



ClieNFarms
Climate Neutral Farms

4.1 Scaling Toolbox

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D4.1 Scaling Toolbox

Authors/Organisation	Daniel Zimmer/Climate-KIC, Pernille Martiny Modvig/Climate-KIC, Laurene Lebelt/Climate-KIC
Contributors	Jan Peter Lesschen/Wageningen Research, Joana Faria Anjos/Consulair, Dr. Lisette Phelan/University of Leeds, Cédric Broussillou/EDF, Dr. Deirdre Hennessy/University College Cork, Marion de Vries/Wageningen Research
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1 Executive summary

This report describes the process and format of the ClieNFarms Scaling Toolbox.

Developed collaboratively with ClieNFarms work packages, Systemic Solution Spaces (I3S) ¹ managers, Lead Commercial Farms, and stakeholders, the toolbox is an evolving set of instruments designed to help stakeholders in the agri-food system through the process of scaling practices towards carbon neutral farming.

Deliverable D4.1 "Scaling toolbox with proven instruments for incentivising carbon farming," is linked to work package 4 focusing on scaling impact of the I3S. Task 4.1 focuses on developing and validating systemic scaling approaches for the I3S, as developed in Work Package 3.

This is done through assessing costs and benefits of I3S implementation on Lead Commercial Farms in WP3 and value gaps and financial needs to compensate farmers and support their transition as well as a piler assessing levers and barriers (e.g., policy, regulations, knowledge, risk) to scaling up impact through the I3S.

The objective and expected impact of Task 4.1 is to develop and validate a framework for scaling based on economic and barrier assessment pillars, to address value gaps by certifying reliable solutions, generating carbon credits, and introducing additional value chains. This framework was delivered under MS4.1 in October 2022. The Scaling Framework is described in section 4 in this document.

The scaling framework has set the stage for developing the scaling toolbox which focuses on balancing value, risk, and trust for individual and systemic transformation processes.

The ClieNFarms Scaling Toolbox is designed as a service directed at individual farmers, industry actors within agrifood value chains, investors and financial institutions, farm advisors, and cooperative organizations. These user archetypes can be broadly classified into three main categories: those with financial resources for leveraging rewards to farmers, entities employing teaching and organizational approaches to initiate change and potentially mobilize funding, and influencers shaping knowledge-based decision-making and legislative frameworks for scaling. The toolbox recognizes the diversity of stakeholders involved in scaling initiatives and aims to provide relevant tools to address the needs of each group.

In response to the urgent environmental challenges facing our planet, the ClieNFarms Scaling Toolbox is designed to facilitate a transformative shift towards climate-neutral farming in Europe. Acknowledging that this transition requires more than just technical solutions, the tools and methods compiled within the toolbox are strategically curated to support behavioural shifts, focusing on training, strategizing, and fostering collaborations based on shared visions.

¹ The core concept of the project is a demonstration approach called the Innovative Systemic Solution Space (I3S). I3S consists of different components and actors who will test and disseminate tailored multi-actor, co-designed innovative solutions to achieve climate-neutral farms within supply chain and local geographical extent. The I3S structure aims to allow for 1 Demonstration Farm to reach 10 lead commercial farms and then 100 outreach farms.

D4.1 Scaling Toolbox

The toolbox will be set up with a user-friendly design, guiding individuals through a selection funnel on the ClieNFarms homepage to access tools tailored to their specific needs. The tools are presented in the form of recipe-like short reports with comprehensive links to sources, additional reading, in-depth explanations, and detailed user guides, ensuring an effective and user-centric delivery of solutions.

Scheduled to be accessible on the ClieNFarms homepage by March 2024, the Scaling Toolbox's user interface is informed by user group interviews, ensuring alignment with their scaling needs for carbon farming in Europe and beyond.

2 Introduction

2.1. Purpose of the document

This document is a report on the development of the ClieNFarms' Scaling Toolbox of proven instruments for incentivising a transition to a climate-neutral agriculture across EU (European Union) farming systems. The development of the Scaling Toolbox is based on the Milestone 4.1 scaling framework delivered in month 10 of the ClieNFarms project. This scaling framework describes a five-step approach required for the transformation of a system through the deployment of "solutions" aiming to move the system towards a defined goal. In this case, the system is defined within the frames of the Innovative Systemic Solution Spaces (ISS) of the ClieNFarms project. An ISS is understood as a number of farms embedded in a landscape/territory and in a series of value chains. In the case of ClieNFarms, the overall goal is to co-develop and scale up systemic and locally relevant solutions to foster climate-neutral and climate-resilient farms across Europe.

The ISS structure aims to allow for 1 Demonstration Farm to reach 10 lead commercial farms and then 100 outreach farms. With this scaling approach, the intention is to optimize the number of farmers who can be reached through the ClieNFarms project. All the solutions will be recorded in the ClieNFarms data hub on the ClieNFarms website that will be an open catalogue for everyone interested in climate mitigation in the agricultural sector. The Scaling Toolbox will be embedded alongside this catalogue.

In the ClieNFarms project we will be starting with the ISS cases, which will be provided with tools guiding them through the different steps of the scaling process. The aim is to reach readiness at the end of the ClieNFarms project period for implementation of the roadmaps and portfolios of solutions designed through the process. The ClieNFarms project will also develop a strategy for scaling solutions beyond these systems by influencing smaller farms and regions beyond Europe during and after the project period and the Scaling toolbox will be made openly available for all interested stakeholders external to the ClieNFarms project through the ClieNFarms homepage.

This document outlines the process of collecting the scaling tools developed and identified through the ClieNFarms project with the aim to contribute to achieve climate-neutrality of European agriculture by 2050. Furthermore, it describes the process of arriving to the final design of the scaling toolbox along with the strategy for making it available to external users.

The Scaling Framework has served as the methodological framework for the Scaling toolbox and has set the stage for the development of concrete and user-friendly tools to support the ISS and individual farmers in implementing the steps of the scaling framework.

The tools of the toolbox have been identified and described in close collaboration with the ClieNFarms work packages 1-4, the ISS managers, the Lead Commercial Farms (LCF) and representatives of the relevant stakeholder groups who are involved in and influence the ISS systems. The idea is that the toolbox will be continuously expanded, tested, and adjusted interactively through the remaining part of the ClieNFarms project.

At the end of the ClieNFarms project the Scaling Toolbox will include financial instruments including de-risking tools, market-based mechanisms, integrated carbon finance solutions, policy and regulatory solutions and knowledge and training tools.

The ClieNFarms Scaling toolbox is currently in the process of being embedded on the ClieNFarms homepage together with the Solutions Catalogue. The developers connected to WP6 expect the toolbox to be accessible to users by 30.03.2024.

The work on developing the user interface of the Scaling Toolbox is based on interviews with representatives of the identified user groups to identify their understanding of “Scaling” as well as to understand their needs in relation to identifying and collecting a useful set of tools to enable their scaling processes towards carbon farming in Europe and beyond².

Each cycle of iteration will pave the way towards offering the scaling framework and scaling toolbox as instruments to be adopted by European practitioners.

2.2. Structure of the document

This document is structured in 9 major sections:

Section 1 - Executive Summary

Section 2 – Introduction. This section describes the purpose and structure of the document and outlines the overarching goals and objectives, the purpose and expected outcomes of Task 4.1 - Develop and validate systemic scaling approaches for the I3S.

Section 3 - Conditions for Scaling. This section describes the foundational aspects influencing scaling strategies, exploring the interconnected dynamics of value, risk, and trust. It also examines the diverse routes available for scaling initiatives.

Section 4 - Overview of the Scaling Framework. In this section, the milestone 4.1 Scaling Framework is introduced describing each of the five steps of the scaling framework in detail.

Section 5 - Overview of The Scaling Toolbox of Proven Instruments for Incentivizing Climate Neutrality. This section presents the ClieNFarms scaling toolbox. It covers the selection of tools, the decisions behind the design of an interactive toolbox, and the identification of user archetypes.

Section 6 - The Process of Developing the Scaling Toolbox. This section describes the methodology employed in developing the ClieNFarms Scaling Toolbox, including user interviews.

Section 7 - Overview of the Selected Tools for the Scaling Toolbox. This section describes the principles behind selection of tools and the integration of tools into the ClieNFarms Homepage.

Section 8 – Next Steps. This section describes the continuous testing and development strategies for the toolbox.

Section 9 – Conclusion.

² The first iteration of the ClieNFarms scaling framework has been developed based on interviews with the following European initiatives working on implementing and scaling solutions towards carbon farming.

-Friesland Campina, (NL)

-Agrovi Knowledge Centre, Henrik Kruse Rasmussen (DK)

-Svensk Kolindlagring, Christina Berneheim (SE)

-Natais, Anne Marie Joliet (FR)

-Rabobank, Harry Farnsworth (NL)

-Livelyhood funds, Thomas Braschi

3 Conditions for scaling

3.1. Value, Risk, and Trust

A scaling process aiming to transform a production system relies on the mobilisation of the stakeholders who interact within a territory and within value chains of products or services. No scaling will occur without a sufficient group of engaged actors. We assume that three critical factors are needed to mobilise a critical number of stakeholders and get them to work together to reach a sufficient scale. Without reaching a certain critical mass the transformation is bound to fail in many cases since it is difficult to create a new value chain or to generate demand if the associated production is too small.

The first of these factors is the value generated by the transformation which needs to be perceived as sufficiently rewarding by the different actors. This value can be related to new products or services that are perceived as beneficial, because they can be monetized. It can also be inspirational, benefit the local communities or improve the local environment and livelihoods. While value is multidimensional, it needs to be perceived as tangible by some of the actors who need to be convinced that taking transformative action is worth the efforts required. In general, part of the value created should be translated into monetary value that benefit the producers. Identifying the value(s) at stake and their potential beneficiaries is essential. The development of business models is a way to extract this monetary value to the benefit of the involved stakeholders. Understanding specific value and what motivates individual stakeholders is important; some more interested in improving margins, others by beautifying the landscape, others by what enjoyment can be reaped in conjunction with the new products or services.

3.2. Scaling Routes

Transforming production systems at scale can take or combine different approaches depending on the complexity of the issues. The term “scaling routes” refers to the main approaches to scaling new practices and behaviour.

