SOL MACC

ORGANIC FARMERS COUNTERING CLIMATE CHANGE

VIABLE CLIMATE-FRIENDLY FARMING

SOCIO-ECONOMIC STRATEGIES

EDITOR AND PUBLISHER

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ABBREVIATIONS

CAP – Common Agricultural Policy
CO_2 – Carbon dioxide
CSA – Community Supported Agriculture
GHG – Greenhouse gas
SDGs – Sustainable Development Goals
SOLMACC – Strategies for Organic and Low-input farming to Mitigate and Adapt to Climate Change

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CLIMATE CHANGE: A MAJOR CHALLENGE TO FARMERS

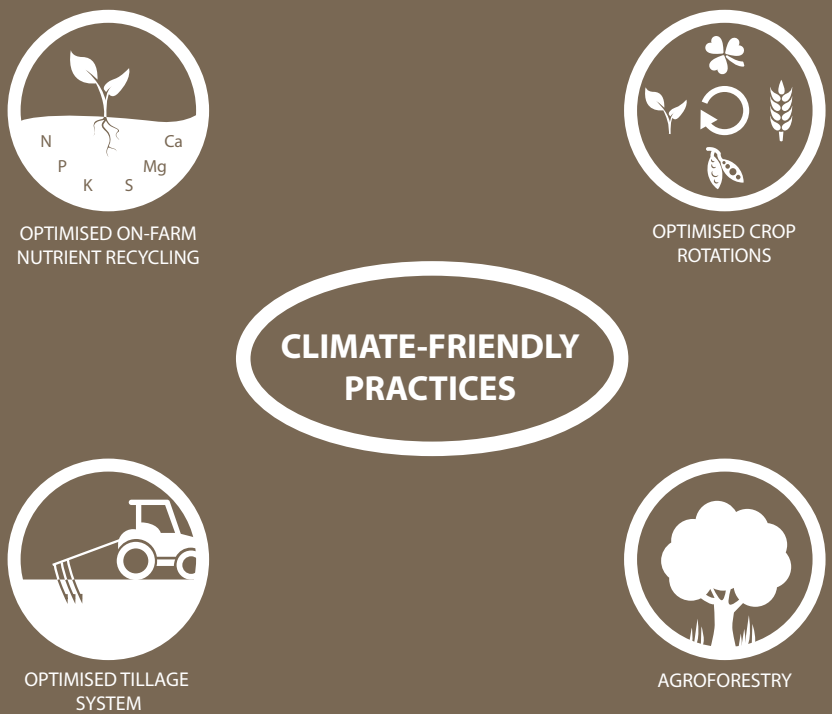
Climate change presents a real challenge to farming, not only in faraway countries but here, too, in our European countryside. Political incentives, such as the recently ratified Sustainable Development Goals (SDGs) and the Paris Agreement of the United Nations Framework Convention of Climate Change, acknowledge this challenge, and the first steps have been taken to address the issue. Among the most serious effects of climate change are harvest losses, irredeemable damage to natural resources and the erosion of farmers' economic viability. Year-to-year variability in yields is expected to increase throughout Europe, owing to extreme climatic events and other factors, such as pests and diseases.

While we can try to adapt to its effects, we must also do our utmost to counteract climate change. Agriculture, especially intensive production systems, contribute a lot to climate change. In Europe, agricultural production accounts for about 10% of anthropogenic greenhouse gas (GHG) emissions.[1] Moreover, the emissions from deforestation due to land conversions for crop or livestock production account for approximately 12% of the world's emissions. On a global scale, emissions from the food sector as a whole (including those from deforestation and land use change, production of agrochemicals, processing and transport of food, food wastage, etc.) add up to between a third and a half of global GHG emissions.[2]

[1] DANILA, A. M., FERNANDEZ, R., NTEMIRI, S., MANDL, N. & RIGLER, E. 2016. Annual European Union greenhouse gas inventory 1990–2014 and inventory report 2016: Submission to the UNFCCC Secretariat. EEA Report No 15/2016. European Commission, DG Climate Action, European Environment Agency, Brussels.

[2] MULLER, A., BAUTZE, L., MEIER, M., GATTINGER, A., GALL, E., CHATZINIKOLAOU, E., MEREDITH, S., UKAS, T. & ULLMANN, L. 2016. Organic Farming, Climate Change Mitigation and Beyond – Reducing the environmental impacts of EU agriculture. FiBL and IFOAM EU. http://www.ifoam-eu.org/sites/default/files/ifoameu_advocacy_climate_change_report_2016.pdf

FIGURE 1:
THE FOUR AGRICULTURAL PRACTICES APPLIED ON THE SOLMACC FARMS



This share needs to be reduced through a collaborative effort, and organic farming can lead the way. While agriculture is more often seen as part of the problem, it can also be part of the solution. The more farmers apply climate-friendly practices the better we can counteract climate change. At the same time, climate-friendly practices must sustain farmers' livelihoods, and a farmer's GHG reductions should not entail a reduction in farm income. Instead the uptake of climate-friendly practices, as part of a wider sustainability agenda, should be seen as the best way to support farm resilience and to enhance societal expectations of agriculture with respect to climate action.

