

POLICY BRIEF

PART III: CONCLUSIONS AND POLICY RECOMMENDATIONS

CONCLUSIONS

Next-generation Solar Thermal Energy (“**STE**”) systems offer a promising solution for a greener future and can contribute significantly to achieving the EU's Green Deal targets. The ICare4Farms project has demonstrated the potential of STE systems to provide sustainable and cost-effective energy for agriculture, making it more energy-efficient and reducing its environmental impact.

However, further advancements are needed for its full potential to be unlocked. This requires investment in research and development and public funding to make STE technology more attractive than fossil fuels and encourage its adoption across Europe. Coordination and coherence between policy measures and a culture of collaboration and knowledge sharing between governments, businesses and other stakeholders are key to scale up initiatives like STE systems and ensure their long-term success and sustainability, ultimately leading to a brighter and more sustainable future for Europe. Standardisation, building capacity among farmers and other stakeholders and investment in these initiatives are also vital for achieving desired outcomes.

Overall, we believe that the development and adoption of next-generation STE systems in agriculture has the potential to drive the growth and development of the agricultural sector while contributing to the achievement of the EU's goals for reducing greenhouse gas emissions, improving energy efficiency and promoting sustainability. To achieve this, governments must take proactive steps to support innovation in the agriculture sector and promote the adoption of Renewable Energy (“**RE**”) technologies and policymakers in North West Europe must prioritise the funding and development of RE technologies in agriculture, including next-generation STE systems.

POLICY RECOMMENDATIONS

This section presents our 10 policy recommendations for policy-makers to support RE and innovation in agriculture, focusing on boosting the roll-out and uptake of next generation STE solutions in agriculture in North West Europe. These recommendations cover six different thematic areas:

I. Financial support:

- (1) Providing funding and financial incentives.
- (2) Ensuring coordination and coherence in funding mechanisms.

II. Technology improvement:

- (3) Unlocking the potential of STE in agriculture: the need for continued research and development.
- (4) Accelerating sustainable technology solutions in agriculture through collaborative innovation.

III. Training and technical support:

- (5) Capacity building: providing continuous training and technical assistance.

IV. Common standards for performance across the European Union (EU):

- (6) Standardising certification processes.
- (7) Simplifying administrative procedures.

V. Networks and partnerships:

- (8) Promoting incubators and accelerators.
- (9) Connecting borders: building a culture of collaboration and exchange of knowledge.

VI. Information campaigns:

- (10) Initiating educational programs and awareness campaigns.

I. FINANCIAL SUPPORT

1) PROVIDING FUNDING AND FINANCIAL INCENTIVES

- **Introducing and developing tailored financial instruments for STE**, such as green bonds, guarantees, and risk-sharing mechanisms, to facilitate access to finance for STE projects, especially in rural and remote areas where financing is scarce.
- **Providing financial incentives to encourage farmers to adopt STE systems**, such as tax credits, grants, subsidies, loan schemes and reduced rates on energy products. For instance, financial support to cover the costs of installing RE systems, tax incentives for RE installations and/or low-interest loans to support the installation of RE systems could be effective measures to encourage the adoption of STE systems. Additionally, tax exemptions could be offered to incentivize RE investments, such as investments in energy-efficient technologies and RE sources, or support schemes such as the Renewable Heat Incentive (RHI) existing in the UK which provides payments to eligible households and businesses for every kilowatt-hour of heat produced from renewable sources.
- **Increasing the funding for STE pilot projects** that demonstrate the feasibility and effectiveness of STE systems in different agricultural settings, and support their replication and scaling up across the region.
- **Increasing the funding to support the actors involved in the roll-out of STE systems**, which may include organising demonstration events, monitoring activities, forming farmer groups and other related efforts.

