



## Module 4. The role of agropreneurs in the low-carbon process

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# MODULE 4. THE ROLE OF AGROPRENEURS IN THE LOW-CARBON PROCESS

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Agriculture can play a relevant role in countries efforts to address climate change, helping them to transition to a low-carbon economy while pursuing economic growth and continuing to meet society's needs. With agrobusiness being one of the major sources of greenhouse gas emissions (GHG) in the world – with the direct emissions of GHG from agriculture accounting for approximately 10% of the total emissions of the European Union (EU) [6] –, agropreneurs should act as managers of the countryside and make sure their sector grows sustainable to help shape a low-carbon economy in rural areas.

Agrotourism can be a means to support the sustainable development of rural areas, helping farmers to balance economic growth – by exploring the viability of complementary economic strategies – with the need to transition to more sustainable development business strategies to preserve the natural assets which are indispensable for agricultural production [3]. Long-term sustainable agrotourism can, thus, change farmers mindset and educate visitors towards the mitigation of undesirable environmental impacts in rural areas.

Hence, the aim of module 4 'The role of agropreneurs in the low-carbon process' is to provide both professionals in the tourism sector – i.e., SMEs and entrepreneurs – and VET providers key insights on what can be sustainable business growth strategies and activities in rural areas that efficiently balance economic and environmental sustainability, so that agrotourism businesses can reach an appropriate level of knowledge and skills to set up circular economy solutions and comply with environmental international/European goals.

This module is structured into 4 chapters as follows:

- **Chapter 1: Climate change challenges for agriculture and agrobusiness development**, identifying the main environmental problems that agricultural areas face nowadays and their negative impact on agrobusinesses and how agropreneurs should adapt to climate change challenges and adopt more sustainable practices.
- **Chapter 2: Policy options on agriculture and rural low-carbon economy**, specifying relevant international and European legislation and strategies for promoting low-carbon agricultural practices.
- **Chapter 3: The role of agrotourism in a business low-carbon process**, defining agrotourism as a particular model of agricultural business and presenting the diverse ways in which it can support agropreneurs to explore more sustainable development business models, contributing to a low-carbon economy.
- **Chapter 4: tips for reducing the environmental impact of agrotourism activities**, providing the practical suggestions for agropreneurs involved in agrotourism activities to pursue greener and circular economy-based business models, e.g.,

activities reducing carbon dioxide emissions, pollution, and initiatives that preserve and promote rural natural resources.

The learning objectives of this module are the following:

- To outline the reasons that explain why climate change endangers the development of agriculture and agrobusinesses (Chapter 1).
- To elaborate on the ways agropreneurs can adapt to climate change challenges and adopt more sustainable practices (Chapter 1).
- To recognise existing international and European policy options and strategies for promoting low-carbon agricultural practices (Chapter 2).
- To reflect on how existing legislation can support agropreneurs to achieve international and European low-carbon goals (Chapter 2).
- To define agrotourism as a particular model of agricultural business and list agrotourism activities (Chapter 3).
- To explain the important role of agrotourism on the implementation of more sustainable practices by agropreneurs in rural areas (Chapter 3).
- To identify relevant green strategies and activities that can help agropreneurs involved in agrotourism activities reduce their environment impact (Chapter 4).
- To reflect on how agropreneurs involved in agrotourism activities can efficiently set a green and circular economy business model (Chapter 4).

The specific topics chosen for this module take into consideration the feedback provided by tourism SMEs and VET providers from the tourism sector, which participated in a public consultation in April 2022.

## 4.1. Climate change challenges for agriculture and agrobusiness development

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Environmental changes, e.g., melting glaciers, more precipitation, extreme weather events and shifting seasons have considerably altered our planet, generating events such as climate change and loss of biodiversity that, combined with the consequences of continuous economic growth, e.g., population growth, indiscriminate use of natural resources, pollution, led to a common understanding that society's development is no longer sustainable and changes are needed to ensure the future of next generations [3] [12].

**Agriculture is extremely vulnerable to climate change [12]** and although rural areas make a unique and important contribution to the world's economy, they face additional challenges such as declining and aging population, less access to job opportunities, and deficient transport and energy infrastructures [10], meaning that rural areas are usually less equipped than urban areas to address the challenges of climate change.

**Climate change impacts on agriculture** include [12] [15]:

- **Slowed productivity, altered production timeline, limited land availability, and increased pressure on limited resources (soil, water, and air):** disruptions in a farming cycle are becoming frequent due to floods, droughts, or extreme cold, depending on the agricultural areas' location. Crops are reduced and harvest stability is compromised – as different crops have different responses to climate changes –, with long-term production declines, forcing chemical inputs to compensate for losses due to pests, weeds, and diseases. In addition, intensive land management also contributes to the degradation of soil, water, and air. Current agricultural areas are, thus, expected to become unsuitable for crops, which combined with extreme temperatures and weather, force agropreneurs to move and seek new arable lands.
- **Threatened livelihood of agropreneurs, food security and decreased nutrition:** the resulting impacts of the biological effects of climate change on crops include instability in food availability, nutrition, and prices. Firstly, countries may identify diverse ways of addressing these problems and, secondly, agropreneurs face their own adaptation process, which might result into disproportional solutions across the globe. Farming can be entirely abandoned if production costs, e.g., additional labour and equipment investments are too high. Additional impacts include, at a global level, increased prices of agricultural products due to crop decline and limited land availability, and malnutrition, i.e., decrease in the number of calories availability, particularly in children, such as a substantial fall in the consumption of meat and cereals, threatening global food access and security.

