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Transforming food systems with farmers

Pathways to a net zero, nature positive, and farmer resilient future

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Introduction: Food systems that support climate, nature, and people

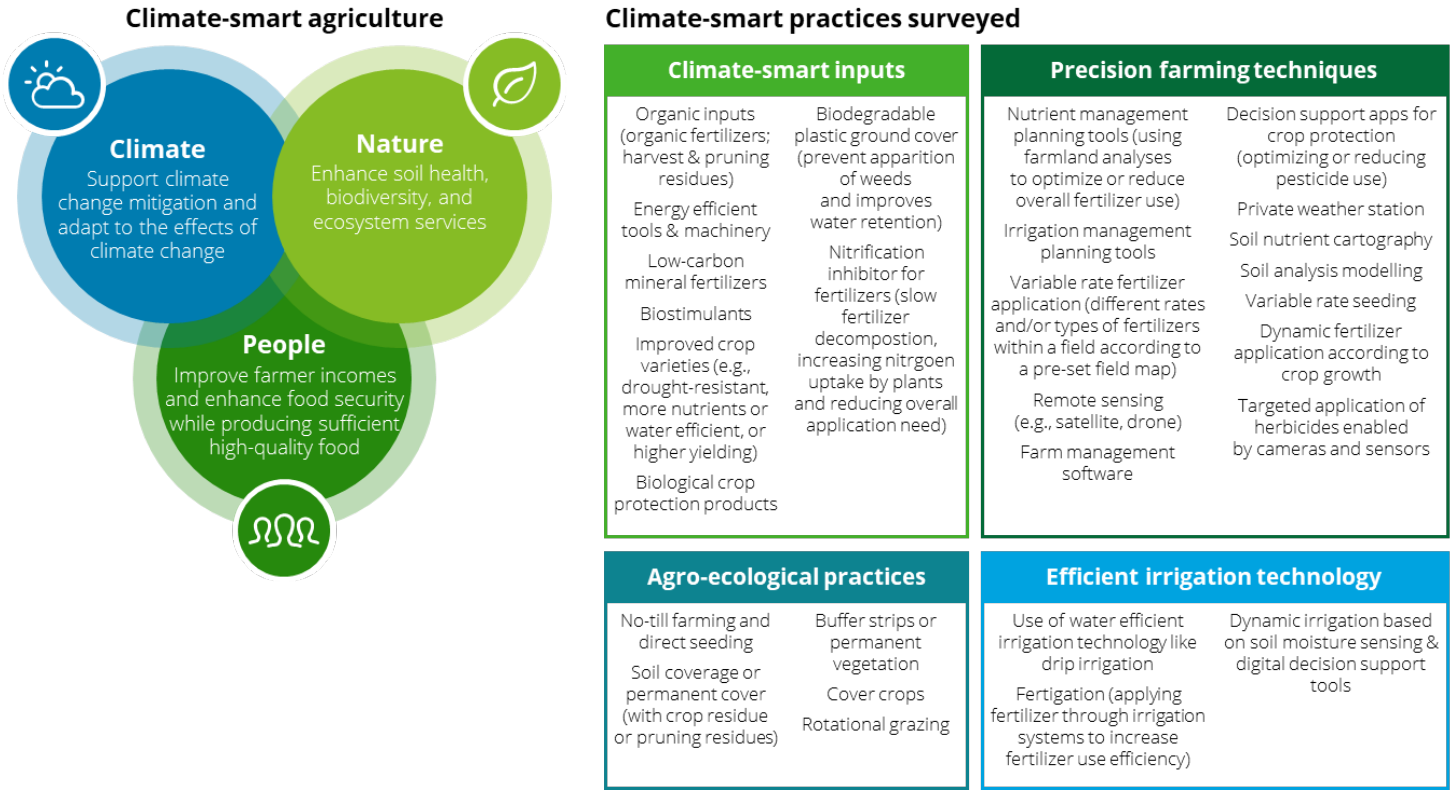
Food and agricultural systems are a cornerstone of society, nourishing the globe's people while contributing nearly a tenth of global GDP and employing more than 1.2 billion people worldwide.[1] [2] However, they are also major contributors to the growing climate and nature crises. Food and land use systems generate approximately one quarter of global greenhouse gas emissions, are the primary driver of biodiversity loss, and account for 92% of the global water footprint.[3] [4] [5] Furthermore, food systems are inequitable. One third of all food produced is wasted while nearly 10% of the global population remains hungry, and 65% of the world's poorest people are farmers.[6] [7] [8]