Overall, ensuring that financial incentives are easily accessible, with simple requirements and intuitive administrative procedures, and attractive enough is crucial for encouraging farmers to adopt RE and increase the contribution of agricultural sector in achieving the EU Green Deal's goals. Nonetheless, there are some crucial considerations to keep in mind:

- **Linking public financial support to the goal of reducing CO2 emissions and decreasing reliance on fossil fuels.** The granting of financial incentives should be made conditional on obligations to achieve results: reducing CO2 emissions and decreasing reliance on fossil fuels. In this sense, it is essential to ask for feasibility studies that determine the suitability of the STE system for a farm before providing funding, as it will be explained below. Thus, the incentive will only be useful if the study demonstrates that the system will be effective on the farm and contribute towards achieving CO2 goals. It is worth noting that currently, in some European countries SolarKeymark type certification for solar collectors (which assesses the quality of the component) is required to receive subsidies. The suggestion here is to eliminate this link between SolarKeymark certification and public financial support. Instead, public subsidies should be directly linked to the goal of reducing CO2 emissions and decreasing reliance on fossil fuels.
- **Feasibility studies.** The ICare4Farms (“I4F”) project has provided significant benefits to all parties involved, particularly through the development of a feasibility tool that offers farmers a crucial first step in determining whether to adopt STE systems. Feasibility studies should be conducted to determine the suitability of the STE system for a farm before providing funding. In this way, the incentive will only be useful if the study demonstrates that the system will be effective on the farm and contribute towards achieving CO2 goals. Additionally, it would be unfair for farmers to bear the cost of preliminary studies and quotes, which could become an obstacle to the roll-out. Thanks to the I4F project, farmers can access support from the online feasibility study tool. As for

on-site feasibility studies, it is also important to consider providing financial support in these cases to avoid imposing costs on farmers.

- **Supporting “early adopters” of new technologies and linking public support to the reduction of fossil energy consumption (obligation of result).** It is important to strike a balance between supporting innovation and funding “early adopters” who take on more risk. To achieve this, early adopters should receive substantial funding covering over 80% of costs (e.g., substantial public aid covering 80% of the costs should be provided for the first two or three pilot sites in each European country).

When the technology has successfully entered the market, funding should be limited to under 30% to incentivise adoption without discouraging private investment. Public support should be seen as an additional benefit, not the primary source of funding. Funding mechanisms should aim to support innovation while maintaining a fair balance between public support and private investment. Excessive support directed towards mature technologies can harm the development of solar thermal innovations in Europe. Therefore, public support should be distributed widely to all initiatives aimed at reducing CO2 emissions, as long as it is financially feasible, while limiting aid to avoid disrupting the market. In addition, suppliers of STE systems should be accountable for the performance of their products by committing to an annual energy savings value that they ensure to their customers. This way, public support for these systems will be tied directly to their ability to effectively reduce fossil energy consumption, rather than just being tied to the installation of the system itself.

Overall, these measures can help Europe become a hub for innovative ideas in the RE sector, leading to a cleaner and more sustainable future. It is important to recognize the contributions of these initiatives to CO2 savings through carbon credits or green loans from banks. By implementing these recommendations, Europe can foster a more sustainable energy system and reduce its reliance on fossil fuels.

2) ENSURING COORDINATION AND COHERENCE IN FUNDING MECHANISMS

- **Ensuring coordination and coherence in funding mechanisms for RE and innovation in agriculture,** including the European Recovery Plan, the Common Agricultural Policy, and the Farm to Fork Strategy, to achieve the EU's climate and energy targets more effectively.
- **Coordinating funding efforts across different agencies and levels of government to ensure that funding is allocated effectively and efficiently** to support the adoption of STE systems and other RE technologies.
- **Ensuring equitable access to funding and financial incentives.** This includes making adjustments based on the different starting points and capacities of each Member State, as well as taking into account the specific circumstances and needs of the most vulnerable individuals and businesses. By providing fair and inclusive access to funding and incentives, authorities can help to promote a more sustainable and equitable transition to a greener future.
- **Providing farmers with clear access to information about available funding opportunities.** This includes providing guidance on how to apply for funds, as well as clarity on eligibility criteria and application procedures. By ensuring that information is readily available and accessible to all farmers, authorities can help to ensure that funds are distributed in a fair and transparent manner, and that farmers are able to apply to the funding programs that suit best to their needs. To achieve this, here are two suggestions:

