11 EU cities (an overview of the primary functions of the pilot projects as indicated by the respective teams is displayed in Table 1). The individual pilot reports can be found in the [Section 2](#) whereas the next paragraph (1.2) describes the general structure and elements contained in the implementation report.



1.3 Pilot implementation report: general structure

Based on the executive project plans (D4.3), each FoodE pilot team was asked to elaborate a final report describing how pilot projects have been eventually implemented in the different local contexts (T4.3).

- For this purpose, each pilot team was provided with a standard template. The template included sections common to the executive plan that had to be updated according to the progress made and the current implementation (e.g., description of the main facilities, infrastructure, systems, equipment, services and activities of the pilot, pilot team composition).
- Furthermore, the templates included new sections concerning the primary functions of the pilots and their contribution to eco-systems services as well as a section on pilot management during FoodE and a vision after FoodE project ends.

Open and closed questions guided the CRFS leaders in the completion of the report. Each report has been delivered by the local team under the coordination and tutoring of the task leader (WR).

It is worth noting that due to the absence of standardized templates specifically designed for describing the pilot projects (or templates that are well-suited), the structure of the template for the executive project plans (D4.3) and pilot implementation (D4.4) was formulated within the FoodE project. This structure was guided by two key criteria 1) Providing practical and technical details pertaining to the project and its associated services/activities 2) seizing the opportunity to gather additional information from CRFS owners that may not be readily available in existing literature, potentially encompassing specific cases or locations.

Consequently, some sections that were not initially mandated for the current deliverable have been included to gather supplementary information deemed highly valuable for the project.

1.3.1 Pilot graphic overview

This section was already developed in the phase of the executive project plan (see D4.3 for details) and it contains a graphic summary of some general information of the pilot projects. In particular:

- geographical location: pilot projects are characterized according to a 3-stage classification (mainland or island, coastal or inland, and urban or peri-urban or rural areas);
- types and status of the organizations managing the CRFS initiatives;
- main CRFS's impact areas and tasks;
- stakeholder map.

1.3.2 Background

This section provides basic information about the FoodE partner institution(s) running the pilot project and its main field of expertise. Additionally, it identifies and describes the local context in which the pilot project arises and/or the already established project that is being improved throughout FoodE. This section is intended to give an impression of the pilots' status and local context before FoodE.

1.3.3 Location

This section provides the exact location of the pilot sites and practical information on how to reach them by different means of transport. The overview of the FoodE CRFS pilots and their location is given in Figure 3.

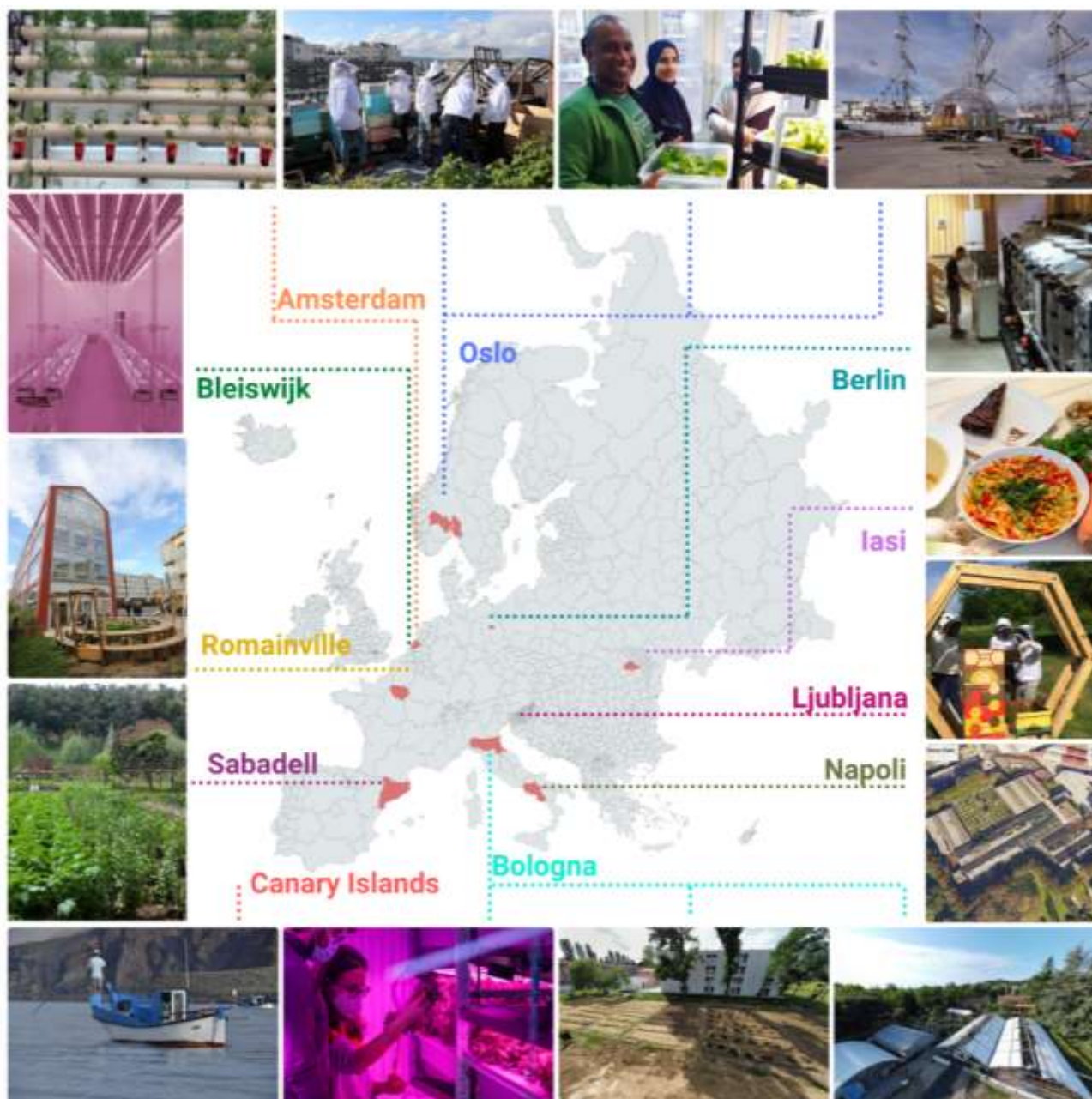


Figure 3. The FoodE consortium currently includes 15 City-Region Food System (CRFS) initiatives located in 11 European cities which serve as pilot projects.

1.3.4 Pilot implementation

This section contains an update on the main facilities, systems, equipment's, services and activities of each pilot project based on progress made (since the executive project plan stage) and the current implementation.

- **Structures and areas:** depending on the pilot project, this includes main buildings, residential buildings, rooms/space for activities, for events, for processing, storage, direct selling, restaurant, kitchen, structures for food production (greenhouses, vertical farms etc.), gardens, production plots, field areas, and parks.
- **Systems and equipment:** depending on the pilot project, this includes machineries, systems and equipment for food production (e.g., crops, honey), for climate control, resource management, waste management, water purification, disease treatments, for food processing and delivery as well as technologies, software's, digital interfaces, and sensors.

- **Services and activities:** this section is certainly the one that has undergone the most updates since the executive plan stage and provides the following information to the pilot community and potential future users: "how can users interact with the pilot initiatives (both online and on-site)? What types of experiences and services are offered and how often? Who are the main target groups of each activity and service?". Depending on the pilot project, this includes educational and training activities, social inclusion programs, outreach activities, research activities, events and festivals, consultancy, open days, guided tours, market activities, on-site production of food and non-food products, and catering and delivery services.

1.3.5 Pilot functions and eco-system services

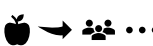
Pilot functions

Within the CRFS initiatives, food constitutes the central dimension of urban and rural linkages in the aspects of ecology, socio-economy and governance. As City/Region food system initiatives (CRFSI), pilot projects are profit or non-profit entities involved in the food system and can have one or more functions along the food chain, namely:

-  to produce food (e.g., agricultural, fish products);
-  to process food into food products (e.g., transformation of agricultural products into food etc.);
-  to distribute food and/or food products (e.g., wholesale, retail, direct selling, community supported agriculture);
-  to serve or cater food (e.g., catering, cooking, restauration, etc.);
-  to prevent, redistribute, or valorize food waste;
-  to provide food-related services (e.g., beekeeping, education, research, rehabilitation, raising-awareness);
- ... others (e.g., produce high quality service water for food production from wastewater, housing, rooms' rental).

An overview of the primary functions of the pilot projects as indicated by the respective teams is displayed in Table 1.

Table 1. The 15 FoodE pilot projects implemented in EU cities and related functions.

Location	City (country)	Pilot project name	Functions
Mainland Coastal Urban	Napoli (IT)	Urban agricultural park with farmers and fishery market	
	Oslo (NO)	Oslo Incubator for Sustainable Food Production	
	Oslo (NO)	Plant factory for social inclusion	
	Oslo (NO)	Educational hydroponic garden prototype	
Mainland Inland Urban	Bologna (IT)	Serra Madre: A food hub for education, leisure and urban farming innovation	
	Amsterdam (NL)	Open source aquaponic farm	
	Berlin (DE)	Urban farm with hydroponic greenhouse and greywater pilot plant	
	Romainville (FR)	The Cité Maraîchère: vertical farm, educational gardens, sustainable and social food, market gardening and mushrooms production, circular innovation and short food chain	



	Iasi (RO)	CUIB: Restaurant with local products	    
	Bologna (IT)	Urban Farming at SALUS Space	  ...
	Sabadell (SP)	Urban agricultural park for participatory agricultural test spaces	   
Mainland Inland Peri urban	Lansingerland (NL)	Plant factory for demonstrational purposes	
	Bologna (IT)	AlmaVFarm: An Indoor Vertical Farm for growing Food, Competences and Innovation	
	Ljubljana (SL)	"PRISON HONEY" - Urban beekeeping for rehabilitation and social inclusion	
Island Coastal Urban & Peri-urban	Tenerife (SP)	Sustainable small-scale fishery in school canteens	 

Eco-system services

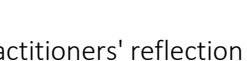
Ecosystem services are the benefits obtained by people from ecosystems ([8]). In the literature, they have been widely described and proposed as an assessment tool to display the socio-ecological benefits humans receive from Urban Agriculture [9-11]. The benefits are commonly categorized into the following groups:

- provisioning services (products obtained from ecosystems);
- regulating services (benefits obtained from the regulation of ecosystem processes);
- socio-cultural services (non-material benefits people obtain from ecosystems) [10].

As with Urban Agriculture, a similar evaluation can be performed for CRFS initiatives. As previously mentioned, each CRFS initiative constitutes a multi-functional agricultural system, which is an extremely important ecosystem providing several types of benefits. Therefore, in conjunction with the full implementation and launch of the pilot projects, pilot managers were asked to assess the contribution of their initiatives from the perspective of ecosystem services on a scale 0-5 (where 0 = no contribution/not applicable, 1 = very low contribution, 2 = low contribution, 3 = medium contribution, 4 = high contribution, 5 = very high contribution) together with an indication of the activities and/or best practices adopted within the project and relevant for the respective service. Table 2 shows the results for each service: the first value indicates the total number of pilots contributing to that service (value ranges between 0 and 15, corresponding to the total number of pilot projects), and the second value indicates the corresponding average score assigned by the pilot teams (scale 0-5). It is important to consider that the perception of ecosystem services of CRFS initiatives expressed by the practitioners may not correspond to the perception of different societal groups and stakeholders [1, 9]. The latter can be investigated during the next phase foreseen in WP4, namely, the participatory pilot monitoring (task T4.4). CRFS practitioners were provided with a short definition of the ecosystem services and examples. Furthermore, it is worth noting that practitioners were asked to assess their own activity rather than comparing them to others, as they may not possess complete knowledge of other projects. Therefore, CRFS practitioners were asked to identify one or more ecosystem services to which they believed their activities contributed the most and evaluate the remaining services accordingly.

Table 2. Overview of the ecosystem services offered by the 15 CRFS pilot initiatives from the perspective of CRFS practitioners.

Category	Ecosystem service	Pilot initiatives ($n_{tot}=15$)	Average score (0-5)
	 Food provision	15	

Provisioning services	 Provision of raw materials	10	
	 Medicinal resources	4	
	 Ornamental resources	8	
	 Energy provision	2	
	 Genetic resources	1	
Regulating services	 Purification of water and/or air	2	
	 Regulation of urban metabolism	7	
	 Enhancement of pollination	9	
	 Control of pests and diseases	10	
	 Enhancement of carbon sequestration / Improvement of local micro-climate	12	
	 Soil erosion prevention and control	3	
	 Habitat provision and/or biodiversity	8	
Socio-cultural services	 Contribution to training and education	15	
	 Contribution to research	13	
	 New forms of recreation	9	
	 Improvement of touristic attractions in the city-region	9	
	 Improvement of mental and/or physical health (therapeutic)	9	
	 Improvement of urban/landscape aesthetic and/or art inspiration	9	
	 Preservation of cultural knowledge and heritage	7	
	 Improvement of social cohesion and community building	14	
	 Improvement of commercial relationships	13	

The primary objective of the self-assessment was to stimulate and prioritize CRFS practitioners' reflection and capture their level of understanding of the different ecosystem services via their scores and the accompanying comments. This is why the comparison between pilot projects, along with the qualitative nature of the exercise, may lead to inconsistencies. However, it is also these inconsistencies that our analysis intended to capture. Based on the information collected, the following results and learning outcomes have been observed:

- The self-assessment exercise encourages CRFS practitioners to reflect on their project's strengths, weaknesses, and areas that have not been considered or addressed thus far, prompting them to set new potential goals.
- It is evident that not all practitioners had a full understanding of the ecosystem services, as indicated by missing or incomplete comments associated with the assessed services.
- If this method is to be employed in the future for assessment purposes, several aspects and improvements should be considered:



- While qualitative indicators are more accessible in terms of language and knowledge (and can facilitate communication with the public), including additional quantitative targets in the definitions can enhance understanding of the applicability of specific services to CRFS activities and allow for more standardized comparisons between initiatives. For example, a link to the FAO guide (FAO, 2021) on measurable SDG indicators, which offer accessible definitions and assessment methodologies for both indicators and sub-indicators, can be made.
- The evaluation should involve a broader range of stakeholders and societal groups to gain further insights into the perceived sustainability and impact of the initiatives, and providing a more representative statistical sample.
- Enhancing user support by providing comprehensive theoretical background information prior to conducting their evaluation.

1.3.6 Pilot management

Firstly, this section presents an update of the pilot's teams and thus the people currently involved in the full operation of the pilot and an indication of their main roles (e.g., pilot owners, managers, executors, communicators etc., as defined in D4.3).

Secondly, the pilot teams were asked to share their vision of how the projects will be managed (and by whom) after the end of the FoodE project. Related to this, some information was also collected regarding the ownership of the land and facilities where the initiatives are being implemented and the duration of the concessions for the use of pilot projects (permanent vs temporary). In fact, these aspects are governed by rules that can vary from country to country and determine who can use which resources, for how long, and under what conditions [12]. Therefore, pilot teams were asked to indicate ownership of land and buildings by choosing from the following options (defined by [12]):

- **Private:** the assignment of rights to a private party, who may be an individual, a group of people or a corporate body, such as a commercial entity or non-profit organization.
- **Communal:** a right of commons may exist within a community, whereby each member has a right to use the holdings of the community independently.
- **Open access:** specific rights are not assigned to anyone and no person can be excluded. This typically includes marine tenure, where access to the high seas is generally open to all; it may also encompass rangelands, forests, etc., whereby there may be free access to the resources for all (an important difference between open access and communal systems is that under a communal system, nonmembers of the community are excluded from using the common areas).
- **Public:** property rights are assigned to an authority in the public sector.

In general, in the 15 pilots, property rights are either private (e.g., individuals, institution, non-profit organization) or public (e.g., municipalities, regional government) (Figure 4). The temporary use concession (under private or public ownership) varies from 4, 10 to 16 years, with the possibility of extension or renewal in most cases.

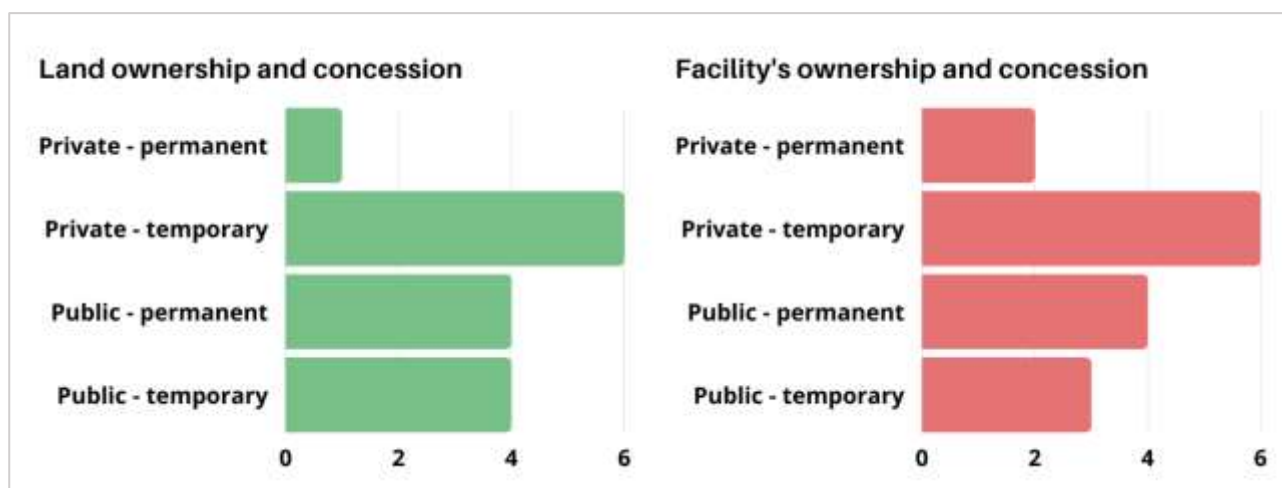


Figure 4. Ownership of land and facilities (private, public) in the 15 FoodE pilot projects and duration of concessions of use (permanent, temporary).

Thirdly, each pilot team was asked to summarize the categories of skills and competences that are relevant for the setting up and/or running of the CRFS pilot initiative together with their relative importance on a scale of 0 to 5 (where 0 = not at all important and 5 =very important) and the current level of coverage of these within the pilot (well represented or underrepresented). The categories are based on the European Commission classification “ESCO - European Skills, Competences, Qualifications and Occupations” (<https://ec.europa.eu/esco/portal/skill>). Table 3 and Table 4 display the total results indicating the number of pilots who considers each skill/knowledge as relevant (value ranges between 0 and 15, corresponding to the total number of pilot projects). Figure 5 shows the corresponding average score on the importance of the skill and knowledge categories assigned by the pilot teams (scale 0-5).

Table 3. Skill categories and examples

Skill type	Examples	Pilot initiatives (n _{tot} = 15)
S1 - Communication, collaboration and creativity	Communicating, collaborating, liaising, and negotiating with other people, developing solutions to problems, creating plans or specifications for the design of objects and systems, composing text or music, performing to entertain an audience, and imparting knowledge to others.	15
S2 - information skills	Collecting, storing, monitoring, and using information; Conducting studies, investigations and tests; maintaining records; managing, evaluating, processing, analyzing and monitoring information and projecting outcomes.	13
S3 - assisting and caring	Providing assistance, nurturing, care, service and support to people, and ensuring compliance to rules, standards, guidelines or laws.	7
S4 - management skills	Managing people, activities, resources, and organization; developing objectives and strategies, organizing work activities, allocating and controlling resources and leading, motivating, recruiting and supervising people and teams.	15
S5 - Working with computers and other digital tools	Using computers and other digital tools to develop, install and maintain ICT software and infrastructure and to browse, search, filter, organize, store, retrieve, and analyze data, to collaborate and	14

	communicate with others, to create and edit new content.	
S6 - Handling and moving	Sorting, arranging, moving, transforming, fabricating and cleaning goods and materials by hand or using handheld tools and equipment. Tending plants, crops and animals.	11
S7 – Constructing	Building, repairing, installing and finishing interior and exterior structures.	11
S8 - Working with machinery and specialized equipment	Controlling, operating and monitoring vehicles, stationary and mobile machinery and precision instrumentation and equipment.	8

Table 4. Knowledge categories.

Knowledge type	Pilot initiatives (n _{tot} = 15)
Agriculture, forestry, fisheries and veterinary	15
Arts and humanities	6
Business, administration and law	13
Education	15
Engineering, manufacturing and construction	13
Health and welfare	8
Information and communication technologies	10
Natural sciences, mathematics and statistics	8
Services (e.g., hygiene and occupational health services, security, transport services etc.)	7
Social sciences, journalism and information	9



Figure 5. Average score (0-5) on the importance of each skill category (left) and knowledge category (right) within the 15 FoodE pilot projects.

1.4 Linkages with other WPs

- **WP1.** WP1 is working on the collection of contributions to task “Innovation Management” (T1.4). Within this task, “innovation” is intended as a new concept, knowledge, methods that could be translated into new products/services, standards and may be turned into intellectual assets. Close cooperation has been



established with the pilot projects as it is expected that most of the innovations monitored during FoodE will be developed in their contexts. To this end, two workshops named “Innovation management in FoodE pilots” have been organized at two General Assembly meetings (on July 2, 2021 and January 12, 2022). In addition, the pilot teams are regularly asked to fill in the innovation monitoring questionnaire to ensure continuous updating.

▪ **WP2.**

- WP2 developed a methodological framework for the integrated sustainability assessment of City/Region Food Systems Initiatives (CRFSI). The methodology is presented in two complementary deliverables, namely the methodological framework to develop Life Cycle (D2.2) and the data collection protocol (D2.3). Within task 2.4, WP2 will perform the full sustainability assessment of pilot initiatives in a participated way and the results will provide a baseline scenario. In this process, FoodE pilot owners are involved in the co-design of the sustainability assessment based on LCA, LCC, s-LCA (co-designing goal, indicators, data collection, interpretation). To this end, two workshops called “SUSTAIN 1” and “SUSTAIN 2” have been organized at two General Assembly meetings (on July 2, 2021 and January 12, 2022).
- Based on the co-design, T2.4 develop a self-assessment tool that guides and assists the pilots in the data collection and in the assessment.
- Lastly, WP4 will carry out the participatory pilot monitoring (T4.4) developing an operational guide for the use of the self-assessment tool and evaluate progresses from the baseline scenario.

▪ **WP3.**

- WP3 is developing the FoodE app, a tool to establish direct interaction between citizens and CRFS initiatives. This will include both a web app (for CRFS manager to upload their data) and a mobile app (interactive platform between stakeholders) (D3.7). Six FoodE pilot projects were integrated in the first version of the FoodE app prototype (T3.2.2) as examples of CRFS initiatives. The pilots’ data as well as the linkage between the app and the pilots will be added in a later stage, following the development of WP4 and WP2 joint tasks.
- WP3 is creating an inventory of all “MyLocalFoodE” initiatives organized during the FoodE project (T.3.1.3). This includes both the large dissemination and awareness raising events planned in two partner cities each year, but also all smaller events and activities organized by the other FoodE partners (e.g., main activities organized by pilot initiatives within WP4 with pupils, students, and other stakeholders). Furthermore, there is a substantial contribution of WP4 to FoodE KidScience as most of the activities with school pupils are organized within the framework of the CRFS pilot initiatives.

▪ **WP5.**

- WP5 will propose a classification/typology of CRFS(I) business models and each model will be described holistically as well as with SWOT analyses (T5.1). The review of the state-of-the art in this field will be integrated with meaningful outcomes emerging from the activities already performed within WP2 and WP4. To this end, the pilot implementation reports will serve as an important basis. Additionally, each business model description is supposed to be performed in an applied way, meaning that the inspiring examples for each business model deriving from WP2 and WP4 will be further analyzed.
- Building on the CRFS’ sustainability assessments in WP2 and pilot implementations in WP4, WP5 aims to create a simplified dataset of indicators (T5.2), suitable for the development of innovative BMs to enhance CRFS sustainability. Previous activities of sustainability assessment in both existing (WP2) and newly implemented pilots (WP4) will allow for compiling a simplified dataset of indicators suitable for the online survey tool (T5.3) and certification standard (T5.4). The

reduction of indicators in the dataset allows wider applicability without oversimplifying complexity and interactions.

- **WP6.** Within task 6.2, WP6 will analyze the roles and relationships of different actors in the food chain, and it will further build on the results of WP4, including observations in the case study cities, and of stakeholder mapping and analysis (T7.2.1).



Figure 6. Main linkages between WP4 and other WPs in the FoodE project

1.5 Impacts

Table 5. Impacts generated so far (M26) by the recently implemented 15 CRFS pilot projects (within WP4).

Generated impacts ^a	Additional information
Implementation of 15 CRFS innovative pilot projects in European cities.	Implementation of 15 CRFS innovative pilot project in 11 European cities, co-designed with citizens and stakeholders.
Creation of 38 new job opportunities.	Job opportunities for socially disadvantaged citizens, medium to high-skilled technicians, international refugees, and researchers. Among the functions carried out within the CRFS projects there are: managing and supervising farming activities, market management, performing field-tests and trials, catering services, training and education activities.
Involvement of 1320 participants in the co-design of innovative CRFS pilot projects.	Active engagement and empowerment of civil societies and relevant food chain stakeholders in identifying priorities and co-design innovative CRFS.



11000 people participating in dissemination and promotional events.	This includes different types of activities such as outreach activities, symposia, events and festivals, open days, guided tours.
3970 stakeholders actively engaged in the CRSF pilots.	This includes 1100 individual citizens and stakeholders as well as 135 public and private partners (e.g., local farmers, fishermen, builders and material suppliers) directly involved in the pilot activities (e.g., implementation and management of the pilot, agricultural activities, beekeeping and fishing) and 2735 direct beneficiaries of the pilot activities (e.g., provision of food for vulnerable groups, provision of local seafood to school canteens).
500 direct beneficiaries of training, educational and research activities.	Workshops, courses, hands-on experiences provided by the pilot initiatives. In addition, internships and thesis opportunities have been created for 17 students so far.

^a Note: numbers do not include data collected within WP3 for the creation of a catalogue of all "MyLocalFoodE" and kid science activities (expected by M38).

2. Pilots' implementation reports: specific section

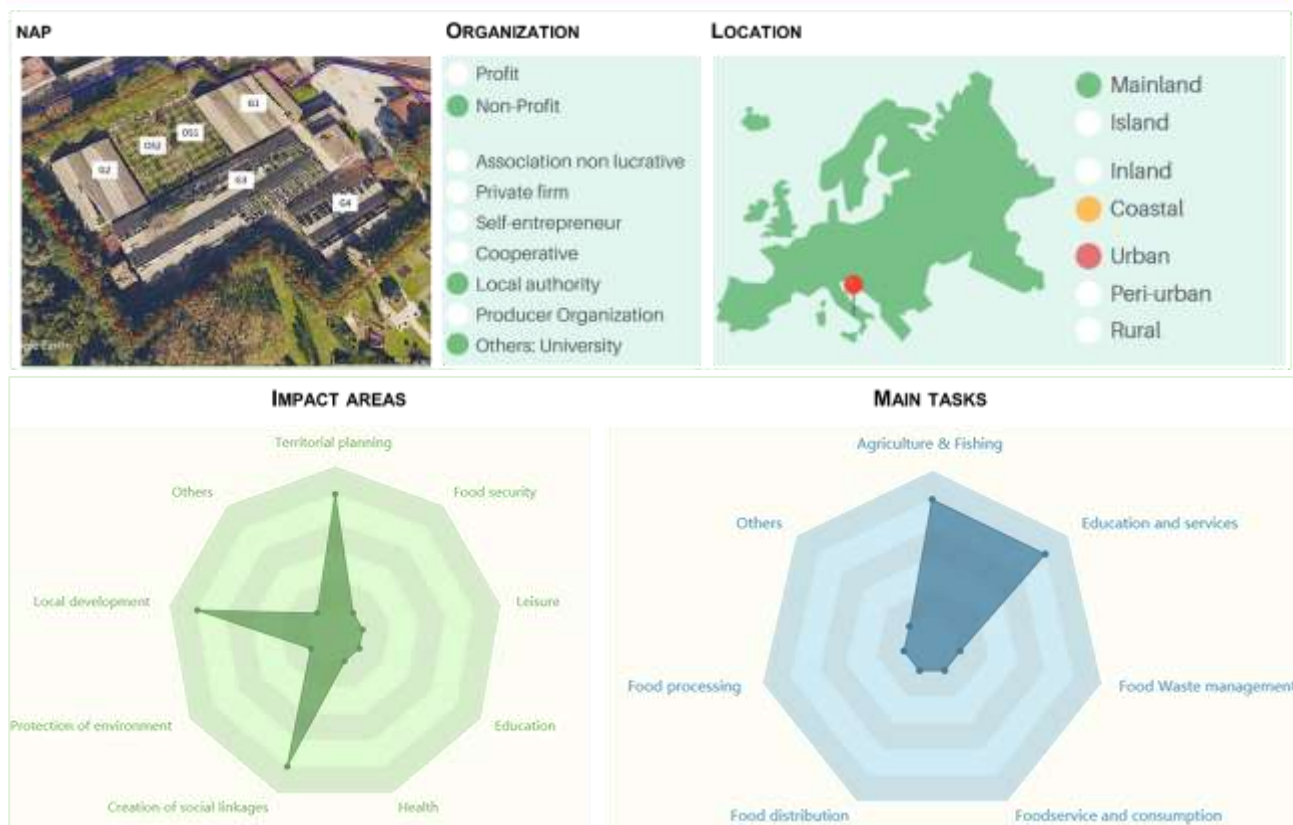
Napoli (IT)

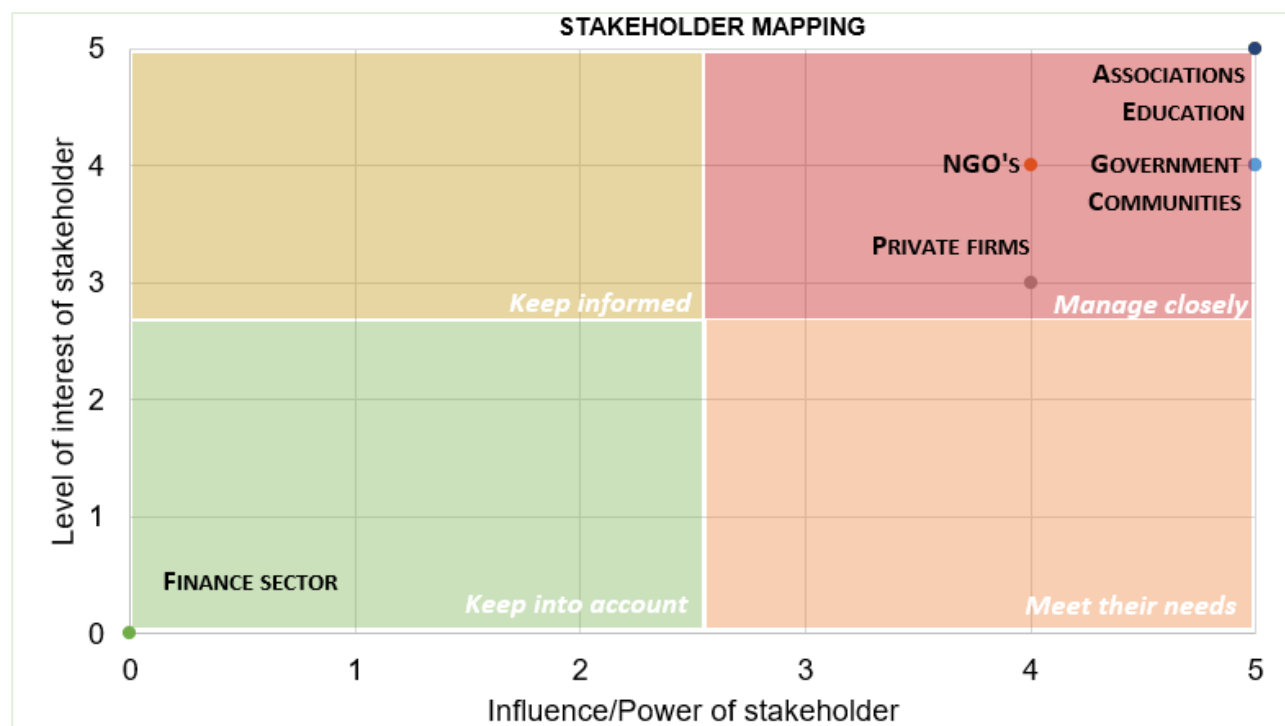
FoodE Pilot - Urban agricultural park with farmers and fishery market

Naples, Italy

Municipality of Naples

In an area suffering from excessive population density and infrastructure of the built environment, an urban agricultural park with farmers and a local market is built. In both the greenhouses and open spaces a number of local horticultural products will be grown. The pilot aims to define sustainable cultivation protocols. It will involve local organizations and citizens while increasing their awareness of food production and security.





1. Background

The Troisi park is located in a district of the City of Napoli suffering from excessive population and infrastructure density of the highly urbanized environment. It covers an area of 12 hectares and includes open spaces, mainly cultivated with Mediterranean plant species, an artificial pond for rainwater collection, and some greenhouses.

2. Location

Address: Viale 2 Giugno, 80146 Napoli (Italy) (find on [Maps](#))

	On foot ✓	The pilot is embedded in a densely urbanized area, the VI district of Metropolitan City of Napoli and it is easily reached on foot by the local population. The entire area is accessible also by persons with disabilities.
	By bike ✗	Unfortunately, the district has not yet a cycle path.
	By car ✓	The main entrance dedicated to the plot is reachable by car and a public parking area is available nearby. There are no driving restrictions.
	By bus/metro ✓	The main entrance of Troisi Park is at 700 m from the metro station of San Giovanni/Barra, on the route of Line 1 of the metro service of Napoli, and at 1,3 km from the station of Barra, on the route of Line 12, 13 and 14 of the commuter railways. The Bus stops are located at 400 and 700 m from the entrance of the park.

		
	By train	All the metro and commuter lines stop also at the Napoli Central Station, the main hub of railways and bus services connecting the city of Napoli with other regional, national and international locations.
	By plane	The International Airport of Napoli can be reached in 54 min by metro (L2 till Napoli Centrale Station) plus “Alibus” (from Napoli Centrale to Airport).
	By ferry	Bus lines connect regularly the harbor of Napoli (Molo Beverello) to the closest bus stop (Troisi). At Molo Beverello daily ferry services connect with Islands of the Gulf (Ischia, Capri and Procida) and from the main Italian Islands (Sardinia and Sicily).
	Others	Taxis, private car services with drivers and car rentals are available at the Central Station, at the Airport and at the harbor.

3. Pilot implementation

Co-design process
Part of the regeneration of the area and structures of the Troisi Park (Napoli) have been the target of an international student competition (UrbanFarm2021) which involved about 200 participants including students, experts, citizens and representatives from the academia. The main input was on the technical aspects of the floating system and pot cultivation under the greenhouse structure as well as on the plan of educational activities with schools and disadvantaged people. In addition, two surveys were organized reaching more than 700 participants including citizens, local entrepreneurs, and farmers. The surveys’ results revealed the awareness and approach of local stakeholders toward the park regeneration plans, as well as their interest in actively participating in the implementation of the project.

3.1 Main structures and areas

The Municipality of Napoli (NAP) is implementing the functionality of one large greenhouse (total surface 1053 m²) and both open spaces (total surface 1221 m²) of the Troisi Park that are now almost 100% operative for pilot activities, included the market and the “educational area”.



Figure 7. Troisi park area (left), local market (center), vegetable garden (right).

3.2 Main systems-equipment

The greenhouse hosts both floating systems and pot cultivation which will be dedicated to the production of different species of leafy greens and aromatic plants, respectively.

The **floating system** includes tanks made of recycled materials that are waterproofed with a black plastic film. The oxygen levels in the tanks can be monitored and controlled through aeration pumps positioned throughout the tanks. Plants will grow on coconut coir substrate, an environmentally friendly substrate that can be used for soilless culture. Three tanks will be devoted to:

- red and green lettuces (*Lactuca sativa* var. capitata cv. “Napoletana”), escarole (*Cichorium endivia* var. crispum cv “Riccia”) and radicchio (*Cichorium intybus* var. foliosum) to be grown and harvested with their root apparatus to increase their shelf-life.
- rocket (*Eruca sativa*), spinach (*Spinacia oleracea*) and basil (*Ocimum basilicum*) to be sold as pre-cut vegetables.

Planter boxes already present in the greenhouses and made of recycled material, are being reused and dedicated to potted aromatic plant production: basil (*Ocimum basilicum* cv “Gigante bolloso di Napoli”, “Violetto” and “Cannella”), rosemary (*Salvia rosmarinus*), mint (*Mentha arvensis*), chili-peppers (*Capsicum annum*) and chives (*Allium schoenoprasum*) in pots, irrigated with driplines.

A **rainwater collection** system has been integrated into the greenhouse facility.

Finally, the **on-site composting system** fed with organic waste from the in-house crop production activities has to be developed. The compost will be used in the soil-based growing systems in the greenhouse facilities.

3.3 Main services and activities

The pilot will offer the following services and activities:

- **Local food production:** leafy vegetables, and potted aromatic plants (Figure 8).
This is the result of the renovation process of already existing greenhouses that became functional and suitable for cultivation. Local horticultural products will be grown based on previously developed sustainable cultivation protocols, involving local organizations and citizens as well as increasing their awareness of food production and security.



Figure 8. Potted plant production in greenhouse .

- **Local market:** on-site products and products from local farmers.
The pilot hosts a market for home-grown fruits, veggies and flowers from neighborhood farms, as well as fresh fish from local fisheries. The implementation has been designed on preliminary microeconomic piloting addressing the definition of crop production systems, optimization of production protocols, diversification of marketable production into horticultural products, artisanal fisheries and aquaculture and organization of consumer markets. Once developed and realized, the food system model will be integrated with national/regional strategies and programs for urban agricultural development, sustainable use of natural resources resulting in improved food security and adoption in several other areas within Napoli and/or in other regions.
- **Social activities:** training courses for disadvantaged categories and involvement in the production and market activities.
- **Educational activities:**
 - thematic workshops and labs on the main topics related to urban agriculture functions and methods targeting primary and secondary school students. Local schools and associations are involved in planning a calendar of small events related to kid science activities. For instance, in February 2022 a new kid science activity has started with 25 students of a secondary school involved in a series of seminars on the sustainability of urban agriculture and subsequently in practical labs for the selection and cultivation of local plant species at their own school and at Troisi Park.
 - The “Ortopiù” experience involving people with autism spectrum disorders will partly continue and further developed at Troisi Park, through inclusive activities of plant cultivation and food marketing (Figure 9).
 - Large events involving citizens will also be organized.



Figure 9. Series of training course for young people with disabilities in collaboration with Ortopiù' project during MyLocalFoodE initiatives.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to distribute/sell food and/or food products
- to prevent, redistribute, or valorize food waste
- to provide food-related services: education, research, training of disadvantaged societal groups.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 6 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 6. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site production of leafy vegetables, aromatic potted plants.
 Provision of raw materials	★★★★★	On-site composting system fed with organic waste from the in-house crop production activities to be used in the soil-based growing systems in the greenhouse facilities. Use of planter boxes made of recycle material.
 Ornamental resources	★★★★★	On-site production of flower crops.

4.2.2 Regulating services

Table 7 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars = no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 7. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Enhancement of pollination	★★★★★	The area surrounding the pilot inside the park is already rich in biodiversity (both flora and fauna), cultivation practices will pay particular attention not to alter it.
 Control of pests and diseases	★★★★★	Biological control of pest and disease will be applied.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	Greenhouses are unheated, thus only seasonal and affordable cultivations are being considered. Water use efficiency is increased by drip irrigation system connected to rainwater collection system. Organic waste and organic matter will be used for plant nutrition.
 Soil erosion prevention and control	★★★★★	Soil erosion is prevented by using organic soil improvers.
 Habitat provision and/or biodiversity	★★★★★	Only local species and cultivars will be grown.

4.2.3 Socio-cultural services

Table 8 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 8. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Training courses for disadvantaged societal groups on growing vegetables. School pupils involved in workshops: “how to grow your favorite veggies?” Traditional recipes from farm to fork, etc.
 Contribution to research	★★★★★	Analyses of social, environmental and economic impacts of urban agriculture related activities at Troisi Park.
 New forms of recreation	★★★★★	Kid labs and family labs: “choose your seed and grow your plantlet”. In general, the Agricultural park is a recreational, green space for locals, in the heart of the City.
 Improvement of touristic attractions in the city-region	★★★★★	-
 Improvement of mental and/or physical health (therapeutic)	★★★★★	Training course for disadvantaged societal groups on growing vegetables. Such activities already started in collaboration with project “Ortopiù”, involving people with autism spectrum disorders in the community garden and focusing on different aspect of urban gardening (e.g., simplified soilless systems, sowing and planting, plant care, re-use of materials etc.).
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	The district of the city of Napoli surrounding the park is currently suffering from excessive population density and infrastructure of the highly urbanized environment and will benefit from the process of renovation of the park as well as its maintenance and organization of activities.
 Preservation of cultural knowledge and heritage	★★★★★	Local gastronomy is based on traditional food and the awareness on importance of plant species is solicited.
 Improvement of social cohesion and community building	★★★★★	Involvement of local stakeholders in completing the pilot, suggesting and realizing new activities on site.
 Improvement of commercial relationships	★★★★★	Organization of local markets with on-site products and products from local farmers, strengthening the relationship with local producers.