These challenges are estimated to persist and agropreneurs are expected to be more initiative-taking identifying long-term sustainable solutions at market, policy, science & technology, and land management levels that prepare for the future while deal with present issues [14].

Agropreneurs can address climate change challenges through a **climate-smart agriculture (CSA)**, an integrated approach for transforming and reorienting agricultural development – cropland, livestock, forests, and fisheries – under the new interlinked realities of food security and accelerating climate change [4] [20].

The most used definition is provided by the Food and Agricultural Organisation of the United Nations (FAO), which defines a CSA as 'agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHGs (mitigation) where possible, and enhances achievement of national food security and development goals' [16]. Built on existing knowledge, technologies and principles of sustainable agriculture, CSA has an explicit focus on addressing climate change, it considers the synergies and trade-offs between productivity, adaptation, and mitigation and aims to capture new funding opportunities to close the investment gap of agropreneurs [4].

**Agropreneurs can adapt and mitigate climate change challenges through a CSA approach** by [4] [5] [11] [16] [20]:

- **Establishing support systems to increase sustainable agricultural productivity (produce more and better food to improve nutrition security and development and support the agrobusiness income increase):** agropreneurs should make sure they are in line with robust international, European, national, and regional policies to enhance their response to climate change taking into consideration a broader policy framework; by engaging with youth and the local community on agricultural development, agropreneurs expect to enhance skills and knowledge, support job creation and ensure sustainable agricultural practices while rebuilding economic opportunities; agropreneurs should also consider applying to financial support from public or private institutions, so as to shift to affordable sustainable farming practices.
- **Adapting and enhancing resilience of agricultural and food security systems to climate change at multiple levels,** by defining concrete strategies to respond to climate change, that may range from farm-level practices to more high-level technological advancements; by adopting agroecology, i.e., the application of ecological principles to agriculture (e.g., cover crops, minimising tillage, nutrient management), agroforestry, and crop diversification, in-farm principles that have high potential to strengthen climate change resilience; and by managing (e.g., managing irrigation and nutrient runoff, soil health management) monitoring and measuring (e.g., remote sensing, satellites, better modelling for forecasting, agropreneurs easier access to information) the environmental impact on agriculture for sustainable crop production and operations improvement. All these strategies and tools will help agropreneurs reduce vulnerability to drought, pests, diseases and other climate-related risks and shocks and improve their capacity to adapt and grow in the face of adversities.
- **Reducing GHG emissions from agriculture (including crops, livestock, and fisheries),** i.e., pursuing lower emissions for each calorie or kilo of food produced by introducing carbon farming mechanisms (e.g., European Commission's carbon calculator for assessing a farm's carbon footprint, recommend mitigation options for GHG emissions reduction and provide certification of low-carbon farming), avoiding deforestation from agriculture (e.g., sustainable management of forests, conservation and enhancement of forest carbon stocks) and

managing soils and trees in ways that maximise their potential to absorb carbon from the atmosphere.

#### Summary

*Since the second half of the 20<sup>th</sup> century, a series of environmental changes have been calling for long-term sustainable practices to meet the needs of the present while ensuring the future of next generations. Agriculture is the most vulnerable sector to climate change and rural areas are usually less equipped to deal with the challenges it entails. Direct negative impacts of climate change can be felt at crops level – e.g., slowed productivity, altered production timeline, limited land availability, and increased pressure on limited resources (soil, water, and air). The resulting impacts of these effects include instability in food availability, nutrition, and prices and threats to agropreneurs livelihood.*

*Is it thus important for agropreneurs to take on a climate-smart agriculture approach to adapt to climate change challenges through concrete sustainable agricultural practices at three levels: (i) productivity (by sustainably increase agricultural productivity and incomes from crops, livestock, and fish without having a negative impact on the environment), (ii) adaptation (by increasing agropreneurs capacity to adapt and prosper in the face of environmental shocks while protecting the ecosystem) and (iii) mitigation (by reducing and/or removing GHG emissions).*

#### Questions for reflection

- 1. How much aware are agropreneurs of the negative impacts and rural areas extreme vulnerability to climate change?*
- 2. In what ways can agropreneurs implement and comply with more sustainable practices considering a costs-benefits approach?*
- 3. In what ways are agropreneurs willing to adopt a climate-smart agriculture approach for their businesses?*

## 4.2. Policy options on agriculture and rural low-carbon economy

Rural areas and agriculture have a key role to play in the development of a sustainable and low-carbon economy [10]. There are several international and European policies for the rural low-carbon economy that can frame agropreneurs development of their own sustainable business strategies, as follows:

**A)** At an **international level**, in September 2015 the United Nations adopted the 2030 Agenda for Sustainable Development that comprises a set of 17 Sustainable Development Goals (SDGs), an urgent and universal call to action to achieve sustainable development for all [3] [19]. Since then, the SDGs have been shaping policies, programmes, and funding at international, European, national, and local levels, with agriculture being the only sector that is transversal to the 17 SDGs [18] [17].