- a. **Information platforms.** In order to support farmers in accessing available funding for their operations, it is recommended that relevant public authorities implement an information platform, such as a website, which provides clear and comprehensive information on the different levels of available incentives, including national, regional, and county-level programs. Such a platform would enable farmers to easily access information on funding opportunities that are available in their specific region, allowing them to make informed decisions about which programs may best suit their needs.
- b. **Joint offices.** The multiplicity of funding schemes and the complexity of application procedures are often disruptive for farmers and therefore an obstacle for STE roll-out. This situation highlights the need to simplify the processes involved in farm funding, ensuring equal access to funding and financial incentives for all farmers.

In order to improve the accessibility and coordination of available funding for farmers, it may be beneficial to establish joint offices or “one-stop shops” (« *guichet unique* »). These offices would serve as centralised hubs, providing farmers with advice on funding and application procedures, while also centralizing and coordinating all relevant information. This approach would help to reduce the need for farmers to approach multiple authorities for information on funding, while also ensuring that the information they receive is consistent and aligned across all levels of government. By simplifying the process and providing a more cohesive approach to funding, joint offices could make it easier for farmers to navigate available funding options.

II. TECHNOLOGY IMPROVEMENT

3) UNLOCKING THE POTENTIAL OF STE IN AGRICULTURE: THE NEED FOR CONTINUED RESEARCH AND DEVELOPMENT

- **Investing in research and development of next generation STE solutions.** The I4F project has demonstrated the potential of STE in agriculture. It has been shown that STE can significantly cut costs for farmers while also reducing negative impacts on the environment. Storage of hot water is also easier with STE systems, both in tanks and in the ground, compared to other energy systems. To further advance STE technology, additional research and development is necessary. For instance, the integration of the solar thermal system with various types of farm uses and the development of phase-changing materials for heat/thermal energy storage can greatly improve STE efficiency. Additionally, the I4F project has tested the technology in pilots and has shown that it can be scaled up to other countries. Further research could expand the work done by I4F, including larger-scale implementation, use in other industries such as brewing, and heat-loops for housing. Therefore, investing in research and development would enable STE technology to become more attractive than fossil fuels, driving wider adoption and reducing carbon emissions.
- **Incentivising research and development of next generation STE solutions.** One of the key recommendations for advancing STE technology is to provide incentives and funding for research and development. This investment in innovation is essential for creating more efficient, cost-effective, and scalable solutions that will benefit all stakeholders. Public funding is crucial for this effort, as it serves the common interest and helps drive wider adoption of STE systems across Europe. Building on the experience of successful STE projects such as Fengtech and I4F, future research could focus on improving upon existing technology to create the next generation of STE solutions. As it has been seen in the previous point, this could involve integrating solar thermal systems with various farm uses and developing heat/thermal energy storage, such as phase-changing materials. Incentivizing this research and development will encourage more companies

to conduct research in STE systems within Europe, ultimately leading to the creation of new innovative companies and the improvement of RE technology in Europe.

4) ACCELERATING SUSTAINABLE TECHNOLOGY SOLUTIONS IN AGRICULTURE THROUGH COLLABORATIVE INNOVATION

Another recommendation is to **encourage collaborative innovation and foster partnerships and cooperation among diverse stakeholders at the local or regional level**, including farmers, energy companies, local authorities, research institutions and civil society organisations, in order to accelerate the development and roll-out of sustainable technology solutions in agriculture. By promoting knowledge sharing, innovation and best practices, these partnerships can support the success of STE deployment in the agricultural sector. One potential approach for facilitating this collaboration is the establishment of innovation hubs. These hubs can serve as platforms for sharing knowledge, expertise and technology among stakeholders from various sectors, bringing together diverse perspectives and expertise. Innovation hubs can promote cooperation across different sectors and accelerate the development of new solutions.

