Food Systems in European Cities

Deliverable 4.3 – Joint report on executive projects of the pilots

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Document Control Sheet

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Executive summary

In the first phase (T4.1), 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). The successful results of the co-design and co-creation process of innovative CRFS pilot were described in D4.2.

Based on the outcomes of the co-creation activities, each local FoodE Partner proceeded with the executive design of the final pilot project to be implemented (T4.2). The plan describes the progresses of the City-Region Food System pilots (main structures, infrastructures, systems, equipment, services and activities, pilot team) and the plan towards their full operation (T4.3). The current deliverable is a joint report of the executive project plans of the 15 FoodE CRFS pilots.

Each CRSF initiative will be subsequently monitored 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 (WP5) and business models (WP6) for the replication and up-scaling of sustainable CRFS in different European contexts.

1. Introduction

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 and in collaboration with existing and innovative CRFS projects (T4.1), the finalization of the executive projects of the best selected ideas (T4.2), the project implementation (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.

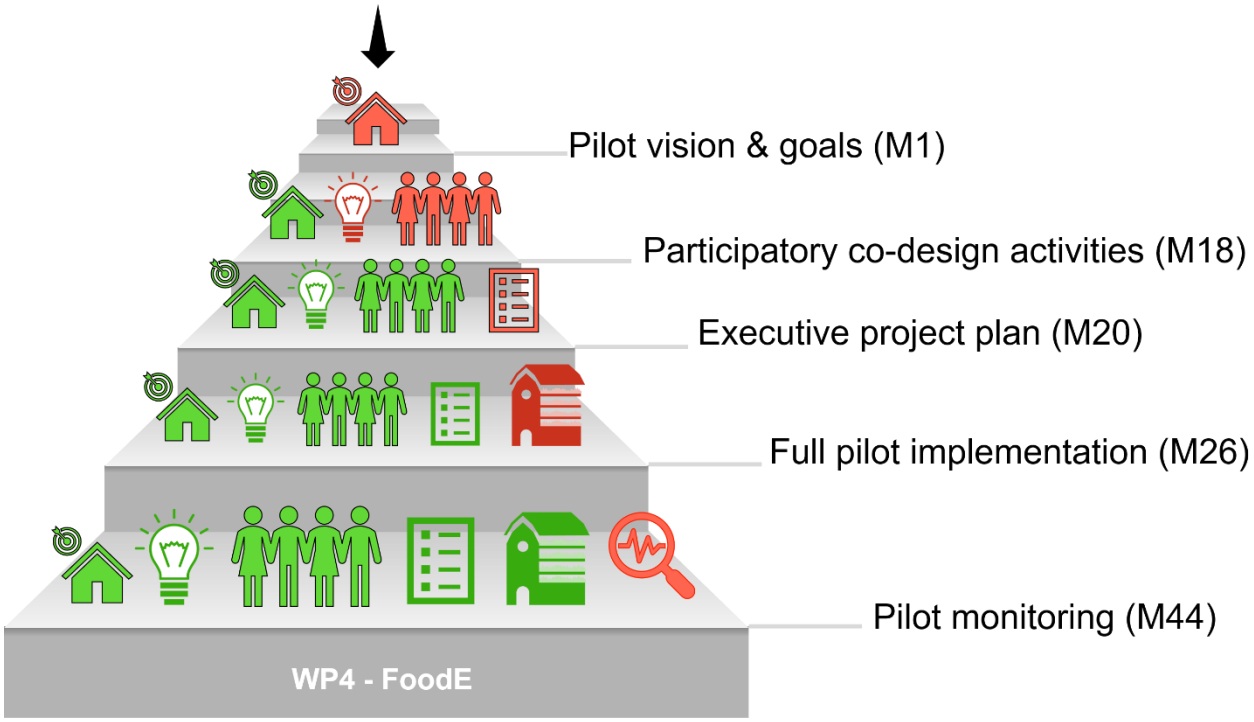


Figure 1. Visual representation of WP4's main tasks from the Pilot project perspective. In brackets the deadline for the completion of the activity, expressed in project month.

The current deliverable presents the collection of the 15 individual executive project plans, elaborated by the respective pilot teams, in view of their full implementation planned for M26 (T4.3).
The overview of the FoodE CRFS pilots is given in Figure 2.

1.1 Linkages with other tasks

From the beginning of the FoodE project (M1), Partners hosting pilot initiatives started purchasing and arranging the main structures, systems and equipment necessary for their projects. In addition, each local Partner responsible for the pilot has integrated the results of the co-design and co-creation process (T4.1) in an executive project plan (T4.2). Depending on the specific cases, after implementation, the project will either be managed by the authors of the project, by the related FoodE Partner institution or will be assigned to a third party (e.g. NGO).
The participatory pilot monitoring (T4.4) will start after the full implementation of CRFS pilots (M26). Within T4.4, the implemented CRFS pilot projects will be monitored and evaluated for their environmental, societal and economic sustainability. They will feed the first version of sustainability framework assessment (WP2) with new data and indicators, will contribute to the definition of key indicators (WP5) and business models (WP6) for the replication and up-scaling of sustainable CRFS in different European contexts for increasing access to affordable, safe and nutritious food in EU cities. Over the course of 2021, WP4 facilitated and mediated the collaboration with WP2 (T2.4) where FoodE pilot owners were introduced to the FoodE assessment framework

(explain its benefits for their implementation and decision-making process, co-design and integration of potential emerging needs, and discuss potential data collection strategies).
Pilot project were also integrated in the first version of the FoodE app prototype (T3.2.2, [4]) 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.

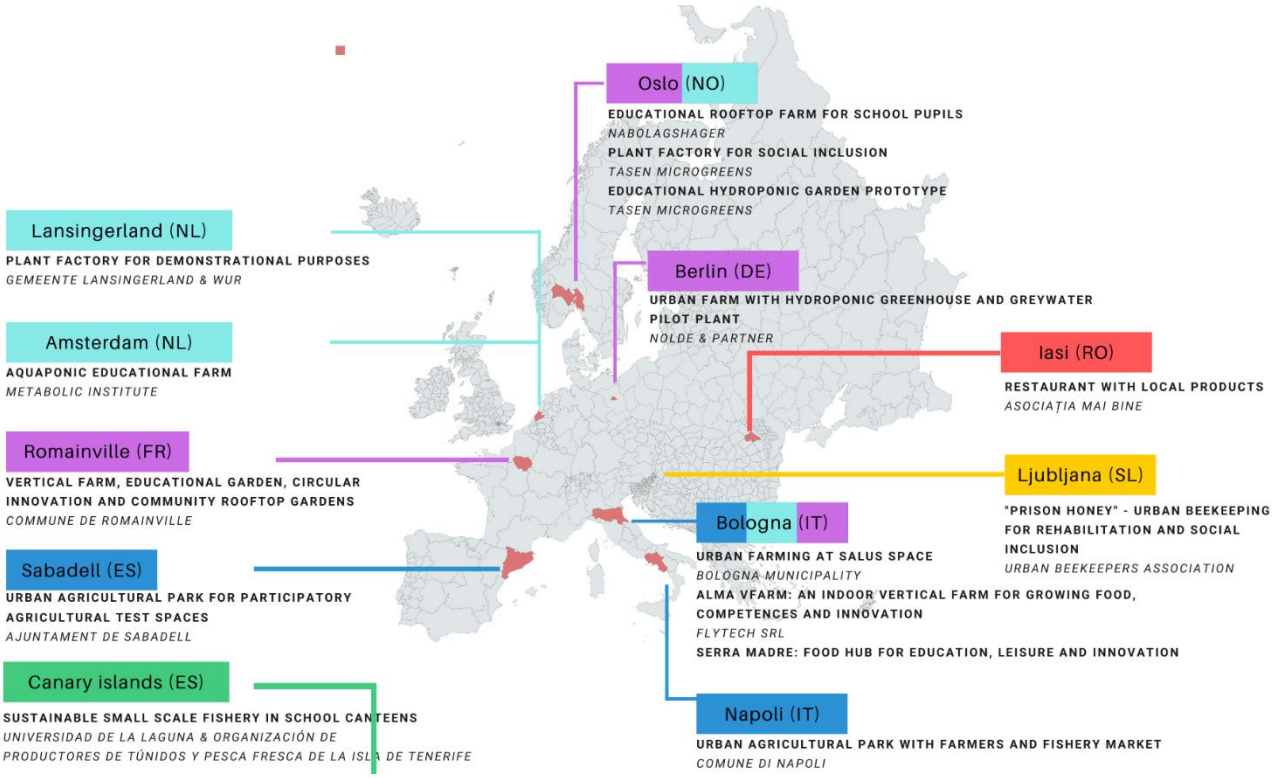


Figure 2. The FoodE consortium currently includes 15 City-Region Food System (CRFS) initiatives located in 11 European cities which serve as pilot projects.

1.2 Executive project plan: general structure

Based on the CRFS pilot goals and visions as well as the outcomes of the participatory co-design activities (D4.2, [3]), each FoodE pilot team was asked to proceed with the executive plan of the final pilot project to be implemented (T4.3).
For this purpose, each pilot team was provided with a standard template of the executive plan. The template included different sections with open and closed questions that guided the CRFS leaders in the description of the main pilot structures, infrastructures, systems, equipment's, services and activities as well as their current status and plan towards their completion and functioning. Additionally, the template had a section where to integrate the solutions and experiences resulting from the co-design process (selected based on pre-defined criteria) and that show potentials to be further exploited for designing/improving the CRFS pilot initiatives. Lastly, some information on the key partners of the pilots was collected in order to create a stakeholder map for each of them. Each executive plan has been delivered by the local team under the coordination and tutoring of the task leader (WR). This section describes the general structure of the executive projects while the individual plans are reported in the next section 2"Executive plans of FoodE CRFS pilot projects".

1.1.1 Pilot graphic overview

This section contains a graphic summary of some general information of the pilot projects. In particular, the following data have been collected (in line with the "Survey of CRFS initiatives" developed within T2.1):

- Geographical location (mainland, islands) and specific pilot area (urban, peri-urban, rural-inland, rural-coastal). See Figure 3 for an overview of the 15 CRFS pilots.

- Types and status of the organizations managing the CRFS initiatives. See Figure 4 for an overview of the 15 CRFS pilots.

Country	Italy				Spain		France	Netherlands		Slovenia	Romania	Germany	Norway		
City	Naples	Bologna			Sabadell	Tenerife	Romainville	Bleiswijk	Amsterdam	Ljubljana	Iasi	Berlin	Oslo		
Pilot project	NAP	FLY	BOL	SER	SBD	ISL	RMN	LAN	METAINST	BEE	MBINE	NOL	NBL	TAS1	TAS2
Geographic location															
Mainland	x	x	x	x	x		x	x	x	x	x	x	x	x	x
Island						x									
Area															
Urban area	x	x		x	x	x	x	x	x	x	x	x	x	x	x
Peri-urban area			x		x	x								x	x
Rural area I (Inland)					x										
Rural area II (Coastal)						x									

Figure 3. Main geographic locations and areas of the 15 CRFS pilot projects within FoodE.

Country	Italy				Spain		France	Netherlands		Slovenia	Romania	Germany	Norway		
City	Naples	Bologna			Sabadell	Tenerife	Romainville	Bleiswijk	Amsterdam	Ljubljana	Iasi	Berlin	Oslo		
Pilot project	NAP	FLY	BOL	SER	SBD	ISL	RMN	LAN	METAINST	BEE	MBINE	NOL	NBL	TAS1	TAS2
Organization type															
Profit			x	x								x	x	x	x
Non-profit	x	x			x	x	x	x	x	X	x				
Organization status															
Association non lucrative									x	x					
Private firm											x		x	x	X
Self-entrepreneur												x			
Cooperative			x	x											
Local authority	x				x		x	x							
Producer Organization															
Others (please specify)	University	University				University		Research							

Figure 4. Types and status of the organizations in charge of the 15 CRFS pilot projects within FoodE.

- Main CRFS's impact areas. Out of the total, the pilot impact is distributed as follows (Figure 6):
  - 25% to education;
  - 17% to creation of social linkages (benefitting socially disadvantaged groups etc.);
  - 17% to territorial planning (best life-being into cities etc.);
  - 15% to local development (empowering local stakeholders, providing jobs etc.);
  - 15% to protection of environment (biodiversity conservation, climate change mitigation etc.);
  - 4% to food security;
  - 4 % to others areas (e.g. research, water waste management);
  - 2% to health;
  - 2% to leisure.
- Main pilots' tasks. Out of the total, the main pilot tasks are distributed as follows (Figure 6):
  - 28% to agriculture & fishing;
  - 25% to education and services (education, literacy and training, events, etc.);
  - 19 % to others (e.g. urban beekeeping, research);
  - 16% to foodservice and consumption (catering, cooking, restauration, etc.);
  - 6% to food distribution (wholesale, retail, community supported agriculture etc.);
  - 3% to food processing (transformation of agricultural products into food etc.);
  - 3% to food waste management;
- Readiness level and time plan. The pilot had to give an indication of the readiness level of the structures/systems/services, from 0 to 100% (where 0% = not ready/not complete, 100% = ready/complete) and the plan towards the completion and full operation (on a timeline between M18 and M26) (see Figure 5).

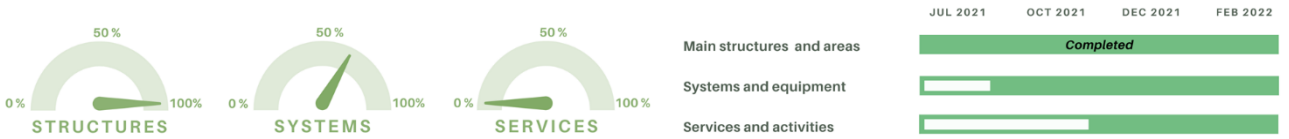


Figure 5. Example of graphics on readiness level (left) and time plan (right) of pilot projects.

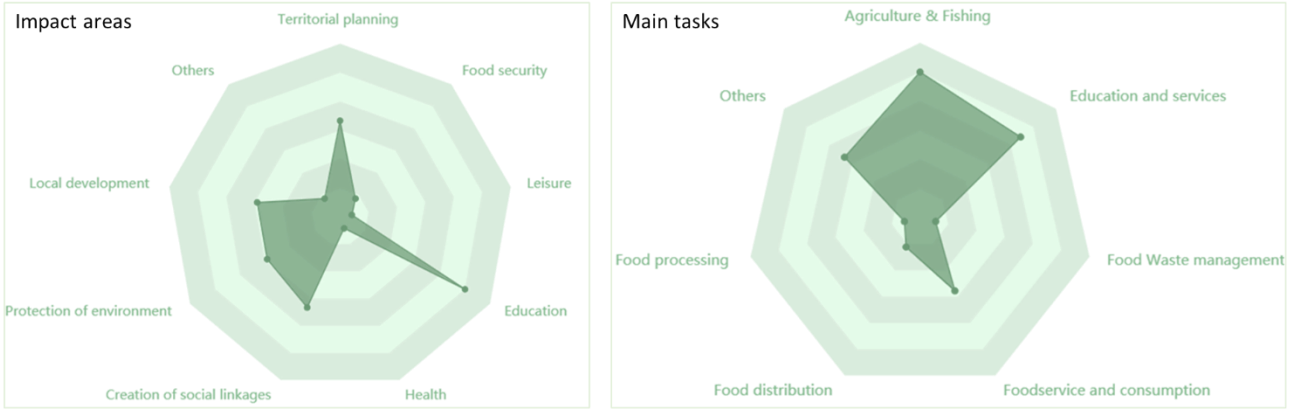


Figure 6. Main impact areas and tasks of the 15 CRFS pilot projects within FoodE.

In addition, a **stakeholder map** (Figure 7) for each of the pilot project was created in order to give a visual representation of the relationship that the following stakeholders have with the CRFS initiatives:

- Government and regulatory authorities (municipalities, state etc.);
- Non-Governmental Organization;
- Private firms;
- Associations[1] (of citizens, refugees, unemployed, homeless, producers, schools etc.);
- Communities[2] (citizens, vulnerable groups such as elders, refugees, unemployed, homeless, inmates etc.);
- Finance sector (e.g. banks etc.);
- Education and research (e.g. schools, universities, students, teachers/professors, researchers etc.).

Each pilot team was asked to indicate the level of interest that each partner may have in their CRFS project (or certain aspects of it) on a scale 0-5 (where 0 = no interest/no key Partner, 1 = very low interest, 2 = low interest, 3 = medium interest, 4 = high interest, 5 = very high interest). Similarly, the pilot team had to indicate the degree of power that each partner may have over the improvement, performance, success of the CRFS project (or certain aspects of it) on a scale 0-5 (where 0 = no influence/no key Partner, 1 = very low influence, 2 = low influence, 3 = medium influence, 4 = high influence, 5 = very high influence).

[1] Association refers to a group of people who organize and work together to achieve a particular goal.
[2] Community refers to a group of individuals living in the same geographical area sharing the same physical environment while sharing the same culture.

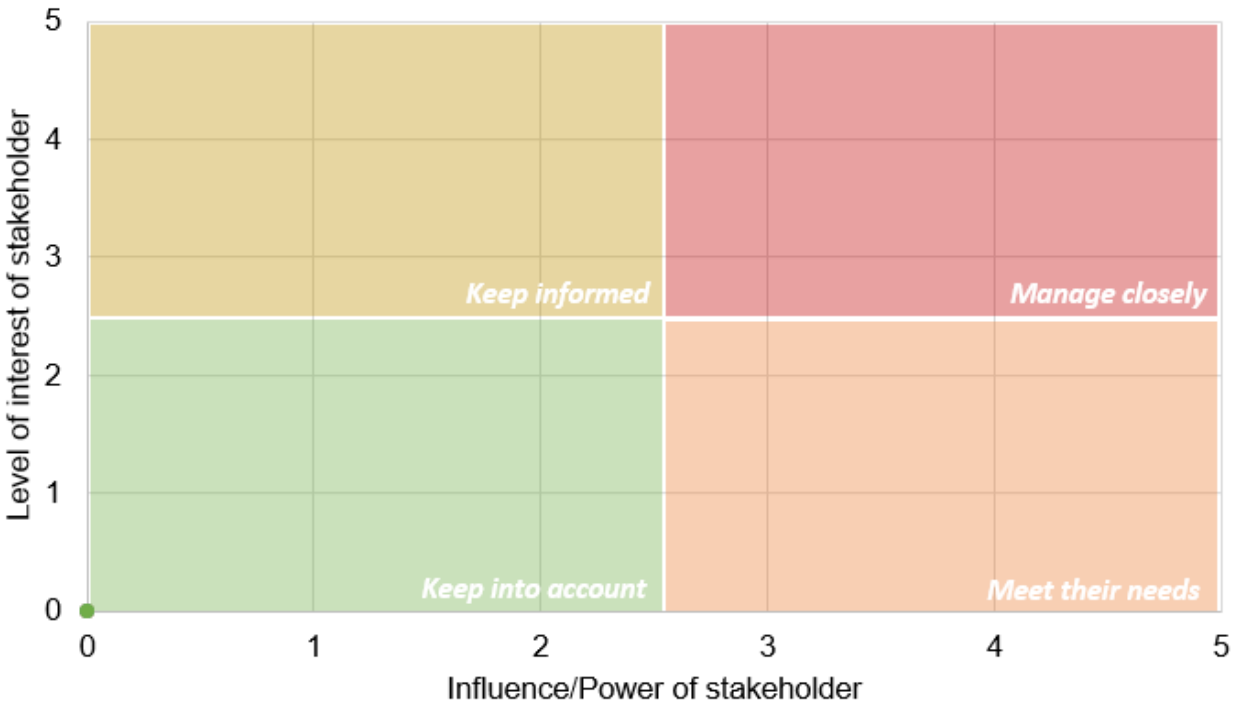


Figure 7. Stakeholder map used in the pilot graphic overview to describe both the impact stakeholders may have on the project and the impact the project may have on stakeholders. The quadrant of the map that stakeholder occupies determines the intensity, frequency and types of engagement required.

1.1.2 Background and vision

This section introduces the general context in which the pilot project is inserted and its background as well as the vision and expected impact within FoodE.

1.1.3 Implementation plan

This section describes the main structures, systems, services and activities of each pilot project, together with an indication of their current readiness and functioning level, missing elements and plan towards the completion and full operation (on a timeline between M18 and M26).

- Structures and areas: depending on the pilot project, this can include main buildings, rooms/space for activities, for events, for processing, storage etc., restaurant, kitchen, structures for food production (greenhouses, vertical farms etc.), production plots, field areas, etc.
- Systems and equipment: depending on the pilot project, this can include machineries, systems and equipment (e.g. for climate control, resource management, waste management etc.), software's, digital interfaces, etc.
- Services and activities: depending on the pilot project, this can include educational activities, outreach activities, research activities, events, consultancy, food production plans, placement of the beehives, etc.

1.1.4 Integrating the outcomes of the co-design activities

In this section, the pilot teams were asked to describe 1) which potentials/opportunities they see in the winning projects, ideas, experiences emerged during the co-creation and co-design process (D4.2, [3]) 2) how they are going to implement them in the pilot project and if adaptation plans are needed and 3) who is (or will be) involved in this process.

1.1.5 Pilot team

This section contains the list of people involved in the pilot projects and needed for their full operation. A list of roles is presented below:

- **Pilot owner** (formally the owner of the pilot project/facility, not necessarily involved in the daily management of the pilot and reporting of tasks).
- **Pilot leader(s)/manager(s)** (main contact persons associated with the pilot project, responsible of pilot management plan, and of reporting tasks).
- **Pilot executor(s)** (involved in the daily management of the pilot and directly involved in the executive plan of the pilot project).
- **Communicator(s)** (specific person involved in communication on social media, website, event organization/activities).
- **Other** (in this case, pilot were asked to specify the role).

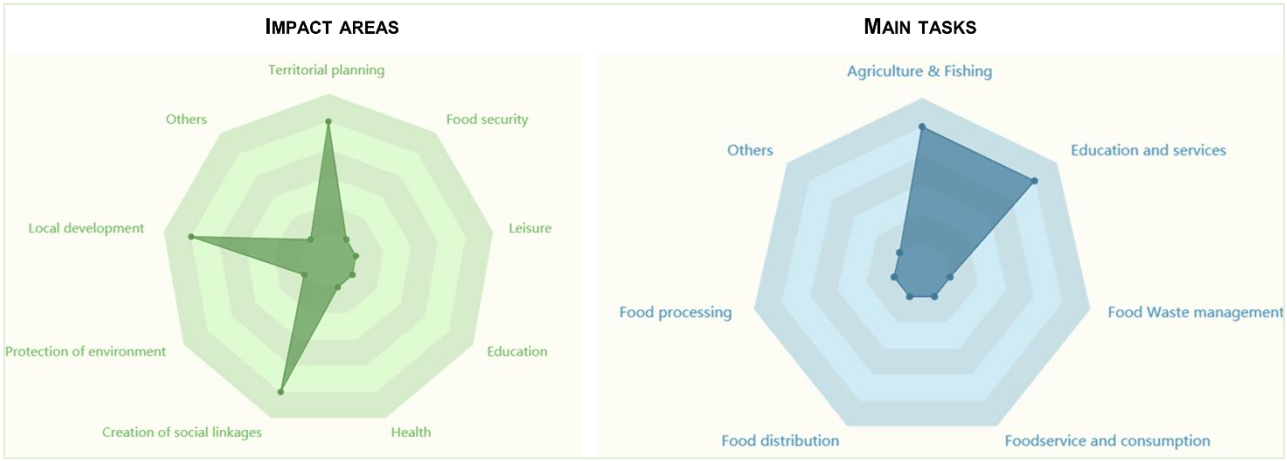
1.3 Remarks

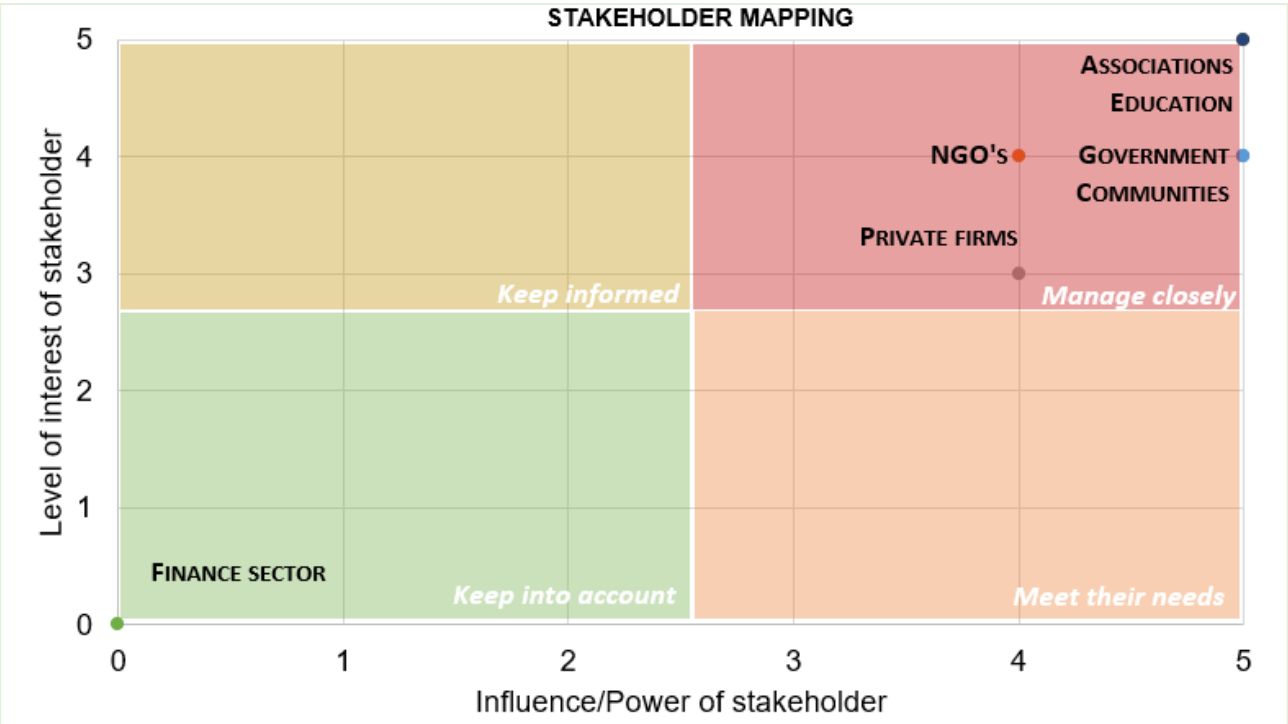
The FoodE partner "POLAR PERMACULTURE SOLUTIONS, AS" has recently declared bankruptcy (July 2021). Consequently, the pilot project "Circular economy restaurant" planned in Longyearbyen will no longer exist and no executive plan has been presented by Polar Permaculture (POL).
The total number of FoodE pilot remains unchanged (15). This is due to the fact that an additional CRFS initiative in Bologna ("Serra Madre") joined the project in Spring 2021 (with no additional costs), under the leadership of UNIBO. However, the number of European cities hosting FoodE CRFS has decreased from 12 to 11.
Given the situation, the specific section dedicated to the executive plan of Polar Permaculture will describe the strategy designed by the FoodE consortium to pursue the core activities of Polar permaculture pilot and related KPI's.

2. Executive plans of FoodE CRFS pilot projects

Naples (IT)

FoodE Pilot - Urban agricultural park with farmers and fishery market





Background

The park selected for the FoodE project 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 ha and includes both open spaces, mainly cultivated with Mediterranean plant species, some greenhouses and an artificial pond for rainwater collection .

Vision

The available greenhouses need to be regenerated to make them functional and suitable for cultivation. Both in the greenhouses and in the open spaces a series of local horticultural products will be grown with the aim of defining sustainable cultivation protocols, involving local organizations and citizens as well as increasing their awareness of food production and security. In addition to locally produced vegetables, the pilot will host a market for home-grown fruits, veggies and flowers from neighborhood farms, as well as fresh fish from local fisheries. The implementation will include 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, 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.

Among the long term goals: create job opportunities for socially disadvantaged citizens in farming activities and market management; a local food production that can partly satisfy the demand of local citizens; active involvement of local stakeholders in farming/farmers market and education of youth living in the surrounding area.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

The Troisi Park offers more than 5000 m^2 of greenhouses and open spaces that could be potentially available for pilot activities, depending on the available funding's. Currently (July 2021), one of the greenhouses ("G1") and the open spaces ("OS") are under restoration (Figure 11). The G1 has an area of 1023 m^2 (33 m length x 31 m width) and will be dedicated to food production, whereas the OS, which covers a total area of 891 m^2 (2 greened spaces, each one of 13.5 m length x 33 m width) will host the market and the '"educational area".

What is missing and which is the plan towards their completion

The greenhouse and open space restoration needs to be completed.

List of the main systems/equipment that are used (or will be used) in the pilot project

The greenhouse G1 will host 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** (Figure 12) includes tanks made out of recycled materials that will be waterproofed with a black plastic film. The oxygen levels in the tanks will 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 in small bunches as cutting vegetables (Figure 13).

Planter boxes already present in the greenhouses and made out of recycled material, will be 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.

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

A rainwater collection system will be integrated into the greenhouse facility, including roof gutters, mechanical and biological filters, and reservoir tanks for water storage. The rainwater collected will be utilized for irrigation of the greenhouse crops. The student team "Agrivolution", winner of UrbanFarm 2021, estimated the yearly rainwater that can be collected in each facility by considering the average monthly precipitation for Naples ([5]), roof surface area and an efficiency factor of 85%. The calculations for G1 (with surface area of 1105 m^2) results into 839'137 L of rainwater collected yearly ([1]). In addition, the daily irrigation water requirements for possible suitable crops and growing systems were also estimated and they are reported in Figure 14.