Classically three main routes are distinguished:

- Scaling-up is the **organic growth** of a given initiative in each context. Aggregating similar farmers in a territory to transform their production system is an example of it. This is typically what i3S of ClieNFarms will be doing in an initial phase: they wish to demonstrate transformation trajectories in lead commercial farms and to convince farmers of a single region to adopt the same practices.
- Scaling-out is the **replication** of a transformation in other comparable systems or contexts where little adaptation of the solutions is required. Scaling out can be seen as the simplest way to scale. In many cases however, what can be assessed as a comparable context ends up being different: even slight differences in regulations, behaviours, societal organisation, and power structures suffice to make the replication difficult.
- Scaling deep, based on **system’s transformation**, is the more general form of scaling because most of the transformations are complex and require a thorough examination of the system and of its behaviour when nudged. Systems are in general stabilised by feedback loops that are difficult to break. Without understanding them and acting upon them, the transformation is bound to fail. Hence the need to understand these loops and associated barriers.

In addition, other complementary approaches can be also used in combination with these 3 main scaling archetypes. This is the case of “connecting the dots” based on the idea that facilitating interconnections and cross-pollination between different stakeholders, solutions or initiatives is likely to generate momentum.

Scaling is often a combination of the three approaches mentioned above. In ClieNFarms, the data base of solutions belongs mostly to scaling-out, while the first steps of our farming systems transformation tend to focus mostly on scaling-up approaches. When entering the sourcing districts of off-taker companies, a first attempt to scaling deep is introduced with the definition of farm archetypes and the assumption that different farms will take different transformation routes.

In the scaling approach developed in Task 4.1., we deliberately take a fully-fledged scaling deep approach and base our framework on an understanding of the system’s functioning and of the barriers of its transformation.

4 Overview of the Scaling Framework

The Scaling Framework which was developed under Milestone 4.1 of the ClieNFarms project has served as the methodological framework for the Scaling toolbox. A scaling framework can be defined as a series of steps and approaches required for the transformation of a system through the deployment of “solutions” with the aim of moving the system towards a defined goal. In this case, the system is defined within the frames of the innovative Systemic Solution Spaces (I3S) of the ClieNFarms projects. An I3S is understood as a number of farms embedded in a landscape/territory and in a series of value chains. In the case of ClieNFarms, the overall goal is to co-develop and scale up systemic and locally relevant solutions to foster climate-neutral and climate-resilient farms across Europe. In the ClieNFarms project we will be starting with the I3S cases, where we intend to guide them through the scaling process with the aim of reaching readiness for implementation of the roadmaps and portfolios of action designed through the process at the end of the ClieNFarms project period. The ClieNFarms project will also develop a strategy for scaling solutions beyond these systems by influencing smaller farms and regions beyond Europe during and after the project period.

Through the I3Ss, the ClieNFarms project will develop a network of farmers to debate technical and financially feasible aspects, promote participation of the surrounding ecosystem (finance, agro-equipment, service providers, advisors etc.) to allow investments in specific equipment, to strengthen – and if necessary - re-design- advisory systems and provide clear policy support that will be key to achieving success in the transition to climate-neutral farms. This network will provide strong demonstration and farmer empowerment.

The scaling framework has been developed on the basis on interviews with European initiatives working on implementing and scaling solutions towards carbon farming.

4.1. Five steps towards scaling

The proposed approach has 5 steps presented in Figure 1 in a sequential way but will in practice be implemented partly in parallel and in an iterative way (particularly as regards Step 4 which needs to guide the entire process). These steps are described in further detail in the following sections.

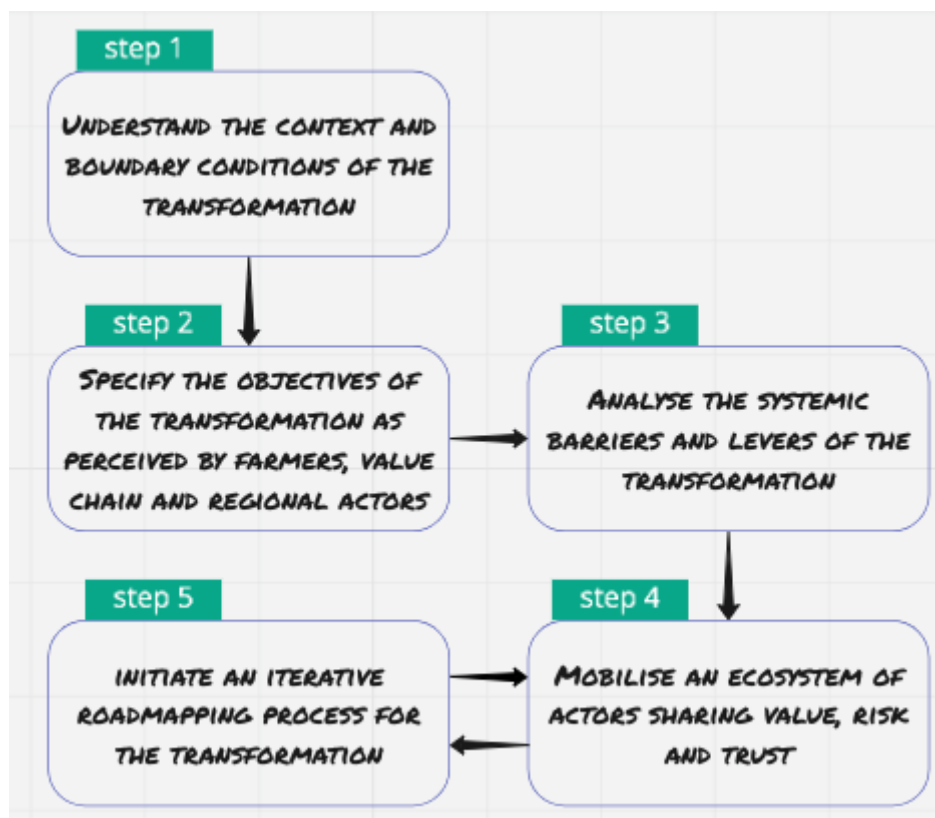


Figure 1: The five proposed steps of the scaling approach. Over the course of the ClieNFarms project, we will seek to create momentum for the implementation of the steps of the scaling framework starting with the most motivated ISSs. The project itself does not hold resources to fund the implementation of the scaling activities and therefore, we intend to design financing plans and fundraise through for instance the instruments under the upcoming soil mission and other instruments.

The scaling framework relies on 5 major steps moving from step 1 where the system to be transformed is defined and a collective understanding of the boundary conditions of the transformation between the stakeholders involved is generated.

In step 2, the objective of the transformation is specified, and a common intent as perceived by farmers, value chain and regional actors is formulated.

Step 3 focusses on levers and barriers of the transformation and identifies the feedback loops which either reinforce status quo or balance other factors and loops of the system and prepare a list of leverage points for the realization of the intent.

In step 4, the actors within and with connection to the system are mobilized to drive the implementation of the roadmap. This step will to some extent run in parallel with steps 2 through 5 as the ecosystem will evolve progressively throughout the process.

Step 5 develops a portfolio of interventions and translates it into a roadmap, i.e. a series of concrete steps of the transformation.

Over the course of the ClieNFarms project, we will work with the I3S and the ecosystems around these to collect information and co-design tools to enable the implementation of the five steps towards scaling solutions at systems level and beyond. The interaction with I3Ss and their ecosystems will be facilitated through the I3S managers. In order to secure efficient collaboration and input flow from the ClieNFarms work packages 1-3 to support the iterative shaping of the scaling framework and scaling toolbox under Task 4.1, we will design a timeline with annual review points for feedback and input collection from the ClieNFarms consortium. The generated feedback will be integrated immediately after each review.

4.2. Step 1: Define the boundary conditions of the system transformation

The overall boundary conditions for systems transformation refer to the targets of the European Commission and the anticipated role of carbon farming to support the achievement of the proposed 2030 net removal target of 310 Mt CO₂eq in the land sector, as presented in July's package on [delivering the European Green Deal](#).

The boundary conditions for the ClieNFarms Scaling approach will therefore strongly relate to and be defined by the boundary conditions of land use and forestry as defined under the EU communication on [Sustainable Carbon Cycles](#).

What?

The definition of the boundary conditions of the system both relates to the targets set by the European Commission and to the general context in which the transformative scaling is or will be happening. It relates to the typology of farms & farm conditions (e.g., production systems, to the policy and political context in the region, the challenges related to agroecological and climate neutrality conditions (with a particular focus on climate change adaptation and mitigation).

The idea is to set the stage of (i) what are the broad characteristics of the “I3S system” in which the transformation needs to take place, (ii) who are the value chain actors and other stakeholders that are playing a role in the transformation, (iii) what important conditions need to be considered to assess the transformative momentum of the region, (iv) what specific elements of the context related to climate change need to be kept in mind for the I3S? More details on these are presented in Figure 2.