For instance, the I4F project has benefited from a hub at the project level, which facilitated the sharing of experiences among stakeholders. Furthermore, the SmartAgriHubs project has established a platform that links companies to the field and enables them to receive feedback throughout the development of the technology. This enables companies to ensure that end-users will be satisfied when the technology is finally ready for deployment. It is a practical way for companies to stay in touch with farmers throughout the development process.

III. TRAINING AND TECHNICAL SUPPORT

5) CAPACITY BUILDING: PROVIDING CONTINUOUS TRAINING AND TECHNICAL ASSISTANCE

Another recommendation is to prioritise capacity building as it plays a crucial role in the effective implementation of technology in the agricultural industry. This includes:

- **Providing comprehensive training programs.** Training is an important component of capacity building in the adoption of STE systems among farmers and other stakeholders involved in the process to ensure they have the necessary knowledge and skills to use the technology effectively. This includes providing education initiatives and training programs aimed at increasing understanding and adoption of STE systems, as well as encouraging the formation of cooperatives and communities that can pool resources and expertise.

Particularly, training should be provided to technical personnel and agricultural advisors, who are the main actors supporting and talking every day with the farmers. For example, in the context of the project I4F and STE systems, there have been staff actively involved in providing training and support to farmers and advisors since the beginning of the project, as well as providing ongoing support for the monitoring of the pilot site. Other members have provided training for installers to ensure that they are equipped with the necessary skills and knowledge to effectively install and maintain STE systems. This type of technical training is necessary for the successful implementation and maintenance of STE systems, particularly for plumbers and other technical personnel who play an important role in the installation process.

Additionally, training should be provided to students at an early age. One suggestion for expanding the training initiatives for STE systems is to include this practical training for new STE system in plumber's schools and agricultural schools for young farmers. It is important to educate the next generation of farmers on the issue of energy and the importance of adopting STE technologies in agriculture. While some schools may already have training programs on this topic, it is necessary to ensure that all schools in the NWE region offer such training. Also, it is useful to promote early adoption of STE systems. For example, during a visit to SPACE within the context of the I4F project, we met with students at the Master's level in France, but it is also important to provide training to students aged 16-20.

Finally, to enhance the adoption of STE technologies, there is a need to increase the coverage of such technologies in the training courses offered by universities and other higher education institutions. Although some training courses currently include STE, the content covered represents only a small fraction of the overall curriculum. Therefore, there is a need to expand the proportion of training materials and resources devoted to STE technologies in order to better equip students with the skills and knowledge necessary to effectively utilize these technologies.

- **Offering advice and technical support.** Another important aspect of capacity building in the adoption of STE systems is the provision of advice and technical assistance to help individuals, farmers and companies adopt RE technologies. Specifically, establishing a STE system design office (bureaux d'étude) is recommended to provide technical assistance and support in the application and calculation of individual systems. This support is particularly vital for larger factories, which often require more complex system designs.

Nowadays, France, Ireland, Belgium, the UK, and the Netherlands provide technical assistance through various agencies such as ADEME, the Department of Agriculture, Food, and the Marine, AFSCA, DEFRA, and LNV. Additionally, there are programs providing advice on these topics to farmers and other stakeholders. In Belgium, for example, there is a program called "huisdokter" which provides individuals with an energyscan and advice on energy-saving and production. Similarly, Boerenbond has performed a significant number of energyscans to provide advice on these topics to farmers and other stakeholders. This type of individualized support and advice is critical in promoting the adoption of STE systems and ensuring their long-term success and sustainability.