5. Pilot management

For the duration of the FoodE project, the pilot is co-managed by the two FoodE partner institutions: Municipality of Napoli (NAP) and University of Napoli (UNINA). The core team (and related roles) actively managing the project is shown in Figure 10.

Both land and buildings of the pilot project are properties of the Metropolitan City of Napoli and granted to the pilot use for an indefinite time. After the FoodE project, the pilot can be managed by the related FoodE partner institution (NAP) or assigned to third parties. Currently there is not a specific plan. The vision is to



involve local organizations and community in maintaining the pilot activities under the supervision of administration of City of Napoli.

Person name	Role in the pilot	Institution
Teresa Bastia	Pilot owner, Pilot manager (1)	Municipality of Napoli
Chiara Cirillo	Pilot manager (2)	University of Napoli
Giuseppe Carlo Modarelli	Pilot executor (1), Pilot communication	University of Napoli
Lucia Vanacore	Pilot executor (2)	University of Napoli

Figure 10. People involved in the FoodE pilot team and respective roles and institutions at M26.

5.1 Skills and expertise requirements

Table 9 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 9. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Under-represented 👎	Planning events and training courses, creating specific solutions, communicate and promoting activities.
S2 - information skills	★★★★★	Well represented 👍	Monitoring the cropping activities and outcomes, recording, managing and evaluating cropping and education activities.
S4 - management skills	★★★★★	Under-represented 👎	Organizing and managing flows, work activities, resources.
S5 - Working with computers and other digital tools	★★★★★	Under-represented 👎	Website and other digital tool services.
S6 - Handling and moving	★★★★★	Under-represented 👎	Cleaning goods and materials, taking care of plants.
S7 – Constructing	★★★★★	Under-represented 👎	Creating sustainable solutions of interior and exterior furniture (such as sales boxes for the market or benches for rest areas).
S8 - Working with machinery and specialized equipment	★★★★★	Under-represented 👎	Technical assistance.

Table 10 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars = not at all important and 5 stars =very important) and the current level of coverage of these within the pilot (well represented or under-represented).



Table 10. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Under-represented 👎	-
Education	★★★★★	Well represented 👍	-
Engineering, manufacturing and construction	★★★★★	Under-represented 👎	-
Health and welfare	★★★★★	Under-represented 👎	-
Social sciences, journalism and information	★★★★★	Under-represented 👎	-

5.2 Pilot network

The pilot in Napoli is collaborating with:

- **Other 10 CRFS initiatives (excluded FoodE pilots)** such as NGO's, social horticulture associations, private farms and foundations.
- **Other FoodE Pilots:** future collaboration on social inclusion together with the agricultural park in Sabadell.
- **another organizations/Institutions (outside FoodE):** higher educational institute (University).
- **Other projects (e.g., other EU projects, etc.):** Ortopiù project (managed by "[Si puo' dare di piu' onlus](#)").

6. Pilot communication

6.1 Videos

Video (title)	Link
Troisi Park (Napoli, Italy) on UrbanFarm channel	https://www.youtube.com/watch?v=yLMH8qUNP7o
Troisi Park - The location's description (Naples, Italy)	https://www.youtube.com/watch?v=QfhsF5GLGB0
Playlist Videos UrbanFarm 2021- Round 1	https://youtube.com/playlist?list=PLzZ52i2AkTPucXZHgFZApCIU9YsXjEJU
Playlist Videos UrbanFarm 2021- Round 2	https://youtube.com/playlist?list=PLzZ52i2AkTPjynPz1356ERWqtIzfU678
Grand Finale of UrbanFarm 2021	https://www.youtube.com/watch?v=crfZH8TJTnw&t=24420s

7. Photo credits

Figure 7. Municipality of Napoli. (2020). Troisi park area (left), local market (center), vegetable garden (right). [Photograph].

Figure 8. University of Napoli (2022). Potted plant production in greenhouse. [Photograph]. Si Può Dare Di Più Onlus. (2020). Series of training course for young people with disabilities in collaboration with Ortopiu' project during MyLocalFoodE initiatives. [Photograph]. <https://bit.ly/3M6C4Y5>

Bologna (IT)

FoodE Pilot - AlmaVFarm: An Indoor Vertical Farm for growing Food, Competences and Innovation

Bologna, Italy

Flytech & University of Bologna

In this indoor vertical farm, you will find students, professors, technicians and other experts from the University of Bologna, working together on an innovative indoor growing environment. They study the use of light, irrigation, mineral nutrition, and climate management in order to maximize the resource efficiency within vertical farms. Hereby, they foster sustainable innovation in indoor farming technologies.



FLY



ORGANIZATION

- ☐ Profit
- ☒ Non-Profit
- ☐ Association non lucrative
- ☐ Private firm
- ☐ Self-entrepreneur
- ☐ Cooperative
- ☐ Local authority
- ☐ Producer Organization
- ☒ Others: University

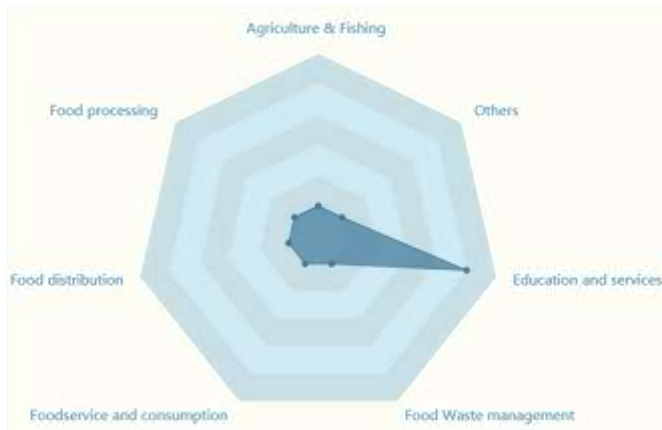
LOCATION

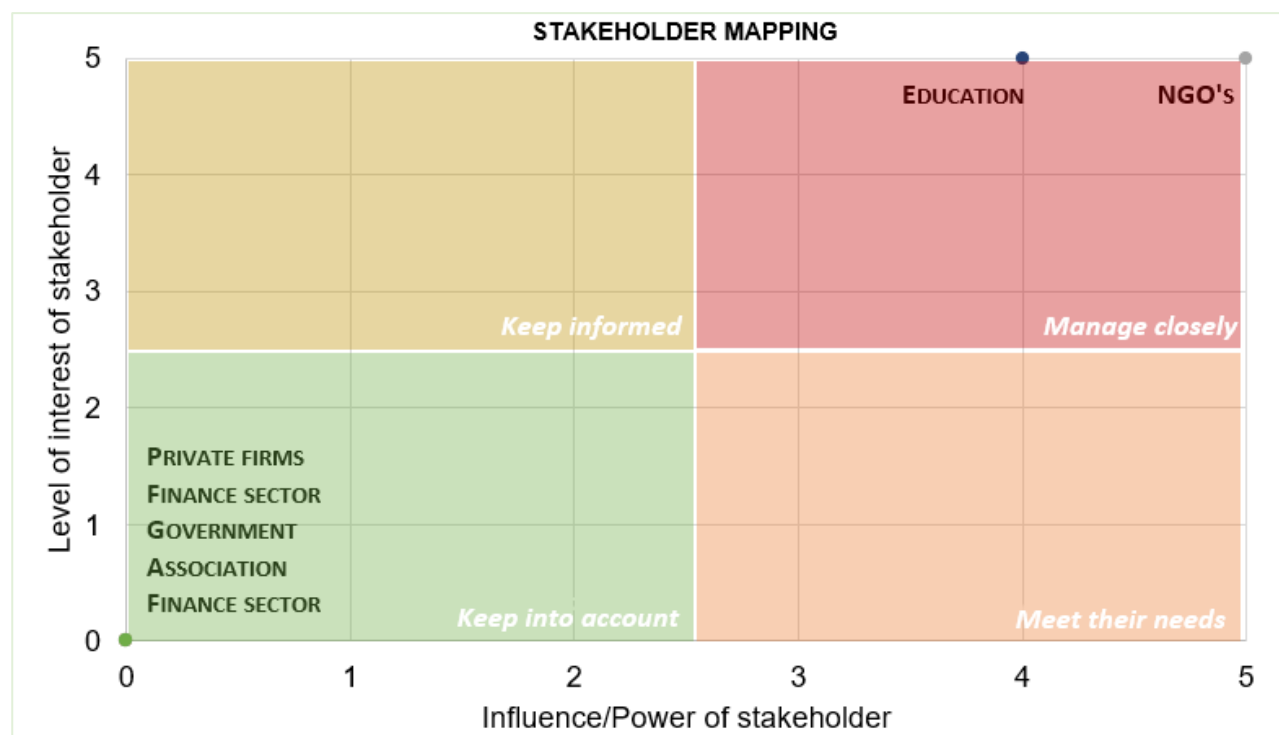


IMPACT AREAS



MAIN TASKS





1. Background

The University of Bologna (UNIBO) has strong expertise in the field of urban and peri urban agriculture, and it has also involved numerous citizens in initiatives related to the topic. UNIBO, together with Flytech Srl (Belluno, Italy), an electrical engineering company specialized in the design and production of custom electronics for lighting systems in several contexts, has carried out several research in the field of indoor agriculture. Thanks to this collaboration, several studies have been carried out on the definition of optimal characteristics of light for indoor cultivation (e.g., Vertical farms) in a broad spectrum of horticultural and aromatic species, with specific reference to 1) the light spectrum 2) the light intensity and 3) the photoperiod. During 2020-2021, a new vertical farm facility (AlmaVFarm) was built at the University for use as research and educational tool. The collaboration between the University of Bologna and Flytech Srl is continuing with the study of crop management practices (irrigation, mineral nutrition and medicinal species) in indoor cultivation systems, with the aim of maximizing resource efficiency.

2. Location

Address: Viale Giuseppe Fanin, 40, 40127 Bologna BO, Italy (find on [Maps](#))

	On foot ✓ The pilot can be safely reached on foot, there are no barriers for people with disabilities.
	By bike ✓ The pilot can be safely reached by bike. Coming from the city center or from the central station there are cycle paths. It is also possible to board the train with one's own bicycle: in particular, from Bologna Roveri it will possible to reach the pilot via the eco-bike corridor, the "Corridoio ciclo-eco-ortivo Roveri/Battirame/Scuola di Agraria". The eco-bike corridor is a system of green infrastructure (vegetable gardens, cultivated fields) interconnected from an ecological point of view, which is being implemented thank to the collaboration between the University of Bologna, the Municipality of Bologna and the social cooperative Eta Beta.

	By car ✓	There is a free university car park reserved for employees of the University (Department of Agricultural and Food Science) and visitors, no specific driving restrictions apply in the area.
	By bus/metro ✓	A few meters from the pilot, there is the bus station "Facoltà di agraria" (bus line n. 35 and 55) for buses coming from the train station, and the bus stop "Sighinolfi" (line n. 20) for buses coming from the city center.
	By train ✓	The nearest train stations to the pilot are Bologna Centrale and Bologna Roveri. From Bologna Centrale is possible to reach the pilot with the bus n.35, as described above, while from Bologna Roveri the bus to reach the pilot is the number n.55. In addition, from the Stazione Roveri it is possible to reach Salus Space, a FoodE pilot, by bike.
	By plane ✓	The nearest airport is Bologna Marconi, which has direct and fast connections to Bologna Centrale.
	By ferry ✗	-

3. Pilot implementation

Co-design process

For the co-design of the pilot an online survey and a student hackathon have been organized to select innovative ideas to be implemented.

- ❖ The online survey involved researchers, students and professors from different departments of the University of Bologna, for a total of **64 participants**, who were asked about their preference for the crop species to grow and their interest in the activities to develop within the Pilot. From the survey, a broad interest has emerged for vegetable crops, aromatic and medicinal plants. Research activities, co-design activities and workshops were the activities for which participants showed the most enthusiasm. T
- ❖ The student Hackathon involved **27 students** from the Master in Agricultural Science and Technologies and in International Horticultural Science who worked in groups to design innovative and sustainable solutions regarding the typology of growing systems, the crop species, the research and the dissemination activities to be integrated in AlmaVFarm.
Solutions included: installation of both aeroponics and hydroponic systems, crop selection, installation of dimmable LED lights, systematic control of environmental parameters through sensors, and the nursery's installations.

3.1 Main structures and areas

The pilot is located at the University of Bologna (department of "Agricultural and Food Sciences") and it includes a vertical farm of 70 m² (Figure 11), for a total plant growing surface of 58 m², able to host more than 23000 plants. The facility hosts two different zones, one dedicated to hydroponic cultivation, with an ebb and flow system, and one to the aeroponic cultivation.

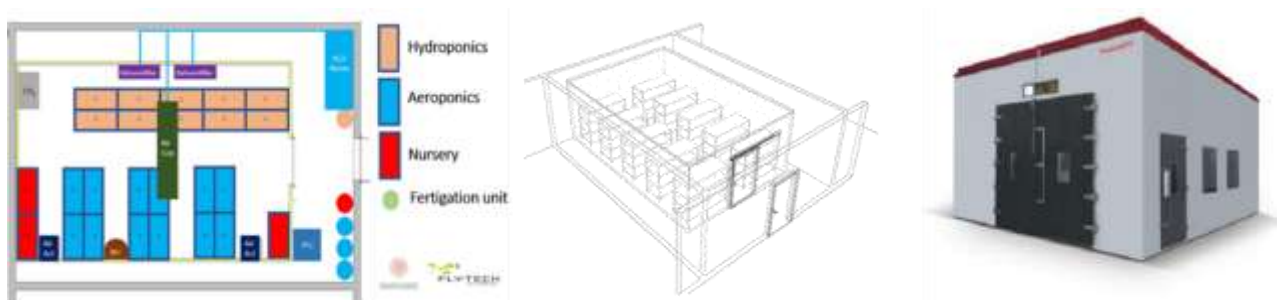


Figure 11. Plan (left) and 3D view (right) of the climate control chamber of AlmaVFarm. The isothermal chamber measures 830 x 566 x 290 cm, has steel covered sandwich panels containing an expanded polyurethane foam inside, and sliding isothermal door.

3.2 Main systems and equipment

Inside the vertical farm, a complete control of climate factors such as temperature, air humidity and CO₂ is possible. Continuous data collection on water, energy and nutrient use allows the monitoring of the environmental footprint of the system. The main systems and equipment's are listed below:

- **Hydroponic system.** The system consists of 10 blocks, each of three levels, for a total of 30 cultivation shelves (Figure 12). Each shelf has height-adjustable LED lamps at the top. The system consists of 2 independent fertigation units, each controlling 5 blocks.
- **Aeroponic system.** It is divided into 2 sectors:
 - the growing sector, which consists of 12 blocks, each of 3 levels, for a total of 36 cultivation shelves (Figure 12, Figure 13). Each shelf has height-adjustable LED lamps at the top. The sector consists of 3 independent fertigation unit, each controlling 4 blocks.
 - the germination unit, which consists of 3 blocks, each of 5 levels, for a total of 15 cultivation shelves. This sector consists of a single fertigation unit.
- **Dimmable LED lighting system** (supplied by Flytech Srl) (Figure 13). It consists of 25 LED light controllers that allow specific light characteristics to be controlled: spectrum, intensity, and photoperiod.
- **Heating Ventilation Air conditioning (HVAC) system.**
- **CO₂ supply system.**
- **Sensors for climate control** (temperature, CO₂ and humidity sensors).
- **Closed-loop fertigation system.**
- **Digital tools and apps** (e.g., Nido® for the control of the fertigation, one for each fertigation unit, HVAC interface panel)
- **Resource use control** (e.g., energy meter).



Figure 12. Structures for layered production (left), equipped with LED lighting system (Flytech Srl) (right) of AlmaVFarm.

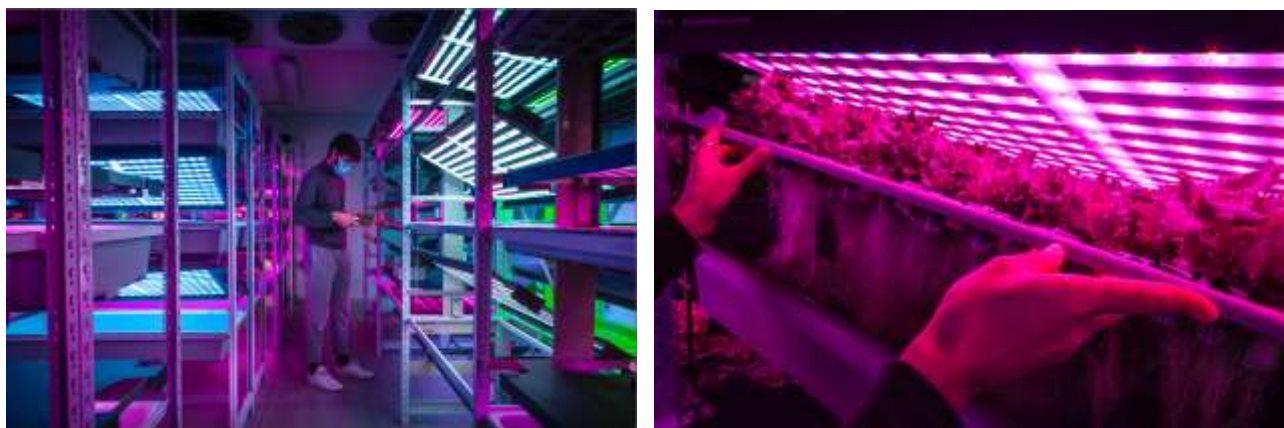


Figure 13. View of the pilot (top) and details of the hydroponic (left) and aeroponic system (right) during experimental trials.

3.3 Main services and activities

AlmaVFarm is an experimental, demonstrative, educational vertical farm, co-designed with their future users. In particular, the pilot is a multi-functional space where students, professors, technicians of the University and, more in general, experts are involved in activities of co-design, management, and research and education, meeting the growing interest towards the implementation of indoor farming systems.

The following activities are offered by the pilot:

- **Research activities:** the research activities are conducted continuously and regularly within the pilot. The main lines of research concern the optimization of technologies and the analysis of the system sustainability (Figure 14). Several collaboration opportunities are possible for researchers, including those from other research fields (such as architecture, economy, engineering, physics) and from other universities.
- **Education activities:** the pilot actively involves students in problem-based learning and hands-on activities to generate sustainable innovation in indoor farming technologies. It regularly offers possibilities for bachelor and master students (from different degree courses and universities) to perform their thesis or internship within the pilot. The pilot integrates complementary and interdisciplinary skills towards the solution of management and technical issues associated with indoor/vertical farming and the application of integrated approaches for the implementation of viable indoor farming. From September 2021, three students have started to develop their thesis on experimental research performed within the pilot and seven students have performed their internship there. In November and December 2021, a participatory activity was organized involving 39 students who actively participated in the design and management of an experimental trial in AlmaVFarm.
- **Dissemination events:** workshops (on-site or online) and guided tours of the pilot aimed at both the community of the University of Bologna and citizens (e.g., students, investors and people interested in the sector) to raise awareness about innovative indoor growing system and their potential in the context of urban agriculture. These events are also aimed at private firms to show the commercial potential of the system and identify potential collaborations regarding the whole process from seed to harvest (e.g., seeds companies, companies producing mechanical components, etc.).
- **Food distribution program:** the project will investigate and foster sustainable food distribution as part of the direct sales program of the University of Bologna's experimental station.



Figure 14. Experimental activities carried out at AlmaVFarm with leafy crops.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to provide food-related services: education and research.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 11 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 11. Contribution to “provisioning services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Food provision	★★★★★	Some crops, such as horticultural crops, are produced mainly for experimental and demonstrational purposes.
 Medicinal resources	★★★★★	Some medicinal plants are produced for experimental and demonstrational purposes
 Ornamental resources	★★★★★	Some ornamental plants are produced for experimental and demonstrational purposes.

4.2.2 Regulating services

Table 12 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 12. Contribution to “regulating services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	Within the pilot, research is carried out to quantify system-related environmental loads and the effect on impact categories.

4.2.3 Socio-cultural service

Table 13 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 13. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Contribution to training and education	★★★★★	Educational activities offered to pupils, students and citizens.
 Contribution to research	★★★★★	Experimental research on the technological and sustainability aspects of the vertical farming.
 Improvement of touristic attractions in the city-region	★★★★☆	Being the pilot the first experimental vertical farm in Italy, many stakeholders come to the city to visit the pilot.
 Improvement of commercial relationships	★★★★★	Workshops and guided tours of the pilot for companies and investors interested in the sectors.

5. Pilot management

For the duration of the FoodE project, the pilot is co-managed by the two FoodE partner institutions: University of Bologna (UNIBO) and Flytech Srl (FLY). The core team (and related roles) actively managing the project is shown in Figure 15.

Both land and buildings of the pilot project are properties of the University of Bologna and for an indefinite time. After the end of the FoodE project, the pilot will continue to be managed by the related FoodE partner Institution (University of Bologna, UNIBO). Research and dissemination activities concerning vertical farming will continue thanks to the participations in other projects with Italian and foreign universities and research centers. The same services that are now offered by the pilot will be offered to the same stakeholders.

Person name	Role	Institution
Francesco Orsini	Pilot leader/manager	University of Bologna
Giuseppina Pennisi	Pilot executor	University of Bologna
Laura Carotti	Pilot executor	University of Bologna
Andrea Crepaldi	Pilot executor	Flytech Srl



Marco Gazzi	Pilot executor	Flytech Srl
Matteo Landolfo	Pilot executor	University of Bologna
Ilaria Zauli	Pilot executor	University of Bologna
Giorgio Prosdocimi Gianquinto	Pilot executor	University of Bologna

Figure 15. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

The following actors have been fundamental in the design and implementation process:

- **Private firms** were involved to provide technical support and to adapt the system to experimental research needs, making it suitable for a commercial scale. In the implementation process three companies have been involved, while other companies will be involved in later phases.
- **Students** with different background performed their internship, were involved the collection of data for their thesis, or joined participatory activities within the pilot. In this way they were actively involved in the implementation of the pilot, allowing also the transfer of knowledge.
- **Researchers** started already several research activities aimed at optimizing plant production and the use of resources and constituting one of the core activity of the pilot.

Table 14 summarizes the general skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars =very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 14. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Under-represented 👎	▪ Organization of education and dissemination activities ▪ Communication of these activities ▪ Developing solutions for problems
S2 - information skills	★★★★★	Well represented 👍	▪ Collecting data for experimental research ▪ Managing and analyzing experimental data
S4 - management skills	★★★★★	Well represented 👍	▪ Managing people working in the pilot and people collaborating with (e.g., students, private firms).
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	▪ Using computers and other digital tools to develop, install and maintain ICT software and infrastructure

S6 - Handling and moving	★★★★★	Well represented 👍	- Handling the material required for the plant growth cycle - Wash and sanitize the materials after each experimental trial
S7 – Constructing	★★★★★	Well represented 👍	- Handling the material required for the plant growth cycle. - Wash and sanitize the materials after each experimental trial.
S8 - Working with machinery and specialized equipment	★★★★★	Well represented 👍	Controlling and operating with precision instrumentation and equipment

Table 15 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 15. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Under-represented 👎	-
Education	★★★★★	Well represented 👍	-
Engineering, manufacturing and construction	★★★★★	Well represented 👍	-
Information and communication technologies (ict's)	★★★★★	Well represented 👍	-
Natural sciences, mathematics and statistics	★★★★★	Well represented 👍	-
Social sciences, journalism and information	★★★★★	Under-represented 👎	-

5.2 Pilot network

So far, the pilot AlmaVFarm achieved the following goals:

- **Job opportunity:** for 1 technician for running the pilot.
- **Dissemination and promotional events:** around 128 citizens that participate in the dissemination and promotional events.



- **Stakeholder engagement in pilot activities:** around 7 local private stakeholders involved in the indoor vegetables supply chain.

In addition, the pilot AlmaVFarm is collaborating with:

- **Another CRFS initiatives:** a social cooperative.
- **Other 2 FoodE Pilots:** Serra Madre, Salus Space jointly organizing educational and research activities.
- **Other 3 organizations/Institutions (outside FoodE):** universities/research centers.
- **Other 2 projects (e.g., other EU projects, etc.):**
 - Innovative Technologies for Future Indoor Farmers (INNOFarming), within the Call Erasmus+, funded by the European Commission.
 - Sustainable Vertical Farming (V-Farm), within the call PRIN (Research Projects of National Interest) funded by the Italian Ministry of Research and Education.

6. Pilot communication

6.1 Videos

Video (title)	Link
Aeroponica e idroponica: vertical indoor farming - AlmaVFarm (in Italian)	https://www.youtube.com/watch?v=NM9DdTsk-xo
VERTICAL FARM: coltivazione vertical in aeroponica e idroponica (in Italian)	https://www.youtube.com/watch?v=R_F9Y3ABpGs https://www.youtube.com/watch?v=R_F9Y3ABpGs
VERTICAL FARM: aeroponica e idroponica, continuano le sperimentazioni (in Italian)	https://www.youtube.com/watch?v=8YTfDSnmR9I
FoodE Pilot: AlmaVFarm (Part 4)	https://www.youtube.com/watch?v=xDmUBHdRdsk

6.2 Links to dissemination materials

- <https://coltureprotette.edagricole.it/ricerca-scientifica/vertical-farming-una-nuova-frontiera-della-ricerca/>
- <https://www.facebook.com/rescueabunibo/posts/5233287356700149>
- <https://www.facebook.com/rescueabunibo/posts/5214568851905333>
- <https://www.facebook.com/AquaponicDesign.bo/posts/625325368831287>
- <https://www.facebook.com/AquaponicDesign.bo/posts/628591965171294>
- <https://www.facebook.com/EUFoodE/posts/429938651959234>
- <https://www.facebook.com/distal.unibo/posts/452175149890703>
- <https://www.facebook.com/rescueabunibo/posts/4820237864671769>
- <https://www.facebook.com/rescueabunibo/posts/4714155981946625>
- <https://distal.unibo.it/it/eventi/the-bright-side-of-vertical-farming-first-research-experience-at-almavfarm>

7. Photo credits

Figure 11. University of Bologna (2021). Plan (left) and 3D view (right) of the climate control chamber of AlmaVFarm. Isothermal chamber measures 830 x 566 x 290 h, has steel covered sandwich panels containing an expanded polyurethane foam inside, and sliding isothermal door (130 cm x 220 cm h). [Photograph]

Figure 12. University of Bologna. (2021). AlmaVFarm with structures for layered production equipped with LED lighting system supplied by Flytech. [Photograph]

Figure 13. Marco Raccicchini. (2021). View of the pilot (top) and details of the hydroponic (left) and aeroponic system (right) during experimental trials. [Photograph]

Figure 14. Marco Raccicchini. (2021). Experimental activities at AlmaVFarm [Photographs]

FoodE Pilot - Urban Farming at SALUS Space

Bologna, Italy

Municipality of Bologna

The Salus Space project is an ambitious urban regeneration plan of a peripheral area of Bologna (Savena district). The purpose is to give this space back to the community by creating a multi-functional center with several public facilities from residential buildings to cultural, recreational and work spaces. Citizens expressed their needs to create a place for active participation with cultural and social opportunities, environmental quality and recreational and aesthetic gardens for the community well-being. Part of the area is a rooftop area convertible into garden and climate-controlled shipping containers that can be adapted to host indoor farming activities. The rooftop will be used for demonstration activities on vertical farming systems.



BOL



ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

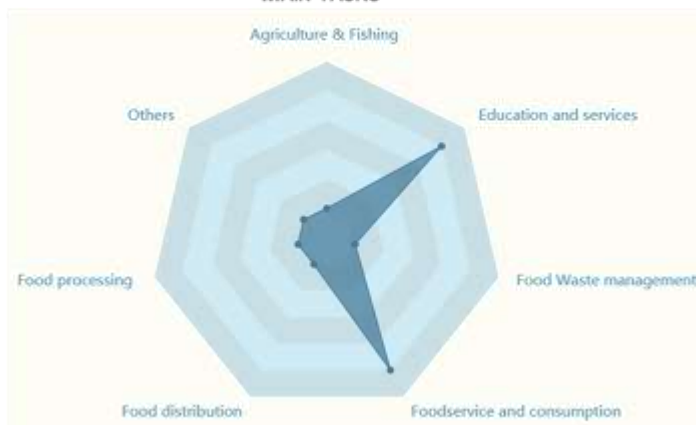
LOCATION

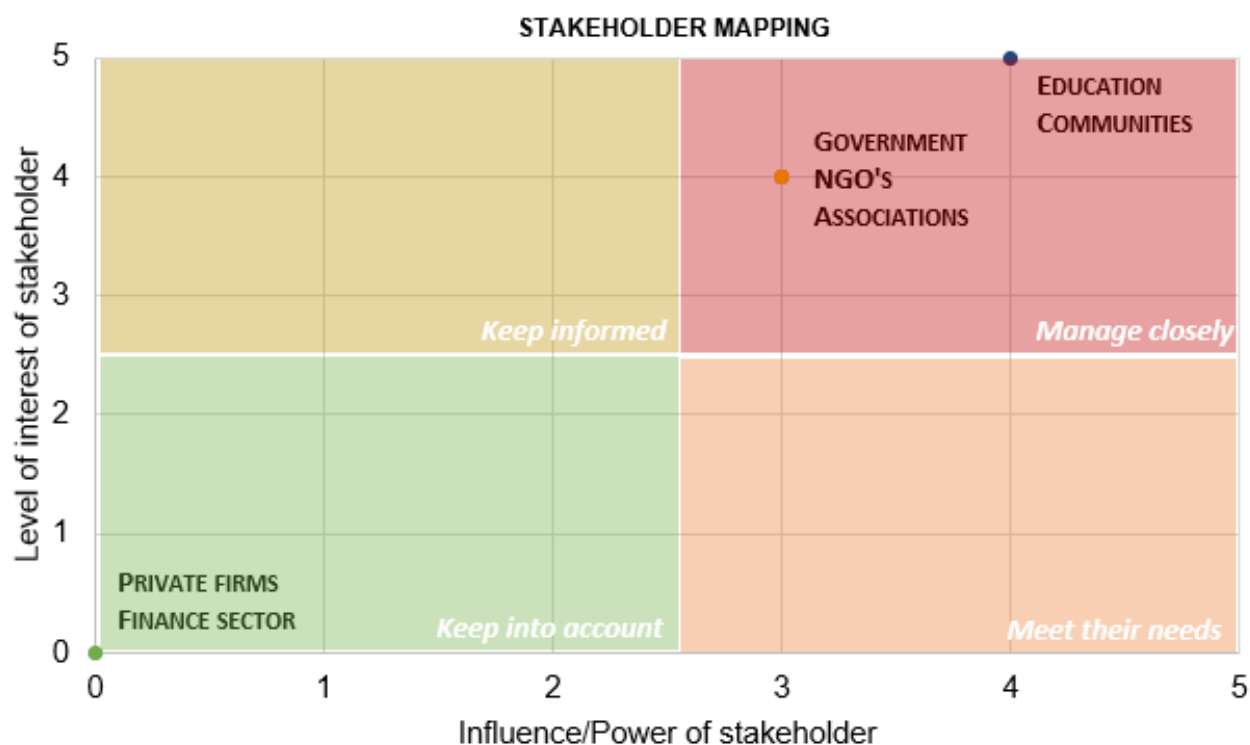


IMPACT AREAS



MAIN TASKS





1. Background

The Bologna city council owns an area that once housed the private clinic “Villa Salus” and that has undergone regeneration plan, and that will be devoted to the promotion of intercultural dialogue, social inclusion, capacity building and income generation in the framework of the EU project “Salus Space” (winner of the UIA-Urban Innovative Actions program) coordinated by the Municipality of Bologna with the participation of 16 partners.

2. Location

Address: Via Malvezza, 2, 40139 Bologna BO, Italy (find on [Maps](#))

	On foot ✓	Salus Space can be easily reached on foot either directly from Via Malvezza or from the walkway accessible from Via Mondolfo (neighborhood area called Villaggio Due Madonne). There is a bus stop at a walking distance (about 500 m). There is full accessibility for disabled people.
	By bike ✓	Salus Space can also be easily reached by bicycle from Via Malvezza and Via Mondolfo. In addition, thanks to the bike path already present in the Savena district, Salus Space is well connected to the city center which can be reached in less than twenty minutes. There is a project to improve the cycling accessibility with the creation of new cycle paths and the connection to the closest metropolitan railway.
	By car ✓	Salus Space can be reached by car from Via Malvezza. Before the entrance to Salus there is a free parking lot, and then walk through the large tree-lined driveway. An empty lot, close to the entrance gate, is arranged as a parking area for the events since a higher number of cars is expected. Via Malvezza will be restored soon, with a low-speed zone (20 or 30 km/hour) to improve safety.



	By bus/metro ✓	Salus Space can be reached by bus taking the line n. 25 or 19 (from the city center or from the train station Bologna Centrale) and getting off at the last stop "Deposito Due Madonne".
	By train ✓	The nearest train stations to the pilot are Bologna Centrale and Bologna Roveri. From Bologna Centrale it is possible to reach the pilot by bus (as described above), while from Bologna Roveri it is possible to reach the pilot by bike in 10 minutes.
	By plane ✓	The nearest airport is Bologna Airport (BLQ) which has frequent and fast connections to the central train station. The airport is one of the most important airports in Italy in terms of number of passengers and international destinations.
	By ferry ✗	-

3. Pilot implementation

The goal of Salus is to experiment with a space of coexistence and sustainable collaborative management where the social inclusion of migrants and refugees is combined with a vision of intercultural welfare and active citizenship able to overcome the logic of welfare by category.

Co-design process

Main targets of the co-design process was the regeneration of the area and buildings of the former clinic Villa Salus (Bologna) by bridging the latest innovations in urban farming design and technology with multi-functional planning of urban spaces as well as using cross sectoral knowledge, teamwork and intercultural dialogue. For this purposes more than **200 participants** (students, citizens, researchers, professors, other stakeholders) were involved in the framework of the student competition "UrbanFarm" 2021. In addition, the winner ideas were further analyzed in a series of focus groups with the inhabitants of Salus Space (as well as other citizens, students, local authorities) in order to meet the needs and interests of the local community.

The most important outcomes included the design of a rooftop garden and technical aspects such as the rainwater collection system, crops' selection and production plans, management of materials' cycles, the organization of events and educational activities in harmony with the local community.

3.1 Main structures and areas

Salus Space (Figure 16) consists of:

- cohousing building, hosting a mixed community (around 40 people including single, couples, families with children);
- a study center;
- a conference room;
- 1 container for restaurant/bar (Figure 16);
- 1 container emporium (Figure 16);
- 1 container for theater workshops (Figure 16);
- 1000 m² of community soil-based garden (behind the co-housing) managed by 2 residents of Salus Space (Figure 17). The garden produces year-round seasonable vegetable for the Syrian restaurant and for the local farmer's market;

- A rooftop garden for vegetable production and events on the 8.36 m² terrace of the study center.
- A bio-pond for the collection of rainwater that will be used for fresh food production (Figure 17). The implementation of the bio-pond was organized as a participatory activity with students. This was preceded by a training event that provided participants with preliminary skills in the construction and management of bio-lakes and bio-pools. The topics covered were: definitions, regulations, regenerative zones, water circulation and replenishment systems, bathing zones and typical bacteria.
- 1 container for the production of mushrooms for producing, processing and selling mushrooms during the spring-summer season and 1 container of 12 m length each, for the production of microgreens, baby leaves, seedlings for the garden. The containers will be operative by May 2022.



Figure 16. Plan of Salus Space including the different areas (left) and containers for bar/restaurant, workshops and emporium (right) until the end of 2023.



Figure 17. Bio-pond (left) and vegetable garden (right)

3.2 Main systems/equipment

- The principles of permaculture and regenerative agriculture are applied in the garden. In fact, only natural fertilizers such as mature horse manure and compost are used. The mulching is made with compostable “Mater-Bi” cloth.
- The garden is irrigated with a system of drip wings positioned below the mulching of the cultivation areas in order to minimize evaporation. The irrigation system is manually operated. During the first year the garden was worked with a tiller, and currently is maintained by hand.
- The home aquaponics system has 1000 liters of aquaculture tank and 3 square meters of growth bed. Ornamental fish are raised in this system for now but the goal by 2022 is to include fish for community use.
- Seedlings are germinated in the growth beds and then transferred to the main garden, and some leafy vegetable plants are also grown to show the community and citizens the differences between the two growing methods.

- The community's composting system is a classic raised pile system placed near the vegetable garden where both residents' vegetable waste and green mowing from the garden and Salus areas are deposited. The compost produced is then used both in the garden and in the aquaponics system.
- The cultivation of microgreens is now only for private use within the residential unit. The plan for 2022 is to structure year-round indoor cultivation to produce trays for sale at the Saturday farmers' market.
- Mushroom cultivation will take place starting in April 2022 inside a dedicated container. The mushrooms produced, mainly *Pleurotus spp.*, will be for direct sale and use in the restaurant. The mushrooms will be grown on ballots of coffee grounds or other reclaimed substrates (Figure 18).



Figure 18. Experiments of mushrooms' cultivation on different reclaimed substrates.

3.3 Main services and activities

Salus Space is a multifunctional center with housing, art and craft workshops, a theatre, a study center with coworking stations, an emporium, a weekly farmer's market, vegetable gardens, a food court and, a training hub for soilless crops and urban agriculture, and above all, a community.

The following activities and services are offered by the pilot:

- **On-site production** of vegetables, microgreens, baby leaves, flowers, seedlings and mushrooms (Figure 19).



Figure 19. Vegetables and flowers from the outdoor garden.

- **Educational and outreach events:**
 - through the installation of highly innovative production systems, dissemination events, professional training courses and educational workshops will be organized for more than

2.000 citizens in order to encourage the development of a shared awareness towards innovative farming systems. During the events, the participant can taste the products grown thanks to the transformation directly inside the container restaurant.

- A series of cultural promotion and dissemination events on urban horticulture and soilless growing systems such as aquaponics, hydroponics, microgreens, and vertical farming (that have already been carried out involving more than 200 citizens), will continue with a similar structure (Figure 20). Educational and outreach events were held regularly 2 Saturdays per month throughout the year 2021. All events were held in-person to introduce the FoodE activities at Salus spaces to the different types of stakeholders involved. Specifically, the activities targeted university and secondary school students, professionals/companies and citizens of Bologna, not only from the Savena district, where the pilot is located, but also from other districts of the city.
- **Training hub** in the field of soilless crops and urban agriculture.

The schedule of activities is available on the project's website (<https://shorturl.at/bjpz7>).



Figure 20. Lab on aquaponics (left) and microgreens lab (right).

- **Study center:** in Salus Space there is a Study Center where different University Departments run a field-research around the topic of social innovation and urban agriculture, with regular events. For this purpose, the Department of Agricultural and Food Sciences (DISTAL) has signed a convention with the Municipality of Bologna to develop a Think Tank, with the coordination of DAMSLab - Department of the Arts.
- **Labs for collective creations** (e.g., theatrical, craft, musical) open to everybody.
- An **emporium** with food and craft products of the territory (e.g., flours, pasta, wine, craft beers, honey and more).
- **Restaurant** with typical Syrian cuisine (Figure 21)
- **Weekly farmers' market** with local products, every Saturday morning from 8.30 to 13.00 (Figure 21).



Figure 21. Syrian restaurant (left) and weekly farmer market (right). Source: Salus website (<https://saluspace.eu/locanda/>).

4. Pilot functions and eco-system services

4.1 Pilot functions

- to distribute/sell food and/or food products
- to provide food-related services: education and training center in the field of soilless crops and urban agriculture.
- others: activities beyond food, such as accommodation and rooms' rental, art and craft workshops and theatre.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 16 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 16. Contribution to “provisioning services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Food provision	★★★★★	Cultivation of community gardens to produce vegetables, microgreens, baby leaves and mushrooms for residents and sale.
 Provision of raw materials	★★★★★	In Salus Space, the vegetable waste produced by the inhabitants and the restaurant is collected for the production of compost to be used in the vegetable gardens.
 Ornamental resources	★★★★★	Many flowering plants were planted in Salus Space throughout the year 2021. This is both to beautify the space and promote biodiversity.
 Energy provision	★★★★★	There is a 15Kw photovoltaic system above the co-housing that is now being used for community services, and will be used to operate the mushroom production container.

4.2.2 Regulating services

Table 17 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 17. Contribution to “regulating services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Regulation of urban metabolism	★★★★★	Salus Space aims to implement a zero-waste strategy, meaning that no plastic is used within the community and organic waste is collected for compost production.
 Enhancement of pollination	★★★★★	Edible and non-edible flower crops have been placed in all areas of Salus to promote biodiversity and a higher presence of pollinating insects.
 Control of pests and diseases	★★★★★	In the vegetable gardens of Salus Space no synthetic pesticides are used for pest control. Currently, only products allowed for organic farming are used, favoring a natural biological control. The community garden is supplied with horse manure as fertilizer.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	For example, the vegetable garden is irrigated with rainwater collected from the flat surfaces of the co-housing and study center. In addition, a more efficient use of water is encouraged by using a drip irrigation system, placed below the mulch.