List of the main services/activities that are offered (or will be offered) by the pilot project

The pilot will offer the following services and activities:

- Local food production: leafy vegetables, aromatic potted plants.
- Local market: on-site products and products from local farmers.
- Social activities: training courses for disadvantaged categories and involvement in the production and market activities.
- Educational activities: primary and secondary school students will be involved in thematic workshops and labs on the main topics related to urban agriculture functions and methods. Large events involving citizens will also be organized.

What is missing and which is the plan towards their completion

The activities will start once the facilities will be completed (the greenhouse and open space restoration).

Integrating the outcomes of the co-design activities

Which of the resulting ideas, projects and/or experiences do you plan to pursue and implement in your project? Why?

The ideas presented by student teams participating in UrbanFarm 2021, particularly the ones from the winning team "Agrivolution" appeared to be consistent with needs of the local administration and with the context. Specifically, the modularity of the team's proposal provides a certain degree of flexibility in implementing solutions that best fit the needs as well as the current possibilities of the park. Currently, the focus will be on the growing systems (floating system and pot cultivation as soon as greenhouse structure is renovated) and on educational activities (in the nursery lab with local species). The economic evaluation of costs and revenues annexed to the student's proposal led to consider production activities as self-supporting by the end of the first cultivation cycle. The involvement of schools and local associations will help in the organization of kid science activities and training on cropping and selling food with disadvantages people (see "Ortopiù" experience).

Do they need some adaptations in order to be realized? Which?

There will be some adaptations consisting in re-sizing the activities on the effective spaces available.

Who will you involve in this implementation process?

The implementation process within the pilot site will involve the pilot team, part of the co-design team and some local associations and farmers.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that the minimum structures needed for pilot operation and participatory monitoring will be ready by the deadline M26 (T4.3).

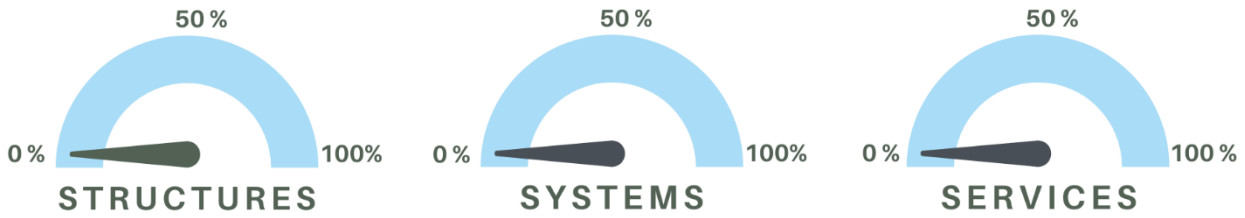


Figure 8. Readiness and functioning of structures, systems, services of the FoodE pilot in Naples (Urban agricultural park with farmers and fishery market) on a scale 0 – 100% (where 0%: not ready, functioning, 100%: ready, operative).

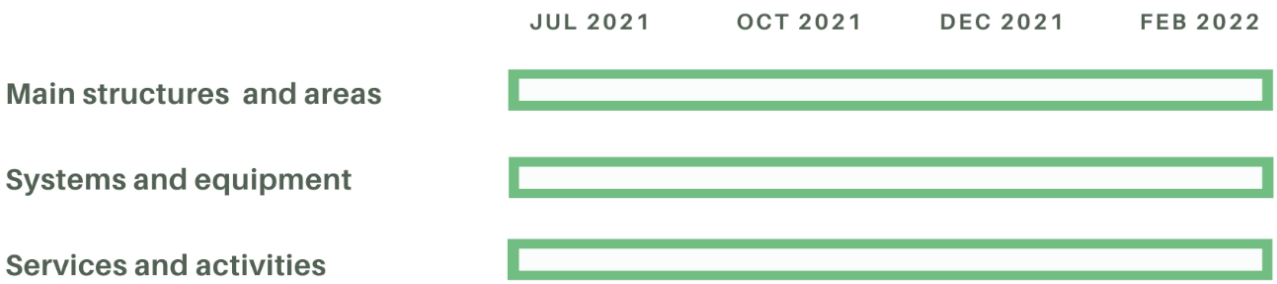


Figure 9. Time plan towards completion and functioning of structures, systems and services of the FoodE pilot in Naples (Urban agricultural park with farmers and fishery market).

Pilot team

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

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

Pictures

Figure 11. Top view of area and structures of Massimo Troisi Park (where G=Greenhouse, OS=Open Space).

Figure 12. 3D view of the floating system in the greenhouse 1 (G1) proposed by the winning team "Agrivolution" within the student challenge UrbanFarm2021.

CROPS	PLANT (m^2)	PLANT DENSITY (pt/m^2)	CYCLE/ CUTTING (year)	€ x PLANT/CUT. (€)
GREEN LETTUCE	125	25	9	0.69
RED LETTUCE	125	25	8	0.75
ESCAROLE	125	25	7	0.8
RADICCHIO	125	20	5	1.5
BASIL	80	30	12	0.3
ROCKET	80	30	12	0.4
SPINACH	80	30	12	0.4

Figure 13. Crop production in G1 proposed by the winning team of UrbanFarm2021 "Agrivolution" for the co-design of FoodE Pilot in Naples ([1])

Calculations for crops daily irrigation requirments

Facility	Crops	Growing system	Irrigation system	Growing substrate	Planting density (plants/m^2)	Cultivation area (m^2)	Number of plants	Irrigation requirement (mL/plant/irrigation)	Daily number of irrigations	Daily water use (L/plant)	Growing cycle (days/cycle)	Water use per cycle (L/cycle)	Number of cycles (cycles/year)	Yearly water use (L/year)	Yearly facility water use (L/year)
G1	Leafy greens (variety)	Floating raft	DWC	Coconut coir	25	745	18625	N/A	N/A	0.004	28	1982	10	19817	**19817**
G2	Vegetables (variety)	Planter box	Hand	Soil	8	15	120	37.2	N/A	0.446	42	2250	8	18000	**18403**
	Leafy greens (variety)	Aquaponics	Flood	Coconut coir	25	12	300	N/A	N/A	0.004	42	50	8	403	
G3	Tomato (all varieties)	Gutter	Drip	Coconut coir	2	304	608	100	48	4.800	150	437760	1	437760	**1460211**
	Pepper	Gutter	Drip	Coconut coir	3	76	228	100	48	4.800	150	164160	1	164160	
	Zucchini	Gutter	Drip	Coconut coir	3	76	228	100	48	4.800	150	164160	1	164160	
	Eggplant (all varieties)	Gutter	Drip	Coconut coir	3	76	228	100	48	4.800	150	164160	1	164160	
	Friariello	Planter box	Drip	Soil	8	72	576	37.2	12	0.446	120	30857	6	185143	
	Broccoli	Planter box	Drip	Soil	4	18	72	74.4	12	0.893	120	7714	4	30857	
	White Cauliflower	Planter box	Drip	Soil	4	18	72	74.4	12	0.893	120	7714	6	46286	
	Purple Cauliflower	Planter box	Drip	Soil	4	18	72	74.4	12	0.893	120	7714	6	46286	
	Basil	Container	Subirrigation	Soil	45	72	3240	6.6	12	0.079	35	9000	10	90000	
	Sage	Container	Subirrigation	Soil	45	12	540	6.6	12	0.079	35	1500	10	15000	
	Mint	Container	Subirrigation	Soil	45	12	540	6.6	12	0.079	35	1500	10	15000	
	Chives	Container	Subirrigation	Soil	45	12	540	6.6	12	0.079	35	1500	10	15000	
	Rosemary	Container	Subirrigation	Soil	11	36	396	27.1	12	0.325	56	7200	6	43200	
	Chile peppers	Container	Subirrigation	Soil	11	36	396	27.1	12	0.325	56	7200	6	43200	
G4	Vegetables (variety)	Planter box	Hand	Soil	15	500	7500	19.8	N/A	0.238	42	75000	8	600000	**600000**

Annex 3

Figure 14. Estimated daily irrigation water requirements for possible suitable crops and growing systems. Source: full project proposal of the "Agrivolution" team presented at UrbanFarm 2021 ([1]).

Reference (visuals)

Figure 11. Municipality of Naples. (2020). Top view of area and structures of Massimo Troisi Park (where G=Greenhouse, OS=Open Space), location of the FoodE pilot in the city of Naples. [Image].

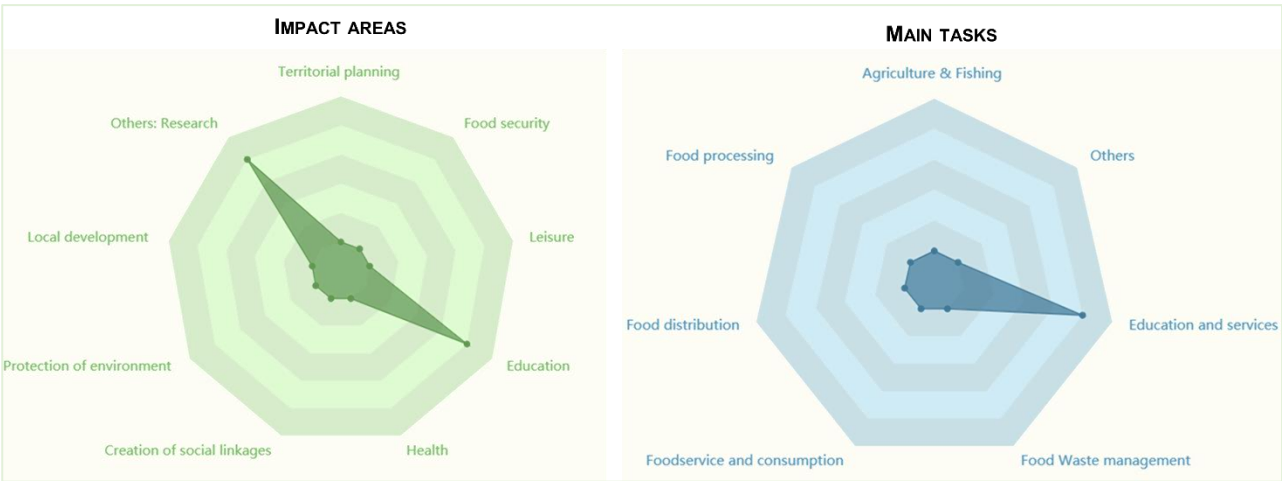
Figure 12. Amitrano, C., Coppola, G., El-Naggar, N., Iovane, M., Menichini, G., Waller, R., Rossitti. (2021). 3D view of the floating system in the greenhouse 1 (G1) proposed by the winning team "Agrivolution" within the student challenge UrbanFarm2021 [Image]. http://amsacta.unibo.it/6707/1/UrbanFarm2021.pdf

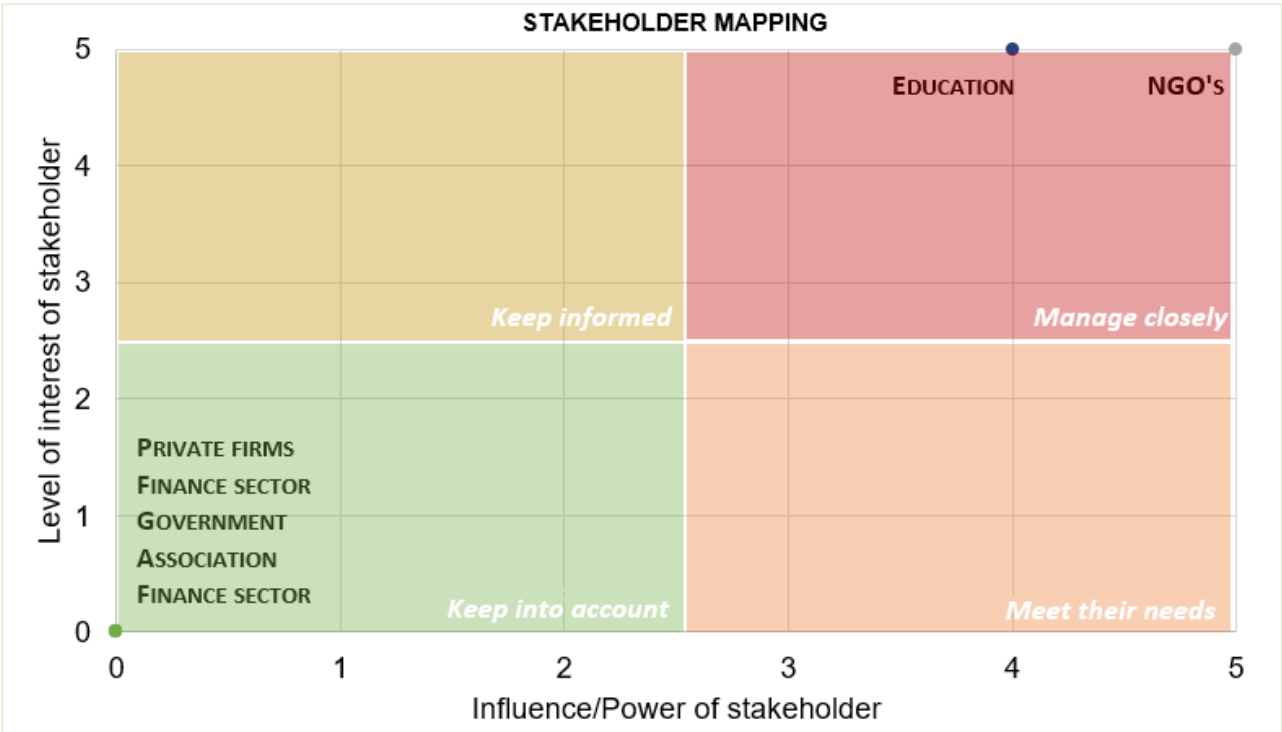
Figure 13. Amitrano, C., Coppola, G., El-Naggar, N., Iovane, M., Menichini, G., Waller, R., Rossitti. (2021). Crop production in G1 proposed by the winning team of UrbanFarm2021 “Agrivolution” for the co-design of FoodE Pilot in Naples. [Image]

Figure 14. Amitrano, C., Coppola, G., El-Naggar, N., Iovane, M., Menichini, G., Waller, R., Rossitti. (2021). Estimated daily irrigation water requirements for possible suitable crops and growing systems. Source: full project proposal of the “Agrivolution” team presented at UrbanFarm 2021. [Image]

Bologna (IT)

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





Background

Flytech Srl (Belluno, Italy) is an electrical engineering company specialized in the design and production of custom electronics for lighting systems in several, different contexts. In collaboration with University of Bologna, it conducted activities 1) in the definition of the optimal characteristics of light for indoor cultivation (e.g. Vertical farms) in a broad spectrum of horticultural, aromatic and medicinal species 2) as well as in the adaptation of crop management practices (irrigation, mineral nutrition and climate management) in indoor cultivation systems, with the main aim of maximizing the resource efficiency.

Vision

The main goals is to obtain an experimental, demonstrative, educational pilot project, co-designed with their future users. In particular, the pilot will focus on the creation of a new design indoor growing environment where students, professors, technicians of the University and, more in general, experts will be involved in activities of co-design, management, and education. There is a growing interest among students of different study degrees (agricultural science, architecture, design, engineering and others) towards the implementation of indoor farming systems. The pilot will allow to involve students in problem-based learning and hands-on activities to generate sustainable innovation in indoor farming technologies. The pilot will allow integrating 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. In addition, the project will investigate and foster sustainable food distribution as part of the direct sales program of the University of Bologna's experimental station.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

The pilot is located at the University of Bologna (Agricultural and Food Sciences) and it includes a vertical farm of 70 m² (Figure 19, Figure 21), for a total plant growing surface of 58 m², able to host more than 23'000 plants. The facility hosts two different zones, one dedicated to hydroponic cultivation and one to the aeroponic cultivation.

What is missing and which is the plan towards their completion

The main structure is complete and operations (together with the equipment) will be tested by the end of the summer (August-September 2021).

List of the main systems/equipment that are used (or will be used) in the pilot project

Inside the pilot, there will be the complete control of climate factors such as temperature, humidity and CO_2. Continuous data collection on water, energy and nutrient use will allow the monitoring of the environmental footprint of the system. The main systems and equipment's are listed below:

- Hydroponic system.
- Aeroponic system.
- LED lighting system (Flytech Srl) (Figure 18).
- Heating Ventilation Air conditioning (HVAC) system.
- CO_2 supply system.
- Sensors for climate control (temperature, CO_2 and humidity sensors).
- Closed-loop fertigation system.
- Digital tools and apps (e.g. Nido® for the fertigation, HVAC interface panel, Figure 20).
- Resource use control (e.g. energy meter).

What is missing and which is the plan towards their completion

Most of the major systems and equipment described above are ready, except for the LED lighting system, which will be ready in Autumn 2021.

List of the main services/activities that are offered (or will be offered) by the pilot project

The following activities will be offered by the pilot:

- Research activities.
- Education activities (possibility for bachelor and master students to perform their thesis and to participate in the implementation of the system).
- Dissemination events (workshops aimed at both the community of the University of Bologna and citizens to raise awareness of innovative indoor growing system and their potential in the context of urban agriculture).

What is missing and which is the plan towards their completion

The activities are planned but they will start only after the whole facility and systems are fully tested. The first activities that will start will be research activities followed by education and dissemination activities.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

The LED lights, the aeroponic system, the systematic control of environmental parameters through sensors (sensors for measuring the EC/pH, humidity, temperature, CO_2) and the nursery's installations (for high plant density and characteristics suitable for the young seedlings, Figure 19), are among the resulting ideas that will be implemented in the pilot. These resulting ideas were chosen because of their level of innovation and because they are well suited to the context and to the pilot's peculiarities. The ideas to be implemented must be in fact well suited to an experimental contest, allowing different experimental conditions to be set, while being commercially advantageous in order to be replicable on a commercial scale. Regarding the crops to be grown, two of the crop categories proposed by the student projects will be grown in the pilot: the aromatic and the medicinal plants. These two categories were chosen because, within a controlled environment that allows to steer the crop growing factors (such as a vertical farm), it is possible to increase their quality and thus increase the value of the product.

Do they need some adaptations in order to be realized? Which?

The ideas described need some adaptations that have been discussed with private firms (with which the University collaborates) in order to make them more suitable to the pilot in terms of space, efficiency and management of the system. In particular, regarding the growing system, both an aeroponic and hydroponic systems will be installed, in order to have two different case studies. LED lamps have been designed to be highly adaptable in terms of light intensity and spectrum qualities in order to have optimized light conditions for each type of crops and development stage.

Who will you involve in this implementation process?

Students, researchers and private firms will be involved in the implementation process.

- Students with different background will have the opportunity to perform their thesis in the pilot, collecting data and participating to the implementation of the pilot.
- Researchers will be able to carry out research aimed at optimizing plant production and the use of resources. In fact, on the basis of the survey that was circulated within the UNIBO community, a strong interest in participating in the implementation and research activities emerged from the two categories.

The idea is to involve various people from both UNIBO and other universities (even students who did not participate in the co-design activities) in order to facilitate the transfer of knowledge. Private firms will also be involved to provide technical support and to adapt the system to experimental research needs, while also making it suitable for a commercial scale. Collaboration with three companies has already started for the implementation process, other companies will be involved in later phases.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready and operative before M26 (T4.3).

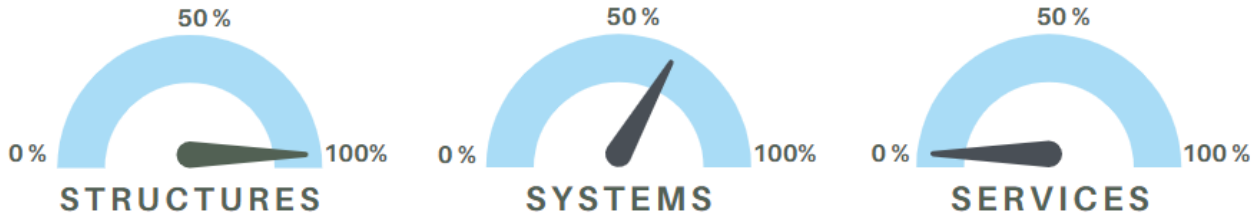


Figure 15. Readiness and functioning of structures, systems, services of the FoodE pilot in Bologna (ALMA VFarm: An Indoor Vertical Farm for growing Food, Competences and Innovation) on a scale 0 – 100% (where 0%: not ready, functioning, 100%: ready, operative).

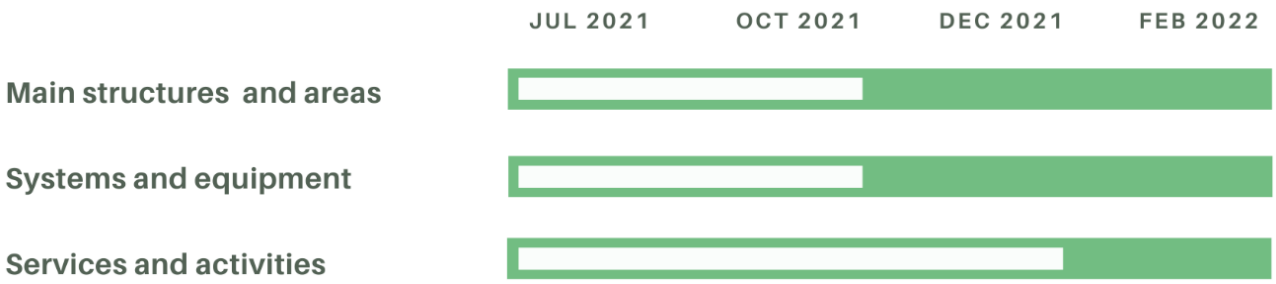


Figure 16. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Bologna (ALMA VFarm: An Indoor Vertical Farm for growing Food, Competences and Innovation).

Pilot team

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

Figure 17. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

Figure 18. Structures for layered production (left), equipped with LED lighting system (Flytech Srl) (left) of ALMA VFarm.

Figure 19. Production layers of one of the three nurseries of ALMA VFarm.

Figure 20. The interface of the heating, ventilation, and air conditioning unit (HVAC) of ALMA VFarm.

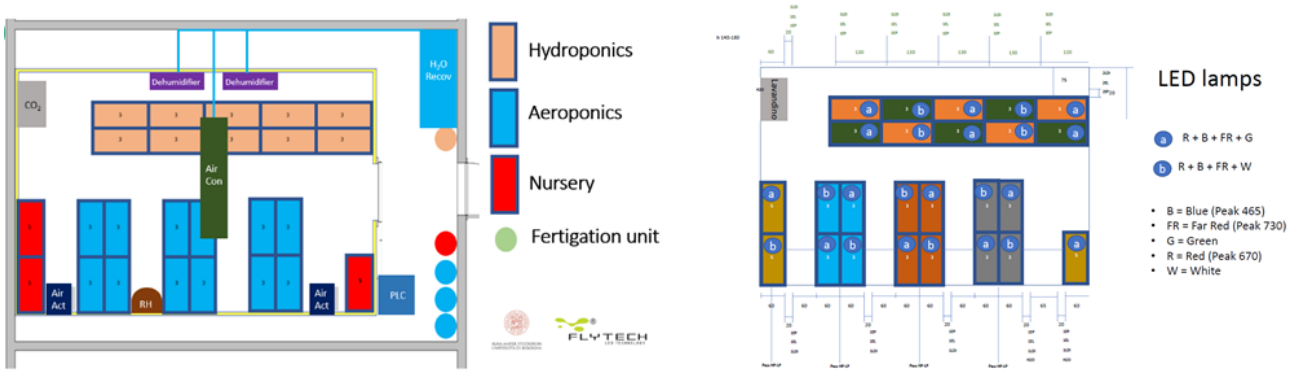


Figure 21. Plan (left) of the climate control chamber of ALMA VFarm and LED lamps (right).

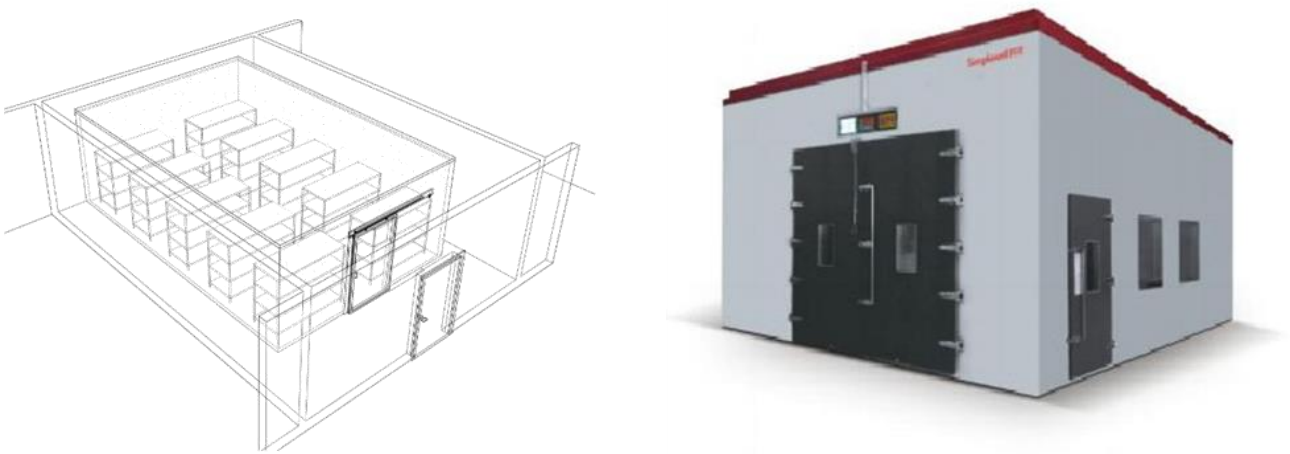


Figure 22. Isothermal chamber (Measures 830 x 566 x 290 h, Steel covered sandwich panels containing an expanded polyurethane foam inside, Sliding isothermal door (130 cm x 220 cm h).

Reference (visuals)

Figure 18. University of Bologna. (2021). Alma VFarm with structures for layered production equipped with LED lighting system supplied by Flytech. [Photograph]

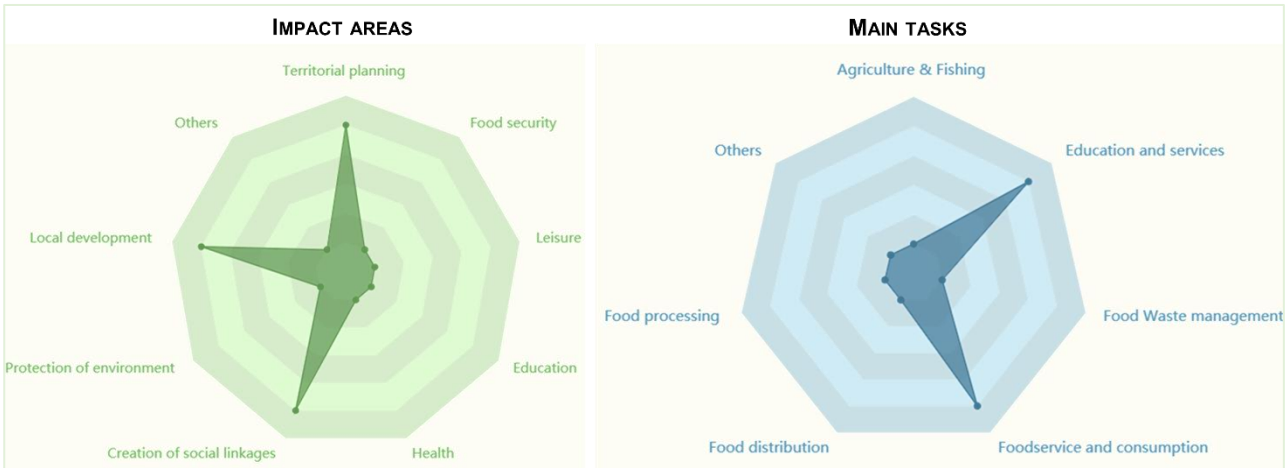
Figure 19. University of Bologna. (2021). Production layers of one of the three nurseries of ALMA VFarm. [Photograph]

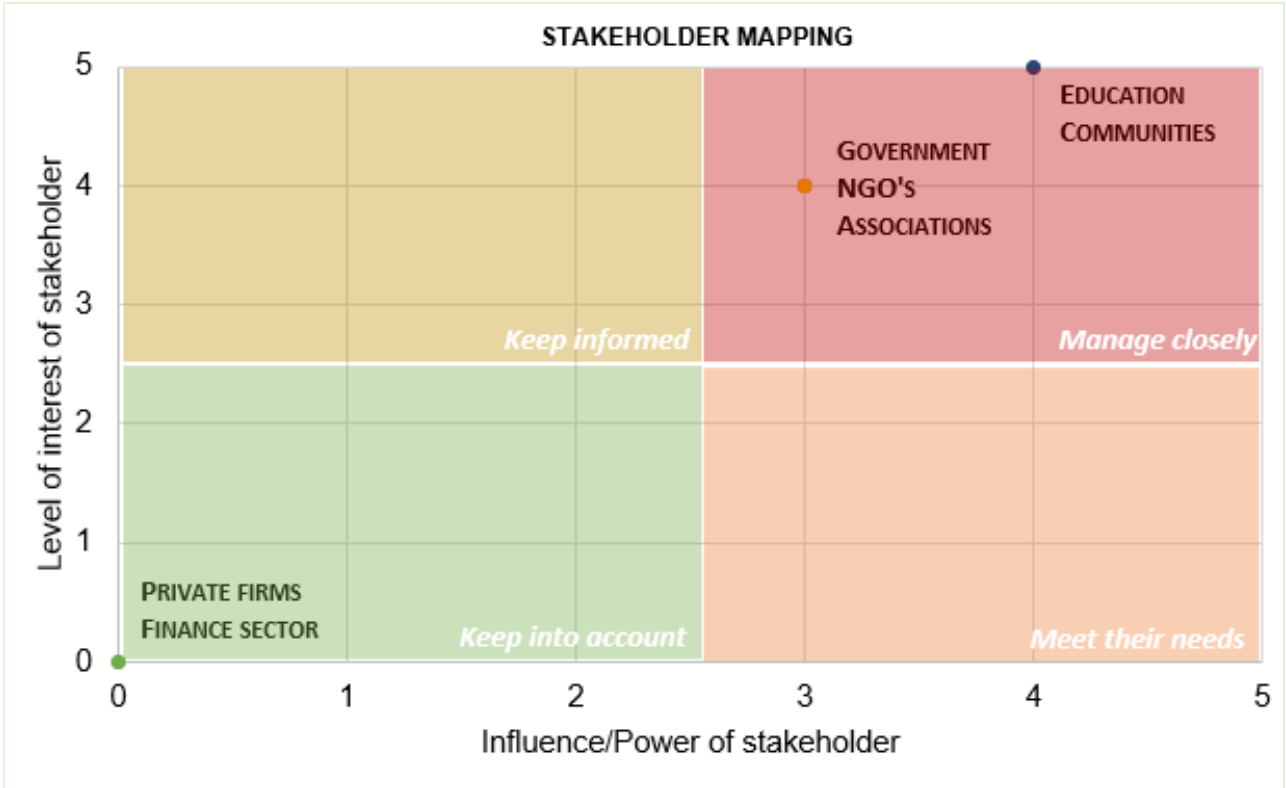
Figure 20. University of Bologna. (2021). The interface of the heating, ventilation, and air conditioning unit (HVAC) of ALMA VFarm.