The project SOLMACC (Strategies for Organic- and Low-input-farming to Mitigate and Adapt to Climate Change) sets out to demonstrate the difference climate-friendly practices can make. It promotes the wider adoption of innovative practices (see Figure 1) that can contribute to the EU achieving its objectives for climate change mitigation and adaptation in the food and farming sector, while considering the economic costs and gains from the practices.

In the project, 12 motivated organic farmers set up a demonstration farm network, with four farms each in three countries (see Map 1). The farmers contribute land, equipment and labour, and share their experiences of applying newly acquired knowledge. Without such support, projects like SOLMACC would not be possible.

Each farm applies four agricultural practices (see Figure 1), which are evaluated for their climate change mitigation and adaptation potential, as well as their socio-economic and technical feasibility.

This brochure presents the results of a roundtable meeting in Nuremberg, Germany, in February 2017, where European experts in agricultural research, farm advisory services, retailing, and food processing discussed factors that might hinder the wider uptake of climate-friendly farming measures, as well as strategies to address those factors. The brochure outlines how climate-friendly farming can be made economically viable and how other hindering factors, such as the shortage of information about relevant techniques or a lack of political support, can be overcome. It also highlights the importance of a supportive policy environment to better stimulate the uptake of more environmentally sound and climate-friendly practices in the transition to more sustainable farming. Because climate-friendly and resilient farming systems need a collaborative effort, recommendations are given for a diverse range of stakeholder groups across the agri-food sector. The brochure targets, in equal measure, farmers, farmer associations, advisors and extension services, processors, retailers, consumers and policymakers. It is available in English, Swedish, Italian and German.

MAP 1:

THE SOLMACC DEMONSTRATION FARM NETWORK

1 **Hallen**
Trägsta Gård

2 **Vattholma**
Hånsta Östergärde

3 **Töreboda**
Sötåsens naturbruks gymnasium

4 **Kvidinge**
Körslätts Gård

5 **Neißeaue - Klein-Krauscha**
Gut Krauscha

6 **Dortmund**
Kornkammer Haus Holte GbR

7 **Aichach**
Biolandhof Kreppold

8 **Schwabmünchen**
Pfänder Hof GbR

9 **Verona**
Azienda Agricola Biologica Fontanabona

10 **Montevarchi**
Azienda Agricola Mannucci Droandi

11 **Fiumicino**
Azienda Agricola Biologica Caramadre

12 **Monreale**
Aziende Biologiche Tamburello

CLIMATE-FRIENDLY FARMING
SOCIO-ECONOMIC IMPLICATIONS AND FARMERS' MOTIVATION

Agriculture is one of the most vulnerable economic sectors, and changes to the climate will have a big influence on agricultural production. The prices, quantities and quality of products will be influenced by the effects of climate change, such as extreme temperatures, changing precipitation patterns and increased pressures from pests and diseases. This will have an impact on farmer's incomes and livelihoods, as well as on food security for EU citizens.[3]

Climate-friendly farming, such as the SOLMACC practices, organic farming in general, and other agro-ecological approaches, provide sustainable ways for farmers to adapt to climate change, while at the same time reducing their emissions from production. However, if climate-friendly farming is to become a widely applied mitigation approach in the EU, the practices have to deliver sufficient incomes for the farmers. If farmers' incomes decline due to the climate-friendly practices, the economic sustainability is not assured and the farmers might go back to the unsustainable practices that threaten the environment and the long-term sustainability of the sector. Thus, climate-friendly practices should secure incomes, by increasing agricultural productivity and/or reducing production costs and/or exploiting new niche markets to increase the overall market value of the products. At present, market values often neglect the ecosystem services provided by farmers practising climate-friendly agriculture. This means the eventual costs of climate-friendly practices are usually not reflected in current prices.

Using a farmers' questionnaire, SOLMACC assessed the economic potential of its agricultural practices. All the participating farmers reported that, when they applied the climate-friendly SOLMACC practices (e.g. part of the improved crop rotation, tillage management or agroforestry

[3] FAO 2016. THE STATE OF FOOD AND AGRICULTURE - CLIMATE CHANGE, AGRICULTURE AND FOOD SECURITY. Food and Agriculture Organization of the United Nations, Rome.

practices) crop yields were maintained. In some cases, in particular for the optimized nutrient recycling and crop rotation practices, the farmers even reported that crop yields increased by between 1% and over 10%. In contrast, some of the practices might lead to higher production costs. Three main contributing factors were analysed: operational costs (e.g. fuel use), input costs (e.g. seed purchases) and labour costs. While some of the practices involved a reduction in operational and input costs, the additional labour costs (in particular for agroforestry practices) could reduce farmers' economic gains.

Lastly, farmers were asked if their overall economic returns changed with the implementation of the SOLMACC practices. More than half the farmers (6 out of 11) recorded no change in their economic returns, while 5 farmers achieved an increase. 2 of the 11 farmers reported small economic gains of between 1% and 10%, and three farmers even reported increases of more than 10%. Despite of these positive experiences, only 2 of the SOLMACC farmers stated that their motivation derives from the wish to maximize their profit, or to meet changing consumer demands or the political requirements of the CAP.