Framed by the SDGs, countries can take on a set of 20 interconnected actions put forward by FAO to help their agropreneurs take on sustainable agricultural practices [18]. These actions correspond to several policy areas that can be implemented at a national and local level to empower agrobusinesses to use resources sustainably through new value chains, business models and skills [10].

From FAO's 20 **interconnected actions based on the 17 SDGs**, the following 10 relate with the sector's contribution to a low-carbon economy [18]:

- **Encourage diversification of production and income**, i.e., cultivate multiple crops to build resilience to climate change and natural disasters by conserving biodiversity, improving soil and plant health, and reducing exposure to pests, diseases or extreme weather events.
- **Build producers' knowledge and develop their business-oriented capacities** and investment in innovative technology for a better understanding on greener agricultural systems and sustainable socio-economic entrepreneurship, including linking agriculture to other sectors (e.g., tourism).
- **Enhance soil health and restore land**, as soil makes up the greatest pool of terrestrial organic carbon, mitigating climate change through the reduction of GHG emissions. This can be done through several initiatives such as water, sustainable soil, and land management and fighting deforestation.
- **Protect water and manage scarcity**, as water plays a key role in climate change adaptation of agrobusiness for crops and livestock. Promoting sustainable water management and efficiency in agriculture, particularly through improved knowledge, research & innovation, is thus of utmost importance.
- **Mainstream biodiversity conservation and protect ecosystem functions**, i.e., conserving, monitoring, and using a wide range of domestic plant and animal diversity to adapt in the face of climate change, combined with the creation of conservation areas due to the degradation of natural habitats.
- **Reduce losses, encourage reuse and recycle, and promote sustainable consumption**. Every year the world loses, or wastes, about a third of the food it produces, which constitutes a threat to food security, a waste of resources, ever-



greater stress on ecosystems and a danger to the environment in the form of GHG emissions. Reducing food losses, reusing and recycling residues through composting, promoting more sustainable consumption patterns and identifying domestic renewable energy resources to reduce the energy footprint of food production and consumption are relevant practices for more efficient food systems and greater commitments to a circular economy in food and agriculture.

- **Prevent and protect against (natural) shocks: enhance resilience** towards natural hazards and disasters by enhancing institutional and technical capacities to deliver disaster-risk reduction. For agropreneurs, this can mean diversifying their sources of income (e.g., agrotourism), diversifying farming practices and moving away from intensive agricultural systems, integrating climate change strategies, and addressing climate variability by using new prediction technologies.
- **Address and adapt to climate change.** As a significant source of GHG emissions, it is essential that agriculture and other land-use sectors be part of the climate solution. Agropreneurs are, thus, encouraged to follow a climate-smart approach (see Chapter 1) aimed to sustainably increase agricultural productivity and income while adapting and building resilience to climate change and reducing GHG emissions.
- **Strengthen ecosystem resilience** to agriculture intensification, i.e., large-scale production of single crops (monoculture) or intensive animal farming. Integrated systems that include mixed cropping, crop-livestock, agroforestry, tree-crop-livestock as well as the promotion of agricultural heritage has demonstrated their ability to cope with climatic variability and address many sustainability issues of food security, biodiversity, land use, water, and forest management.
- **Enhance policy dialogue and coordination** to contribute to an integrated approach towards sustainability that includes taking stock of relevant sectoral policies, mapping and analysing strategies between economic, social, and environmental spheres and assessing the state of sustainability of agriculture and food systems, identifying key issues and relevant actions, taking into consideration the SDGs, national strategies and engaging with other agropreneurs and relevant stakeholders (e.g., farmers and producers organisations, SMEs, local community, decision-makers).
- **Strengthen innovation systems**, i.e., increase investments in agricultural R&D, as innovation is the main driver for the agricultural and rural transformation, including not only the use of new technologies and improved skills, but also the implementation of new practices such as improved crop varieties, agroecological practices, and biotechnologies to address issues like improving sustainability and resilience, raise income and reduce risks, create new market opportunities and reduce natural resources degradation.

**B) At a European level,** The European Commission aims to support sustainable rural development through several initiatives, in the framework of the European Green Deal [10], a set of proposals to make the EU's climate, environment, energy, agriculture, industry, transport, R&D, finances and regional development policies fit for reducing GHG emissions by at least 55% by 2030 [1] and ultimately to enable Europe to become a climate-neutral and resource efficient economy by 2050 [10].