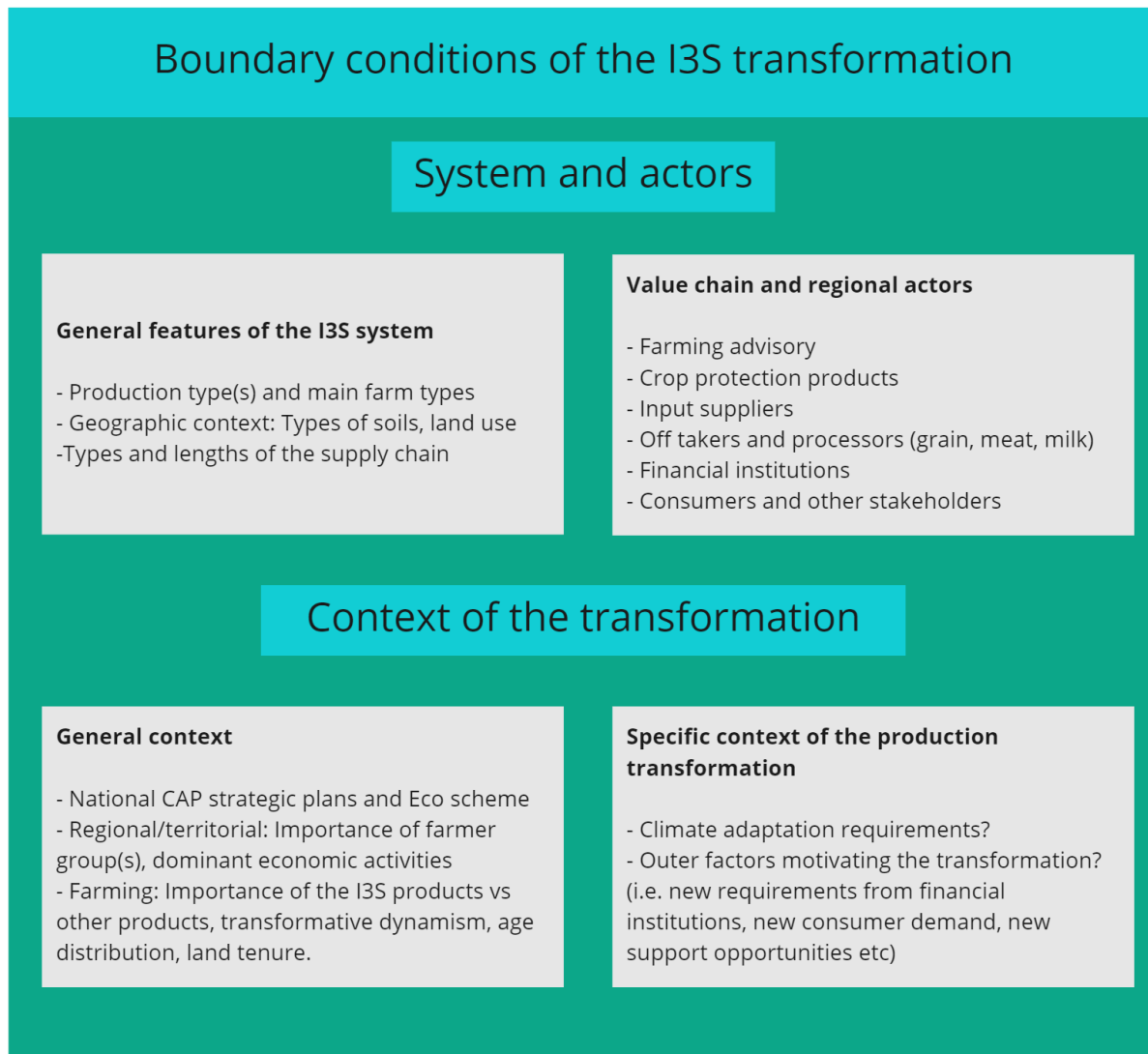


Figure 2: Step 1 investigates the general context in which the transformative scaling is or will be happening. It relates to the typology of farms & farm conditions, to the policy and political context in the region, the challenges related to agroecological conditions.

This analysis (and all subsequent steps) needs to distinguish three levels (Figure 2): farms and farm types, region, or territory of the i3S, and supply or value chain/sector. Both observed and perceived aspects of the context should be considered.

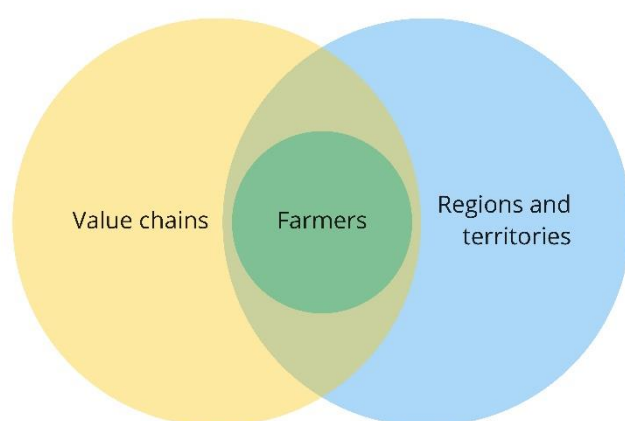


Figure 3: The relation between farmers and the surrounding ecosystems of actors of the I3S systems. The farmers in each I3S system are influenced by the value chains they deliver to or depend on for their production and by the region/territory in which they operate both in terms of the legislation under which they operate and in terms of the physical and cultural systems which apply to their growing conditions and mode of operation and production.

In this step, we will work with the I3S as the system to be transformed. This system is to be understood as the farmers and the ecosystems of actors around these to collect information and co-design tools to enable the implementation of the five steps towards scaling solutions at systems level and beyond. The ecosystems connected to the I3S can be defined as the system of actors who are involved in and influence the I3S systems either through their role as service providers to the farmers, through their connection to the value chain or through political, financial, or social influence. The involvement of these actors is crucial both with regards to understanding the many different interests that shape the system and in relation to establishing ownership and commitment to the transformation from all system actors.

The system actors will be identified in collaboration with the I3S manager and with input from the ClieNFarms work package 5 outcomes of the Policy briefs. A recruitment plan will be designed with the aim to engage the right actors in the process.

Based on the learnings from this process a tool for stakeholder mobilisation will be developed, which will include the identification of relevant actors including identification of the pioneers and the laggards of the system.

Another important area to map out the boundary conditions of the system is the regional regulatory landscape and the consequences (intended and unintended) of these on the I3S system that may be blockers to be taken into consideration as well. Here, we will identify the general legislative context and investigate how it interprets or differs regionally European legislation and mechanisms such as the Common Agriculture Policy.

Finally, we will map out the socio-economic conditions including levers and blockers of the I3S system. This could be focus areas such as access to skilled labour, tendencies, and bias in the type of solutions and practices promoted through farm advisors and other service providers, farm economy, income structures of the farm household, family structures etc.

How?

The fruit of this phase will be extracted from results produced by ClieNFarms work packages 1-3, stakeholder interviews, desktop research, workshops, and focus group meetings with stakeholders.

This phase will use data coming from WP1 (baseline), WP3 and Task 4.2 (farm typology) of the ClieNFarms Project.

Expected outputs for each I3S system

- An analysis of the context and boundary conditions of the system in question (farmer/region/sector)
- A list of key stakeholders to engage in the next steps of the process
- Observations of behavioural patterns in the system.

4.3. Step 2: Specify the intended systemic transformation



What?

- This phase is dedicated to understanding the transformation intent of the system around each I3S, considering the three levels of farms, region, and sector/territory.
- This means understanding current dynamics of change, the transition profile of the actors involved (incremental or radical), and their vision for the future, both at the individual and collective level.

Intent is the set-up phase of the scaling approach. It is designed to establish directionality, to scope needs, vision, and objectives for systemic change and ultimately to agree to work together on a roadmap for catalysing radical transformation of the system. It creates an opportunity to understand and embrace existing solutions and commitments and investigate ambition and motivation for change. The motivation for change depends both on the perception of the current context one actor or group of actors are situated in, and on a vision for the future – a situation the actor or group of actors aspire to. The main outcome of this step is to build an understanding of motivation factors and desired changes, through the definition of a vision.

The vision should be identified and decided upon in collaboration between all the relevant representatives from the system in question. This means that we will be working with groups of stakeholders who are in anyway involved in or play a significant role the I3S and therefore, we will be working with ecosystems of actors reaching beyond the ClieNFarms project. We will identify and works with actors with representative levels of ambition and scepticism, risk willingness or –aversion as well as stakeholders who hold influential power in one shape or another over the behavioural patterns of the system.

A vision for the future should include the key elements, principles or building blocks that the actors involved are striving for. It may not be a fully detailed picture of the entire system, nor should it be set in stone. It should rely on realistic assumptions. The vision can include several levels and different elements as well as a view of both the short term and the longer-term desired outcomes, key constraints, non-negotiables, priority in outcomes and so on.

It is crucial that the vision is designed in a way that corresponds with the visions set out by the EU. The visioning process, therefore, should be designed in a way that clearly sets out the emission targets as defined by climate science. These EU climate targets should work as a guiding star for the visioning work for each I3S when we design intent statements or visions. This is to make sure that the overarching target will contribute to the ambitions set by the EU ambitions for 2030 and 2035.

Is it in line with what the EU vision has approved through overarching vision of the ClieNFarms project to support the intention of the Farm to Fork Strategy to shift the current EU food system towards a sustainable model, contributing to achieving climate neutrality by 2050 as well as to support the realization of the 2030 climate and energy framework and its EU-wide 2030 targets to cut at least 55% of greenhouse gas emissions (from 1990 levels).

It must be clear to all involved actors of the system, that the vision, they are to develop for their specific system should support and play a part in the overall goal of ClieNFarms to pave the way for combined biogeochemical (reduction in GHG emissions, increase C storage) and bio geophysical effects (increase in surface albedo, reduction in sensible heat flux and infrared radiation) in order to mitigate climate change more efficiently. And furthermore, that this cannot happen at the expense of food security.

Defining a vision is an iterative process that depends on many factors:

- the farmer perspectives depend on the farm context, the availability of knowledge and proven solutions, the challenges the farmer faces for transformation, the opportunities s/he may also see;
- the regional and territorial perspectives relate to the collective and landscape property related aspects of the transformation: What level of ambition is required for the local territorial properties in the region in question? Is there a shared vision of the direction to take; or are there different visions? Who is aligned with this/these visions?
- the sectorial perspective defined by the type of product and the general context of the production in question? What are the tendencies in consumer demand for the production in question? What possibilities are there to affect consumer trends in the direction of the vision?

How?

Moving from the individual to the collective level, visions should be developed in a participative way that allows for a constructive debate/discussion. This can be done through multi-stakeholder workshops.

This process may confront different visions of change (radical vs incremental). Different farmers may have different visions and levels of ambition depending on their context and aspirations. Different visions may exist at regional level because of conflicting needs or priorities, or because of siloed approaches across actors or inside governing institution. This is also the case for sector/value chain actors.

When defining a vision for transformation across these three levels, a key part of the work is to identify common threads, diverging threads, areas of conflict and potential for resolution or convergence.

All findings and learnings from this step will be concretized and packaged for implementation through the development of concrete implementation tools for practitioners to use to work through all the steps of the scaling framework.

Expected outputs

- Intent: A collective understanding of the ambition level both on individual and collective level (based on the work of WP (work packages) 1-3), and a representation of possibility and aspiration as a frame of reference for subsequent choices and decision making.
- Analysis of momentum for change: Radical vs. Incremental
- Analysis on how the roadmaps for the Lead Commercial farms of the ClieNFarms project align with this ambition

4.4. Step 3: Analyse barriers, levers, and tentative leverage points of the systemic transformation

What?