But what additional factors, besides income, influence a farmer's decision to introduce climate-friendly agricultural practices? The SOLMACC farmers were asked about their motivation to move towards climate-friendly agricultural practices which could entail a risk of reduced economic gains. Most of the farmers (10 out of 11) are motivated by the urge to achieve long-term sustainability.

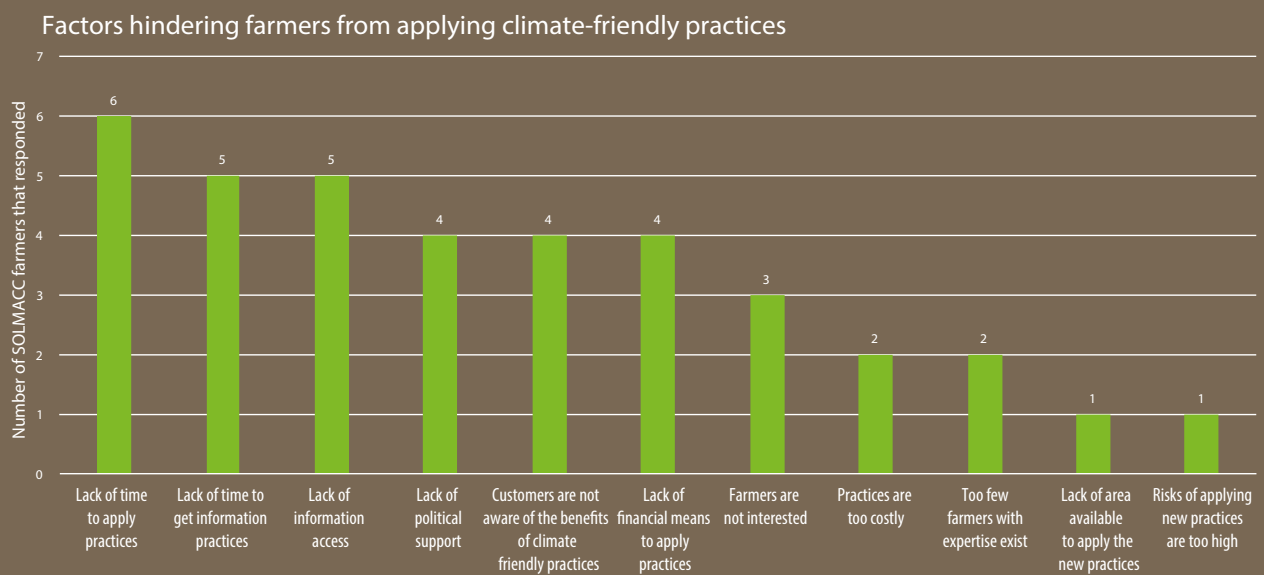
They consider climate change as an element to consider if their long-term vision is to ensure sustainability. Or, as Ylva and Kjell Sielin (Hånsta Östergärde, Swedish SOLMACC farmer), put it, "*The agricultural challenges are that we must now (1) repair the life supporting systems, such as a stable climate, and (2) move beyond producing more food for more people. We want to take part in fulfilling these two tasks.*"

Others claimed that the essence of their motivation is the wish to protect soil fertility (9 out of 11), in particular as a climate change adaptation strategy. "*By participating in the SOLMACC project I hope to find a better-adapted way of managing my plant production. Moreover, the measurements and assessments of the climate relevance of my farm operations are very exciting.*" (Dirk Liedmann, Kornkammer Haus Holte, German SOLMACC farmer).

When the same farmers were asked where they currently see constraints to a shift to climate-friendly agriculture practices, they replied that a lack of time and financial means (e.g. for investments in machinery), as well as the limited access to information, political support and consumer awareness, are essential factors (see Figure 2). These things need to be considered when researchers, farm advisors or policymakers want to motivate farmers to pursue climate-friendly practices.

FIGURE 2:

SOLMACC QUESTIONNAIRE RESULTS: WHAT HINDERING FACTORS DO FARMERS FACE REGARDING THE USE OF CLIMATE-FRIENDLY AND RESILIENT AGRICULTURAL PRACTICES IN THE EU?



TALKING ECONOMICS

RE-THINKING BUSINESS MODELS TO MAKE CLIMATE ACTION PROFITABLE

One strategy to encourage the wider uptake of climate-friendly farming is to explain how these practices can bring economic benefits for the farmer – in other words, how the potential additional costs associated with climate-friendly farming measures can be compensated for with different business models. Climate-friendly farming practices could open up new niche markets to farmers and their climate-friendly products. During the roundtable, experts tried to list these business-driven potentials. They discussed possible solutions, such as climate-friendly labelling, B2B (business to business) investments and the strengthening of regional value chains as well as the roles of the respective food chain stakeholders.

At the same time, it is essential to identify win-win opportunities for farmers, such as practices that are both climate-friendly and reduce costs. This calls for more research on the economic opportunities and risks of climate-friendly farming practices.