- **Ensuring access to documentation.** In terms of documentation, it is important to ensure that training organizations have access to the necessary materials, and they should be provided in English. For instance, it is important to ensure that there is sufficient documentation available for the construction of STE panels, including technical drawings. This will help to ensure that they are able to effectively train individuals and communities on the implementation and maintenance of STE systems.
- **Disseminating information.** Finally, ensuring that information flows to all facilitators and individuals who have the potential to disseminate and multiply knowledge about STE systems is critical. This includes engaging farmers and other stakeholders with STE systems as ambassadors to promote wider adoption, as well as providing technical assistance to help individuals, farmers, and companies adopt RE technologies.

From farmers and technicians to government officials and policymakers, capacity building must be a continuous process that keeps pace with evolving technologies and changing needs in the sector. In this way, we can ensure that agriculture technology is being used to its full potential, and that it is contributing to sustainable and equitable growth in the sector.

IV. COMMON STANDARDS FOR PERFORMANCE ACROSS THE EU AND SIMPLIFICATION OF ADMINISTRATIVE PROCEDURES

6) STANDARDISING CERTIFICATION PROCESSES

This recommendation is about certification and labelling for sustainable technology in agriculture, including Solar Thermal Energy systems. This includes:

- **Establishing certification and standardisation processes to ensure consistency across the EU,** making data comparable and usable across the region. By establishing a certification and labelling scheme for sustainable technology in agriculture, common standards can be set for performance, reliability and safety. This will provide guarantees to end-users and investors about the quality and environmental efficiency of the systems.
- **Clarifying criteria for certification on the basis of quality and environmental efficiency.** To make it easier for companies to get certified for sustainable technology STE systems, it's important to have clear criteria and guidelines for certification. This will give companies a better understanding of what is required for certification and help them adapt their technology to meet the criteria. If a technology doesn't meet the criteria, it needs to be changed.

It's important to note that the primary purpose of product certification should remain to indicate the quality of a product, similar to the AB mark for organic agricultural products. Regarding the quality of the product, in STE systems the risks of overheating and freezing must be effectively managed to ensure the safety and efficiency of the device. This responsibility falls on the suppliers of STE systems who must provide appropriate measures and equipment to prevent incidents from occurring. This obligation is crucial to maintain the safety of the people and equipment involved in the system.

- **Creating an official list of recognised certifications and funding authorities in each country throughout the EU.** Having a catalogue of available certifications and funding authorities will simplify the certification process by giving companies useful information, such as what are the requirements to get the certifications and who provides them (in France, for example, ADEME is the main organization that provides financial support and certification for STE).

7) SIMPLIFYING ADMINISTRATIVE PROCEDURES

- **Simplifying administrative procedures for STE installations.** In order to make it easier and more attractive for farmers and agro-businesses to adopt this technology, administrative procedures for STE installations should be modernised and simplified. This can be achieved by streamlining regulations and easing administrative burdens of STE installations, such as access to planning permits. For example, Ireland has implemented a shorter time period for obtaining permits and fewer area restrictions for STE installations.
- **Establishing common certification criteria.** The implementation of standardised certification criteria would allow farmers to obtain certification in one country and automatically qualify for equivalent certification in other countries. This approach would eliminate the need to go through the entire certification process for each country, saving valuable time and reducing costs.

- **Modernising the certification process at a European level.** Additionally, to ensure that STE systems are properly certified, it is important to modernise the certification process at a European level. Currently, the performance of a single collector is tested, rather than the performance of the entire system. By updating the certification process to include the overall system performance, farmers and agro-businesses will be better equipped to select the most efficient and effective STE systems for their needs.

As an example, the certification process for the Fengtech system within the I4F project was expensive and time-consuming. Modernising and simplifying the certification process at a European level, as recommended, could have made the certification process more accessible and affordable for the project and other initiatives, streamlining the process and encouraging the widespread adoption of STE systems.

V. NETWORKS AND PARTNERSHIP

8) PROMOTING INCUBATORS AND ACCELERATORS

The recommendation here is to **promote the development of incubators and accelerators** that support start-ups and entrepreneurs in the agriculture technology sector. These organizations can provide resources and support to help these companies bring new products and services to market, create jobs and contribute to the economic and social prosperity.