This phase focusses on the systemic transformation of the defined system (farmer/region/sector) which will be required to move from status quo to the realization of the intent statement as defined in phase 2.

This phase will revolve around a systemic analysis mapping out levers and barriers for the realization of the intent taking a point of entry in three levels of focus: farm level (with main types), the regional level and the sectoral level.

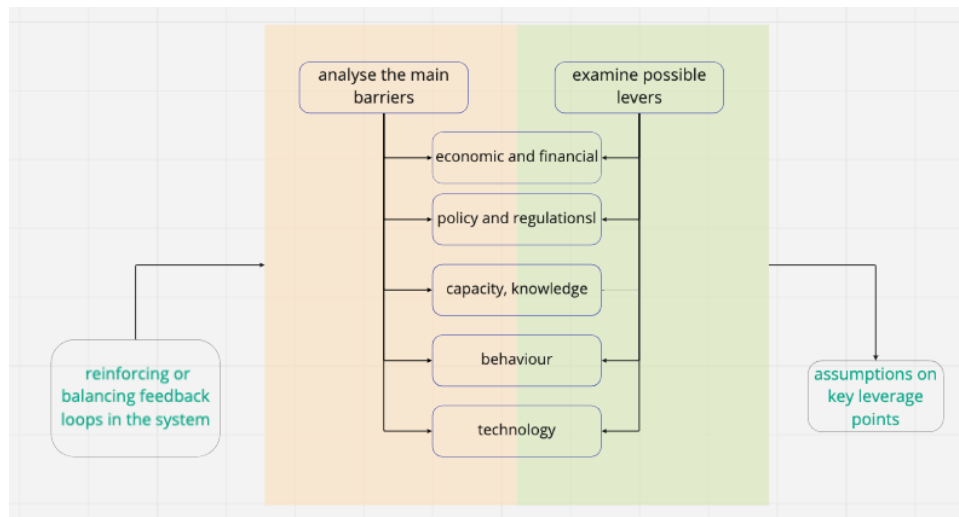


Figure 4: Step 3 will commence by an investigation of reinforcing and balancing feedback loops within the system in question. This step investigates both levers and barriers for the transformation through five windows or focus areas: Economy and finance, policy and regulation, capacity and knowledge, behaviour, and technology. The outcome of this step is a set of assumptions on key leverage points which will feed into the following step focussing on road mapping.

Based on context analysis (step 1) this phase will identify the feedback loops which either reinforce status quo or balancing other factors and loops of the system. This could be e.g., food pricing, food control, subsidy mechanisms, metrics in relation to nutrition value etc. These feedback loops will be designed using tools such as the cognitive map in cocreation between representatives of the relevant actors of the system.

EXAMPLE

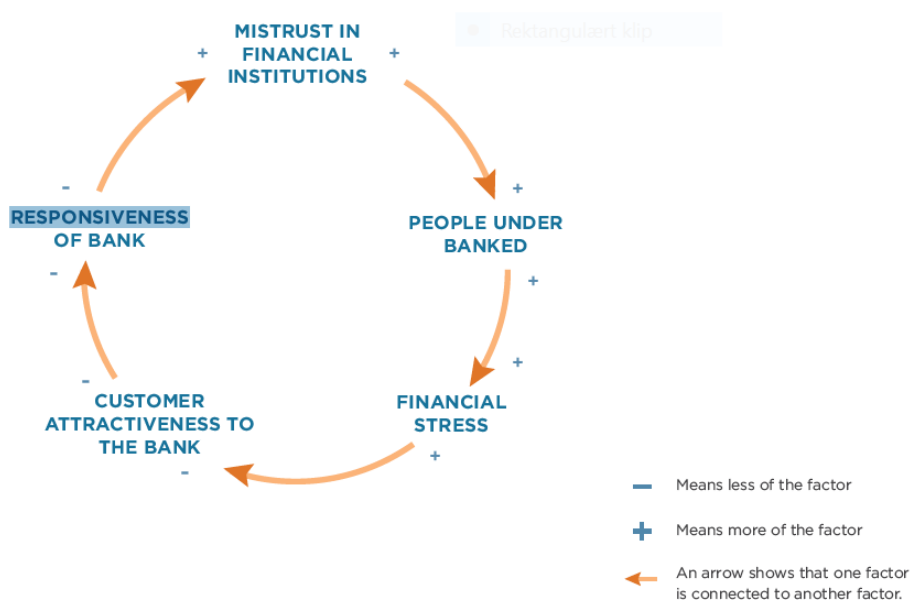


Figure 5: As an example of a feedback loop, this figure shows a loop from the U.S. Financial Inclusion team at Omidyar Network. They chose mistrust in financial institutions as a factor. They knew

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that this mistrust led to a large number of people being under banked. That, in turn, increased their financial stress, which made these customers less attractive to the banks. This made the banks less responsive to their needs which, in a vicious cycle, made their mistrust in financial institutions even greater.

Based on the feedback loops we will examine barriers and levers in relation to realization of the intent by focusing on the following areas: economy and finance, policy and regulation, capacity and knowledge, behaviour and belief systems, technology, and solutions.

The focus will be on key areas which hold the potential to break the negative or status quo reinforcing loops and design alternative, positive pathways towards the realization of the intent. Here we will look at 5 focus areas under the system in question. We will analyse the structures holding the status quo together and investigate the socio-economic structures for scaling. We will identify the pioneers and change opposers and look at the underlying motivation and incentives that drive change willingness or the risks and uncertainties that prevent change from happening.

The focus area on Economy and Finance will focus on farm economy, support mechanisms and subsidy structures as well as financial support for investment in new practices or risk compensation and co-funding as a risk sharing mechanism.

The focus area on Policy and Regulation will dive into intended and unintended consequences of EU-, national- and regional legislation and support/penalty mechanisms which affect decision making and daily practice at farm level.

The focus area on Capacity and knowledge focuses on identifying levers, barriers, and feedback loops in relation to practitioners' knowledgebase and access to new knowledge. Here we will dive into farming education, original and continuous education of farming advisors and other service providers, peer learning and knowledge and habits passed from generation to generation.

Under the focus area on behaviour, we will dive into the less concrete but critical factors that drive behavioural change such as culture, heritage, social acceptance and exclusion, community structures, farmer wellbeing, peer support etc. Here we will seek collaboration and knowledge sharing with the recently launched EU projects Beatles: Co-creating Behavioural Change Towards Climate-Smart Food Systems and Farmwell: Improving farmers' wellbeing through social innovation and lean on thinkers on social change such as Kwame Anthony Appiah (The Honor Code).

Finally, the focus area on technology will focus on recent technology designed to promote carbon farming as well as availability, accessibility, and affordability of this to practitioners.

The analysis will conclude by preparing a list of leverage points towards the realization of the intent.

The last step of this phase will be to analyse the results of the implemented intent in relation to the needed change (net zero by 2030) vs. the status quo. This analysis will provide an indication of the level of ambition and will serve to determine whether the intent should be adjusted to increase the likelihood of achieving net zero within the defined system with or without counting on external CO₂e balancing mechanisms.

How?

The activities under this step will be carried out in collaboration between representatives of the actors of the I3S system as well as the ClieNFarms Creative Arena under work Packages 1 to 3. As even small systems revolving around a single farm will reach far into chains of actors, we will not engage the full system but the part of the system, which is involved in transformation. The collaborative work will also include interaction and knowledge extraction from the stakeholder meetings organized by the ClieNFarms work package 3. The aim of this work is to collectively uncover feedback loops, barriers and levers will include desktop research, systems mapping workshops, focus group interviews, interviews with farmers and representatives of all relevant stakeholders who influence or play a role in the system in question. Here, all the above-mentioned focus areas should be represented.

In this step we will look at the identified feedback loops and the derived levers for change. We will look at the specific solutions from the ClieNFarms solution catalogue which are found to be relevant to the I3S system in question and simulate and test these solutions for potential unintended consequences and trade off which may be counterproductive to the intent as defined in step 2 and the levers as identified in this step.

The data and learnings extracted in this step will be process using cognitive maps to identify feedback loops and systems maps.

Expected outputs

- An analysis of the needed change vs. the possible change - including the realism of going to net zero with or without external CO₂e balancing.
- An analysis of feedback loops and the relation between adaptation and mitigation and entry points/motivation for farmers. Is the motivation mainly driven by a wish for climate adaptation with aim of optimizing conditions in the short term or is the motivation driven by long term mitigation concerns.
- Assumptions on key leverage points. Key areas/actors/relationships of action, momentum for change.
- A map of feedback loops and identified key leverage points for how to disentangle them.

4.5. Step 4. Create the enabling conditions: develop a trustful ecosystem of actors ensuring value creation and risk management

What?

To implement the systemic transformation, an enabling ecosystem needs to be generated in an I3S. Such an ecosystem will not be ready by the end of the ClieNFarms project, but having a prospective idea of the foundations of such an ecosystem is essential to the preparation of a roadmap for the deployment of the solutions.

Experience gained in other transformative projects shows that the three foundational elements of the ecosystem are value, risk, and trust³. These elements are essential to create an enabling environment where enough actors have the will and agency to act. Transformation is always a complex process, and

³ Please refer to chapter 2.1, Value, Risk and Trust for further description.

all actors will not play the transformation in the same way or at the same pace because of the diversity of values, economic conditions, perspectives to win or lose from the transformation.