Figure 21. University of Bologna. (2021). Plan of the climate control chamber of ALMA VFarm and LED lamps. [Image]

Figure 22. University of Bologna. (2021). Isothermal chamber representation of ALMA VFarm. [Image]

FoodE Pilot - Urban Farming at SALUS Space





Background

The Bologna city council owns an area which is undergoing regeneration 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 "SalusSpace" (winner of the UIA-Urban Innovative Actions program) coordinated by the Municipality of Bologna with the participation of 16 partners.

Vision

The area, where the private clinic Villa Salus once stood, has been recovered from abandonment and regenerated. 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 , above all, a community. The goal 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 of overcoming the logic of welfare by category.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

Salus Space consists of (Figure 28):

- cohousing building;
- a study centre;
- a conference room;
- 1 container restaurant/bar (Figure 27);
- 1 container emporium (Figure 27);
- 1 container for theatre workshops (Figure 27);
- 1000 m² of community garden;
- a multifunctional garden, designed based on the results of the co-design activities;
- a bio-pond for the collection of rainwater that will be used for fresh food production.

What is missing and which is the plan towards their completion

Structures and areas are almost complete. The multifunctional garden was already designed, but should be realized. The excavation for the bio-pond was already realized, but the waterproofing and filling works are still to be done. The works are on-time, according to the time-table, and will be finalized within M26.

List of the main systems/equipment that are used (or will be used) in the pilot project

For the pilot project, the following will be installed:

- 2 containers of 12 m length each, for the production of microgreens, baby leaves, mushrooms, seedlings for the garden.
- a rooftop garden for vegetable production and events on the 8.36 m² terrace of the study centre.

What is missing and which is the plan towards their completion

For the containers, several quotations have been already collected. Several inspections were organized to define the placement of containers and to bring essential services (water, electricity, etc.) to the site. For the rooftop garden, the terrace of the study centre is accessible, and the work is already planned for the next months. The works are on-time, according to the time-table, and will be finalized within M26.

List of the main services/activities that are offered (or will be offered) by the pilot project

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, it will be possible to taste the products grown thanks to the transformation directly inside the container restaurant.

To date, a series of cultural promotion and dissemination events on urban horticulture and soilless growing systems such as aquaponics, hydroponics and vertical farming have already been carried out involving more than 50 citizens.

What is missing and which is the plan towards their completion

Periodic events will continue to be organised to finalise the co-design process, and once the production systems are complete, training courses will be initiated.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

Co-design activities carried out for Salus Space included the international student challenge UrbanFarm2021. The pilot was in fact chosen as one of the locations to be redeveloped, and among the solutions presented by the students, it was decided to include in the project the proposal of the winning team "EcoSalus" for the arrangement of the central garden (Figure 26).

Moreover, in the last co-design session (a focus group with citizens and several stakeholders), the following ideas emerged and showed some potentials:

- Dedicate a space in the garden to grow lavender.
- Organize educational activities for the youngest children to be carried out in the garden.
- Include a rainwater harvesting system.
- Collaborate with other neighborhood gardens to create a seed bank.
- Create a network that involves different urban gardens and similar realities.
- Provide more information about the functioning of containers (advantages and disadvantages, taste of the products grown in containers, describe how pollination works as well as soil preservation and enrichment).

Do they need some adaptations in order to be realized? Which?

As regards the arrangement of the central garden, due to several limitations related to the space under consideration, the above-mentioned project will only be taken as a model and will need some future adjustments for its implementation.

Beyond the rainwater collection system, already installed in the co-housing building, the proposals emerged in the focus group, instead, will be shared in a second focus group with the inhabitants of Salus Space to establish which ideas/projects can be implemented based also on the needs and interests of the local community.

In addition, since most of the proposals that have emerged during the co-design activities, are related to the organization of events and networks, a discussion between the actors responsible for the pilot will be necessary to make them feasible in terms of space availability, resources and efficiency.

Who will you involve in this implementation process?

The subjects involved in the Temporary Association of Purpose, Salus Space citizens and the local community, researchers from the University of Bologna.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready and operative by the deadline M26 (T4.3).

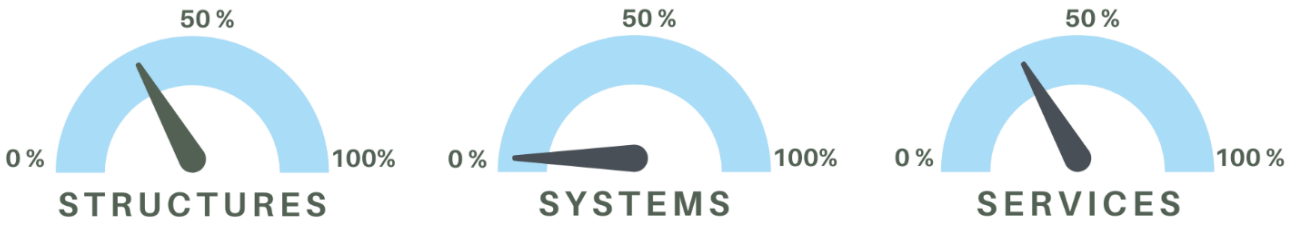


Figure 23. Readiness and functioning of structures, systems, services of the FoodE pilot in Bologna (Urban Farming at SALUS Space) on a scale 0 – 100% (where 0%: not ready, functioning, 100%: ready, operative).

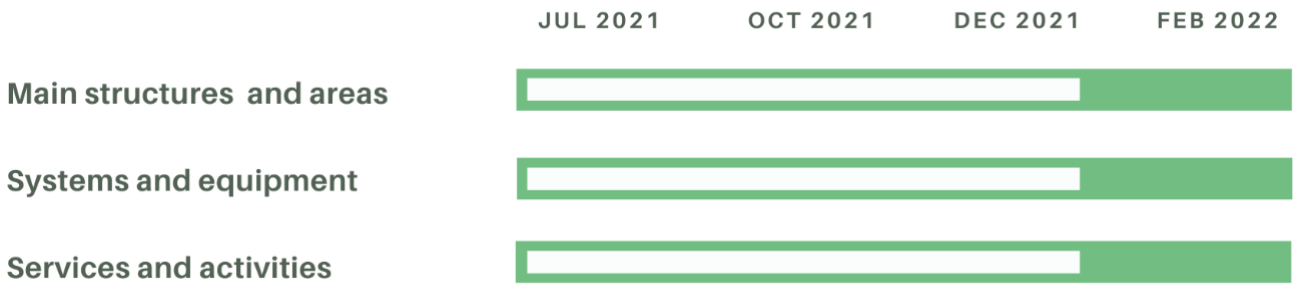


Figure 24. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in in Bologna (Urban Farming at SALUS Space).

Pilot team

Person name	Role	Institution
Inti Bertocchi	Pilot owner, Pilot Manager (1)	Municipality of Bologna
Francesco Lombardo	Pilot executor (1)	Aquaponic Design
Luca Settanni	Pilot executor (2)	Aquaponic Design
Gian Marco Tamborra	Pilot executor (3)	Aquaponic Design
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 25. 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.

Pictures

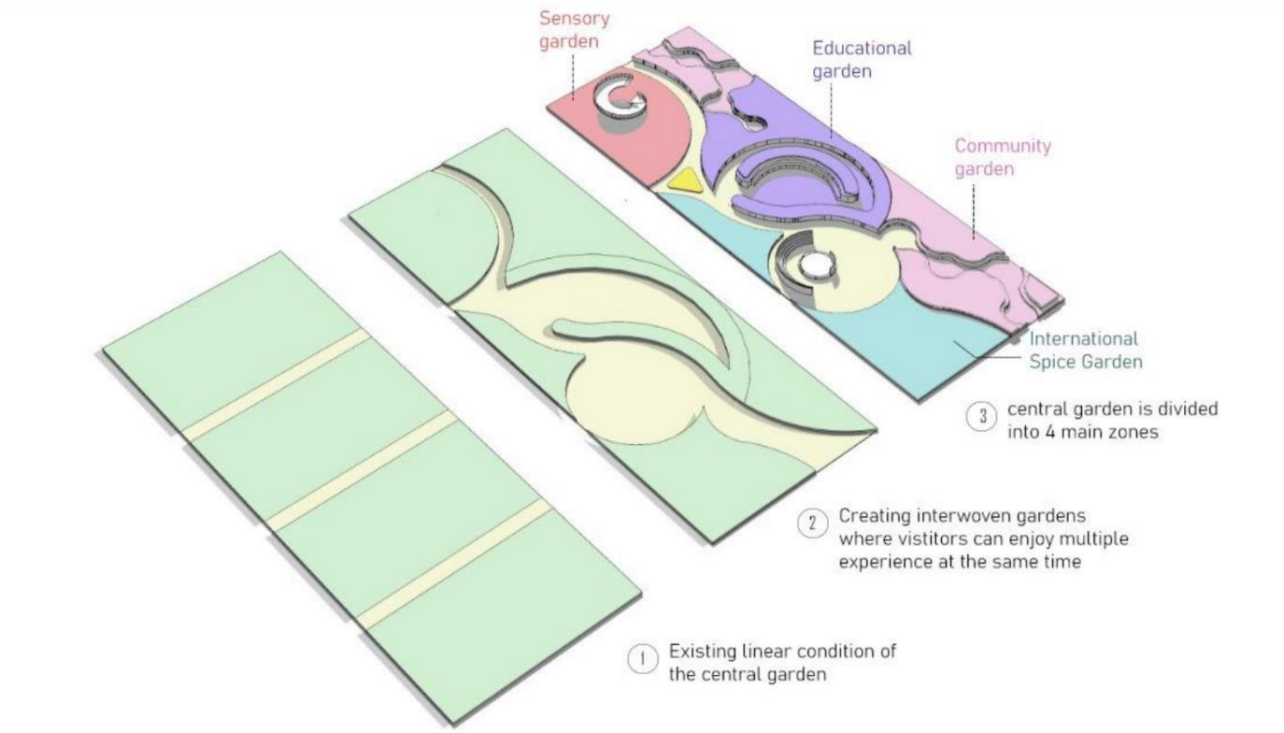


Figure 26. Project for the renovation of the central garden proposed by the winning team of UrbanFarm2021, "EcoSalus". It will be used as a model for the actual arrangement of this space.

Figure 27. Containers for bar/restaurant, workshops and emporium.

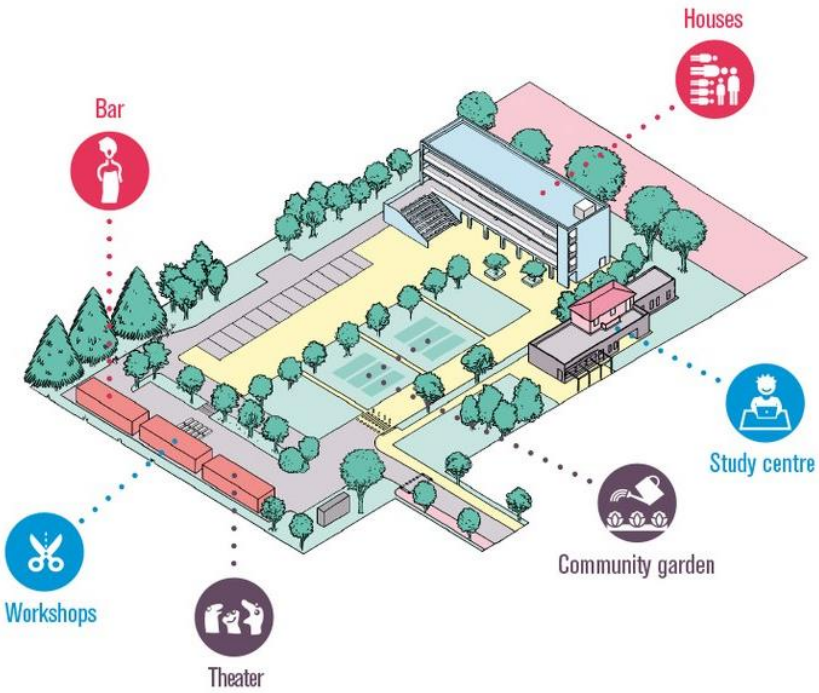


Figure 28. Plan of Salus Space including the different areas.

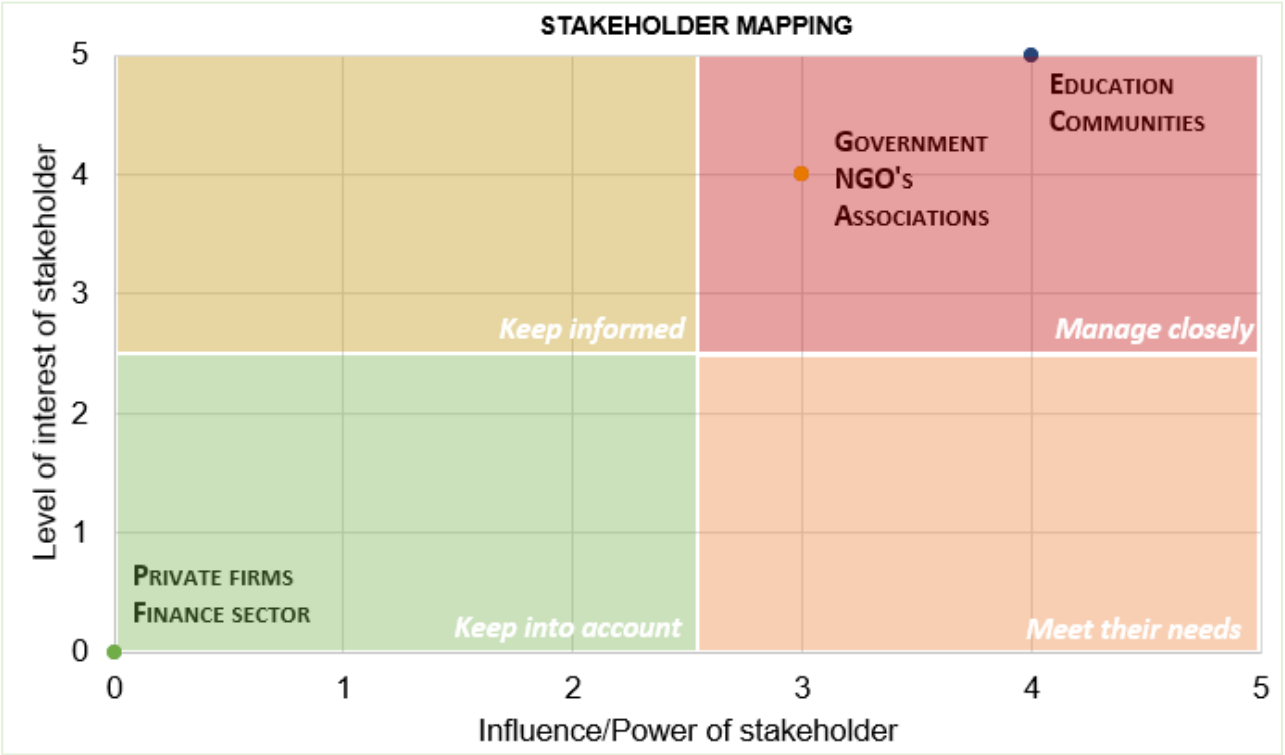
Reference (visuals)

Figure 26. Municipality of Bologna. (2021). Project for the renovation of the central garden proposed by the winning team of UrbanFarm2021, "EcoSalus" that will be used as a model for the actual arrangement of the FoodE pilot space. [Image]

Figure 27. Municipality of Bologna. (2021). Containers for bar/restaurant, workshops and emporium at Salus Space (front view). [Image]

Figure 28. Municipality of Bologna. (2021). Plan of Salus Space including the different areas. [Image]

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



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.

Vision

The pilot aims to strengthen and innovate the artistic and cultural proposal of the "Le Serre" by focusing on the creation of an artistic production center that connects the world of research (scientific and humanistic), the world of business and the world of art around the great challenges of our time: sustainability and climate change.

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 and educational events) while also raising their awareness of food production and safety. The greenhouses will therefore be transformed into an even larger ecosystem: from a hub that hosts seasonal programming to a center of artistic-cultural production, with the activation of permanent laboratories in which artistic investigation helps to understand complexity and build positive imaginaries that guide actions for change. A synergistic, inclusive and participatory approach where environmental sustainability and culture dialogue, to imagine a desirable and sustainable future.

In the large outdoor area an above-ground bio-lake will be created for the treatment of rainwater depurated by plants, connected to the aquaponic cultivation system. It will be a model of circular economy in symbiosis with the ecosystem and, at the same time, functional to spread a virtuous model of above-ground cultivation with high yield and low waste of resources.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

- Event space. An area of experimentation and openness, dedicated to events for debates, conferences, workshops, artistic and cultural productions on issues of 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 (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.
- Concept store. A corner dedicated to sustainability, environment, food and art, where visitors can find small quality productions, seeds of ancient crops and editorial products aimed at the dissemination of the values behind the project, with an adjoining point of administration functional events.
- Bio-lake. In the large outdoor space an above-ground bio-lake will be created for the treatment of rainwater phyto-depurated by plants, connected to the aquaponic cultivation system, a model of circular economy in symbiosis with the ecosystem of the greenhouses and, at the same time, functional to spread a virtuous model of above-ground cultivation with high yield and low waste of resources.

- **Aquaponic garden**. The old seedbeds will be transformed into new seats surrounded by greenery, in direct contact with the tanks dedicated to aquaponics, all within a regenerated garden that will expand the spaces accessible to the public dedicated to relaxation, leisure and cultural events.

What is missing and which is the plan towards their completion

The load-bearing frame of the future structure of Serra Madre is already in place and will undergo a major redevelopment process in order to accommodate all the new services that will be offered.

The work on the facilities is expected to begin in September 2021. Dissemination events and cultural workshops are ongoing in the community garden and the small aquaponic system created within it.

The following structures are already present:

- the community vegetable gardens
- the vegetarian and vegan restaurant
- the coworking space, the nursery
- a very large space all around the Greenhouses of Giardini Margherita open to all and equipped with power outlets and free wi-fi.

List of the main systems/equipment that are used (or will be used) in the pilot project

As part of the Serra Madre project, highly innovative vertical cultivation systems will be installed that will allow to optimize the production for the restaurant despite the limited space available. 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 cm” since they will be produced through aquaponics systems.

What is missing and which is the plan towards their completion

The above-ground growing systems requires the construction of a highly automated greenhouse that promotes targeted climate control. In addition, the rainwater harvesting system in an emerged bio-lake will allow winter rainfall to be stored so that water use can be optimized during the warmer months. It will be possible to cultivate all year round and cover the entire needs of the restaurant already present in the production of leafy vegetables thanks to the vertical cultivation systems. Work on Serra Madre will begin in autumn 2021.

List of the main services/activities that are offered (or will be offered) by the pilot project

Serra Madre will offer citizens the opportunity to get in touch with and learn about above-ground growing systems such as aquaponics, hydroponics, and bioponics. In addition, thanks to the shared garden, it will be possible to spread the importance of biodiversity and ecological systems with agro-system function.

These training paths will be activated through targeted and professional training courses as well as dissemination events open to all.

Finally, the schools of the Municipality of Bologna will be involved in order to encourage the spread of these topics among children.

What is missing and which is the plan towards their completion

Inside Serra Madre, the following activities will be activated:

- Cultural events (e.g. concerts, screenings, presentations, focus groups).
- Themed meals (e.g. intercultural menus with typical products).
- Professional training courses.
- Free workshops for all.
- Sensory paths and awareness of environmental and food issues.

Integrating the outcomes of the co-design activities

The pilot project Serra Madre joined the FoodE program in spring 2021, therefore co-design activities have not been carried out yet. However, they are included in the calendar of activities for October-December 2021. In particular, they will be co-design workshops and/or focus group for the design of the aquaponic gardens and the whole area surrounding the emerged bio-lake.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that the pilot won't be 100% ready by the deadline M26 (T4.3). This is due to the fact that the pilot project "SERRA MADRE" joined the FoodE program in spring 2021, as mentioned in the previous section. However, part of the activities will still be able to start in the current pilot state while the incomplete facilities and systems will be ready in spring of 2022.

Figure 29. Readiness and functioning of structures, systems, services of the FoodE pilot in Bologna (Serra Madre: A food hub for education, leisure and urban farming innovation) on a scale 0 – 100% (where 0%: not ready, functioning, 100%: ready, operative).

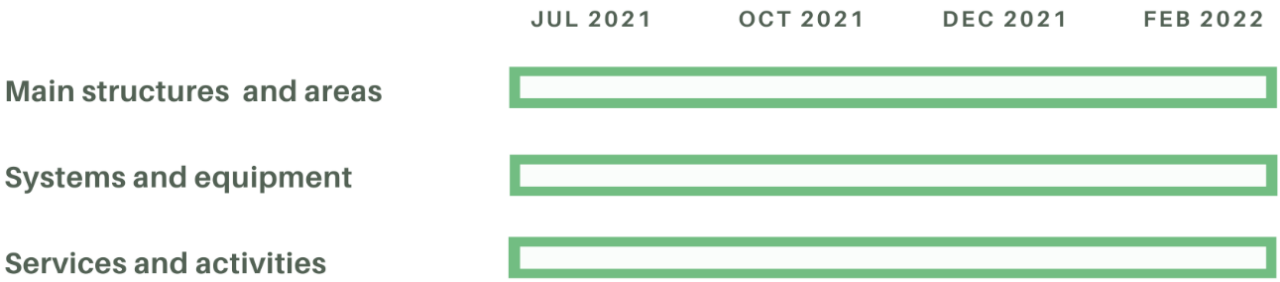


Figure 30. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Bologna (Serra Madre: A food hub for education, leisure and urban farming innovation).

Pilot team

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
Elisa Frasnetti	Pilot execution supporter, Pilot communicator (1)	University of Bologna

Laura Carotti	Pilot execution supporter, Pilot communicator (2)	University of Bologna

Figure 31. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

Figure 32. 3D views of the multifunctional greenhouse.

Figure 33. *3D view of the above-ground bio-lake and the aquaponic garden.*

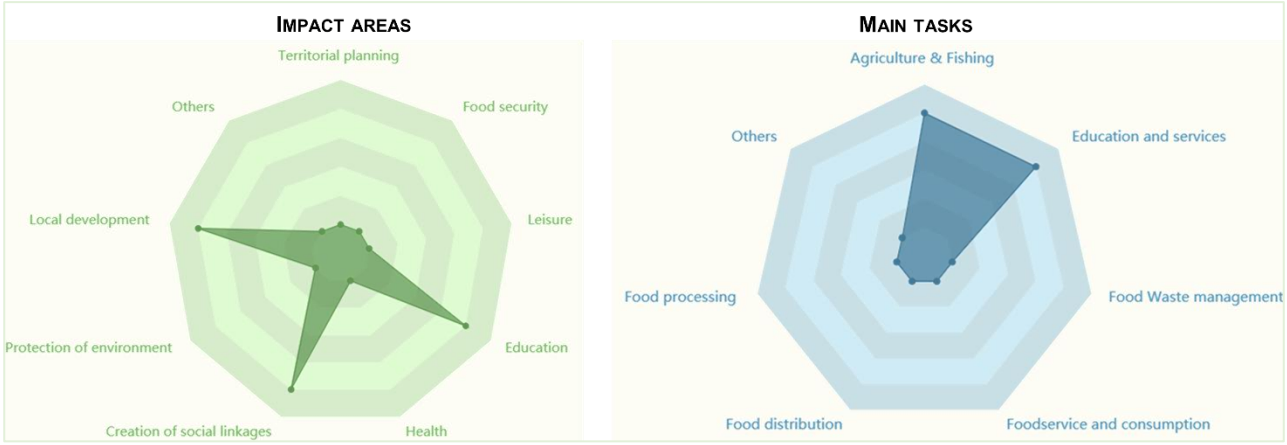
Reference (visuals)

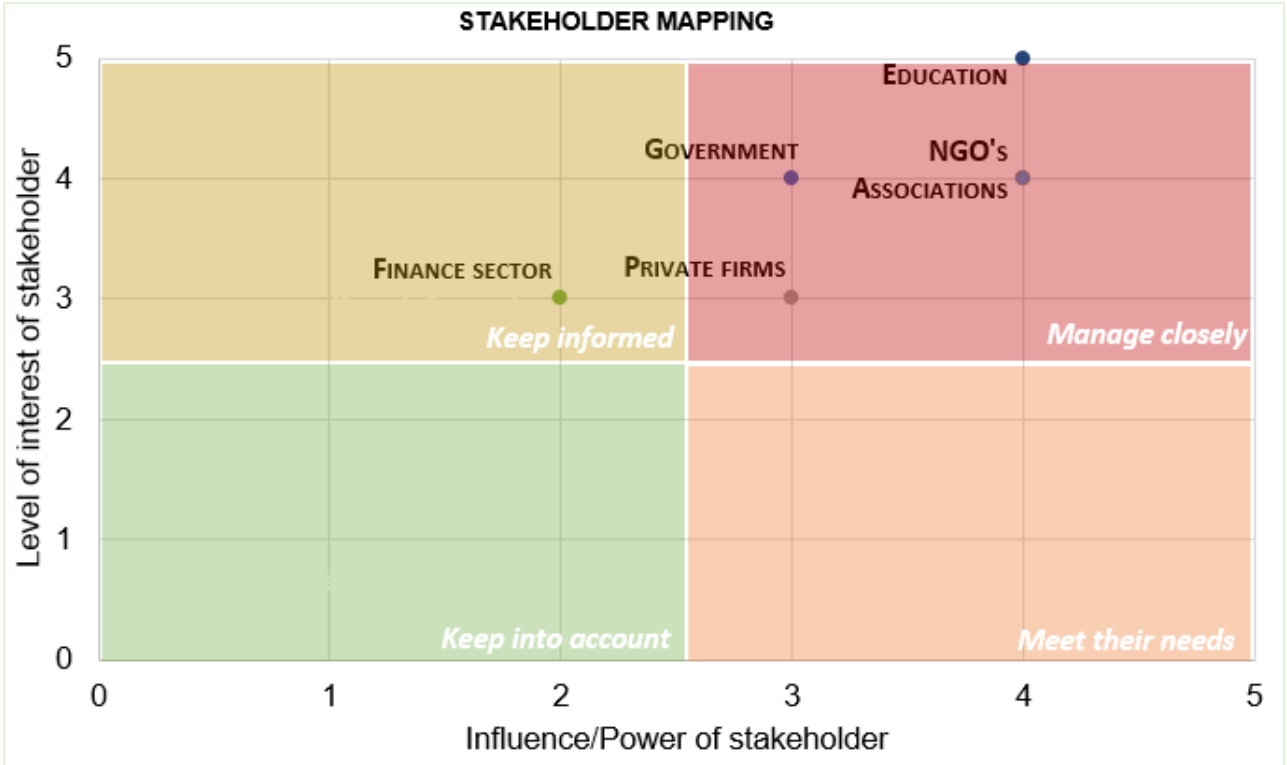
Figure 32. Kilowatt. (n.d.). 3D views of the multifunctional greenhouse of Serra Madre pilot. [Image].

Figure 33. Kilowatt. (n.d.). 3D view of the above-ground bio-lake and the aquaponic garden of Serra Madre pilot. [Image].

Sabadell (SP)

FoodE Pilot - Urban agricultural park for participatory agricultural test spaces





Background

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 and "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 also a vineyard which is currently managed by a cooperative for social inclusion. In the same region, UAB has conducted several projects associated with innovative growing systems in the urban environment, as well as sustainability assessment of various farming systems.

Vision

The pilot will convert 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.

