

ACHIEVING 'GROWTH WITHIN'

A €320-BILLION CIRCULAR
ECONOMY INVESTMENT
OPPORTUNITY AVAILABLE
TO EUROPE UP TO 2025



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»» 4 DEPLOYING REGENERATIVE AGRICULTURAL PRACTICES

Regenerative agriculture could be broadly defined as the synergistic combination of as many practices as possible, including permaculture, organic, no till,¹⁴⁷ holistic grazing, and keyline land preparation.

Shifting towards an agricultural model that regenerates the soil and revitalises ecosystems through farming management practices and technologies could bring Europe onto a pathway to achieve overall economic benefits of up to €35 billion per annum by 2030, against an estimated investment of €15 billion between now and 2025. The primary areas of potential investment are in providing funding to farmers to bridge the transition towards regenerative practices, as well as investments in specific technologies and machinery enabling these practices. This transition would see economic rewards based largely on a reduced dependency on fertiliser and pesticides throughout the agricultural industry, alongside an overall reduction in agriculture-related greenhouse gas emissions.

Relevance of investment theme

It is becoming increasingly evident how deeply harmful conventional agricultural practices can be.¹⁴⁸ Our current farming model has resulted in 30%–85% of EU agricultural land being affected by soil degradation¹⁴⁹ and productivity gains

for major crops starting to decline around the world.¹⁵⁰ The annual cost of soil degradation in Europe amounts to €38 billion.¹⁵¹ Indeed, gains in European agricultural productivity have fallen steadily from 2.5% per annum in the 1970s to 1.3% per annum in the 2000s and 0.9% in 2010. This slowing of productivity gains has continued despite significant increases in the use of fertilisers, chemicals (such as pesticides, herbicides, fungicides, and insecticides), fuels, and other inputs designed to increase yields.¹⁵² Currently, 73km³ of water is poured into the European agricultural system each year (of which only 40% actually reaches the plants),¹⁵³ alongside 16 million tonnes of synthetic fertiliser (of which only 5% actually goes into nutrients absorbed by humans). Excessive application of chemical fertilisers creates dependency on imports¹⁵⁴ and heightens risk within the system. For example, nitrogen fixation and phosphorus have already exceeded the safe operating limits of the planet by a factor of two.¹⁵⁵ At the same time, conventional agriculture does not always produce healthy outcomes. In a recent report, the nutritional content of several types of fruits and vegetables, including cucumbers and tomatoes, was shown to have fallen significantly during the second half of the twentieth century.¹⁵⁶ Some foods also often contains traces of toxic chemicals and plastics.¹⁵⁷

However, emerging practices and technologies are providing increasing evidence that one does not have to choose between preserving the soil and using it for agriculture. In fact, profitable agricultural practices exist that not only preserve the soil, but regenerate it. These practices revitalise the farm's entire ecosystem, resulting in many benefits, including:

- The removal of greenhouse gas emissions from the atmosphere to be stored in the ground in the form of carbon;
- Greater yield stability due to a reduced reliance on fertilisers (crops will eventually become more resistant to viruses and weather changes because healthy soils cope better with droughts and floods);¹⁵⁸
- Decreased water usage;
- Production of healthier food with a higher-quality nutrient profile than