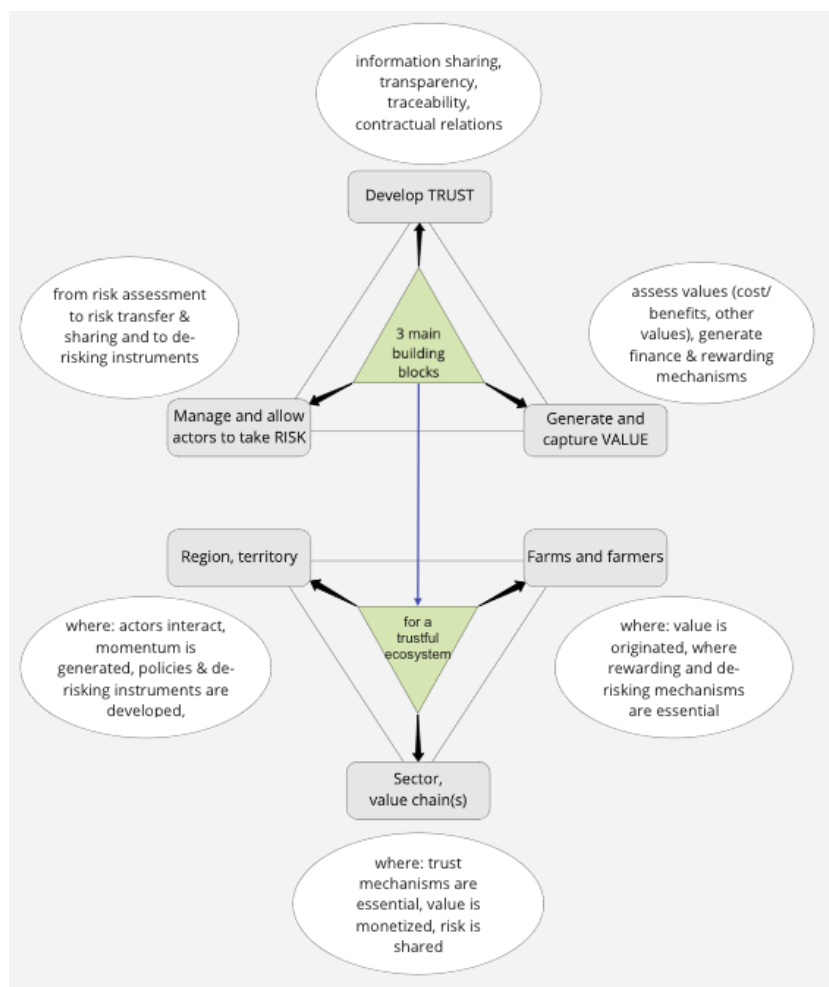


Figure 6: To implement systemic transformation, an ecosystem needs to be in place in which value, risk and trust are articulated and managed. What is the value that can be generated and for whom? Can this value generate monetary flows? What are the risks and de-risking instruments that can be put in place? What mechanisms can generate trust?

Value, risk, and trust elements will need to be established at the three levels already mentioned in the previous sections: (i) the farm or farm groups (belonging to farms sharing a similar ecosystem/community); (ii) the supply (or value) chain(s) of the sector; (iii) the region or relevant territory (or jurisdiction).

How?

Data collected and meetings planned with the different actors of the i3S will be critical to initiate the trustful ecosystem. Data from the Lead Commercial Farms on costs and benefits of the various proposed solutions including in the transition phase, on the values of the different farmers, on the risks they are facing, and the possible de-risking methods will need to be collected in a structured way particularly during the demonstration events that will gather large numbers of farmers and actors.

At the same time, it is suggested to use these meetings/events to broaden the audience to cover the three dimensions of the ecosystem (different farmer groups, supply chains and territorial actors). A systemic mapping of these actors, on their roles (regarding the three building blocks- and potential

motivation to support the transition should be developed (based on Step 3 analysis) to analyse how the transformation roadmaps of the lead commercial farms could be supported and scaled.

All findings and learnings from this step will be concretized and packaged for implementation through the development of concrete implementation tools for practitioners to use to work through all the steps of the scaling framework.

Expected outputs

- An analysis of the initial baseline and future needs in terms of value-risk-trust including assumptions on the priorities
- Comparison of these future needs with the roadmaps for lead Commercial farms developed by WP3
- Suggestions of possible tools to be implemented (e.g., de-risking instruments, farmer pooling mechanisms, supply chain coordination.)

4.6. Step 5. Prepare portfolio of actions and roadmap for transformation

What?

Based on previous steps and on the roadmaps prepared in ClieNFarms WP3, a portfolio of actions will be prepared. This portfolio is an integrated set of actions that aim to transform the i3S at scale e.g., to create momentum for farms of the i3S to implement the solutions based on the levers and leverage points identified (Figure 6). This portfolio will engage actors of the whole ecosystem at the three levels of (i) farm and farm groups, (ii) value chains and (iii) territory/region. For different farm types, different sets of solutions will be needed and the different levers aiming to capture value, to allow actors to take risk and to create trust will be also used in different ways and sequences for the different types of farms.

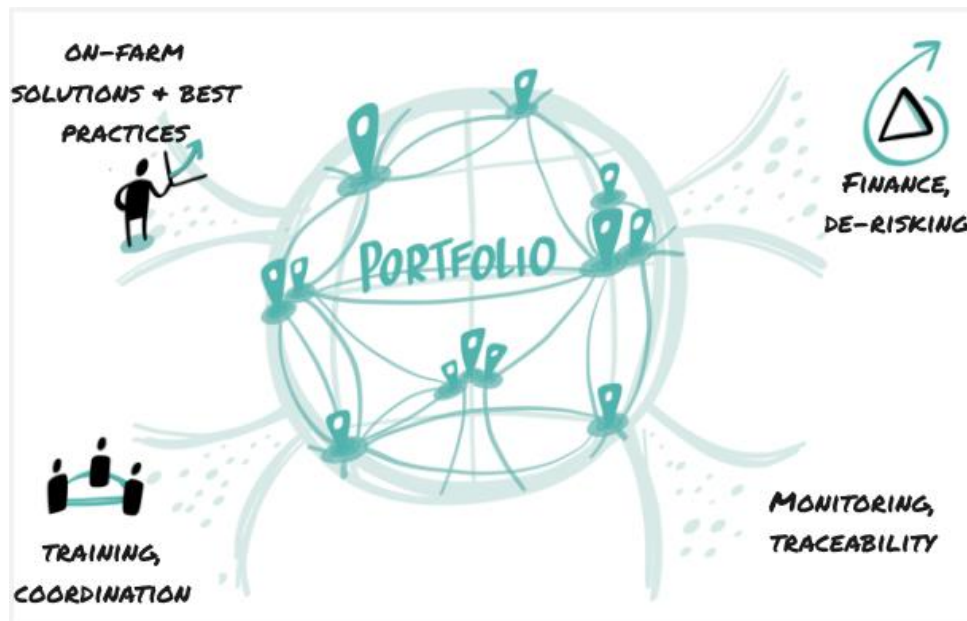


Figure 7: The portfolio approach combines actions resulting from the systemic analysis and attempt to use all levers and leverage point identified

The ambition of the scaling approach is to then implement this portfolio in a timely manner through a road mapping process which will not be linear but based on trials and learnings (Figure 7) and dependent on the willingness of the actors to act and on financial resources to be mobilised. Testing the assumptions on the key leverage points Through the portfolio of interventions from which a farmer can choose what best suits the context of the farm system. This will be done in iterative cycles where more and more data will be uncovered along the way. In the beginning we may only have data on the values and properties in terms of sustainability (emissions, biodiversity water quality and perhaps social etc.) of a few these interventions. The system will need to incorporate a way to rapidly test context specific/farm level innovation actions for their contribution to systems outcomes so these can be monetised and rewarded over time.

This non-linearity is also a result of the complexity of the transformation: number of actors to be involved, influence of external context change, lessons learnt from the implementation of solutions.



Figure 8: The road mapping approach is not a linear one, because of the complexity of the transformation: number of actors to be involved, influence of external context change, lessons learnt from the implementation of solutions.

The roadmap will consist of a selection of innovation options or interventions for each of the defined levers and barriers using a portfolio composition approach. It will be based on coherent choices about projects and problems based on design principles and theories of systemic change and will build on a collective understanding of the portfolio landscape and project positions considering existing and innovation solutions from multiple perspectives to understand their value as stand-alone-solutions, in relation to one another and in context.

The selection of innovations and solutions builds on the catalogue of solutions as developed through the ClieNFarms work packages 1 – 3. It is worth noting that these will be designed from implementation on-site at the individual farm level and therefore, solutions and methods that address issues that go beyond the individual farm level such as value chain related innovations and solutions on business models, governance related innovations such as organizational and structural innovations and solutions on for instance risk sharing measures, co-funding and insurance mechanisms governance will have to be designed in collaboration with the relevant systems actors and tested in collaboration with the farmers.

How?

This should be the result of a multi-stakeholder process preparing an initial view of the transformative pathway and resources to trigger action. Could be developed during some of the local I3S meetings.

The preparation of these roadmaps falls under the scope of the ClieNFarms project, but the implementation of the road maps goes beyond the scope of the project. Therefore, business model design and development of value propositions for the integral elements of the roadmap will be incorporated in the design of the roadmaps with the aim to integrate a funding strategy into the roadmap. These roadmaps targeting e.g., the living labs under the soil mission or other relevant instruments.

Expected Outputs

- A portfolio of iterative pathways towards scaling beyond ClieNFarms project (based on the roadmaps from WP3)
- An analysis and classification of actions: necessary, easy, nice to have, need to have etc.
- Analysis of the actors to be engaged and to take the driver seat
- Implementation plan including resources needed to trigger action

The full report over Milestone 4.1, Draft Scaling Framework, can be found in Annex 1 for a full overview including descriptions of planned processes in relation to the development of the D4.1 work on the ClieNFarms Scaling Toolbox.

5 Overview of The Scaling Toolbox of Proven Instruments for Incentivising Climate Neutrality.

5.1. Selection of Tools for Incentivizing Climate Neutrality

Considering the critical environmental challenges confronting our planet, it is evident that the transition towards climate-neutral farming in Europe requires a shift in the agri-food system beyond purely technical solutions. A comprehensive transformation must take place across all sectors and at all levels simultaneously. This transformation inherently requires a change in behaviour. Many of the tools and strategies collected in the toolbox are specifically designed to support such mindset or behavioural shifts through processes of training, strategizing, and the establishment of collaborations based on shared visions.

While individual farm-level solutions are indispensable, they offer only a partial remedy to the challenges at hand. Measures such as hedgerow planting and reduced tillage, though impactful at a micro-level, have limited potential for broader, systemic change. To effect transformation and scale sustainable agricultural practices, it is important to explore mechanisms for disseminating innovative ideas and practices throughout the agricultural community.

The significance of trust building, movement creation as well as habit and belief system change has been highlighted repeatedly in user group and stakeholder interviews conducted both in relation to the development of the Scaling Toolbox⁴ and in the process of developing the ClieNFarms Scaling Framework. This points at a need for tools to assist users in driving processes such as developing common visions, conducting context- or systems analyses, engaging stakeholders, and designing road maps of interlinked innovations. The type of tools that serve these purposes are non-technical in nature and describe processes for human interaction and co-creation. This need is reflected in the content of the Scaling Toolbox where a considerable number of tools centres on behavioural change and the establishment of collaborative networks that transcend traditional boundaries.