The roundtable discussions concluded that there is a need to differentiate between the increasing potential economic benefits of climate-friendly farming practices for conventional/integrated farms and those for organic farms. For conventional farmers, a transition to organic farming combined with climate-friendly practices can be lucrative. As was highlighted by the experts, the reduction of input costs (e.g. fertilizer purchases) and the receipt of conversion and maintenance payments to support organic production, as well as the higher prices obtained for organic products, are strong incentives for making the change.

For organic farmers, other policy support such as agri-environmental payments, support for advisory services and knowledge transfer are also very important to foster the uptake of climate-friendly practices. However, experts considered additional climate-friendly labels not to be advantageous to them as it could create confusion amongst consumers and weaken the established organic labels which deliver a whole range of public benefits. Moreover, the criteria for such a label would be difficult to establish and the additional willingness of consumers to pay over and above the organic premium is likely to be limited. If possible, farmers can try to improve the way they communicate the things they already do well. In particular, climate-friendly practices, such as the introduction of legumes in the crop rotation, should be highlighted and explained to consumers. This might increase the consumers' willingness to buy more expensive but sustainable products. (Farmers communication with consumers will be dealt with in more detail in the chapter on "Improving communication").

Another option for farmers would be to share the economic risks by building up regional value chains, community supported agriculture (CSA), or both. If consumers become more involved in the agricultural production, they might get to know in more detail the climate risks faced by local farmers, and the importance of climate-friendly practices. This understanding might increase their willingness to accept higher prices. At the same time, regional value chains and CSA structures reduce the farmers' risk of total economic loss if crops should fail, as the risk is shared by the community.

Furthermore, it is important to understand the different timescales involved in the economic benefits of climate-friendly farming activities, as some are short-term measures, while others are long-term. Short-term measures mostly concentrate on increasing farmers' incomes, for instance through the optimization of farm resources (purchasing energy/fuel efficient machinery, establishing composting structures instead of buying fertilizers externally, etc.) or by achieving higher prices through improved communication with consumers. Long-term measures are bigger in scale and directed towards internalizing the externalized costs of agricultural production. To achieve this, there is a need for science-based policy changes that promote climate-friendly and economically viable farming practices. The responsibility for setting up these measures lies mainly with policymakers, as discussed in the last chapter of this brochure. However, access to information and the communication between farmers, farm advisors and researchers should be fostered. The benefits of building and maintaining soil organic matter are also likely to be long-term.

Lastly, a farm's profitability in general, and the promotion of climate-friendly farming techniques depend on the individual farmer. Creative, communicative and flexible behaviour are important characteristics. In some cases, climate-friendly farming may mean giving up long-established traditions. Additionally, consumers should be made to understand the value and importance of climate-friendly farming. This might be difficult for the individual farmer, especially in the beginning. Here, farm advisors, farming associations and researchers should provide additional support.

RECOMMENDATIONS FOR RESEARCHERS AND FARM ADVISORS

- Increase on-farm analysis of climate-friendly farming costs and economic returns (in collaboration with the farmers and farm advisors). This is important because most of the economic data is currently based on modelling values.

- Communicate with farmers about win-win strategies (solutions that are both climate-friendly and economically viable), such as optimizing resource use and measures to build up soil fertility. As results from the SOLMACC project show, practices that are good for the climate, such as optimized nutrient recycling and crop rotation with leguminous crops, can increase crop yields and therefore also farmers' incomes.

RECOMMENDATIONS FOR FARMERS

- Invest in building up or strengthening regional value chains. These may increase the willingness of consumers to pay a higher price (due to the communication with the farmer) and may help to reduce the climate change/economic risks to the individual farmer, by providing a support system. An example of a well-established regional value chain is the Ökodorf Brodowin, in Germany. Here, several farmers collaborate in an association structure. Diverse agricultural products are marketed under the same brand and sold regionally in farm shops, cafes and organic boxes.[4]

- Consider using community supported agriculture (CSA) models. These help to spread the economic risks of individual farms. They also allow the farmer to involve consumers directly in the production system. Consumers can, for example, rent a small share of the agricultural land and cultivate their own vegetables, or they can hold shares in the farm. This is the case at the tegut Saisongärten, where farmers help consumers to prepare their rented land and provide tools for cultivation.[5]

- Allow flexibility and creativity to rule your farm. Instead of focussing on tradition, adopt practices which mitigate GHG emissions while also being economically viable, e.g. mulching, reduced tillage.

[4] www.brodowin.de/en/home-en
[5] www.tegut.com/aktuell/artikel/bio-gemuese-in-den-tegut-saisongaerten-selbst-frisch-ernten.html

BEST PRACTICE

FLAACHTAL FARMERS - HOW TO MARKET CLIMATE-FRIENDLY FARMING

In the Flaachtal region of Switzerland, farmers have started an association for climate-friendly farming. They have three major goals, which they call their "20/20/20" approach. They aim to reduce GHG emissions from agricultural production by 20%, to reduce costs by 20% and to increase economic returns by 20% through the sale of climate-friendly products. So far, 26 farmers have joined the network. Together, they represent the diverse agricultural production systems in the region (animal husbandry, wine production, arable crops, etc.). Their main objectives are to increase resource efficiency, to sequester more carbon in the soil, to close energy- and nutrient-cycles (e.g. materials, nutrients, energy) and to use renewable energy sources. This has led to a reduction in GHG emissions, and they can market their products locally as climate-friendly.