The Sabadell City will be found on three separate locations:

- Ripoll River
- Parc Agrari
- Hort urbà

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

- Parc Agrari pilot plot. The Agricultural Park pilot already presents the soil prepared for cultivation (green fertilizer), the floral margin (for preservation of beneficial insects) and the primary irrigation system (with small modifications to be made in the coming months). In the participatory processes, crop distribution has been decided on several plots (productive and demonstrative of traditional varieties) with a total area of approximately 15,000 m^2 (Figure 37).
- Ripoll River pilot plot. It will be developed within a municipal garden that is already working. Two plots of approximately 90 m^2 will be used each with a total of 180 m^2 of demonstration garden (Figure 39).
- 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 m^2 and it is planned to start the pilot with half of this surface (1.000 m^2). The plot is bordered by a perimeter fence with access control and has natural soil and water for irrigation (Figure 40).

What is missing and which is the plan towards their completion

There are no infrastructures pending for the pilot development. The city council is in the process of building an agricultural warehouse (planned for 2022) that will help the project, but at the moment it is not necessary for its launch.

List of the main systems/equipment that are used (or will be used) in the pilot project

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 38).
- Primary irrigation system (at the beginning of the plot).

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.

What is missing and which is the plan towards their completion

For the pilots of the Agricultural Park and Horta del Ripoll, almost all the systems and equipment's are available, only a small programmer and the secondary irrigation system are needed. In addition, there is the need to buy some field tools, organic fertilizers, seeds etc. For urban garden pilot, it is necessary to buy some more equipment's such as tanks, materials for the primary, secondary irrigation system as well as irrigation programmers, organic fertilizers etc.

List of the main services/activities that are offered (or will be offered) by the pilot project

The activities that are planned to take place are:

- Educational activities: open days of pilots; workshops on food waste and UAB bachelor's degree final project.
- Productive activities: tests with traditional varieties; production of horticultural crops with traditional, local varieties.
- Research activities in collaboration with UAB, focused on local production and food waste.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

Some of the ideas resulting from the participatory process clearly link with the general objective set out in the FoodE project. Specifically:

- for the Agricultural Park (Can Gambús): making two cultivation areas (productive and demonstrative) considering traditional varieties and respectful cultivation techniques (biological control of pests, biodegradable padding, deficient irrigation, etc.).
- For the pilot Horta del Ripoll: promoting organic production (also reducing water and fertilizers) among the city's horticulturists
- For the urban garden in the city centre: creating educational and productive orchards (for self-consumption), promoting the collaboration with chefs, local neighbourhood associations and schools in the surrounding area.

Do they need some adaptations in order to be realized? Which?

Large modifications of the pilot plots are not necessary since the solutions that have been adopted can be easily adapted to the existing situation.

In some cases, it is possible that some time is required in order to obtain all the species in the beginning of the pilot (because of the cultivation period).

Who will you involve in this implementation process?

In the co-creation activities have participated, among others, the members of the pilot team, UAB researchers, students (university and secondary), agriculture promotion associations, consumer cooperatives, citizen associations, sellers of agroecological products, associations against food waste, etc.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready by the deadline M26 (T4.3).

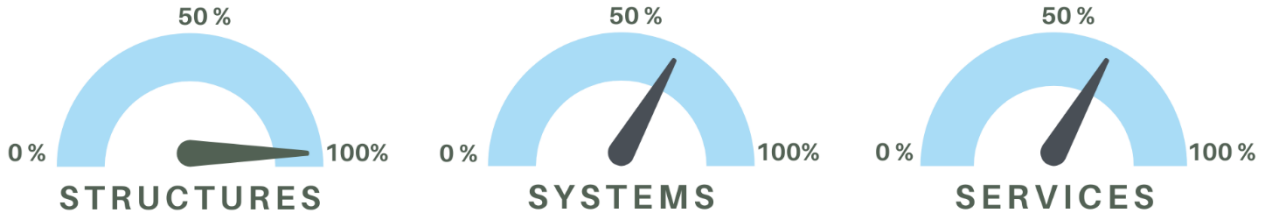


Figure 34. Readiness and functioning of structures, systems, services of the FoodE pilot in Sabadell (Urban agricultural park for participatory agricultural test spaces) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

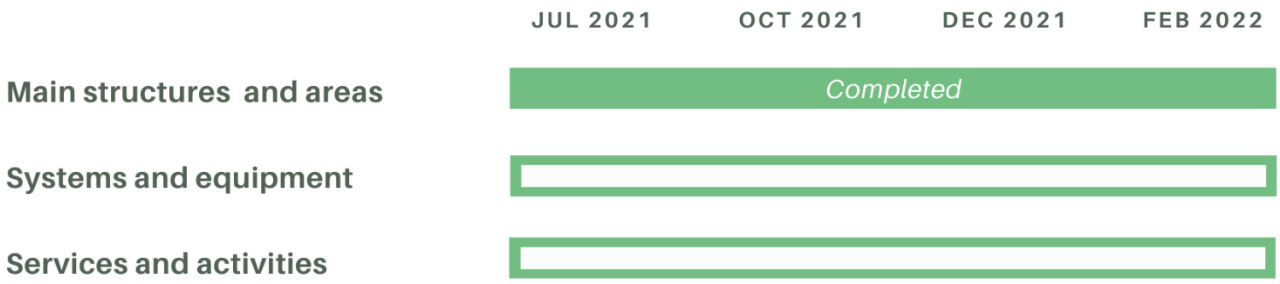


Figure 35. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Sabadell (Urban agricultural park for participatory agricultural test spaces).

Pilot team

Person name	Role	Institution
Pere Muñoz	Pilot owner/leader	Ajuntament de Sabadell
Cristina Buscarons	Pilot executor (1)	Ajuntament de Sabadell
Isabel Lleonart	Pilot executor (2)	Ajuntament de Sabadell

Figure 36. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

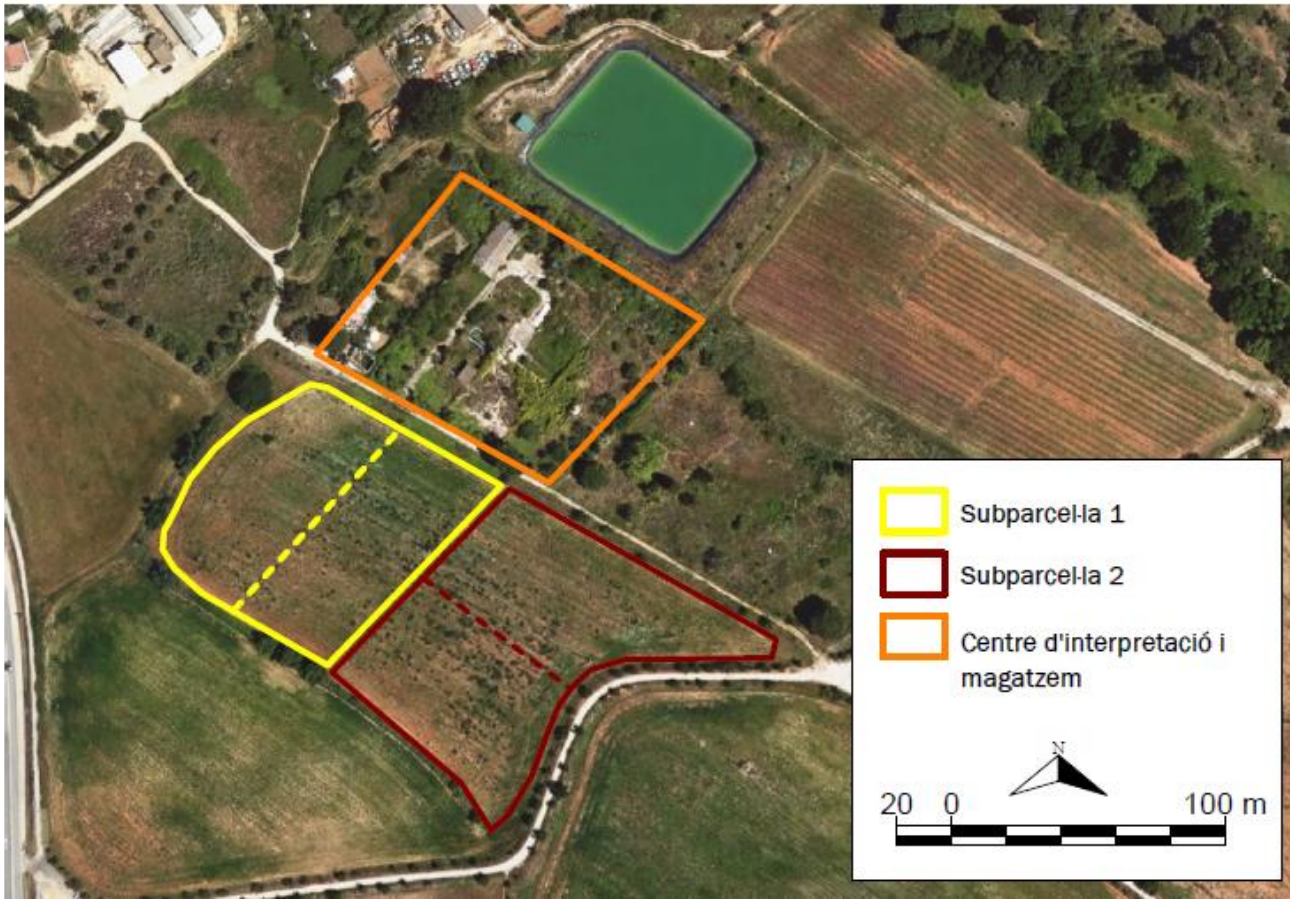


Figure 37. Distribution of plots proposed by the Parc Agrari pilot (yellow: subplot 1, red: subplot 2, orange: demonstration center and storage room).

Figure 38. Installation of the floral margin and overview of Parc Agrari (Can Gambús) pilot with green fertilizer.

Figure 39. Detail of the Horta del Riu Ripoll (Horta de Can Bages) with one of the plots where the pilot will be developed.

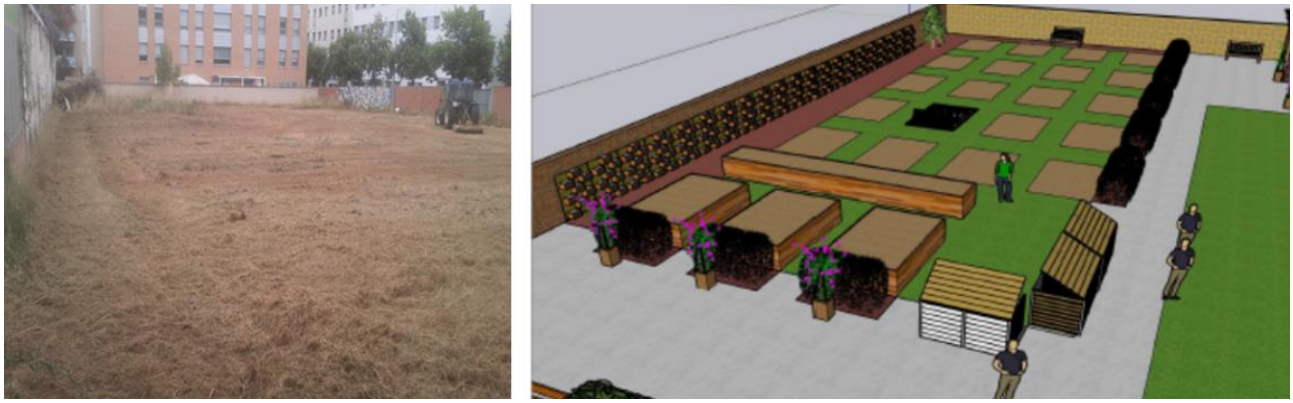


Figure 40. Detail of the urban plot in which the third pilot will be developed and design proposal for the productive orchards.

Reference (visuals)

Figure 37. 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 38. Municipality of Sabadell. (2021). Installation of the floral margin and overview of Parc Agrari (Can Gambús) pilot with green fertilizer. [Photograph]

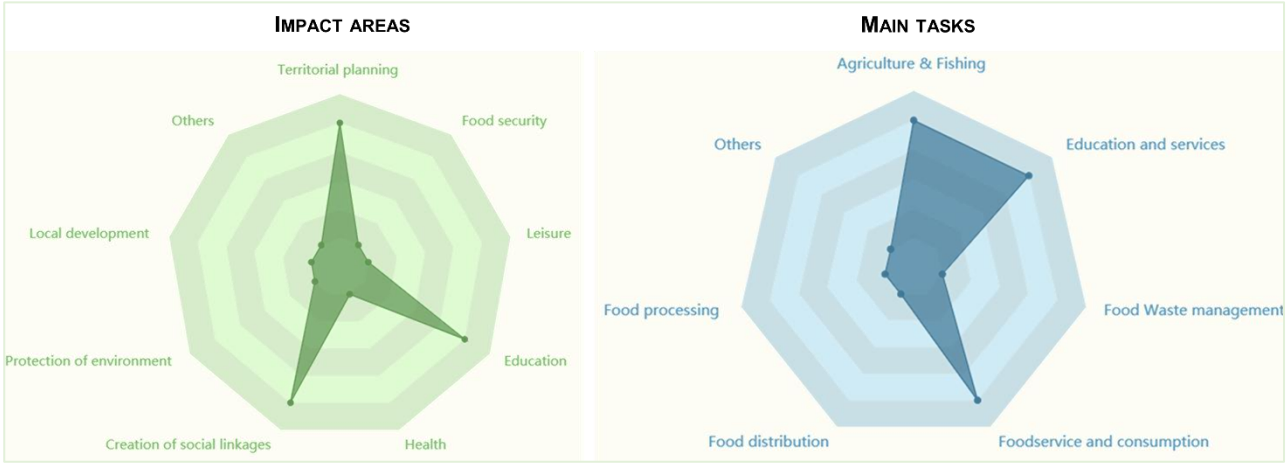
Figure 39. Municipality of Sabadell. (2021). Detail of the Horta del Riu Ripoll (Horta de Can Bages) with one of the plots where the pilot will be developed. [Photograph]

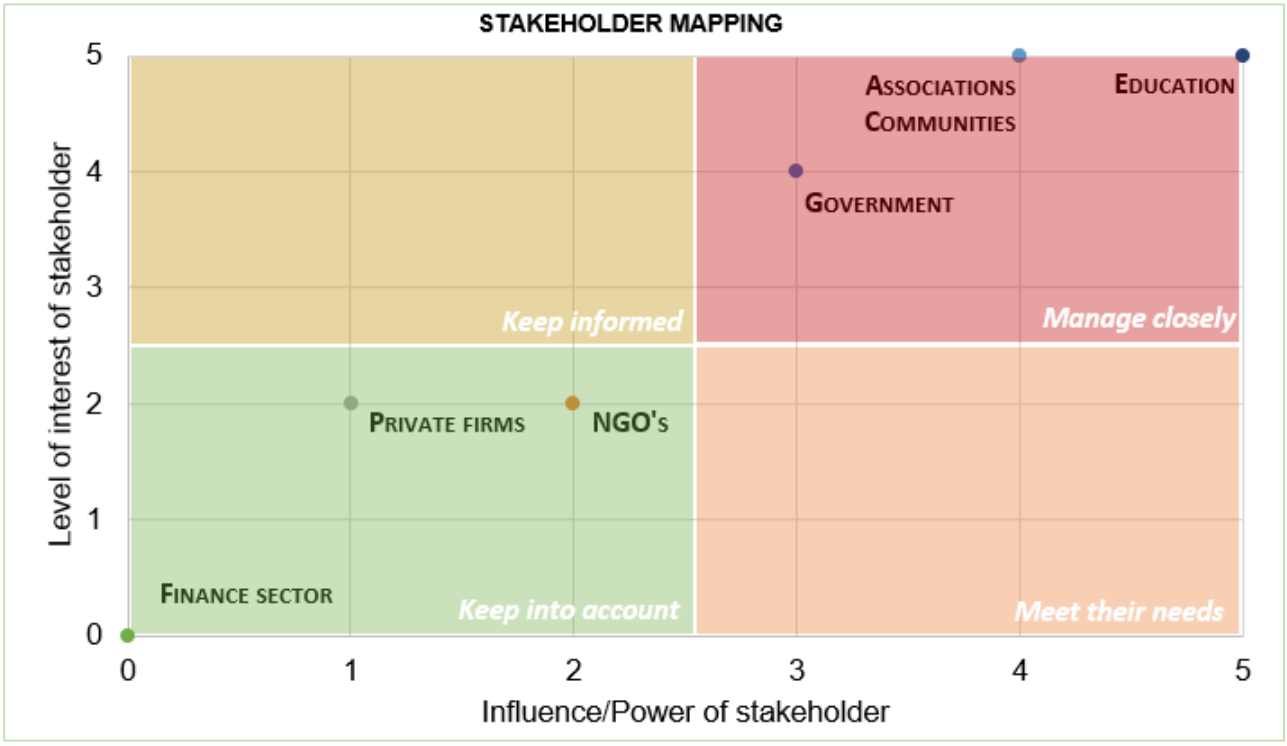
Figure 40 (left). Municipality of Sabadell. (2021). Detail of the urban plot in which the third pilot will be developed and design proposal for the productive orchards. [Photograph]

Figure 40 (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]

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.





Background

The Cité Maraîchère is a vertical greenhouse devoted to urban agriculture (700 m^2 for market garden production in boxes and 130 m^2 in the basement for mushrooms and French endive production). Its challenges: bring out a new way of eating in a popular area located near the city center; raise awareness and offer workshops on sustainable food, nature in the city and eco-citizenship; develop vocational training and promote social inclusion by setting up an integration project.

The vertical market garden city hosts various equipment and activities such as a professional kitchen, a café-canteen, educational spaces, workshops for all audiences, meeting and cultural events, educational gardens and a collective compost.

The Cité Maraîchère is a municipal facility serving inhabitants and stakeholders in the social and solidarity economy. Market gardening and animation services are provided by teams of integration employees of the new Communal Agency for Ecological and Solidarity Transition and the café-canteen will be operated, from the summer of 2021, by an external partner. While the market gardening activities began in January 2021, the first educational activities will be launched in spring 2021, initially with City departments and a participatory worksite with residents for the outdoor spaces.

Vision

The social project is to educate citizens to ecology and sustainable food, and supply fresh and local products at affordable prices for inhabitants.

The agronomic project is to test market gardening in boxes, without synthetic chemical inputs and with a circular substrate (composed of crushed cellular concrete from construction waste, compost and mushroom cultivation waste). 753 boxes have been installed in the two vertical greenhouses of the Cité Maraîchère. These operate without heating or artificial light, with natural ventilation and a drip watering controlled by a programmable system.

Market gardening production will be seasonal, varied and with common species (fruits vegetables, leaf vegetables, berries, aromatics). In the basement will be cultivated oyster mushrooms, shiitake and French endives.

As part of the FoodE project, the Cité Maraîchère is at the same time a demonstrator, a place of awareness raising and an event organizer.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

Two vertical greenhouses which can accommodate 700 m² of agricultural exploitation. They include (Figure 44):

- The modular space (110 m^2).
- The professional kitchen (23 m^2 and 50 m^2 basement).
- The café-canteen (50 m² space is made up of a 40-seat dining room and a bar), Figure 45.
- The educational greenhouse (90 m^2), Figure 46.
- A belvedere room (upstairs, 36 m^2).
- Mushroom cultivation (in the basement).

Outdoor spaces:

- 6 thematic educational gardens (85 m^2) 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 will collect waste related to educational activities. Its access and waste inputs will be regulated: the bins will be closed with a padlock and are only open during weekly service hours or during the day.

What is missing and which is the plan towards their completion

The restaurant's opening, finalization of the educational gardens and of the table for edible landscaping ("la Végétable") and consolidation of the economic model with elected officials.

List of the main systems/equipment that are used (or will be used) in the pilot project

Greenhouse climate and irrigation control system and equipment (vents for aeration, programmable drip irrigation, 753 soilless culture containers, blackout screens), growing media, collective compost, "la Végétable" (a table for edible landscaping), software for selling vegetables, spaces for employees (offices, locker rooms, etc.), a cargo bike.

List of the main services/activities that are offered (or will be offered) by the pilot project

- Catering service (restaurant).
- Educational activities (e.g. educational garden).
- Events.
- Rooms' rental.
- Food production activities. Leafy vegetables, fruit vegetables, berries, seasonal aromatic plants are grown in 753 soilless culture containers. In the basement, a 130 m² offers ideal conditions for growing oyster and shiitake mushrooms, and endives.
- Collective compost.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

The participatory workshops (D4.2, [3]) 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 Végétable" (the table for "edible landscaping") (Figure 47).

In addition, during the international challenge UrbanFarm 2021, three groups of students worked on the co-creation 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 that will be explored by the pilot team for their implementation (e.g. the diversification of the food processing activities and optimization of the spaces).

Do they need some adaptations in order to be realized? Which?

They will mainly need adaptation to accommodate the available budget and meet political approval of the Municipality.

Who will you involve in this implementation process?

The pilot team, together with citizens and financial partners.

Readiness level and time plan

The full activities will start in September 2021 with the opening of the restaurant. Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready before the deadline of M26 (T4.3).

Figure 41. Readiness and functioning of structures, systems, services of the FoodE pilot in Romainville (The Cité Maraîchère: vertical farm, educational gardens, sustainable and social food, market gardening and mushrooms production, circular innovation and short food chain) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

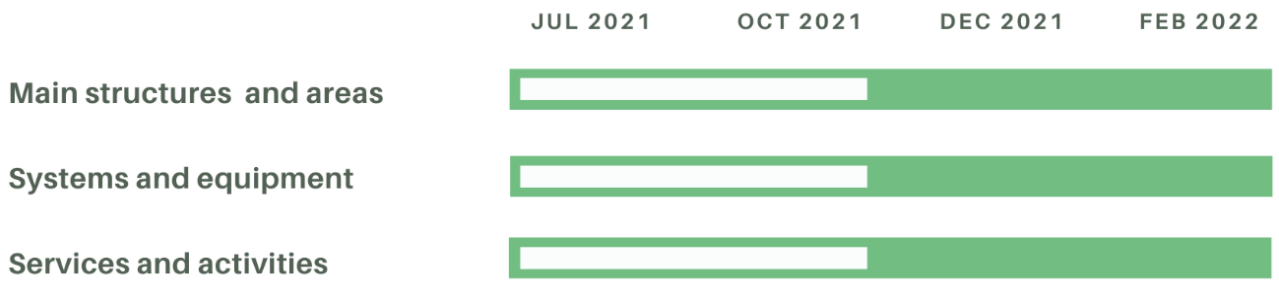


Figure 42. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Romainville (The Cité Maraîchère: vertical farm, educational gardens, sustainable and social food, market gardening and mushrooms production, circular innovation and short food chain).

Pilot team

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
Sandra Carvalho	Pilot communicator	Commune de Romainville

Figure 43. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

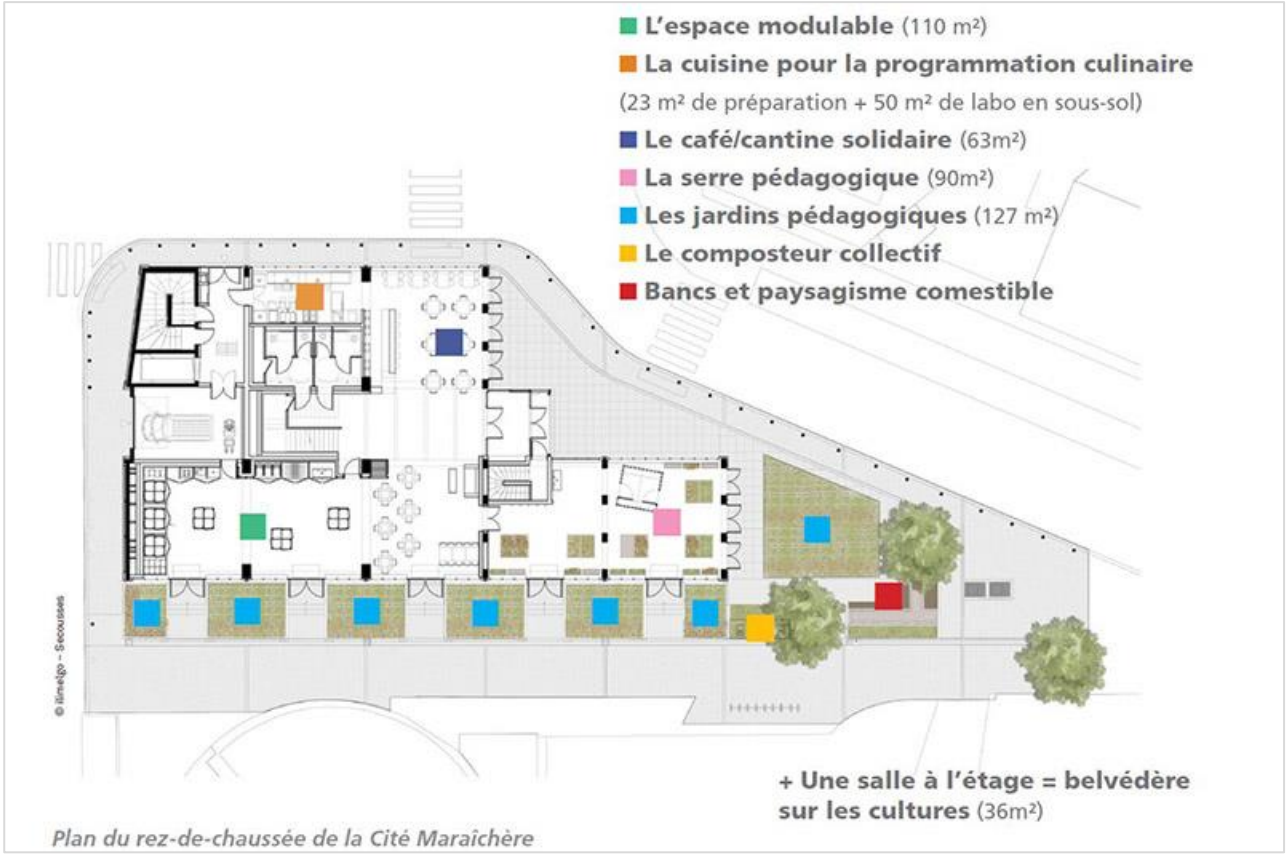


Figure 44. Ground floor plan of Cité Maraîchère.

Figure 45. View from the 6th floor of the greenhouse production area (left) and the café-canteen (right).

Figure 46. The educational greenhouse (left) and educational space (right).

Figure 47. Prototype and realization on- site of "la Végétable" (the table for "edible landscaping") at the Cité Maraîchère.