4.2.3 Socio-cultural services

Table 18 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 18. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Contribution to training and education	★★★★★	Salus Space was created as a place for integration of migrants and refugees and conceived as a permanent laboratory to train disadvantaged people and any citizen interested to learn in a multicultural environment covering several fields of intervention. Social Agriculture is definitely an important part of this educational offer and the pilot will keep offering different training experiences to enhance social and economic empowerment.
 Contribution to research	★★★★★	In Salus Space there is a Think Tank for Social Innovation and intercultural welfare, where different University Departments, including DISTAL (Department of Agricultural Sciences, Bologna) will work together to carry out a field-based research. This will attract new funds to expand the use of different urban agriculture techniques and involve researchers and specialists in the near future.
 New forms of recreation	★★★★★	One of the gardens, designed with local inhabitants during the co-design phase, has been conceived for recreational purposes, and will be open to all citizens. Families with children can benefit from this shared space, finding a

		pleasant environment to play and rest, surrounded by aromatic and ornamental plants.
 Improvement of touristic attractions in the city-region	★★★★★	The mix of facilities with collaborative management, the inclusive approach, and the creation of an attractive and beautiful environment will attract responsible tourists. They will have the opportunity to stay at Salus Space for a short time immersive experience, working with refugees and inhabitants, combining accommodation and training, and promoting social responsibility.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	A collaboration between Salus Space and the regional Health Agency (CSM - Center for Mental Health) has already been established. Currently, in Salus, there are two inhabitants affected by health issues and there is the aim to involve more disadvantaged users, e.g., people coming out from pathological addiction that are hosted in the nearby structure, called “Casa Gianni”. The therapeutic benefits of urban agriculture will thus be further developed, also in collaboration with students of the Master Degree on Horticultural Therapy of the University of Bologna.
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	The FoodE project is a first step to recover the traditional rural landscape and make accessible to all citizens a public area which had been in a state of abandonment and neglect for 15 years (surroundings of the former Villa Salus hospital) with a special focus on aesthetics and biodiversity issues. This is of particular importance for the inhabitants of the neighborhood.
 Preservation of cultural knowledge and heritage	★★★★★	The area where the pilot action takes place is a former rural area that has been abandoned for many years. The re-use of the land will bring social and economic benefits as well as the preservation of the historical agricultural wedges. In the near future, the intention is to connect the existing rural heritage areas in order to create a rural district.
 Improvement of social cohesion and community building	★★★★★	Social cohesion and community building is the core of the whole project at Salus, based on the presence of a collaborative community that will get actively involved in the design and implementation of all activities. The community building process is facilitated by a community manager and a linguistic mediator hired by the Municipality. Moreover the collaborative governance system allows all citizens and local inhabitants to participate according to their possibility and interest, thus creating a social mix and enhancing the social cohesion, as it is stated in Salus Space “Charter of values” (available at this link).
 Improvement of commercial relationships	★★★★★	Economic sustainability is another important goal to be achieved within the project. This requires the creation of a social enterprise and the establishment of stable relationships with local economic stakeholders. An emporium, a restaurant and a weekly farmers’ market are



other ways to improve sustainability and promote commercial neighborhood-wide business connections.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution: Bologna City Council (BOL). The core team (and related roles) actively managing the project is shown in Figure 22.

The pilot implementation was carried out by the pilot team with the help of Salus Space citizens, the local community and researchers from the University of Bologna.

Both land and buildings of the pilot project are properties of the Municipality of Bologna and granted to the pilot use for an indefinite time. After the FoodE project, the pilot initiative will be managed by the related FoodE pilot institution (BOL) together with the members of the Salus Space community who will always be able to refer to all those realities and actors that today manage the space and its activities.

Person name	Role	Institution
Inti Bertocchi	Pilot owner, Pilot Manager (1)	Municipality of Bologna
Francesco Lombardo	Pilot executor (1)	Aquaponic Design and in support of Municipality of Bologna
Luca Settanni	Pilot executor (2)	Aquaponic Design and in support of Municipality of Bologna
Gian Marco Tamborra	Pilot executor (3)	Aquaponic Design and in support of Municipality of Bologna
Elisa Frasnetti	Pilot execution supporter, Pilot communicator (1)	University of Bologna
Laura Carotti	Pilot execution supporter, Pilot communicator (2)	University of Bologna
Giuseppina Pennisi	Pilot execution supporter, Pilot communicator (3)	University of Bologna

Figure 22. People involved in the FoodE pilot team and respective roles and institutions.

Salus Space is managed by a Temporary Association of Purpose made up of six subjects of the Third Sector:

- Eta Beta Cooperativa Sociale (as leader)
- Acli Provinciali di Bologna APS
- Aquaponic Design
- Cantieri Meticci
- Cefal Emilia Romagna
- IRS Istituto per la Ricerca Sociale.

Each reality shares its knowledge and experience, in a co-management that focuses on the idea of collaboration. The Municipality of Bologna and the Savena District ensure their supervision and share the governance. The work of community building, social and linguistic mediation and communication is carried out by Open Group and Cidas in close relationship with the ATS, thanks to a PON Metro funding.



5.1 Skills and expertise requirements

Table 19 summarizes the skills categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 19. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	-
S2 - information skills	★★★★★	Well represented 👍	-
S3 - assisting and caring	★★★★★	Well represented 👍	-
S4 - management skills	★★★★★	Well represented 👍	-
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	-
S7 – Constructing	★★★★★	Well represented 👍	-

Table 20 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars =Very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 20. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Arts and humanities	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Well represented 👍	-
Education	★★★★★	Well represented 👍	-
Engineering, manufacturing and construction	★★★★★	Well represented 👍	-
Health and welfare	★★★★★	Well represented 👍	The District Authorities such as health, social and educational services, are present within the project thanks to a strong



			collaboration and they will provide all required assistance. The social and economic activities within the pilot aim at integration of disadvantaged people. The target of the previous UIA project is represented by migrants and refugees but FoodE enlarges the scope.
Information and communication technologies (ict's)	★★★★★	Well represented 👍	In the study center a “digital gym” will be established soon to provide the required skills and tools to improve this aspect.
Social sciences, journalism and information	★★★★★	Well represented 👍	There is not a specific team working on that but within the above mentioned “Think Tank”, many reflections on social sciences and information issues will take place. Currently, there is a “participatory editorial staff” involving the inhabitants which represents an innovative experience.

5.2 Pilot network

So far, the pilot Salus Space achieved the following goals:

- **Job opportunity:** for 1 resident of Salus Space who will manage all the activities related to the vegetable gardens and soon for the above-ground container plants.
- **Education - research – training:** about 200 citizens have been involved during the training workshops both outdoors (in the gardens and in the community spaces) and indoors at the study center where they have been involved in frontal lessons.
- **Dissemination and promotional events:** more than 30 formal and informal events have been held during which training courses, storytelling moments about the Salus Space project and FoodE have been organized. Overall, about 500 people have been involved, including citizens, residents, professionals and students.

In addition, the pilot Salus Space is collaborating with:

- **Other 2 projects (e.g., other EU projects, etc.):** AgriBioSalus - Project ReactEU.

6. Pilot communication

6.1 Videos

Video (title)	Link
Salus space	https://www.instagram.com/tv/CXBcm2wASw-/
FoodE Pilot - Salus Space	https://www.youtube.com/watch?v=zR-3mEixW1w
COLTIVARE FUNGHI con fondi di caffè: raccolta e fruttificazione	https://www.youtube.com/watch?v=NUVOxRjtA2A



Playlist Videos UrbanFarm 2021- Round 1	https://youtube.com/playlist?list=PLzZ52i2AkCTPucXZHgFZApCIU9YsXjEJU
Playlist Videos UrbanFarm 2021- Round 2	https://youtube.com/playlist?list=PLzZ52i2AkCTPjynPz1356ERWqtlZfU678
Grand Finale of UrbanFarm 2021	https://www.youtube.com/watch?v=crfZH8TJTnw&t=24420s

6.2 Links to dissemination materials

- <https://saluspace.eu/news/>

7. Photo credits

Figure 16. Municipality of Bologna. (2021). Plan of Salus Space including the different areas (left) and containers for bar/restaurant, workshops and emporium (right). [Image]

Figure 17. Municipality of Bologna. (2021). Bio-pond (left) and vegetable garden (right). [Photograph]

Figure 18. Aquaponic design. (2022). Experiments of mushrooms' cultivation on different reclaimed substrates [Photograph]. <https://www.youtube.com/watch?v=NUVOxRjtA2A>

Figure 19. Municipality of Bologna. (2021). Vegetables and flowers from the outdoor garden. [Photograph]

Figure 20. Municipality of Bologna (2021). Lab on aquaponics (left) and microgreens lab (right). [Photograph]

Figure 21. Salus space. (2022). Syrian restaurant (left) and weekly farmer market (right). [Photograph]. Saluspace.Eu. <https://saluspace.eu/locanda/>

FoodE Pilot - SERRA MADRE: A food hub for education, leisure and urban farming innovation

Bologna, Italy

University of Bologna

Within the city largest urban park (Giardini Margherita) the FoodE stakeholder board member "Kilowatt" manages the space "Le Serre", a food and sustainability hub hosting aquaponic and hydroponic growing systems, a community gardening, a child nursery, a food bistro, a co-working space and several educational, social and artistic events.



SER



ORGANIZATION

- ☒ Profit
- ☐ Non-Profit
- ☐ Association non lucrative
- ☐ Private firm
- ☐ Self-entrepreneur
- ☒ Cooperative
- ☐ Local authority
- ☐ Producer Organization
- ☐ Others

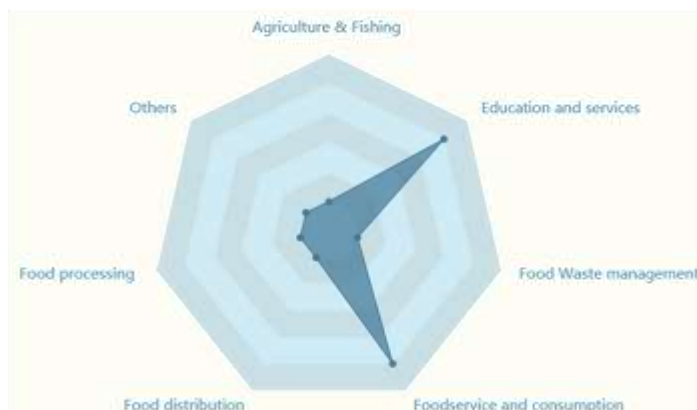
LOCATION

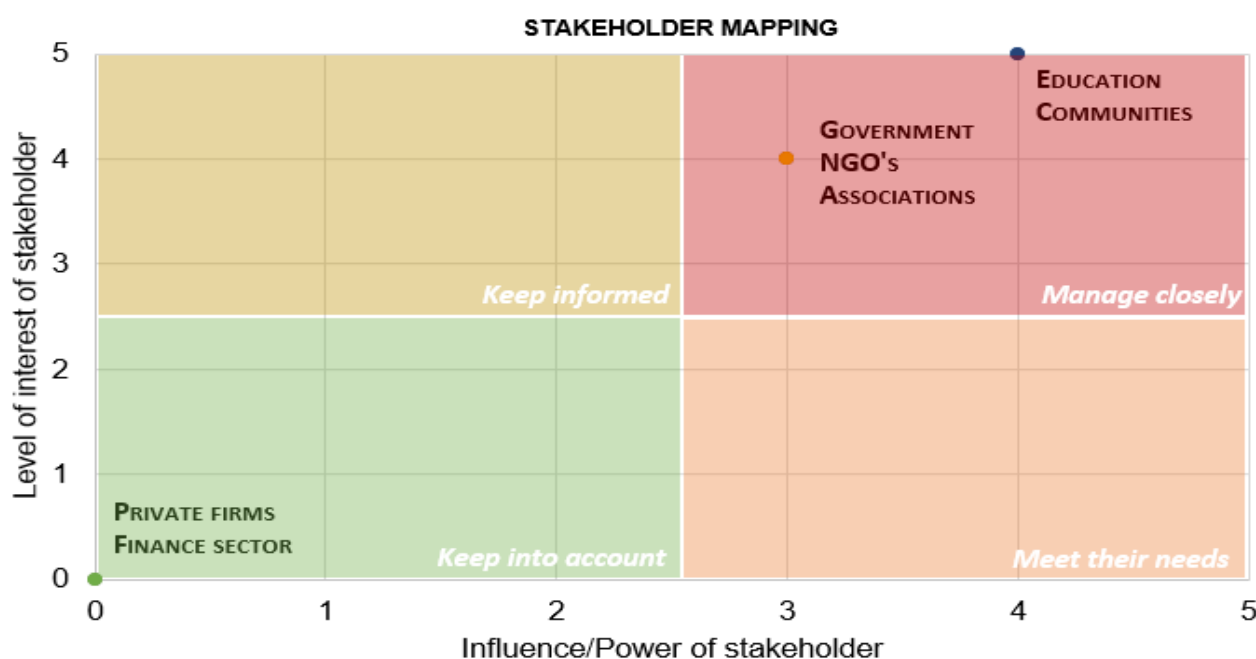


IMPACT AREAS



MAIN TASKS





1. Background

Within the largest urban city park in Bologna (Giardini Margherita) the FoodE Stakeholder Board member Kilowatt manages the “Le Serre” space (owned by the municipality of Bologna). A food and sustainability hub (“SERRA MADRE”) has been created within “Le Serre” and includes aquaponics, community gardening, a child nursery, a food bistro, co-working, social and artistic events and educational activities. In 2019, about 120’000 local inhabitants and visitors took part in the activities promoted.

2. Location

Address: Via Castiglione, 134, 40136 Bologna BO, Italy (find on [Maps](#))

	On foot ✓	The pilot is easily accessible on foot, in fact it is only 10-15 minutes’ walk from Piazza Maggiore, the center of Bologna.
	By bike ✓	The pilot is also well accessible for those coming by bike, entering from the large park of Giardini Margherita which has several bike paths. Near the pilot there are many places where visitors can safely tie their bike.
	By car ✗	It is not possible to access the pilot by car, but it is possible to park the car in the parking places of Giardini Margherita (paid municipal parking) and then walk to the pilot in 5-8 minutes.
	By bus/metro ✓	It is possible to reach the pilot by bus: line n.14 from the city center getting off at the “Baraccano” bus stop and line n. 32 from the central station getting off at the “Giardini Margherita” bus stop. Both stops are only a few minutes’ walk from the pilot.
	By train ✓	The nearest train station to the pilot is Bologna Centrale, from where it is possible to reach the pilot by bus number 32, as described above, or by bike following the cycle path around the historical center (“tangenziale delle biciclette”).
	By plane ✓	Bologna Airport, from which there are fast and frequent connections to the central station.



	By ferry X	-
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3. Pilot implementation

Co-design process
❖ Serra Madre was the co-design target of the International Student Challenge UrbanFarm2022 (Link UrbanFarm22). The pilot is in fact one of the two locations for which teams of international students from different backgrounds have presented their redevelopment project, considering social, environmental and economic aspects. Within the challenge, the Serra Madre location was targeted within the work of approximately 35 participating students, organized in 7 different teams. The final event of UrbanFarm2022 took place on the February 17, 2022. Some of the ideas resulting from the competition will be implemented in the Pilot. ❖ Other co-design activities are scheduled for October-December 2022, in particular, workshops and/or focus groups for the design of the aquaponic gardens and the whole area surrounding the bio-lake (two greenhouses of 300 m² each plus 1,500 m² of outdoor space). This space will soon undergo regeneration with the primary aim of strengthening and innovating the artistic and cultural offer of the complex. The aim is to create a center of virtuous dialogue between the worlds of research (scientific and humanistic), business and art on the great challenges of our time: sustainability and climate change. The combination of academic approach and artistic creativity is an essential mix to read these challenges in their complexity, rework them and make them explorable from several point of view.

3.1 Main structures and areas

The pilot “Serra Madre” consists of different areas:

- **Event space.** An area of experimentation and openness, dedicated to events for debates, conferences, workshops, artistic and cultural productions regarding environmental sustainability and climate change, Climate Change Initiatives (CCI), social entrepreneurship and promotion of the city.
- **“Kilowatt's (KW)baby”.** The expansion of the KW Baby educational service of the child nursery (0-6 years) based on the methodology of outdoor education, with an effective increase in the accommodation capacity (from 7 to 20 children).
- **Co-working space.** A space dedicated to work that provides an expansion of Kilowatt's offices and the creation of new workstations to integrate the current offer of coworking.
- **Space lab.** A multifunctional space for training and production, dedicated to the development of transversal skills, workshops and courses on image education, development of editorial products and creative crafts.
- **Bio-lake.** In the large space around the frame of the greenhouses uncovered, an underground bio-lake has been created for the treatment of rainwater drained from the plants, connected to the NFT cultivation system immediately above. A model of circularity in symbiosis with the ecosystem of the greenhouses and, at the same time, functional to spread a virtuous model of cultivation above ground and low waste of resources.
- **Aquaponic garden.** In the space of the greenhouses there are small and large aquaponics systems in close contact with the users of the space. In particular, there is an aquaponic table that is available to the public to use for leisure, work and study.

- **Greenhouses.** As part of the Serra Madre project, the project includes a greenhouse dedicated exclusively to the production of vegetables throughout the year to be able to supply the kitchen with high quality products at “0 km” since they will be produced through aquaponics systems. Two greenhouses of 300 m² each plus 1,500 m² of outdoor space will soon undergo regeneration with the primary aim of strengthening and innovating the artistic and cultural offer of the complex.
- **Vetro restaurant.** The restaurant offers dishes made from raw materials coming directly from the on-site garden or purchased from local producers.



Figure 23. Top view of Serra Madre (left) and Detail of the artistic work Hydroponic Cloud and bio lake.



Figure 24. Aquaponic garden (left), feeding fish with duckweed (*Lemna minor*) (center and right).



Figure 25. Restaurant with local products. On the right, vegetables produced in the aquaponic garden.

3.2 Main services and activities

In addition to the services already described in section 3.1, the pilot offers:

- **Horticultural production:** the available greenhouses (currently under renovation) and open spaces are suitable for growing a range of local horticultural products with the aim of defining protocols for sustainable urban cultivation (e.g., on aquaponics and hydroponics) and involving local organizations and citizens (e.g., through community gardening) while also raising their awareness of food production and safety.
- **Training activities:** Serra Madre offers citizens the opportunity to get in touch and learn about different types of growing systems such as aquaponics and hydroponics. Moreover, thanks to the shared garden, it is possible to spread the importance of biodiversity and ecological systems with agro-systemic function. These training paths are activated through targeted and professional training courses, as well as events open to everyone (citizens, students, professionals).
- **Festival and workshops to raise public awareness.**
 - Schools of the Municipality of Bologna are involved in activities to raise pupils' awareness on the food related issues. In January 2023, a series of kid science activities is scheduled to take place at Serra Madre, during the MyLocalFoodE Festival in Bologna.
 - In September 2021, in Serra Madre was held "[Resilience Festival](#)", a 4-day event where more than 2000 people participated in free events on a wide variety of topics. In the framework of the festival was held the presentation of the comic "[Mr.Aquaponic](#)". Together with the comic presentation, free workshop, open to all, were organized on the aquaponic systems already present in the pilot. A total of 100 people, including students, professionals and citizens were involved in this activity during the 4 days.
 - In 2022, free training and storytelling events about the Serra Madre project will be organized regularly, for at least 2 weekends a month. The focus will be mainly on the biological control and agroecology and above ground systems.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to process food into food products
- to provide food-related services: education, training and research.
- other: cultural center, child nursery, coworking.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 21 summarizes the contribution of the CRFS pilot initiative to "provisioning services" on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 21. Contribution to "provisioning services"

Service sub-category	Contribution	Activities - best practices contributing to each service
 Food provision	★★★★★	On-site production of vegetable crops and fish. The Vetro restaurant within Le Serre serves refined and entirely vegetarian and/or vegan dishes. The products used are completely local and purchased from local growers who can guarantee quality and freshness.

 Ornamental resources	 The greenhouses within the space produce potted ornamental plants for distribution throughout Le Serre areas.
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4.2.2 Regulating services

Table 22 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 22. Contribution to “regulating services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Regulation of urban metabolism		Vegetable scraps from the kitchen are composted on site and then the compost is used in the garden. In addition, mushroom production is being tested using coffee grounds produced by the Vetro Bar as a growth medium.
 Enhancement of pollination		Flowering strips are planted in the green areas of Le Serre every year, depending on the time of year, so that there is always a food source for pollinating insects.
 Control of pests and diseases		In the urban garden no pesticides or fertilizers of synthetic origin are used. The production cycle is managed entirely with biological techniques.
 Enhancement of carbon sequestration / Improvement of local micro-climate		The pilot is located within one of the largest parks in Bologna, the Giardini Margherita, constituting a green lung for the city, despite being 5 minutes from downtown. Inside the greenhouses there is a lot of vegetation, the seats and tables are surrounded by greenery.
 Habitat provision and/or biodiversity		At Le Serre there are numerous water bodies available to birds and pollinating insects. There are also many communities of dragonflies that help during the summer season to reduce the presence of mosquitoes. In addition, many aquatic and marsh plants have been introduced into the existing bio-lake. The first ones to favor the reproduction of goldfish and carp present while the second ones offer shelter during the winter to many pollinating insects and predators such as ladybugs. The outdoor plants that are already present in the greenhouses and those that will be built later in Serra Madre are unique in Italy.

4.2.3 Socio-cultural services

Table 23Table 8 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 23. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Contribution to training and education	★★★★★	Training and education activities on several topics such as aquaponics and hydroponics.
 Contribution to research	★★★★★	There is a vermi-composter that produces earthworm humus from kitchen waste. This humus is used to create a natural liquid fertilizer to be used in vegetable gardens and above ground cultivation systems. A research program was activated in 2022.
 New forms of recreation	★★★★★	Le Serre is a space where people can enjoy many services for free, such as drinking water fountains, as well as electric plugs for digital devices and wi-fi internet connection. For this reason, during the spring and summer season, the space is filled with workers and students who also spend the entire day inside Le Serre. Moreover, Kilowatt organizes many training courses, events of cultural dissemination both artistic and scientific free of charge. This means that many citizens of Bologna experience the contents and services offered by Le Serre.
 Improvement of touristic attractions in the city-region	★★★★★	Le Serre are very popular with Italian and international tourists as well, in fact, the Vetro restaurant and spaces are very well known because of their innovation not only in terms of cuisine but also of location.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	Inside Serra Madre is a bio-lake that generates a continuous waterfall and promotes relaxation and concentration. During the summer of 2021, yoga and meditation events were organized right inside Serra Madre.
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	During the Resilience Festival hosted by Le Serre, artists and scientists collaborate on highly innovative projects to create works of art that can raise awareness among viewers about issues of global warming, food and environmental sustainability.
 Improvement of social cohesion and community building	★★★★★	Using the space has a large civic function, in fact the space is open to everybody and many of the services are free, so who comes to Le Serre decides to support an innovative project of urban regeneration shared by the city of Bologna. During spring and summer, the space is filled with university students who then create work and study groups inspired by the same model of Le Serre.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution: University of Bologna (UNIBO) in strict collaboration with Kilowatt and Aquaponic design. The core team (and related roles) actively managing the project is shown in Figure 26.

Both land and buildings of the pilot project are properties of the Municipality of Bologna and with a temporary concession of 16 years. After the FoodE project, the pilot initiative will be managed by Kilowatt and Aquaponic Design. The plan is to make Le Serre an important cultural and educational center in Italy. In this context, the



call “Culturability” has been won in 2021, and within Serra Madre will be built a project dedicated to the dissemination of humanities and environmental sciences.

Person name	Role	Institution
Nicoletta Tranquillo	Pilot owner	Kilowatt
Francesco Lombardo	Pilot leader/manager	Aquaponic design
Luca Settanni	Pilot executor (2)	Aquaponic Design
Gianmarco Tamborra	Pilot executor (3)	Aquaponic Design
Michele D'Ostuni	Pilot execution supporter, Pilot communicator (1)	University of Bologna
Elisa Appolloni	Pilot execution supporter, Pilot communicator (1)	University of Bologna
Laura Carotti	Pilot execution supporter, Pilot communicator (2)	University of Bologna
Giuseppina Pennisi	Pilot execution supporter, Pilot communicator (3)	University of Bologna

Figure 26. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 24 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 24. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	Over the years, Le Serre has set up its own communication and marketing studio and now offers this service to third parties. The project Serra Madre, thanks to the important work of the team that manages the project has won numerous awards and recognitions. Finally, the Emilia Romagna Region itself has given an important award for innovation in urban regeneration.
S2 - information skills	★★★★★	Under-represented 👎	-
S4 - management skills	★★★★★	Well represented 👍	Kilowatt, has been managing the space Le Serre for over 6 years and started from a completely abandoned place to create today a unique environment in Italy. With over 20 employees, Kilowatt expertly manages every phase and process



			within Le Serre of Giardini Margherita.
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	-
S7 – Constructing	★★★★★	Well represented 👍	-

Table 25 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 25. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Arts and humanities	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Well represented 👍	-
Education	★★★★★	Well represented 👍	-
Engineering, manufacturing and construction	★★★★★	Well represented 👍	-
Health and welfare	★★★★★	Well represented 👍	-

5.2 Pilot network

The pilot Serra Madre is collaborating with:

- **Other 3 CRFS initiatives (excluded FoodE pilots):** Semino, Vetro, Aquaponic Design.
- **Other 2 FoodE Pilots:** Salus Space and AlmAVFarm, sharing knowledge on vegetable garden crops and soilless systems.

6. Pilot communication

6.1 Video

Video (title)	Link
UrbanFarm2022 - 4th rendezvous: Virtual tour of "Le Serre dei Giardini Margherita"	https://www.youtube.com/watch?v=uYgYWDgWSrg
Playlist videos UrbanFarm 2022 – Round 1	https://youtube.com/playlist?list=PLzZ52i2AkcTMI-CbRVVCwnXkrbr5EAWet



Playlist videos UrbanFarm 2022 – Round 2

https://youtube.com/playlist?list=PLzZ52i2AkcTM_Y8wephN_1SkVh8q-4TxJ

6.2 Links to dissemination materials

- <https://zero.eu/en/news/il-nuovo-progetto-di-riqualificazione-per-le-serre-grandi-dei-giardini-margherita/>

7. Photo credits

Figure 23. Kilowatt. (n.d.). Top view of Serra Madre (left) and Detail of the artistic work Hydroponic Cloud and bio lake. [Photograph]. <https://Kilowatt.Bo.It/>.

Figure 24. Kilowatt. (n.d.). Aquaponic garden (left), feeding fish with duckweed (*Lemna minor*) (center) and (right). [Photograph]. <https://Kilowatt.Bo.It/>.

Figure 25. Kilowatt. (n.d.). Restaurant with local products. On the right, vegetables produced in the aquaponic garden [Photograph]. <https://Kilowatt.Bo.It/>. <https://vetro.kilowatt.bo.it/>

Bleiswijk (NL)

FoodE Pilot - Plant factory for demonstrational purposes

Bleiswijk, Netherlands

WUR & Municipality of Lansingerland

In one of the largest greenhouse areas in Europe, you will find the Wageningen Research Centre.

This center investigates aspects of resource efficiency, sustainability, and public appeal of horticulture products in its 7'500 m² of greenhouses. The project will provide trainings and educational activities to local growers, enabling them to adopt innovative greenhouse technologies themselves.



LAN



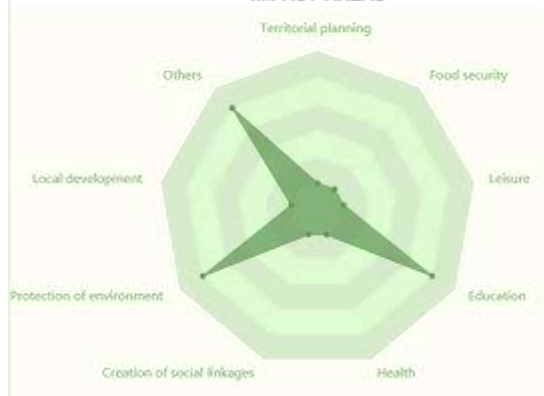
ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others: Research centre

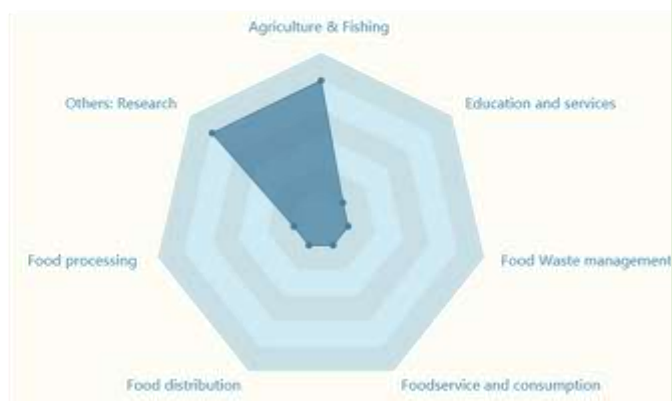
LOCATION

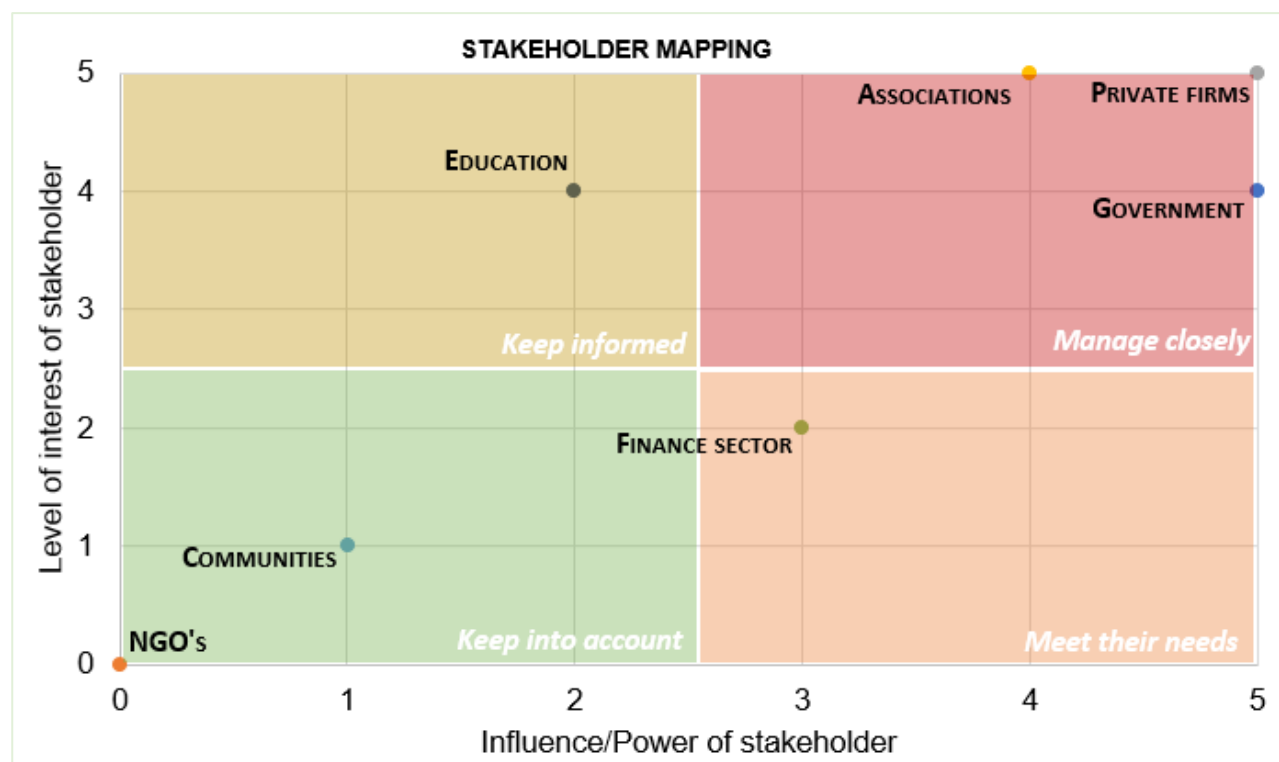


IMPACT AREAS



MAIN TASKS





1. Background

Wageningen University & Research (WUR) has a unique research facility in Bleiswijk, in the heart of the Municipality of Lansingerland, the second largest greenhouse horticultural municipality in the Netherlands. The unit of “Greenhouse Horticulture” investigates all aspects of horticultural production in its 7500 m² of greenhouses and, together with the business community, science and government, translates the results into application-oriented research and innovation processes. The research facility includes greenhouses for sustainable crop protection research, energy-saving experimental greenhouses, measurement setups for greenhouse materials research and early warning of crop stress, two innovation and demonstration centers (on energy and water strategies). At the end of 2020, a new vertical farm facility was built and constitutes one of the pilot case studies within the FoodE project. In particular, it will serve as research, educational and demonstrational center, trying to answer questions regarding the most suitable crop choice, climate and cultivation strategy in commercial vertical farming.

The municipality of Lansingerland has been working closely with WUR for 15 years (as well as with other leading research institutions in greenhouse horticulture) and wishes to further develop its position as a knowledge-intensive municipality focusing on sustainable greenhouse horticulture. It is currently collaborating with entrepreneurs and residents on a “Horti Science Vision”, which should form the basis for guiding greenhouse horticulture research and future plans on topics such as education, employment and space.

2. Location

Address: Violierenweg 1, 2665 MV Bleiswijk (Netherlands) (find on [Maps](#))

	On foot ✗	The pilot is not reachable on foot via a dedicated trail.
	By bike ✓	The pilot can be reached by bike thanks to a newly built cycle path that connects the train station of Lansingerland-Zoetermeer as well as other cycle paths in the surroundings. In the Netherlands, it is possible to rent a bike at

		Dutch train stations through the “OV fiets” service and bring them on board. Lansingerland station is currently not equipped with this service.
	By car ✓	The pilot is easily accessible by car. In fact, the property is located near the A12, the motorway that connects the city of The Hague with the German border, near Zevenaar, and the German Autobahn BAB 3. There is free parking for visitors at the pilot location.
	By bus/metro ✗	There is a bus station next to the "Lansingerland-Zoetermeer" train station, but currently there is no connection to the pilot facility. It is in the plan of Lansingerland municipality to add the bus stop.
	By train ✓	The nearest train station is “Lansingerland-Zoetermeer”, located approximately 2 km from the Pilot location. The journey can be easily planned via the national NS service (link) or 9292.nl (link).
	By plane ✓	The nearest airport is Amsterdam Schiphol. From there it takes about 1 and a half hours by train, with an intermediate change in The Hague Centraal or Leiden Centraal.
	By ferry ✗	-

3. Pilot implementation

Co-design process
WUR and the Municipality of Lansingerland involved relevant food-chain stakeholders in a co-creation process towards the implementation of the pilot case study in Bleiswijk. ❖ 70 stakeholders in both public and private sector were surveyed via a questionnaire and focus group with the aim to identify interests as well as challenges and opportunities in the vertical farming sector. The outcomes contributed to give an overview of the general direction within Vertical Farming, the most pressing topics, the important variables, as well as the areas for future research and outreach activities to be organized at the pilot site with the engagement of different stakeholders (e.g., local producers, suppliers, students, citizens). ❖ In addition, a student project was issued through the ACT program of Wageningen University (Academic Consultancy Training). A team of MSc students with background in horticulture, nutrition and sustainable agriculture co-developed a standardized methodology to support the choice of crops and cultivars to be investigated in the research trials. This was done in collaboration with experts and academic coaches, with a total of 14 participants.

3.1 Main structures and areas

The research facility of Wageningen university & Research in Bleiswijk has more than 85 greenhouse compartments corresponding to an area of 7500 m². Over the course of 2019 and 2020, a new vertical farm was built (Figure 27). It contains four airtight cells (Figure 28):

- two high-wire cells (for high-wire cultivation). Each cell has a production compartment of 30 m² and 4 production gutters, in two pairs.
- two multilayer cells (with two layers per cell). Each layer has a production area of 10.3 m².

In addition, the facility has also 4 cells dedicated to entomology and crop protection research and 4 cells for bulb research. The vertical farm shares laboratories (e.g., taste lab, DNA lab, crop protection lab, plant measuring room, etc.), offices, meeting rooms, and a cafeteria with the entire research facility complex.



Figure 27. Newly built vertical farm facility at the Business Unit “Greenhouse Horticulture” of Wageningen University & Research (Bleiswijk).



Figure 28. High wire cell (left) and double-layer cell (right) at the vertical farm facility of the Business Unit Greenhouse Horticulture (Bleiswijk).

3.2 Main systems/equipment

The vertical farm facility is equipped with control for temperature, relative humidity, CO₂ concentration. Each cell has a dedicated HVAC unit featuring a ventilator, heating unit and cooling unit.

Lighting system:

- the multilayer cells (MLCs) are illuminated using an array of dynamic LED modules (Philips/Signify) reaching a maximum of $1000 \mu\text{mol PAR m}^{-2} \text{s}^{-1}$ in the top layers and $500 \mu\text{mol PAR m}^{-2} \text{s}^{-1}$ in the bottom layers. The light spectrum can be set via the Signify's light control system;
- the hi-wire cells (HWCs) are illuminated using an array of Toplighting and Far-Red LED modules. (Philips/Signify) reaching a maximum of $1500 \mu\text{mol PAR m}^{-2} \text{s}^{-1}$ (fully dimmable). The light spectrum can be set via the Signify's light control system.

Irrigation and nutrient supply:

The fertigation unit can mix tailor-made solutions, in which the mixed amounts for each ingredient can be chosen (NH_4 , K, Na, Ca, Mg, NO_3 , Cl, S, HCO_3 , P, Si, Fe, Mn, Zn, B, Cu, Mo). The unit works with a double set of pH and EC sensors. All irrigation tanks are equipped with level sensors so solution levels can be tracked. The high-wire cells are equipped with a drip irrigation system, controlled via the ProDrain system (Ridder®). The multi-layer cells are equipped with an ebb and flow system and irrigation is controlled by time or volume given.

Data tracking system:

- Electricity counters.
- Measuring boxes (Temperature, Relative Humidity, CO_2).
- Temperature management.
- Air management (ventilation, fogging, CO_2).
- Data for irrigation (e.g., flowmeters).
- Light systems (e.g., power consumption).
- Free data points for additional measurements.

3.3 Main services and activities

The indoor farm is a multi-functional space for research, education, outreach activities as well as B2B projects. Together with the Municipality of Lansingerland (NL), the pilot will be a demonstrational center for local growers, producers, suppliers as well as for the civil society.

In particular, the pilot is in charge of the following activities:

- **Research activities.** Thanks to the full climate control, the vertical farm is an optimal research tool and is used for the investigation of production recipes, light spectrum, new crops and many other topics (Figure 29). This research is (also) intended to unveil new insights for horticulture in greenhouses. The vertical farm was designed with a high airtightness and features numerous electricity and flow counters. This allows researchers to determine: the energy balance, the water balance, the CO_2 balance within experiments and determine the effects and efficiency of different climate recipes.



Figure 29. Research activity on dwarf tomato crops, investigating the effects of sub-optimal temperatures on crop productivity and resource use.

- **Educational and training activities.** Possibility for master students and PhD students to collaborate on projects and perform their thesis and internships, (Figure 30) in collaboration with Wageningen university as well as international universities (included those within the FoodE consortium). To date, 5 students have been involved, while 3 others have already been formally accepted and are expected to commence their research activities in spring/summer 2022.
The pilot team also facilitates training and dissemination workshops on closed plant production which will be accessible to local growers and other agricultural specialists.
- **B2B collaborations.** The vertical farming is also used as a service for the industry (e.g., growers, producers of starting materials, suppliers of fertilizers and consumables, substrate, energy, installation companies in the field of climate, water, energy) to test new products and protocols and to formulate input for development of innovative business model(s) (in connection with WP5).
- **Dissemination and outreach activities:**
 - development of dissemination materials (e.g., videos and factsheets) aimed at citizens, and that reflect the social impact of vertical farming and high-tech vegetable production. In addition, kid science activities with Dutch schools and/or families will be mainly organized by the Lansingerland Municipality during the MyLocalFoodE festival expected in January-February 2023 ;
 - organization of a large public event for residents of the region Rotterdam-The Hague and international public, in the occasion of the MyLocalFoodE initiative (expected in 2023). The aim is to provide citizens with an insight into the innovative nature of vertical farming and indoor vegetable production in general, and the role they play in the current economic and environmental scenario;
 - other events (e.g., multi-days symposia, masterclass, workshops) open to a broader audience of citizens, researchers/academic (educational parties), and professionals, taking the advantage of the synergy between Wageningen Research (WR) and the Municipality (LAN). For example, in 2021, the Horti-science week was organized, which included the opening of the Vertical Farm, a symposium on vertical farming, and a dialogue evening with young entrepreneurs (under 35) from Tuinbouw Jongeren Oostland (TJO), who work in greenhouse horticulture and related activities. In 2022, another event is planned (“Lekker Lokaal”) in collaboration with the Taste lab (WR) on the topics of nutrition, health and sustainable production.



Figure 30. Research activities carried out with MSc students, investigating the effects of light and temperature on dwarf tomatoes crop.



Figure 31. Highlights from the Horti-science week 2021: opening of the vertical farm facility (left), guided tour to stakeholders inside the vertical farm (center), vertical farm conference and presentation of dr.ir. Luuk Graamans (WR) (right).

4. Pilot functions and eco-system services

4.1 Pilot functions

- to provide food-related services: research, education and training.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 26 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 26. Contribution to “provisioning services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Food provision	★★★★★	The vertical farm produces leafy greens and fruity vegetables as part of research and demonstrational activities. Indirectly, the research findings can help to improve the production of such crops in commercial vertical farms, where the goal is food production.
 Medicinal resources	★★★★★	The vertical farm produces herbs as part of research and demonstrational activities.
 Ornamental resources	★★★★★	The business unit Greenhouse Horticulture (WR) has long-term experience in flower production in greenhouses and assists commercial farms. The combination of vertical farm and floriculture is not yet explored in the pilot. One possible model to explore in the future could be the production of young flower crop seedlings.