These processes often build on a knowledge base relevant to the systems in question and it is the aim that the toolbox will offer tools of a more technical nature for users to seek to deepen the knowledge base to inform the development of strategic processes.

5.2. Designing an Interactive Toolbox

The toolbox design is aimed to guide individual users to a tailored selection of tools embedded in the ClieNFarms homepage. Users will be led to the type of tools that are most pertinent to their specific needs and circumstances through a form of selection funnel. The selection funnel is segmented into four distinct stages, each with a particular focus, to ensure the effective delivery of tools and solutions.

⁴ Highlights from user-group interviews are described in the section “User Interviews and Insights on Scaling” on page 12 in this report.

Architecture of the ClieNFarms Scaling Toolbox

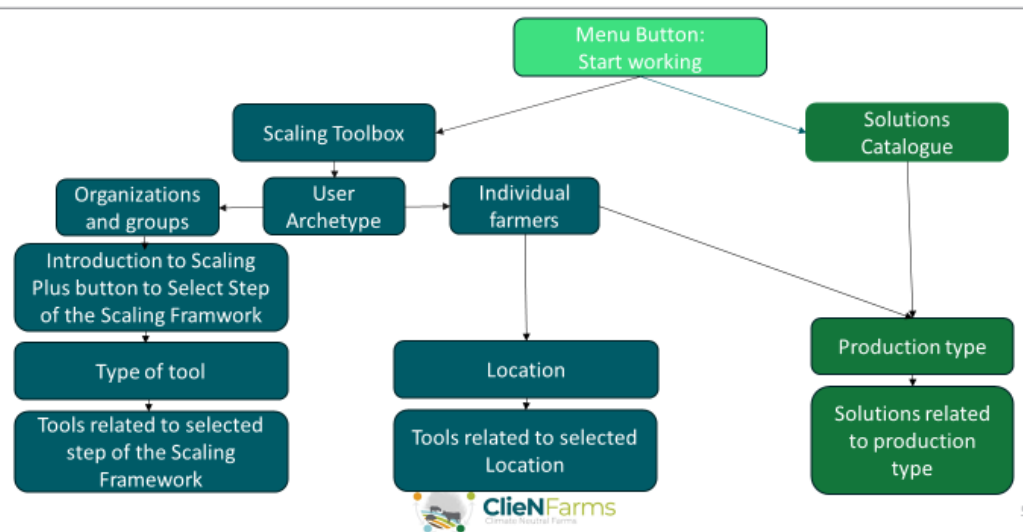


Figure 9: Selection layers of the ClieNFarms Scaling Toolbox.

The first stage of the selection funnel is dedicated to the identification of relevant tool clusters for the individual user. The tools will be presented in the form of recipe-like short reports with links with sources, additional reading, in-depth explanations and detailed user guides.

By clicking the menu button “Start working” on the ClieNFarms homepage, the user will be presented with the option to either explore the “Solutions Catalogue” or the “Scaling Toolbox.” These two components offer support to users in either exploring concrete solutions towards climate Neutrality for implementation at farm level through the “Solutions Catalogue”⁵ or in exploring tools that can support groups of actors in driving processes towards pursuing scaling through the scaling routes described above in the section “Scaling Routes.” These tools can be accessed through “The Scaling Toolbox, which is described in this report.

Selecting the Scaling Toolbox will lead the user to select which user archetype he or she identifies most with.

All users who identify organizations or groups as well as individuals looking to establish a group will be led to an introductory description of the Scaling Framework laying out the types and process of scaling. The user will then select where in the process he or she is with their scaling process. The selected step in the scaling framework will lead to a display of a list of relevant tools to proceed with the scaling process. Users who identify as individual farmers will be presented with the choice between interest in location specific monitoring and scaling tools or interest in production type related solutions. Users who click the local specific tools will be led to the tools relevant to the selected locality and users who click on production type will be led to the Solutions Catalogue from where there is a choice between production types leading to a list of concrete solutions to be applied at farm level.

⁵ The Solutions Catalogue is developed in ClieNFarms work package 1 under Task 1.4 lead by Wageningen Research. The Solutions Catalogue (currently under construction) can be accessed here: [Solutions - ClieNFarms](#)

5.3. User Archetypes

Five archetypes of users have been identified as key actors in driving the scaling of sustainable agricultural practices. These Archetypes are described in further detail in this section.

In the quest to develop a comprehensive toolbox for agricultural transformation, our research journey has involved a series of interviews with representatives from key user groups identified by the ClieNFarms Task 4.1 wider team.

These interviews have been instrumental in unveiling distinct archetypes of users or scaling agents, each possessing unique levers for initiating change. We have identified five archetypes that serve as key actors in driving the scaling of sustainable agricultural practices.

These archetypes can be broadly categorized into three groups: those who have financial resources at their disposal as a means of leverage in the shape of rewards to farmers, secondly, those who start with employing teaching, demonstration, and organizational approaches to instigate change – and possibly mobilize funding in a second stage and thirdly those who influence and shape the knowledge base decision making as well as the legislative frames in which scaling can happen.

Archetypes 1 and 2: The Financial Leverage Group

The first two archetypes comprise entities with financial resources, which grant them significant bargaining power in the realm of agricultural transformation.

This group encompasses the following key stakeholders:

1. **Industry with a Progressive Approach:** This category includes industries that adopt a forward-looking perspective and actively engage in "insetting" initiatives to reduce their own carbon footprint. Such industries are often engaged in rather short value chains, which enable a more direct and controlled approach to possible price premiums or to the carbon neutrality of their value chain. These industries operate in isolation and are in direct contact with their suppliers in general. They can also group themselves in landscapes and operate through a neutral platform. Here, an example of an effective strategy could be the application of the LENs ([Landscape Enterprise Networks](#)) approach.
2. **Investors and Financial Institutions:** This category also aim to reduce their carbon footprints, but they view carbon more as an asset for compensation, employing carbon credits as a tradable product. Notable examples include dedicated funds and financial institutions with an important portfolio in agriculture. Given the complexities of monitoring a wide array of solutions, this archetype prioritizes a select short range of practices, such as reduced tillage, cover crops, and crop rotation diversification. These practices are field-specific and focus on long-term sustainability. The common goal among this group is to replicate these practices across multiple farms and regions.

Archetypes 3 and 4: The Teaching and Organizational Leverage Group

The third and fourth archetype are characterized by entities that do not have direct access to financial resources to reward farmers but possess considerable influence through teaching and organizational approaches to scaling. This group consists of Farming Advisors and Cooperatives.

Farm advisors, cooperative organizations, and other groups embrace a teaching-like approach to scaling sustainable agricultural practices. They seek external funding to support their educational and training activities. Their approach is highly detailed and complex, involving the implementation of practical solutions in collaboration with farmers. The objective is to empower farmers with knowledge and tools to enact sustainable change.

Under this archetype, we also find **Individual farmers** who are driven by personal ambitions and aspire to initiate change from the bottom up through own initiatives or through forming co-ops or movements for scaling. These form the fourth archetype. Individuals often rely on different funding mechanisms to start their sustainability journey. Initially, they create and implement solutions from the ground level, with a focus on for example sequestering carbon through regenerative practices. As they progress, they engage with industry partners willing to support their efforts by compensating for sequestered carbon. This bottom-up approach exhibits similarities to the LENs approach, emphasizing the importance of local action and community involvement.

The Fifth Archetype: The Academic and Political Context Framing Leverage Group

As an overarching leverage group, we find academia, politicians, and policy makers. These actors form the leverage group that influences and shapes the knowledge base for decision making and the frames in which scaling can happen. This group is not directly targeted as users of the Scaling Toolbox however, the groups form an essential stakeholder be brought into scaling processes to ensure frame setting that supports the desired transformations.

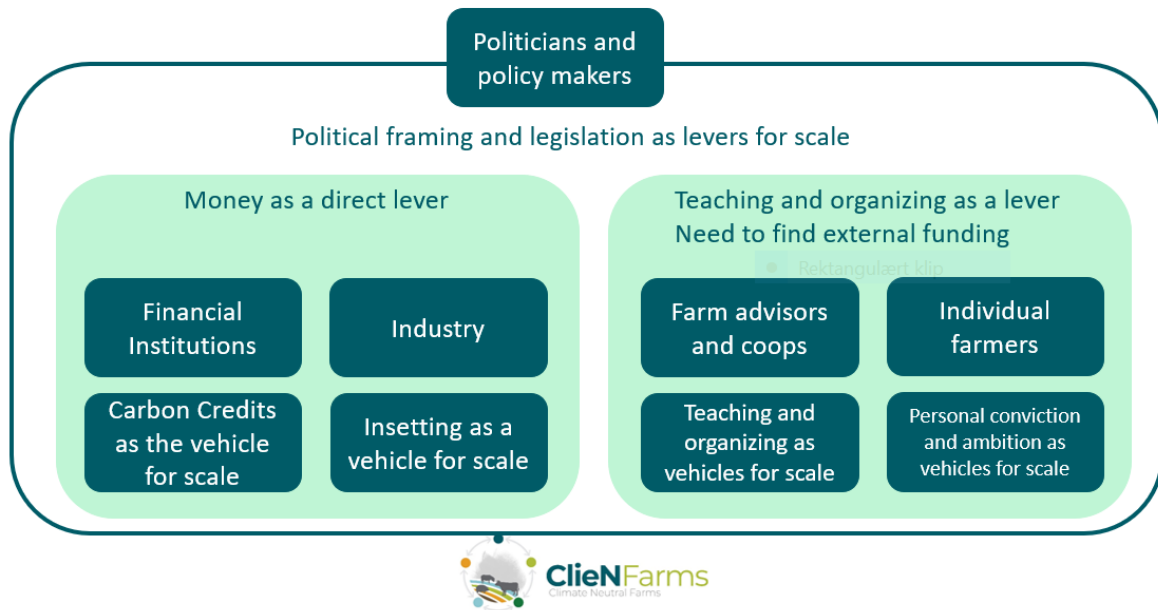


Figure 10: The four distinct archetypes as depicted in the light green boxes serve as the foundational pillars for the scaling toolbox's selection logic.