Fortunately, sustainable food and agriculture practices can reverse these trends. When sustainably managed, food systems can feed the world while revitalizing critical habitats, restoring soil health, mitigating climate change, and providing fair livelihoods for farmers.[9] Specifically, a set of proven and readily available practices such as no-till farming, cover crops, precision nutrient management, and efficient irrigation can restore soil health, sequester carbon from the atmosphere, and increase farmer resilience.[10] [11] These practices – referred to here as "climate-smart" – have the potential to transform global food production.

While many business leaders, NGOs, and policymakers are increasingly recognizing climate-smart agriculture as a critical opportunity for reaching global climate, nature, and food goals, these practices have yet to be adopted at scale. Too often, farmers lack the appropriate education, policy, value-chain, and consumer mechanisms needed to incent and support their transition from conventional to climate-smart production. For farmers who do transition, any changes at the farm level are unlikely to last if not supported by demand signals and financing for more sustainably produced products. Lasting change will require multistakeholder collaboration to reshape food systems. Namely, public-private partnerships that convene actors from across the food and agriculture value chain can help develop and scale coherent action and cost-effective innovations in a way that exceeds what any single actor can accomplish.

This report is the product of a broader collaboration between the World Economic Forum and Deloitte to accelerate and scale the adoption of climate-smart agriculture across the globe. The initiative, called 100 Million Farmers, is a multistakeholder platform catalyzing action to transition to net zero, nature positive, and farmer empowering food systems by 2030 through pre-competitive coalitions around the world. The platform's first coalition, the EU Carbon+ Farming Coalition, consists of 14 corporations, NGOs, and academics, in consultation with farmer organizations. This report highlights the findings of a survey conducted by the EU Carbon+ Farming Coalition and administered to 1,600 farmers across seven countries and six crops in the EU. The report uses the EU as a case study to explore what it would take to reshape food systems to support climate-smart production and what the impact of these practices could be if scaled throughout the region. While the data points are specific to the EU, the broader themes are consistent for most farmers around the world. Therefore, these learnings can be used to scale the global adoption of climate-smart agriculture. **Our analysis finds that if an additional 20% of EU farmers adopted climate-smart agriculture by 2030, the EU could reduce its annual agricultural greenhouse gas emissions by 6%, improve soil health on 14% of agricultural land, and put between €1.9 and €9.3 billion in farmers' pockets annually.**

Figure 1: 28 climate-smart practices that can help improve outcomes for climate, nature and people were included in the scope of the farmer survey