4.2.2 Regulating services

Table 27 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 27. Contribution to “regulating services”



Service sub-category	Contribution	Activities - best practices contributing to each service
 Control of pests and diseases	★★★★★	The business unit Greenhouse Horticulture (WR) develops strategies and techniques for sustainable crop protection in indoor cultivation: biological pest control, application of agents with the appropriate techniques; use of substrate and crop resistance; climate and environment are all examined individually and as a total system and then optimized.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	The research activity is mainly aiming at quantifying resource use efficiency and related environmental loads.

4.2.3 Socio-cultural services

Table 28 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 28. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Contribution to training and education	★★★★★	The vertical farm serves as an educational space, primarily aimed at master's and PhD students who can perform thesis and internships around the topic of indoor cultivation systems, climate control, resource use, and climate-crop modeling. The vertical farm, along with the entire facility of the Greenhouse Horticultural unit, serves also a demonstration center for local producers. In synergy with the Municipality of Lansingerland, the pilot also serves to raise public awareness by showcasing the innovative nature of vertical farming and indoor vegetable production.
 Contribution to research	★★★★★	The vertical farm is an optimal research tool and is used for the investigation of several topics around vegetable production (e.g., production recipes, light spectrum, new crops, resource use efficiencies, etc.).
 Improvement of social cohesion and community building	★★★★★	Through the organization of events (e.g., multi-days symposia, masterclass, workshops, open days) open to citizens, researchers/academic (educational parties), and professionals on the topics of nutrition, health and production.
 Improvement of commercial relationships	★★★★★	Consultancy projects as well as activities organized in collaboration with the Municipality (e.g., events, guided tours, masterclasses, etc.) will consolidate the B2B relationships with several commercial partners.



5. Pilot management

For the duration of the FoodE project, the pilot is co-managed by the FoodE partner institutions: Wageningen Research (WR) and the Municipality of Lansingerland (LAN). The core team (and related roles) actively managing the project is shown in Figure 32.

Both land and buildings of the pilot project are properties of Wageningen University & Research and are available for an indefinite time. After the FoodE project, the pilot initiative will be managed by the related FoodE pilot institution (WR). Research, education and dissemination activities will continue. The organization of bigger events and the inclusion of the civil society will be performed in collaboration with the Municipality of Lansingerland (LAN).

Person name	Role	Institution
Isabella Righini	Pilot leader (1), Pilot executor (1), Communicator	Stichting Wageningen Research
Luuk Graamans	Pilot executor (2), Pilot communicator	Stichting Wageningen Research
Freyr van den Assem	Pilot manager (2)	Gemeente Lansingerland
Samir Amghar	Pilot manager (3)	Gemeente Lansingerland
Cecilia Stanghellini	Pilot manager (1),	Stichting Wageningen Research

Figure 32. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 29 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 29. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	- Communication and dissemination around education, training and outreach activities. - Problem solving and knowledge transfer.
S2 - information skills	★★★★★	Well represented 👍	Collecting, storing, monitoring, and analyzing data from experimental trials.
S4 - management skills	★★★★★	Well represented 👍	- Managing and supervising people working in the pilot (researchers, staff) and people collaborating with (e.g., students, private firms). - Organizing and managing activities (work, projects, events) and allocation of resources.



S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	Using computers and other digital tools, software's and interfaces for running and monitoring the vertical farm systems (climate computers, alarms, water system etc.)
S6 - Handling and moving	★★★★★	Well represented 👍	- Handling the material required for the experiments. - Clean and sanitize the vertical farm cells and materials after each experimental trial.
S8 - Working with machinery and specialized equipment	★★★★★	Well represented 👍	Controlling and operating with precision instrumentation, equipment and sensors.

Table 30. summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 30. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	Horticultural science, crop physiology, biology
Business, administration and law	★★★★★	Well represented 👍	Expertise required for project administration and budgeting and assistance in national and international calls for proposals.
Education	★★★★★	Well represented 👍	Teaching and creation of educational material.
Engineering, manufacturing and construction	★★★★★	Well represented 👍	Biosystem engineering, modelling.
Information and communication technologies (ict's)	★★★★★	Well represented 👍	Data science, artificial intelligence.
Natural sciences, mathematics and statistics	★★★★★	Well represented 👍	Statistics, mathematical models.
Social sciences, journalism and information	★★★★★	Under-represented 👎	Expert in Science Communication, able to translate research and academic results into practice and to reach a wider (non-scientific) audience.



5.2 Pilot network

So far the pilot in Lansingerland achieved the following goals:

- **Job opportunity:** 1 research position on the training workshop program and experimental trials in the vertical farm.
- **Dissemination and promotional events:** more than 200 stakeholders involved in co-design and outreach events.
- **Education-training:** 3 internship students and 1 student performing his master thesis at the Pilot. In addition, 1 guest PhD student collaborating on a research activity in 2022.

The pilot is collaborating with:

- **1 other organizations/Institutions (outside FoodE):** Delphy improvement center.
- **1 other projects (e.g., other EU projects, etc.):** FieldLab Vertical Farming ([link](#)), Horti Science Park.
- **2 other FoodE Pilots:** AlmaVFarm (UNIBO), Tåsen microgreens (TAS) for future organization of joint initiatives and workshops around the vertical farm topic, joint research activities with AlmaVFarm.

6. Pilot communication

6.1 Videos

Video (title)	Link
FoodE Pilot: Plant Factory for Demonstrational Purposes	https://www.youtube.com/watch?v=6mkLYKdEIL4
Horti-science park	https://www.youtube.com/watch?v=8AeWmjoY13I

6.2 Links to dissemination materials

- <https://www.onderglas.nl/wur-partner-in-groot-eu-project-voor-stadslandbouw/>
- <https://www.onderglas.nl/vertical-farming-is-heel-nuttig-als-onderzoekstool/>
- <https://www.wur.nl/nl/nieuws-wur/Show/Meer-productie-en-kwaliteit-in-urban-farming.htm>
- <https://delphy.nl/en/news/delphy-is-celebrating-15-years-of-horticultural-development-at-the-horti-science-park-netherlands/>

7. Photo credits

Figure 27. Stichting Wageningen Research. (2021). Newly built vertical farm facility at the Business Unit “Greenhouse Horticulture” of Wageningen University & Research (Bleiswijk). [Photograph]

Figure 28. Stichting Wageningen Research. (2021). High wire cell (left) and double-layer cell (right) at the vertical farm facility of the Business Unit Greenhouse Horticulture (Bleiswijk). [Photograph]

Figure 29. Stichting Wageningen Research. (2021). Research activities on dwarf tomato crop. [Photograph]

Figure 30. Stichting Wageningen Research. (2021). Research activities carried out with MSc students, investigating the effects of light and temperature on dwarf tomatoes crop. [Photograph]

Figure 31. Stichting Wageningen Research. (2021). Highlights from the Horti-science week 2021: opening of the vertical farm facility (left), guided tour to stakeholders inside the vertical farm (center), vertical farm conference and presentation of dr.ir. Luuk Graamans (WR) (right). [Photograph]

Amsterdam (NL)

FoodE Pilot - Open-source Aquaponic Farm

Amsterdam, The Netherlands

Metabolic Institute

On a former shipyard you will find an educational urban greenhouse. The aim of the project is to be an educational center for sustainable urban food production in the city of Amsterdam and to enlarge the existing aquaponic unit. This will enable a stable and marketable production of fishes, edible flowers, herbs, and vegetables for local customers.



METAINST



ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

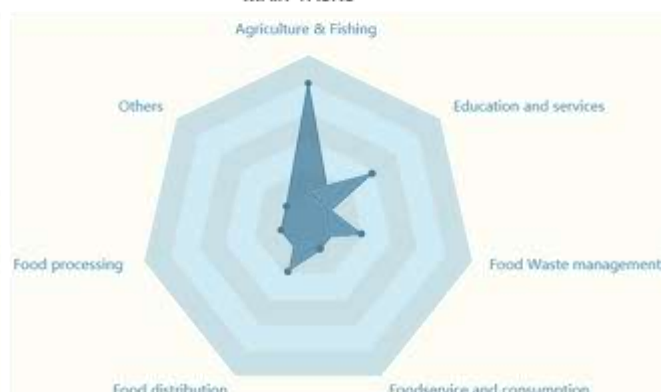
LOCATION

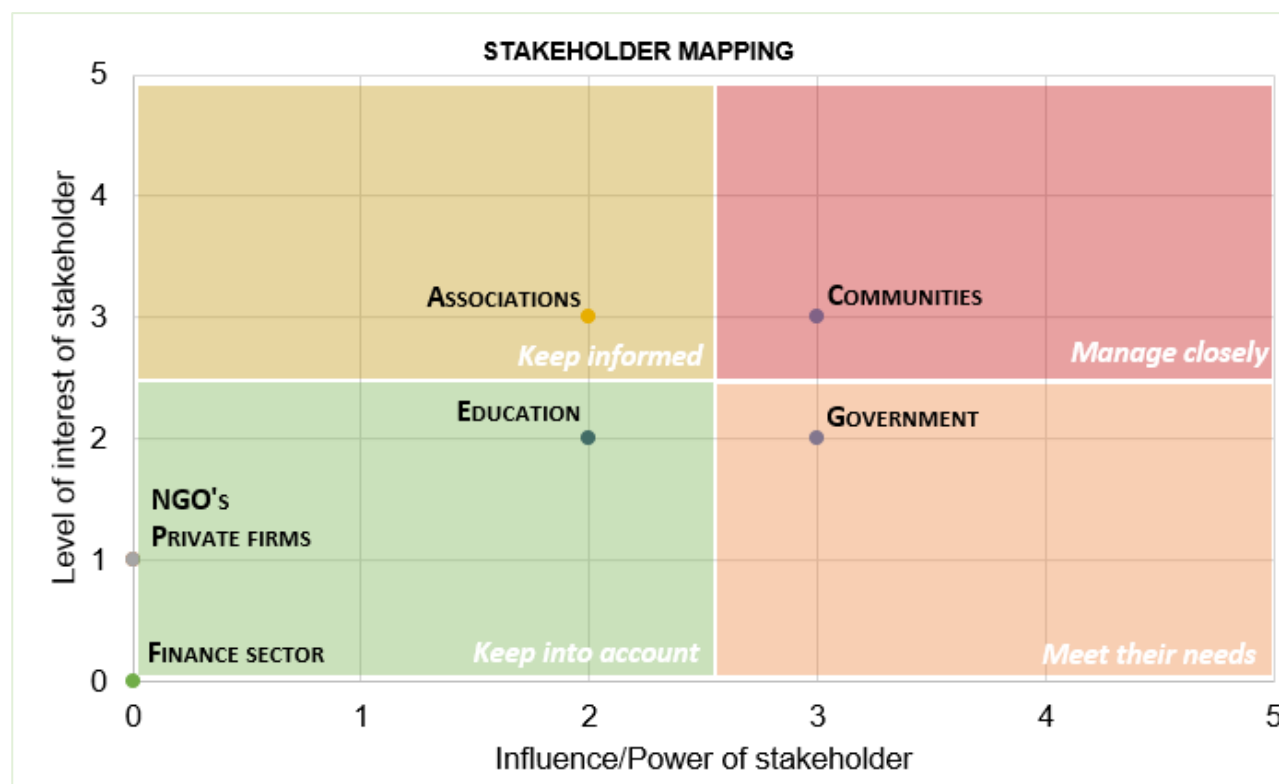


IMPACT AREAS



MAIN TASKS





1. Background

An educational aquaponic greenhouse is located on an old, polluted brownfield (former shipyard) in the North of Amsterdam, converted in 2014 into a Cleantech playground, where solutions for the sustainable city of tomorrow are being tested. The Metabolic Institute is leading the project and is a core member of De Ceuvel, an award-winning office park for creative, sustainable and social entrepreneurs which has become a global showcase for sustainable urban development. As one of the most unique urban developments in Europe, De Ceuvel seeks to inspire and educate society on how to create resilient communities. In addition, as a member of the Cleantech Playground project, Metabolic has created with De Ceuvel a living laboratory for innovation and experimentation.

2. Location

Address: Korte Papaverweg 6, 1032 KB Amsterdam (find on [Maps](#))

	On foot ✓	The pilot is safely accessible on foot via pedestrian path, it is not accessible for people with disabilities due to the presence of stairs.
	By bike ✓	The pilot is accessible by bike, through the extensive bike infrastructure of Amsterdam.
	By car ✓	The pilot is accessible by car, although parking in the area may not be easy, but can be found within a 5-10 min walk from the pilot.
	By bus/metro ✓	There is a bus service, about 300 meters from the pilot location (stop: Amsterdam Mosplein”).
	By train ✓	The closest train station is 25 min by foot (2.5 km), 16 min by bus or 12 min by bike.

	By plane ✓	The pilot is located nearby the International airport of Schiphol (Amsterdam)
	By ferry ✓	The ferry to cross the main river of Amsterdam is located 7 min a bike ride away or 18 min by foot.

3. Pilot implementation

Co-design process

Metabolic Institute organized two online student hackathons involving **50 participants** to explore tangible solutions in urban agriculture:

- ❖ focus on solutions to closing the local nutrient loop for the aquaponics system. The hackathon teams were tasked with developing a detailed blueprint for the complete automation of the struvite crystallization process to facilitate its use by other communities;
- ❖ develop a user journey and a conceptual user interface design (conceptual UI/UX) for the current aquaponics software. The work carried out by the students constituted a solid base for final digital interface of the pilot (Figure 33). The user interface developed by the winners underwent several rounds of iteration to adjust the user experience based on the feedback of pilot farm manager, to develop a unique visual aesthetic of the software, and optimize the overall performance of the software.



Figure 33. User Interface mockup of the Metabolic aquaponic system proposed by the winning team of the hackathon (left) and with adaptations made by the pilot team (right).

3.1 Main structures and areas

The core of the pilot is the greenhouse with a total area of 44 m². Within the greenhouse several growing systems (Figure 36) are modularly connected, namely:

- Nutrient-filter technique system.
- Media bed system (with bell syphon).
- Deep-water culture system.
- Wicking bed.
- Modified Dutch bucket system.
- Towers.
- Wicking pots

A fish room (below greenhouse) is equipped with two new fish tanks, each connected to a swirled (mechanical) filter. Next to these are located the sump tank, which acts as the lowest point of the system and as biological filter (Figure 35).



Figure 34. Top view of Metabolic farm (left) and terrace of Café "De Ceuvel" (right).

3.2 Main systems/equipment

- Water and air pumps.
- Water heater.
- Struvite reactor (Figure 35).
- Fish tanks and water filters (described above).
- Growing systems (described above).
- Ventilators.
- Sensors (pH, oxygen, water flow, water level, CO₂, light, humidity).
- Newly developed aquaponics monitoring software (phone or tablet interface) (Figure 37).

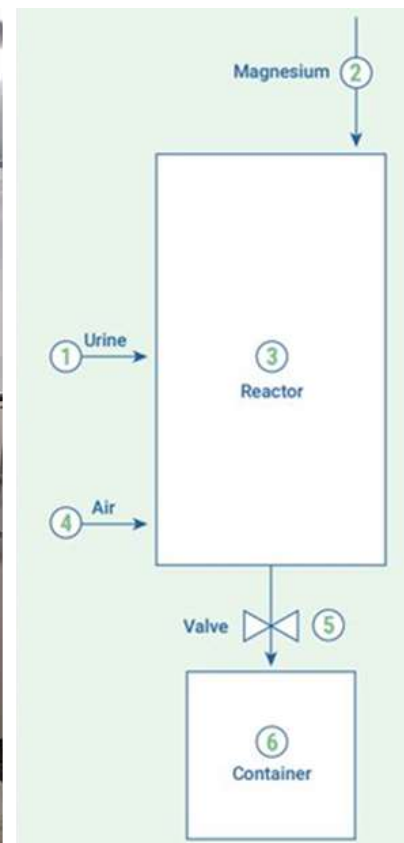


Figure 35. Semi-automated struvite reactor before (left) and after (center) connected to the sewers system, below the farm (right).



Figure 36. Variety of growing systems (NFT, DWC, modified ebb-and-flow, soil beds, etc.) used at Metabolic aquaponic farm. They are all connected to each other, yet each structure being independent and modular.

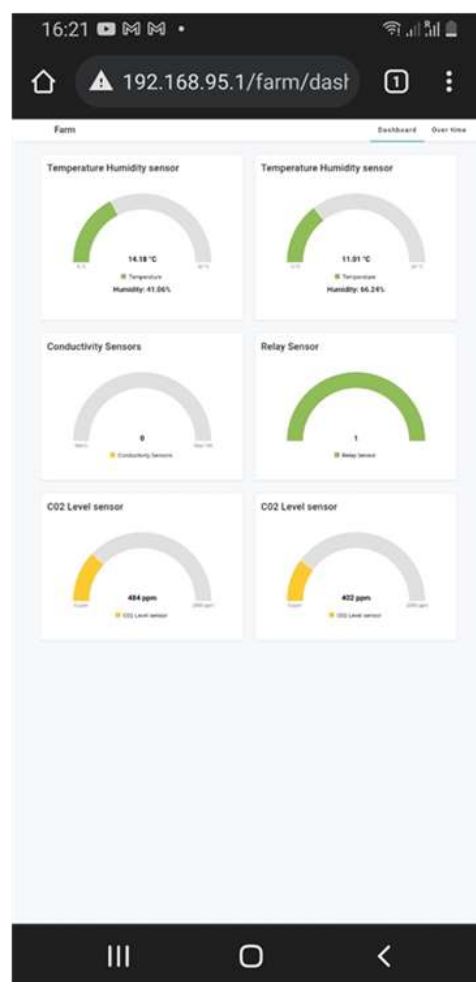


Figure 37. Metabolic aquaponic farm (left) and actual interface from phone webpage at MVP stage, not all sensors were yet connected and not all display panels were yet deployed at the time of the picture.

3.3 Main services and activities

- **Demonstrational center.** The greenhouse aims to be a showcase and open-source educational center for sustainable urban food production in Amsterdam. It aims to test both high-tech and low-tech solutions by integrating different grow systems and developing an open-source aquaponics management software for inexperienced growers. Additionally, the pilot will develop a series of open-source blueprints on how to build an aquaponic system from reused materials and open-source

hardware/software components. These blueprints will disseminate widely the open-source software and hardware systems the pilot team uses to facilitate the daily management of the farm in partnership with local urban communities and monitor the aquaponics system performance.

- **On-site food production** of fresh vegetables (tomatoes, peppers, leafy greens), herbs (coriander, basil, mint), and edible flowers, as well as fresh fish.
- **Educational and raising awareness programs.** Possibility to visit the greenhouse and read the educational signs, and attend educational tours led by the farmer (there is no online interaction per se). The educational activities will occur occasionally but may be increased to monthly in the future, depending on demand and sanitary restrictions. Pupils, students, but also any people interested in aquaponics/urban farming (e.g., young adult, retiree, etc.) are welcome. During 2020-2021, 2 student online hackathons were held and included an educational booklet and one lecture on urban food systems given to the attendees.
- **Research activities** on the topic of aquaponics and sustainable vegetable production in cities. For example, the aquaponic system was used as a test site for a master's thesis for Wageningen University (master's program in organic farming). The student focused on the training of black soldier flies as fish feed for the farm.
- **Workshops** will be regularly given in the greenhouse to present and disseminate local knowledge, allowing citizens to design, build, and manage their own small-scale aquaponics units.



Figure 38. The aquaponic greenhouse at De Ceuvél used a living lab during the FoodE project.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to distribute/sell food and/or food products: the farm sells products directly to the café next door.
- To provide food-related services: demonstrational and educational center.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 31 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 31. Contribution to “provisioning services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Food provision	★★★★★	Production of fresh vegetables (tomatoes, peppers, leafy greens), herbs (coriander, basil, mint), and edible flowers, as well as fresh fish. In addition, the pilot produces insect protein through the rearing of black soldier fly larvae, and successfully trialed their inclusion in the fish diet.
 Provision of raw materials	★★★★★	Production of struvite crystals through a struvite reactor that extracts phosphorus from urine, collected from the café located next to the farm. In addition, the pilot produces its own hot compost and worm compost.

4.2.2 Regulating services

Table 32 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 32. Contribution to “regulating services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Purification of water and/or air	★★★★★	Water cycles in a closed-loop systems, where plant naturally filters and clean the water before reaching the fish tanks again.
 Regulation of urban metabolism	★★★★★	Reuse of local food waste from the local café as feed for black soldier flies rearing, which in turn are used as feed for the fish. In addition, use of local food waste as feedstock for both the worm compost towers and hot compost system.
 Enhancement of pollination	-	Mostly enclosed system with limited contact with local ecosystem/biodiversity. Crops in the greenhouse are hand pollinated.
 Control of pests and diseases	★★★★★	Use of Integrated Pest Management (IPM, mainly biological control, to control pests in the greenhouse. At the pilot there is also production of own natural pesticide (garlic+ hot peppers mixture).
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	The pilot is operating almost entirely as a close-loop systems regarding water use. In fact, the water pumps have been switched to the most energy efficient models, added insulation layers in pipes during winters, and shading veil during summer days. The pilot team also adapted fish and plant species to minimize heating or cooling requirements of the water. There are also solar panels on side of the greenhouse, but they will need to undergo reparations before being operational.

	Soil erosion prevention and control	-	Soilless system.
	Habitat provision and/or biodiversity	-	Mostly enclosed system with limited contact with local ecosystem/biodiversity.

4.2.3 Socio-cultural services

Table 33 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 33. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities - best practices contributing to each service
 Contribution to training and education	★★★★★	Educational tours are given, and outdoor educational signs (free walk-in) are placed around the farm. School pupils are educated on urban farming and aquaponics.
 Contribution to research	★★★★★	The technological development of the different growing systems and experiments will be compiled in a freely available online manual.
 New forms of recreation	★★★★★	Workshops for kids/pupils with a focus on playful education to learn about urban farming.
 Improvement of touristic attractions in the city-region	★★★★★	De Ceudel site has become a key touristic attraction for the North of Amsterdam. The greenhouse is an important element of the concept of the “city of tomorrow”, strengthening the overall attractiveness of the site.
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	The pilot is integrated in the post-industrial heritage site of De Ceudel. The greenhouse, especially during the main growing season, improves the overall aesthetic of the site by providing greenery. The overall architecture of the farm (made of reused boats) serves as inspiration for sustainable and resource-efficient architectural oeuvres.
 Preservation of cultural knowledge and heritage	★★★★★	The farm is built on top of a former shipyard with the main building being a reused old boat, preserving the historical past of the site as a former industrial hub.
 Improvement of social cohesion and community building	★★★★★	Through workshops with the local community, tours for local schools and the relationship with the café that serves the food. The greenhouse contributes greatly to the social cohesion of the De Ceudel site and the surrounding neighborhood (“Buiksloterham”).
 Improvement of commercial relationships	★★★★★	The production is still small, but the greenhouse has a great relationship with the café next door (which is receiving local products from the farm).

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institutions: Metabolic B.V. (METAINST). The core team (and related roles) actively managing the project is shown in Figure 39.



The land where the pilot initiative is located is property of the City of Amsterdam with a temporary concession of 10-year with 3 years left on the current agreement (future agreement on renovation may be possible). On the contrary, the building and the structures of the pilot project are properties of Metabolic B.V. for an indefinite time. After the FoodE project, the pilot will continue to exist if the land tenure agreement is extended. The farm and the services offered during FoodE will be managed by Metabolic B.V. but will stay within the Metabolic ecosystem, of which METAINST is part of. Depending on demand, the service offering may be expanded to include paid, professional workshops.

Person name	Role	Institution
Antoine Coudard	Pilot leader, pilot manager (1)	Metabolic Institute
Elizabeth Corbin	Pilot manager (2)	Metabolic Institute
Andrei Beca	Pilot executor (1)	Metabolic Institute

Figure 39. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 34 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 34. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	Creation of hackathon materials (booklet, leaflets, presentation, and lectures), creation of school tours content and development and printing of outdoor educational signs.
S4 - management skills	★★★★★	Well represented 👍	Allocating resources for equipment, material and other construction costs, team supervision, and development of objectives to achieve vision of the farm.
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	The pilot team created their own ICT system with the development of a customized sensor network (CO ₂ , temperature, light, oxygen, electrical conductivity, water flow) and developed a dashboard and software to manage and display data.
S6 - Handling and moving	★★★★★	Well represented 👍	Fabricating growing system elements using handheld tools, tending to plants and animals.
S7 – Constructing	★★★★★	Well represented 👍	Renovation and upgrading of all elements of the aquaponics systems (pumps, piping system, tanks, growing system) and the addition of



several growing systems into an overall built-in modular system.

Table 35 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 35. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	Rearing of fish, manage a multi-crop farm.
Business, administration and law	★★★★★	Well represented 👍	-
Education	★★★★★	Well represented 👍	School tours, educational content writing.
Engineering, manufacturing and construction	★★★★★	Well represented 👍	Construction, plumbing, electricity.
Information and communication technologies (ict's)	★★★★★	Well represented 👍	Sensors and software development.
Natural sciences, mathematics and statistics	★★★★★	Well represented 👍	Aquaponics are Techno-Biological systems to keep in balance at all-time.

5.2 Pilot network

So far the pilot in Amsterdam achieved the following goals:

- **Job opportunity:** for 1 socially disadvantaged citizen in the management of the aquaponic farm.
- **Education - research – training:** more than 50 citizens attending the training workshops.
- **Dissemination and promotional events:** more than 50 visitors that participate in the dissemination and promotional events.

In addition, the pilot is collaborating with:

- **another CRFS initiatives (excluded FoodE pilots):** aquaponic farm.
- **another organizations/Institutions (outside FoodE):** Wageningen University (Master program organic agriculture).

6. Pilot communication

6.1 Videos

Video title	Link
FoodE Pilot - Aquaponic Educational Farm - Interview with Antoine Coudard	https://www.youtube.com/watch?v=b_jAOCNbvyQ
Aquaponic Farm 2	https://www.youtube.com/watch?v=EosOVJL45wI



FoodE Pilot: Aquaponic Educational Farm	https://www.youtube.com/watch?v=OitkvWvQyEk
Aquaponic educational farm	https://www.instagram.com/tv/CUfDIN1Kh6E/

6.2 Links to dissemination materials

- <https://www.metabolic.nl/news/two-urban-farming-hackathons-with-foode/>

7. Photo credits

Figure 33 (left). Stichting Metabolic Institute. (2020). First-prize conceptual dashboard of the aquaponics software – developed by Team C during the second hackathon “design a user-friendly/user-expert interface for the aquaponics software” organized by Metabolic Institute for the co-design of the FoodE Pilot in Amsterdam (Netherlands). [Image]

Figure 33 (right). Stichting Metabolic institute. (2021). User Interface mockup of the Metabolic aquaponic system. [Image]

Figure 34 (left). Stichting Metabolic institute. (n.d.). Top view of Metabolic farm [Photograph]. <https://www.metabolic.nl/>. <https://www.metabolic.nl/projects/de-ceuvel/>

Figure 34. De Ceuvel. (n.d.). Terrace of Café “De Ceuvel” [Photograph]. <https://deceuvel.nl/en/cafe/about-us/> .

Figure 36. Stichting Metabolic institute. (2021). Variety of growing systems (NFT, DWC, modified ebb-and-flow, soil beds, etc.) used at Metabolic aquaponic farm. They are all connected to each other, yet each structure being independent and modular. [Photograph]

Figure 35. Stichting Metabolic institute. (2021). Semi-automated struvite reactor before (a) and after (b) connected to the sewers system, below the farm (right). [Photograph]

Figure 37. Stichting Metabolic institute. (2021). Metabolic aquaponic farm (left) and actual interface from phone webpage at MVP stage – not all sensors were yet connected and not all display panels were yet deployed at the time of the picture. [Image]

Figure 38. Stichting Metabolic institute. (n.d.). The aquaponic greenhouse at De Ceuvel used a living lab during the FoodE project [Photograph]. <https://www.metabolic.nl/>. <https://www.metabolic.nl/projects/de-ceuvel/>

Romainville (FR)

FoodE Pilot – The Cité Maraîchère: vertical farm, educational gardens, sustainable and social food, market gardening and mushrooms production, circular innovation and short food chain.

Romainville, France

Commune de Romainville

The Cité Maraîchère is a systemic and multifunctional space located in the heart of the Marcel-Cachin district, Romainville, and is the culmination of a vast urban renewal program operated between 2007-17 in accordance with the principles of sustainable development. Its aim is bringing together in one place the activities of gardening (greenhouses and mushroom growing, composting, catering, sales, educational activities, experimentation and training). Through diversified proposals and audiences, the project seeks to strengthen the social and cultural diversity of the area and allow multiple exchanges between farmers, food industry professionals, consumers, residents, researchers, students, and all the actors operating in the district.



RMN



ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

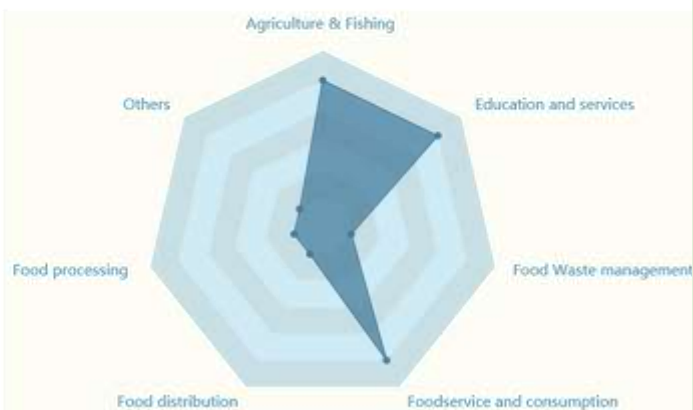
LOCATION

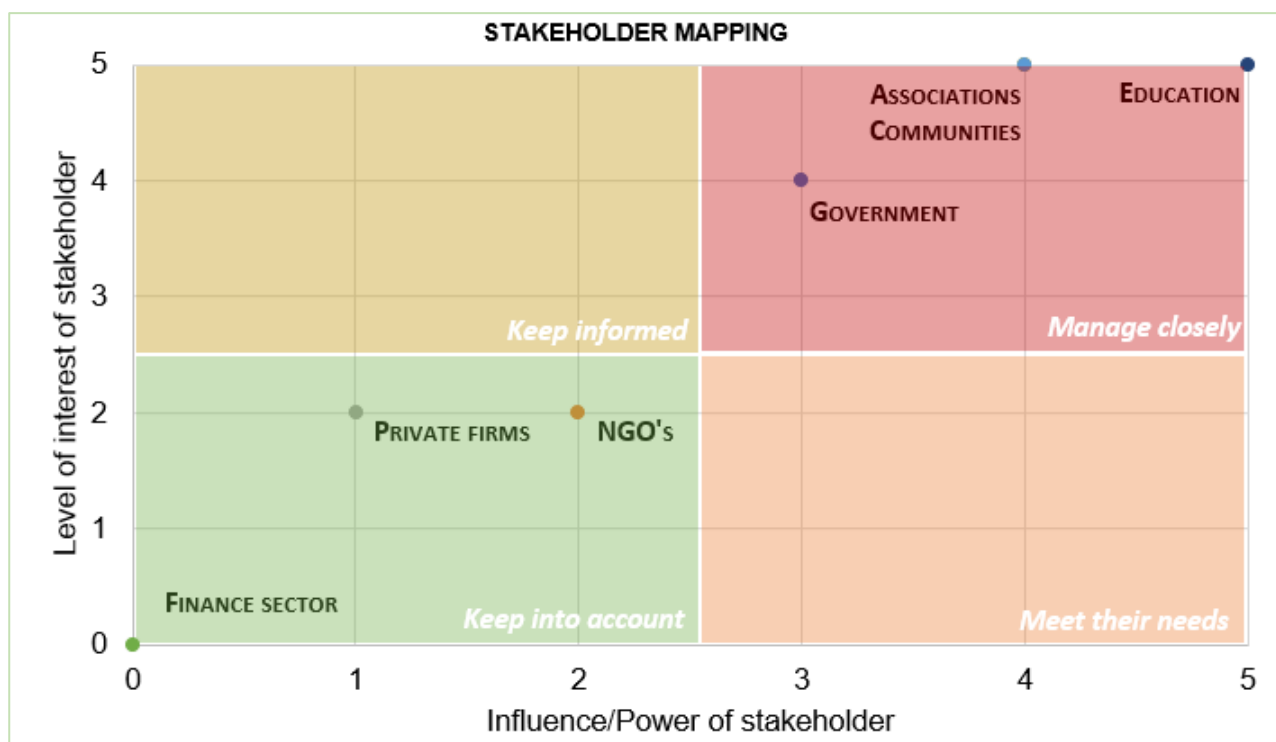


IMPACT AREAS



MAIN TASKS





1. Background

Romainville is located 3 km east of Paris, on an area of 344 hectares and 26,510 inhabitants (INSEE 2016). It belongs to the Territoire d'Est Ensemble, which includes nine towns and more than 400,000 inhabitants.

The Municipality of Romainville has been committed for many years to a proactive approach aimed at ensuring sustainable economic development (e.g., requalification, completed or in progress, of all social housing districts, implementation of structuring development operations etc.).

The Cité Maraîchère is a systemic and multifunctional space located in the heart of the Marcel Cachin district, and is the culmination of a vast urban renewal program operated between 2007 and 2017. It responds to precise objectives set by the municipality, in consultation with the inhabitants: to improve the living environment of the inhabitants, to open up the district to make it the heart of the city, and to restore a social mix.

2. Location

Address: 6 rue Albert Giry, 93230 Romainville, France (find on [Maps](#))

	On foot ✓	The pilot is easily accessible on foot since it is located in the heart of Romainville.
	By bike ✓	It is reachable by bike but there are not yet many tracks or bike racks.
	By car ✓	The pilot is accessible by car. There are several public parking's in the area and no specific restrictions.
	By bus/metro ✓	There are several bus stops near the pilot (e.g., "Les Noyers"). There is also a metro station (n. 11) but it is 20 minute away from the pilot.
	By train ✗	There is no train station in Romainville. Main train stations are in Paris (Gare du Nord, Gare de Lyon, Gare Montparnasse, etc.), which are between 30 and 60 min from the Cité Maraîchère.



	By plane ✓	The nearest airport is Paris Charles de Gaulle (about 25-30 km away). It can be reached by car (30 min) or by bus (1.5 hours).
	By ferry ✗	-

3. Pilot implementation

Co-design process

The Municipality of Romainville involved almost **300 participants** in the co-design of the pilot project “The Cité Maraîchère ” through several activities:

- ❖ A participatory workshops was crucial for co-design and construction of outside spaces of the Cité Maraîchère, in particular:
 - the set-up of a collective composter for the Cité Maraîchère and for neighborhood;
 - the creation of community gardens;
 - the design and construction of “la Végétale” (the table for “edible landscaping”) (Figure 43).
- ❖ The students’ projects delivered within the international challenge UrbanFarm 2021 provided technical and management solutions for the design of the multi-functional space the Cité Maraîchère by building on the ecological principles to which the original project refers and creating a solidarity-based food ecosystem centered on circular economy, re-employment logic and social inclusion. The winning team “GrowPro” proposed several solutions (e.g., the diversification of the food processing activities and optimization of the spaces) that are further implemented. Also, a project on insect breeding proposed by another team has been considered and may materialize in the future.

3.1 Main structures and areas

Two vertical greenhouses which can accommodate 700 m² of agricultural exploitation. They include (Figure 40):

- The modular space (110 m²).
- The café-canteen (50 m² space is made up of a 40-seat dining room and a bar), Figure 41; and its professional kitchen (23 m² and 50 m² basement).
- The educational greenhouse (90 m²), Figure 42.
- A belvedere room (upstairs, 36 m²).
- Mushroom and French endive cultivation (130 m² in the basement).

Outdoor spaces:

- 6 thematic educational gardens (85 m²) linked to educational workshops dedicated to collective and educational gardening, with residents and associations of the neighborhood;
- A square in front of the educational greenhouse with a garden of 80 m² of open ground, vegetated spaces of 16.4 m² for edible landscaping (e.g., fruit trees, berries) to allow walkers and inhabitants of the neighborhood to see fruit, vegetables or aromatic herbs grow, pick and consume freely and free of charge.
- A neighborhood composter installed on the forecourt of the Cité Maraîchère collects waste related to educational activities. Its access and waste inputs is regulated: the bins will be closed with a padlock and are only open every Saturday.

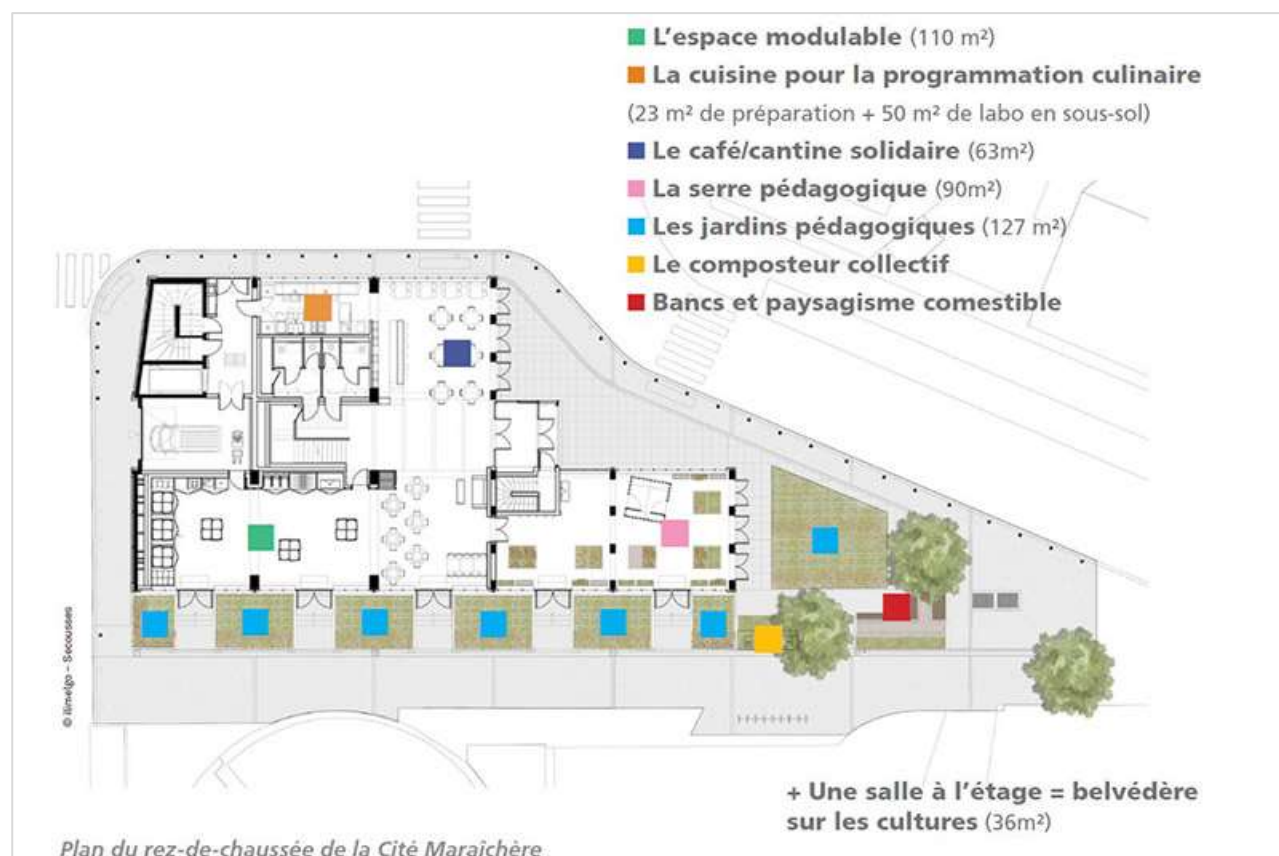


Figure 40. Ground floor plan of Cité Maraîchère.



Figure 41. View from the 6th floor of the greenhouse production area (left) and the café-canteen (right).

3.2 Main systems/equipment

- Greenhouse climate and irrigation control system and equipment (vents for aeration, programmable drip irrigation, soilless culture containers with growing media, blackout screens);
- collective compost;
- “la Végétale” (a table for edible landscaping, Figure 43);
- software for selling vegetables, spaces for employees (offices, locker rooms, etc.);
- a cargo bike, an electrically assisted bike.

3.3 Main services and activities

Conceived as an innovative and supportive space, the Cité Maraîchère is a multi-faceted place for market garden production, learning, teaching and raising awareness of more environmentally friendly lifestyles, recreation and exchanges, catering and sales, and also provides a new living space in the Marcel Cachin district. The main challenges are: bring out a new way of eating in a popular area located near the city center; raise



awareness on sustainable food, nature in the city and eco-citizenship; develop vocational training and promote social inclusion by setting up an integration project.