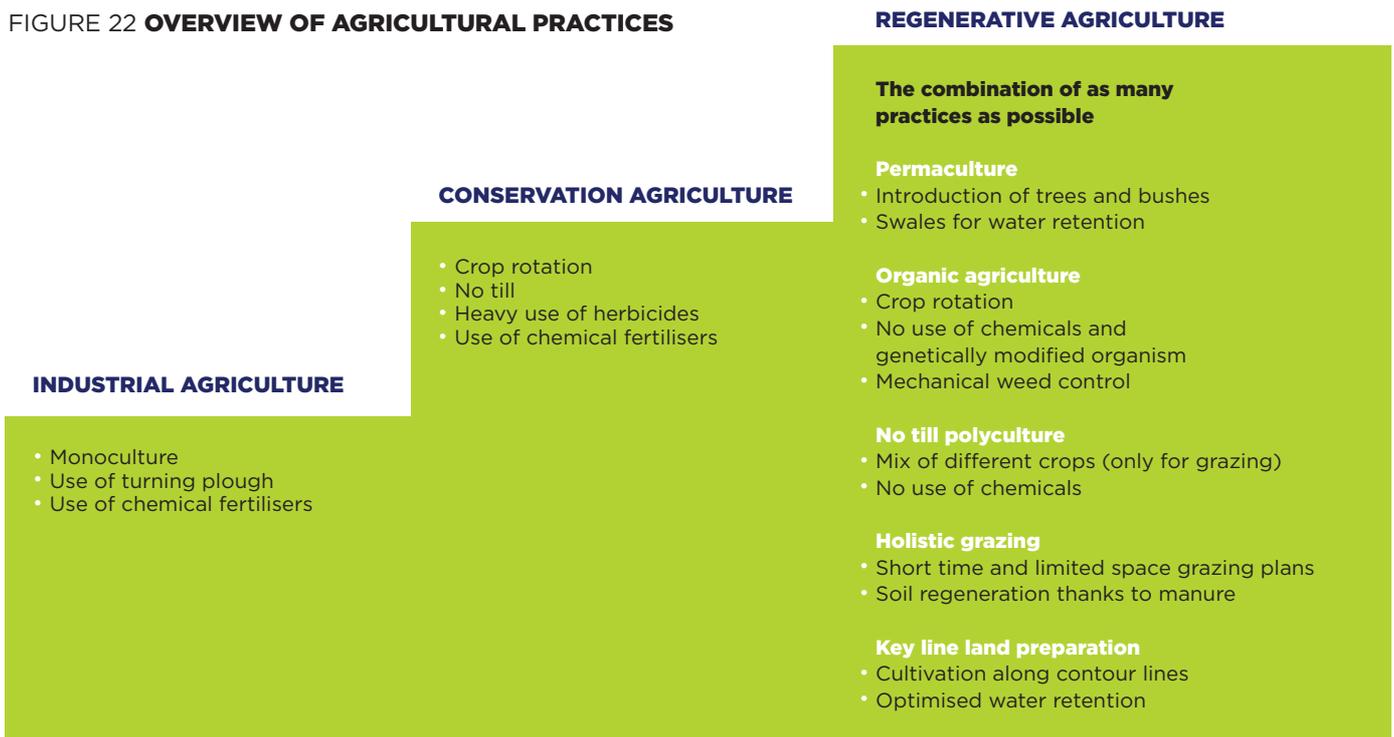
that produced with the help of synthetic fertilisers and other chemicals;

- Giving farmers greater control over their cost base, as inputs such as fertiliser are generated by the farm itself.

The idea at the core of these 'regenerative agricultural' practices and technologies is that everything in the farm should be reinvented to mimic nature: in the words of agri-pioneer, Leontino Balbo: 'If we can restore soil to natural ecosystems conditions, nature will do the rest'.¹⁵⁹

This shift goes far beyond resource efficiency, which focuses on using water and other inputs more economically. Pioneer farmers, landowners, and scientists are starting to think outside the box on many levels, such as in the choice of crops and livestock on farms, the harvesting methods and equipment, and the management techniques for water, waste, energy, and above all, land. A shift in all these factors could mean

FIGURE 22 OVERVIEW OF AGRICULTURAL PRACTICES



Sources: Volterra Ecosystems; Rodale Inst., Gabe Brown (No till polyculture); Allan Savory (Holistic grazing); P.A. Yeomans (Key line land preparation);¹⁶⁰ http://ec.europa.eu/eurostat/statistics-explained/index.php/Organic_farming_statistics; <http://www.sciencedirect.com/science/article/pii/S209563391530016>

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that nature is able to revive the entire ecosystem, generating strong levels of natural capital on which to build highly productive agricultural businesses.