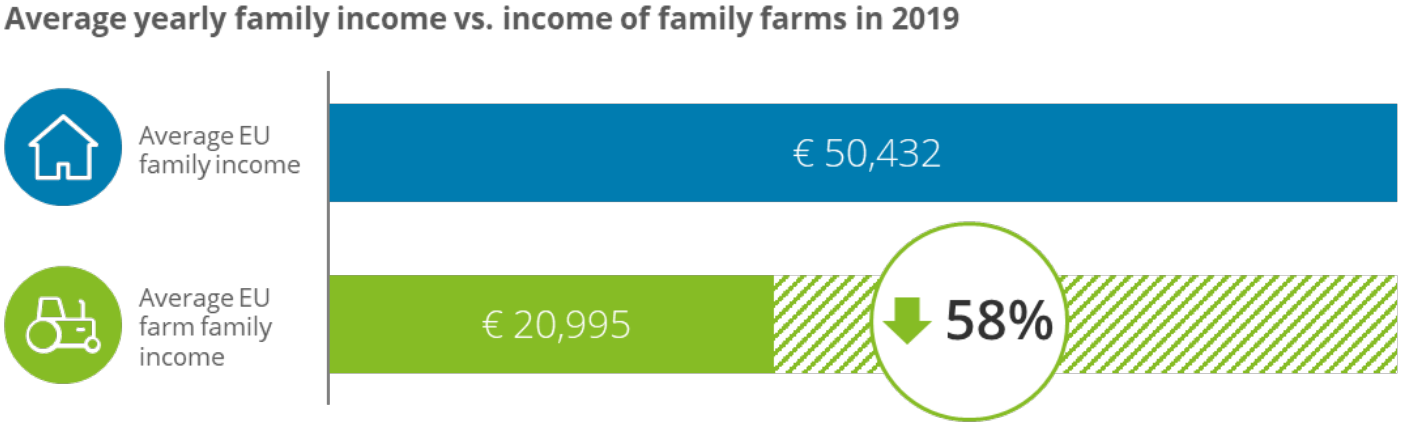


The state of climate-smart agriculture today: EU case study

Farm economics

Being a farmer in the EU is economically challenging. An average farming family in the EU earns just €20,995 per year, 60% below the average EU family wage of €50,432, and over two thirds of farms in the EU earn €8,000 or less.[12] [13] [14] As price takers in a commodity market with declining prices, farmers capture a small portion of the total profit from food relative to other actors in the value chain, such as consumer-facing brands.[15] On top of this, farmer income is highly volatile, with annual price swings of 40% or more driven by increasingly extreme and unpredictable weather events, and most farmers lack the appropriate insurance products and other financial instruments needed to help mitigate this risk.[16]

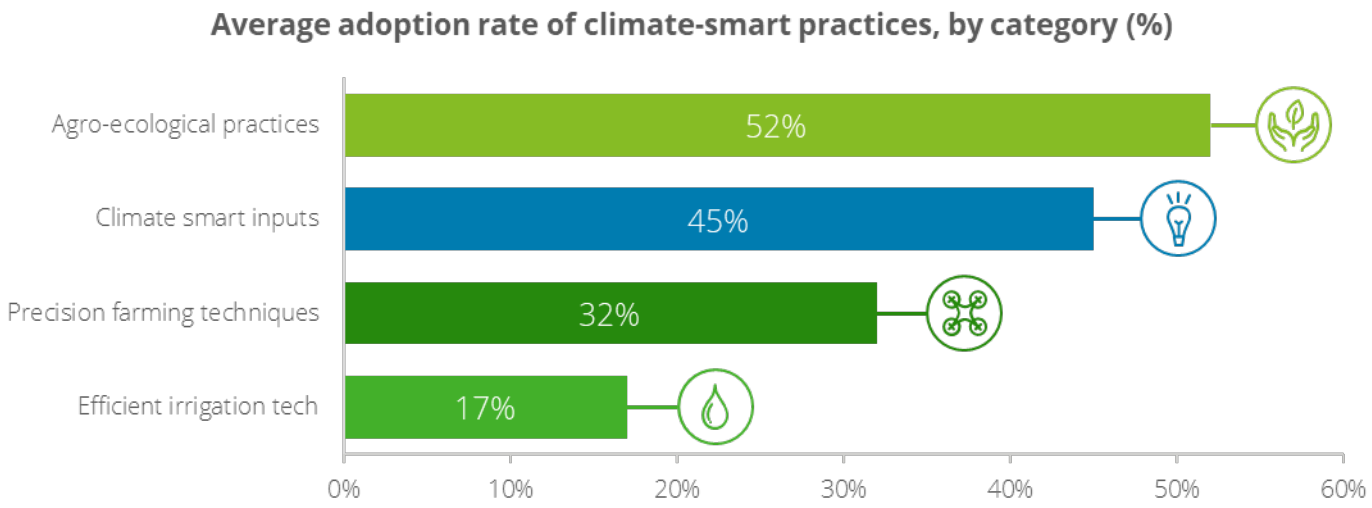
Figure 2: An average farming family in the EU earns nearly 60% less than the average non-farming family