The pilot offers the following services and activities:

- **Food production activities.**
 - Leafy vegetables, fruit vegetables, berries, seasonal aromatic plants are grown in 400 soilless culture containers in the greenhouse.
 - The basement has an area of 130 m², offering ideal conditions for growing oyster and shiitake mushrooms, and endives. The production is sold to inhabitants, with a household income-based tariff system.
 - 233 soilless culture containers will be placed outdoor on public space and part of them will be used for educational activities. Originally, these containers were supposed to be in the greenhouse. However, the limited availability of natural light (in addition to the absence of artificial lights) makes cultivation impossible in some of the floors. Therefore, a new destination has been found for some of these boxes. A student performing an internship at the pilot site will take care of the productivity and pedagogic functions of these soilless cultures. Her activities include: planning crop choices and rotations for the production boxes based on the results of inhabitants' surveys, local climatic conditions, substrate types and yield obtained in commercial urban farms and community gardens (data from previous works such as [Semoirs](#), [Fewmeter](#) and [Jassur](#)); managing the space in the production and leisure areas; performing data analyses and estimating production.
- **Catering service (restaurant):** the café-canteen (50 seats) is exploited by an external partner, “Cheffes”, with three women cooks. It is opened from Tuesday to Sunday, and offers home-made and seasonal food, including some vegetable and mushrooms produced by the Cité Maraîchère. The café-canteen also organizes events (such as concerts, games, exhibitions) and participates to events organized by the Cité Maraîchère.
- **Educational activities.** Since September 2021, a full program of educational activities has been implemented focusing on sustainable development, nature in city, food, gardening, wastes, reuse, etc. An educational program is dedicated to schools, throughout the year (Figure 43). Workshops are dedicated to general public on the weekends. In addition, 95 soilless culture containers are installed in schools, for educational activities (these boxes also came from the greenhouse, for the reasons described above). The schedule of the activities is available at the project’s website (<https://www.lacitemaraichere.com/reservations.php?id=370>).
- **Awareness activities** are also organized on public spaces, for example during the market.
- **Events** for general public and for specific audiences.
- **Room rental service.**
- **Collective compost.** The neighborhood composter is open every Saturday from 10 am to 12 pm and managed by the “zero waste” team. Further opening times supervised by local people may be provided over the course of the year.
- **Workplace integration workshop:** the team of the Cité Maraîchère hires people in integration both for the educational and the market gardening activities.



Figure 42. The educational greenhouse (left) and educational space (right).



Figure 43. Kid workshops from the Nursery of School Carchot (left), "la Végétale" (the table for "edible landscaping") (center) and the market (right).

Challenges and future plans:

- The manager of gardening market is testing a more intensive crop rotation in the greenhouse.
- The Cité Maraîchère had a project with insects' production but it's stopped for now (issues with skills, use of the insects, budget, etc.).
- There is also another project to replace boxes at the first floor by activities to process food into food products (mushroom dehydration).
- There also the plan to cultivate flower crops.
- One student will work on a small pedagogical aquaponic system which is ready to be put in service at the pilot location. Student's activities include: collecting data on the first production of fishes and aromatics/leafy vegetables; sizing of the production system; visiting other aquaponic systems to compare the production between the prototype and professional one. There are plans to collaborate with an association for what concerns the materials (<https://www.federation-ecoconstruire.org/>).

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to distribute/sell food and/or food products
- to serve or cater food
- to prevent, redistribute, or valorize food waste
- to provide food-related services: educational and raising awareness activities
- other: rooms' rental

4.2 Ecosystem services

4.2.1 Provisioning services

Table 36 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 36. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site production of leafy vegetables, fruit vegetables, berries, seasonal aromatic plants, mushrooms. Prices are set using a household income-based tariff system.
 Provision of raw materials	★★★★★	Collective composter mushrooms substrate is used as compost after mushrooms are grown and sold.

4.2.2 Regulating services

Table 37 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 37. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Regulation of urban metabolism	★★★★★	Compost; mushrooms substrate; collection of food waste for anaerobic digestion.
 Enhancement of pollination	★★★★★	Not yet but there is a plan to install insects’ hostels in the outdoor space and then, move them inside the greenhouse.
 Control of pests and diseases	★★★★★	Integrated pest management, no use of synthetic pesticides.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	The greenhouse is unheated and there are no artificial light and natural ventilation and no use of synthetic pesticides. The pilot has a rainwater harvesting system, drip irrigation systems, bikes for deliveries and travels, substrate for boxes with reuse materials.
 Habitat provision and/or biodiversity	★★★★★	Cultivation of ancient species, especially for tomato crop.

4.2.3 Socio-cultural services

Table 38 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars = no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 38. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Around 1 000 workshops per year for schools (nursery, primary, junior high and high schools). Principally schools of

			the city, but also from other cities. Schools can visit the pilot for a single workshop or for a complete cycle. Three themes: nature in the city, zero waste, and sustainable food. Also, organization of workshops, events and awareness activities for general public.
	Contribution to research	★★★★★	Via student projects with AgroParisTech (APT) and INRAE.
	New forms of recreation	★★★★★	Popular education; many events; participative workshops; new place with activities and restaurant for the neighborhood. Artistic performances hosted in the greenhouse.
	Improvement of touristic attractions in the city-region	★★★★★	Partnership with the Seine Saint Denis's tourist office. Visit of foreign delegation; many requests to discover the place (cities, urbanism agencies, etc.); many press requests.
	Improvement of mental and/or physical health (therapeutic)	★★★★★	Activities linked with food wellness, for the inhabitants and for the employees.
	Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	The greenhouse building and the outdoor spaces have a unique architectural design that harmonically integrates in the urban Centre of Romainville and that can inspire other cities.
	Preservation of cultural knowledge and heritage	★★★★★	Some activities linked with the garden market history of the city.
	Improvement of social cohesion and community building	★★★★★	New place for the area; restaurant; activities and events.
	Improvement of commercial relationships	★★★★★	Partnerships with local producers and stakeholders (beer factory, cheese factory, market, etc.).

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution Romainville City Council (RMN). The core team (and related roles) actively managing the project is shown in Figure 44.

The pilot implementation was carried out by the pilot team with the collaboration of citizens and financial partners.

Both land and buildings of the pilot project are properties of the City of Romainville and for an indefinite time. After the FoodE project, the pilot initiative will be managed by the related FoodE pilot institution (RMN) and will continue to exist and offer the services offered during the FoodE Project.

Person name	Role	Institution
Lélia Reynaud-Desmet	Pilot leader	Commune de Romainville
Yuna Conan	Pilot manager	Commune de Romainville
Adrianna Le Goff	Manager of educational activities	Commune de Romainville

Figure 44. People involved in the FoodE pilot team and respective roles and institutions.



5.1 Skills and expertise requirements

Table 39 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 39. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Under-represented 👎	Website and social medias; paper communication tools; create videos; press relationships; animation and creation of educational tools.
S2 - information skills	★★★★★	Under-represented 👎	Retrieve and refresh data; write notes and reports; work with students for research studies; etc.; public and press relationships
S3 - assisting and caring	★★★★★	Under-represented 👎	For integration jobs; social support for employees in integration.
S4 - management skills	★★★★★	Under-represented 👎	-
S5 - Working with computers and other digital tools	★★★★★	Under-represented 👎	-
S6 - Handling and moving	★★★★★	Well represented 👍	-
S7 – Constructing	★★★★★	Well represented 👍	-
S8 - Working with machinery and specialized equipment	★★★★★	Well represented 👍	-

Table 40 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 40. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Under-represented 👎	Business model; pilot's budgeting and legal aspects.
Education	★★★★★	Under-represented 👎	-



Engineering, manufacturing and construction	★★★★★	Well represented 👍	-
Health and welfare	★★★★★	Well represented 👍	-
Information and communication technologies (ict's)	★★★★★	Under-represented 👎	-
Natural sciences, mathematics and statistics	★★★★★	Well represented 👍	-
Services (e.g., hygiene and occupational health services, security, transport services etc.)	★★★★★	Well represented 👍	-
Social sciences, journalism and information	★★★★★	Well represented 👍	-

5.2 Pilot network

So far the pilot in Romainville achieved the following goals:

- **Job opportunity:** for 3 technicians and 12 jobs in integration
- **Dissemination and promotional events:** 250 people have a « card » to buy vegetables, 5 000 kids, 200 people participated to events, 1 000 people visited the place, around 30 people per day at the café-canteen.
- **Education - research – training:** the FoodE partner AgroParisTech (APT) is hosting 2 internship students from University of Bologna who will work on the pilot Cité Maraîchère.

In addition, the pilot is collaborating with:

- **Another FoodE pilot,** (Salus Space) and two FoodE partners UNIBO and BOL in developing simplified aquaponic systems (e.g., internship Ernesto Rossini in spring 2022).
- **Other 10 CRFS initiatives (excluded FoodE pilots),** food producers, urban farms
- **Other 20 organizations/Institutions (outside FoodE,** mainly companies, other cities, associations, public partners, etc.

6. Pilot communication

6.1 Videos

Video (title)	Link
À la découverte de la Cité Maraîchère!	https://www.youtube.com/watch?v=4g9_iafbYPQ
Webconférence MyLocalFoodE - Des idées pour manger sain et local	https://www.youtube.com/watch?v=q7O5KfDjdPw
Playlist Videos UrbanFarm 2021- Round 1	https://youtube.com/playlist?list=PLzZ52i2AkctPucXZHgFZApCIU9YsXjEJU
Playlist Videos UrbanFarm 2021- Round 2	https://youtube.com/playlist?list=PLzZ52i2AkctPjynPz1356ERWqtIzFU678



Grand Finale of UrbanFarm 2021

<https://www.youtube.com/watch?v=crfZH8TJNw&t=24420s>

6.2 Links to dissemination materials

- <https://www.lacitemaraichere.com/>
- <https://www.facebook.com/LaCiteMaraichere/>
- <https://twitter.com/citemaraichere?lang=fr>
- <https://www.instagram.com/citemaraichederomainville/?hl=fr>
- <https://www.linkedin.com/in/la-cit%C3%A9-mara%C3%A8re-de-romainville521792170/?originalSubdomain=fr>

Printed materials:

- <https://www.lacitemaraichere.com/images/Image/File/A4-brochure-pedagogique-CM-2021-2022.pdf>
- <https://foode.eu/wp-content/uploads/2022/02/Flyer-Web-Cite-Maraichere-English-2022.pdf>

7. Photo credits

Figure 40. Commune de Romainville. (2021). Ground floor plan of la Cité Maraîchère [Image]. <https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html>

Figure 41 (left). Commune de Romainville. (2021b). View from the 6th floor of the greenhouse production area of The Cité Maraîchère [Photograph]. <https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html>

Figure 41 (right). Commune de Romainville. (2021c). The café-canteen of The Cité Maraîchère [Photograph]. <https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html>

Figure 42 (left). Commune de Romainville. (2021d). The educational greenhouse of The Cité Maraîchère [Photograph]. <https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html>

Figure 42 (right). Commune de Romainville. (2021e). The educational space of The Cité Maraîchère [Photograph]. <https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html>

Figure 43. Commune de Romainville. (2021f). Prototype and realization on-site of *la Végétale* (the table for “edible landscaping”) at the Cité Maraîchère. [Image]. <https://www.lacitemaraichere.com/en/>

Iasi (RO)

FoodE Pilot – CUIB: Restaurant with local products

Iasi, Romania

Asociatia Mai Bine

Founded in 2013 as a social enterprise, this project has grown to be the most sustainable bistro in Romania. Through FoodE it will advance towards its vision of capacity building for sustainable development and its objectives of decreasing the environmental negative impact while increasing the social positive impact. It will become the first zero-waste unit within the Romanian HORECA sector by integrating a closed-loop economy model in its operational activities. As well, the pilot will integrate strategies for a transition to lower energy consumption, recovery of heirloom plant varieties, reducing the proximity distance towards km0, the founding of the first local food bank, and doubling the number of vulnerable beneficiaries.



MAIBINE



ORGANIZATION

ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

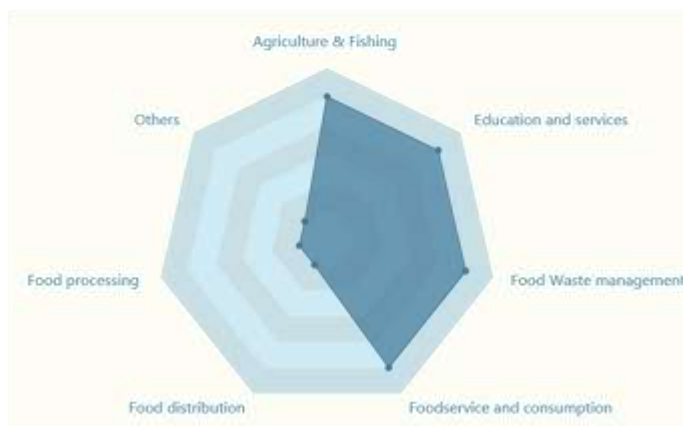
LOCATION

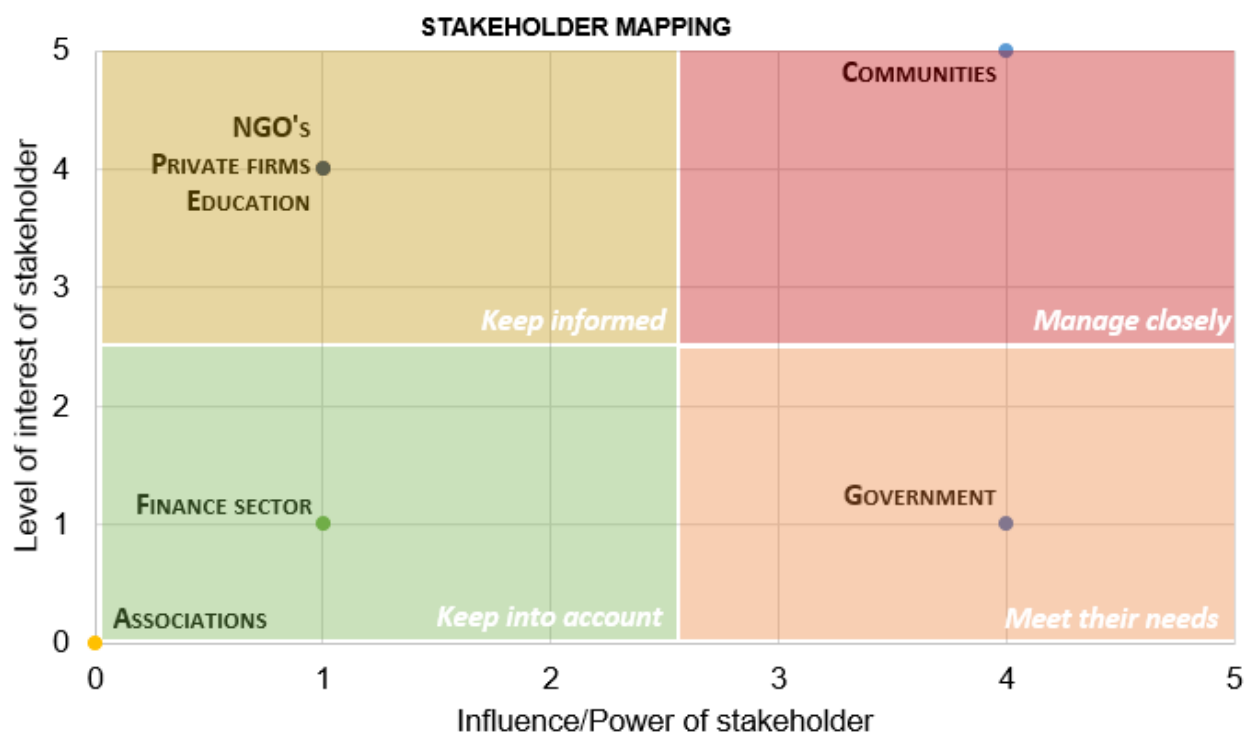


IMPACT AREAS



MAIN TASKS





1. Background

The “Centrul Urban de Inițiativă Bună” (CUIB) is one of the most sustainable bistro in Romania, in terms of both environmental and social impact and it is one of the most popular local restaurants based in Iași, the second biggest city of the country (7th rank generally and 1st for local food on TripAdvisor, 1st recommendation on Lonely Planet and Rough Guides). Founded by *Mai bine*, back in 2013, as a green social enterprise, it is still pioneering locally, regionally and nationally multiple practical approaches of sustainability for the HORECA system:

- Low carbon impact food: vegetarian, local, seasonal and natural ingredients.
- Ecological, artisanal and local beverages.
- Fair trade and ethical products.
- Solidarity services: free food for the most vulnerable.
- Low waste operational activities.
- Mental and human ecology education.
- Community consolidation through convivial and cultural events.

Through FoodE, the bistro will advance towards its vision of capacity building for sustainable development and its objectives of decreasing the environmental negative impact while increasing the social positive impact.

2. Location

Address: Strada Gavril Musicescu 14, Iași 700259, Romania (find on [Maps](#))

	On foot ✓	The pilot is easily reachable on foot since it is located in Iași city centre.
	By bike ✓	The pilot is accessible by bike, there are cycle paths nearby, at a distance of about 200 meters. The pilot offers 10% discounts for people coming in by bike.



	By car ✓	The pilot is reachable by car but there is very limited parking area. The pilot team encourages using public transport, walking or biking.
	By bus/metro ✓	The pilot is located in the city centre and it can be easily reached by bus (stop: Statia Independentei – 1, Piata Mihai Eminescu) and tram (stop: Piata Mihai Eminescu). No metro transport system available in the city.
	By train ✓	The closest train station is “Iași Central Station”, which is about 1 km away from the pilot location.
	By plane ✓	The nearest airport is International Airport of Iași, and it is well connected with public transports
	By ferry ✗	-

3. Pilot implementation

Co-design process
The co-design activities involved around 100 participants and concerned three main action areas: ❖ “Zero food miles”: the community was surveyed about their knowledge and experience with local producers of ingredients that can be used on restaurant menu (Figure 50). Considering the consumers warranty/certification approach, some producers have been contacted and some providers have been changed. With the help of the FoodE sustainability assessment framework and students from Bologna University (UNIBO) and Wageningen University (WUR), a system will be built, able to calculate the best providers while taking into consideration the means and the place of production as main indicators. ❖ “Zero waste”: new measures identified through the co-design activity (survey) have been already implemented (e.g., biodegradable sponges, in house produces cleaning products, use of compostable materials). In addition, the pilot invested in a domestic composter where they will compost more than 75% of the pilot bio-waste. Moreover, a process for a zero-waste precertification has been initiated. ❖ “Zero food waste”: this is the area that has the biggest room for improvement and requires the most effort. In addition to significantly reduce waste by composting it and recover food from supermarkets, several measures are required to reduce the waste produced on-site.

3.1 Main structures and areas

Thanks to the FoodE program, many improvements and changes to the structures and equipment became possible. CUIB operates in a rented building that has:

- a kitchen (Figure 46);
- a small space for storage;
- a serving place for clients which includes the bar area and a small shop with eco-friendly products (Figure 46);
- a terrace (Figure 45);
- a community garden (Figure 51);
- a small garden on the terrace (Figure 46);



Figure 45. Outdoor terrace (left) and terrace garden with raised beds (right).



Figure 46. Bistro customer space (left) and kitchen (right) after renovation.

3.2 Main systems/equipment

- The bistro has all the necessary equipment for the kitchen, the bar, the sales department, and the transport (a van), all improved within the FoodE program.
- In addition, the serving area and the shop have been enriched with new furniture and new design for the products' display, a new sale system with a new checkout and a software.
- The kitchen has been recently renovated and new appliances, new furniture and more professional equipment have been purchased (Figure 47).
- Two cargo bicycles are used for food delivery and as a help in the community garden (Figure 48). There are also plans to implement a zero-waste system for the kitchen and to make a mobile kitchen on a cargo bicycle.



Figure 47. Shop after interior renovation.



Figure 48. Cargo bikes for delivery.

3.3 Main services and activities

The following services and activities are offered by the pilot:

Catering services. The main activity of CUIB is providing public catering services cooking and serving food in the bistro in the city center of Iasi (on which 90% of the resources are invested). Several alternatives are offered for the sustainable consumption of food, preparing dishes realized mainly with local, vegetarian ingredients and artisanal options (Figure 49, Figure 50). For beverages, locally or regionally and fair-trade certified coffee, chocolate and teas are served. Options for take away and catering are available, depending on the bistro daily capacity. The service is offered year-round, daily for about 10 hours a day (the opening hours are changed on a seasonal basis).



Figure 49. Some of the CUIB dishes: soup with locally grown mangold (or Roman beet) (left), salad with home-grown vegetables (center), a vegetable borsch (Borșul) with fresh and seasonal vegetables (right).



Figure 50. CUIB menu available at <https://cuib.poloniq.ro/meniu>

- **Food delivery service.** In November 2020, the COVID-19 pandemic triggered the search for solutions to address the situation, which led to the launch of food delivery services integrating the zero waste and low environmental impact principles. The service is open to everybody and is provided daily. Customers benefit from discounts if they come by bike to pick up their food and if they come with their own reusable packaging.

- **Educational and outreach activities.** Several materials are available and include menus (Figure 50), leaflets, brochures, blog articles with the aim of raising consumer awareness. Many events are organized on-site (e.g., urban horticulture workshops, convivial lunches organized in the umbrella of MyLocalFoodE initiative) to promote the slow food concept, healthy diets as well as local producers. While the number of these activities was diminished due to Covid19 pandemic, in non-corona times, the incidence of events was almost weekly, and at least one event per month was organized by the pilot itself. Monthly events are scheduled to be hosted throughout 2022 as MyLocalFoodE.
- **Urban gardening and composting.** A pilot community garden was initiated in spring 2021 as well as the improvement of the already existing green space on the terrace (with raised beds) and cultivation of a small plot in the courtyard (Figure 51). Some of the home-grown products (mint, basil, chard, green beans and zucchini) are used in the kitchen (Figure 52). A composting activity of bio-waste has also started and the compost is then used in the gardening activities. In these activities several volunteers are involved, mainly youth up to 30 years old. As well, tens of pupils benefited from this activity by participating in educational workshops in the community garden or by visiting it.



Figure 51. Community garden before (left) and after (right)



Figure 52. CUIB vegetable garden and product harvest.

- **Selling activities (zero waste shop).** A small zero waste shop was integrated in the FoodE pilot as well, including non-food products in order to support a zero-waste life for the bistro members and clients (Figure 53, Figure 54). The shop has the same opening hours as the bistro.



Figure 53. Small shop (left) with resale of eco-friendly products: deodorant (100% natural ingredients, plastic free, from [Tuli A Tuli - přírodní kosmetika](#)), ecological sponges and bamboo cotton buds (from [loveeco.eu](#)).



Figure 54. Zero Food Waste Shelf inaugurated at the bistro.

- **Food waste prevention.** The pilot collects food from supermarkets that is a bit altered (misshapen, of a low-quality class, close to the expiration date) and it redirects the products (over 95%) to vulnerable people via a partner foundation. Less than 5% of the collected products are integrated in the restaurant menus, however, there is a plan to increase this amount and organize more awareness activities against food waste. The pilot team collects and redistributes food three times a week. According to their last reports, in 2021, the pilot collected over 19 tons of aliments with a value of over 78 000 RON (corresponding to over 15 000 EUR).
- **Free food for vulnerable people.** The pilot helps mediate the donation of food from supermarkets to the homeless in Iasi. In addition, in the last three years, during the cold months, the pilot cooked thousands of liters of soup and *borsch* (Figure 49) that were distributed (free of charge) to over 100 beneficiaries from Iasi, reaching about a quarter of the homeless in Iasi. There is a plan to continue with these activities that were limited due to the pandemic. However, the food collected mentioned above now reaches almost 400 vulnerable children and people, as follows: 300 homeless people, 24 beneficiaries and 10 employees of a social center, 8 poor families with 13 adults and 9 children and a partner foundation that supports about 50 vulnerable children.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to process food into food products
- to distribute/sell food and/or food products
- to serve or cater food
- to prevent, redistribute, or valorize food waste
- to provide food-related services: education and outreach.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 41 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 41. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site production of crops (mint, basil, chard, green beans and zucchini) within the urban garden, which provide a small fraction of the ingredients needed for bistro menu. The pilot helps mediate the donation of food from supermarkets to the homeless in Iasi (around 400 beneficiaries involved so far).
 Provision of raw materials	★★★★★	The pilot uses the resulting organic matter from the kitchen in creating compost for the garden.
 Ornamental resources	★★★★★	On-site production of ornamental plants and organization of plants exchange events for the local community.

4.2.2 Regulating services

Table 42. summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 42. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Regulation of urban metabolism	★★★★★	Several waste reduction measures were implemented and will be implemented in order to become the first zero waste certified bistro in Romania.
 Enhancement of pollination	★★★★★	Distributing seeds for pollinators flowers, organizing seed bombs workshops.
 Control of pests and diseases	★★★★★	The garden is managed following permaculture principles so the pilot doesn't make use of any synthetic pesticides but mainly relies on nature-based solutions.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	100 fruit trees and shrubs planted in 2021, via FoodE. Using permaculture principles in the urban gardening activities.

	Habitat provision and/or biodiversity	★★★★★	Using heirloom species in the gardening activities.
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4.2.3 Socio-cultural services

Table 43 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 43. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	The pilot team is participating regularly in training and other types of educational activities self-organized or initiated by collaborators. The subjects that are covered are: human ecology and sustainable lifestyles (often focusing on food), urban ecology, green social entrepreneurship, and circular economy.
 Contribution to research	★★★★★	Indirect contribution to research by collaborating in several H2020 projects and providing data.
 New forms of recreation	★★★★★	The pilot is not only a bistro, but also a place to spend time in a meaningful way, a place that allows recreation and ecology of mind, that creates epiphanies and determines positive changes in the lifestyle of its constant customers. As well, most of the events that are organized are novel in the local landscape, often being the only local actor that offers these forms of recreation: urban agriculture workshops and convivial lunches.
 Improvement of touristic attractions in the city-region	★★★★★	The pilot is often visited by groups of people from outside the city and it is still the first recommendation on touristic guides.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	The pilot team believes that the bistro has the best ratio between healthy food and environmental impact. As confirmed by several testimonials, the pilot is not only promoting human and environmental physical health, but also contributing to the mental health of its employees, beneficiaries and customers. This is possible through the sense of belonging it nurtures, through the green peaceful environments open to all, through providing constant proof that <i>another world is possible</i> .
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	Urban gardening activities supported by the pilot, via the FoodE Project, including planting fruit trees and shrubs in 10 educational units from Iași. In addition, several urban art projects are hosted and/or supported by CUIB. For instance, the mayor of the city posted a picture on social media in front of our painted terrasse fence, echoing the slogan of <i>Mai bine</i> : ethics, ecology, equity. As well, the pilot developed a 200 square meters mural dedicated to

		sustainable food and urban gardening in the main student campus of the city.
 Improvement of social cohesion and community building	★★★★★	The pilot is appreciated locally as the main organization that catalyzes a local community around the principles of sustainability and urban resilience. Whereas the team grew a lot in its 13 years of existence, it is still a grass roots organization, receptive and careful to the interests and needs of the community and supporting it in approaching low impact lifestyles, in harmony with itself, with others and with nature. The pilot also organizes solidary bazaars where people can exchange clothes as well as events where people can enjoy local and healthy food, discuss current societal challenges and opportunities.
 Improvement of commercial relationships	★★★★★	The team know personally most of the producers and/ or distributors of the ingredients used in the bistro. As well, establishing close and long-lasting relationships with their service and product providers is specifically expressed in the procurement guidelines of CUIB.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution Mai Bine Association (MBI). The core team (and related roles) actively managing the project is shown in Figure 55. The pilot implementation was carried out by the pilot team with the help of several partners (Romanian Association for Permaculture, Food Forest, Fundația Emmaus, Rural development Research Platform), volunteers, and several citizens.

Both land and buildings of the pilot project are private properties of one household with a temporary concession. After the FoodE project, the pilot initiative will be managed by the related FoodE pilot institution (MBI). In fact, CUIB is more than 8 years old and the goal is to keep it alive as long as possible. The pilot team has already discussed with the building owner to extend the lease for another 5 years and it has been accepted. So, the team is confident that they will have time to achieve their vision in the coming years to become the first zero-waste unit in the Romanian HORECA industry by integrating a closed-loop economy model into its operations. In addition, the pilot will integrate strategies for a transition to lower energy consumption, recovery of heirloom plant varieties, reduction of the distance of proximity to “km0”, foundation of the first local food bank and doubling the number of vulnerable beneficiaries.

Person name	Role	Institution
Anca Elena Chirilă Gheorghică	Pilot Manager (1)	Asociația Mai bine
Andreea Ghiban	Pilot manager (2)	Asociația Mai bine
George Alexandru Vintilă	Pilot executor	Asociația Mai bine
Cristina Căpitănița	Pilot communication/PR executive	Asociația Mai bine

Figure 55. People involved in the FoodE pilot team and respective roles and institutions.



5.1 Skills and expertise requirements

Table 44 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).\

Table 44. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Under-represented 👎	- Being a bistro with a daily custom activity requires to periodically communicate with clients and partners both online and offline. - The collaboration skills are also important as the activity is based on how well the members of the teams (from kitchen and bar) are working together. - Being among the first sustainable places to eat and spend time in the country, the project relies on creativity both in the way things are managed and also in the way core values and activity are communicated.
S2 - information skills	★★★★★	Well represented 👍	- Right from the start, the team wanted to monitor the environmental impact of the initiative, how the choices influence the CO₂ footprint or the waste management, for example. - At each anniversary, the pilot informs customers about the impact as well as on future plans. The next goal is to become a zero-waste bistro and zero miles bistro (by reducing as much as possible the km that the food makes before ending up at the customers' table.) To do this, the pilot will implement a system to monitor the products' provenience and will also improve the waste management system. - Through FoodE the team has also started to collect data about local producers and about the



			type of activity and their products.
S3 - assisting and caring	★★★★★	Under-represented 👎	The pilot helps mediate the donation of food from supermarkets to the homeless in Iasi. In addition, in the last three years, during the cold months, the pilot cooked thousands of liters of soup and <i>borsch</i> that were distributed (free of charge) to over 100 beneficiaries from Iasi, reaching about a quarter of the homeless in Iasi.
S4 - management skills	★★★★★	Well represented 👍	Being more than a conventional bistro, the pilot needs strong management resources. The skills includes: hiring people, engaging them, keeping the team united, dealing with suppliers and clients, organizing events, collaborating with the financial department, monitoring the sustainability of the project. The supervision of those activities should be constant and regular.
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	- Working with computers mainly to create and communicate pilot messages to the clients and partners. - Working with the selling software where all the financial data are collected.
S8 - Working with machinery and specialized equipment	★★★★★	Well represented 👍	Working with professional equipment in the kitchen and also in the bar.

Table 45 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 45. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Under-represented 👎	The pilot practices permaculture in the community garden and in the terrace garden of the bistro. More



			volunteers with this knowledge would be needed to help with the activities. This is why a call was launched in order to get more help.
Arts and humanities	★★★★★	Well represented 👍	These skills are required for the fundraising events e photo exhibitions held by the pilot and related partners.
Business, administration and law	★★★★★	Well represented 👍	-
Education	★★★★★	Well represented 👍	-
Health and welfare	★★★★★	Well represented 👍	
Information and communication technologies	★★★★★	Under-represented 👎	-
Natural sciences, mathematics and statistics	★★★★★	Under-represented 👎	-
Services (e.g., hygiene and occupational health services, security, transport services etc.)	★★★★★	Well represented 👍	-
Social sciences, journalism and information	★★★★★	Well represented 👍	-

5.2 Pilot network

So far the pilot in Iasi achieved the following goals:

- **Job opportunity:** for 8 disadvantaged users involved in the restaurant activities.
- **Education - research – training:** 6 events have been organized with the aim to educate about sustainable food: Public Debate Urban Gardens, Impact of Nutrition Education Workshop (online), 0 Waste Dinner, 0 Food Waste Event and two editions of a series called “Micul Pranz” (one about degrowth and another one “MylocalFoodE”).
- **Dissemination and promotional events:** in 2021 the pilot counted around 25.000 clients. In addition, they organized and participated at events where at least 2.500 people were direct beneficiaries.
- **Stakeholder engagement in pilot activities:** 7 stakeholders so far involved in implementing food waste activities: Emmaus (charitable foundation), AproStore (grocery shop), ViaNaturalia (online food warehouse), Eco Happy (grocery shop), three supermarkets from Delhaize Group (Romania Mega Image).
- **Food waste reduction:** in 2021, the pilot collected and recovered over 19 tons of aliments.
-

In addition, the pilot is collaborating with:

- **Other 7 CRFS initiatives (excluded FoodE pilots):** *Food Forest* (urban farm), *Convivia* (food education and food events), *“Un Coup de Main Emmaus”* Foundation, *Roade și Merinde* (food hub), *ASAT* (community supporting agriculture), *Cămara lui Vasile* (rural farm), *Legume Târgu Frumos* (rural farm).
- **Other 16 organizations/Institutions (outside FoodE):**
 - 9 schools (Public Kindergarten no 3, Public Kindergarten no 7, Private Kindergarten AngelKids, Mihai Eminescu High School, Gheorghe Asachi High School, Waldorf High School, Elena Cuza Secondary School, Grigore Moisil High School, Kindergarten no 20).
 - 1 public institution (Romanian Literature Museum).
 - 4 NGO’s (Romanian Permaculture Association, Rural Development Research Platform, Romanian Vegan Association, Semințe pentru Viitor).
 - 1 garden product Superpământ.
 - 1 Private entity (REDU).

6. Pilot communication

6.1 Videos

Video (title)	Link
FoodE pilot – CUIB	https://www.youtube.com/watch?v=6aHNrmbgd e0
NESsT Cuib/ Mai Bine Association	https://www.youtube.com/watch?v=2qYJi3w6Axs &t=1s
CUIB circular restaurant	https://www.instagram.com/tv/CVVFGwksb m/

6.2 Links to dissemination materials

- <https://www.facebook.com/media/set/?set=a.3150193918450673&type=3> - On June the 5th the pilot marked the international Day of Degrowth with a public brunch where our colleagues in the kitchen, together with special guest Chef Cătălin, prepared vegan recipes with wild or spontaneous ingredients, groceries from the Community Food Forest garden as well as reclaimed food, either (too) slightly spoiled or close to expiry.
- <https://www.traieste.maibine.org/mai-bine-tinde-zero/> - Article on Mai bine’s blog about the vision of reducing environmental impact at CUIB.
- <https://incuib.ro/> - Bistro website
- <https://www.facebook.com/media/set/?set=a.3289618634508200&type=3> - The making of the urban perennial garden from the bistro’s terrace.
- <https://www.facebook.com/media/set/?set=a.10165100064940322&type=3> - Urban Permaculture Workshop, theory part, April 21st, 2021.
- <https://www.facebook.com/media/set/?set=a.10165118675775322&type=3> - Urban Permaculture Workshop - practical part, April 26th, 2021.
- <https://www.facebook.com/media/set/?set=a.10165213328310322&type=3> - The making of an urban community garden in a kindergarten, May 21st, 2021.
- <https://www.facebook.com/media/set/?set=a.10165307473280322&type=3> - Urban Permaculture and Composting Workshop, June 15th, 2021.

7. Photo credits

Figure 45. Mai bine's personal archive. (2021). Outdoor terrace (left) and terrace garden (right). [Photograph]

Figure 46. Mai bine's personal archive. (2021). Bistro customer space (left) and kitchen (right) after renovation. [Photograph]

Figure 47. Mai bine's personal archive. (2021). Shop after interior renovation. [Photograph]



Figure 48. Mai bine's personal archive. (2021). Cargo bikes for delivery. [Photograph]

Figure 49. Mai bine's personal archive. (2021). Some of the CUIB dishes: soup with locally grown mangold (or Roman beet) (left), salad with home-grown vegetables (center), a vegetable borsch (Borșul) with fresh and seasonal vegetables (right). [Photograph]

Figure 50. Mai bine's personal archive. (2021). CUIB menu available at <https://cuib.poloniq.ro/meniu>. [Image]

Figure 51. Mai bine's personal archive. (2021). Community garden before (left) and after (right). [Photograph]

Figure 52. Mai bine's personal archive. (2021). CUIB vegetable garden and product harvest. [Photograph]

Figure 53. Mai bine's personal archive. (2021). Small shop (left) with resale of eco-friendly products: deodorant (100% natural ingredients, plastic free, from [Țuli A Țuli - přírodní kosmetika](#)), ecological sponges and bamboo cotton buds (from [iloveeco.eu](https://www.iloveeco.eu)). [Photograph]

Figure 54. Mai bine's personal archive. (2021). Zero Food Waste Shelf inaugurated at the bistro. [Photograph]

Ljubljana (SL)

FoodE Pilot - "PRISON HONEY" - Urban beekeeping for rehabilitation and social inclusion

Ljubljana, Slovenia

Urban Beekeepers Association of Slovenia

This urban beekeeping project promotes a greener, healthier environment, enables its citizens to be in touch with bees and raises awareness about the importance of beekeeping and honeybees for the whole food system. This will enhance pollination in the city, promote environmental sustainability and enable customers to get their own locally produced honey. Prisoners in Ljubljana are the first to try these newly installed beehives, while they receive trainings on beekeeping to provide the prison with honey and other bee products.



BEE



ORGANIZATION

- Profit:
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

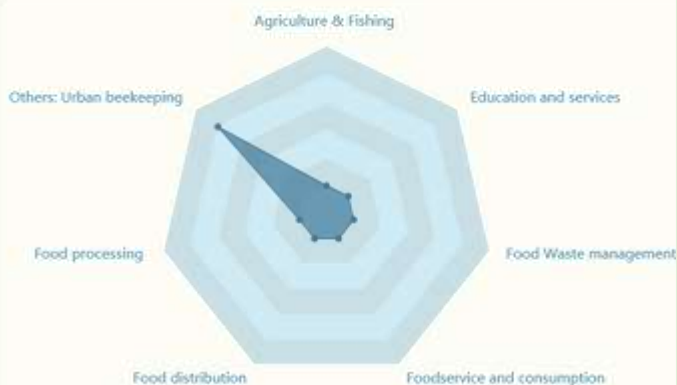
LOCATION

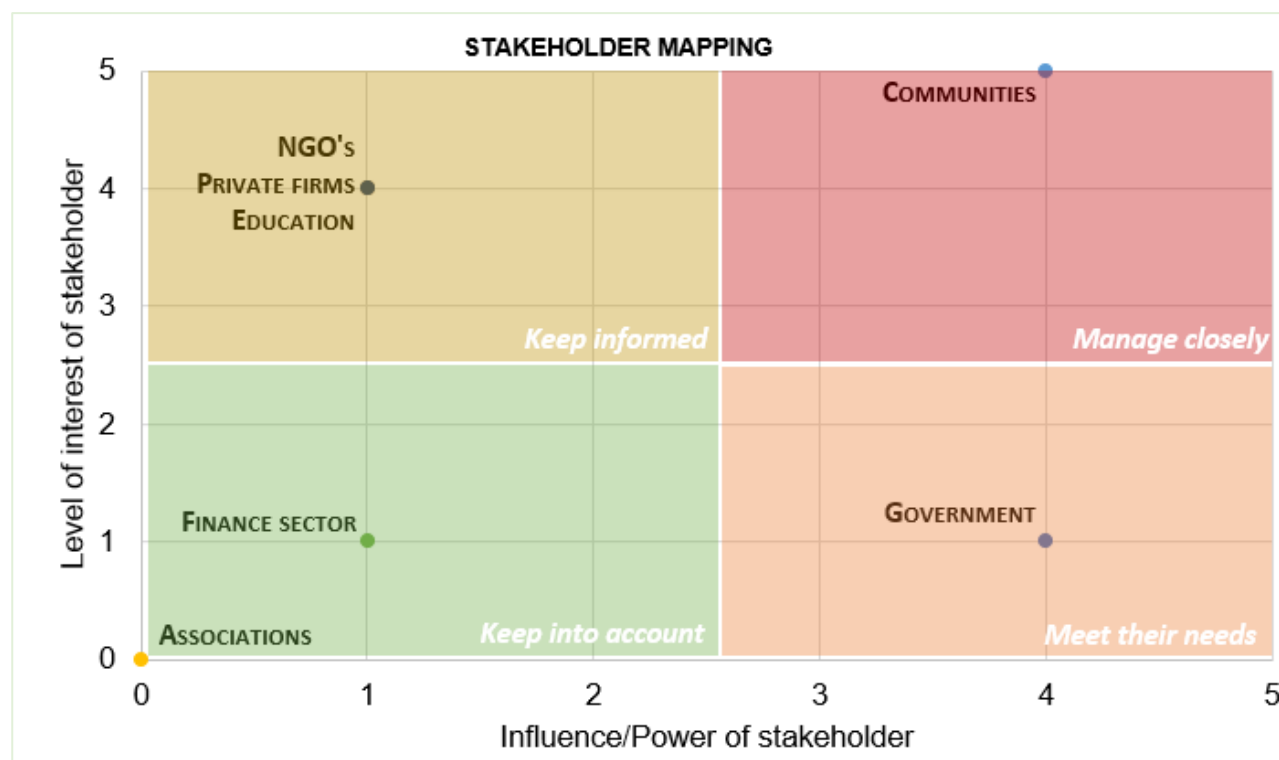


IMPACT AREAS



MAIN TASKS





1. Background

Slovenia's Urban Beekeeping Association has been operating since 2013 in Ljubljana and its surroundings. It stands for the development and promotion of urban beekeeping as an activity that contributes to the protection and development of the urban environment and improves the quality of life in urban areas, raise public awareness of the importance of urban beekeeping, increase the amount of honey plants and trees in urban areas, improve the level of domestic self-sufficiency in honey and bee products and to connect urban beekeeping with other industries working to improve quality of life in cities.

The Association's president (Gorazd Trušnovec) also authored and promotes the "Najemi panj" ("rent-a-hive") professional initiative in Ljubljana, an innovative beekeeping service, fostering greener, healthier environment, enables its citizens to be in touch with bees and raises awareness about the importance of beekeeping and honeybees for the whole system. Besides that, it enables better pollination in the city, and promotes environmental sustainability, with customers getting their own honey, produced on their rooftop terraces or backyard gardens. The customers vary from hotels, public institutions, private companies to regular citizens.