The Green Deal is implemented, i.e., provides a policy framework and funding via other policy initiatives that directly impact agriculture's contribution, particularly the role of agropreneurs, to a low-carbon economy. The most relevant are as follows [2] [5] [10] [16]:

- **Long-term vision for rural areas up to 2040.** Considered as the most important policy initiative for promoting Europe's rural low-carbon economy, it was launched in 2021 and identified the major challenges for rural regions, seeking to strengthen them to become more resilient by restoring landscapes, greening agriculture, and supporting carbon neutrality through leadership in the bio and circular economy, as well as improving digital literacy and diversifying economic activities (e.g., agrotourism). It encompasses a Rural Pact, expected to become a platform for stakeholders' cooperation, including agropreneurs, to achieve the shared EU goals for rural areas, and a Rural Action Plan that includes leveraging sustainable agriculture (e.g., sustainable soil management, building up carbon sinks by investing in rewetting wetlands and peatlands, supporting energy transition and fight against climate change) and diversified economic activities (e.g., promoting rural tourism, acknowledging local products).
- **Common Agricultural Policy (CAP).** Launched in 1962, it is a partnership between Europe and farmers to enable food security, improve agricultural productivity, tackle climate change, sustainably manage natural resources, maintain rural areas, and strengthen their economy. As a common policy for all EU countries, it provides funding for agropreneurs to produce food, as well as support to regional and national rural development plans. It is through these plans that agropreneurs can address resource efficiency, low-carbon and climate resilience and ecosystem preservation.
- **Environmental Action Programme.** First launched in 1973, it is in its 8<sup>th</sup> edition (until 2030), setting out the long-term vision for Europe's environment and aiming to accelerate the transition to a climate-neutral and regenerative economy, with objectives aligned with the European Green Deal, including achieving climate neutrality by 2050, pursuing zero pollution ambition for air, soil, and water, and restoring biodiversity and natural capital. It forms the EU's basis for achieving the UN's SDGs until 2030, based on six priority objectives: (i) achieving the 2030 GHG emissions reduction target and climate neutrality by 2050; (ii) enhancing all sectors' adaptive capacity, strengthening resilience and reducing vulnerability to climate change; (iii) advancing towards a regenerative growth model, decoupling economic growth from excessive resource use and environmental degradation, and accelerating the transition to a circular economy; (iv) pursuing a zero pollution ambition, including for air, water and soil; (v) protecting, preserving and restoring biodiversity, and enhancing natural capital; and (vi) reducing environmental and climate pressures related to production and consumption.

As each rural area and agrobusiness is unique, agropreneurs need to consider what are the best policy alternatives and available financial instruments that better reflect their business, surrounding ecosystem, and willingness to transition to sustainable practices and support a low-carbon economy.

Summary

*Agropreneurs can play a relevant role in the development of a rural low-carbon economy. Framed by international, European, national, and regional policies and strategies, they should act as key changemakers in rural areas and promote more sustainable business models, to fight climate change challenges and contribute to shared sustainable and environmental policy targets.*

*The 2030 Agenda for Sustainable Development and the SDGs are the most recognised international policy framework for sustainable development. Agriculture plays a key and transversal role to all SDGs, which provide a relevant platform for benchmarking transition strategies to greener business approaches in agriculture. At an EU level, the European Green Deal supports policy definition and funding in different areas, including agriculture and rural areas, providing clear policy targets and priorities and strategic funding to support agropreneurs reduce their vulnerability to climate change and accelerate the transition to sustainable business models.*

#### *Questions for reflection*

- 1. In what ways should agropreneurs be involved in the decision-making process of new policy options and strategies that directly affect their business?*
- 2. What are the most relevant international and European priorities for agropreneurs to transition to a sustainable business model?*
- 3. How efficient are current available funding schemes for agropreneurs to support the development of rural low-carbon economies?*

## 4.3. The role of agrotourism in a business low-carbon process

Agriculture is not just about food production alone. To adapt and mitigate the effects of climate change (see Chapter 1), agropreneurs have started deploying alternative business models aimed to diversify their revenue streams [3].

**Agrotourism** is a form of tourism that falls within the framework of rural tourism and presents itself as a particular model of agricultural business [3]. According to [3] [15], it is based on tourism taking place on working farms with the visitor experiencing a wide range of real and authentic leisure and educational rural experiences generally linked to the participation in agrifood activities (e.g., harvesting, feeding), being in contact with animals and nature, rural lifestyle, culture and sightseeing.

The importance of this kind of tourism resides in the possibility of complementing agropreneurs income generated from their traditional business, i.e., food production with revenues from tourism (e.g., accommodation, catering, transport, activities), when faced with natural and economic shocks related to climate change (see Chapter 2), as well as raising awareness and ensuring the conservation of the environmental and agricultural system in which it takes place [3] [8].

In fact, **agrotourism is strongly interlinked with sustainable tourism** as it arises from the emerging trend in tourism demand in which tourists pay more attention to the values of natural and cultural heritage preservation of the countryside, thus providing a valuable contribution to the sustainable development and ecological conservation of rural areas [3] [8] and supporting agrobusinesses transition to more sustainable business models. Ultimately, this new trend raises agropreneurs, who are also involved in tourism activities, awareness to efficiently use natural resources, enhance farming productivity, and preserve the ecosystem in a sustainable way [3].

Agrotourism can support agropreneurs and rural areas process to a low-carbon economy by [3] [8] [9] [13] [19]:

- **Integrating farming in the supply of tourism products and boosting local economies.** Agrotourism is an important opportunity for agropreneurs as it represents an alternative distribution channel for their products. The positive effect of agrotourism is felt in the increased attention of consumers towards sustainable viable practices like the 'zero kilometres' approach, where the supply and consumption of food products to consumers occurs in the same location (or nearby) as the production. The consumption of reduced chemicals and environmental friendlier products has also emerged as a niche market linked to agrotourism. Additionally, agrotourism can be a means for rural economic development, acting as a trigger to motivate other local complementary businesses such as crafts, shops, museums, restaurants, generating local employment opportunities, creating durable supply chains within the local community, and developing new skills. Other local suppliers can join the local distribution channels and offer tourists their own goods and services and tourists are stimulated to visit rural areas beyond agritourism sites and purchase agricultural products and village handicrafts. This reduces the need for large-

scale production and international distribution networks and decreases GHG emissions related with the distribution of agricultural products.