It is important to note that this typology offers a simplified picture. In the complexity of reality, actors may combine different archetypes and actors may represent different archetypes depending on the scaling context they operate within.

6 The process of developing the Scaling toolbox

6.1. User Interviews and Insights on Scaling

As part of the process of designing the Scaling Toolbox, we have conducted 6 interviews with representatives of the user groups identified by the Task 4.1 wider team. The interviews were conducted with the aim to understand how the relevant stakeholders perceive and define the term scaling and which barriers and levers they perceive in relation to pursue scaling.

Additionally, we have drawn out insights from user representatives from three sessions at the annual meeting for the ClieNFarms and Climate Farm Demo projects in Ireland on 12-14 October 2023.

Across the interviews the following overarching insights can be drawn out:

Interconnectedness of Actors and Risks:

The agriculture industry involves a complex network of actors, including farmers, cooperatives, governments, and consumers. Risks are interconnected across this network, and what affects one actor can have ripple effects across the value chain. This highlights the importance of an integrated approach to addressing risks. Engaging with stakeholders from across the whole value chain and connected value chains is crucial for mitigating risk and building trust and support building support for sustainability initiatives.

Risk Management for Transition:

Managing risks associated with the transition is crucial. This involves assessing, mitigating, and sharing risks. Insurance and guarantee mechanisms are important components of sharing risks. Farmers are accustomed to dealing with risks, and they see the transition as an opportunity to address both risks and resilience. Recognizing and managing risks associated with the transition to sustainable practices is crucial. This includes identifying technical, financial, and systemic risks and working on risk assessment, mitigation, and sharing mechanisms.

Trust as the main lever for transition:

Trust emerges as the pivotal force driving transition efforts. Highlighted by our user group representatives, the establishment of trusted relationships with key stakeholders proves to be the main lever for elevating ambitions and integrating transformed practices. Fostering trust among stakeholders, especially for farmers, seems to motivate them to confront the inherent risks of transition with the assurance that the burden is shared collectively rather than in isolation.

Opportunities in Transition:

While there are risks associated with the transition, participants emphasize that there are also significant opportunities for farmers and the industry as a whole. Transitioning to more sustainable practices can lead to new revenue streams and benefits for farmers.

Importance of Data and Tools for Transition:

Several discussions revolve around the need for data and tools to facilitate the transition to more sustainable agricultural practices. This includes tools for calculating carbon footprints, data on the effects of various agricultural practices, and the development of risk assessment and mitigation tools.

Access to comprehensive data is fundamental for scaling carbon-neutral farming. Clear definitions of terms like climate neutrality and net-zero carbon are crucial. These definitions help in setting clear goals and measuring progress. Additionally, there is a need for consistent reporting metrics, which may vary depending on the context, e.g., emissions per unit of product, per hectare, or total emissions.

Role of the European Union and Governments:

Government policies and incentives play a significant role in shaping the transition to more sustainable agricultural practices. Participants have highlighted the influence of EU-level policies and regulations on carbon neutrality and emissions reductions in agriculture and especially, the importance of clear targets to be set by legislative bodies. Many refer to an observation of passive inaction in the system and actors await direction indication from authorities before they want to start deciding on and investing in transformed practices. This especially applies to Carbon farming practices.

Education and Training:

Training and education are essential components of the transition. Providing farmers and stakeholders with the knowledge and tools they need to implement sustainable practices and reduce emissions is critical.

Results-Based Incentives:

Several organizations, including Nataïs⁶ and Friesland Campina⁷ who were both part of the conducted user interviews, are transitioning to results-based incentive models to drive sustainable agricultural practices. Setting specific sustainability goals and rewarding farmers based on performance is a common approach.

Cooperative Models:

Cooperatives, like Friesland Campina, offer a governance structure that involves farmers in decision-making and encourages collective action toward sustainability goals.

Carbon Credits:

Carbon credits and incentives play a vital role in many organizations' sustainability strategies. The integration of carbon credits into financial services is still in the testing phase for some.

6.2. Selection of Tools

As we have seen in our user group interviews, one of the most essential elements for successful transformation lies in trust building and human collaboration to tackle the risks associated with transition. This is reflected in the selection of tools for the Scaling Toolbox in the sense that a significant

⁶ Nataïs is a French Popcorn cooperative working closely with 220 fellow corn growers. The cooperative strives to reduce the use of irrigation water, prevent soil erosion and to decrease the presence of the harmful corn borer. Furthermore, the company works on constant innovation towards reduced carbon and biodiversity footprints. For more information please visit: [Accueil - Nataïs Popcorn](#).

⁷ Friesland Campina is one of the world's largest dairy companies providing milk based products to millions of consumers all over the world. Friesland Campina is a partner to the ClieNFarms Project. To read more, please visit: [Nourishing by nature - FrieslandCampina Global - FrieslandCampina](#)

component of this toolbox centres on behaviour change and the establishment of collaborative networks that transcend traditional boundaries.

Tools incorporated into the Scaling Toolbox have been sourced from all ClieNFarms partners participating in Task 4.1⁸.

While the activities under T4.1 extend beyond this specific deliverable, the overarching goal is to continuously enhance and expand the Scaling Toolbox. Rigorous testing of the toolbox's tools will be conducted in collaboration with the I3S, allowing for refinement based on insights and feedback. Moreover, the toolbox's scope will be broadened to include any additional tools identified as valuable by the ClieNFarms consortium or developed as a direct outcome of project activities.

At the conclusion of the ClieNFarms project, the toolbox will encompass a comprehensive range of financial instruments, including de-risking tools, market-based mechanisms such as labelling, integrated carbon credit solutions combining off-setting and in-setting, policy and regulatory solutions, and knowledge and training tools. Additionally, trust-building instruments like smart contracts and traceability tools will be developed and piloted with value chain actors.

6.3. ClieNFarms Homepage Integration

As described above, the Scaling toolbox will be embedded in the ClieNFarms homepage, coupled with the ClieNFarms Solutions Catalogue. The two of these resources will be interlinked and user will be able to dynamically shift between scaling related tools and on-farm solutions.

The work on designing the web interphase will be carried out by Biosense as part of the WP6 activities. Biosense expects the Scaling Toolbox to be fully functional and accessible by 30.03.2024.

6.4. Continuous Testing and Development

The activities under T4.1 extend beyond this deliverable. The idea is to continue to expand and refine the Scaling Toolbox.

The primary objective is to rigorously test the toolbox's tools in collaboration with the I3S and to subsequently refine the toolbox based on the insights and feedback garnered from this testing process. Furthermore, the scope of the toolbox will be expanded to accommodate any additional tools identified as valuable by the ClieNFarms consortium or those developed as a direct result of project activities.

⁸ Wageningen Research, University of Leeds, EDF, ACTA, AgriCircle, INRAE, NESTLE, Danone, BFH-HAFL FrieslandCampina, Consulai, IFOAM- OE, GWCT, UCSC, Teagasc, and IBNA.

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This collaborative endeavour aims to scrutinize the practicality, effectiveness, and user-friendliness of the toolbox's tools in real-world scenarios.

The T4.1 activities also encompass the iterative expansion of the toolbox. Recognizing that the field of sustainable agriculture is continually evolving and that novel solutions emerge over time, we remain committed to accommodating emerging tools and resources. This expansion is not limited to internally generated tools; it also extends to those identified as useful by the ClieNFarms consortium and any tools originating from within the project itself.

This approach ensures that the toolbox remains a valuable and adaptable resource, capable of meeting the diverse needs of the agricultural community.

7 Overview of the Selected Tools for the Scaling Toolbox

As described earlier, the ClieNFarms Scaling Toolbox contains a selection of technical and more process-oriented tools selected by their capacity to enable users to proceed through all the steps of the ClieNFarms Scaling Framework⁹. Several of the tools will be useful in relation to more than one of the five steps of the Scaling Framework depending on how they are used. Tools are also marked with a categorization of the topic they cover. This could be for systems analysis, ideation and strategy or monitoring of impact as examples.

The Current list of tools can be found here below. A full description of the tools including links and resources can be found in Annex 2.

Table 1

Type of tool	Title of tool	Description	Link
Systems Analysis	Flourishing Multi Level Canvas	Flourishing multi-level is a descriptive and analytical tool analytical provides you with a visual metaphor featuring a combination of a static picture of the current components and a description of the dynamics in the system that your challenge is embedded in.	Visual Toolbox for system innovation pages 78-85.
System Analysis	The Context Map	The tool provides a soft approach to the threefold layer structure that is the base for the multi-level perspective theory.	Visual Toolbox pages 85-95
System Analysis	The Context Map	The tool provides a soft approach to the threefold layer structure that is the base for the multi-level perspective theory.	Visual Toolbox pages 85-95
Ideation and Strategy	Trajectories of change	Trajectories of change looks at how a system evolves and where innovation comes from. It can help you to understand sources of resistance and resilience to changes in your system and the diversity of alternatives co-evolving at the same time in different trajectories.	Visual Toolbox pages 78-85.
Strategy and Risk	Fishing for Barriers	Fishing for Barriers is a visual tool that helps you to identify the main bottlenecks blocking the success of your project, as well as their roots, by breaking them down into smaller pieces and problems.	Visual Toolbox pages 97 – 104
Stakeholder Analysis	The Visual Map	The tool will help you analyse your landscape of stakeholders and give you a comprehensive map of synergies and conflicting interests and interdependencies between actors.	Visual Toolbox pages 41 to 53.
Stakeholder Analysis	The Stakeholder Universe	Stakeholder universe is a quick visual network analysis tool in which your challenge is in the very core of where the stakeholders revolve. The focus is on the connections among actors and how these connections work and might evolve; affecting the system innovation you are planning.	Visual Toolbox pages 54-61.
Stakeholder Analysis	The Actor Tree	The tool will help you generate a categorized list of the main stakeholders for your challenge.	Visual Toolbox pages 21-27

⁹ See section providing and Overview of the Scaling Framework on page 6. You can also find the full report on this in Annex 1.