References (visuals)

Figure 44. Commune de Romainville. (2021). Ground floor plan of la Cité Maraîchère [Image]. https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html

Figure 45 (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 45 (right). Commune de Romainville. (2021c). The café-canteen of The Cité Maraîchère [Photograph]. https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html

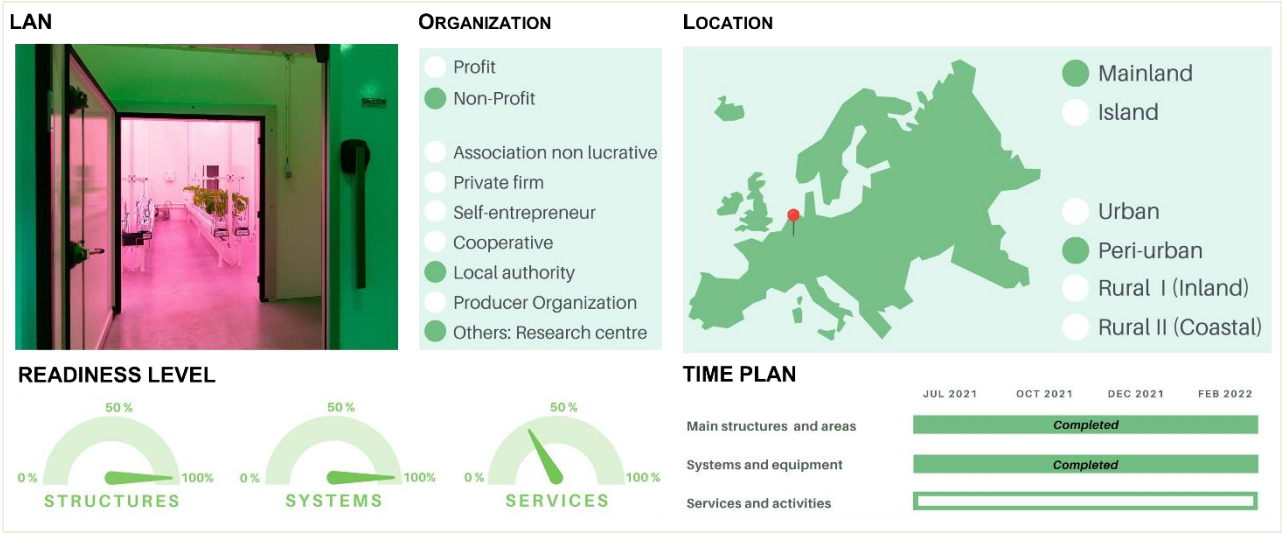
Figure 46 (left). Commune de Romainville. (2021d). The educational greenhouse of The Cité Maraîchère [Photograph]. https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html

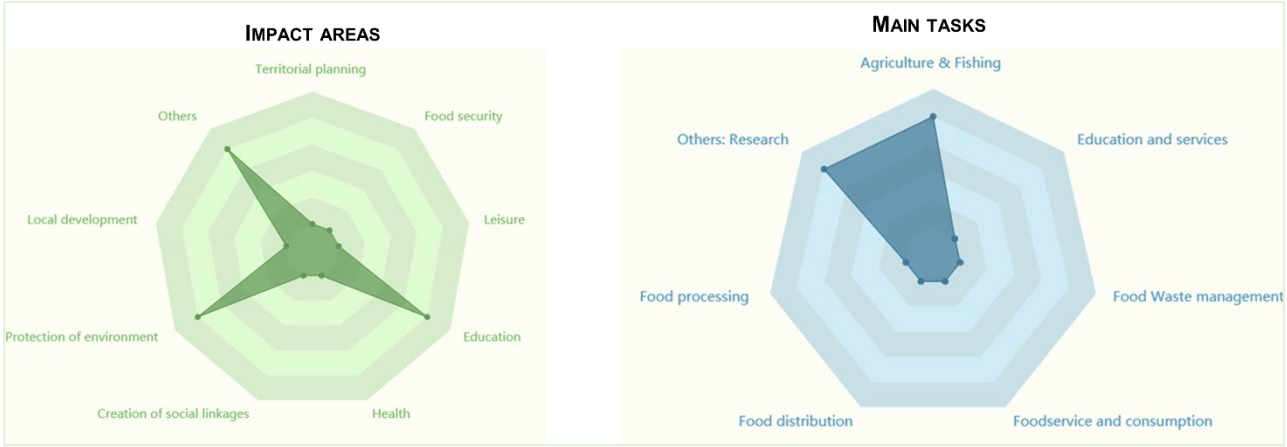
Figure 46 (right). Commune de Romainville. (2021e). The educational space of The Cité Maraîchère [Photograph]. https://www.lacitemaraichere.com/multiplicite-espaces-cite-maraichere-pxl-38.html

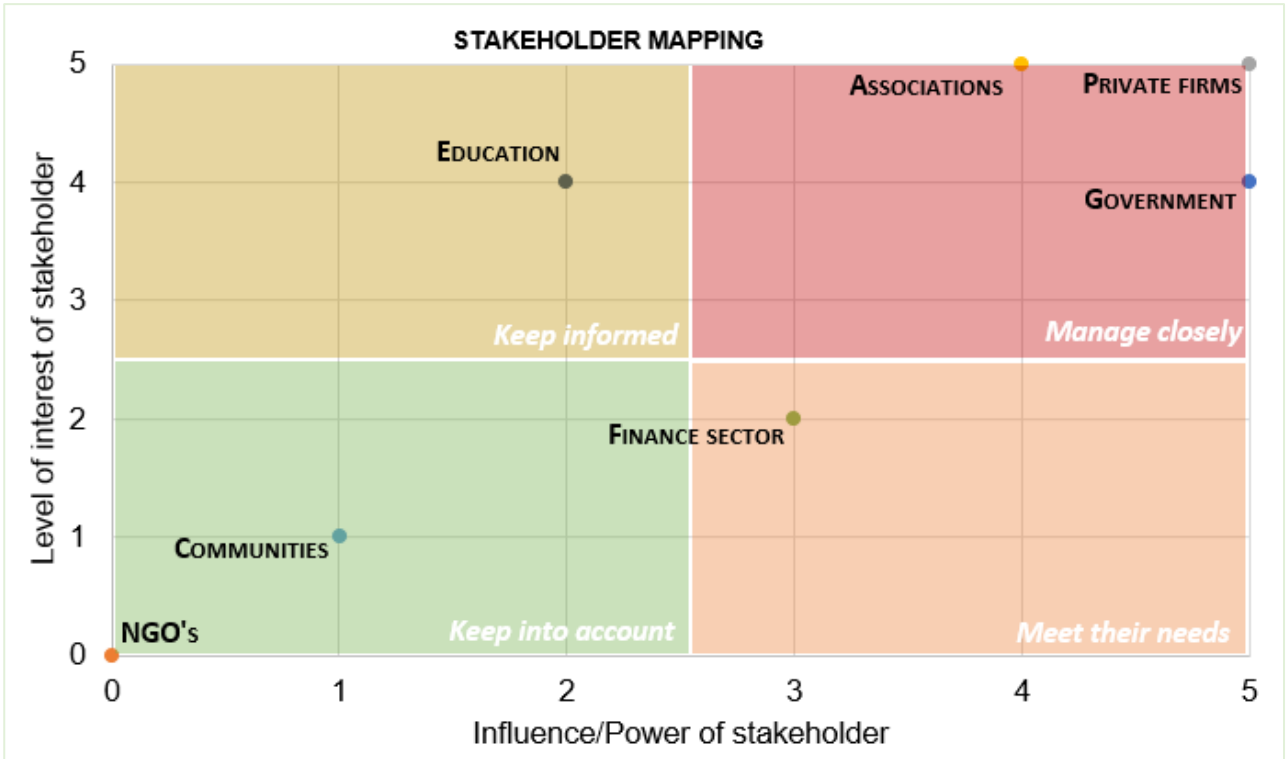
Figure 47. Commune de Romainville. (2021f). Prototype and realization on- site of *la Végétable" (the table for "edible landscaping") at the Cité Maraîchère.* [Image]. https://www.lacitemaraichere.com/en/

Bleiswijk (NL)

FoodE Pilot - Plant factory for demonstrational purposes







Background

The Lansingerland municipality hosts one of the largest greenhouse areas in Europe. Wageningen University & Research is used to investigate all aspects of horticultural production in its 7,500 m^2 of greenhouses at the research facility in Bleiswijk. A vertical farm facility was completed in December 2020 and will constitute one of the case studies of FoodE.

Vision

The indoor farm is a powerful research tool to investigate a number of products and services with respect to their resource efficiency (water, CO_2, energy), sustainability and public appeal. In the FoodE project it will serve as a location for communication and dissemination due to its close connections with the local growers, producers, suppliers as well as the collaboration with the municipality of Lansingerland (NL). The program will facilitate training and dissemination workshops on closed plant production which will be accessible to over 300 local growers and other agricultural specialists. Moreover, dissemination and promotional events will be open to over 2,000 visitors per year. In order to comply with rule and restrictions imposed by the current Covid-19 pandemic, online tools will be used when on-site events won't be possible. Dissemination will focus on inspiration, education and indirect, future job creation.

Pilot implementation

List of the main structures and areas that are present (or will be present) at the pilot facility

Over the course of 2019 and 2020, a vertical farm was constructed in Bleiswijk (Figure 52). It contains four airtight cells (Figure 53):

- two high-wire cells (for high-wire cultivation). Each cell has a production compartment of 30 m^2 and 4 production gutters, in two pairs.
- two multilayer cells (with two layers per cell). Each layer has a production area of 10.3 m^2.

List of the main systems/equipment that are used (or will be used) in the pilot project

The vertical farm facility is equipped with control for temperature, relative humidity, CO_2 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 1000 µmol PAR max in the top layers and 500 µmol PAR max in the bottom layers. The light spectrum can be set via the Signify's light control system.
- the hi-weire cells (HWCs) are illuminated using an array of Toplighting and Far Red LED modules. (Philips/Signify) reaching 1500 µmol PAR max (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 amounts mixed for each ingredient can be chosen (NH4, K, Na, Ca, Mg, NO3, Cl, S, HCO3, 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, etc.).

- Light systems (e.g. power consumption).
- Free data points for additional measurements.

List of the main services/activities that are offered (or will be offered) by the pilot project

- Research activities: thanks to the full climate control, the vertical farm is an optimal research tool and will be used for the investigation of production recipes, light spectrum, new crops and many other topics. This research is (also) intended to unveil new insights for horticulture in greenhouses. The vertical farm was designed with a high air-tightness 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.
- Educational activities: possibility for master students and PhD students to collaborate on projects and perform their thesis, mainly managed by WUR (Figure 54). In addition, kid science activities with Dutch schools will be organized by the Lansingerland Municipality.
- B2B collaborations: the vertical farming as a service for the industry to test new products and protocols.
- Dissemination and outreach activities.

What is missing and which is the plan towards their completion

Dissemination and outreach activities will be organized and will involve citizens, researchers, local producers, entrepreneurs but the full plan is not yet completed. On October 1st, 2021 the facility will host the opening of the new vertical farm and a vertical farming conference (held partly on site and online due to Covid-19 limitations, as part of the "Horti Science Park Event Weeks"). Another local event will probably be held in spring 2022, possibly with schools, citizens and young entrepreneurs.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

The co-design activities organized with both internal and external pilot stakeholders helped in identifying the 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 (Figure 48) and outreach activities to be organized at the pilot site with the engagement of different stakeholders (e.g. local producers, suppliers, students, citizens).

Impact area	Potential	State of the art	Research
Food security	Grow more in a reduced space	Expensive and inefficient for a broad range of crops	Test new crops and cultivation methods
Food quality	Steering nutrient content and quality	Research is still young	Find optimal climate growing recipes to achieve higher nutritional content and high product quality
Resource use	High efficiency of resources	High efficiency for some resources only (e.g. water, land)	Improving energy use efficiency

Figure 48. Impact areas for future research to be developed within and after FoodE.

Do they need some adaptations in order to be realized? Which? (Please use the space below to describe them)

The methodological framework for crop selection developed together with MSc students will be further extended and the criteria will be used to support the choice of cultivars that to be investigated in the research trials (which are best suited to the VF structure).

Who will you involve in this implementation process?

The pilot team, namely WUR team and the municipality of Lansingerland.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready by the deadline M26 (T4.3).

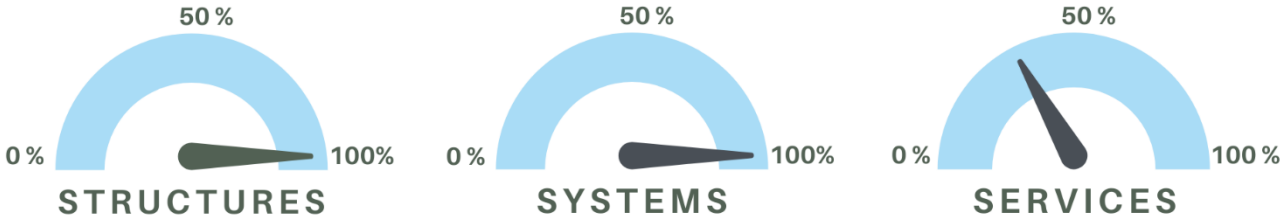


Figure 49 Readiness and functioning of structures, systems, services of the FoodE pilot in Bleiswijk (Plant factory for demonstrational purposes) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

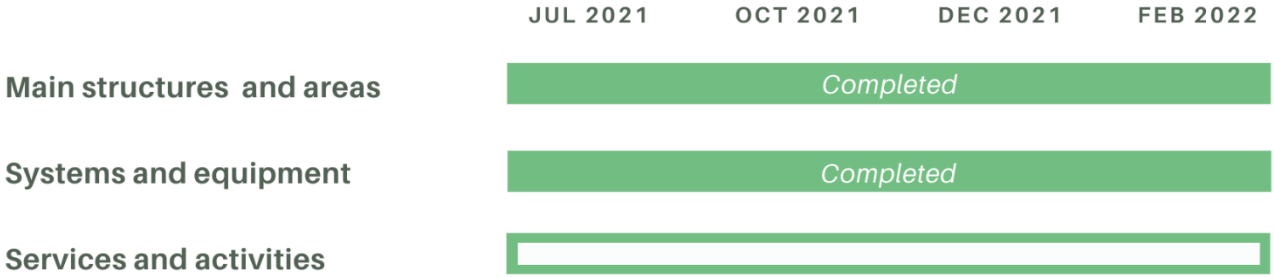


Figure 50. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Bleiswijk (Plant factory for demonstrational purposes).

Pilot team

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
Samir Amghar	Pilot manager (2)	Gemeente Lansingerland
Freyr van den Assem	Pilot manager (3)	Gemeente Lansingerland

Figure 51. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

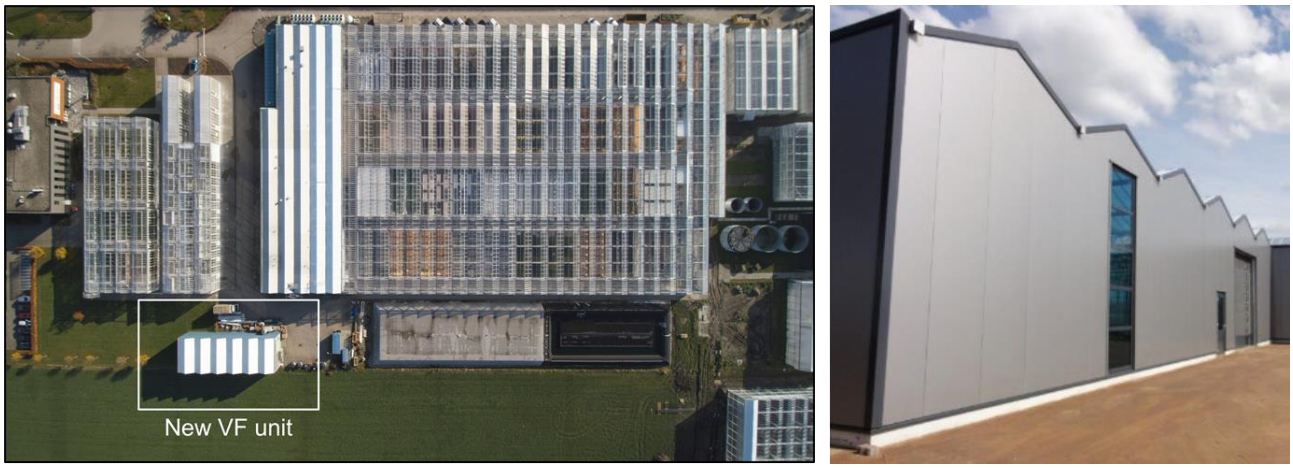


Figure 52. Newly built vertical farm facility at the Business Unit "Greenhouse Horticulture" of Wageningen University & Research (Bleiswijk).

Figure 53. High wire cell (left) and double-layer cell (right) at the vertical farm facility of the Business Unit Greenhouse Horticulture (Bleiswijk).

Figure 54. One of the research activities carried out with MSc students, investigating the effects of light and temperature on dwarf tomatoes crop.

References (visuals)

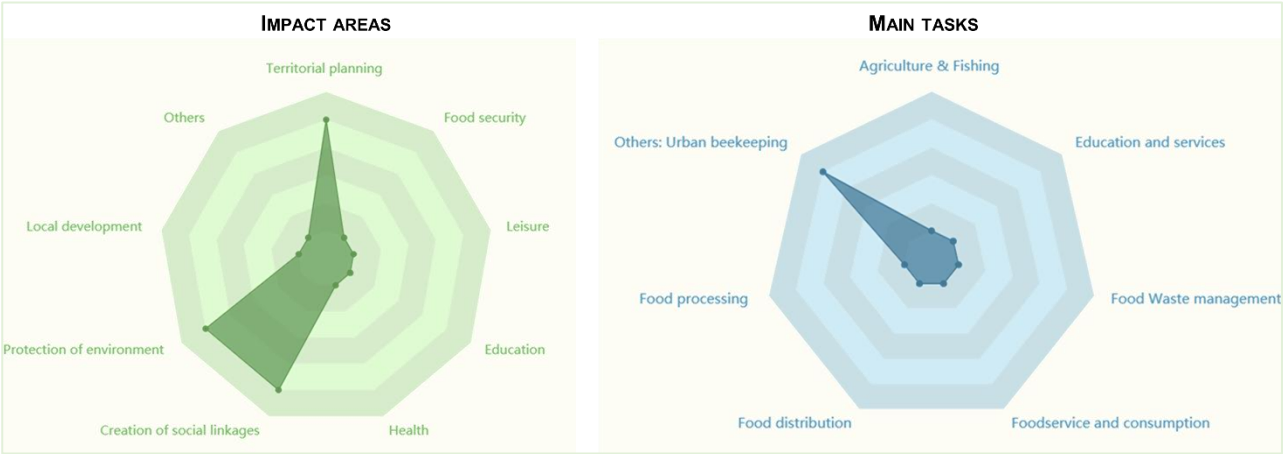
Figure 52. Stichting Wageningen Research. (2021). Newly built vertical farm facility at the Business Unit "Greenhouse Horticulture" of Wageningen University & Research (Bleiswijk).[Photograph]

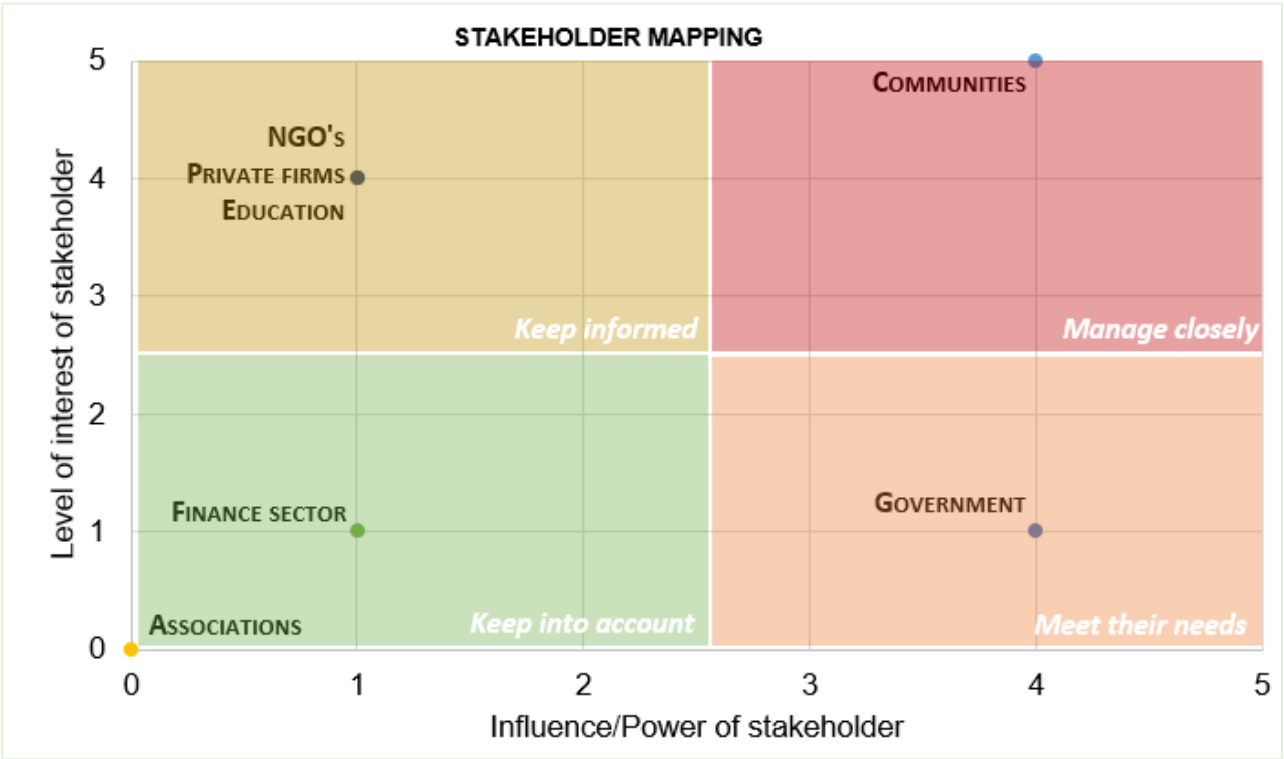
Figure 53. Stichting Wageningen Research. (2021). High wire cell (left) and double-layer cell (right) at the vertical farm facility of the Business Unit Greenhouse Horticulture (Bleiswijk). [Photograph]

Figure 54. Stichting Wageningen Research. (2021). One of the research activities carried out with MSc students, investigating the effects of light and temperature on dwarf tomatoes crop. [Photograph]

Ljubljana (SL)

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





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, which promotes 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.

Vision

The pilot will be a unique, new project for the Urban Beekeeping Association. 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, with the possibility of spreading the business model throughout Slovenia. "*We hope to turn the pilot into an example of good practice and show the therapeutic potential of beekeeping as a craft, vocation or occupation,*" says the president of the Association, Gorazd Trušnovec. Beehives will be installed firstly in one prison in Ljubljana and training will be offered to the inmates, 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.

Pilot implementation

List of the main structures and areas that are present (or will be present) at the pilot facility

- Prison of Ljubljana
- Open Department Ig: garden, storage room, main building, kitchen.

List of main systems/equipment that are used (or will be used) in the pilot project

Beekeeping equipment:

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

What is missing and which is the plan towards their completion

Some minor equipment for honey extraction, since the season for extraction has not started yet. The equipment is ordered already and will arrive to the premises shortly.

List of the main services/activities that are offered (or will be offered) by the pilot project

- Educational activities (beekeeping for inmates, workshops in schools, etc.)
- (Public)events
- Communication and dissemination activities

- Urban beekeeping: hive strand production, beehive placement, honey extraction.

What is missing and which is the plan towards their completion

The beekeeping course for inmates will be ready by the end of the season (Autumn 2021). The same applies tor outreach activities.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

Between December and February 2021, the pilot team conducted two student seminars/competitions with the Faculty of Design (for details, see D4.2 [3]) 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 58) won among two dozen very interesting solutions. The winning proposal has been implemented in April 2021 (Figure 59).

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 will be able to choose 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 60).

Do they need some adaptations in order to be realized? Which?

Few minor technical adaptations to the plans were made.

Who will you involve in this implementation process?

Pilot team, co-design team, outside craftsman, inmates taking part in the pilot, prison administration, media partners.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready before M26 (T4.3).

Figure 55. Readiness and functioning of structures, systems, services of the FoodE pilot in Ljubljana ("PRISON HONEY" - Urban beekeeping for rehabilitation and social inclusion) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

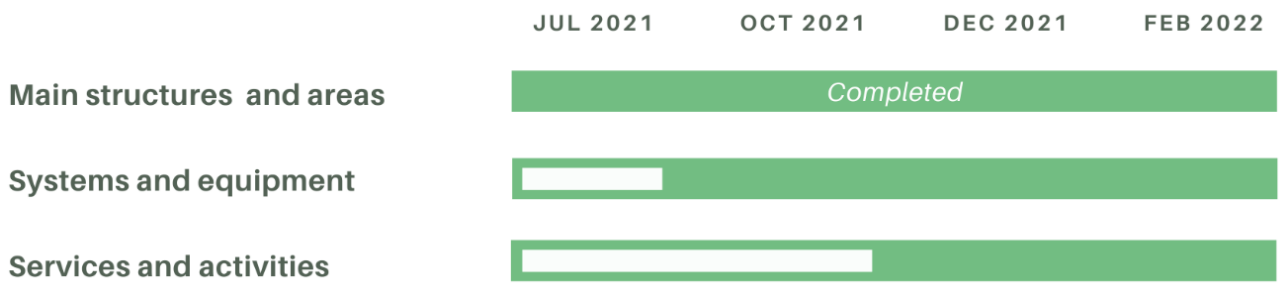


Figure 56. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Ljubljana ("PRISON HONEY" - Urban beekeeping for rehabilitation and social inclusion).

Pilot team

Person name	Role	Institution
Gorazd Trušnovec	Pilot owner	Urban Beekeeping Association
Renata Zamida	Pilot leader/manager	Urban Beekeeping Association
Pia Prezelj	Pilot communication	Cultural Management + Press and Communication (Ljubljana)
Franc Petrovčič	Pilot executor	Urban Beekeeping Association

Figure 57. People involved in the FoodE pilot team and respective roles and institutions

Pictures

Figure 58. The beehive stand, the winning project realized by Amadej Brezovsek during the co-design activity organized by Urban beekeeping association.

Figure 59. Implementation of the beehive stands in the prison garden (full video available at the link).

Figure 60. Painted beehives placed on the hive stand (left), ongoing beekeeping course (right).

Reference (visuals)

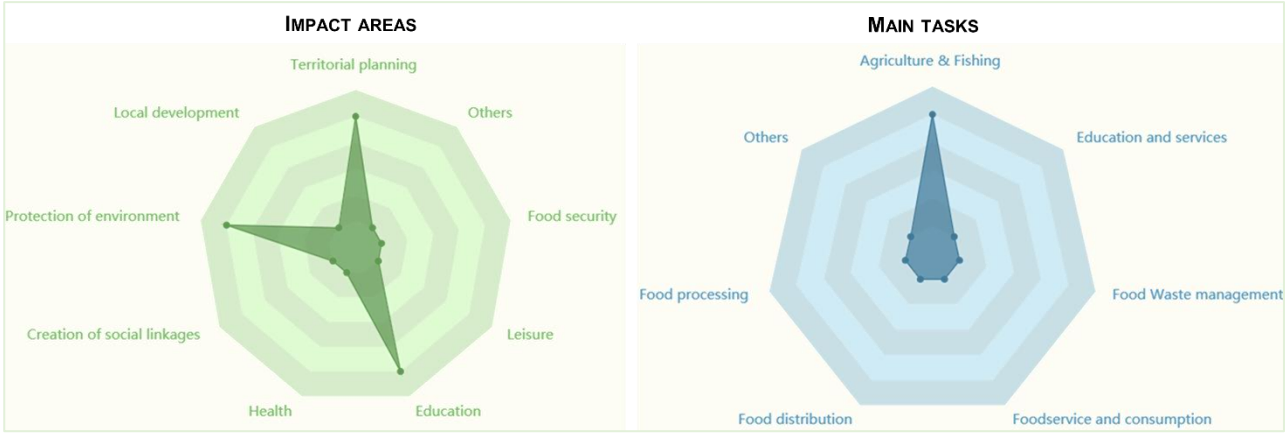
Figure 58 Brezovsek, A. (2021). The beehive stand, the winning project realized by Amadej Brezovsek during the co-design activity organized by Urban beekeeping association.[Image]

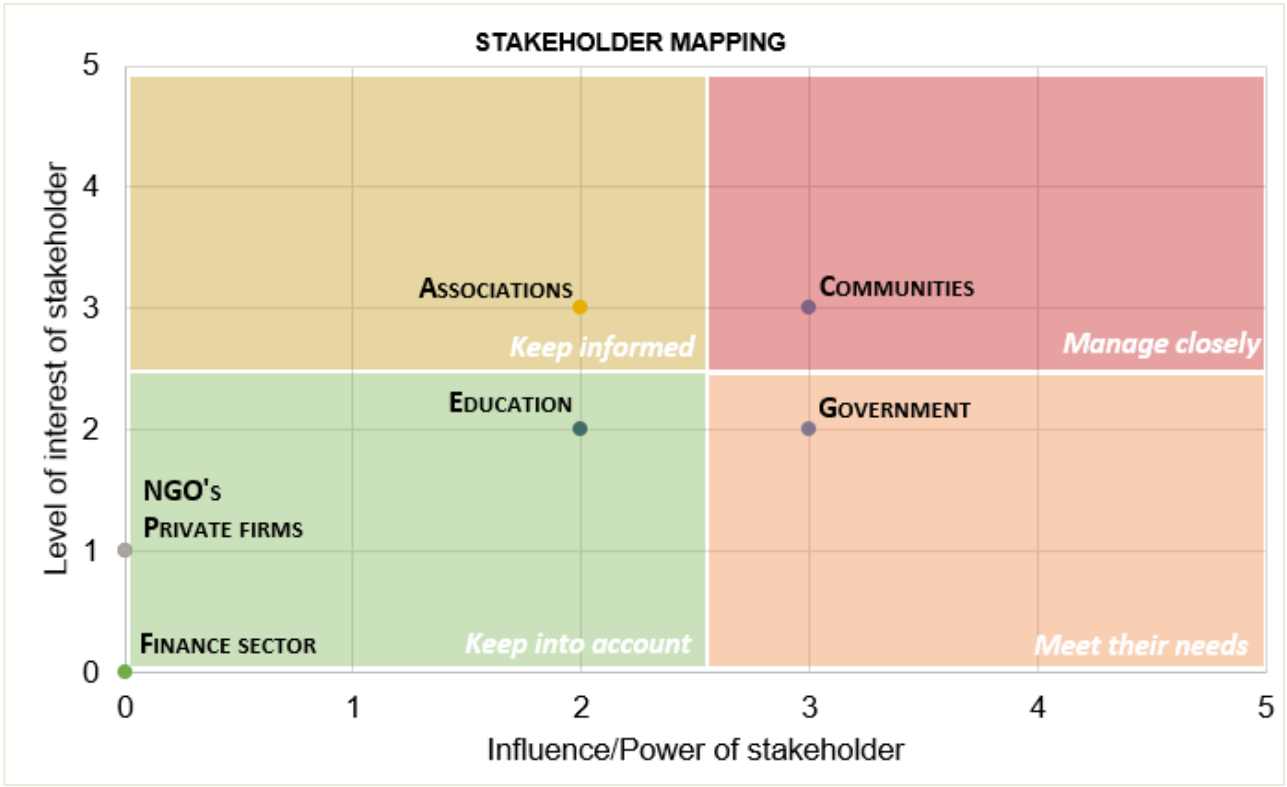
Figure 59. Urban beekeeping association of Slovenia. (2021). Implementation of the beehive stands in the prison garden. https://www.youtube.com/watch?v=0-m8IL3TbPA. [image]

Figure 60. Urban beekeeping association of Slovenia. (2021). Painted beehives placed on the hive stand (left), ongoing beekeeping course (right). [Photograph]

Amsterdam (NL)

FoodE Pilot - Open-source Aquaponics Farm





Background

The 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.

Vision

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. The pilot project will target the enlargement of the existing aquaponic unit allowing for implementing a stable and marketable production of fishes, edible flowers, herbs, and vegetables for local customers.

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. Workshops will be regularly given in the greenhouse to present and disseminate our local knowledge, allowing citizens to design, build, and manage their own small-scale aquaponics units.

Central to its development is the farm's ambition to function as much as possible as a closed-loop system, using only local inputs and cycling efficiently its own resources within the system. The project will, therefore, develop and automatize further the local struvite reactor that produces high-quality fertilizer for the plants. It will also develop key ingredients for a sustainable fish feed, using the digestion of local food waste by insects, such as Black Soldier Flies, that are, in turn, used as fish feed.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

Structures for:

- Nutrient-filter technics system.
- Modified ebb-and-flow system.
- Deep-water culture system.
- Wicking bed.
- Dutch bucket system.
- Towers.
- Soil beds system.
- Built in the greenhouse (total area of 44 m^2).