- **Acting as an alternative source of income for the farmer (business diversification).** Agrotourism activities are increasingly seen as a viable economic diversification strategy for agropreneurs. It allows them not only to survive during periods of poor production due to climate change challenges, by having another source of income, but also to heavily invest on more sustainable production methods for the efficient use of resources, pollution control and circular economy strategies, as well as green technology, that require additional investment.
- **Investing in infrastructures.** The diversification of rural economic activities and subsequent development of rural areas creates the need for public investments and attraction of capital from outside the rural areas on additional energy, and transport infrastructures. Agrotourism can accelerate the shift towards increased renewable energy and sustainable transports, moving towards low-carbon growth because one the main rural tourist attractions usually consist of its natural resources, obliging to greater efforts to preserve the environment. Additionally, tourists are presented with more sustainable transport alternatives (e.g., train) to reach rural areas.
- **Responsibly use and maintain natural resources, promoting biodiversity and environmental protection and supporting waste reduction.** Rich biodiversity and natural heritage are often the main reasons why tourists visit rural areas. Agrotourism can, thus, play a major role in raising agropreneurs awareness and developing greater sensitivity towards the exploitation of natural resources and production practices with zero environmental impacts. Firstly, agrotourism has a positive effect on the preservation of rural natural heritage, contributing to the preservation of biodiversity and natural resources. Secondly, it also supports agropreneurs to transition to more sustainable energy, consumption patterns and waste management practices. Environmentally friendly and circular economy practices adoption, including re-using, recovering, re-developing, regenerating, and valuing resources (e.g., water conservation procedures, recycling programmes, tourists' education on conservation matters, food waste reduction through composting and by feeding animals and reuse of unsold products in local restaurants or by producing marketable new products, such as jam or preserved products, are a reference for sustainability in agrotourism.
- **Educating visitors on agriculture and the rural world.** Agrotourism offers tourists the opportunity to enjoy and reinforce the atmosphere of the agricultural life by staying at a real working agricultural site, while agropreneurs can promote the conservation of the rural context. Pastoral life, rural lifestyle and eno-gastronomy are some aspects encouraging tourists to visit rural areas with the purpose of education, recreation and active involvement in agriculture-based activities. Agropreneurs are, thus, able to maintain agricultural viability and diversify rural economies by providing tourism-associated services and, at the same time, educate tourists towards the mitigation of undesirable environmental impacts in rural areas.

Summary

*Agrotourism helps agropreneurs to provide safe, healthy, and sustainable products, earn additional regular income, considering the diversified range of services they provide, boost local economies by stimulating new jobs and skills, and protect natural resources, strengthen biodiversity, and contribute to the fight against climate change. Hence, agrotourism is highly interlinked with sustainable tourism practices.*

*Questions for reflection*

- 1. What should be agropreneurs predisposition to implement agrotourism services as part of his/her business?*
- 2. In what ways is agrotourism most effective in the creation of combined sustainable production practices with tourism activities?*
- 3. How relevant is the role of agropreneurs in educating tourists towards more sustainable environmental practices?*

## 4.4. Tips for reducing the environmental impact of agrotourism activities

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Agrotourism fully embodies the concepts of sustainable agriculture and tourism [3].

The following are practical suggestions for agrotourism businesses to mitigate the environmental impacts of their activities and transition to a sustainable bio and circular economy business model [1] [2] [7] [8] [9] [10] [13] [18]:

- **Sustainable farming**, i.e., the development of environmentally friendly farming methods that allow crops or livestock to be produced without harming human or natural systems. It includes preventing soil and water resources from adverse effects through agroecology practices such as seed management, water efficiency and management, diversified/mixed crops, integrated approaches of sustainable soil management, and the sustainable management of forests and the conservation and enhancement of forest carbon stocks.
- **Energy efficient housing and accommodation**, i.e., the identification and promotion of domestic renewable energy resources (e.g., solar panels, wind turbines, biomass/biogas coming from agrifood and forestry waste as well as tourism organic waste) will allow agrotourism businesses to reduce the energy footprint of food production and tourism activities.
- **Healthier and environmental friendlier food products** is a new consumption trend that results in increased demand for production of organic food items, i.e., agricultural goods with reduced chemical content and produced by using environmentally friendly practices. Agrotourism provides a platform for these local products, as well as other handmade products (e.g., jams, wine), to serve the needs of foreign and domestic travellers, acting as a secondary distribution channel for agricultural goods. This might help agrotourism businesses being able to emerge as niche brands to compete with established large-scale food production companies.
- **Shorter supply chains**, i.e., the implementation of the 'zero kilometres' approach, where the supply and consumption of food products to consumers occurs in the same location (or nearby) as the production, facilitated by agrotourism. Agropreneurs can still sell their certified goods through national or international distribution networks but avoid market-dictated prices and food prices fluctuations that they have no control over and, at the same time, mitigate the GHG emissions related with products' distribution to larger markets by having part of their production being redirected towards local markets.
- **Clean and sustainable transport** such as the investment in bicycles and cycling lanes and footpaths within and beyond the agrotourism site, seen as an additional service provided by the agrotourism business to improve the experience of tourists that do not harm the environment or reduce sustainability of natural resources in any way. Guided bicycles and foot tours are also an opportunity for additional income while contributing to low-carbon tourist travel.