[6] For further information, please see: www.agroco2ncept.ch

IMPROVING COMMUNICATION

So far, few farmers have introduced climate-friendly farming practices. As outlined in the first chapter, and according to the results of the SOLMACC project, a number of factors still hinder the wider uptake. We have already noted that practices must be economically viable. Besides the financial barriers, a lack of information at the practitioners' level and a lack of knowledge and experience can hamper the larger-scale application of such measures. Furthermore, farmers might also be concerned, at least initially, about the potentially adverse effects on crop yields and income. When bigger investments are required, for example in machinery for reduced tillage or compost turning, farmers might be hesitant and risk-averse. Improving information flows between the different actors (farmers, advisors, researchers, consumers and retailers) is therefore a key issue in the promotion of climate-friendly farming and ensuring the benefits to farmers.

At the expert roundtable, two strategies were developed in the field of communications. The first involves improving communication between farmers, advisors and researchers, while the second focuses on opportunities in farmer–consumer communication.

STRENGTHENING FARMERS' KNOW-HOW: FARMER–ADVISOR–RESEARCHER COMMUNICATIONS

Only farmers can decide what they will do on their farms. Making the change to climate-friendly farming can have a big impact on their livelihoods. It is therefore vital that farmers receive support for their decision-making, and that all the information needed for this process is available.

To establish a solid basis for these decisions, effective good communication is needed between farmers, advisers and researchers.

RECOMMENDATIONS FOR FARMERS AND FARMERS' ASSOCIATIONS

- Strengthen direct exchanges between farmers, e.g. through regular field days or training courses for advisors on the topic of climate-friendly farming. A peer-to-peer exchange is usually appreciated and well-suited to address practical questions.

- Besides the SOLMACC[7] project, there are several research initiatives that aim to develop innovations or help disseminate scientific knowledge to practitioners. Farmers and farmers' associations can either get involved as partners, or they can benefit from the results. Examples are:
  - The European technology platform, TP Organics[8]
  - The European knowledge platform, OK-Net Arable[9] (with information, for example, on reduced tillage and the integration of legumes in crop rotations)
  - The UK network "Innovative Farmers"[10]

  These initiatives usually have material freely available online, or newsletters you can subscribe to.

- As an association, highlight the topic of climate-friendly farming in your regular membership activities (magazines, mailings, meetings).

RECOMMENDATIONS FOR ADVISORS

- Facilitate or enhance the communication between farmers and researchers. There are many possibilities to get in contact with farmers and researchers. Most agricultural fairs hold forums where the latest scientific findings or questions are discussed. Events like the open field days in the SOLMACC project offer farmers and advisors an opportunity to meet researchers, who can showcase and discuss their work.

- When talking about climate-friendly farming, the entry point for a discussion with a farmer might be the economic benefits that a practice can bring (e.g. higher crop yields, lower input costs) as well as the possible adaptation benefit. Benefits such as resilience to extreme weather events (e.g. heatwaves or heavy rain) will become increasingly relevant for farmers as the impacts of climate change increase. The SOLMACC practices or other agro-ecological approaches generally increase resilience, for example by increasing soil water holding capacity, or through a diversification of products and income sources.

- Focus on the benefits that climate-friendly farming has for soils, such as increased soil carbon, soil stability and texture, and increased water-holding capacity. Soil health is an area that interests most farmers. They are therefore likely to respond positively to measures that increase the quality of their soil.

RECOMMENDATIONS FOR RESEARCHERS

- As well as the need to gather more data on the economic impacts of climate-friendly farming (see previous chapter), it is also important that the findings reach the practitioners. Therefore, it is important to promote training and knowledge exchange between farmers, farm advisors, and researchers. By using information hubs, farmers can learn how to utilise resources more effectively, how climate-friendly farming might work on their farms and/or how to communicate with consumers more effectively. Connecting with farmers and advisors directly will help researchers better understand their actual needs (e.g. what crop-specific information they might require).

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[7] www.solmacc.eu
[8] www.tporganics.eu
[9] www.farmknowledge.org
[10] www.innovativefarmers.org

BETTER COMMUNICATION ALONG THE ENTIRE VALUE CHAIN

Farmers, consumers and other actors along the value chain tend to know little about their reciprocal expectations and needs. Climate-friendly farming practices and their effects are rarely talked about when it comes to selling food. Explaining the positive climate impacts of organic farming provides an opportunity to increase consumer loyalty and the acceptance of higher prices. Communicating with consumers or retailers might be challenging for some farmers, but is essential for the success of climate-friendly farming. This was highlighted by several experts at the roundtable. After all, a climate-friendly food sector within the EU does not depend only on climate-friendly agricultural production, but also on the consumers' willingness to change their consumption behaviour. The communication should be clear and easy to understand for the consumers.