Fish tanks and water filter systems in the "fish room" (Figure 64).

What is missing and which is the plan towards their completion

The main structures have been completed in April 2021.

List of the main systems/equipment that are used (or will be used) in the pilot project

- Water and air pumps.
- Struvite reactor (Figure 64).
- Sensors (pH, oxygen, water flow, water level, CO_2, light, humidity).
- Ventilators.
- Water heater.
- Newly developed aquaponics monitoring software (phone or tablet interface).

What is missing and which is the plan towards their completion

A few sensors and the user interface of the aquaponic software are still missing. This work stream will be pushed by the pilot subcontractor during the summer and fall 2021, based on an agreed timeline. The design, renovation, and upgrade of the struvite reactor will be running from the fall 2021 till early February 2022, with the help of the pilot subcontractor and mechanical engineering intern.

List of the main services/activities that are offered (or will be offered) by the pilot project

The pilot will mainly offer educational activities for schools, raising awareness programs for citizens, and will carry out research activities on the topic of aquaponics and sustainable vegetable production in cities.

What is missing and which is the plan towards their completion

Educational signs must be displayed throughout the farm, the content of an educational has to be defined in detail. The educational signs and educational tour content will be developed in September and October 2021 and will be tested with schools till February 2022.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

The user interface concept developed by the winning student team of the second hackathon (Figure 65) focused on the pilot aquaponics software user interface. It was selected as a basis for the main dashboard of the software since it was very intuitive and validated by the pilot aquaponics farm managers. The winning conceptual design of the struvite reactor will not be used directly due to the highly conceptual level of the first hackathon outputs but they will be a used as source of inspiration during the renovation and upgrading process of the reactor.

Do they need some adaptations in order to be realized? Which?

The work carried out by the student constitutes a solid base for the further development of the digital interface but it will need some adaptations. The user interface will undergo several rounds of iteration simply 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. Thus the selected dashboard concept will go through significant change as it's been developed.

Who will you involve in this implementation process?

Mainly the pilot team. In addition, there may be one round of consultation for the user interface with the winning student team of our second co-design activity (second hackathon, D4.2 [3]) to show them the evolution of the dashboard and receive their feedback.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready by the deadline M26 (T4.3).

Figure 61. Readiness and functioning of structures, systems, services of the FoodE pilot in Amsterdam (Open-source aquaponics farm) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

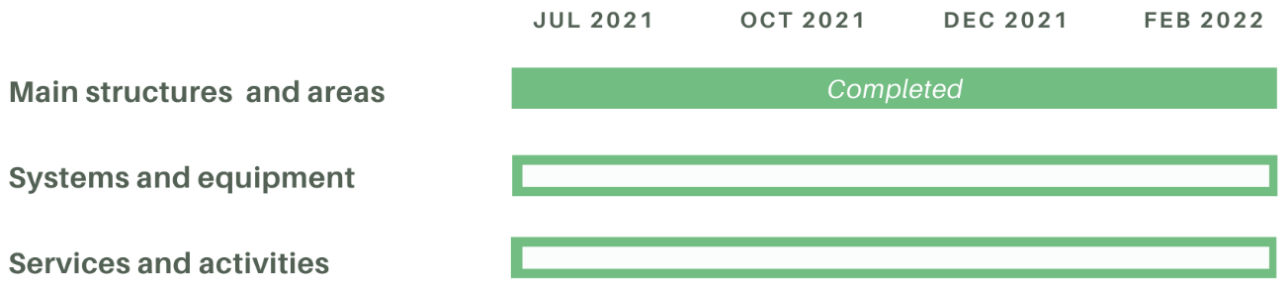


Figure 62. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Amsterdam (Open-source aquaponics farm).

Pilot team

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

Pictures

Figure 64. Metabolic aquaponic farm (left) and semi-automated struvite reactor connected to the sewers system, below the farm (right).

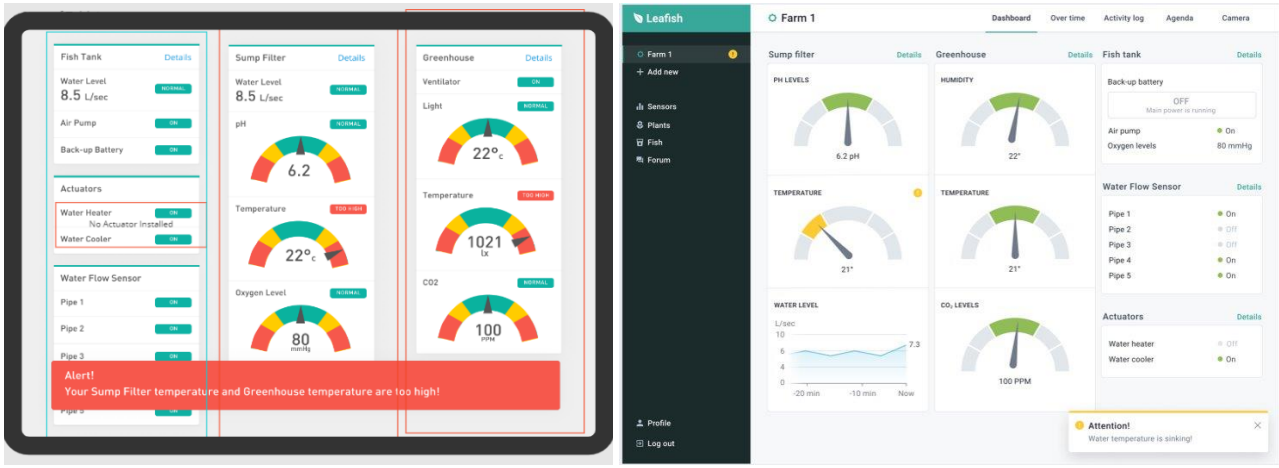


Figure 65. User Interface mockup of the Metabolic aquaponic system proposed by the winning team of the hackathon (left) and with adaptations made by the pilot team (right).

Figure 66. 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.

Reference (visuals)

Figure 64 (left). Stichting Metabolic institute. (2021). Metabolic aquaponic farm, Amsterdam (Netherlands). [Photograph]

Figure 64 (right). Stichting Metabolic institute. (2021). Semi-automated struvite reactor at the aquaponic farm of Metabolic institute in Amsterdam. [Photograph]

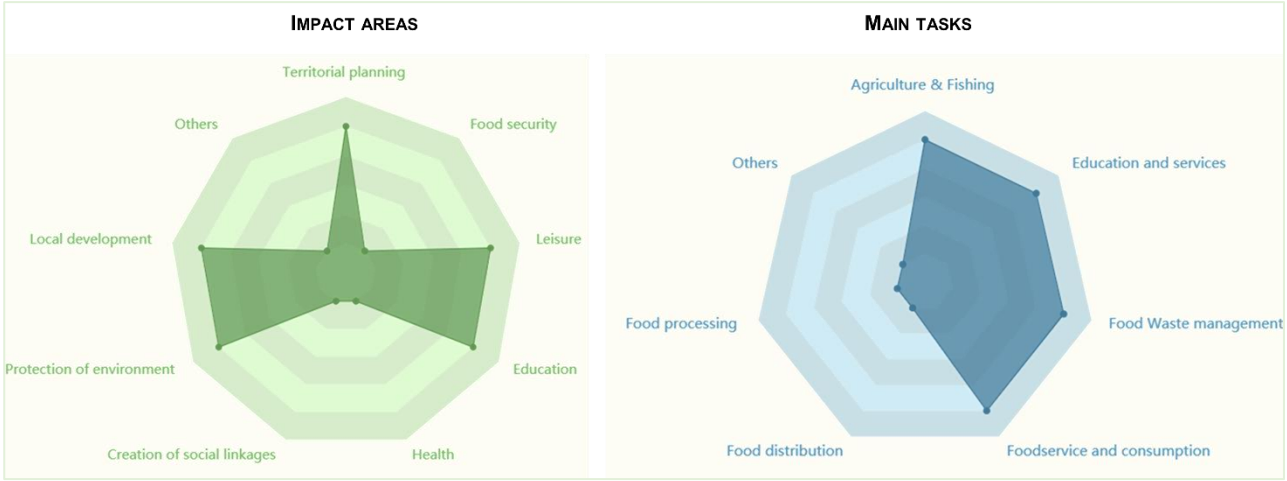
Figure 65 (left). Stichting Metabolic Institute. (2020). First-prize conceptual dashboard of the aquaponics software – developed by Team C during the second hackathon "design a user-friendly/user-expert interface for the aquaponics software" organized by Metabolic Institute for the co-design of the FoodE Pilot in Amsterdam (Netherlands). [Image]

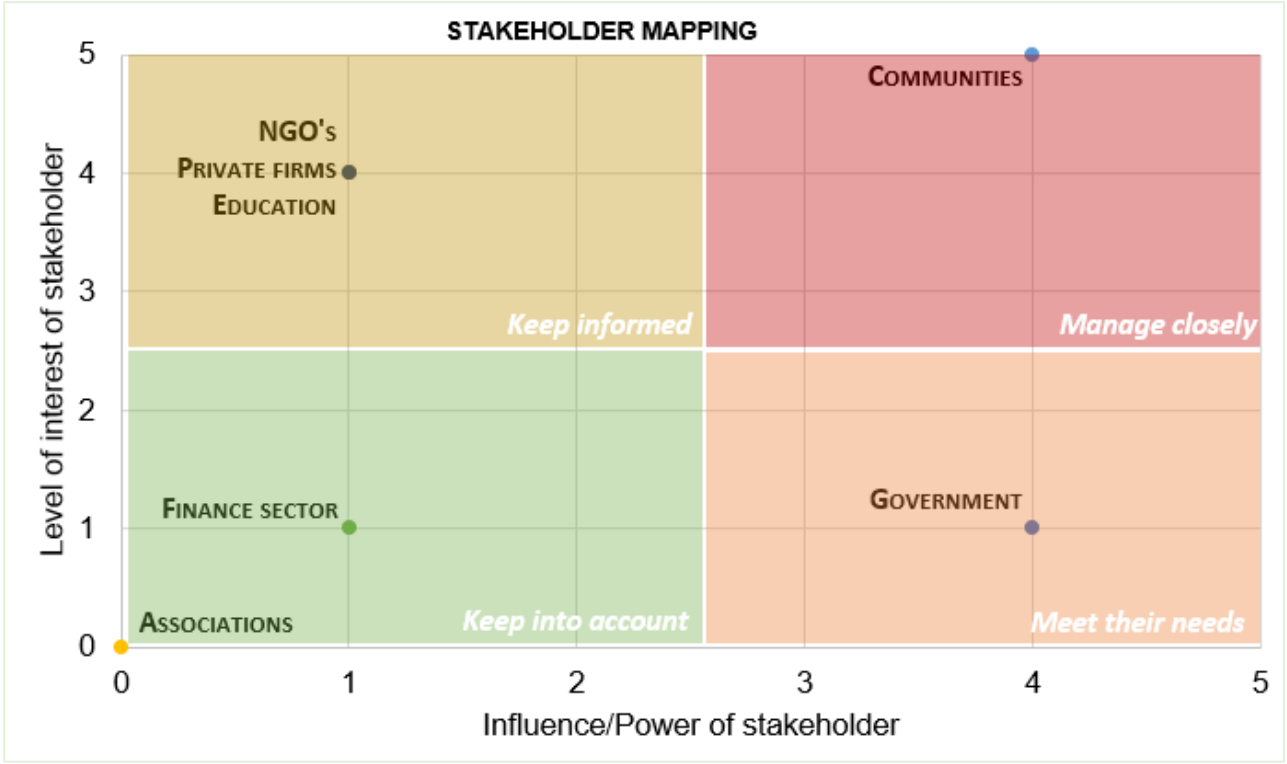
Figure 65 (right). Stichting Metabolic institute. (2021). User Interface mockup of the Metabolic aquaponic system. [Image]

Figure 66. 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]

Iasi (RO)

FoodE Pilot – CUIB: Restaurant with local products





Background

The "Centrul Urban de Inițiative Bune" (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.

Vision

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. Il will become the first zero-waste unit within the Romanian HORECA sector by integrating a closed-loop economy model in its operational activities. It will do so by launching a community garden for aromatic and medicinal plants, including raised bed gardens and greenhouses, within the space, respectively on the terrace and a small soil farm by composting its organic waste. 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.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

From the year of CUIB's opening (in 2013) until 2020, there were no financial resources to make many improvements and changes to the structures and equipment. Thanks to the FoodE program, it has become possible. CUIB operates in a rented building that has:

- a kitchen
- a small space for storage
- a serving place for clients which includes the bar area and a small shop with eco-friendly products (Figure 70)
- a terrace (Figure 70).

Through the FoodE program there is the plan to build:

- a community garden (Figure 73)
- a small garden on the terrace
- possibly, a greenhouse
- change the furniture from inside and, also, from the terrace.

What is missing and which is the plan towards their completion

The community garden is in its initial phase and decisions need to be made regarding the greenhouse construction on the terrace. However, this year the pilot team started planting aromatic plants on the terrace and initiated gardening activities with the plan to become a community garden at the office courtyard. Furthermore the pilot is not going to launch a physical food bank setting per se by the end of the project, but

it is collecting already recovered food from supermarkets on a weekly basis to be redirected for homeless people.

List of the main systems/equipment that are used (or will be used) in the pilot project (use the space below)

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 shop has 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 renovated and new appliances, new furniture and more professional equipment have been purchased. Two cargo bicycles have been ordered and will be used for food delivery and as a help in the community garden. There are also plans to implement a zero waste system for the kitchen and to make a mobile kitchen on a cargo bicycle.

What is missing and which is the plan towards their completion

The two electrical cargo bikes have been ordered and will allow a carbon neutral transport of the bio-waste (from CUIB to the composting site), of the garden products (from the gardens back to CUIB) and of the recovered food (from supermarket to CUIB and/or to the beneficiaries). The composting site still has to be improved and finalized (for now there is a piloting system from recovered pallets following the Charles Dowding model). The bistro has also invested in a domestic compost equipment ("Eutron") and in several bins for collecting the selective waste.

List of the main services/activities that are offered (or will be offered) by the pilot project

- 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 72). For beverages, locally or regionally and fair trade certified coffee, chocolate and teas are served. Option for take away and catering are available, depending on the bistro daily capacity.
- Food delivery service. In November 2020, theCOVID-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.
- Educational and outreach activities. Several materials are available and include menus (Figure 74), leaflets, brochures, blog articles with the aim of raising consumer awareness. Many events are organized on-site (e.g. urban horticulture workshops, convivial lunch organized in the umbrella of MyLocalFoodE initiative) to promote the slow food concept, healthy diets as well as local producers.
- 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. Some of the home-grown products (mint, basil, chard, green beans and zucchini) are used in the kitchen (Figure 72). A composting activity of bio-waste has also started and the compost is then used in the gardening activities.
- 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. In addition, there is the plan to integrate bulk food products in spring 2022.
- 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 the plan to increase this amount and organize more raising awareness activities against food waste.

- **Free food for the homeless.** The pilot helps mediate the donation of food from supermarkets to 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 72) 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.

What is missing and which is the plan towards their completion

As mentioned above, CUIB offers food services on site, in their own bistro and on the terrace, take away, catering and recently, they launched zero waste delivery services They are involved as well in educational activities, via online articles and published materials as well as direct interaction activities that they either host at their premises or they organize events in other settings such as culinary and urban gardening workshops. Given the pandemic context they organized less events and offline educational activities. There is the plan to have monthly events with different thematic: promoting wild ingredients, 100% local menus and/or menus with recovered ingredients.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

The co-design activities were organized for three action areas:

1. "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 74). 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.
2. "Zero waste": new measures identified through the co-design activity (survey) have been already implemented (e.g. biodegradable sponges, use of compostable materials). In addition, the pilot invested in a domestic composter where they will compost more than75% of the pilot bio-waste. Moreover, a process for a zero-waste precertification has been initiated.
3. "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,.

Do they need some adaptations in order to be realized? Which?

The pilot received hundreds of answers and potential solutions for the action areas mentioned above (for details see D4.2, [3]). Those that best fit and integrate with the CUIB conditions will be adopted. In the small shop, for instance, several eco-friendly products are offered (Figure 71) such as deodorant cruelty free brand (from Ťuli A Ťuli - přírodní kosmetika), with 100% natural ingredients, and plastic-free packaging, ecological biodegradable sponges (Iloveeco.eu), obtained from the loofah plant, which makes it a perfect alternative to commercial plastic sponges. They also do not contain adhesive (they are sewn with 100% cotton thread), and the suspended cord is plastic free (100% cotton), and bamboo cotton buds (from Iloveeco.eu).

Who will you involve in this implementation process?

Pilot team, several partners (Romanian Association for Permaculture, Food Forest, Fundația Emmaus), Mai bine team and volunteers, several citizens.

Readiness level and time plan

The essential structures are already completed and functioning, some of them will be ready this autumn 2021 or at the latest February 2022. If the greenhouse will be built, this will be ready by the beginning of next spring 2022. However, the greenhouse is not indispensable for advancing towards the pilot vision and implementing the FoodE pilot strategy. Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready by the deadline M26 (T4.3).

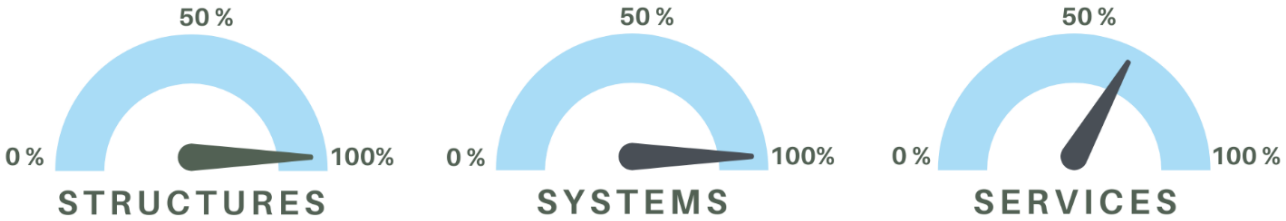


Figure 67. Readiness and functioning of structures, systems, services of the FoodE pilot in Iasi (CUIB: Restaurant with local products) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

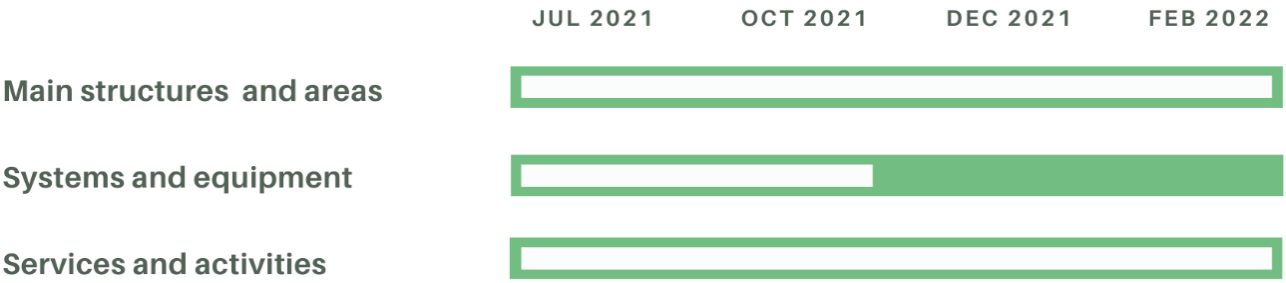


Figure 68. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Iasi (CUIB: Restaurant with local products).

Pilot team

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

Pictures

Figure 70. Internal room of the bistro with bar and customer service (left) and outdoor terrace (right).

Figure 71. Small shop (left) with resale of eco-friendly products: deodorant (100% natural ingredients, plastic free, from [Ťuli A Ťuli - přírodní kosmetika](), ecological sponges and bamboo cotton buds (from [Iloveeco.eu]()).

Figure 72. 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 73. CUIB vegetable garden and product harvest.

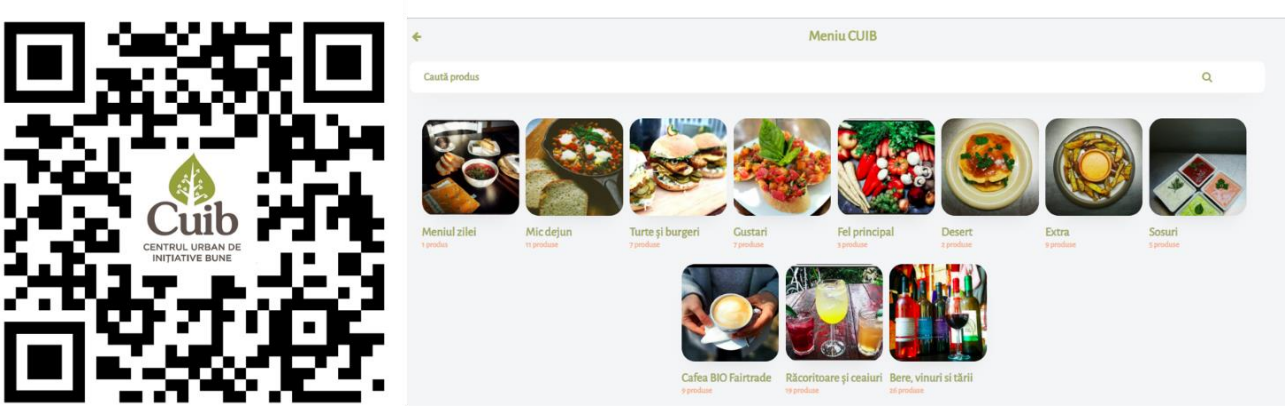


Figure 74. CUIB menu available at https://cuib.poloniq.ro/meniu.

Reference (visuals)

Figure 70. CUIB. (2021).Internal room of the bistro with bar and customer service (left) and outdoor terrace (right). [Photograph]

Figure 71 CUIB. (2021).Small shop (left) with resale of eco-friendly products: deodorant (100% natural ingredients, plastic free, from Ťuli A Ťuli - přírodní kosmetika), ecological sponges and bamboo cotton buds (from Iloveeco.eu). [Photograph]

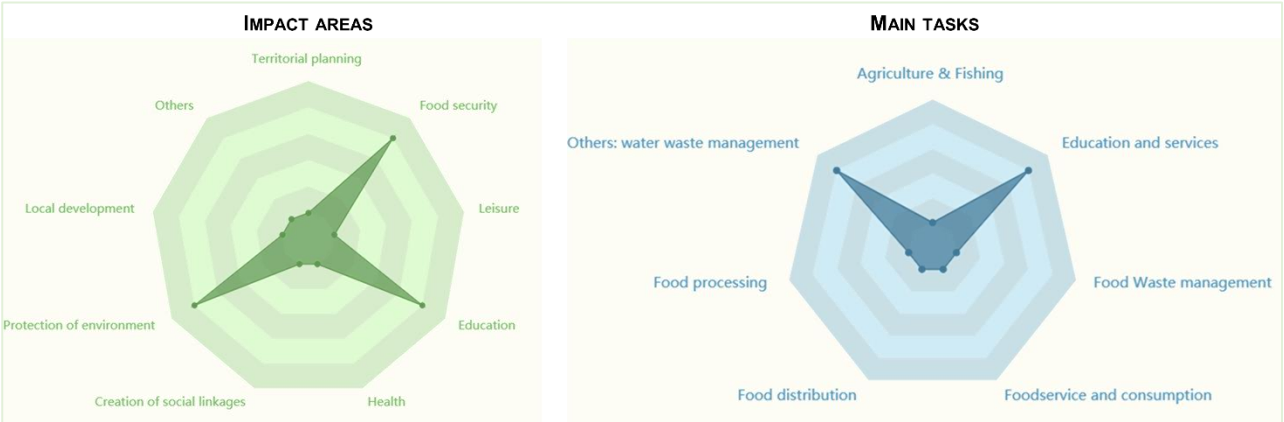
Figure 72. CUIB. (2021).Some of the CUIB dishes: soup with locally grown mangold (or Roman beet) (left), salad with home-grown vegetables (center), a vegetable borsch (Borșul) with fresh and seasonal vegetables (right). [Photograph]

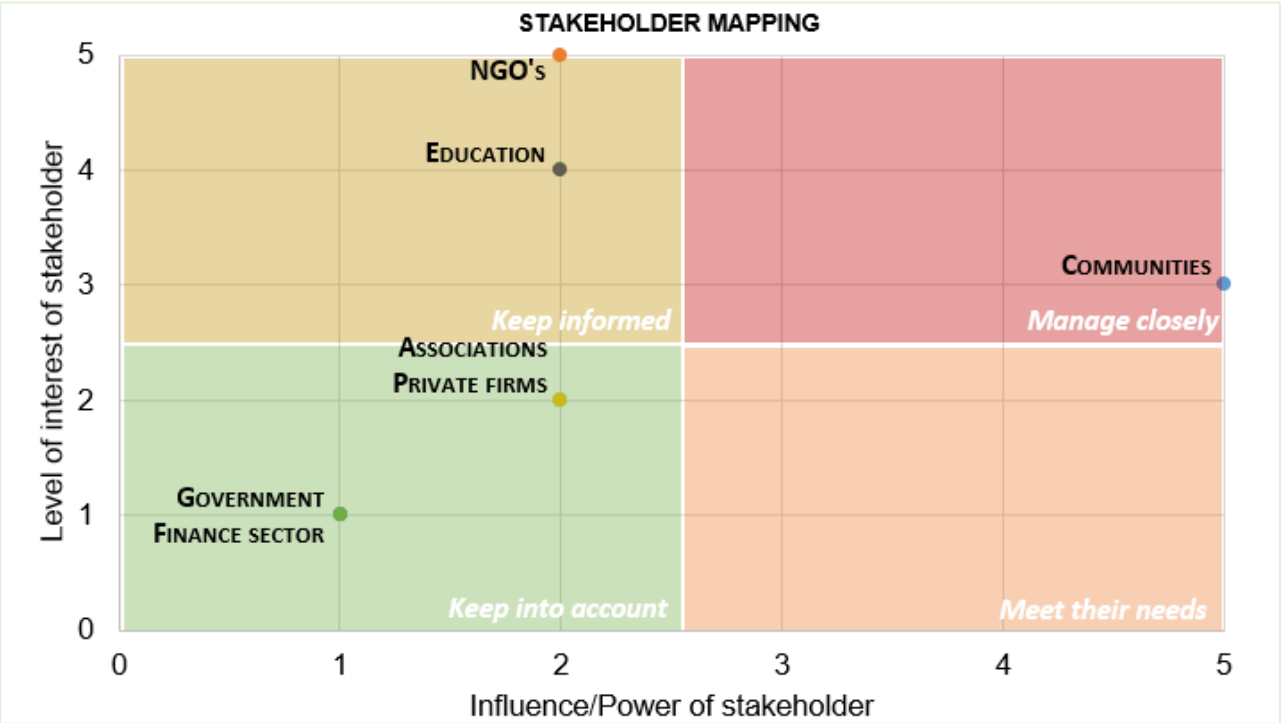
Figure 73. CUIB. (2021). CUIB vegetable garden and product harvest. [Photograph]

Figure 74. CUIB . (2021). CUIB menu available at https://cuib.poloniq.ro/meniu. [Image]

Berlin (DE)

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





Background

For Nolde & Partner, 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 & Partner 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.

Vision

Used water is a safe resource for new water, energy and nutrients and, after appropriate treatment, is ideal for irrigation and nutrient supply. So regional food production should be largely based on regional resources. The existing 17 year old technology for the greywater treatment was designed for toilet flushing only. At that time, the city of Berlin seems to be a water rich city but nowadays there is not enough water for irrigation during the summer, especially in dry periods (similar to other places within the EU). The groundwater level has dropped dangerously in many places.

Now the old water recycling plant will be improved and upgraded to a more compact version with a higher cleaning capacity so that it can also serve urban gardening activities with lower operating costs, professionally operated in a contracting model.

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. The new plant will provide irrigation water to the connected hydroponic greenhouse. 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.

In addition to creating jobs and organising training and dissemination activities for different stakeholders, the goal is to establish greywater recycling as a safe, sustainable and efficient technology for urban food production.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

The pilot project is based in a building where a waste water recycling plant is in operation and where most of the research activities will continue to be carried out together with visits for the public and training programs. Directly attached to the "Water House" is a greenhouse in which various methods of hydroponics are operated with recycled grey water. In the "Water House" there is also a 700-litre aquarium - also operated with recycled grey water - in which tench feel well at home for several generations. Greywater recycling, aquarium and greenhouse are presented to visitors. Former TU tutor Andreas Horn is successfully testing a small version of the "HydroTower" vertical hydroponics system here. He and his partner are driven by the idea that city dwellers can provide themselves with salads, herbs and vegetables even without their own garden

What is missing and which is the plan towards their completion

- Implementation for greywater recycling and heat recovery.
- Material orders and tendering.
- Dismantling of the old plant (inventory of the used material).
- Installation of the new system (inventory of the used material).
- Commissioning the greywater recycling plant (end of 2021).

The plant needs to undergo renovations and this will be managed mainly by the pilot staff. The necessary material from various different dealers needs to be purchased, however, this is not a simple decision, since several aspects needs to be considered and the choices must comply with EU regulations.

List of the main systems/equipment that are used (or will be used) in the pilot project

Water resource management, water treatment components, software, digital monitoring interfaces, visualization of operational results, different hydroponic systems operated with service water, heat recovery from greywater, plant monitoring system.

What is missing and which is the plan towards their completion

- Process optimization.
- Up and downscaling of the greywater recycling technology.
- Working on business/contracting models.