- **Cleaner energy and cutting-edge technological innovation.** Accessing technology will accelerate change in agrotourism business towards more sustainable farming methods by supporting the introduction of smart farming technologies. Examples are food production data monitoring technologies to help resist pests and diseases, innovative methods to reduce water consumption, investment in cleaner mechanisation processes to reduce agriculture's carbon footprint and the combination of better climate information through the systematic use of Information and Communication Technology (ICT) to help address climate variability more efficiently.
- **Preservation of natural resources and biodiversity and restoration of landscapes.** Agrotourism businesses should contribute to the preservation of natural capital, to maintain their region's rich biodiversity and natural heritage, which are often the main reasons why tourists visit rural areas. They should efficiently use natural resources and do not endanger wildlife, as well as be part of the rural area's offer of cultural services for recreation and education purposes related with the preservation of the area's natural heritage.
- **Awareness raising** to increase tourists' interest for agriculture, which indirectly contributes to greater concern towards environmental preservation and the sustainable development of rural areas. This can be done by presenting tourists new experiences as part of the agrotourism services provision, to directly get in touch with the countryside, e.g., harvesting, handling livestock, producing, and preparing products. Tourists will experience the environment of agrotourism sites and feel positivity towards nature and are also expected to change behaviours when returned from their holidays.
- **Future jobs and skills training for the green transition.** As agricultural systems and businesses become more complex, agropreneurs need to improve their employees and their own entrepreneurial, business, digital and green skills to maintain and improve their sustainable agritourism business for years to come regarding relevant new agricultural and tourism trends, technologies, practices, and activities. They should also support local training youth and adult programmes as high-skilled and environmentally concerned labour force will be needed in the future.
- **Empower local communities' collaboration and mutual learning by get involved in decision-making processes.** Agrotourism businesses can take an active role in local policy and decision-making processes, involving a broad range of relevant stakeholders from the local community to identify best practices and replicate them, discuss local environmental challenges, and stimulate the development of tailor-made and integrated policy solutions and investments. This can be achieved through formal (e.g., creation of an association with regular meetings and a formal consultation process by the municipality) or informal engagement methods (e.g., participation in conferences, seminars or public consultations promoted by the municipality).
- **Embracing a circular economy model.** Agrotourism businesses should have a greater commitment to circular economy as an alternative to a traditional linear economy of producing, using, and disposing of waste or unsold food products leveraged by the new services that can be provided in the scope of their touristic



activities. They should, therefore, optimise the added value of their touristic activities, ensuring that products and materials are recovered and regenerated in a continuous sustainable cycle between the farm's food production and the touristic activities it provides. This can be done through the reuse and recycling of residues from tourism through composting, to provide nutrients for soils, and food for livestock or by generating heat (e.g., biomass/biogas) or the use of products made in the farm in touristic accommodations (e.g., bathroom products such as handmade soap and wooden shampoo containers or organic meals with local products).

#### Summary

*Agropreneurs involved in the agrotourism business can follow several practical suggestions, addressing environmental issues and contributing to low-carbon rural areas. Since agrotourism combines both traditional agriculture and tourism activities, agropreneurs should adopt and implement business changes that leverage this interconnection. Only by having a holistic approach of their business and thinking about sustainability in all agrotourism activities will they be able to truly transition to a greener and circular economy business model.*

*From the agricultural side, this might mean engaging in sustainable farming methods, produce more organic food products, introduce new innovative low-carbon technologies and green upskilling. On what concerns the touristic activities side, agropreneurs can make both in-house (e.g., energy efficiency, waste management, recycling and re-using of products, low-carbon tours, cultural services for landscape preservation) or community behaviour changes (e.g., awareness raising, educational training programmes, engagement in decision-making processes).*

#### Questions for reflection

- 1. How will agrotourism businesses balance the costs and benefits of implementing environmentally friendlier practices?*
- 2. What can be the fundamental activities for an agrotourism business to effectively transition to a circular economy model?*
- 3. In what ways should agrotourism businesses keep track of new developments and recent trends regarding new low-carbon techniques, methods and technologies?*

## 4.5. Case studies

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### Case study 1. From farm to fork: an efficient food waste management cycle

An agropreneur has a vast amount of farming land where he/she produces several fruits such as apples and pears. The business started with the production and distribution of these fruits, as the agropreneur inherited the lands from his/her parents. For a while, the agropreneur followed this business strategy. A couple of years ago, he/she decided it was time to expand the business by following a new trend of establishing touristic activities on agricultural lands, associated with traditional agricultural business. Small wooden houses were built for visitors, who hoped to experience countryside activities such as apple/pear picking.