2. Location

Address: Banija 96, Ljubljana-Ig, Slovenia (find on [Maps](#))

	On foot ✓	When at the facility, the pilot can be easily and safely reached by foot, there are no obstacles for persons with disabilities.
	By bike ✓	The pilot is easily accessible by bike via dedicated pathways.
	By car ✓	The pilot is reachable by car and there are parking available at the facility.
	By bus/metro ✓	The pilot is accessible by bus (e.g., line 14).

	By train ✓	The facility can't be reached by train directly, only in combination with bus. The closest train station is Ljubljana Central Station.
	By plane ✓	The closest airport is Ljubljana Jože Pučnik Airport, 50 km away.
	By ferry ✗	-

3. Pilot implementation

Co-design process

The co-design activities involved around **85 participants** including students, students (Faculty of Design), professors (Faculty of Design), architects, journalists, Head of the open Department Prison.

- ❖ Between December and February 2021, the pilot team conducted two student seminars/competitions with the Faculty of Design in order to place the beehives in the prison's garden functionally, aesthetically and in accordance with good practice of landscape architecture. The first seminar was intended for the design of appropriate pedestals for the beehives (since they cannot be placed directly on the ground). The proposal of student Amadej Bezovšek (Figure 56) won among two dozen very interesting solutions. The winning proposal has been implemented in April 2021 (Figure 57).
- ❖ The second seminar was intended for students majoring in Visual Communication at the same faculty who prepared visual templates for painting the beehives to make them as aesthetically attractive as possible. Inmates from the Ig Department involved in the training chose the templates from the nine proposals that were selected as the most suitable from the set of student assignments, and use them to paint their beehives (Figure 58, Figure 59).



Figure 56. The beehive stand, the winning project realized by Amadej Brezovsek during the co-design activity organized by Urban beekeeping association.

3.1 Main structures and areas

- Prison of Ljubljana
- Open Department Ig including:
 - Garden;
 - storage room;
 - main building;
 - kitchen.

3.2 Main systems/equipment

Beekeeping equipment:

- wooden hives with additional inner parts (such as wooden frames and wax foundations);
- beekeeping tools;
- protective gear;
- honey processing machines (honey extractor etc.);
- honey storage units, beehive scales with interface;
- wax processing unit;
- equipment for ecological treatment against varroa mites;
- spear parts wax foundations.



Figure 57. Implementation of the beehive stands in the prison garden (full video available at the [link](#)).



Figure 58. Painted beehives placed on the hive stand (left), ongoing beekeeping course (right).

3.3 Main services and activities

The pilot is a unique, new project for the Urban Beekeeping Association. The following services and activities are offered:

- **Urban beekeeping:** beehive stand production, beehive placement, honey extraction (on-site and on other locations of the pilot owner). In 2021, the honey harvest was 6 kg, somewhat reduced due to the weather conditions, but still a successful result (Figure 61, [13]). Depending on the sort of activity, users can interact on-site or online.
- **Empowerment and rehabilitation of unprivileged groups:** the objectives of the project go beyond business opportunities and food production as such, as they also include social activation in its core. In fact, the project offers a way to rehabilitate and empower underprivileged groups of society (it is aimed at imprisoned persons) primarily in Ljubljana. Beehives have been installed in May 2021 in one prison in Ljubljana and training was offered to the inmates (the first generation completed the beginner's course by the end of 2021), with the aim of providing the prisons with its own honey and other bee products, create more human and socially inclusive conditions within the penalty system and make it an example of good practice for other prison facilities in Slovenia as well as beyond. The long-term goal is to make beekeeping in prisons self-sustainable, without outside help of a professional beekeeper.



Figure 59. Painting of the beehives by the inmates, following patterns and color-scales determined in the co-design activities organized by the Urban Beekeeping Association.

▪ **Educational activities:**

- Exclusive beekeeping courses for inmates;
- workshops in- or for schools, exclusive for pupils as well as guided tours for schools. For example, in November 2021, a local Kindergarten visited the headquarters of the Urban Beekeeper Association in Bežigrad and was able to see the beehives.
- workshops open to all (e.g., for children, families, etc.);

The education activities will be held regularly (the course will take place once a week during the season March-September whereas school activities and creative workshops will be more sporadically).

For example, a successful children workshop on “Molecular candies” was organized at the end of 2021 ([Link](#), Figure 60). The main task of this workshop is to make edible sugar packets from natural polymers. The children get to know a new type of bioplastic that is completely natural and can also be eaten, thus building in the direction of the future without environmentally harmful plastics. Children add natural colors and flavors to the biopolymers and pack sweet and honey delicacies in them. They also experienced the magic world of molecular cuisine and pack beverage balls on the grill or make sweet sticks.

- **Public events** (sporadically, on-site of the pilot or elsewhere).
- **Communication and dissemination activities** (continuously).

For example, in September 2021, the Administration of the Republic of Slovenia for the Execution of Criminal Sanctions, in cooperation with the Urban Beekeeper Association, joined the pilot “Honey Cell – Beekeeping” with Prisoners, which was presented in more detail. The Administration identified the Honey Cell project as a useful activity for inmates, directing them to acquire new knowledge and skills useful after release from prison. The centerpiece of the event was the potting of the year's honey that was produced by the inmates with the support of beekeeping mentors (Figure 61).



Figure 60. Children workshop on “molecular candies” (left) and guided tour to the Kindergarten “Mini vrtec” (right).



Figure 61. Public and media presentation of the pilot with live honey extraction at the “Honey Cell – Beekeeping” pilot project. Year’s honey potting (left) and visit of the Administration of the Republic of Slovenia for the Execution of Criminal Sanctions (right).

4. Pilot functions and eco-system services

4.1 Pilot functions

- to provide food-related services: beekeeping , educational activities, rehabilitation of socially disadvantaged groups.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 46 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

**Table 46. Contribution to “provisioning services”**

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site honey production via ecological beekeeping.
 Provision of raw materials	★★★★★	Beeswax production.
 Medicinal resources	★★★★★	Production of propolis.
 Ornamental resources	★★★★★	Melliferous plants and flowers.

4.2.2 Regulating services

Table 47 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 47. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Enhancement of pollination	★★★★★	Pollination provision (bees are one of the most important pollinators),
 Control of pests and diseases	★★★★★	Bees’ health is under strict control, in this way general bee condition and health in the surrounding areas is improved.
 Habitat provision and/or biodiversity	★★★★★	Increasing biodiversity by providing pollination service to the agriculture in the area. Development and promotion of urban beekeeping as an activity that contributes to the protection and development of the urban environment and improves the quality of life in urban areas.

4.2.3 Socio-cultural services

Table 48 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 48. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Providing beekeeping training courses, workshops for inmates, schools, and locals.
 Contribution to research	★★★★★	The beehives are included in research projects of the Faculty for Veterinary Medicine of the University in Ljubljana (Disease Prevention Surveillance Project).
 New forms of recreation	★★★★★	Beekeeping is an outdoor activity and demands physical effort from the beekeeper. The pilot is a recreational space for inmates and visitors.

	Improvement of touristic attractions in the city-region	★★★★★	The beehive stands developed and produced for the pilot received a design award and thus contribute to the visibility and recognizability of Slovenian design (also at international level). Urban beekeeping has an increasing tourism potential. In 2021, a guided tour of the urban beehives was arranged for 5 tourist-groups.
	Improvement of mental and/or physical health (therapeutic)	★★★★★	Beekeeping has therapeutic effect. In addition, the pilot offers craft learning to underprivileged societal groups (imprisoned) not only as a distraction but also as a new occupation.
	Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	The beehive stands developed and produced for the pilot received a design award by the Designers' Guild of Slovenia: (link) . A lot of attention was given to the aesthetics of the pilot also in the preparatory phase.
	Preservation of cultural knowledge and heritage	★★★★★	Beekeeping is an important part of the Slovenian tradition (culturally and socially). In addition, during the design and implementation of the pilot project, special attention was paid to include folkloric elements and ethnological motifs related to Slovenian tradition. The beehives were painted inspired by the color scales and shapes of the artworks of a Slovenian painter and designer (Helena Vurnik).
	Improvement of social cohesion and community building	★★★★★	Beekeeping as a new opportunity for social integration of the imprisoned. The pilot aims to create more humane and socially inclusive conditions within the penalty system and make it an example of good practice for other prison facilities in Slovenia.
	Improvement of commercial relationships	★★★★★	There is an increasing interest for beehives also from commercial partners, businesses and institutions.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution: Slovenia's Urban Beekeeping Association (BEE). The core team (and related roles) actively managing the project is shown in Figure 62.

The pilot implementation was carried out by the pilot team with the help of the co-design team, outside craftsman, inmates taking part in the pilot, prison administration, media partners.

Both land and buildings of the pilot project are properties of the Prison Administration and the pilot has a temporary concession during the entire FoodE project, with possible extension and/or permanent use for beekeeping in the future. After FoodE, there is a plan for the inmates to care of the hives and bee families, with the help of the prison facility. The owner of the pilot project (BEE) remains available for additional mentoring or monitoring and seeks to expand the pilot to other facilities (including day care centers for the persons with disabilities, elderly, etc.).

Person name	Role	Institution
Gorazd Trušnovc	Pilot owner	Urban Beekeeping Association



Renata Zamida	Pilot manager	Urban Beekeeping Association
Franc Petrovčič	Pilot executor - mentor	Urban Beekeeping Association

Figure 62. People involved in the FoodE pilot team and respective roles and institutions

5.1 Skills and expertise requirements

Table 49 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 49. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Under-represented 👎	Knowledge sharing, communicating, collaborating, negotiating.
S2 - information skills	★★★★★	Well represented 👍	Maintaining, processing, monitoring beekeeping activities.
S3 - assisting and caring	★★★★★	Well represented 👍	Supporting, mentoring inmates.
S4 - management skills	★★★★★	Well represented 👍	Managing project, organizing work, monitoring, recruiting, financial supervision.
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	Collect and analyse data.
S6 - Handling and moving	★★★★★	Well represented 👍	Handling the beehives and bee families
S7 – Constructing	★★★★★	Well represented 👍	Beehive stands construction.
S8 - Working with machinery and specialized equipment	★★★★★	Well represented 👍	Beekeeping equipment (light machinery).

Table 50 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 50. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	Beekeeping.
Arts and humanities	★★★★★	Well represented 👍	Project set-up with sensibility for design/aesthetics (beehive stands,



			beehive illustration, cooperation with Faculty for Design)
Business, administration and law	★★★★★	Well represented 👍	Management, provisions, limitations (both the prison department and beekeeping underlie strict provisions and laws to be followed).
Education	★★★★★	Well represented 👍	Knowledge and knowledge-sharing with inmates, schools and visitors.
Engineering, manufacturing and construction	★★★★★	Well represented 👍	Beehives stand construction.
Social sciences, journalism and information	★★★★★	Well represented 👍	Communication and dissemination of the pilot activities.

5.2 Pilot network

So far the pilot in Ljubljana achieved the following goals:

- **Job opportunity:** for 1 person for running the pilot.
- **Education - research – training:** around 15 local stakeholders attending training and dissemination workshops.
- **Dissemination and promotional events:** around 300 citizens that participate in the dissemination and promotional events.

In addition, the pilot is collaborating with:

- **Other 6 organizations/Institutions (outside FoodE):** Prison administration, Slovenian Beekeeping Association, Faculty for Design, High Schools and Elementary Schools, Hotel Park-green hotel.
- During the FoodE project, the pilot would like to establish a close collaboration with the pilot in Romainville (France) on the topic of urban beekeeping as part of the educational gardens and sustainability programs.

6. Pilot communication

6.1 Videos

Video (title)	Link
FoodE pilot project 'Prison Honey' by Urbani Cebelar	https://www.youtube.com/watch?v=xPqyoAsH03o
Prison Honey pilot project - From the Sketch to the Bee Stand	https://www.youtube.com/watch?v=Qr_Ne3K5j5o
Urban beekeeping	https://www.instagram.com/tv/CV5OMjzg88g/

6.2 Links to dissemination materials

- <https://urbanicebelar.si/uradna-predstavitev-projekta-medena-celica>
- <https://www.gov.si/novice/2021-09-14-v-okviru-projekta-medena-celica-cebelarjenje-z-zaprtimi-osebami-iztocen-prvi-med/>
- <https://urbanicebelar.si/en/prison-honey>



7. Photo credits

Figure 56 Brezovsek, A. (2021). The beehive stand, the winning project realized by Amadej Brezovsek during the co-design activity organized by Urban beekeeping association.[Image]

Figure 57. Urban beekeeping association of Slovenia. (2021). Implementation of the beehive stands in the prison garden. <https://www.youtube.com/watch?v=0-m8IL3TbPA>. [image]

Figure 58. Urban beekeeping association of Slovenia. (2021). Painted beehives placed on the hive stand (left), ongoing beekeeping course (right). [Photograph]

Figure 59. Urban beekeeping association of Slovenia. (2021). Painting of the beehives by the imprisoned themselves, following patterns and color-scales determined in the co-design activities organized by the Urban Beekeeping Association. [Photograph]

Figure 60. (Left) Urban beekeeping association of Slovenia. (2021). Children workshop on “molecular candies” at Honey Cell pilot project in Ljubljana [Photograph]. <https://www.facebook.com/events/717855479605042/>

Figure 60. (Right) Urban beekeeping association of Slovenia. (2021). Guided tour to the Kindergarten “Mini vrtec” at Honey Cell pilot project in Ljubljana [Photograph]. <https://urbanicebelar.si/obisk-mini-vrtca>

Figure 61. (Left) Administration for the Enforcement of Criminal Sanctions. (2021, September 14). Presentation of the Honey Cell project by pouring the first honey of the year [Photograph]. <https://www.gov.si/novice/2021-09-14-v-okviru-projekta-medena-celica-cebelarjenje-z-zaprtimi-osebami-iztocen-prvi-med/#group-126360-1>

Figure 61. (Right) Administration for the Enforcement of Criminal Sanctions. (2021, September 14). Visit of the Administration of the Republic of Slovenia for the Execution of Criminal Sanctions at the Honey Cell project [Photograph]. <https://www.gov.si/novice/2021-09-14-v-okviru-projekta-medena-celica-cebelarjenje-z-zaprtimi-osebami-iztocen-prvi-med/>

Tenerife (SP)

FoodE Pilot - ECOTÚNIDOS - sustainable small-scale fishery in school canteens

Tenerife, Spain

Organización de Productores de Túnidos y Pesca Fresca de la Isla de Tenerife (ISL), Instituto de Investigación Social y Turismo (Universidad de La Laguna)

School managers, cooks, fishers, and researchers jointly try to create new ways to process and distribute fresh fish on the Canary Islands. Their aim is to make better use of local fish catches instead of relying on imports, starting with the implementation in school canteens. Hereby, they support local fishers and provide school pupils with healthy meals.



ISL/ULL



ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others: University

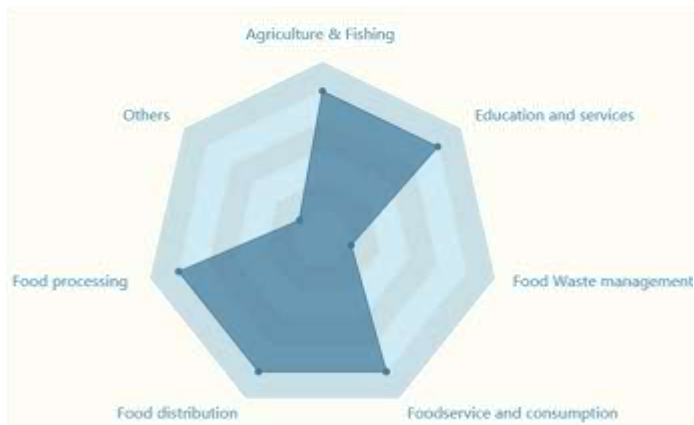
LOCATION

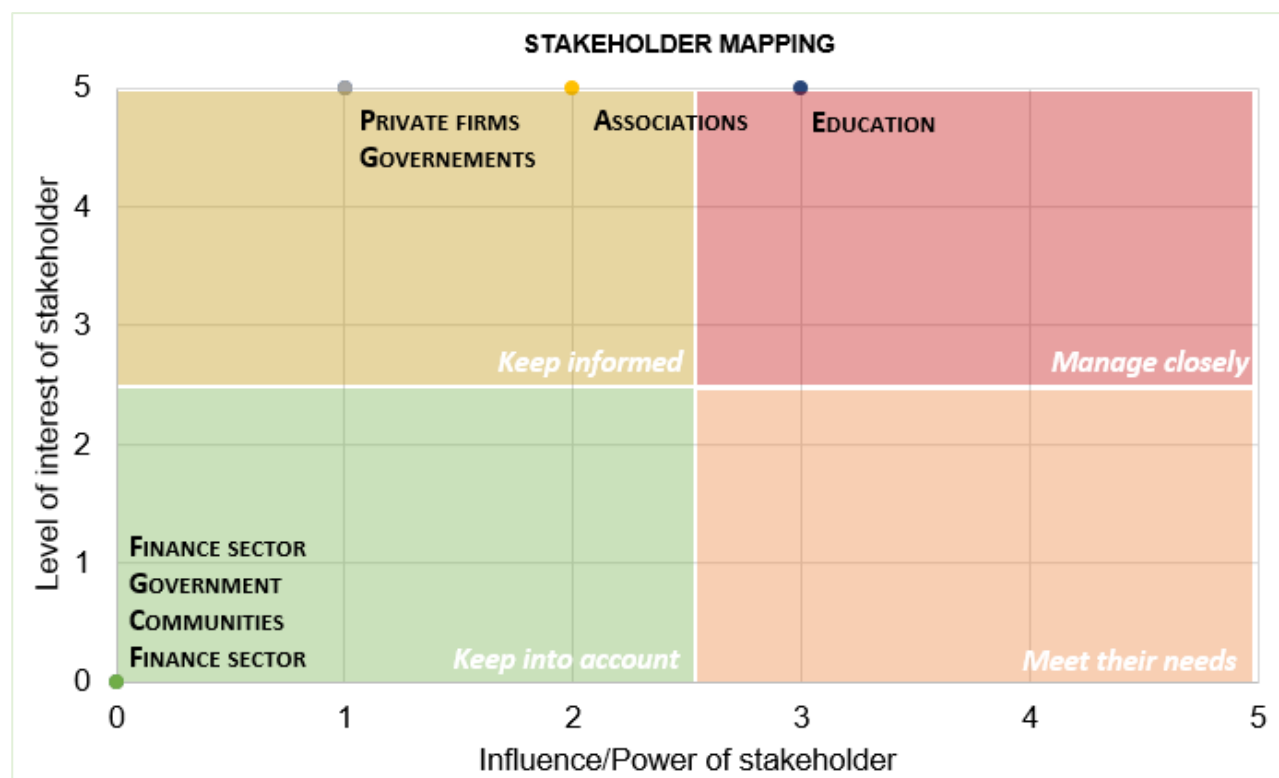


IMPACT AREAS



MAIN TASKS





1. Background

After years of research on the value chain of local small-scale fisheries in the Canary Islands, it has emerged that these provide only about 17% of the consumption of fresh and frozen fish in the Archipelago while, at the same time, 2.5 times this quantity is exported. Large imports provide around 83% of local consumption. Better use of local catches can be realized. This nonsense can be exemplified in the consumption of fish in most school canteens. Despite being on an island, most schools in Tenerife consume frozen fish from anywhere in the world. For this purpose, in 2018, a pilot project started to be implemented with the support of a fishers Producer Organization (“Islatuna”, with over 70 boats) and other stakeholders coordinated by the University of La Laguna under the project “Macarofood”. It involved school managers and cooks, fishers, researchers and institutions, trying to define together new ways to process and distribute the fish. Prestigious chefs developed recipes with local fish, trained the cooks, and ten schools (2000 pupils) begun to receive fish, processed to facilitate the consumption (skipjack tuna and other fishes, refrigerated/speed-frozen) with lower prices than the imports. The pilot has been a success and, within the FoodE project, there are plans to expand the experience to more fisher organizations in several islands, multiplying at least five the number of schools, pupils, and families involved as well as to University canteens.

2. Location

Address: the pilot is spread between Islatuna, University of La Laguna and many schools in the Island.

- ISL Vía Transversal 1 Dársena Pesquera, 14, 38120 Santa Cruz de Tenerife, Spain (find on [Maps](#))
- University of La Laguna, Instituto de Investigación Social y Turismo, Campus de Guajara.

	On foot ✓	There is a pedestrian path that connects Santa Cruz de Tenerife with the Dársena Pesquera area where Islatuna (ISL) is located. University of La Laguna (ULL) can also be reached by public transport and pedestrian paths.
	By bike ✓	There is a cycle path that connects Santa Cruz de Tenerife with the Dársena Pesquera area.



	By car ✓	The area offers public space for parking purposes. There are not significant driving restrictions apart from being a port area.
	By bus/metro ✓	There is no metro service in Tenerife. The closest tram station is around 8 km from Islatuna. The regular bus lines 910 and 945 (TITSA) connects daily Santa Cruz with the Dársena Pesquera area. The bus stop “Darsena Pesquera” is around 250 meters from Islatuna. The bus stop “Instituto Oceanográfico” is around 300 m from Islatuna. University of La Laguna is easily connected by tram. The schools involved are located in a diversity of urban and peri-urban areas.
	By train ✗	There is no train in Tenerife.
	By plane ✓	The “Aeropuerto Norte” is around 17 km from Islatuna.
	By ferry ✓	There is a maritime station in Santa Cruz with several regular ferry services around 6 km far away from Islatuna.

3. Pilot implementation

Co-design process

A focus group was organized together with **50 participants** including school managers, cooks, canteen staff, teachers parents association representatives and fishers association representatives. The co-design activity aimed to exchange ideas about the pilot development and fine-tune the processes and the fish distribution, together with local stakeholders, by considering the actual and future challenges. The following ideas have been pursued and will be implemented:

- ❖ Develop new receipts more suitable for the specific consumers.
- ❖ Educational activities:
 - “Draw your tuna”.
 - “Share your recipe”.
 - “Our fish and the seasons”.
 - Marine recipe book.
- ❖ Extend the fish offer with other species (white fish, small pelagic).
- ❖ Extend the project to other islands, schools and suppliers that have shown interest.
- ❖ Possibility to expand the pilot to University Canteens and Colleges of the University.

3.1 Main structures and areas

Fisher organizations have their own facilities, and some of these organizations have facilities to process fish adequately. Schools and school canteens have their own facilities as well as the University (ULL).

3.2 Main systems/equipment

- Fisher organizations have their own equipment for fish processing and fish delivery. Systems for deep-freezing are already in operation.

- Schools' canteens have their own equipment. Sample materials for activities in schools are ready to be used. A beta version of the app to place fish orders to connect schools with fisher organizations is in testing process.

3.3 Main services and activities

The following activities and services are offered by the pilot:

- **Local fish (processed or raw) delivery:**
 - **to school canteens** (cooks and pupils as final users), including different fish species and formats (already ongoing) (Figure 63).
 - **University canteens**, including different fish species and formats. They will be involved shortly, and new typologies of consumers are being scouted.
- Cooks and consumers have access to the fish products on a weekly basis.

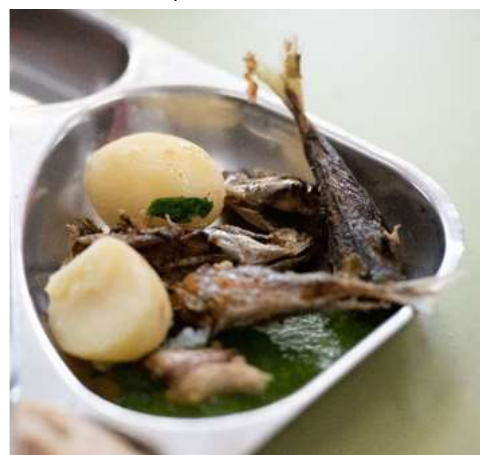


Figure 63. Small-pelagic fish prepared for frying and in the meals to be consumed in the school canteens. CEIP Princesa Tejina, Tenerife.

- **Educational activities** aim to reach school students and teaching staff and are held regularly throughout the year. Among the activities already organized, there are
 - "Draw your tuna". Activity targeting 5-year-old pupils. After a general description of tuna and three species (wahoo, big eye and skipjack), the pupils are given templates to color in.
 - "Our fish and the seasons". Activity targeting 6-7-year-old pupils. Basic information regarding the marine environment, seasonality and migrations is given. A game with information about different species (parrot fish, mackerel, horse mackerel, amberjack, skipjack, big eye and wahoo) is played.
 - "Share your recipe". Activity targeting 8-year-old pupils. After giving information on the nutritional facts of fish, each pupil (with the support of a relative) fills in a template with a receipt. The recipes are shared in class.
 - Marine recipe book. The best recipes resulting from the "Share your recipe" activity are collected to form a marine recipe book.
- **Workshops with cooks.** Workshops take place 1- 2 times a year. Cooks have attended several workshops in order to make the most of the products delivered (Figure 64, Figure 65)..



Figure 64. Chef in the training of school cooks (left) and School managers and cooks at Islatuna fisher organization (right).

- **Tastings events.** Tastings events are offered 1-2 times a year. Together with communication activities, they mainly target teaching staff, administrative staff, students, cooks, renowned chefs, fisher organizations, scientific community (e.g., researchers, scientists), industry (e.g., fishers, fisher organizations, retailers), civil Society (e.g., NGOs and civil society organizations), general public (e.g., consumers), media, etc.
- **Communication activities and dissemination platforms:**
 - The website (www.pescaartesanal.org) provides all the information related with artisanal fisheries and local fish products.
 - The app to place fish orders to connect schools with fisher organizations is being developed to directly connect suppliers with consumers.
 - A WhatsApp group with all school canteens involved is active in order to disseminate information, clarify queries, etc. Users (cooks canteen managers) have access and can order fish products offered by the suppliers.
- **Research activities** are undertaken regularly throughout the year, investigating new species and looking for new suppliers, new consumers, etc.



Figure 65. School canteen cooks and managers in the first training sessions held in Islatuna. Photo: Jose Pascual.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to process food into food products
- to distribute/sell food and/or food products
- to provide food-related services: training for cooks, promoting the consumption of local fish products (in school canteens) and raise environmental awareness.



4.2 Ecosystem services

4.2.1 Provisioning services

Table 51 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 51. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	Local seafood distribution. To date, 2.335 pupils have received meals made with local fish.
 Provision of raw materials	-	Fish wastes are not yet re-used, but Islatuna is in process to develop new ideas in order to do so. In fact, one of the issues to use the wastes from fish processing is the big volume of wastes to be recycled. With the current size of the project, this does not seem feasible but it could become so as the pilot project expands.

4.2.2 Regulating services

Table 52 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 52. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	Reduction of emissions due to local seafood consumption, reducing imports and exports, and the small-scale fisheries generate much less CO ₂ emissions. The overall pilot sustainability assessment will be carried out in WP2.
 Habitat provision and/or biodiversity	★★★★★	Promotion of consumption of local species and sustainable exploitation according to their natural life cycles. Promotion of artisanal fisheries and sustainable fishing practices.

4.2.3 Socio-cultural services

Table 53 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 53. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	- Educational activities targeting school students and related to local seafood, marine ecosystem awareness, small-scale fisheries, food security and sustainability. - Training activities for cooks in order to promote local seafood consumption.

		Communication activities and awareness creation on local seafood consumption in general.
 Contribution to research	★★★★★	Research on the local seafood value chain, new market opportunities for local seafood processing and distribution, and development of local seafood consumption in general.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	Promotion of local seafood consumption and integration into the diets of children and pregnant women. Contribution to healthier diets in school canteens with a focus on the choice of fish species and the needs of children.
 Preservation of cultural knowledge and heritage	★★★★★	Promotion and conservation of small-scale fisheries and traditional fishing culture.
 Improvement of social cohesion and community building	★★★★★	Activities targeting small-scale fisheries conservation awareness, traditional fishing community's enhancement, with the particular involvement of school students.
 Improvement of commercial relationships	★★★★★	- Promotion of local seafood distribution. - Improvement of the relationships of local seafood providers and potential customers. - Development of the local seafood value chain.

5. Pilot management

For the duration of the FoodE project, the pilot is co-managed by the FoodE partner institutions: University of La Laguna (ULL) and the fishers Producer Organization "Islatuna" (ISL). The core team (and related roles) actively managing the project is shown in Figure 66.

The pilot implementation was carried out by the pilot team with the help of the suppliers, schools' managers, teachers and school canteen staff.

Both land and facilities are owned by the harbor of Santa Cruz de Tenerife and Island government and Islatuna (Producer Organization) rents them for a definite period of time. After the end of the FoodE project, there are different options: University of La Laguna (ULL) may stay as coordinating institution or its role may be transferred to a third party such as the Regional Federation of Fisheries Organizations, which has been consolidating in recent months.

Person name	Role	Institution
Jose J. Pascual- Fernández	Pilot owner, pilot leader, communicator (1)	Universidad de La Laguna
Jaime Ramón-Bruquetas	Pilot executor, communicator (2)	Universidad de La Laguna
Jonathan Marrero	Pilot Owner, Islatuna (ISL), general manager of the producer organization	Islatuna (ISL)
Juan Ramón García Gorrín	Pilot executor, sales manager of Islatuna	Islatuna (ISL)

Figure 66. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 54. summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

**Table 54. Skill categories**

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Under-represented 👎	Communication of the benefits and sustainability of local seafood consumption.
S2 - information skills	★★★★★	Well represented 👍	Research and information on small scale fisheries, local seafood consumption and local seafood value chain.
S3 - assisting and caring	★★★★★	Well represented 👍	Providing schools with local seafood.
S4 - management skills	★★★★★	Well represented 👍	Management of the products distribution, workshops, events, activities, etc.
S5 - Working with computers and other digital tools	★★★★☆	Well represented 👍	Digital tools to improve the food distribution and for communication. Digital tools for research purposes.
S6 - Handling and moving	★★★★★	Well represented 👍	Local seafood distribution.

Table 55. summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 55. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Well represented 👍	-
Education	★★★★★	Under-represented 👎	-
Engineering, manufacturing and construction	★★★★★	Well represented 👍	-
Health and welfare	★★★★★	Well represented 👍	-
Information and communication technologies	★★★★☆	Well represented 👍	-



Natural sciences, mathematics and statistics	★★★★★	Well represented 👍	-
Services (e.g., hygiene and occupational health services, security, transport services etc.)	★★★★★	Well represented 👍	-
Social sciences, journalism and information	★★★★★	Well represented 👍	-

5.2 Pilot network

So far the pilot in Tenerife achieved the following goals:

- **Dissemination and promotional events:** around 300 participants involved in dissemination and promotional activities, including those involved in watching the YouTube video on the preparation of several species in school canteens organized by University La Laguna and master students ([link](#), 160 views)
- **Stakeholder engagement in pilot activities:**
 - 11 schools involved so far (CEIP Acentejo, CEIP Ayatimas, CEIP Guayonge, CEIP Las Mercedes, CEIP Maximiliano Gil, CEIP Practicas Anejas, CEIP Princesa Tejina, CEIP La Luz, CEIP Aguamansa, CEIP La Corujera, CEIP Leoncio Rodríguez).). One of them has left the pilot during the pandemic (Ayatimas) and hopefully it will be integrated again in the pilot in the coming months.
 - 2.335 pupils have been receiving meals with local food (CEIP Acentejo 210, CEIP Ayatimas 170, CEIP Guayonge 170, CEIP Las Mercedes 350, CEIP Maximiliano Gil 200, CEIP Practicas Anejas 365, CEIP Princesa Tejina 345, CEIP La Luz 210, CEIP Aguamansa 90, CEIP La Corujera 110, CEIP Leoncio Rodríguez 115). In February 2022 there are around 1400 pupils receiving fish from the pilot.
 - 58 boats from Islatuna and 26 from the cooperative Pesca restinga in El Hierro. These numbers vary as some boats may enter or leave the organizations. More than 160 fishers linked to these boats.

In addition, the pilot is collaborating with:

- **another CRFS initiative (excluded FoodE pilots):** Collective Brand “Pesca Artesanal” on communication purposes.
- **Another organization/Institution (outside FoodE):** “Cabildo de Tenerife”, for events and communication purposes.
- **another project (e.g., other EU projects, etc.):** “Macarofood” (Interreg Mac project <https://macarofood.org/>)

6. Pilot communication

6.1 Videos

Video (title)	Link
Seminario Macarofood 2021 - Sábado 6 Noviembre 2021	https://www.youtube.com/watch?v=wzk5RxVBWkl

6.2 Links to dissemination materials



Piloto ecotúnicos Macarofood FoodE.pdf

7. Photo credits

Figure 63. Jose Pascual (2021). Small-pelagic fish prepared for frying and in the pupil dish to be consumed. CEIP Princesa Tejina, Tenerife. [Photograph]

Figure 64. (Left) Jose Pascual. (2018). Chef in the training of school cooks at Islatuna fisher organization. [Photograph]

Figure 64. (Right) Jose Pascual. (2018). School managers and cooks at Islatuna fisher organization. [Photograph]

Figure 65. Jose Pascual. (2018). School canteen cooks and managers in the first training sessions held in Islatuna. [Photograph]

Oslo (NO)

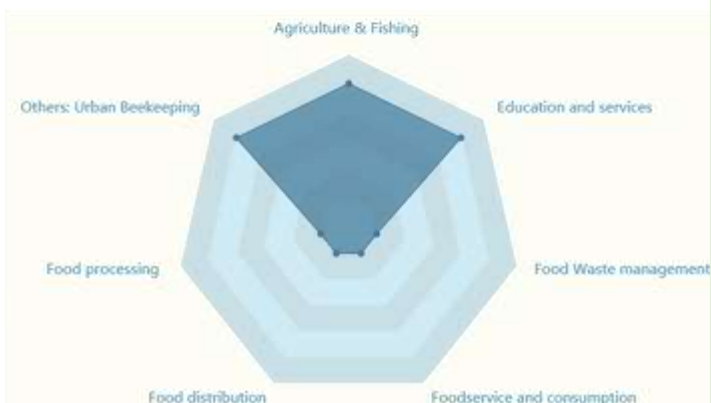
FoodE Pilot - Oslo Incubator for Sustainable Food Production (NBL)

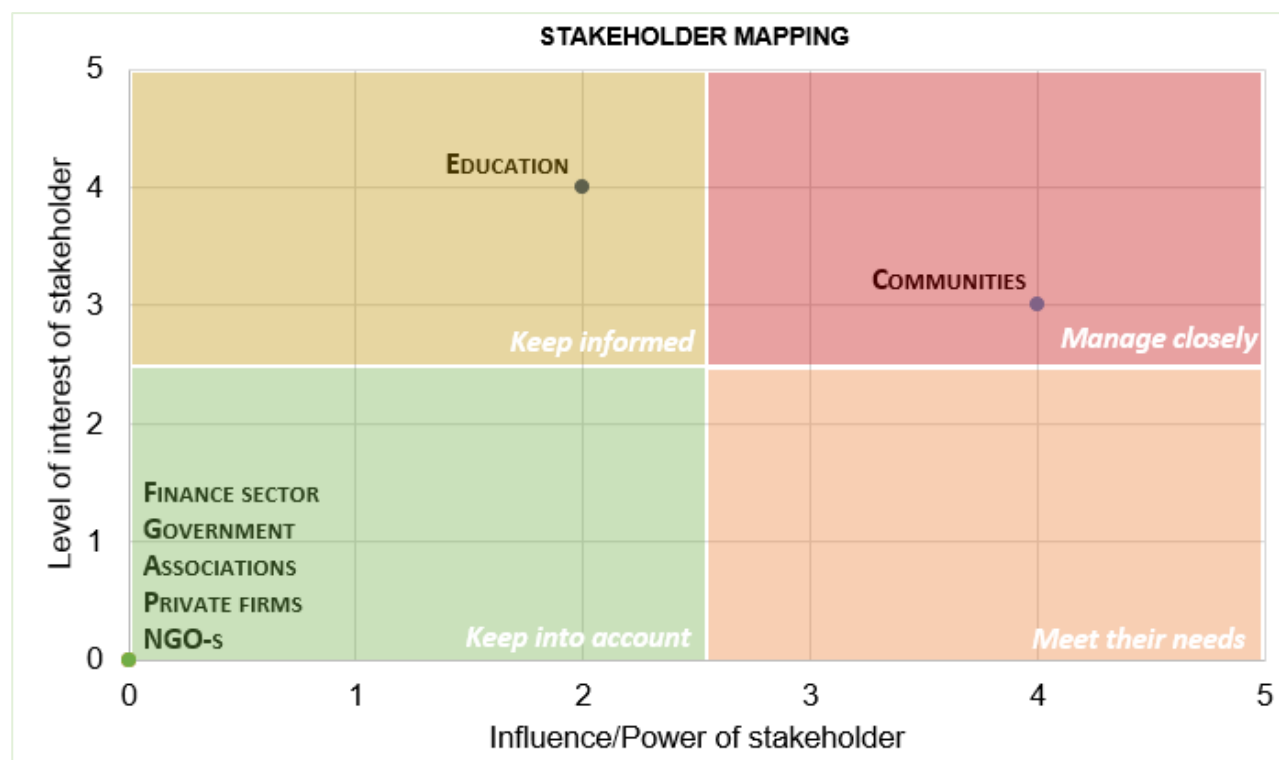
Oslo, Norway*Nabolagshager*

In collaboration with Hersleb upper secondary school, with the highest drop-out rate in Oslo, this project explores the synergies of social innovation and urban farming through participatory processes. In doing so, the project aims to create sustainable, long-lasting green jobs for vulnerable groups while enhancing CRFS sustainability. Minority youth will have the opportunity to develop a more holistic curriculum to start their own sustainable food businesses through the work at the rooftop farm and the linkages with a public urban incubator space (Linderud Gård, an old farm) as well as other places in the city including a makers-space (which will be turned into a commercial kitchen).

**NBL****ORGANIZATION**

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

LOCATION**IMPACT AREAS****MAIN TASKS**



1. Background

Nabolagshager (NBL) has a collaboration with Hersleb upper secondary school, with the highest drop-out rate in Oslo. The majority of students are first or second-generation immigrants struggling with low academic test scores and low degree of attractiveness on the labor market as well as limited life skills and networks to ensure employability and other key aspects of societal integration and participation. In previous years, NBL has employed youth for maintenance of the “Tak for Maten” rooftop garden and then for implementing a composting soil factory. Youth have now moved towards focusing on the most profitable aspect of the project: urban beekeeping. With over six youth now trained as beekeepers, an innovative model of financing has been implemented. This ‘community supported’ model closely resembles that of community supported agriculture, with community members buying shares of the beehives then working alongside the youth to maintain the hives. The community members then have access to some of the honey, with the youth selling the remaining honey at markets.

Nabolagshager has developed the business side of this project as part of a partnership with the City of Oslo and County Governor of Viken. This partnership piloted an educational incubator program for urban agriculture business start-ups. The youth beekeeping project has thus been able to take part in the program, gaining essential business knowledge to move the project towards financial sustainability. Over 30 other CRFS initiatives have also taken part in this programming co-run by Nabolagshager.

The pilot aims to explore the synergies of social innovation and urban farming through participatory processes, leading to sustainable, long-lasting green jobs for vulnerable groups while enhancing CRFS sustainability.

2. Location

Address: Schweigaards gate 23, 0191 Oslo, Norway (find on [Maps](#))

 On foot 	The beehives are on a rooftop of a private building. It is possible to walk to the building. However, the roof is not accessible for persons with disabilities.
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	By bike ✓	The pilot is accessible by bike, the city of Oslo has good bike paths in the city centre.
	By car ✓	There is private parking near the pilot, however, it is very difficult to drive a car in Oslo's city centre and the city is moving towards making large areas car-free.
	By bus/metro ✓	There is metro, bus and tram service very nearby. The closest Metro stop is called "Grønland", and the closest bus and tram stop is called "Munkegata" or "Politihuset" (both are same distance).
	By train ✓	Oslo Central Station is about a 5-minute walk from the pilot, which is in the heart of the City.
	By plane ✓	The closest airport is "Oslo Gardermoen Airport", which is about 51 km away.
	By ferry ✗	The closest ferry is the "Oslo Fjord" ferry service operated by the public transit authority. It is about 3 km from the pilot.

3. Pilot implementation

Co-design process
Nabolagshager organized a co-design workshop involving more than 50 participants (aspiring entrepreneurs, public sector employees, entrepreneurs, students) with the aim to identify the biggest challenges with business models around urban agriculture towards the creation of business models that are tailored to their community needs and their customers' desires. This has been done together with local stakeholders while also providing education on this topic. ❖ Resulting innovative ideas about funding streams have been implemented. NBL has adopted a "community supported beekeeping" idea that came out of the co-design workshop. This adds an additional funding stream to the project that helps push it towards sustainability. ❖ During the co-design workshop the idea was still quite vague, without good marketing systems in place or price structures. The pilot team worked to develop this idea into more concrete action steps, along with help of experts from the Oslo Incubator for Sustainable Food Production. The pilot team is now recruiting new members for the 2022 season with good success.

3.1 Main structures and areas

- Rooftop beekeeping area with 4 hives (with 2 more coming in May 2022) (Figure 68).
- Honey processing facility, within the Nabolagshager office which includes a honey centrifuge, a jarring facility, as well as storage. Recently, the pilot has used the space to do a "mead workshop", exploring Norwegian heritage with honey.
- Rooftop garden.

3.2 Main systems/equipment

- Honey extractor.
- Wax processing unit, still in a testing phase.
- Beekeeping equipment and tools (e.g., beekeeping suits for community members).
- Equipment for disease treatment.