Sources: Farm Accountancy Data Network, Eurostat, World Economic Forum

Farmers across all countries surveyed cited initial investment costs as the top barrier to climate-smart practice adoption. Low and volatile incomes lead to a lack of capital to support the upfront costs required to adopt new practices. As a result, just 42% of surveyed farmers had adopted three or more climate-smart practices. While these upfront costs are often low, they are still prohibitively high for most farmers who live paycheck-to-paycheck to support their families. **In the long run, climate-smart practices typically yield higher profits for farmers but require a payback period of approximately two to four years to break even on the investment, depending on the practice.**[17] [18] [19] Climate-smart agriculture has the potential to boost farmer profits – their top stated motivation in the survey – but most farmers simply cannot afford to make the transition.

Figure 3: Adoption rates vary across categories, with higher adoption for lower-tech and lower-cost practices

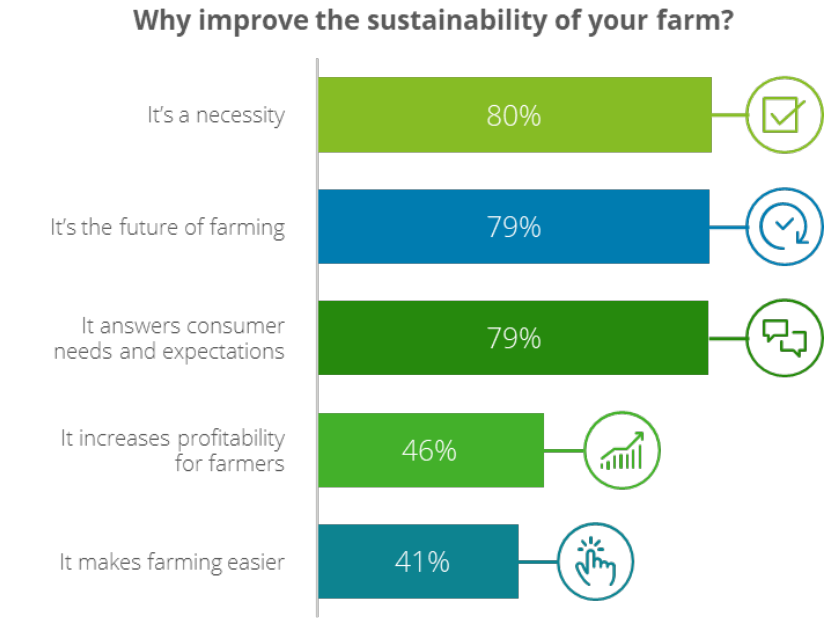


Source: Farmer survey

Awareness and knowledge

After initial investment costs, lack of knowledge or available information was farmers' second most cited barrier to practice adoption. **70% of farmers reported having searched for information on climate-smart farming, demonstrating an interest in the area, yet only one out of four reported having a "good" or "very good" knowledge of the subject** due to insufficient and unreliable information. Farmers receive information from an overwhelming number of channels, including input providers, cooperative advisers, public institutions, retailers, agricultural press, private advisers, and other farmers, often with insufficient or conflicting messages. As a result, 39% of surveyed farmers are dissatisfied with the information they receive, and 31% of farmers cited improved information sources (reliable and high-quality) as their primary preferred incentive for climate-smart practice adoption.