As soon as the agrotourism business kicked-off it was a huge success and allowed the agropreneur to have an alternative, and more regular, source of income, particularly since in latest years it was not always possible to predict the success of apple or pears production due to extreme weather conditions. After a while, the agropreneur realised that a lot of money was being invested in providing everyday meals to tourists and that a lot was being wasted, so perhaps an alternative solution that better managed food waste from tourism activities in the farm could be found. The agropreneur wanted his/her agrotourism to become increasingly known for its sustainable practices.

Guided by the principles of a circular economy model, the agropreneur decided that the solution was to start a small-scale vegetable farm, for which tourists would contribute as part of their countryside experience. The food produced in this part of the farming land would be included in the meals of tourists, combined with meat and fish bought from other local agropreneurs – a more local distribution channel. The food produced at the small-scale vegetable farm, together with the apples and pears from the traditional agrobusiness and the local producers' meat and fish now fed satisfied tourists, that supported part of their meal production process.

Moreover, food leftovers would now go through a composting process, to provide nutrients for the soil of new apples and pears production and to generate heat in the winter – through biomass/biogas – in the wooden touristic accommodations. For this, the agropreneur invested in a composting/heating infrastructure and provided training and clear instructions to his/her employees on how to use the new infrastructure and process food waste in the farm. This zero-food waste strategy allowed the agropreneur to be almost self-sufficient in terms of food provisions for his/her visitors, buy more local products – decreasing his/her impact on carbon emissions of food distribution –, adopt a greener source of energy for touristic accommodation – decreasing his/her impact on carbon emissions of energy use –, and start a circular economy process that fully manages food waste.

## Case study 2. Re-discovering nature as a wine lover: promoting low-carbon activities

A local Government decides to promote more environmentally sustainable development practices, at several policy levels, in its region. This region is mainly rural, therefore most public funding would go to promote individual or integrated rural sustainable activities and strategies. To assess the state of sustainability at an environmental level and identify key issues and relevant actions, the local Government decided to conduct a public consultation with local key stakeholders, including agropreneurs, environmental associations, SMEs. Based on the public consultation, it became clear that the region's preservation, conservation, and promotion of its natural landscape and biodiversity called for urgent action.

For years, intensive agricultural practices led to the degradation of the region's natural landscape and resources (e.g., soil degradation, water shortages, deforestation). Adding to these environmental consequences was also the evident tourism decrease in the region, which had always been well known for its natural landscapes. Hence, the local Government decided to devise a strategy for the preservation of the region's natural heritage, providing funding for local stakeholders to promote the region's natural capital while implementing more sustainable agricultural practices and contributing to a low-carbon and circular economy.

A local agropreneur decided to apply for the funding provided by the local Government. He/she had a very successful agricultural business related with wine production and over the years has made several smart farming investments – e.g., cleaner mechanisation processes, use of solar panels – to turn his/her business more sustainable. To expand his/her business and, at the same time, contribute to the region's natural heritage preservation and promotion, the agropreneur decided that the best way to apply the public funding was to adopt a set of low-carbon touristic activities in his/her vineyard that would expand the business while educating visitors for the environmental preservation of the region's landscape.

Guided by the principles of a low-carbon economy, the agropreneur started providing foot tours to the vineyard and renting bicycles and small electric cars for visitors who wanted to get to know the entire estate or even the region, instead of using their own cars. For the bicycles and electric cars renting, the agropreneur engaged with other local businesses – e.g., restaurants, museums, other agrotourism businesses –, to provide an integrated touristic regional package that increased vineyard visitors' willingness to replace their cars for low-carbon alternatives for the rest of their visit.

As part of their countryside experience, tourists could enjoy the lovely scenery of the vineyard, learn more about wine production, visit the wine cellars and do wine tasting in a single foot tour. Afterwards, they were encouraged to rent a bicycle or an electric car to continue sightseeing and could enjoy discounts in local restaurants or free local museum entries. With these additional touristic activities, the agropreneur was able to increase his/her income and provide low-carbon transport alternatives to those interested in getting in touch with wine production and enjoy the region's natural landscape.

## Case study 3. A day in the life of a farmer: authentic touristic experiences for sustainable rural areas

A small agropreneur produces biological red fruits entirely for national and international distribution. For several years, the business was going well, however, in the last couple of years the small agropreneur faced production shortages, particularly due to extreme heat in his/her region caused by climate change. His/her red fruits crops reduced significantly, and, in some years, harvest was almost all compromised. In those difficult years, the small agropreneur was faced with the decision of introducing chemicals into his/her agricultural production, which meant he/she could no longer sell the red fruits with a biological label.

The small agropreneur started searching for solutions. He/she wanted to save the red fruits business, but it was almost becoming impossible to continue with not so much available income coming from their distribution. The small agropreneur searched for relevant international and European legislation that could help him/her benchmark alternative solutions, as well as adapt and enhance his/her business resilience to climate change.

He/she came across the concept of climate-smart agriculture and decided to adopt and implement changes and concrete actions, at three levels: (i) by opening his/her agricultural land to a touristic experience "a day in the life of a farmer", that would provide an alternative and regular source of income (in which visitors would accompany the small agropreneur in a normal business day, monitoring the crops growth, harvesting the red fruits, understanding the logistical aspect behind the distribution process, ending with local gastronomy and natural sightseeing); (ii) by turning his/her red fruits production completely biological once again (with no more chemicals use) and bet on more local markets (that are usually more prone to small-scale production and mean less distribution costs for the agricultural producer); and (iii) by collaborating with a local agricultural university to identify a high-tech low-cost way to monitor crops conditions and foresee future problems (e.g., satellite images).