Farmers can improve this communication by explaining what climate-friendly farming is, and why it is so important to do it. Organic farmers in particular can show that many of their practices already have a positive impact in terms of reducing GHG emissions. Farmers and advisors can work together on a proper communications strategy that promotes the benefits of climate-friendly farming.

Speaking to your customers about climate-friendly agriculture is relatively easy if you sell your products directly. Setting up a system of community supported agriculture, as outlined in the previous chapter, is one option for farmers to get the consumers engaged, enabling them to communicate the benefits of climate-friendly agriculture to them. But other strategies are also available to farmers who do not use these channels (e.g. social media, working with schools and local groups, liaising with farmers' associations).

BEST PRACTICE

ORGANIC DAY AT WESSANEN

Wessanen is a European food company which believes organic food is essential to address the main problems that people and the planet are facing today. Every year they organise an Organic Day, when their approximately 1,000 employees across the company raise awareness about organic-related topics, like soil, healthy nutrition and food trends. In 2017, the topic was "Can organic food combat climate change?".

The event takes place simultaneously in all the company's approximately 10 locations in five countries. Local experts are invited to lead a conference and to debate with employees. There are also challenges to engage people in the topic, and workshops to share and raise knowledge. The objective is that, by the end of the event, employees better understand the impacts of the different forms of agriculture on greenhouse gas emissions, but also the impacts across the whole food chain and where Wessanen as a responsible company can act. They will also become more aware on their role as consumers when they make their own food choices.[11]

[11] www.wessanen.com/en/newsroom/organic-food-against-climate-change

RECOMMENDATIONS FOR FARMERS AND ADVISORS

- Work with schools and local groups – they are eager to learn! Get in touch with teachers and associations. Presentations in schools, field days for kids or climate-friendly cooking classes are good ways to engage young consumers and their parents.

- Social media allows your voice to be heard! It allows you to connect with people you have never met but whom you would like to communicate with. If you use the right techniques, you get noticed and you can influence the behaviour of your target audience. Here are some tips on making that happen:
  - Tell people what is special about your climate friendly agriculture, and what climate-friendly farming means to you and your community. You can make a short video or include pictures from your farm. What effects of climate change are already visible on your farm? What has changed for the better? YouTube is the most popular channel for this kind of communication!
  - Tell the story: make a regular (e.g. weekly) update on what is going on on your farm (for example, how well the crops are growing, if you have a new tractor or new animals on the farm, a dish that you have cooked, etc.). Experience shows that social media users like to see things "from inside". This way, you create a real story which significantly increases the engagement of your target audience.
  - Engage your audience by starting a conversation with them. It is better to share one post that encourages a discussion than to post 10 articles that don't achieve any reaction. After getting a post, always reply to it. Remember, 10 engaged users are more valuable than 100 readers who do not comment. If you receive a negative comment, try to understand why and explain your point of view. Don't criticize people, but focus on explaining your approach.
  - Be patient – social media need time to make a broader impact. Your users communicate your messages further, but this takes time.
  - If possible, talk to your farmers' association about their communication to the general public or other actors in the food sector (e.g. retailers) through social or traditional media. Your work could be an excellent showcase for climate-friendly and sustainable farming. Use information material from NGOs. Many green NGOs offer free flyers, postcards or booklets addressing consumers on the importance of climate change mitigation and how to achieve it.

RECOMMENDATIONS FOR ACTORS ALONG THE VALUE CHAIN

Cooperation between farmers and other actors along the value chain is a win-win situation. Farmers can improve the visibility for their products, and retailers can attract more consumers to their shops.

- Award prizes for the most climate-friendly or sustainable farmer.

- Shops and supermarkets can organize climate-friendly tasting events, where farmers present their products directly to consumers and talk about their climate-friendly production.

- Shops can display climate-friendly recipes next to the products. Their displays could contain a recipe, information on the carbon footprint and a picture of a farmer who produces the product using climate-friendly practices.

- Use a regular shop magazine to feature farmers practising climate-friendly farming and/or climate-friendly recipes.

- Shops can encourage their staff to provide simple messages to the customers – they are in direct contact with consumers and are best placed to engage them in a discussion. One option is to organise a staff excursion to a farm or arrange a training day on the topic of climate-friendly farming.

CURRENT AND FUTURE POLICY

PROMOTING PUBLIC POLICIES THAT HELP FARMERS ACT ON CLIMATE CHANGE

Agriculture is highly dependent on the climate, the environment and natural resources when it produces private goods for the market (e.g. farm produce) as well as public goods for society (e.g. soil fertility, clean water, biodiversity conservation). Although the evidence from the SOLMACC project shows that the greater use of climate-friendly practices can help farms improve their yields and gain wider economic benefits in the long-term, there are rarely any guarantees. Moreover, changing their practices without adequate support and advice can be time-consuming for farmers. Above all, they face the need to maximize their price competitiveness for private goods in an increasingly globalized food system. The fact remains that there is often insufficient market motivation for farmers to apply practices that address climate change and other environmental problems. This demonstrates the failure of the market to adequately recognise the value of public goods. In view of this, there is a need for public policy to signal to farmers and other actors in the agri-food chain that they must act on climate change. Such policies should be part of a wider agenda to increase the environmental and socio-economic performance of European agriculture.