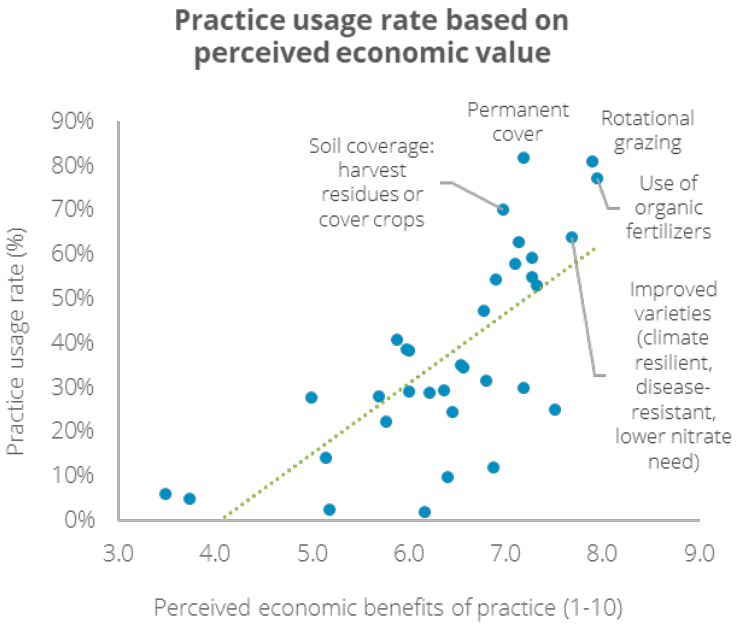
Figure 4: Farmers feel the social pressure to transition to climate-smart agriculture, but not all see the business case



Source: Farmer survey

Poor information hurts farmers' perception of the economic benefits of climate-smart agriculture, which significantly limits adoption. **Although four out of five farmers view climate-smart agriculture as a necessity and the future of farming, fewer than half believe it increases profits**, despite a wealth of data that links climate-smart practices to increased profits. For farmers, perceived economic gain is critical. **On average, for every 10% increase in farmers' perception of economic benefits, the adoption of that practice increased by 16%** (R^2 greater than 0.5). Practices with positive economic perception scores of more than 7 out of 10 were adopted by 60% of farmers, compared to just 6% adoption of practices with scores lower than 5.

Figure 5: Farmers are significantly more likely to adopt a practice if they think it will help them improve their bottom line

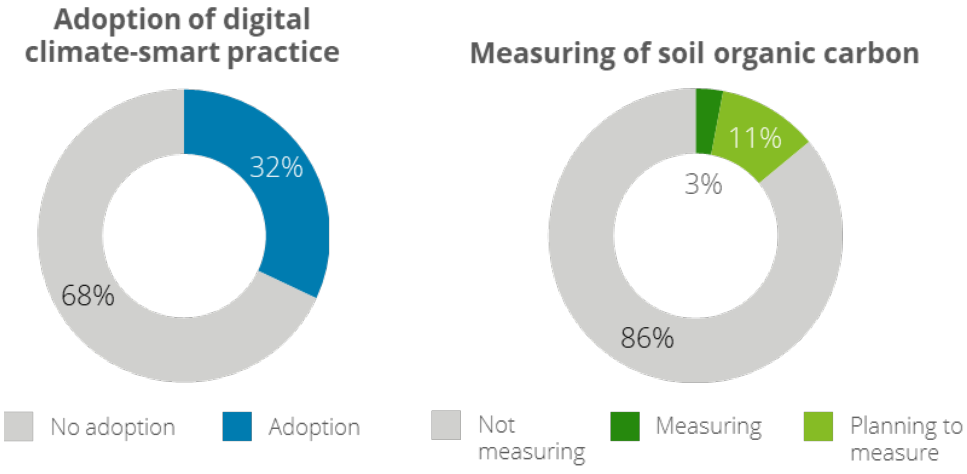


Source: Farmer survey

Data and technology

Digital climate-smart practices are critical for the transition to climate-smart agriculture. Tech-enabled precision agriculture, when paired with more traditional practices such as cover crops or natural buffer zones, can reduce the environmental impact of agriculture while improving productivity. These digital practices, such as farm management software, satellite or drone monitoring, and decision support technology for input and water use optimization, can deliver a variety of benefits to farmers.[20] Benefits range from improved productivity and crop quality to more efficient operations, reduced input usage and costs, lower environmental impact, and adaptation to climate change.[21]