List of the main services/activities that are offered (or will be offered) by the pilot project

Educational activities, outreach activities, research activities, events, consultancy

What is missing and which is the plan towards their completion

- Offering plant tours for different groups.
- Working on business/contracting models.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

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, events (e.g. to raise awareness on the potential of domestic waste water) as well as consultancy and research.

For the technical and financial parts of the pilot, the team had several exchanges in close collaboration with associations and investors.

Do they need some adaptations in order to be realized? Which?

Part of the co-designers are housing associations and investors. They would like improvements to be made but only if it results in a financial profit for them and at the same time if risk-free operation can be guaranteed. For this reason, the pilot team has worked hard on a contracting model. The advantages of the grey plant systems will benefit the environment and the residents.

Who will you involve in this implementation process?

Especially the pilot team and an external company that can carry out the construction of similar projects in the future according to the current pilot plans.

Readiness level and time plan

The old plant is still in operation including the greenhouse, planning for the new water recycling plant is more than 50% complete. The material orders and contract awards are in preparation. The realization will be completed on schedule in spring 2022. Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready by the deadline M26 (T4.3).

Figure 75. Readiness and functioning of structures, systems, services of the FoodE pilot in Berlin (Urban farm with hydronic greenhouse and water pilot plant) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

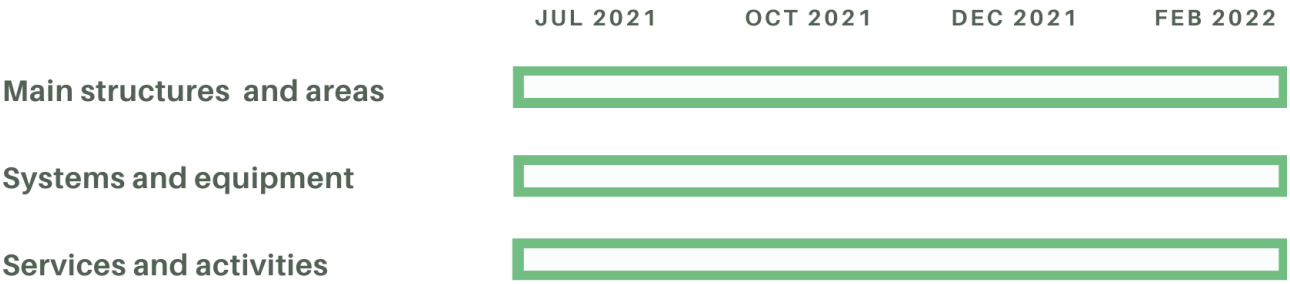


Figure 76. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Berlin (Urban farm with hydronic greenhouse and water pilot plant).

Pilot team

Person name	Role	Institution
Erwin Nolde	Pilot manager, Pilot communicator	Nolde & Partner
Holger Sack	Pilot executor	Nolde & Partner

Figure 77. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

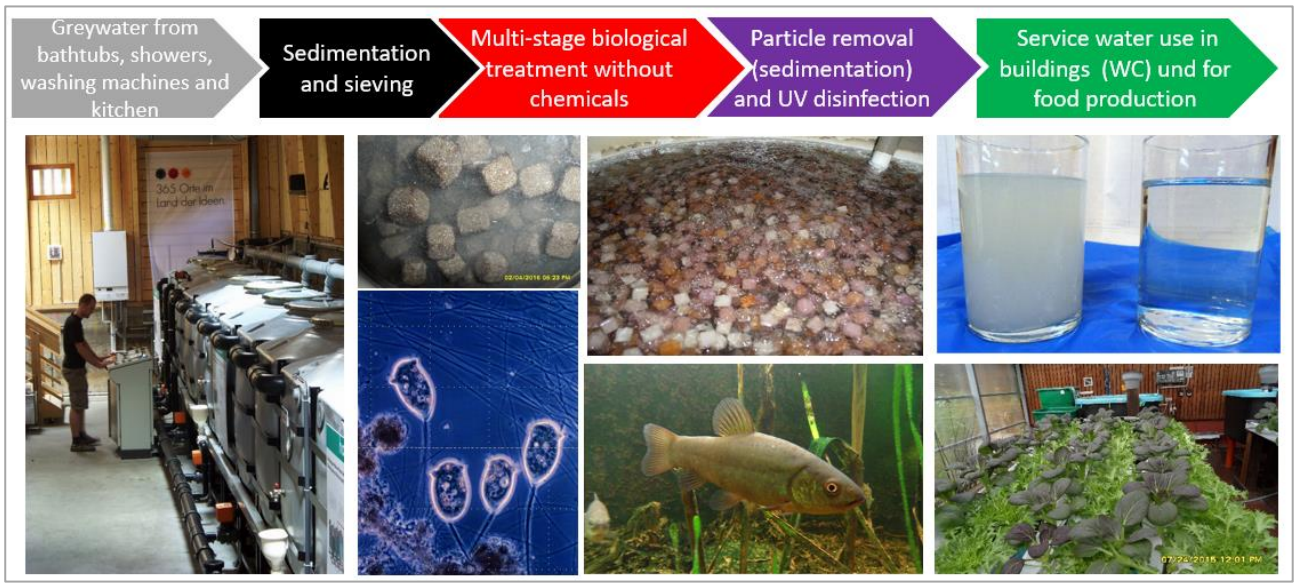


Figure 78. The picture shows the existing water recycling plant in the "Water House". Here, the water is purified purely biologically using microorganisms without the addition of chemicals, so that the water can ultimately be used for vegetable production and fish farming without hesitation.

Figure 79. In the greenhouse, different hydroponic possibilities for plant production are developed, tested and demonstrated to the public.

Figure 80. 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".

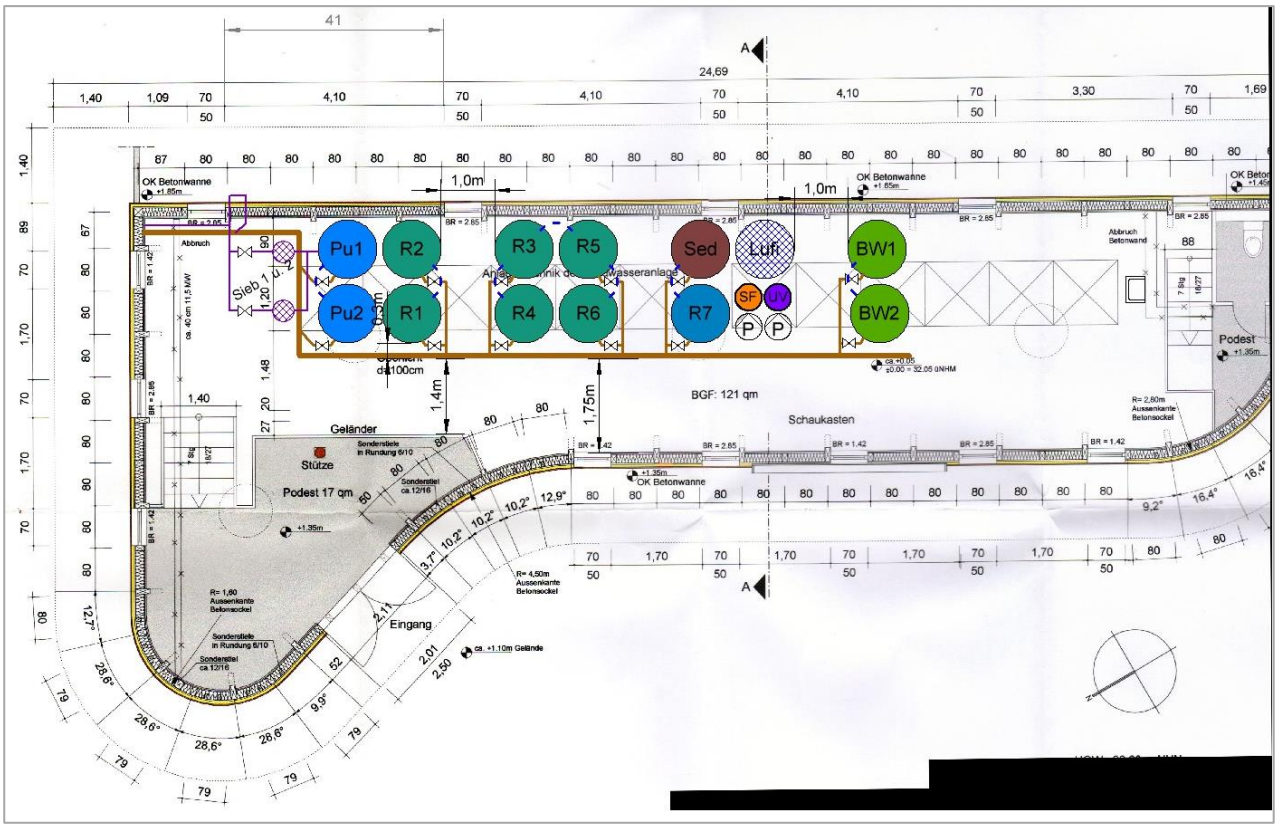


Figure 81. Installation plan for the new compact greywater recycling plant

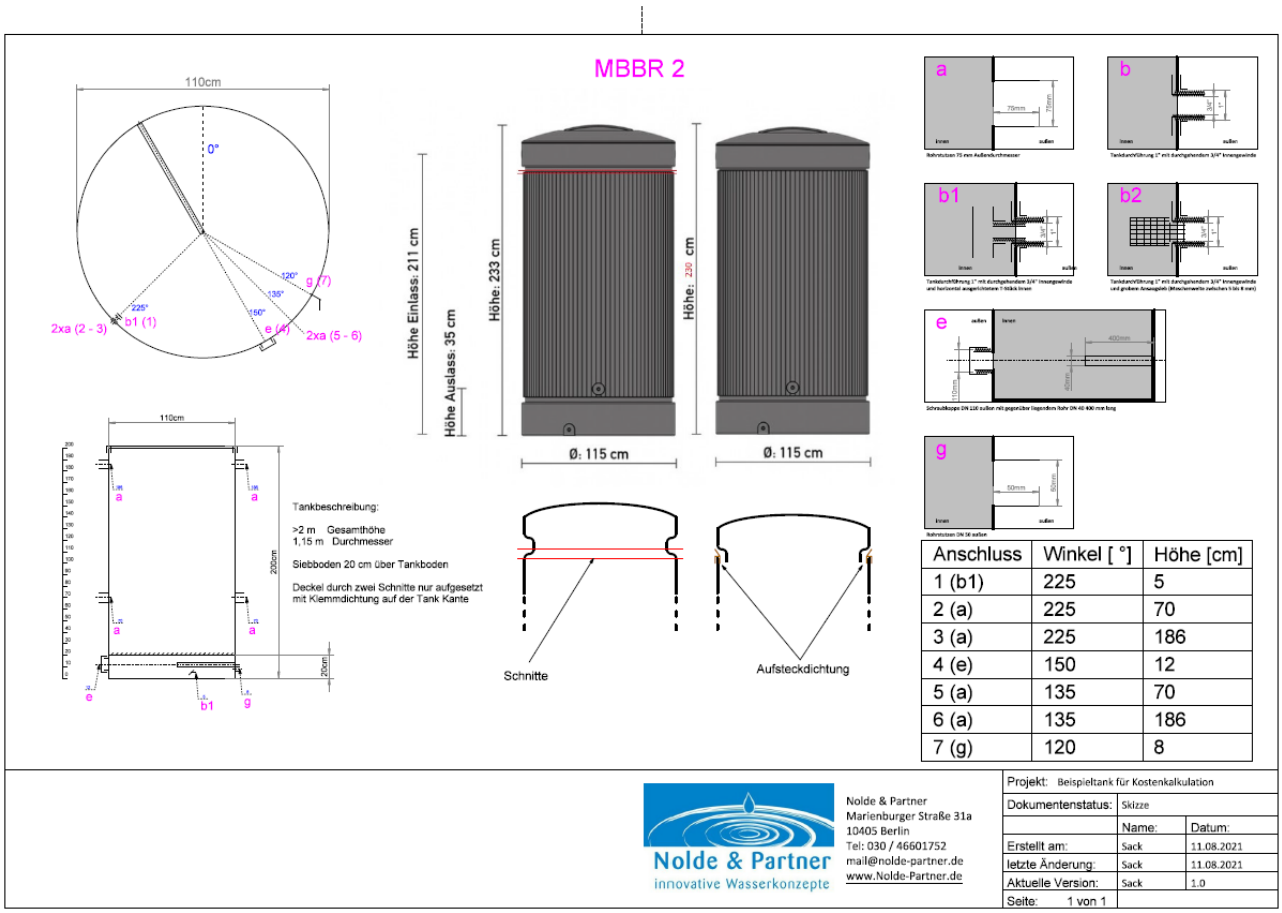


Figure 82 Detailed drawing according to which the tanks of the new water recycling plant are to be built.

Figure 83. The first finished container, after which the other containers are to be manufactured.

References (visuals)

Figure 78. Nolde & Partner. (2020). The existing water recycling plant in the "Water House". Here, 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 without hesitation. [Image]

Figure 79. Nolde & Partner. (2020). In the greenhouse, different hydroponic possibilities for plant production are developed, tested and demonstrated to the public. [Image]

Figure 80. Nolde & Partner. (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]

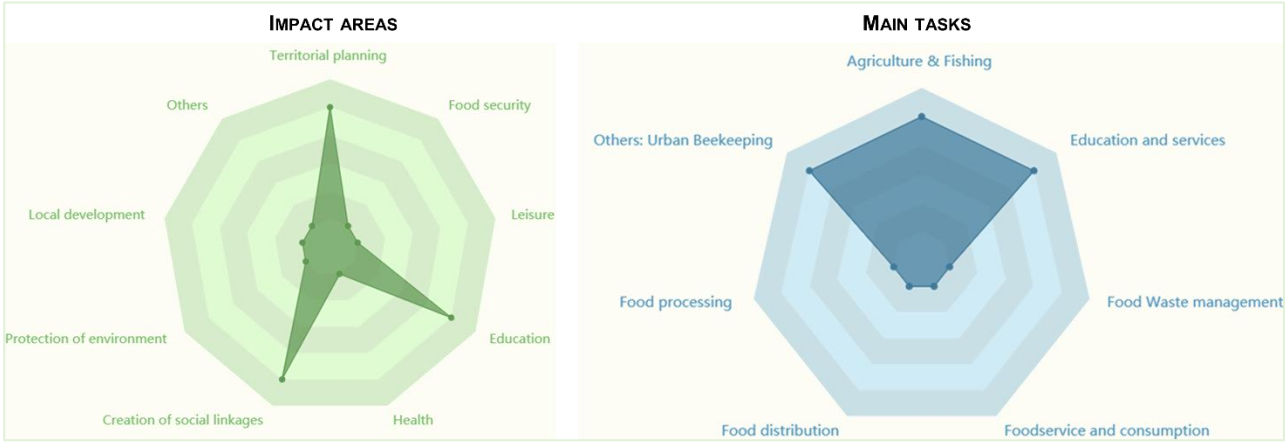
Figure 81. Nolde & Partner. (2020). Installation plan for the new compact greywater recycling plant. [Image]

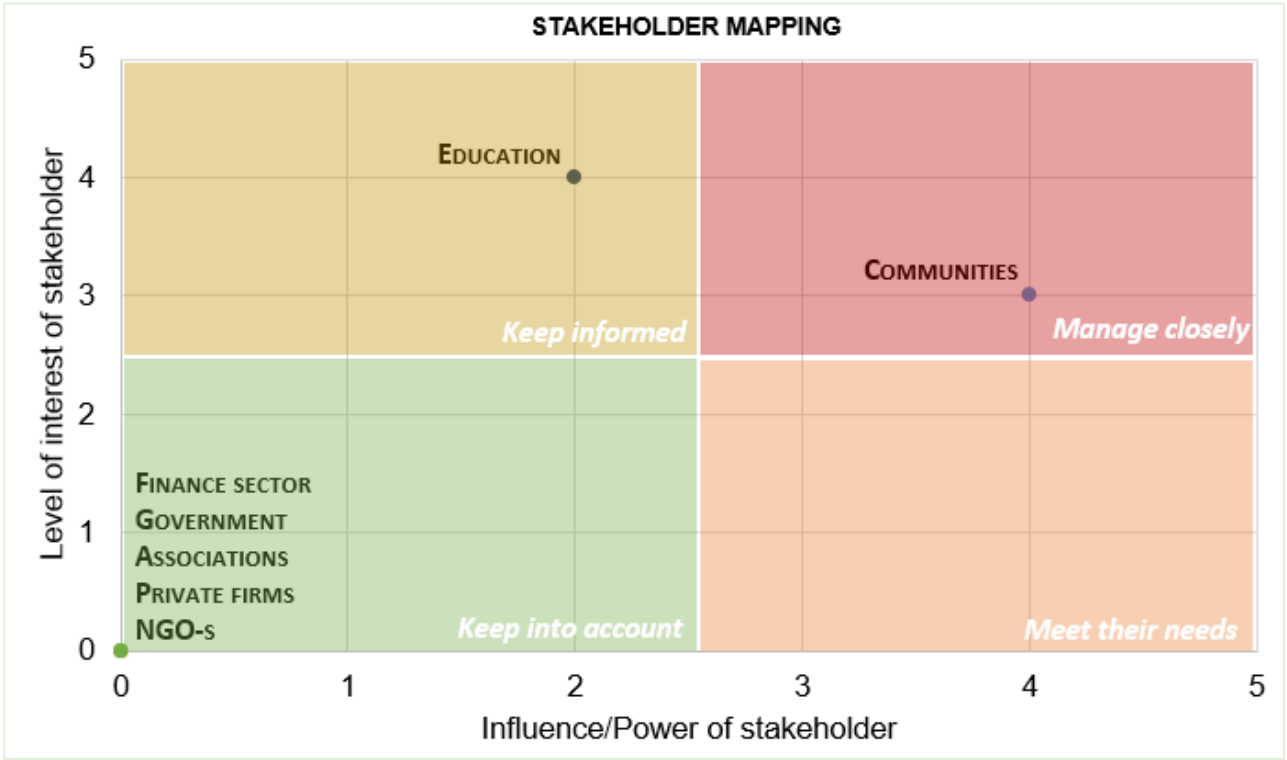
Figure 82. Nolde & Partner. (2020). Detailed drawing according to which the tanks of the new water recycling plant are to be built. [Image]

Figure 83. Nolde & Partner. (2020). The first finished container, after which the other containers are to be manufactured. [Photograph]

Oslo (NO)

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





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 – 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 Naboalgshager.

Vision

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. The pilot key activities will 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 lessons of this program will be utilized in a rooftop beekeeping project centered on entrepreneurship training and "living lab" methodology and tools. Furthermore it will explore 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.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

- Rooftop beekeeping area with 4 hives (Figure 87).
- Honey processing facility – within the Nabolagshager office.

List of the main systems/equipment that are used (or will be used) in the pilot project

- Honey extractor.
- Beekeeping equipment.

What is missing and which is the plan towards their completion

- 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.

List of the main services/activities that are offered (or will be offered) by the pilot project (use the space below)

- Educational activities.
- Entrepreneurship training (Figure 88).
- Education to the public by the youth employees.

What is missing and which is the plan towards their completion

The pilot has two goals to ensure successful completion. The first is the incubator training: the goal is to target more focused entrepreneurs in the second season of this program, focusing on further developing business development skills. The second is to recruit more citizens to be part of the community supported beekeeping, pushing the program towards better sustainability.

Integrating *the outcomes of the co-design activities*

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

Innovative ideas about funding streams, NBL has implemented 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.

Do they need some adaptations in order to be realized? Which?

During the co-design workshop the idea was still quite vague, without good marketing systems in place or price structures. So the pilot team has been working to further develop this idea through an initial implementation in the 2021 season.

Who will you involve in this implementation process?

Pilot team only.

Readiness level and time plan

Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready by the deadline M26 (T4.3).

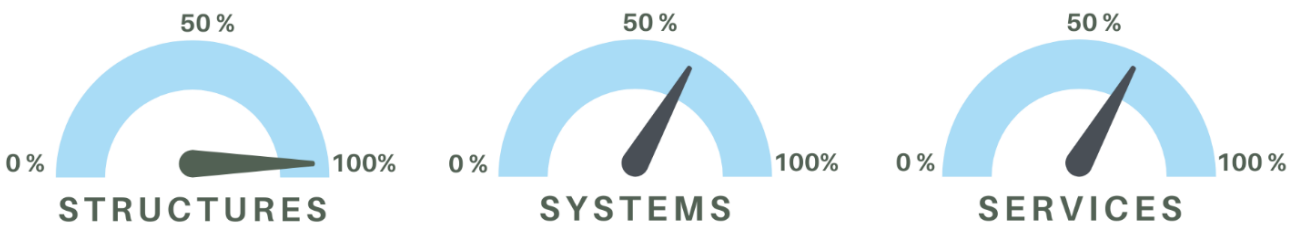


Figure 84. Readiness and functioning of structures, systems, services of the FoodE pilot in Oslo (Oslo incubator for sustainable food production) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

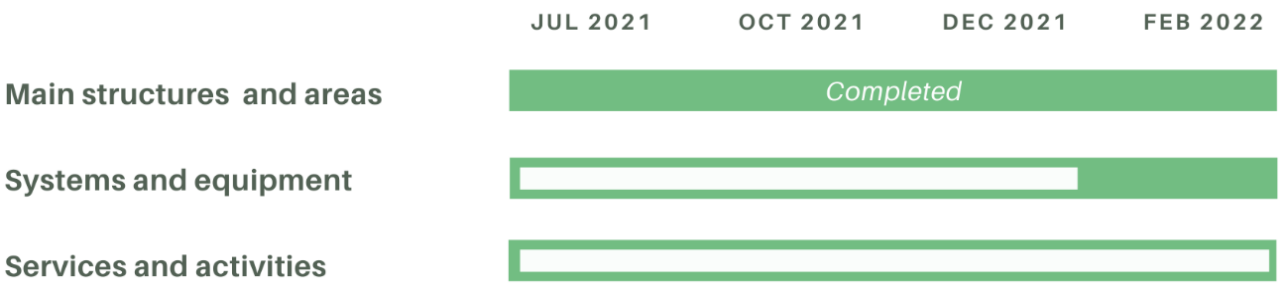


Figure 85. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Oslo (Oslo incubator for sustainable food production).

Pilot team

Person name	Role	Institution
Adam Curtis	Pilot owner, Pilot communicator	Nabolagshager

Idil Akdos	Pilot owner, Pilot communicator	Nabolagshager

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

Pictures

Figure 87. The youth in the program check the beehives to monitor health and honey production.

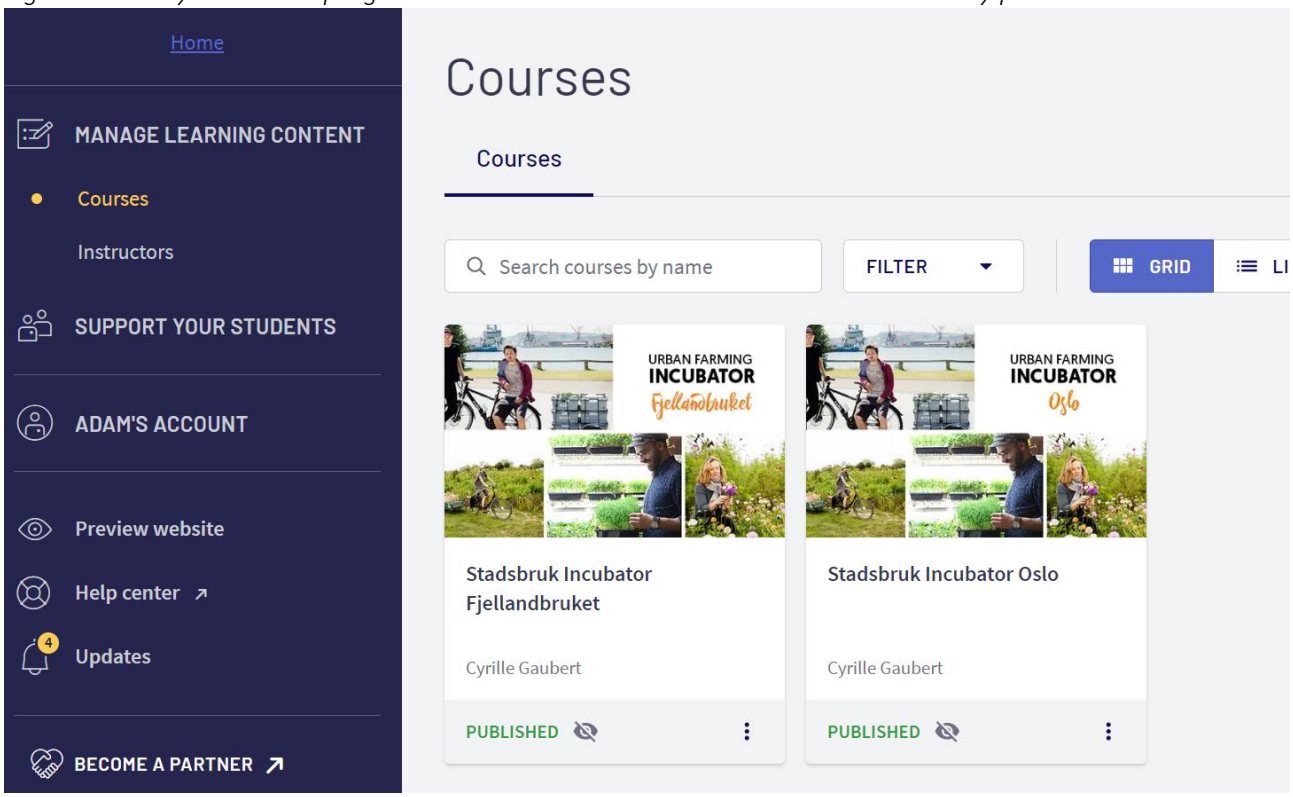


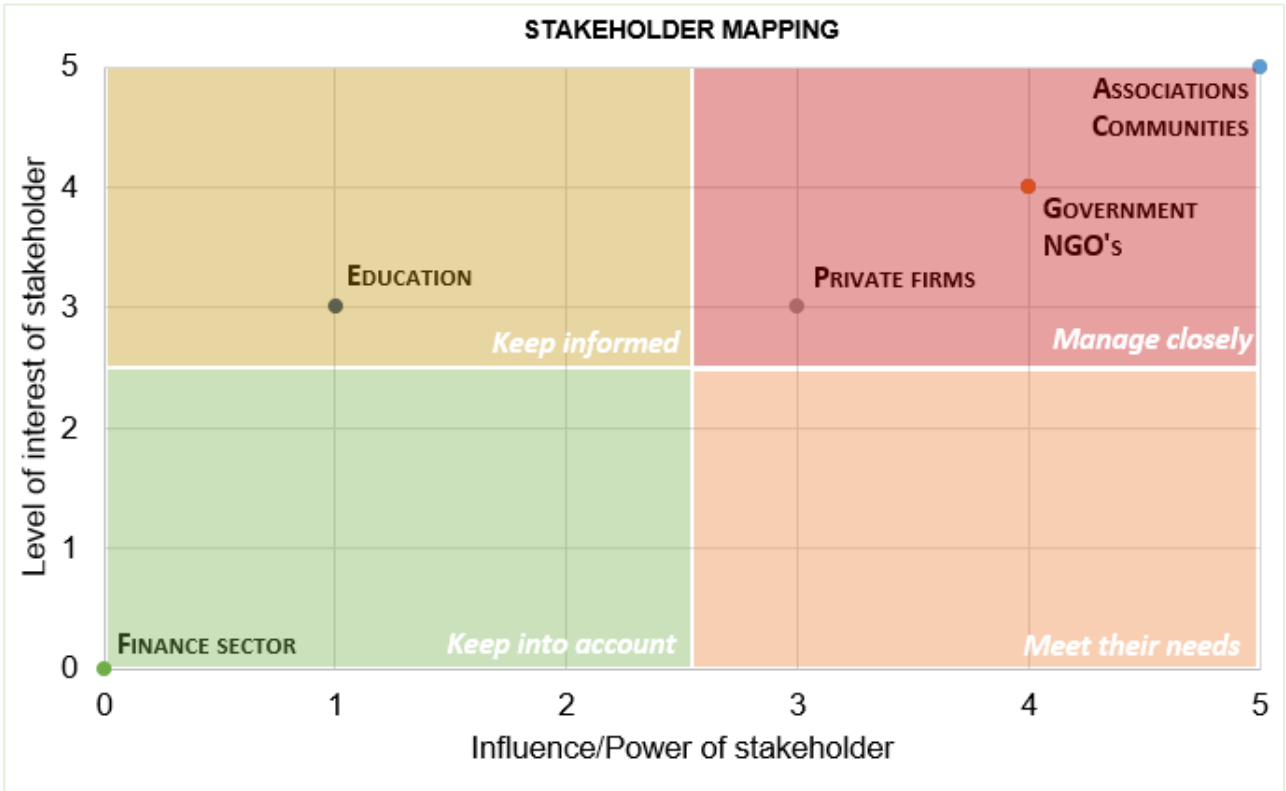
Figure 88. Training courses facilitated by Nabolagshager through the incubator program.

Reference (visuals)

Figure 87. Nabolagshager. (2021). The youth in the program check the beehives to monitor health and honey production. [Photograph]

Figure 88. Nabolagshager. (2021). Training courses facilitated by Nabolagshager through the incubator program. [Image]

FoodE Pilot - Plant factory for social inclusion



Background

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

Vision

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 are in need of exposure to the working environment). Expected job creation opportunities for 3 individuals to run the pilot; attendance of more than 30 further individuals in workshops for implementing their own small scale plant factory; more than 2000 citizens that participate in the dissemination and promotional events.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

Tåsen Microgreens' main warehouse and production facilities (located in Haugenstua, Oslo) will act as the base for the pilot project (Figure 92). Main demonstration and educational activities will take place at the pilot location, but also it is foreseeable that rooms of the collaborating organizations will also be used for meetings.