Current organic agricultural practices can be considered as regenerative to some extent, as it implies stopping the use of pesticides and conventional fertilisers, and allowing the soil to start regenerating once these inputs have been removed. However, organic agriculture is just one step towards the soil regeneration and ecosystem revitalisation that are essential to regenerative agriculture. Also, existing organic agricultural practices fail to capture most of the potential economic and environmental benefits if they are not combined with other regenerative practices. As shown in Figure 22, combining several regenerative practices (rather than implementing one) unlocks tremendous economic value for farmers. For example, a 50% higher profitability could be achieved by shifting to organic vegetable monoculture (i.e. by stopping using conventional inputs).¹⁶¹ But a 200% higher profitability could be achieved by shifting to regenerative vegetable multi-culture (i.e. by introducing a mix of annual and perennial plants, and implementing holistic ecosystem management in a way that mimics nature).¹⁶²

Recent developments

Multiple transitions to regenerative agricultural practices have started in Europe, specifically over the last years. Advanced regenerative agricultural practices with a positive business case and successful proof-of-concept are:

- Regenerative fruit/vegetable/cash crops multi-culture;
- Holistic-planned grazing for bovine, ovine, porcine, and poultry farming;
- Agroforestry systems with alley cropping;¹⁶³
- Low-input pasture-based dairy systems.¹⁶⁴

Figure 23 gives an overview of the business case for three examples of regenerative practices¹⁶⁵ implemented by Volterra Ecosystems. This Spanish company focuses on integrating various practices into coherent management systems aimed at regenerating farmland within profitable enterprises. The profitability results assessed in Figure 23 are based on initiatives that have already achieved such profitability levels in Europe.¹⁶⁶

Another player in this space, SLM Partners, scales up profitable regenerative practices by acquiring and managing land on behalf of institutional investors. Direct investment in corporate vehicles gives investors the security of land ownership, but also maximum control over how the land is managed, and full equity exposure to the returns from regenerative farming. SLM Partners has identified a number of proven regenerative agricultural systems that are applicable at commercial scale and provide economic returns that are as good, or better than, industrial production models.¹⁶⁷ They are currently investing in one of these systems (holistic-planned grazing for beef cattle and sheep) and are exploring others for further investment opportunities. These examples demonstrate not only viability, but also a willingness to start embracing these methods in key parts

of the industry, making now a conducive time for investment.

Investment opportunities identified

Although a set of regenerative agricultural practices are profitable, leveraging innovative technologies designed to mimic nature – such as Big Data and robotics – has good potential to further enhance profitability and substantially reduce the payback time as shown by the Balbo Group's innovations, detailed in the case study below. The opening up of this regenerative agricultural market offers four key investment opportunities:

- Investment by farmers or farming companies and landowners in machinery, tools, technologies, proprietary agricultural practices, trees or livestock to shift to regenerative agriculture.
- Provision of finance solutions to farmers during the transition phase to bridge the temporary cash flow reduction they face when shifting to specific regenerative practices and/or meeting their needs for capital to invest in machinery or other assets when required.¹⁶⁸
- Development and dissemination of innovative technologies and services designed to drive the transition, such as Big Data, robotics, apps, and farm management methods aimed at enhancing current agricultural practices (e.g the Agros Fortis model in the case example).
- Creation of cooperative, not-for-profit or public bodies to develop and deploy programmes to increase farmer awareness of and capabilities in regenerative agricultural practices.

Current barriers to investment

The present-day barriers that prevent farmers from shifting towards regenerative practices at scale can be broken down as follows:

- Most farmers are not familiar with regenerative practices and may be risk-averse or resistant towards them, as the shift to organic farming has been challenging on some farms. In addition, incumbent suppliers, such as agrichemical and heavy land equipment companies have vested interests that prevent them from proactively supporting the move to regenerative practices.
- New skills are required to manage innovative regenerative farms, as the practices involved are more knowledge-intensive and need to be tailored to local conditions.
- Consumer awareness of regenerative practices is very low overall, even though it is increasing in regard to organic practices as shown by the growing sales of organic products.
- The shift towards regenerative practices is challenging for farmers or farm owners, as income is more unstable during the transition period and investment payback times are medium to long term, especially for tree crop models.