Figure 6: Adoption rate of digital climate-smart practices is low, at 32%, and only 3% of farmers currently measure soil organic carbon



Source: Farmer survey

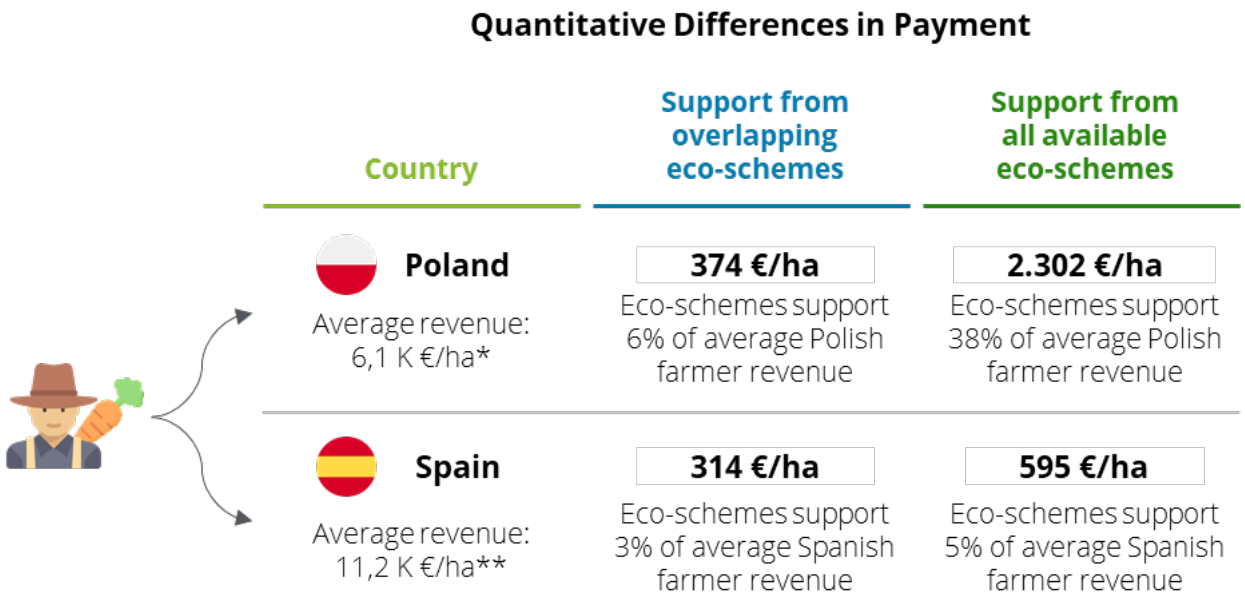
Despite their potential for impact, digital practices were adopted by just 32% of farmers, compared to 45% adoption for other climate-smart practices. Adoption of digital measurement tools is even lower, with just 3% of farmers measuring soil organic carbon and 11% planning to measure in the future. These low adoption rates are driven primarily by financial and educational barriers. The lagging adoption of digital practices is concerning for compliance with measurement, reporting, and verification (MRV) programs that connect farmer compensation to data proving farm sustainability performance, such as carbon credit programs.

Policy

The European Commission is set to launch a new Common Agricultural Policy (CAP) in addition to a suite of other policy initiatives aimed at promoting climate-smart practice adoption. CAP aims to do so through conditionality, a set of do-no-harm requirements farmers have to respect to receive CAP funds, and eco-schemes, which pay farmers for taking actions that are beneficial to the environment, such as soil restoration or reduced pesticide use. However, the fragmentation and flexibility in national implementation plans will likely drive market distortions, hinder farmer access, and limit the ability for solutions to scale.