In addition, the pilot team is working on finalizing the following aspects:

- Better filling equipment to fill honey into jars.
- A more sterile processing facility to better meet food safety rules.
- Better marketing for the project to attract more community members in the scheme.
- Additional bee keeping suits for community members.

3.3 Main services and activities

- **Educational activities:**
 - The community members work with the beekeepers to take care of the hives (usually 2 events per week during the May to September season) (Figure 68).
 - Internship programs and thesis opportunities for Bachelor and/or Master students in collaboration with Universities. For example, in 2021, the pilot hosted a Master student from The University of Bologna (UNIBO). The student mainly focused on testing models for sustainability assessment on the pilot, this contributed to the work carried out in WP2 of FoodE.
- **Entrepreneurship training and living lab** (Figure 67). The pilot key activities include the running of an incubator program for CRFS across the Oslo region in order to test out and explore economic sustainability for CRFS. The insights gained from this program will be applied to a rooftop beekeeping project centered on entrepreneurship training and “living lab” methodology and tools.
 - For example, a six-week course entrepreneurship course was given in spring 2021 to over 20 participants, helping them get the education and tools to jump-start their CRFS initiative.

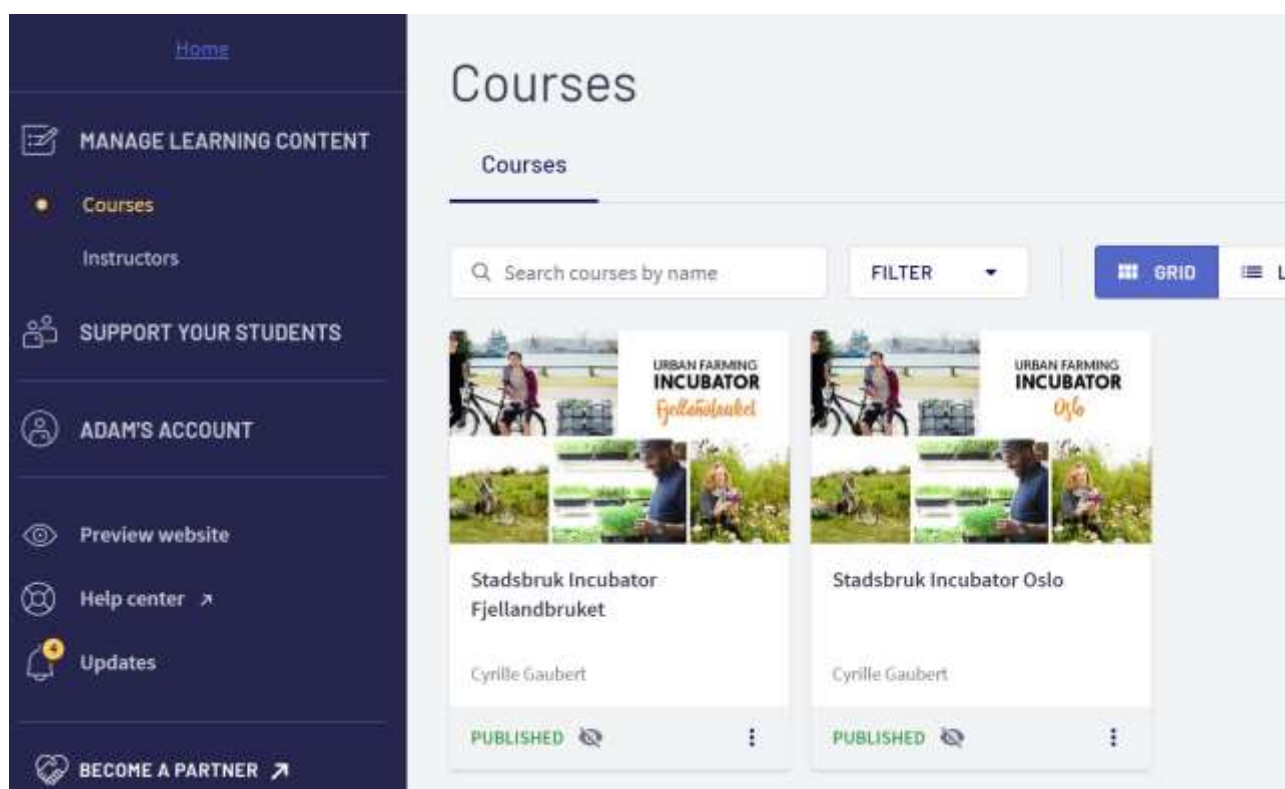


Figure 67. Training courses facilitated by Nabolagshager through the incubator program.

- **Education to the public by the youth employees.** The pilot implements participant-lead dissemination activities in collaboration with Hersleb school to ensure that the impact of the activities reach a higher share of the student community

- For example, an educational activity was carried out with a school class of 28 students. Students were able to visit the rooftop as part of an entrepreneurship course. Students were shown the facilities and discussion around the business model took place.



Figure 68. The youth in the program check the beehives to monitor health and honey production.

▪ **Events and festivals to raise public awareness**

- MyLocalFoodE festival “Edible City: Communal Berry Bush Planting and Food Awareness Event” (Figure 69) engaging around 80 people. The aims were 1) to increase awareness of local food options in Oslo, including urban agriculture 2) to plant a public berry bush patch at a local high school (Hersleb vgs Oslo) to increase cultural integration of minority populations through culturally important Norwegian foods. For these purposes, immigrant groups were invited to the local high school (in a partnership with a local NGO). A total of 88 berry bushes were planted in the school yard, with many young people participating and gardening for the first time in their lives. Finally, the event hosted a convivial dinner with local food and facilitated round table discussions on several food related issues and challenges. Many citizens brought up price and lack of diversity as key reasons they shopped at immigrant fruit and veg shops. Information was shared about EU vs non-EU agricultural rules and the cultural importance of agriculture in Norway.
- MyLocalFoode festival “Takeaway Plants”. The goal of the event was to engage citizens in discussion about Urban Agriculture through creating a ‘takeaway’ counter with tomato and sunflower plants. The festival was organized during the peak 4 weeks of spring in Norway in which people are excited about growing and it is a short window of time to get individuals involved in urban agriculture before they lose interest with other summer activities. Another big goal of these events was to build awareness for our public berry patch planting project and larger MyLocalFoodE event at the end of June.
The event was quite successful with 125 plants given away to the public. Most individuals stayed at the takeaway counter for 12-15 minutes, talking about their experiences with urban agriculture, and getting advice from the pilot staff about projects in which they could get involved throughout the city. Due to Covid19 no paper flyers were used, but promotion of the entire MyLocalFoodE event was done through QR codes and encourage individuals to join, learn and connect with others.



Figure 69. Berry Bush Planting at the Hersleb upper secondary school during the MyLocalFoodE festival. Photo: Julie Hrnčířová ([link](#))

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to process food into food products
- to distribute/sell food and/or food products
- To provide food related services: educational activities and entrepreneurship training.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 56 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 56. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site honey production (and honey derived products such as mead); limited food production with perennial crops on the rooftop around the beehives.
 Provision of raw materials	★★★★★	Beeswax is harvested and products are made with it, such as body creams and sandwich wraps.
 Ornamental resources	★★★★★	Perennial flowers growing on the rooftop from past years.

4.2.2 Regulating services

Table 57 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 57. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Enhancement of pollination	★★★★★	Pilot's bees are quite close to Oslo's botanical garden, providing services its plants.
 Control of pests and diseases	★★★★★	Bees' health is monitored for pests and diseases.
 Habitat provision and/or biodiversity	★★★★★	The development and promotion of urban beekeeping as an activity that contributes to the protection and development of the urban environment and improves the quality of life in urban areas.

4.2.3 Socio-cultural services

Table 58 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 58. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Education of community members who help weekly to care for the bees and collect honey. Educational opportunities for youth through work on honey processing. These youth have also hosted fellow students on the rooftop to engage them in educational activities.
 Contribution to research	★★★★★	The pilot was one of the first to test the first version of the sustainability assessment protocol (developed by WP2) contributing to its co-design and fine-tuning. The pilot is exploring business models around urban agriculture towards the creation of business models that are tailored to its community needs and its customers' desires.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	Beekeeping also has a therapeutic effect on the people who work in it: it is an outdoor activity, it gives an active role in the community, it increases self-esteem and self-confidence, it requires working together taking care of something outside of oneself.
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	The garden surrounding the bees adds to the aesthetic of a very concrete, grey urban environment.
 Improvement of social cohesion and community building	★★★★★	The pilot explores the synergies of social innovation and urban farming through participatory processes, leading to sustainable, long-lasting green jobs for vulnerable groups while enhancing CRFS sustainability. Currently, 4 young people from a challenging school and from minority backgrounds have been employed.
 Improvement of commercial relationships	★★★★★	Via entrepreneurship training and living lab.



5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution: Nabolagshager (NBL). The core team (and related roles) actively managing the project is shown in Figure 70.

The pilot implementation was carried out by the pilot team along with Community Supported Beekeeping members.

The building on which the rooftop is owned by the Norwegian Farmers Union but is in the process of being developed to luxury office space. Therefore, the building will be torn down at the end of summer of 2023. This was already known since the start of the project and this is why all the pilot elements are arranged in such a way that are easily transportable to the new location (which is already selected). After the FoodE project, the pilot initiative will be at the new location and will be managed by the related FoodE Pilot institution Nabolagshager (NBL). The aim is to have a consolidated and sustainable business model that allows the CRFS initiative to run for decades into the future.

Person name	Role	Institution
Adam Curtis	Pilot owner, Pilot communicator	Nabolagshager
Idil Akdos	Pilot executor, Pilot communicator	Nabolagshager

Figure 70. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 59 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 59. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	Communication is key in obtaining members for the CSB project as well as keeping the members involved in the project.
S2 - information skills	★★★★★	Well represented 👍	Keeping records of honey output, monitoring pests.
S4 - management skills	★★★★★	Well represented 👍	Managing the team of community members as well as youth.
S6 - Handling and moving	★★★★★	Well represented 👍	Harvesting of honey and building of new beehives.

Table 60 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 60. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
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Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Well represented 👍	-
Education	★★★★★	Well represented 👍	-

5.2 Pilot network

Currently, the pilot achieved the following goals:

- **Job opportunity.** Currently, over 4 youth have a paid job in the project.
- **Dissemination and promotional events:** around 150 citizens participated in the dissemination and promotional events.
- **Stakeholder engagement in pilot activities:** 30 students have been involved in the management of the beehives.

6. Pilot communication

6.1 Videos

Video (title)	Link
FoodE rooftop farm	https://www.youtube.com/watch?v=sSEIGSMqMYA&t=3s
Medal Winning Honey: Nabolagshager	https://www.youtube.com/watch?v=d4gaVHUVyAg
Rooftop farm	https://www.instagram.com/tv/CUxQEjxqe2I/

6.2 Links to dissemination materials

- Edible City: Communal Berry Bush Planting and Food Awareness Event: https://vartoslo.no/adam-curtis-astrid-grytte-bydel-gamle-oslo/sma-og-store-naboer-plantet-solbaerbusker-i-skolegarden-pa-hersleb---her-skal-naermiljoet-fa-hoste-lover-rektor/313582?fbclid=IwAR2ZBYGoaiqxc3jiCPEhcGKSWWBr-CqfvQfzFOO_dRPtQ8Focu4x4QBxE7M

7. Photo credits

Figure 67. Nabolagshager. (2021). Training courses facilitated by Nabolagshager through the incubator program. [Image]

Figure 68. Nabolagshager. (2021). The youth in the program check the beehives to monitor health and honey production. [Photograph]

Figure 69. Hrnčířová, J. (2021, July 12). Berry Bush Planting at the Hersleb upper secondary school during the MyLocalFoodE festival [Photograph]. [Link](#)

FoodE Pilot - Plant factory for social inclusion

Oslo, Norway

Tåsen Microgreens

This pilot project implements a sustainable system for indoor production, packaging, and distribution of already cut microgreens, baby leaf and salads. The pilot project aims at creating job opportunities and training activities for disadvantaged population groups and promote active citizen participation in the organization of events. Hereby, it targets the issues of social inclusion, plant cultivation and resource management at once.



TAS (1)



ORGANIZATION

- ☒ Profit
- ☐ Non-Profit
- ☐ Association non lucrative
- ☒ Private firm
- ☐ Self-entrepreneur
- ☐ Cooperative
- ☐ Local authority
- ☐ Producer Organization
- ☐ Others

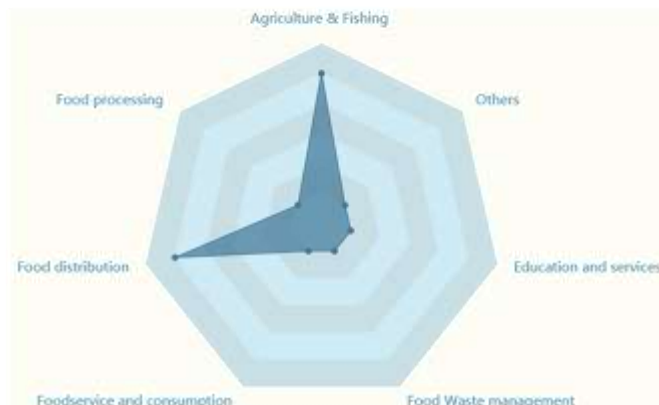
LOCATION

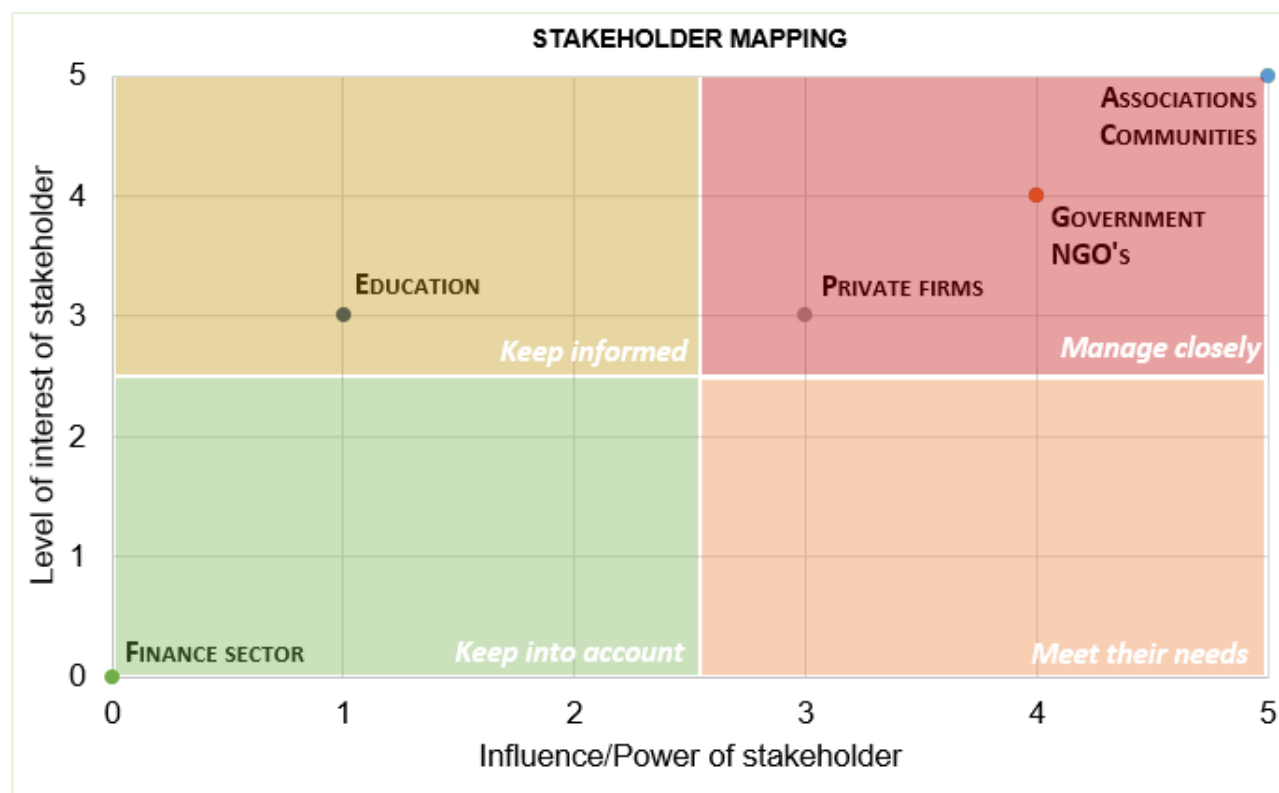


IMPACT AREAS



MAIN TASKS





1. Background

Tåsen microgreens owns the first and largest plant factory in Norway, producing microgreens for local restaurants and shops. In collaboration with the FoodE partner Nabolagshager, it brings in knowledge and skills on social inclusion and job creation.

A sustainable system for indoor production, packaging, and distribution of pre-cut microgreens, baby leaf and salads will be implemented. Alternative strategies for sales, distribution and transportation will also be integrated into the system. Collaborations will be developed with organizations and communities in the surrounding areas, seeking to introduce the business and its wider social contributions with disadvantaged and/or challenged individuals (such as unemployed international refugees, prisoners, as well as those who exposure to the working environment).

2. Location

Address: 0876 Oslo, Norway (find on [Maps](#))

- Tåsen Microgreens Farm (Franzefossveien 19,1336 Sandvika) (find on [Maps](#)).
- Dugrud AS: private owned restaurant (Dronning eufemias gate 16) (find on [Maps](#)).

	On foot ✓	Dugrud AS can be easily reached by walking from the central station less them 5 minutes
	By bike ✓	Tåsen Microgreens Farm in Sandvika is accessible by bike.
	By car ✓	Tåsen Microgreens Farm in Sandvika is accessible by car.
	By bus/metro ✓	Tåsen Microgreens Farm in Sandvika is accessible by bus from Sandvika. The closest bus stop is "Tangen".

	By train ✓	In Sandvika there is the train nr. 13 from Nasjonalteateret to Drammen. Get off at Sandvika station. At Sandvika Bussterminal take the Buss nr. 240 to Skui and get off at Emma Hjorts vei.
	By plane ✓	The closest airport is "Oslo Gardermoen Airport" (70 km away).
	By ferry ✗	-

3. Pilot implementation

Co-design process
Tåsen microgreens involved a total of 120 participants (mainly students and entrepreneurs) in co-design workshops and online focus group with the general objective to raise awareness of the positivity of indoor agriculture and analyze how consumer behavior has changed. It emerged how locals interpreted the importance of local food systems during the past year and a half with the Covid-19 pandemic, so this idea will be further integrated into the future pilot activities. Along with this, the pilot team will work on the food waste reduction and the minimization of resources. This will be at the basis of food production plans and demonstrating how this influences communication channels with our customers and the management of delivering our products sustainably. This will be considered when working on food production plans and communicating with customers, and in making product delivery management more sustainable.

3.1 Main structures and areas

Tåsen Microgreens' main warehouse and production facilities (located in Sandvika, about 14 km from Oslo) are the base for the pilot project. Production at the warehouse is performed in a plant factory of 400 m² equipped with multilayer shelves (Figure 71). Main demonstration and educational activities take place at the pilot location, but also it is foreseeable that rooms of the collaborating organizations will also be used for meetings.



Figure 71. Production of microgreens at the plant factory of Tåsen microgreens with multilayer trolley shelves supplied by Avisimo (<https://www.avisomo.farm/no/hjem>)

3.2 Main systems/equipment

- The plant factory is equipped with:

- Heating Ventilation Air conditioning (HVAC) system (installed by one of the tech-partners, Owners of mountain”).
- LED lights, irrigation system, air circulation and sensors (measuring temperature, relative humidity and CO₂).
- Custom made growing system built by one of the pilot’s partner (Avisimo, <https://www.avisomo.farm/no/hjem>), based on multilayer trolley shelves (Figure 71, Figure 72). Currently, they use a biodegradable, foam-substrate produced from biopolymers and natural additives (GrowFoam, <https://www.growfoam.ag>).
- In addition, there are computers, projectors and whiteboards for data visualization, educational and training activities.



Figure 72. Layered microgreens production by the plant factory of Tåsen microgreens (left) and manual sowing of selected seeds on growing media (right).

3.3 Main services and activities

- **Horticultural production:** commercial production of pre-cut microgreens, baby leaf and salads (Figure 73), by controlling the whole process from seed to harvest and delivering to several customers (such as restaurants). They currently deliver living plants with the growing pot (used from the start), but they are investigating different harvesting and packaging solutions. However, current experience is that selling live plants directly is the most sustainable way to go.



Figure 73. Different types of growing media (left) and microgreens produced in the Plant factory of Tåsen microgreens (right)

- **Social inclusion.** Tåsen Microgreens fosters social inclusion by employing disadvantaged and/or challenged individuals from the collaborating organizations. An array of activities will take place in order to train them, share knowledge and reflect on the production processes, including food production plans and the growing schedule, and sales market expectations. Working together in food production and with a closer look at sustainable practices contribute to broader social inclusion (Figure 74).
- **Educational activities** in collaboration with local schools. Each school has a growing course that the students attend. One or two students are given the responsibility to manage the small-scale growing system set up by Tåsen and ensure that the products are delivered to the school kitchen.



Figure 74. Social inclusion activities at the pilot location.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to distribute food and/or food products
- to provide food-related services: social inclusion and integration.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 61 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 61. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	Growing herbs and salads indoor and using the produce in professional kitchens.
 Provision of raw materials	★★★★★	Tåsen Microgreens supplies the necessary materials such as seeds, growing medium and nutrients.

4.2.2 Regulating services

Table 62 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 62. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	Use of biodegradable foam-substrate media from seed-to-harvest-to -customers (the plant is sold with the growing pot). Adoption of biological control practices to reduce the use of synthetic pesticides, efficient irrigation systems adapted to crop needs.
 Soil erosion prevention and control	-	Soilless cultivation.

4.2.3 Socio-cultural service

Table 63 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars = very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 63. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Educational activities and training are offered to schools.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	-

	Improvement of social cohesion and community building	★★★★★	Employment and training of international refugees and disadvantaged societal groups.
	Improvement of commercial relationships	★★★★★	Establishment of commercial relationships with local customers (such as restaurants) receiving the fresh products from the indoor farm. Digital platforms (such as https://toogoodtogo.no/no) are also used.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institutions: Tåsen Microgreens (TAS). The core team (and related roles) actively managing the project is shown in Figure 75. Both land and buildings of the pilot project are private properties of Franzefoss AS and Dugurd AS with a temporary concession. After the end of the FoodE project, the pilot will continue to be managed by the related FoodE partner Institution (Tåsen Microgreens) seeking to continue to offer educational and socially inclusive activities.

Person name	Role	Institution
Shima Shaysteh	Pilot owner (1), Pilot executor (1), Communication	Tåsen Microgreens
Rafik Halabi	Pilot Owner (2), Pilot executor (2), Communication	Tåsen Microgreens

Figure 75. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 64 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 64. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 	Communicating, collaborating developing solutions and production plans for different types of crops.
S2 - information skills	★★★★★	Well represented 	Collecting data especially in relation to crop behavior and environmental parameters. Analyzing data for optimal crop production.
S3 - assisting and caring	★★★★★	Under-represented 	The pilot team has experience in dealing with disadvantaged and/or challenged people involved in the pilot project. The pilot team needs to develop activities that are better suited to the conditions and needs of the operators and users.
S4 - management skills	★★★★★	Well represented 	Managing staff and disadvantaged societal groups working at the pilot.

			Organizing and managing activities (work, projects, events) and allocation of resources.
S5 - Working with computers and other digital tools	★★★★★	Under-represented 	Using climate computers and other digital tools, software's and interfaces for running and monitoring the indoor farm systems.
S6 - Handling and moving	★★★★★	Well represented 	Handling the material from seed to harvest and post-harvest (transportation and distribution to final customers)
S7 – Constructing	★★★★★	Under-represented 	-
S8 - Working with machinery and specialized equipment	★★★★★	Under-represented 	-

Table 65 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 65. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 	-
Arts and humanities	★★★★★	Under-represented 	-
Business, administration and law	★★★★★	Under-represented 	-
Education	★★★★★	Well represented 	-
Engineering, manufacturing and construction	★★★★★	Under-represented 	-
Health and welfare	★★★★★	Under-represented 	-
Information and communication technologies (ict's)	★★★★★	Well represented 	-
Natural sciences, mathematics and statistics	★★★★★	Under-represented 	-
Services (e.g., hygiene and occupational health	★★★★★	Under-represented	-



services, security,
transport services etc.)



5.2 Pilot network

So far the pilot achieved the following goals:

- **Job opportunity:** for 3 international refugee running the pilot.
- **Education - research – training:** around 10 further international refugees attending workshops for implementing their own small scale plant factory.
- **Dissemination and promotional events:** around 2000 citizens that participate in the dissemination and promotional events.

In addition, the pilot is collaborating with:

- **Other 3 CRFS initiatives (excluded FoodE pilots):** 2 technology partner, “Owners of Mountain”.
- **Another FoodE Pilot:** Nabolagshager, collaborating on social inclusion.

6. Pilot communication

6.1 Videos

Video (title)	Link
“Mise en place”	https://www.instagram.com/tv/CMrug4JAhCP/
How to boost your health through microgreens	https://www.instagram.com/p/CMsXsITA8hq/?utm_source=ig_web_copy_link
Urban farmin safari in Oslo	https://www.instagram.com/tv/CMuJko0gD56/
Microgreens ready for restaurant re-opening	https://www.instagram.com/p/CODPB1aAn_3/?utm_source=ig_web_copy_link

7. Photo credits

Figure 71. Tåsen microgreens. (2021). Production of microgreens at the plant factory of Tåsen microgreens with multilayer trolley shelves supplied by Avisimo (<https://www.avisomo.farm/no/hjem>). [Photograph] <https://www.instagram.com/taasenmicrogreens/>

Figure 72 (left). Tåsen microgreens. (2021). Layered microgreens production by the plant factory of Tåsen microgreens [Photograph]. <https://www.instagram.com/taasenmicrogreens/>

Figure 72 (right). Tåsen microgreens. (2021). Manual sowing of selected seeds on growing media at the plant factory of Tåsen microgreens [Photograph]. <https://www.instagram.com/taasenmicrogreens/>

Figure 73. Tåsen microgreens. (2021). Growing media and microgreens produced in the Plant factory of Tåsen microgreens [Photograph]. <https://www.instagram.com/taasenmicrogreens/>

Figure 74. Tåsen microgreens. (2021). Social inclusion activities at the pilot location of Tåsen microgreens [Photograph]. <https://www.instagram.com/taasenmicrogreens/>

FoodE Pilot - Educational hydroponic garden prototype

Oslo, Norway

Tåsen Microgreens

In this micro-hydroponic system for schools, children can learn how to grow salads and herbs themselves. The system gives the user information about the basic principles of plant requirements. The aims of the project are to raise awareness among students on how food is produced, train urban farmers and educate children on food production methods.



TAS (2)



ORGANIZATION

- ☒ Profit
- ☐ Non-Profit
- ☐ Association non lucrative
- ☒ Private firm
- ☐ Self-entrepreneur
- ☐ Cooperative
- ☐ Local authority
- ☐ Producer Organization
- ☐ Others

LOCATION

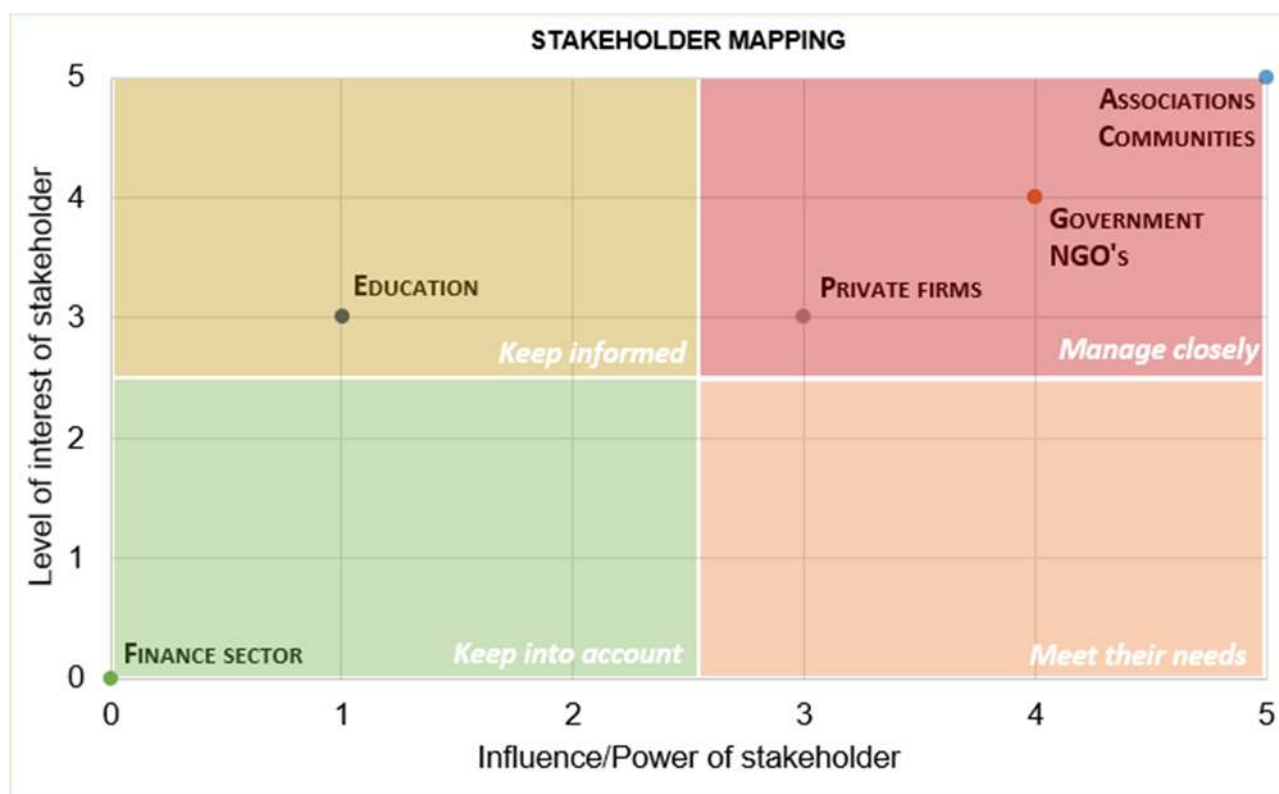


IMPACT AREAS



MAIN TASKS





1. Background

Tåsen microgreens has developed scalable growing systems for indoor plant cultivation with artificial lighting that can easily serve educational purposes.

Development of a micro-hydroponic system for schools where children can learn how to grow salads and herbs take responsibility for cultivation, as well as recognize their role and contribution in the overall food systems. The collaborations with schools, teaching staff and students, will enable the concept of food systems to be effectively integrated into the students- curricula. In addition, "instructions" of how to achieve this in schools and home garden will be integrated on the FoodE app along with additional educational tools. The development of a digital application will give the user the necessary instructions to learn and understand basic principles of plant requirements and their seasonality, and overall highlight the responsibility we all have to contribute to food systems. Among the long-term goals: raise awareness of how food is produced, train urban farmers and educate children on food production methods that are both easy to understand and include stimulating and up-to-date technologies.

2. Location

Address: Inner Oslofjord, Norway (find on [Maps](#)). The pilot is collaborating with the following schools:

- High school Hersleb videregårdeskole (Herslebs gate 20B, 0561 Oslo)
- High school Kuben videregårdeskole (Kabel gate 10, 0580 Oslo)
- Primary school Oslo Montessori skole (Huldreveien 28, 0781 Oslo)

	On foot ✓	Hersleb School is near downtown Oslo and can be reached by foot.
	By bike ✓	Hersleb School is near downtown Oslo and can be reached by bike. We have cycle paths and cycle parking near the school.



	By car ✓	Oslo Montessori skole, street parking outside the school. Kuben videregående skole, small parking lot outside the school.
	By bus/metro ✓	Oslo Montessori skole: Subway nr. 1 to Hølemnollen. Subway station called: Skrådalen stasjon.
	By train ✓	-
	By plane ✓	-
	By ferry ✗	-

3. Pilot implementation

Co-design process

The activities have been organized jointly with the other pilot project coordinated by Tåsen ("Plant factory for social inclusion"). Although Tåsen is specialized in growing microgreens, it used the co-design activities to investigate which plants are interesting for students to grow. There has been great interest in edible flowers, vegetables that cannot be purchased in regular supermarkets and in exploring the relationship between plants and beneficial insects. These are the main findings that will help the pilot team in shaping the production plans with the students. The pilot team wants the students to commit and take responsibility for their crop production, therefore it is important to encourage them by integrating their wishes as much as possible. The outcomes of the co-design activities can be integrated into the pilot by maintaining relationships with the schools and understanding how the pilot will best suit their schedules and ensure that the plants can be maintained by the students throughout the school year.

3.1 Main structures and areas

- Tåsen Microgreens' main warehouse and production facilities act as the base for the pilot project to store materials.
- One room at the warehouse is a dedicated area for prior activity design to ensure the planned activities with production are suitable for the students.
- At the schools, there are spaces available for the plants to grow, as well as rooms for information sessions.
- Alternative teaching and learning arena's for Urban Agriculture and aquaculture are also used:
 - Sukkerbiten (located next to the Opera House in Oslo).
 - Oslo fjordhage (located in OsloFjord), a public show case managed by Hersleb school as well as a social meeting place for Oslo youth of all ages (Figure 76).

Main systems/equipment

- Small-scale hydroponic prototypes for educational purposes (Figure 76). The growing systems are currently placed at the respective schools (Figure 77). System's dimensions are: 1x1 m and 1.8 m high. It is equipped with:
 - 3 layers of hydroponic growing beds;
 - LED lighting;

- irrigation system using a water barrel on the bottom. Inside the water barrel there are 3 peristaltic pumps, and provide nutrients and pH adjustment. EC and pH levels are controlled regularly.
- Production equipment at the warehouse.
- Computers, projectors and whiteboards for information sharing etc.



Figure 76. On the left: 'Greenland floating garden' (Oslo fjordhage) intends to use the water surface on Akerselva river to run productive and dissemination-oriented activities for children and young people in the local community. On the right: indoor production of leafy vegetable production, multi-layer shelves.

3.3 Main services and activities

Educational activities: Tåsen Microgreens collaborates with schools around Oslo, to work together with the teachers and create educational programs (Figure 77, Figure 78). Tåsen's existing plant factory is used as a demonstrational micro-hydroponic system to educate the students about the potential of growing plants indoor and how this can be operationalized in an urban setting. Students can learn several growing-related tasks and take the responsibility of growing crops, as well as connect with the wider community and find solutions for further community involvement and demonstrations. The close collaboration with the schools and the students will also help defining important features to include while developing a digital application. This will give the user the necessary instructions to learn and understand basic principles of plant requirements and their seasonality, and overall highlight the responsibility we all have to contribute to food systems.



Figure 77. Educational activity at Oslo Montessori school (left) and growing system currently installed at the partner school (right).



Figure 78. Visit of a high school class (formerly Hersleb school). The Oslo Fjordhage was used as a classroom in marine biology, mathematics and life skills for an entire school day.

4. Pilot functions and eco-system services

4.1 Pilot functions

- to produce food
- to provide food-related services: education

4.2 Ecosystem services

4.2.1 Provisioning services

Table 66 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 66. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site production of leafy vegetables and herbs.
 Medicinal resources	★★★★★	On-site production of medicinal plants and herbs.

4.2.2 Regulating services

Table 67 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 67. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	Adoption of biological control practices to reduce the use of synthetic pesticides, efficient irrigation systems adapted to crop needs.
 Soil erosion prevention and control	-	Soilless cultivation.

4.2.3 Socio-cultural service

Table 68 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 68. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Educational activities organized with local schools (primary schools and high schools). To this end, small-scale hydroponic systems were developed. Student can learn how to grow salads and herbs and see the whole process from “farm to fork” (the products are used in the schools’ canteens).
 New forms of recreation	★★★★★	Being responsible of vegetable production in schools is also a form of recreation, especially for pupils.
 Improvement of social cohesion and community building	★★★★★	-

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institutions: Tåsen Microgreens. The core team (and related roles) actively managing the project is shown in Figure 79.

Both land and buildings of the pilot project are private properties with a temporary concession. After the end of the FoodE project, the pilot will continue to be managed by the related FoodE partner Institution (Tåsen Microgreens) seeking to continue to offer educational and socially inclusive activities.

Person name	Role	Institution
Shima Shaysteh	Pilot owner (1), Pilot executor (1), Communication	Tåsen Microgreens
Rafik Halabi	Pilot Owner (2), Pilot executor (2), Communication	Tåsen Microgreens

Figure 79. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 69 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 69. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 	Develop materials and tools to assist students in schools during the educational activities.
S4 - management skills	★★★★★	Well represented 	Organizing, managing and planning production activities as well as projects with schools.



S5 - Working with computers and other digital tools	★★★★★	Under-represented 👎	Using climate computers and other digital tools, software's and interfaces for running and monitoring the indoor farm systems.
S6 - Handling and moving	★★★★★	Well represented 👍	-
S7 – Constructing	★★★★★	Well represented 👍	Realizations of small-scale hydroponic systems.

Table 70 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 70. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Education	★★★★★	Well represented 👍	-
Engineering, manufacturing and construction	★★★★★	Under-represented 👎	-
Information and communication technologies (ict's)	★★★★★	Under-represented 👎	-
Services (e.g., hygiene and occupational health services, security, transport services etc.)	★★★★★	Under-represented 👎	-
Social sciences, journalism and information	★★★★★	Under-represented 👎	-

5.2 Pilot network

So far the pilot achieved the following goals:

- **Dissemination and promotional events:** around 1000 citizens that participate in the dissemination and promotional events.

In addition, the pilot is collaborating with:

- **Other 2 organizations/Institutions (outside FoodE):** Technology partner and the schools (City of Oslo).

6. Pilot communication

6.1 Videos

Video (title)	Link
---------------	------



Visit of class M4A from H20 high school (formerly
Hersleb school)

www.oslofjordhage.no

6.2 *Links to dissemination materials*

- www.oslofjordhage.no
- <https://oslofjordhage.no/2021/05/vellykket-apningshelg/>
- <https://oslofjordhage.no/2021/05/velkommen-til-plantemarked-15-16-mai/>
- <https://oslofjordhage.no/2021/02/dyrkingssesong-2021-igang/>

7. *Photo credits*

Figure 76 (left). Tåsen microgreens. (2021). “Greenland floating garden” intends to use the water surface on Akerselva river to run productive and dissemination-oriented activities for children and young people in the local community. <https://www.instagram.com/taasenmicrogreens/>. [Photograph]

Figure 76 (right). Tåsen microgreens. (2021). indoor production of leafy vegetable production, multi-layer shelves. <https://www.instagram.com/taasenmicrogreens/>. [Photograph]

Figure 77. Tåsen microgreens. (2022). Educational activity at Oslo Montessori school (left) and growing system currently installed at the partner school (right). [Photograph]

Figure 78. Oslo fjordhage (2021). Visit of a high school class (formerly Hersleb school). The Oslo Fjordhage was used as a classroom in marine biology, mathematics and life skills for an entire school day. <https://oslofjordhage.no/2021/10/besok-av-klasse-m4a-fra-h20-vgs-tidl-hersleb-skole/>. [Photograph]

Sabadell (SP)

FoodE Pilot - Urban agricultural park for participatory agricultural test spaces

Sabadell, Spain

Municipality of Sabadell

In two peri-urban agricultural test spaces and 1 urban space, citizens are able to participate in experimental tests on traditional local varieties grown in organic production systems. The project brings together local consumer cooperatives, schools, and farmers in order to collect information about organic production and to boost local food production and consumption.