## 4.6. Quiz

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1. **In what ways climate change endangers the development of agriculture and agrobusiness? Please select the correct answer.**
  - a. Environmental changes, e.g., as melting glaciers, more precipitation, extreme weather events and shifting seasons.
  - b. Continuous economic growth, e.g., population growth, indiscriminate use of natural resources and pollution.
  - c. Inherent vulnerabilities of rural areas, e.g., declining, and aging population, less access to job opportunities, and deficient transport and energy infrastructures.
  - d. All the above.
2. **Climate change impacts on crops productivity, land availability and pressure on natural resources can lead to indirect negative economic impacts, such as...Please select the correct answer.**
  - a. Instability in food availability, nutrition, and prices.
  - b. Social revolt and uprising and political reforms.
  - c. Collapse of agricultural businesses and large-scale distribution markets.
  - d. National/local diverse and clashing ways of addressing climate change.
3. **According to FAO, what is a climate-smart agriculture approach? Please select the correct answer.**
  - a. An approach that has an explicit focus on supporting agropreneurs to adapt and enhance resilience to climate change challenges, including reducing greenhouse gas emissions.
  - b. An approach that has an explicit focus on capturing new funding opportunities for agropreneurs to shift to affordable sustainable farming practices.
  - c. An approach that has an explicit focus on addressing climate change, considers synergies and trade-offs between sustainable agricultural productivity, adaptation, and mitigation to climate change, and aims at capturing new funding opportunities for agropreneurs.
  - d. None of the above.
4. **At an international level, agropreneurs' sustainable agricultural practices can be framed by which policy strategy? Please select the correct answer.**
  - a. The Common Agricultural Policy (CAP).
  - b. The United Nations Agenda for Sustainable Development, that comprises a set of 17 Sustainable Development Goals
  - c. The Environmental Action Plan.
  - d. The Long-term vision for rural areas, that encompasses the Rural Pact and the Rural Action Plan.
5. **At a European level, the European Commission's Green Deal strategy sets the target of reducing greenhouse gas emissions (GHG) by 2030 by at least...Please select the correct answer.**
  - a. 55%
  - b. 45%
  - c. 35%
  - d. 25%
6. **Agrotourism is important to agropreneurs efforts to adapt and mitigate climate change because... Please select the correct answer.**

- a. It can present itself as an alternative income generator, complementing agropreneurs traditional business, i.e., food production with revenues from tourism (e.g., accommodation, catering, transport, activities).
  - b. It supports agropreneurs efforts to raise visitors' awareness and ensure the conservation of the environmental and agricultural system in which the touristic experience takes place.
  - c. It allows agropreneurs to develop more sensitivity towards the exploitation of natural resources and production practices with zero environmental impact.
  - d. All the above.
- 7. From the following examples of environmentally friendly practices, which one directly supports agrotourism businesses low-carbon emissions efforts? Please select the correct answer.**
- a. Food waste from the agrotourism goes through a composting process, in which the biomass/biogas is used as a cleaner energy source for heating.
  - b. Unsold agricultural products are sold at a lower price to local restaurants to have zero food waste from agricultural production.
  - c. Unsold agricultural products are used in touristic added-value activities inside the farm, such as visitors' possibility to learn how to make jam from unsold fruit.
  - d. The agropreneur invest in a new sustainable water irrigation system for his/her crops, that allows to better manage water leakages.
- 8. What is sustainable farming? Please select the correct answer.**
- a. The adoption and implementation of high-tech innovations that allow agricultural production to increase rapidly.
  - b. The production of diversified crops in a single agricultural land, together with the use of chemical products to decrease the waiting time for harvesting.
  - c. The development of environmentally friendly farming methods that allow crops or livestock to be produced without harming human or natural systems.
  - d. The selling of high-priced agricultural products in international and national markets to maintain the agrobusiness' economic sustainability.
- 9. From the following examples of environmentally friendly practices, which one directly supports agrotourism businesses to reduce their energy footprint of food production and tourism activities? Please select the correct answer.**
- a. The identification of alternative energy resources and their implementation in agricultural production and tourism accommodations, e.g., solar panels, wind turbines, biomass/biogas.
  - b. Investing in bicycles renting and cycling lanes and footpaths and walking tours to improve the touristic experience of visitors.
  - c. Transition to cleaner and ICT-based mechanisation processes in agricultural production that sustainably increase production without environmental harm.
  - d. All the above.
- 10. Agrotourism can contribute to the preservation of natural resources and biodiversity by... Please select the correct answer.**
- a. Supporting agropreneurs to efficiently use natural resources and to not endanger wildlife, as natural capital is why tourists are attracted to the region.
  - b. Being part of the region's offer of cultural services for recreation and education purposes related with the preservation of the region's natural heritage.
  - c. Empowering local communities' collaboration through integrated actions and strategies that intend to preserve the region's natural landscape.
  - d. All the above.

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