From 22 draft strategic plans analyzed across 21 member states, 166 different eco-schemes were identified, creating a lack of standardization that will likely slow overall progress on environmental and social objectives. Payment modalities vary greatly between member states; while Spanish farmers will receive a flat rate for each individual practice they adopt, Dutch farmers will be rewarded proportionally for their efforts based on a multidimensional eco-scheme with a point-based system. Discretion in funding could lead to eco-schemes accounting for 40% of Polish carrot farmers' income compared to just 5% of Spanish carrot farmers' income. The EU is also preparing for carbon markets through policy initiatives focused on improving MRV, but currently only 3% of EU farmers cited measuring organic carbon despite 50% of surveyed farmers being interested in carbon markets.

Figure 7: Differences in reward structures for eco-schemes across EU member states could lead to farmers receiving significantly different compensation for applying the same practices



* Considering average price 0,2 €/kg (Polish gov data) and average yield 30,6 Tn/ha (quantitative survey)

** Considering average price 0,1783 €/kg (Spanish gov data) and average yield 63 Tn/ha (quantitative survey)

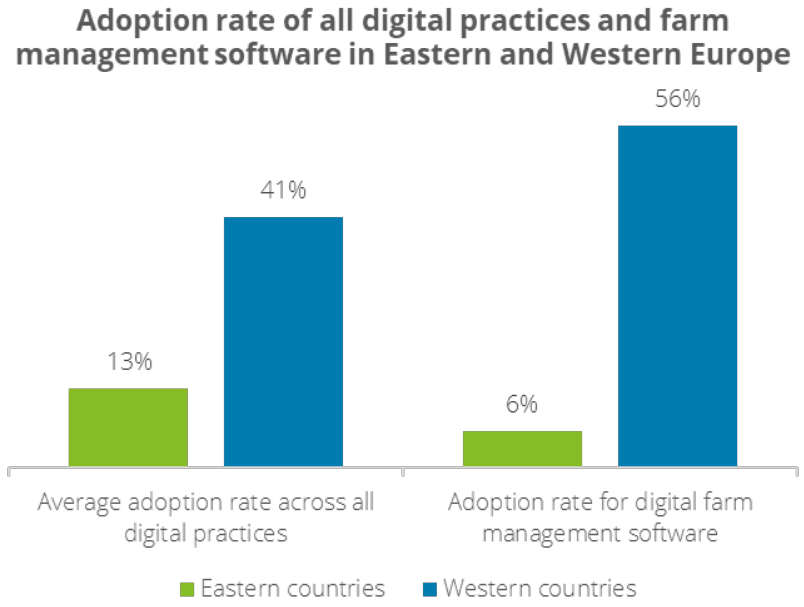
Source: Polish Second draft Strategic Plan (July 2021); Spanish Proposal for Eco-schemes (October 2021); German Draft for intervention profiles (May 2021); Italian draft for eco-schemes (October 2021); French Strategic Plan Draft (September 2021); Dutch proposal por eco-schemes (October 2021)

Farm diversity

EU member states vary significantly in terms of number of farms, farm sizes, income per farm, and crops produced. While many types of solutions will be consistent across geographies, specific solution design and implementation will need to be tailored to these demographic and operational nuances, while still aiming for cost-effectiveness.

Western European farms tend to be larger and more profitable than Eastern European farms, in addition to being cooperatively owned and engaging in more technology-based agricultural practices. Eastern European farmers tend to search for information on climate-smart farming less and rely more on farmer-to-farmer learning, while Western European farmers search for climate-smart farming through more formalized channels such as the agricultural press and cooperative advisers. **Western and Eastern Europe also exhibit a digital divide, with 41% of Western European farmers using digital tools compared to just 13% among Eastern European farmers**, and 56% of Western European farmers using digital farm management tools compared to just 6% of Eastern European farmers.