SBD



ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

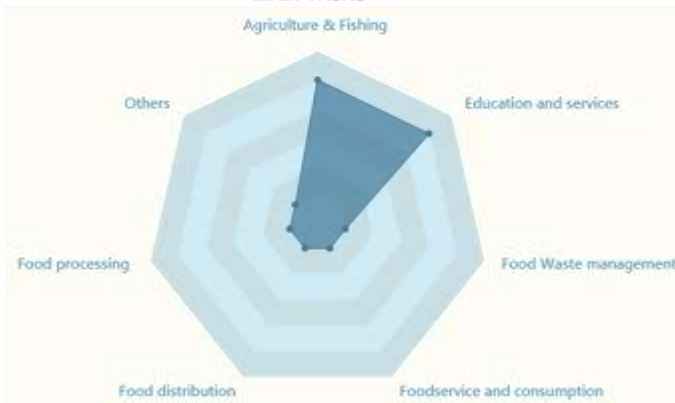
LOCATION

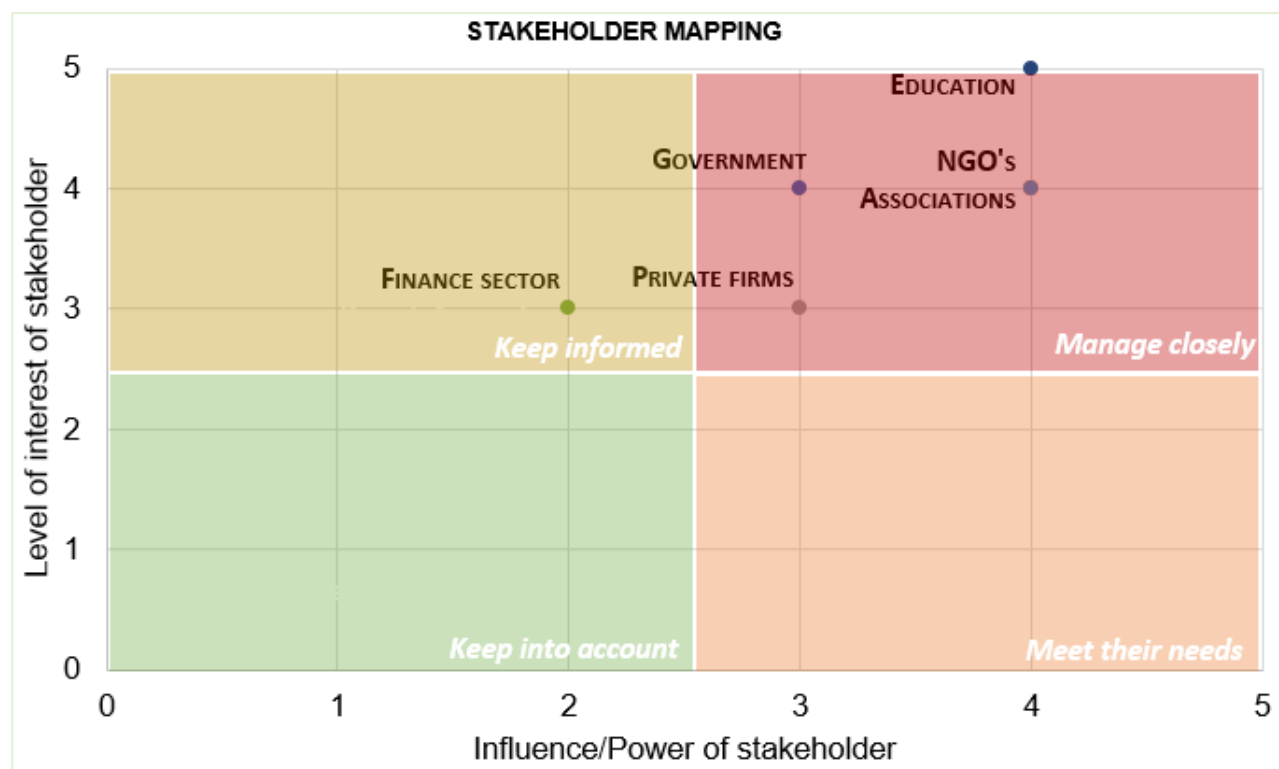


IMPACT AREAS



MAIN TASKS





1. Background

The municipality of Sabadell is located in the south of the comarca of Vallès Occidental (Spain) on the River Ripoll, 20 km north of Barcelona.

The Sabadell City Council (SBD) has fields under organic production both in the area of the Ripoll River and in the area of the “Parc Agrari”. In the farms of the river, there are social, inclusive orchards and farms that are cultivated by different associations as well as “agricultural test spaces” for new farmers. In the Parc Agrari, there are also different areas of “agricultural test spaces” as well as professional horticultural farms that the City Council has awarded to horticulturists. In the municipal farms, there is a vineyard which is currently managed by a cooperative for social inclusion. In the same region, the Universitat Autònoma de Barcelona (UAB) has conducted several projects associated with innovative growing systems in the urban environment, as well as sustainability assessment of various farming systems.

2. Location

Addresses: the pilot has three plots in different locations:

- [Ripoll River](#)
- [Parc Agrari](#)
- [Hort urbà](#)

	On foot ✓	The three pilots are accessible by foot and two are accessible to people with disabilities (Parc Agrari and Hort urbà).
	By bike ✓	There are bike lanes near Parc Agrari and Hort Urbà.
	By car ✓	The three pilots are accessible by car, there is public parking in Parc Agrari and Ripoll River and public/private parking in Hort urbà.

	By bus/metro ✓	The pilots can be accessed by bus. From the center of Sabadell, the pilot Parc Agri can be reached via bus line 7 (stop: “Av. La Pau”) plus 1 km on foot. The pilot Ripoll River can be reached via bus line 2 (stop: “Balcans”) plus 1 km on foot (around 40 minutes). The nearest bus stop to Hort Urbà is “Rambla” (lines 1, 2, 3, 11, 80).
	By train ✓	There are two train station: Sabadell Centre (RENFE) and Sabadell Plaça major (FFGG).
	By plane ✓	The closest airport is Barcelona airport, around 40 km away.
	By ferry ✗	-

3. Pilot implementation

Co-design process
The municipality of Sabadell, in close collaboration with University of Barcelona (ICTA-UAB) involved more than 200 participants (students from agricultural professional school, citizens organizations, School organizations, NGOs for organic farming, local traders, other UE H2020 project members, local administration) in the co-design of the projects. ❖ Student challenge (Collabathon) to design a cultivation plan for the ecological production of vegetables in the experiment plot of the Agricultural Park (“Can Gambus”) while ensuring reduction of food waste and efficient use of resources. The proposed solutions included: realization of two cultivation areas (productive and demonstrative) considering traditional varieties and respectful cultivation techniques (biological control of pests, biodegradable padding, deficient irrigation, etc.). ❖ A focus group for the pilot “Ripoll River”: promoting organic production (also reducing water and fertilizers) among the city's horticulturists, networking with local representatives of other projects that have FoodE-like purposes to find synergies and joint activities as well as with other actors who may be potential participants in the FoodE project panel (e.g., Ecological Dining Rooms and Sustainable Restaurants’ Association). ❖ Student project for the urban garden in the city centre (Horta urba’): creation of educational and productive orchards (for self-consumption), promoting the collaboration with chefs, local neighbourhood associations and schools in the surrounding area. ❖ Focus group with the Stakeholder Advisory Board of Catalunya. During the “MyLocalFoodE” events the members have been surveyed about function and ecosystem service that should be covered by the pilot of Sabadell (see section 4.2).

3.1 Main structures and areas

- **Parc Agrari pilot plot.** The Agricultural Park pilot is ready for cultivation (soil is prepared with green fertilizer), hosts floral margin (for preservation of beneficial insects) and it is equipped with irrigation system. In the participatory processes, crop distribution has been decided on several plots (productive and demonstrative part, with traditional varieties) with a total area of approximately 15,000 m² (Figure 80).

- **Ripoll River pilot plot.** It is developed within an already functioning municipal garden. Two plots of approximately 90 m² are used, constituting a total of 180 m² of demonstration garden (Figure 82).
- **Hort Urbà pilot Plot.** The third pilot to be developed in Sabadell is an urban garden within a plot located in the centre of the city. The total area of the plot is 2000 m² and the pilot will start with half of it (1.000 m²). The soil-based plot is bordered by a perimeter fence with access control and has access to water for irrigation purposes (Figure 83). During the month of March 2022, the installations of the first phase of cultivation tables and the irrigation system will be carried out.

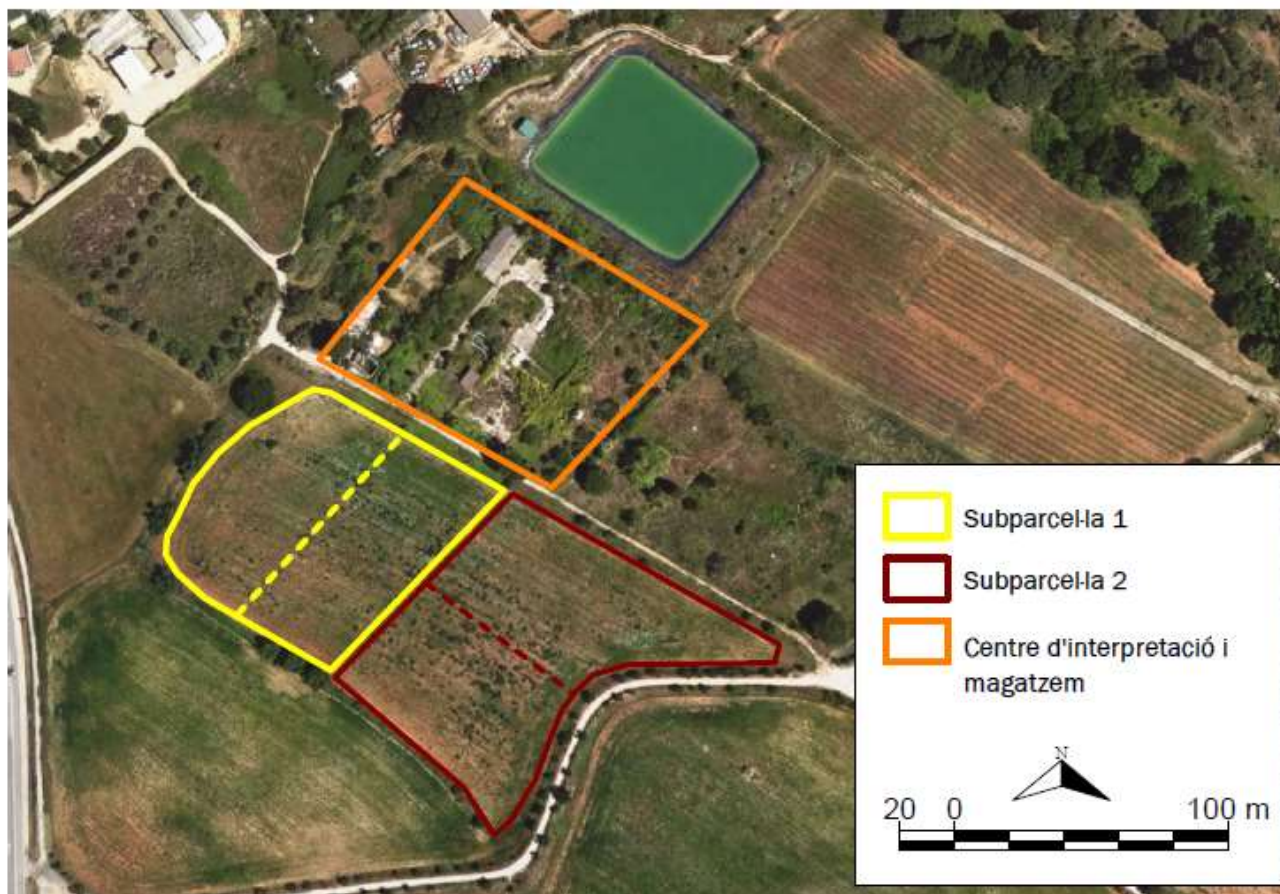


Figure 80. Distribution of plots proposed by the Parc Agrari pilot (yellow: subplot 1, red: subplot 2, orange: demonstration center and storage room).

3.2 Main systems/equipment

In Parc Agrari pilot:

- Construction with irrigation pumps, irrigation programmer, irrigation pond.
- Protective fence against wildlife (wild pigs and roe deer).
- Floral margin (variety of flower crops for the preservation of beneficial insects) (Figure 81).
- Primary irrigation system.

In Ripoll River pilot:

- 2 wells for irrigation and regulation tanks.
- Construction with irrigation pumps and programmers.
- Protective fence against wildlife (wild pigs and roe deer).
- Primary and secondary irrigation system.



Figure 81. Installation of the floral margin and overview of Parc Agrari (Can Gambús) pilot with green fertilizer.



Figure 82. Detail of the Horta del Riu Ripoll (Horta de Can Bages) with one of the plots where the pilot will be developed.

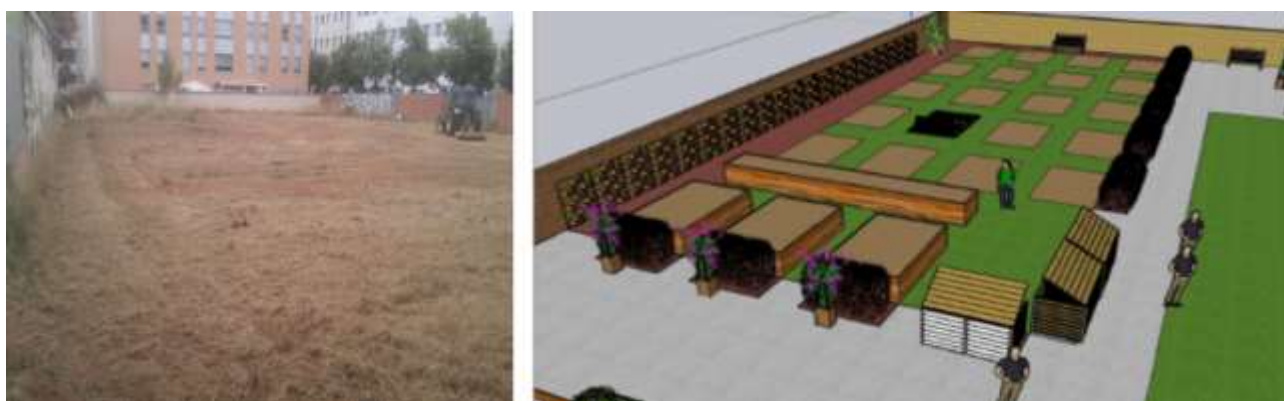


Figure 83. Detail of the urban plot in which the third pilot will be developed and design proposal for the productive orchards.

3.3 Main services and activities

The activities that are planned to take place are:

- **Educational activities in collaboration with ICTA-UAB :**
 - Pilots' open days. For example, in 2021 several open days have been organized at the pilot Hort Urba and Parc Agrari, involving a local secondary school and a high school as well as NGOs and civil society associations (Figure 85). During the visits, the participants could learn about the plots and facilities, the characteristics of the fields and crops, the urban limitations, how

the municipal gardens work, the environmental benefits and the reduction of impacts involved in local production.

- Workshops on food waste and UAB bachelor's degree final project will be held regularly.
- **(Co-) Production activities:**
 - tests with traditional varieties;
 - production of horticultural crops with traditional, local varieties.
 - Citizens' empowerment: the pilot converted two "council open-air fields" into "agricultural test spaces" where citizens will be able to participate in experimental tests on traditional local varieties grown in organic production systems. The objective is to collect information enabling to produce a local, quality product within a clean production system.
 - Farmers from the Agricultural Park will also contribute by producing and marketing their products directly to the main market in Sabadell. There will also be the participation of consumer cooperatives of local organic products as well as schools in the city.
- **Research activities** in collaboration with UAB, focused on local production and food waste.
- **Outreach and promotional events.**



Figure 84. Collabaton "Pilots design of FoodE in Sabadell" at ICTA Building as final part of the design process of the Can Gambús Pilot.



Figure 85. Open Days "Can Gambús" Pilot and Hort Urba'.

4. Pilot functions and eco-system services

The pilots functions and the ecosystems services indicated in this report are the results of the co-creation process realized with the Stakeholder Advisory Board of Catalunya.

4.1 Pilot functions

- to produce food
- to distribute/sell food and/or food products

- to prevent, redistribute, or valorize food waste
- to provide food-related services: education, training, promotion of activities for people affected by mental and physical disabilities.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 71 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 71. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site production of local varieties of fruits and vegetables.
 Provision of raw materials	★★★★★	Composting organic matter and re-use as fertilizer.
 Genetic resources	★★★★★	On-site production of local varieties; Test and study of local varieties

4.2.2 Regulating services

Table 72 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 72. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Regulation of urban metabolism	★★★★★	Promote the use of the organic waste as a fertilizer. Collection and commercialization of products that do not comply with market standards.
 Enhancement of pollination	★★★★★	Promote the generation of green corridors. Realization of flower border.
 Control of pests and diseases	★★★★★	Implementation of Integrated Pest Management (IPM): realization of flower borders to host beneficial insect for pest and disease control; use of organic product and macerates for pest control.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	Increase the fertility of the soil through the use of organic matter.
 Soil erosion prevention and control	★★★★★	Promote minimum and no tillage at the pilot site as soil conservation strategy.
 Habitat provision and/or biodiversity	★★★★★	Creation of green corridors; establishment of flower border; increase the fertility of the soil using organic matter.

4.2.3 Socio-cultural services

Table 73 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 73. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Organization of open days, workshops, courses targeting secondary schools, high schools and universities. Establishment of a test pilot focusing on the improvement in the local varieties’ cultivation.
 Contribution to research	★★★★★	Research activities in collaboration with the University ICTA-UAB, mainly focusing on local production and food waste.
 Improvement of mental and/or physical health (therapeutic)	★★★★★	Employing people with mental and physical disabilities.
 Improvement of urban/landscape aesthetic and/or art inspiration	★★★★★	Cultivation of local varieties, establishment of flower borders.
 Improvement of social cohesion and community building	★★★★★	Organization of outreach and promotional events, initiatives for locals. Give the possibilities to the inhabitants of Sabadell to walk through the entire park.
 Improvement of commercial relationships	★★★★★	Strengthen the short value chain; generate an additional value for products with lower market quality; promote the commercialization of local varieties.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution: Municipality of Sabadell (SBD), in collaboration with ICTA-UAB. The core team (and related roles) actively managing the project is shown in Figure 86.

The pilot co-creation and implementation was carried out by the pilot team along with UAB researchers, students (university and secondary), agriculture promotion associations, consumer cooperatives, citizen associations, sellers of agroecological products, associations against food waste, etc.

Property rights belongs to the Municipality of Sabadell: the property of the soil is from the municipality that will license users of each pilot four years. After that, the pilot will return to public tender and the process will start again. After the FoodE project the pilot initiatives can be managed by the related FoodE pilot institutions (SBD,UAB) or assigned to third parties, depending on the plot and final decisions. In fact, in the case of the urban orchard (Hort urbà) and Ripoll River pilots, the idea is that they will be managed by social associations (promoting organic production, proximity horticulture, etc.). In the case of the Parc Agrari pilot, the best compromise would be a license for some professional producer for 4 or 7 years.

Person name	Role	Institution
Pere Muñoz	Pilot owner/leader	Ajuntament de Sabadell



Cristina Buscarons	Pilot executor (1)	Ajuntament de Sabadell
Núria Saperas Sagués	Pilot executor (2) from January 2022	Ajuntament de Sabadell
Isabel Lleonart	Pilot executor (2) until January 2022	Ajuntament de Sabadell

Figure 86. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 74 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 74. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	Developing solutions to problems, creating plans or specifications for the design of objects and systems.
S2 - information skills	★★★★★	Well represented 👍	Collecting, storing monitoring and using information.
S3 - assisting and caring	★★★★★	Well represented 👍	Providing support to people.
S4 - management skills	★★★★★	Well represented 👍	Managing people activities. Organizing work activities. Recruiting and motivating teams
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	Using computers and other digital tools.
S7 – Constructing	★★★★★	Well represented 👍	Repairing and installing simple structures

Table 75 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 75. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	-
Arts and humanities	★★★★★	Well represented 👍	-
Business, administration and law	★★★★★	Well represented 👍	-



Education	★★★★★	Well represented 👍	-
Health and welfare	★★★★★	Well represented 👍	-
Information and communication technologies (ict's)	★★★★★	Well represented 👍	-
Natural sciences, mathematics and statistics	★★★★★	Well represented 👍	-
Services (e.g., hygiene and occupational health services, security, transport services etc.)	★★★★★	Well represented 👍	-
Social sciences, journalism and information	★★★★★	Well represented 👍	-

5.2 Pilot network

So far the pilot in Sabadell achieved the following goals:

- **Job opportunity:** for 5 socially disadvantaged citizens in farming participatory testing trials.
- **Stakeholder engagement in pilot activities:** at least 15 local farmers involved in the experimentation and 2000 local citizens and stakeholders engaged in farming activities and farmers' market.

In addition, the pilot is collaborating with:

- **2 other projects (e.g., other EU projects, etc.):** EU projects FoodSHIFT 2030 and Transform, mainly on the topics of local and proximity production, short food supply chains and reduction of food waste.
- In the near future, there are plans to collaborate more closely with 2 other FoodE Pilots (agricultural parks) in Napoli and Bologna.

6. Pilot communication

6.1 Videos

Video (title)	Link
El programa europeu FoodE arrenca a Sabadell	https://www.youtube.com/watch?v=roYLchlOhgg

6.2 Links to dissemination materials

- https://www.sabadell.cat/ca/?option=com_content&view=article&id=145875&Itemid=955
- <https://www.naciodigital.cat/sabadell/noticia/31268/hort-urba-social-al-centre-zona-conreus-al-parc-agrari-experiment-agricultura-urbana-sabadell>
- <https://www.ccma.cat/324/la-uab-i-lajuntament-de-sabadell-participen-en-un-projecte-europeu-per-promoure-lagricultura-local-i-sostenible/noticia/3035641/>



7. Photo credits

Figure 80. Municipality of Sabadell. (2021). Distribution of plots proposed by the Parc Agrari pilot (yellow: subplot 1, red: subplot 2, orange: demonstration center and storage room). [Image]

Figure 81. Municipality of Sabadell. (2021). Installation of the floral margin and overview of Parc Agrari (Can Gambús) pilot with green fertilizer. [Photograph]

Figure 82. Municipality of Sabadell. (2021). Detail of the Horta del Riu Ripoll (Horta de Can Bages) with one of the plots where the pilot will be developed. [Photograph]

Figure 83 (left). Municipality of Sabadell. (2021). Detail of the urban plot in which the third pilot will be developed and design proposal for the productive orchards. [Photograph]

Figure 83 (right). Municipality of Sabadell. (2021). Detail of the urban plot in which the third pilot will be developed and design proposal for the productive orchards. [Image]

Figure 84. Municipality of Sabadell. (2021). Collabaton “Pilots design of FoodE in Sabadell” at ICTA Building as final part of the design process of the Can Gambús Pilot. [Photograph]

Figure 85. Municipality of Sabadell. (2021). Open Days “Can Gambús” Pilot and Hort Urba’. [Photograph]

Berlin (DE)

FoodE Pilot - Urban farm with hydroponic greenhouse and greywater pilot plant

Berlin, Germany

Nolde - innovative Wasserkonzepte GmbH

This 'Water House' collects the greywater of about 250 residents. The treated greywater is fed back into the building, where it will be re-used used for gardening and toilet flushing. With clean water becoming increasingly scarce, this project rethinks the way we can use wastewater as a resource for new water, energy, and nutrients. During the FoodE project, the old plant will be dismantled and replaced by a newly developed version, which will integrate all technical and efficiency improvements made during the past 14 years. The new plant will have the capacity of treating 10,000 liters of greywater per day, also providing irrigation water to the connected hydroponic greenhouse.



NOL



ORGANIZATION

- Profit
- Non-Profit
- Association non lucrative
- Private firm
- Self-entrepreneur
- Cooperative
- Local authority
- Producer Organization
- Others

LOCATION

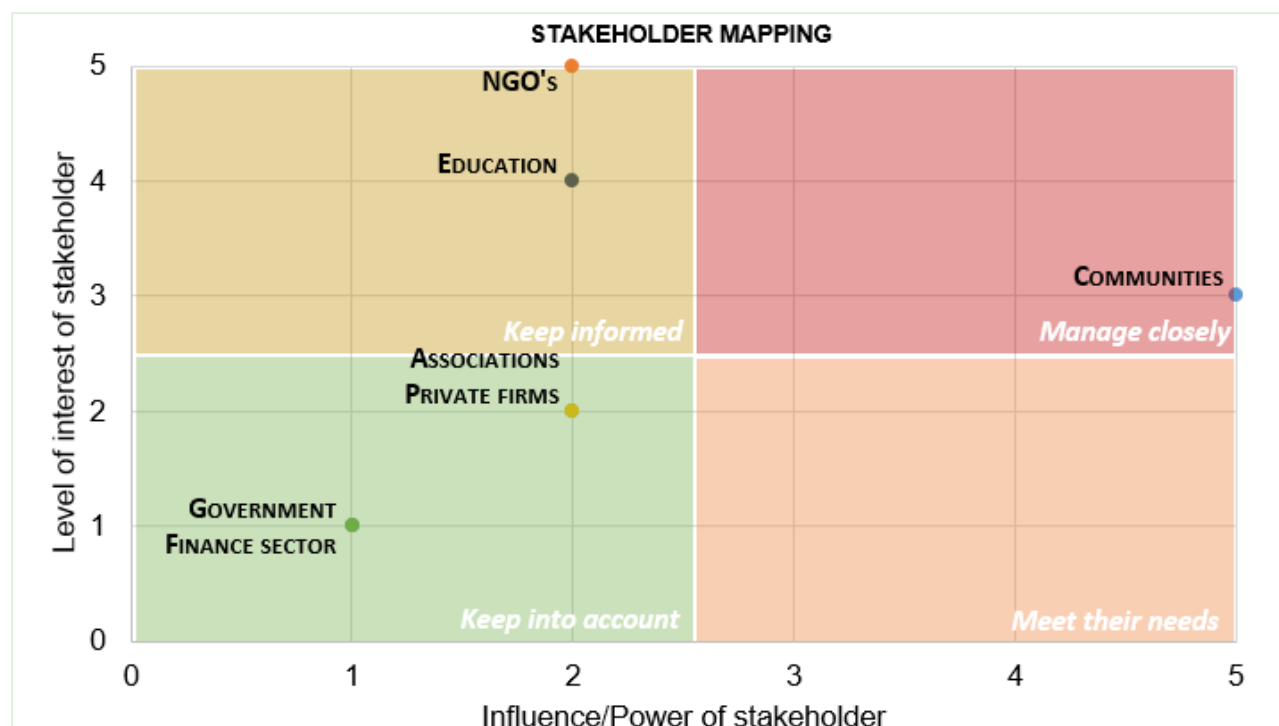


IMPACT AREAS



MAIN TASKS





1. Background

For Nolde - innovative Wasserkonzepte GmbH, wastewater is not just waste for disposal, but a resource for new water, energy and nutrients. The adequate supply of clean water with high quality is becoming a severe problem in many European cities. If large cities make use of water sources from the surrounding areas, it often negatively affects the availability of water for agricultural purposes. With the “Water House”, Nolde - innovative Wasserkonzepte GmbH is successfully running a greywater recycling plant in the center of Berlin (Germany) since 2006. The plant collects the greywater from a residential unit with 250 inhabitants. The treated greywater is fed back into the building and is re-used by the inhabitants for toilet flushing and gardening. The plant is the first of its kind in Germany.

2. Location

Address: Bernburger Straße 20, 10963 Berlin, Germany (find on [Maps](#))

	On foot ✓	The pilot site is easily reachable on foot, problematic for people with walking difficulties due to the presence of stairs.
	By bike ✓	The pilot site can be easily reached by bike (many cycle paths present in the city).
	By car ✓	Potentially, the pilot site can be reached by car, but it is very difficult to find a parking place in the area.
	By bus/metro ✓	The pilot is located 200 m distance from U Mendelssohn-Bartholdy-Park, 10963 Berlin and 500 m distance from Station, Potsdamer Platz, 10785 Berlin.
	By train ✓	
	By plane ✓	The closest airport is “Berlin Brandenburg Airport Willy Brandt” located about 25 km away.



	By ferry	-
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3. Pilot implementation

Co-design process
The workshops and the focus groups organized with citizens and students between 2020 and 2021 helped the pilot team in defining the type of activities and services that will be offered at the full pilot operation. Among the most promising one, there are: ❖ educational activities (e.g., “Do it Yourself” educational workshops, summer schools, lectures) for a broad range of students ages; ❖ outreach activities and events (e.g., to raise awareness on the potential of domestic wastewater); ❖ consultancy and research. In addition, for the technical and financial aspects of the pilot, the team had several exchanges in close collaboration with associations and investors. ❖ From the various discussions emerged that there is a lack of qualified personnel to ensure that high-quality greywater recycling plants are operated safely and sustainably. In this respect, the pilot team has addressed the problem and worked on a software-supported maintenance and operator model that will be offered to the users in the future.

3.1 Main structures and areas

The pilot project is based in a building where a wastewater recycling plant is in operation.

During the FoodE project, the old water recycling plant is improved and upgraded to a more compact version with a higher cleaning capacity and integrating all technical and efficiency improvements. In this way it can also serve urban gardening activities with lower operating costs, professionally operated in a contracting model. The new plant will also provide irrigation water to the connected hydroponic greenhouse (Figure 87).

Here is the summary of the main pilot’s elements:

- **Greenhouse.** It is directly attached to the “Water House”, includes various hydroponics systems that are operated with recycled grey water (Figure 88).
- **Fish tank.** In the “Water House” there is also a 700-litre aquarium - also operated with service water recycled from grey water, hosting tench (*Tinca tinca*) for several generations (Figure 88).
- **Vertical hydroponic system..** A former tutor from the Technical University of Berlin (Andreas Horn) is successfully testing a small version of the "HydroTower" vertical hydroponics system at the pilot location. Together with his partner are driven by the idea that city dwellers can provide themselves with salads, herbs and vegetables even without their own garden.
- **Wastewater recycling plant.**
 - The dismantling of the old plant is currently in progress and has been taken off the operating water network (Figure 89).
 - The pilot team is working on the installation of the new system with the new tanks (Figure 89). Some delays were due to supply of fundamental electronic components.
 - Commissioning the greywater recycling plant. The plan is to have completed the work by the end of April 2022 and after that, it will take another 2-3 weeks to build up the biofilm for water purification. Then the new facility should be ready to go into operation. However, this date ultimately depends on whether and when the materials arrive.



Figure 87. The existing water recycling plant in the "Water House". The water is purified purely biologically using microorganisms without the addition of chemicals, so that the water can ultimately be used for vegetable production and fish farming.



Figure 88. Hydroponic system in the greenhouse (left) and fish tank (right) fed with recycled greywater.



Figure 89. Conversion from the old to the new wastewater recycling plant. The old tanks have been removed and are now being recycled (left). The new tanks arrived and were placed in the water house to complete their installation.

3.2 Main systems/equipment

- Water resource management;
- Water treatment components;
- Software and digital monitoring interfaces, visualization of operational results (Figure 90);

- Different hydroponic systems operated with service water;
- Heat recovery from greywater;
- Plant monitoring system;
- Up and downscaling of the greywater recycling technology is completed;
- Business/contracting models: The contracting agreement with the nine owners was signed.

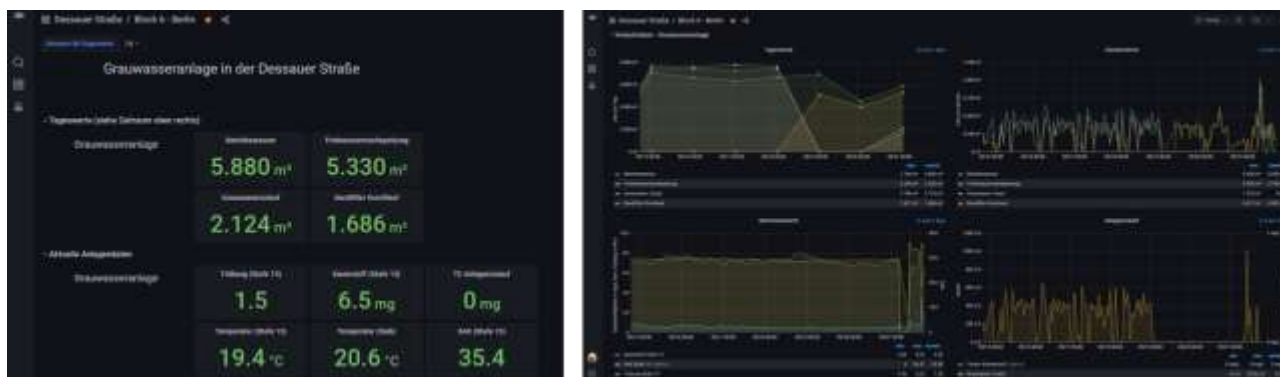


Figure 90. The first draft for monitoring and visualizing the operating results of the greywaters recycling plant (screenshot from smart phone) from the new developed application for the “Water House”.

3.3 Main services and activities

- **Greywater recycling** as a safe, sustainable and efficient technology for urban food production. Recycled process water is sold and used by the residents for flushing toilets and watering green areas as well as by the greenhouse operator for food production.
- **Educational activities** and **training programs** for students and for the public. For example: DIY-Workshops (e.g., “Do It Yourself” Hydroponics), prototyping for home hydroponics, measurements via simple digital tools.
- **Awareness-raising activities and events** on different topics, e.g., to raise awareness on regional food production and resources showing the potential of water, nutrients and thermal energy available in domestic wastewater.
- **Research activities** and **consultancy**.
- **Guided tours**. The greywater-treatment plant as well as the hydroponic greenhouse will be open to the public and guided tours will be offered to transfer knowledge on water, energy and nutrients recycling from greywater as well as on this resource-efficient urban food production. This type of activity has been organized in the past (Figure 92) and can be resumed after the renovation. The grey water recycling plant in the water house is awaiting completion and commissioning, which is scheduled for April 2022.



Figure 91. In the greenhouse, different hydroponic possibilities for plant production are developed, tested and demonstrated to the public.



Figure 92. Plant tour at the Berlin FoodE pilots in 2021.

4. Pilot functions and eco-system services

4.1 Pilot functions

- To provide food-related services: education, research.
- Others: produce high quality service water for food production from wastewater.

4.2 Ecosystem services

4.2.1 Provisioning services

Table 76 summarizes the contribution of the CRFS pilot initiative to “provisioning services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 76. Contribution to “provisioning services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Food provision	★★★★★	On-site production of leafy vegetables (lettuces) on a small scale.
 Provision of raw materials	★★★★★	The pilot can provide 100% of the water requirement and partly also plant nutrients from used water.
 Energy provision	★★★★★	Heat recovery from greywater to be used in the winter season.

4.2.2 Regulating services

Table 77 summarizes the contribution of the CRFS pilot initiative to “regulating services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 77. Contribution to “regulating services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Purification of water and/or air	★★★★★	Nature-based solutions for water purification (biofilm with microorganisms) combined with IoT (“Internet Of Things”).
 Regulation of urban metabolism	★★★★★	Water recycling to be used by the residents for flushing toilets, watering green areas, irrigate a small-scale greenhouse and supply a fish tank.
 Enhancement of carbon sequestration / Improvement of local micro-climate	★★★★★	The water recycling process is contributing to this aspect, however, it is not yet possible to measure it reliably. A full assessment will be performed within WP2.
 Soil erosion prevention and control	-	The pilot uses soilless systems.
 Habitat provision and/or biodiversity	-	The pilot provides about 900 m ² of biodiversity habitat at the pilot project site, which is mainly overgrown with reeds. However, this is not the subject of the FoodE project.

4.2.3 Socio-cultural services

Table 78 summarizes the contribution of the CRFS pilot initiative to “socio-cultural services” on a scale 0 to 5 (where 0 stars= no contribution, 5 stars= very high contribution) and a brief description of the types of activities and/or best practices adopted within the pilot relevant to each individual service.

Table 78. Contribution to “socio-cultural services”

Service sub-category	Contribution	Activities -best practices contributing to each service
 Contribution to training and education	★★★★★	Education and training programs given by the partner from the Technical University of Berlin (for what concerns the greenhouse) and given by the pilot team (on the recycling of the water).
 Contribution to research	★★★★★	A start-up has emerged from the ranks of the university. The project location has undoubtedly contributed to this. In addition, the pilot is doing research in order to be able to develop and build the new plant.

	Improvement of touristic attractions in the city-region	★★★★★	-
	Preservation of cultural knowledge and heritage	★★★★★	-
	Improvement of social cohesion and community building	★★★★★	The pilot is an opportunity to motivate local residents to join the initiative promoted by the pilot. On the other hand, there are several legal and liability reasons that hinder this process.
	Improvement of commercial relationships	★★★★★	The project will certainly improve pilot's business relations.

5. Pilot management

For the duration of the FoodE project, the pilot is managed by the FoodE partner institution: Nolde - innovative Wasserkonzepte GmbH (NOL). The core team (and related roles) actively managing the project is shown in Figure 93.

The pilot implementation was carried out by the pilot team along with external company that can carry out the construction of similar projects in the future according to the current pilot plans.

The building is privately owned and the plant is tolerated by a community of owners. After very long negotiations with an owners' association (70 owners), a contracting agreement for the water house has been established and it is valid until 2031 (10-year duration). No contract for the greenhouse is present yet. After the FoodE project, the "Water House" will be managed by the same FoodE partner institution (NOL) and the greenhouse will be managed by the current external partner, if the landlord agrees. The plan is to operate the water house for a long time, especially since a considerable amount of money has been invested in the project and will continue to be part of the business.

Person name	Role	Institution
Erwin Nolde	Pilot manager, Pilot communicator	Nolde - innovative Wasserkonzepte GmbH
Holger Sack	Pilot executor	Nolde - innovative Wasserkonzepte GmbH
Niclas Dehmel	Pilot executor	Nolde - innovative Wasserkonzepte GmbH
(Dr.Ing.) Grit Bürgow	Greenhouse operation and education	Aquatectura - studio Berlin and Technical University of Berlin

Figure 93. People involved in the FoodE pilot team and respective roles and institutions.

5.1 Skills and expertise requirements

Table 59 summarizes the skill categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).



Table 79. Skill categories

Skill type	Importance	The skill is currently	Comment
S1 - Communication, collaboration and creativity	★★★★★	Well represented 👍	-
S2 - information skills	★★★★★	Well represented 👍	-
S4 - management skills	★★★★★	Under-represented 👎	-
S5 - Working with computers and other digital tools	★★★★★	Well represented 👍	-
S6 - Handling and moving	★★★★★	Well represented 👍	-
S7 – Constructing	★★★★★	Well represented 👍	-
S8 - Working with machinery and specialized equipment	★★★★★	Well represented 👍	-

Table 80 summarizes the knowledge categories that are relevant to the setup and/or management of the CRFS pilot initiative, their relative importance on a scale 0 to 5 (where 0 stars =not at all important and 5 stars = very important) and the current level of coverage of these within the pilot (well represented or under-represented).

Table 80. Knowledge categories

Knowledge type	Importance	The knowledge is currently	Comment
Agriculture, forestry, fisheries and veterinary	★★★★★	Well represented 👍	The expertise of the pilot team is not sufficient for the operation and management of the greenhouse, so they rely on the Technical University of Berlin.
Business, administration and law	★★★★★	Well represented 👍	Expertise required due to the huge range of regulations starting with hygiene and ending with tax law hygiene.
Education	★★★★★	Well represented 👍	Education, training, teaching. Partly done by members of the university.
Engineering, manufacturing and construction	★★★★★	Well represented 👍	This knowledge is very well covered by the pilot team.
Information and communication technologies (ict's)	★★★★★	Well represented 👍	As SMEs, they often lack the necessary time for IT related aspects, but the expertise is well covered.



Social sciences, journalism and information	★★★★★	Well represented 👍	As SMEs, they often lack the necessary time for dissemination and outreach, but the expertise is well covered.
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5.2 Pilot network

So far the pilot achieved the following goals:

- **Creating job opportunity:** 1 technician was employed at the beginning of the project to run the pilot.
- **Stakeholder engagement in pilot activities:** around 30 people (students and citizens) have been involved in the co-design of the pilot and other stakeholders have been engaged to discuss technical and financial aspects of the greywater plant.

In addition, the pilot is collaborating with:

- **Other 2 CRFS initiatives (excluded FoodE pilots):**
 - A housing association (Erste Wohnungsgenossenschaft Berlin-Pankow e.G.) that wants to build a green roof as a bee pasture and the pilot team would like to irrigate this roof with reclaimed water, ensuring that the plants will survive the summer and bees won't die for lack of food sources.
 - A youth education center (Kurt Löwenstein with 120 beds). The pilot team is planning a sewage treatment plant that goes far beyond the usual. The wastewater is to be treated far better than usual and then used to irrigate an approx. 9000 m² meadow orchard, which has suffered greatly from drought in recent years.
- **Another organizations/Institutions (outside FoodE):** Blue community Berlin (<http://bluecommunityberlin.de/>)
- **Other 2 projects (e.g., other EU projects, etc.)**
 - Edible cities network (<https://www.edicitnet.com/>)
 - Interreg central Europe (<https://www.interreg-central.eu/Content.Node/CWC.html>)

6. Pilot communication

6.1 Videos

Video (title)	Link
Reciclaje de agua - Erwin Nolde	https://youtu.be/OT-jKxExE3U
Roof-Water-Farm: Wasserrecycling und Nahrungsmittelproduktion in der Stadt	https://youtu.be/g4kXt7LoB_A

6.2 Links to dissemination materials

- Raber, W., Nolde, E., Gehrke, I., Dinske, J., Reichmann, B., Dott, W.: Hygienische Aspekte gebäudeintegrierter Farmwirtschaft in Verbindung mit gebäudeintegriertem Wasser- und Nährstoffrecycling, a Korrespondenz Abwasser, Abfall · 2021 (68) · Nr. 8, page 628 - 636.

7. Photo credits

Figure 87. Nolde - innovative Wasserkonzepte GmbH. (2020). The existing water recycling plant in the "Water House". The water is purified purely biologically using microorganisms without the addition of chemicals, so that the water can ultimately be used for vegetable production and fish farming. [Image]

Figure 88. Nolde - innovative Wasserkonzepte GmbH. (2020). Hydroponic system in the greenhouse (left) and fish tank (right) fed with recycled greywater. [Photograph]



Figure 89. Nolde - innovative Wasserkonzepte GmbH (2022). Conversion from the old to the new wastewater recycling plant. The old tanks have been removed and are now being recycled (left). The new tanks arrived and were placed in the water house to complete their installation. [Photograph]

Figure 90. Nolde - innovative Wasserkonzepte GmbH. (2020). The first draft for monitoring and visualizing the operating results of the greywaters recycling plant (screenshot from smart phone) from our new developed App for the “Water House”. [Image]

Figure 91. Nolde - innovative Wasserkonzepte GmbH (2020). In the greenhouse, different hydroponic possibilities for plant production are developed, tested and demonstrated to the public. [Photograph]

Figure 92. Nolde - innovative Wasserkonzepte GmbH (2021). Plant tour at the Berlin FoodE pilots in 2021. [Photograph]



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