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Type of tool	Title of tool	Description	Link
Stakeholder Engagement	The Scaling Scan - CIMMYT and Public Private Partnership Knowledge Labs	The Scaling Scan is a practical tool to determine the strengths and weaknesses of your scaling ambition. The tool is developed by CIMMYT and Public Private Partnership Knowledge Labs—PPP Labs	https://repository.cimmyt.org/handle/10883/20505
Stakeholder Engagement	The Enlarged Stakeholder Map	The Enlarged empathy map is a visual tool that allows you to build a stakeholder profile by quickly browsing the sources of information you have close at hand. The empathy map is intended for you to put yourself into a stakeholder's shoes and thereby see the challenge from a different perspective.	Visual Toolbox
Stakeholder Engagement	Pentagonol Problem	Pentagonal Problem is a visual tool to help teams nail down the problem, identify its different components and details, getting to a common ground for future actions.	Visual Toolbox pages 17-12
Stakeholder Analysis	Credential Cards	The Credential Cards tool aims to characterise stakeholders' stances and relation to the challenge.	Visual Toolbox pages 35-41.
Sourcing Tool	Dashboard for Outcomes of Regenerative Agriculture	The DORA-Tool, short for "Dashboard for Outcomes of Regenerative Agriculture," serves the purpose of providing farmers with precise data on biomass productivity and soil coverage of their fields.	https://www.startup.ch/agricircle
Monitoring Impact	Tool for scaling agroecology transition- TAPE - FAO	The tool is developed by FAO as a comprehensive tool that aims to measure the multi-dimensional performance of agroecological systems across the different dimensions of sustainability.	Fao.orghttps://www.fao.org/agroecology/tools-tape/en/
Monitoring Impact	The Cool Farm Tool	The tool is a back casting method which uses time travel and a little imagination.	https://coolfarm.org/
Mobilizing Actors and Monitoring Impact	LENs Process Flow Map	The LENs process flow map is a tool that serves as a 'game plan' for all LENs stakeholders as it outlines the tasks that supply- and demand-side stakeholders and the entity responsible for coordinating the LENs need to implement to successfully establish a place-based, NbS (Nature Based Solutions) trading community and successfully realise an envisaged trade.	Building business partnerships for resilient landscapes https://landscapeenterprisenetworks.com/
Ideation and Strategy	The Visual Story	Visual Story is a visioning method which encourages you to suspend disbelief and imagine a future so brilliant that your success is on media front pages everywhere.	Visual Toolbox Pages 118-125
Ideation and Strategy	Ocean of opportunities	An ideation tool aimed at identifying gaps in the market or systems context that might be turned around to being windows of opportunity. It frames the current solutions by two main features or dimensions and helps you to map out the range of current solutions within such variables. E.g.: the mobility system is bound by use (individual/collective) and access (private/public).	Visual Toolbox pages 112-117

D4.1 Scaling Toolbox

Type of tool	Title of tool	Description	Link
Ideation and Strategy	LENs Demand Specification Document	The LENs demand specification document is a tool that enables demand-side stakeholders (e.g., agri-food businesses, and water companies) to articulate their interest in establishing a place-based NbS trading community at an individual and collective level. Specifically, the tool allows these stakeholders to identify desired outcomes that could be derived and business risks stemming from the underperformance of the landscape could be mitigated through direct value-creation trades in geographic areas that are core to their business operations.	https://landscapeenterprisesnetworks.com/
Ideation and Strategy	Business Model Canvas	The Business Model Canvas is a strategic management and entrepreneurial tool that allows its user to describe, design, challenge, invent and pivot their business model.	BMC (Business Model Canvas)BMC
Finance	Financial mechanisms to support Carbon Farming	This tool is a list of relevant measures, funding opportunities and rewarding mechanisms which are relevant to fuel projects and activities to scale carbon farming and other sustainable farming practices in Europe.	See appendix page 70
Finance	Typologies and criteria and mechanisms to obtain sustainable finance	This tool is a list of relevant measures, funding opportunities and rewarding mechanisms which are relevant to fuel projects and activities to scale carbon farming and other sustainable farming practices in Europe.	See appendix page 71
Monitoring Impact	Scaling Carbon monitoring- and planning tools UK and Ireland	This sheet contains a list of locally adapted tools to enable farmers and advisors to calculate the carbon footprint of a specific farm and create scenarios for the impact of various climate initiatives based on these calculations. Many of these tools draw on local/national databases and therefore, are only relevant to farms which are already registered in these databases.	See appendix page 73
Monitoring Impact	Carbon monitoring- and planning tools Nordics	This sheet contains a list of locally adapted tools to enable farmers and advisors to calculate the carbon footprint of a specific farm and create scenarios for the impact of various climate initiatives based on these calculations. Many of these tools draw on local/national databases and therefore, are only relevant to farms which are already registered in these databases.	See appendix page 74
Monitoring Impact	Carbon monitoring- and planning tools Benelux	This sheet contains a list of locally adapted tools to enable farmers and advisors to calculate the carbon footprint of a specific farm and create scenarios for the impact of various climate initiatives based on these calculations. Many of these tools draw on local/national databases and therefore, are only relevant to farms which are already registered in these databases.	See appendix page 75
Back casting	Future Radars	The tool is a backcasting method which uses time travel and a little imagination. First, travel forward in time to your ideal future.	Visual Toolbox pages 127 – 134

Type of tool	Title of tool	Description	Link
Back casting	Socio-Technical Roadmap	Socio-technological roadmap (STRM) is a collaborative backcasting tool for multiple stakeholders to plan together. After envisioning the desired future, stakeholders can jointly set out different pathways to bridge the gap between such a future and the present time.	Visual Toolbox pages 136 – 143.
Energy	Electricity Consumption Estimation Tool	The tool aims to provide farmers with a better understanding of their electricity consumption today and in a future with more usages electrified (e.g. transport, robotization, heat pumps). It should be used to understand both current consumption and future consumption, especially if new electrical equipment is planned/implemented.	The listed solutions will be based on deliverable 1.4.
Energy	Use of Photovoltaic Geographical Information System (PVGIS)	The Photovoltaic Geographical Information System (PVGIS) is a tool from the Joint Research Centre in Ispra (Italy). PVGIS is a web site that gives you information about solar radiation and Photovoltaic (PV) system performance. You can use PVGIS to calculate how much energy you can get from various kinds of PV systems at nearly any place in the world.	https://joint-research-centre.ec.europa.eu/photovoltaic-geographical-information-system-pvgis/getting-started-pvgis_en Link
Energy	Use of Electricity Maps to assess impact of local electricity production	The “Electricity Maps” is an open access tool provided by the start-up company Electricity Maps. It gathers electricity information from various electricity transmission system operators.	https://app.electricitymaps.com/map
Policy	EEA (European Environmental Agency) database on GHG (greenhouse gas) policies and measures in Europe	The EEA database on GHG policies and measures in Europe is an information providing tool that contains quality checked aggregated GHG policy data reported by European countries and made available by the EEA on its website.	http://pam.apps.eea.europa.eu/?source={\"track_total_hits\":true,\"query\":{\"match_all\":{\"display_type\":\"tabular\",\"sort\":{\"Country\":{\"order\":\"asc\"}},\"ID of policy or measure\":{\"order\":\"asc\"}},\"highlight\":{\"fields\":{\"*\":{}}}}link
Monitoring Impact	Copernicus Land Cover and Land Use Mapping	Land cover and land use mapping is part of Land Monitoring Service, provided by the European Union’s Earth observation programme Copernicus, focussing at local scale on different hotspots.	Land Cover Copernicus Global Land Service
Monitoring Impact and Strategy Forming	ADOPT The Adoption & Diffusion Outcome Prediction Tool	ADOPT (Adoption and Diffusion Outcome Prediction Tool) is a <u>web-based tool</u> that allows you to evaluate and predict the likely level of adoption and diffusion of specific agricultural innovations with a particular target population in mind. This tool predicts the likely rate and peak adoption level of new innovations and practices in agriculture and estimates the importance of a range of factors influencing the adoption.	Problem Framing Canvas Handbook: Making sense of problems for better responses (griffith.edu.au)

Type of tool	Title of tool	Description	Link
Strategy and Risk	The Problem Framing Canvas	The Problem Framing Canvas is a strategic tool designed to guide individuals and teams through the process of identifying and defining complex problems.	Problem Framing Canvas Handbook: Making sense of problems for better responses (griffith.edu.au)

The tool sheets will be set up as PDFs with a visual language that matches the overall visual strategy for ClieNFarms. The raw files can be found in the annex.

8 Next Steps

The Scaling toolbox (D4.1) will be iteratively expanded and tested over the course of the ClieNFarms project as data from Work Packages 1-3, WP6 and from Task 4.2 start flowing in and as communication with farmers reveal levers and barriers for change. The tools will be connected to the selection logic of the scaling toolbox user interphase and serve as a sort of facilitation guide to transform European farms and drive the scaling of carbon farming practices in Europe.

Over the course of the ClieNFarms project, we will work with the I3S and the ecosystems around these to collect information and co-design tools to enable the implementation of the five steps towards scaling solutions at systems level and beyond. The interaction with I3Ss and their ecosystems will be facilitated through the I3S managers. To secure efficient collaboration and input flow from the ClieNFarms work packages 1-3 to support the iterative shaping of the scaling framework and scaling toolbox under Task 4.1, we will design a timeline with annual review points for feedback and input collection from the ClieNFarms consortium. The generated feedback will be integrated immediately after each review.

Over the remaining period of the project, we will explore possibilities for collaboration with sister projects like Climate Farm Demo and Climate Smart Advisors to codevelop a common toolbox.

9 Conclusion

With the ClieNFarms Scaling Toolbox for Incentivizing Carbon Neutral Farming, our aim is to select and package a set of tools that can support our pursuit of transforming European Agricultural systems towards carbon-neutrality.

A major component of this work will rely on mobilizing stakeholders within territories and value chains, in social and value drive farming communities or groups in which the balance of value, risk, and trust can be nurtured as a lever for individual and systemic transformation processes.

Looking ahead, our goal is to continually enhance and expand the Scaling Toolbox through testing and refining in collaboration with the I3S. By the end of the ClieNFarms project we expect the Scaling Toolbox will encompass an extensive array of financial instruments, market-based mechanisms, policy solutions, and knowledge tools.

D4.1 Scaling Toolbox

Recognizing the evolving nature of sustainable agriculture, the aim is to keep adapting the toolbox, accommodating emerging tools identified by the consortium.

This collaborative effort ensures that the Scaling Toolbox remains a valuable, evolving resource, capable of addressing the needs of the agricultural community in the pursuit of carbon-neutral farming.