This includes setting ambitious targets and introducing strategies that put agriculture at the forefront of climate mitigation and adaptation, while rewarding farmers for delivering climate and environmental benefits and supporting further research and innovation to ensure the agri-food sector achieves its full potential.

Many national and regional governments in Europe already run schemes to encourage the uptake of beneficial practices for climate and the environment. These range from conversion and maintenance payments for organic farming and other land management schemes, to infrastructural investments and farm advice and extension services for farmers or groups of farmers. Farmers will accept changes to their agricultural practices more easily if there is a generally acknowledged need for action in the agricultural sector. This is not yet always the case, as some governments and farming trade unions claim the sector should be exempted from any significant action in order to ensure "food security". This is often seen as a justification to continue business as usual.

BEST PRACTICE

PUBLIC GOODS BONUS
PUTTING A PRICE ON ENVIRONMENTAL SERVICES PROVIDED BY AGRICULTURE

The public goods bonus is a concept for future-oriented payments for climate, biodiversity and water protection. It has been developed and piloted in the north German federal state of *Schleswig-Holstein* by *the Deutsche Verband für Landschaftspflege* (DVL)/Landcare Germany, an umbrella organisation for rural conservation organisations in Germany.

The underlying idea of the public goods bonus is the evaluation of environmental services provided by individual farms, with rewards given for the climate, biodiversity and water protection services they deliver. This approach allows farmers to produce not only marketable products like corn, potatoes or milk, but also ecological goods and services.

Policymakers have a huge role to play in supporting a more ambitious transition towards climate-friendly agriculture, by setting ambitious targets and developing strategies for the sector that link global challenges with local action. However, current developments show that little action can be expected from the agriculture sector beyond the existing policies. In the EU, for example, the Climate Package 2030 does not require sector-specific action, and most countries expect to meet their targets through non-agricultural measures. Indeed, agricultural emissions are expected to decline by just 2.3% by 2030. By 2050, they will represent one third of the EU's total emissions. At the same time, there is growing recognition that achieving deep cuts to GHG emissions requires a close link between long-term strategic planning and short-term policy action. Long-term national-level strategies for a low-carbon economy are vital if we are to raise our ambitions and implement climate policies effectively.

In the EU, for instance, despite the emphasis on climate action as a crosscutting objective in the Common Agricultural Policy (CAP), relatively little action has so far been taken by Member States, and improvements should be made to the CAP to enhance climate action.[12] The EU's historical experience of agri-environmental schemes and other relevant measures supported under the CAP shows that most farmers are not taking up these measures in a systematic way. It is therefore necessary for public policies to support climate-friendly and environmentally friendly agriculture more effectively, based on the concept of public money for public goods. This calls for the commitment of famers, advisors, researcher and policymakers, underpinned by a new deal between citizens and farmers. As the use of public money to support the uptake of environmentally sound and climate-friendly practices is not properly integrated in our existing market frameworks, policymakers need to reward and incentivize those farms that deliver positive climate and environmental outcomes. This is essential to stimulate efforts to reduce GHG emissions and adapt to the changing climate as part of a wider sustainability agenda. A more systemic approach from farm to fork would be better suited to reduce the GHG emissions linked to food production and consumption in the EU, while achieving sustainable development goals, in particular the restoration of ecosystems services.

Funds must be provided and opportunities created to scale up the best agroecological systems and integrate them into a coherent supply and value chain. Significant investment is now needed in research and development for new economic paradigms that penalize business models which contribute to environmental degradation, and reward those that protect and promote biodiversity and eliminate environmental pollution and other harmful practices. The end price of products must reflect the true costs of production by internalizing all the externalities, such as biodiversity loss, water pollution and GHG emissions. Training and extension work for agroecological production and fair trade must be integrated into academic and vocational education programmes. The transition of the food sector towards agroecology will entail the development of a more coherent, complementary and consistent EU policy framework. Proper research funding is needed to trigger that transition of Europe's food systems.

Payments for public goods and services, such as climate protection, biodiversity, and intact bodies of water, can contribute to farm incomes.

Farmers will be able to make their own decisions voluntarily and from an entrepreneurial perspective. In contrast to typical agricultural products, environmental services do not have a direct market value as part of the agricultural production. It is nevertheless possible to put a price on these public goods based on an evaluation of the economic implications of specific measures on individual farms.[13]

[12] Research for agri committee 2017. The consequences of climate change for EU agriculture: follow-up to the cop21 - UN Paris climate change conference. Ip/b/agri/ic/2016-20, february 2017.
[13] More information at: www.lpv.de/fileadmin/user_upload/PP_Gemeinwohlpraemie_FIN_EN_web-neu.pdf

RECOMMENDATIONS FOR FARMERS' ASSOCIATIONS, FARMERS AND ADVISORS

- Take advantage of different policy support measures that exist for the uptake of more environmentally sound and climate-friendly practices. In the EU for example, there are 118 national and regional Rural Development Programmes for the period 2014-2020, which offer farmers incentives or educational schemes for climate action.