What is missing and which is the plan towards their completion

The workspaces are already available for use, however, they will require furniture and structures to be placed appropriately. This can be finalized upon clear sharing of plans with the organizations and finalizing the activities.

List of the main systems/equipment that are used (or will be used) in the pilot project

- Production equipment at the warehouse.
- Computers, projectors and whiteboards for information sharing etc.

What is missing and which is the plan towards their completion:

Necessary upgrades to the production technology, and evaluate options that accommodate the budget., system installation and tests to ensure functionality needs to be performed as well.

List of the main services/activities that are offered (or will be offered) by the pilot project

Social inclusion. Tåsen Microgreens will foster 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 the experience and reflect on the production processes, including food production plans and the growing schedule, sales market expectations. This strengthen the role that individuals working together have in contributing to a wider social inclusion while producing food with a closer look at sustainable practices (Figure 94).

What is missing and which is the plan towards their completion

The program of activities needs to be finalized with the organizations, along with attendees and expectations with the differing organizations.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects/ experiences do you plan to pursue and implement in your project? Why?

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.

Do they need some adaptations in order to be realized? Which?

It is important to train the pilot staff and the new employees as well as pilot users on the topics of local food systems and food waste. As these issues are not specific only to Tåsen Microgreens operations (they extend across the entire food system), it will be important to work to provide a broader overview and use Tåsen's pilot as a case example to show the impact and potential.

Who will you involve in this implementation process?

The outcomes of the co-design activities can be integrated into the pilot by consulting with the pilot teams (staff from the organizations they are in collaboration with) as the activities are developed and finalized. The organizations Tåsen collaborates with have a greater understanding of the capabilities of the disadvantaged and/or challenged people who will be involved in the pilot project. Therefore, they will help the pilot team develop the activities that are better suited to the conditions and needs of the operators and users. This insight will be valuable for Tåsen in designing the activities to achieve the best results to truly excel in achieving the pilot goals.

Readiness level and time plan

The production technology in the warehouse will require upgrades shortly, it is important that these are completed prior to the launch of the pilot. Work spaces at the warehouse as well as at the locations of the organizations will need to be confirmed according to the requirements of the activities.
Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready before March 2002.

Figure 89. Readiness and functioning of structures, systems, services of the FoodE pilot in Oslo (Plant factory for social inclusion) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

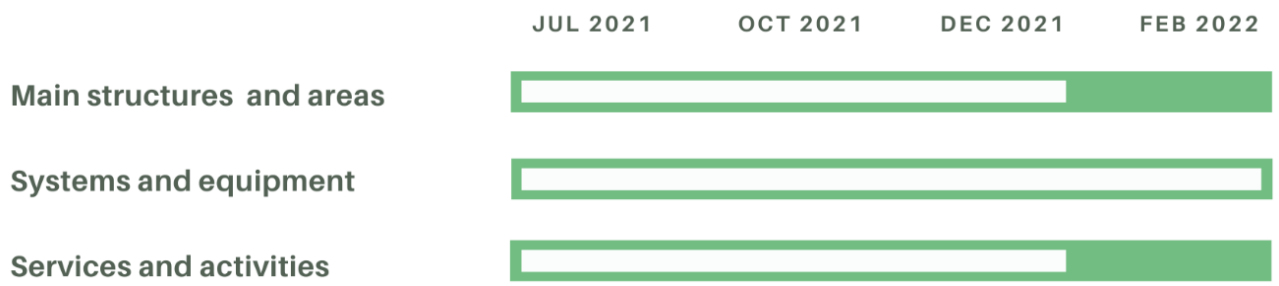


Figure 90. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Oslo (Plant factory for social inclusion).

Pilot team

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
Joanna Costello	Pilot Leader, Pilot executor (3), Communication	Tåsen Microgreens

Figure 91. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

Figure 92. Layered microgreens production by the plant factory of Tåsen microgreens (left) and manual sowing of selected seeds on growing media (right).

Figure 93. Growing media (left) and microgreens produced in the Plant factory of Tåsen microgreens (right)

Figure 94. Social inclusion activities at the pilot location.

References (visuals)

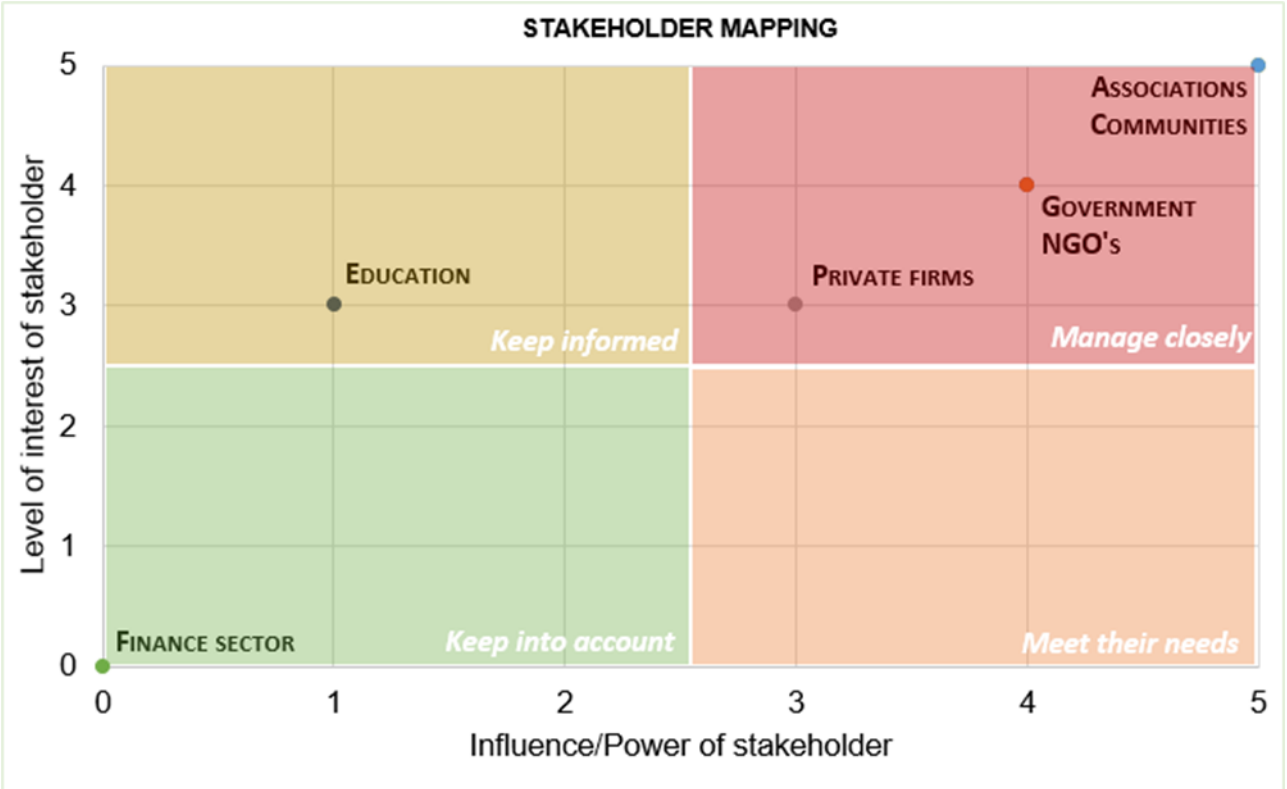
Figure 92 (left). Tåsen microgreens. (2021). *Layered microgreens production by the plant factory of Tåsen microgreens* [Photograph]. https://www.instagram.com/taasenmicrogreens/

Figure 92 (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 93. Tåsen microgreens. (2021). *Growing media and microgreens produced in the Plant factory of Tåsen microgreens* [Photograph]. https://www.instagram.com/taasenmicrogreens/

Figure 94. 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



Background

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

Vision

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 app 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. Expected job creation: opportunities for 1 technician involved in the construction of the systems at the schools; more than 30 students attending workshops and taking responsibility for implementing their own small scale plant factory; more than 2000 citizens that participate in the dissemination and promotional events (wider school community).

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

Tåsen Microgreens’ main warehouse and production facilities (located in Haugenstua, Oslo) will 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 will be spaces available for the plants to grow, as well as rooms for information sessions. Sukkerbiten (an alternative teaching and learning arena for Urban Agriculture, located next to the Opera House in Oslo) will also be used.

What is missing and which is the plan towards their completion

The workspaces are already available for use, however, they will require materials and structures to be placed appropriately. This can be finalized upon clear sharing of plans with the schools, and finalizing the activities with the students.

List of the main systems/equipment that are used (or will be used) in the pilot project

- Production equipment at the warehouse.
- Computers, projectors and whiteboards for information sharing etc.

What is missing and which is the plan towards their completion

Materials for plant growing , “Avismo” technology for mini hydroponic systems, make a plan with the school about what materials are required.

List of the main services/activities that are offered (or will be offered) by the pilot project

Tåsen Microgreens will collaborate with schools around Oslo, to work together with the teachers and create educational programs. Tåsen’s existing plant factory will be used as an demonstrational tool to educate the students about the potential of growing plants indoor and how this can be operationalized in an urban setting. Students will learn several growing-related tasks and will 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 the app.

What is missing and which is the plan towards their completion

The program of activities needs to be finalized with the schools, along with considering the age range of the students, and expectations, commitment and growing seasons alongside when the students are at school.

Integrating the outcomes of the co-design activities

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

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.

Do they need some adaptations in order to be realized? Which?

When considering local food systems, it is important to consider what can be grown in a more sustainable way. In particular, there is the need to understand more clearly what are the growing requirements for certain "tropical" plants and how the existing systems can be accommodated to improve the sustainability of the overall growing system at the different levels of the production chain (e.g. resource use, packaging materials, green jobs, etc.).

Who will you involve in this implementation process?

The outcomes of the co-design activities can be integrated into our 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.

Readiness level and time plan

Material required by the schools needs to be assessed and work spaces at the warehouse as well as at the schools and Sukkerbiten need to be confirmed according to the requirements of the activities themselves. Overall, by looking at the current status of the pilot (structures, systems, activities), it can be estimated that it will be 100% ready before M26 (T4.3).

Figure 95. Readiness and functioning of structures, systems, services of the FoodE pilot in Oslo (Educational hydroponic garden) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

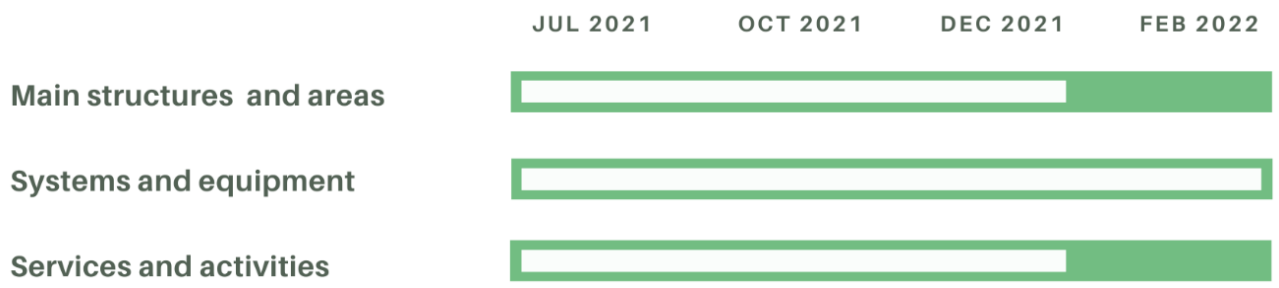


Figure 96. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Oslo (Educational hydroponic garden).

Pilot team

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
Joanna Costello	Pilot Leader, Pilot executor (3), Communication	Tåsen Microgreens

Figure 97. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

Figure 98. On the left: '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. On the right: indoor production of leafy vegetable production, multi-layer shelves.

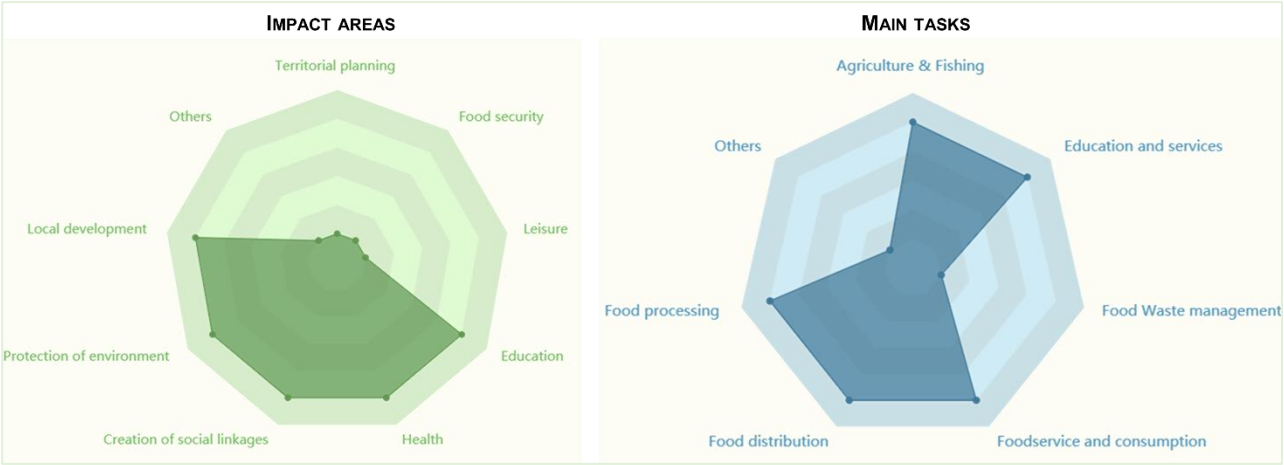
Reference (visuals)

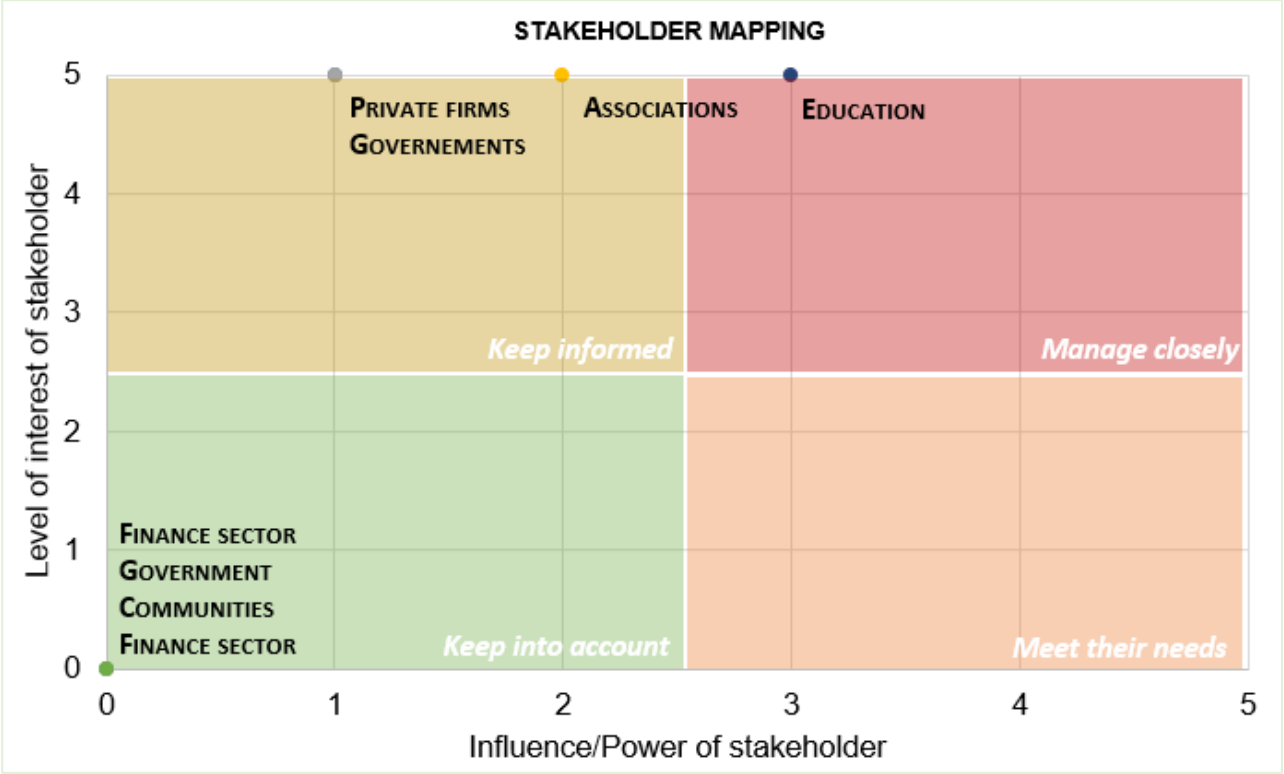
Figure 98 (left). Tåsen microgreens. (2021). “Greenland floating garden” intends to use the water surface on Akerselva river to run productive and dissemination-oriented activities for children and young people in the local community. https://www.instagram.com/taasenmicrogreens/. [Photograph]

Figure 98 (right). Tåsen microgreens. (2021). indoor production of leafy vegetable production, multi-layer shelves. https://www.instagram.com/taasenmicrogreens/. [Photograph]

Tenerife (SP)

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





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.

Vision

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. This will require the development of training materials (text and multimedia) to raise the awareness of local marine resources.

Implementation plan

List of the main structures and areas that are present (or will be present) at the pilot facility

Fisher organizations have their own facilities, and some of these organizations have adapted (or have plans to adapt) their facilities to process fish adequately in order to join the pilot. Schools and school canteens have their own facilities as well as the University (ULL).

What is missing and which is the plan towards their completion:

ULL is trying to include new fisher organizations or other enterprises in the initiative and they may need to develop some facilities on their own, probably with institutional support from the government.

List of the main systems/equipment that are used (or will be used) in the pilot project

- Fisher organizations have their own equipment for fish processing and fish delivery. Systems for deep-freezing are already in operation, or are planned to be acquired by some fisher organizations.
- Schools canteens have their own equipment. Materials for activities in schools are being developed. An app to place fish orders to connect schools with fisher organizations is also being developed.

What is missing and which is the plan towards their completion:

Fish processing and delivery is already working with the existing facilities of fisher organizations, some have been adapted to this purpose. During the expansion of the pilot new facilities need to be created or adapted.

List of the main services/activities that are offered (or will be offered) by the pilot project

- Local fish (processed or raw) delivery to school canteens, including different fish species and formats (already working).
- Activities of the 4 blocks of educational activities will be carried out with students
  - Local fishes and marine ecosystem: awareness creation tools.
  - Local seafood: collective learning tools.
  - Small-scale fisheries, food security and sustainability.

Activity types (developed during the co-design participatory activities):

- "Draw your tuna".

- "Share your recipe".
- "Our fish and the seasons".
- Marine recipe book.

What is missing and which is the plan towards their completion

- The local fish delivery is already working.
- The extension plans of the fish delivery to other suppliers, islands and schools are under development.
- The educational activities are also under development.

Integrating the outcomes of the co-design activities.

Which of the resulting ideas / projects / experiences do you plan to pursue and implement in your project? Why?

From the co-design focus group organized together with school managers, cooks, canteen staff, teachers parents association representatives and fishers association representatives led to the following ideas will be pursued:

- Extend the project to other islands, schools and suppliers that have shown interest.
- Extend the fish offer with other species (white fish, small pelagic)
- Carry out the activities that have been defined throughout the participatory process:
  - "Draw your tuna".
  - "Share your recipe".
  - "Our fish and the seasons"
  - Marine recipe book
- Carry out new activities in the following stages that are being defined with the information gathered during the participatory process.

Do they need some adaptations in order to be realized? Which?

New suppliers have to be chosen. New schools have to be chosen. The materials for the activities with students are defined but have to be fully developed.

Who will you involve in this implementation process? (e.g. pilot team only, co-design teams, citizens, etc.)

The pilot team, the suppliers, schools managers, teachers and school canteen staff.

Readiness level and time plan

The kid science/awareness creation activities are being developed and will be implemented next year. Overall, by looking at the current status of the pilot (structures, systems, activities), it can estimated that it will be ready by the deadline M26 (T4.3).

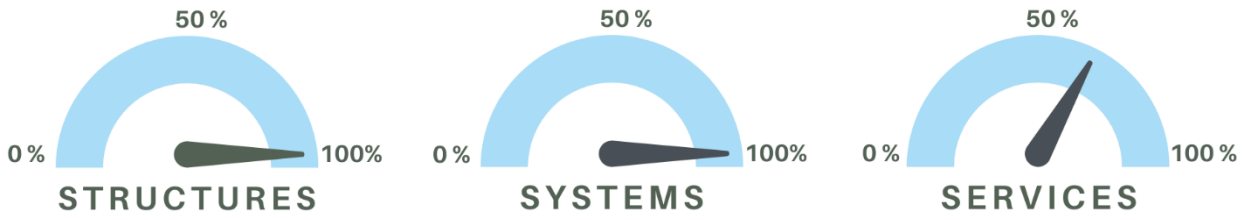


Figure 99. Readiness and functioning of structures, systems, services of the FoodE pilot in Tenerife (ECOTÚNIDOS - sustainable small-scale fishery in school canteens) on a scale 0 -100% (where 0%: not ready, functioning, 100%: ready, operative).

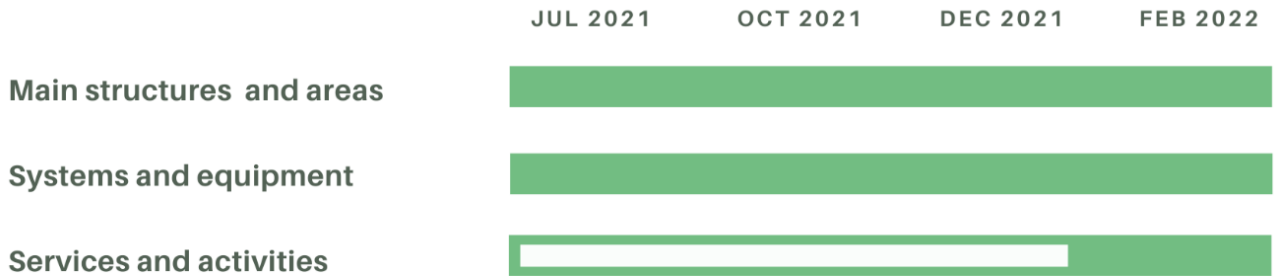


Figure 100. Time plan towards completion and functioning of structures /systems/services of the FoodE pilot in Tenerife (ECOTÚNIDOS - sustainable small-scale fishery in school canteens).

Pilot team

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

Figure 101. People involved in the FoodE pilot team and respective roles and institutions.

Pictures

Figure 102. Chef in the training of school cooks (left) and School managers and cooks at Islatuna fisher organization (right).

Figure 103. Small-pelagic fish prepared for frying and in the pupil dish to be consumed. CEIP Princesa Tejina, Tenerife.

Reference (visuals)

Figure 101 (left). Islatuna fisher organization. (2021). Chef in the training of school cooks at Islatuna fisher organization (right). [Photograph]

Figure 101 (right). Islatuna fisher organization. (2021). School managers and cooks at Islatuna fisher organization (right). [Photograph]

Figure 102. Islatuna fisher Organization. (2021). Small-pelagic fish prepared for frying and in the pupil dish to be consumed. CEIP Princesa Tejina, Tenerife. [Photograph]

Longyearbyen (NO)

FoodE Pilot - Circular economy restaurant

The FoodE partner "POLAR PERMACULTURE SOLUTIONS" has recently declared bankruptcy (July 2021) and accordingly it will not be able anymore to take part in the project. Consequently, the pilot project "Circular economy restaurant" planned in Longyearbyen will no longer exist and no executive plan has been presented by POL.

In place of the executive plan, this section will describe the strategy designed by the FoodE consortium to pursue the core activities of Polar permaculture pilot and related KPI's.

The FoodE consortium took the joint decision to re-distribute the core activities and internal KPI's of POL among (a limited) number of FoodE partners, already in charge of pilot projects in other European cities. For this purpose, a "call for expression of interest" has been launched where interested FoodE partner had to provide document containing changes to their pilot description currently present in the Grant Agreement, indicating new KPIs and related costs. The proposal has been submitted on September 17 and it is currently awaiting approval by the European Commission.

Original description of Polar permaculture as per Grant Agreement

Background: POL has developed the Polar Permaculture project, the only food production unit-existing in Svalbard island, which sells to local grocery stores, hotels, restaurant and private residences fresh vegetables and eggs, and integrates principles of circular economy for regenerating waste into resources for the farm. HEI partners (WR, UniBO, ULL) and SMEs partners (NOL, FLY, ISL) have competences in protected cultivation technologies and small scale fishery projects in remote islands.

Vision: POL will open a restaurant in march 2019 connected with a food production unit, where the waste from the restaurant and other local activities is processed and provides compost and energy for the food unit, following the approach used by Albron's circular and sustainable pavilion in Utrecht. The FoodE project will allow for the co-design with citizens socially inclusive activities associated with food production, enabling to create partnerships with local stakeholders toward the implementation of an innovative CRFS model that follows circular economy principles.

Furthermore, it will allow for integration with local fishermen, promoting the establishment of innovative community supported fishery schemes for the supply of the restaurant and the local population.

Internal KPI'S:

- Expected job creation opportunities for 1 technician involved in the farm activities;
- more than 5 local fishermen supplying the restaurant;
- more than 2000 citizens that participate in the dissemination and promotional events.
- The food unit will also be integrated by lighting devices, provided by FLY, enabling year round cultivation of leafy vegetables, microgreens and herbs for the restaurant. At least 10 m2 of growing surface will be illuminated by Flygrow lights.

FoodE Partners' proposals

The FoodE partners that submitted proposals are:

- ULL, already in charge of the FoodE pilot ***"Sustainable small-scale fishery in school canteens"***. In addition to the contribution to the KPIs, this CRFS, similarly to POL, is also located on a remote island (Tenerife) and shares many similar challenges. Table 1. includes the partner proposal on specific KPI (second column), compared to the former description, if any (first column) in order to contribute to the achievement of the KPIs of Polar permaculture (third column).

- UNIBO (together with associations Aquaponic Design and Kilowatt, and with the FoodE partner FLY) already in charge of the FoodE pilot ***"SERRA MADRE: A food hub for education, leisure and urban farming innovation"*** in Bologna. The pilot present similarities to the former pilot of POL in terms of zero-waste restaurants, and small scale food production systems (e.g. vertical farming, aquaponics). Table 2. includes the partner proposal on specific KPI (second column), compared to the former description, if any (first column) in order to contribute to the achievement of the KPIs of Polar permaculture (third column).
- MBINE, already in charge of the FoodE pilot ***"CUIB: Restaurant with local products"*** in Iasi. In Addition, the pilot in Iasi also hosts a restaurant with the aim to make it zero-waste (about 10 tons of food recovered per year) and integrate circular economy principles, similarly to Polar permaculture. Through its CRFS, MBINE will also contribute to increase the social impact by providing solidarity food services: food collection from supermarkets and producers and re-distribution to about 200 homeless people and other vulnerable people (project already in place that could be included in FoodE). Table 3. includes the partner proposal on specific KPI (second column), compared to the former description, if any (first column) in order to contribute to the achievement of the KPIs of Polar permaculture (third column).

ULL (Original)	ULL (Proposed)	KPI polar permaculture
-	-	Expected job creation opportunities for 1 technician involved in the farm activities;
▪ Around 70 boats and 150 fishers involved in the programme.	▪ Integration with local fisher organisations will facilitate the establishment of innovative local value chain schemes to supply at least 2 restaurants with similar products served to school canteens ▪ around 80 boats and 160 (+10) fishers involved in the programme.	more than 5 local fishermen supplying the restaurant;
-	-	more than 2000 citizens that participate in the dissemination and promotional events.
-	-	The food unit will also be integrated by lighting devices, provided by FLY, enabling year round cultivation of leafy vegetables, microgreens and herbs for the restaurant. At least 10 m^2 of growing surface will be illuminated by Flygrow lights.

Table 1.

UNIBO - Le Serre (Original)	UNIBO - Le Serre (Proposed)	KPI polar permaculture
-	▪ Hire 1 skilled technician that will design and manage a newly implemented aquaponic greenhouse system.	Expected job creation opportunities for 1 technician involved in the farm activities;
-	-	more than 5 local fishermen supplying the restaurant;
2000 local citizens and stakeholders engaging in the workshops and events	4000 local citizens and stakeholders engaging in the workshops and events	more than 2000 citizens that participate in the dissemination and promotional events.
	The new aquaponic system – built on own resources of Le Serre – will be integrated by FoodE with a multiple layer cultivation (of at least 30 m^2) powered by LED lighting supplied by Flytech.	The food unit will also be integrated by lighting devices, provided by FLY, enabling year round cultivation of leafy vegetables, microgreens and herbs for the restaurant. At least 10 m^2 of growing surface will be illuminated by Flygrow lights.

Table 2.

Maibine (Original)	Maibine (Proposed)	KPI polar permaculture
-	-	Expected job creation opportunities for 1 technician involved in the farm activities;
-	-	more than 5 local fishermen supplying the restaurant;
-	▪ Organizing more dissemination/educational events (additional 20 small events over the two years);	more than 2000 citizens that participate in the dissemination and promotional events.
-	-	The food unit will also be integrated by lighting devices, provided by FLY, enabling year round cultivation of leafy vegetables, microgreens and herbs for the restaurant. At least 10 m2 of growing surface will be illuminated by Flygrow lights.

Table 3.

References

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