Interventions to scale up investments

To escalate the shift towards regenerative practices would require the farms to be incentivised to switch at scale. This could be achieved by increasing the demand/pull for products

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FIGURE 23 **OVERVIEW OF THE BUSINESS CASE FOR THREE REGENERATIVE PRACTICES DEVELOPED BY VOLTERRA ECOSYSTEMS**

»» STEP 1

STATUS QUO	STEP 1 TOWARDS REGENERATIVE AGRICULTURE			
STARTING POINT	SHORT DEFINITION	INVESTMENT NEEDED	NUMBER OF YEARS BEFORE SIMILAR/ BETTER PROFITABILITY ACHIEVED	PROFITABILITY ACHIEVED AFTER THIS DELAY
<p>1. Fruit/vegetable/cash crops conventional, modern monoculture (defined by the use of chemical inputs, such as pesticides or fertilisers, and the likely presence of genetically modified organisms (GMOs)); irrigated with excess of water</p>	<p>Organic fruit/vegetable/cash crops monoculture (defined by no use of chemical inputs and absence of GMOs); use of chemicals can be reduced gradually</p>	<p>€500 euro per hectare (ha) to introduce the right micro- organisms and other elements</p>	<p>Two to three years, depending on how contaminated and depleted the soil is; the organic certifier decides on the number of years for conversion</p>	<p>50% higher than profitability at starting point, but losses in the first two years have to be taken into account</p>
<p>2. Traditional agroforestry (defined by presence of trees on land that is not used anymore/ unproductive, but in principle is suitable for producing feed and/or livestock)</p>	<p>Remove underwood and use biomass in production of energy, compost, animal feed, charcoal, etc</p> <p>Promote natural regeneration, and diversify tree, bush, and grass species</p>	<p>€400,000 to provide a French state-of the-art mobile biomass harvesting and processing machine for at least 2,000 ha per annum (pa)</p>	<p>One to two years, depending on the type of trees</p>	<p>Profitability dependent on type and application of biomass and time needed to (re)introduce livestock into the system</p>
<p>3. Unproductive (bare), rain-fed land destroyed by agrichemicals and monoculture (mainly cereals) OR Unproductive (bare), irrigated land destroyed by agrichemicals and monoculture (mainly corn and sugar beet)</p>	<p>Activate soil with cover crop and micro-organisms (mycorrhizae) in first year and crop rotation and associated crops in years thereafter</p> <p>Decompaction, if required</p>	<p>€300–500 per ha</p>	<p>Two to three years for the land to become productive again (defined by the presence of weeds, fertility, pests, etc) without chemical products</p> <p>Yield per ha on irrigated land is about two or three times that from rain-fed land</p>	<p>50% higher than profitability at starting point, but possible loss of crop in first two years for corn/sugar beet has to be taken into account</p>

STEP 2 TOWARDS REGENERATIVE AGRICULTURE			
SHORT DEFINITION	INVESTMENT NEEDED	NUMBER OF YEARS BEFORE SIMILAR/BETTER PROFITABILITY ACHIEVED	PROFITABILITY ACHIEVED AFTER THIS DELAY
Regenerative fruit/vegetable/cash crops multi-culture (defined by a mix of annual and perennial plants and holistic ecosystem management in a way that mimics nature, including the management of the land, soil, air, water, biodiversity, etc)	€200,000–€500,000 for GPS on a 50–100 ha farm, special weeding equipment, and cold storage of product	Three to five years, depending on the type of crops and trees (for example, three years for almonds and five for pistachios)	200% higher than profitability at starting point, with requirement to be organically certified
Introduction of bovine, ovine, porcine, and poultry livestock (defined by a mix of one to two cows per ha and three to six sheep per ha, plus one to two pigs per ha, alongside poultry, such as chickens and/or turkeys) Introduction of rotational grazing (holistic approach)	Dependent on livestock prices, which will vary widely based on type of animals and number	One to three years, depending on the type of animals and the potential of the land	Higher than profitability at starting point for best practices (several projects to demonstrate and quantify the profitability are ongoing ¹⁶⁹)
Agroforestry ¹⁷⁰ with or without irrigation	Dependent on trees: €500 (almonds, chestnuts, hazelnut, walnuts, wood trees) Up to €2,000 (pistachios)	Three to four years, depending on the type of trees (for example, three years for almonds, five for pistachios, and 25 to 30 years for wood (50 if the starting point was cereals))	200% higher profitability against a starting point of cereals and 300% higher profitability against a starting point of corn/sugar beet (with requirement to be organically certified)

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from transitioned farms by large players up the food supply chain. A push by governments through the provision of financial incentives to switch would also accelerate the shift.