- Support the development of new agricultural policy instruments that can stimulate the uptake of agroecological practices and help farmers pursue the transition towards sustainable farming systems. These instruments should encourage more climate-friendly and environmentally appropriate practices, reduce negative externalities and promote the long-term resilience of farms by reducing their costs and their dependency on external inputs.

RECOMMENDATIONS FOR RESEARCHERS

- Develop methods to optimize the assessment of multifunctional agriculture and food production systems and prevent a silo mentality, as focusing solely on climate change mitigation would run the risk of a further industrialisation of European agriculture, with environmental trade-offs and the loss of farmers' livelihoods.

- Concentrate on measuring the multiple impacts of farming, in order to capture the full range of farms that produce diverse outputs and deliver a wide range of environmental and social benefits on and off the farm, rather than measuring single criteria such as GHG emissions per kilogramme of product, which tend to favour "efficiency" approaches, high-input and large-scale industrial monocultures and livestock systems.

RECOMMENDATIONS FOR POLICYMAKERS

- Ensure a high level of political ambition for climate action in the agriculture sector at European and national level until 2030. This can contribute to the effective implementation of the Paris Agreement on Climate Change. It includes setting ambitious targets for reducing non-CO_2 emissions from agriculture, such as methane and nitrous oxide, as well as CO_2 emissions from croplands and grasslands.

- Set up long-term national plans running until 2050 promoting climate action in the agriculture sector, to help countries identify specific, feasible pathways to a low-carbon economy, based on their national particularities. Establishing long-term plans also helps determine short-term policies and facilitate a meaningful discussion between agri-food stakeholders about what long-term decarbonisation implies. Long-term plans should include the contribution of soil carbon sequestration (e.g. on well-managed grasslands), and of demand-side measures, such as raising awareness about sustainable diets, reduced consumption of animal products and action to reduce food waste.

- Develop new agricultural policy instruments that enable farmers to transition effectively towards more sustainable farming systems, such as organic farming, by rewarding and incentivising those who deliver good environmental and climate-friendly outcomes. Since the Common Agricultural Policy accounts for 40% of the EU budget, there is huge potential to put sustainability at the heart of agricultural spending in order to support farmers' livelihoods and meet societal expectations – based on the principle of public money for public goods.

- The EU should engage in a food systems transition, similar to the energy transition, and shift agriculture towards agroecological approaches like organic farming and agroforestry. Many lock-in factors are preventing change in the dominant food system. From the local to the global level, policies need to be re-designed and better integrated. New farming systems are needed, based on ecological approaches, and new supply chains must be established, while innovation systems, including extension and education services, need to adapt. Only a properly funded EU flagship research programme will be able to make significant advances in the transition of Europe's food systems.

SUMMARY AND CLOSING WORDS

In producing this brochure, we aimed to explain how climate-friendly farming can be made economically viable and how to overcome other hindering factors, such as shortfalls of information on climate-friendly farming techniques and the lack of political support. In this way, we hope to contribute to a wider uptake of climate-friendly farming practices.

The main outcomes of the roundtable discussions can be summarized in five key areas:

1. Communication between all the actors involved in the agricultural value chain is vital. This means, for example, communication between farmers and consumers and between farmers and retailers, about both the benefits and the challenges that derive from climate-friendly farming. Improved communication can increase consumers' loyalty and their willingness to support climate-friendly farming through higher prices. The importance of communication might not always seem obvious, or it seems too time-consuming, but even a small investment can pay off.
2. Farmers' know-how needs to increase. Farmers, researchers and advisors should exchange their knowledge and experience. This will help to raise awareness about climate-friendly farming practices and their benefits, and it will make farmers more aware of the funding options that already exist for climate-friendly and environmentally friendly farming.

FIGURE 3
KEY ACTIONS FOR VIABLE CLIMATE-FRIENDLY FARMING

3. In several areas there is a need for more research or a different research focus. There should be more on-farm analysis of the costs and economic returns of climate-friendly farming, with a focus on the multiple impacts of farming rather than single criteria such as GHG emissions. New economic paradigms are necessary that penalize business models contributing to environmental degradation.

4. Different economic models should be explored. Using or setting up regional value chains, community supported agriculture and collaborative systems could help farmers communicate their climate-friendly practices more effectively to consumers. This, in turn, could help increase people's willingness to pay more for products. Moreover, a regional value chain might reduce the climate-change and economic risks faced by individual farmers.

5. A policy change is necessary. We need to develop new agricultural policy instruments that enable farmers to transition more effectively towards more sustainable farming systems, such as organic farming, by rewarding and incentivizing those who deliver good environmental and climate-friendly outcomes. At the same time, steps should be taken to encourage farmers to take advantage of measures that have already been put in place by national and regional governments in Europe.

Some of these measures can be implemented directly, while others are more long-term developments. If we are to achieve the ambition of economically viable and climate-friendly farming, many different actors in the agriculture sector must get involved, including researchers and policymakers.

As explained at the outset, agriculture needs a collaborative effort to reduce its share of greenhouse gas emissions – and organic farming can lead the way. We believe that projects such as SOLMACC, which are based on cooperation between farmers, advisors and researchers, can contribute to this.

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