Figure 8: A digital divide exists between Eastern and Western Europe, with significantly higher adoption of digital practices in Western Europe



Source: Farmer survey

These local contexts are particularly relevant for the application of these learnings outside of the EU. While economics, information, data and technology, and policy are consistent themes for supporting farmers around the globe, specific needs and applications of these solutions vary significantly by region.

The path forward: Opportunity spaces to accelerate the transition to climate-smart agriculture

The transition to climate-smart agriculture represents an enormous opportunity for business, governments, and farmers. If just an additional 20% of farmers adopted climate-smart agriculture in the EU by 2030, annual agricultural greenhouse gas emissions could be reduced by 6%, soil health could be improved over 14% of the EU's agricultural land, and farmer livelihoods could be enhanced by between €1.9 and €9.3 billion annually. The lower financial bound includes just operational profit, while the upper bound also includes the impact of non-operational profit drivers such as subsidies, carbon credits, and price premiums. On a global scale, these impact numbers could be game changing for climate, nature, and people.

To achieve this potential, public and private sector players from across the food value chain must work together to build a stronger economic case for the transition and address the complex and interconnected challenges faced by farmers. Four solution pathways, when pursued in a mutually reinforcing way, hold the potential to reshape food system practices and outcomes to drive towards a net zero, nature positive, and farmer resilient future.

Four solution pathways

Financing and risk management

Diverse financial mechanisms can help provide farmers with the capital and risk management needed to adopt and sustain climate-smart practices.

- **Innovative, stackable finance and insurance products** can reduce farmers' financial barriers to climate-smart practice adoption by providing optimal maturities, interest rates, guarantees, and risk-sharing models.
- Retail and trader **procurement guidelines**, combined with **long-term purchase agreement guarantees**, can help steer demand and generate price premiums for climate-smart products, much like the organic market today.
- **Carbon credits** and other forms of **ecosystem service payments** offer additional revenue streams for farmers.

Innovation ecosystems

All the solutions needed to create net zero food systems at scale do not exist yet, but breakthroughs in technology and cost reduction can help close the innovation gap.

- **Digital farm management tools** for precision agriculture take the guesswork out of fertilizer and water use to boost yields while reducing input costs.
- **Advanced breeding techniques can help develop new crop varietals** that are less vulnerable to drought, pests, and disease.
- More **cost-effective and accurate measurement**, reporting, and verification (MRV) tools create the **value chain traceability and transparency** needed to enable price premiums, carbon credit payments, and other outcome-based payment schemes.

Education and awareness

Building widespread agreement on the business case for climate-smart agriculture and teaching the technical skills to execute these practices is essential for adoption at scale.

- Farmers would benefit from more accessible and segment-specific information that **clarifies the expected ROI, time, capital, skills, and resources required** to implement specific practices.
- User-friendly **knowledge sharing platforms**, **peer-to-peer learning**, and **local on-farm demonstrations** can help build farmer trust to drive widespread learning for technical execution.
- **Consumer-focused awareness** is also critical for shaping the demand needed to sustain these practices.

The policy environment

Farmers and value-chain players should be supported by an enabling environment that incentivizes the transition to climate-smart agriculture.

- Changes to CAP should **improve farmer subsidy access, reduce market distortions, encourage private sector investments, and clarify messaging to consumers**.
- Globally, policymakers can learn from the EU regarding the importance of **subsidizing climate-smart practices** that **create widespread public benefits** such as public health, a stable climate, and clean water.
- Private sector actors can help drive change by **advocating for these reforms** and signaling their readiness to transition.

From ideation to implementation

Ideas and understanding are only as good as their implementation. Based on the insights generated through the farmer survey, the EU Carbon+ Farming Coalition is committed to working with farmers to demonstrate the feasibility and impact of solutions across these four key intervention areas through demonstration flagship pilots. Driving meaningful progress against global goals related to climate, nature, and people will require similar public-private partnerships within food systems around the world. While the statistics and local contexts vary by region, these learnings from the EU can help accelerate the urgent action needed to create global food systems that support climate, nature, and people.

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