- **European Commission:** The European Commission could leverage existing policy and funding frameworks, such as the Common Agricultural Policy (CAP), the European Innovation Partnership for Agricultural Productivity and Sustainability or Horizon 2020 to provide incentives for farmers to shift. This could be achieved by supporting innovations¹⁷¹ and pilots that are improving regenerative practices or providing specific funding solutions to farmers for the transition phase. Additionally, support could be given to the rollout of farmer and consumer awareness programmes, as well as the building up of skills and knowledge.

These initiatives could build on existing European Commission initiatives, for example the creation of an EU market for organic and waste-based fertilisers aimed at stimulating agroforestry and crops diversification.¹⁷²

Using the CAP could also be an effective mechanism. Some adjustments in current policy could include: the adoption of an accurate definition of regenerative practices, including the concept of a two-tiered transition; the identification of the CAP pillar

that applies for each tier; and a clear definition of key performance indicators to measure the level of transition needed to qualify for certain subsidy allocations.¹⁷³ As the CAP aims to provide guidance on supported practices, partnerships could be set up with cooperative/not-for-profit training bodies deploying capability-building and awareness programmes delivered by farmers for farmers.

- **National, regional, and local governments:** Concurrently with the European Commission, the public sector in Member States could support the deployment of capability-building and awareness programmes, both for farmers and consumers. The public sector could also provide direct support to the transition phase or towards innovations and pilots related to regenerative practices. Moreover, it could provide markets for food products from regenerative agriculture through public procurement and procurement guarantees. A good example of Member State action towards regenerative practices is the 4‰ or '4 per 1,000' initiative driven by the French government that aims to increase the soil carbon stock at a rate of 0.4% per annum, thereby halting the current increase in atmospheric CO₂. The initiative helps contributors in the public and private sectors to commit to a voluntary action plan to implement farming practices that maintain or enhance soil carbon stock. Financial support mechanisms and favourable policies and tools are in

place for farmers innovating to this end.¹⁷⁴ Projects, practical action, and results relating to regenerative practices could also be shared on a blog, enabling all participants to benefit from pooled experience.

- **Private sector:** Retail companies in particular can have a significant impact on farming practices, as has been shown in the past.¹⁷⁵ Impact can be achieved by retailers either changing their requirements for the food products they purchase, or by supporting farmers by providing volume and price guarantees. Recent digital developments¹⁷⁶ are providing retailers with additional tools to measure the benefits of switching to buying food from regenerative agricultural systems. These developments are also enabling retailers to explore the possibility of launching a collaborative effort to shift to regenerative models in their extended supply chain. Digital technologies could be further used to increase the reach of regenerative products in the market and establish customer loyalty to them.

In addition, farmer awareness, capability-building, and technology-transfer programmes would need to be designed and financed. These would most likely require involvement from cooperatives, NGOs or private companies. The lessons from existing programmes should be taken into account during this process. Indeed, existing programmes have shown that

the most powerful enabler of driving change among farmers is simplicity. The shift should follow a step-by-step approach, starting with the practices that are the easiest to implement and the most relevant based on the farmer's own experience, expectations, scale, and climate area. For example, Volterra Ecosystems' experts support farmers and landowners to identify which regenerative practices they should start implementing, and tailor these practices to local conditions. Farmers are also supported on the ground throughout the transition period to review benefits achieved, train staff, fulfil the conditions for the land to be certified as organic, and prepare for the future commercialisation of the produce.¹⁷⁷

Lastly, finance providers could structure specific products geared towards transition finance, such as the MilkFlex loan fund. This fund provides a financial solution designed to match the cash flow generated during the transition to regenerative farming. This provides the affordable and flexible capital farmers need to shift, with no repayments during times of low prices and increased repayments at times of high prices, as well as inbuilt 'flex triggers'. Glanbia Co-operative Society, the Ireland Strategic Investment Fund, Rabobank, and Finance Ireland have announced the planned creation of a new €100-million 'Glanbia MilkFlex Fund' in March 2016.¹⁷⁸