On the other hand, although STE technology has proven its efficiency, there is still room for innovation and improvement. Therefore, incubators can aid in fostering the emergence of new innovators and companies in the sector.

Depending on the local context, focus should be made on creating new incubators or enhancing existing ones by creating new partnerships with existing incubators at a regional level that focus on the same type of projects (in this case, energy-related). This can include joining innovative incubators that are already working on similar activities.

It may also be helpful to create a map of these incubators to better understand their reach and potential for collaboration.

9) CONNECTING BORDERS: BUILDING A CULTURE OF COLLABORATION AND EXCHANGE OF KNOWLEDGE

The next recommendation is to **foster a culture of collaboration and knowledge sharing between different stakeholders in the agriculture-technology sector at a European and international level.** This includes promoting partnerships and cooperation between different sectors, countries, businesses, technologies and other stakeholders in the agriculture-technology sector, such as farmers or universities.

At a European level, this could be achieved through initiatives such as open data platforms, innovation contests and promotional events (e.g., showcases) to spread the idea and demonstrate the benefits of STE systems. Cooperation between universities to spread knowledge can also be helpful. Additionally, congresses and meetings seem to be a good knowledge sharing point among specialists in the agriculture-technology sector. Articles can be published to generate interest and facilitate discussions between stakeholders. During these events, simulations can be used to determine the feasibility and effectiveness of different approaches to STE systems in agriculture. EU coordination of these initiatives can ensure consistent support services across countries.

At an international level, joint research and development projects with countries outside the EU where STE has a high potential for development (e.g., Africa, Asia, and Latin America) could be supported, along with the implementation of foreign good practices based on prior simulations and taking into account local specificities, such as the weather conditions. Additionally, partnerships with universities and embassies of different countries can help to facilitate collaboration and knowledge sharing in the agriculture-technology sector. Inspiring practices from France like Campus France and Business France, which focus on connecting students, universities, and companies across borders. For example, partnerships with universities in South America can be established to promote the adoption of STE systems in agriculture.

VI. INFORMATION CAMPAIGNS

10) INITIATING EDUCATIONAL PROGRAMS AND AWARENESS CAMPAIGNS

- **Initiating educational programs and awareness campaigns** that inform stakeholders on the advantages and benefits of RE technologies and STE systems; emphasise their role in contributing to the EU's Green Deal and climate goals; provide information on the various forms of support available to facilitate the implementation of STE systems, including technical and financial assistance, with the objective of helping individuals and organisations overcome obstacles to adoption; etc.
- **Keeping farm advisors informed about the latest technologies and funding schemes.** Farm advisors play a crucial role in linking farmers with the necessary information and monitoring the implementation of new technologies. They possess the skills to facilitate and coordinate events, create links with local authorities and policy makers and disseminate information effectively. Therefore, it is important to keep them updated on new technologies and funding schemes. For instance, in Ireland, local universities provide training to advisors from TEAGASC on CAP payments and new technologies, who then pass on this knowledge to farmers. Similarly, in France, farm advisors in cooperatives and chambers of agriculture have the responsibility of disseminating information and providing training to farmers.
- **Raising awareness among farmers about the existence and advantages of the feasibility tool developed as part of the I4F project.** To ensure the widespread use of this tool, which serves as a vital initial step in determining whether to adopt STE systems, it is important for public authorities to take an active role in disseminating this information.
- **Contributing to awareness-raising at a local and regional level, by:**
 - a. **Supporting the organisation of site visits**, accompanied by testimonials from early adopters, has been shown to be a successful farmer-to-farmer learning practice. This approach ensures that awareness-raising is conducted by those with practical knowledge of the technology. In the context of the I4F project, successful events such as site visits and showcases have been held, which are the most efficient means of allowing farmers to see the technology and benefit from others' experiences. It would be beneficial to include farmers from different sectors (e.g., breeders, greenhouses) and with varying levels of experience with the technology (i.e., those who adopted it one year ago, five years ago, etc.) in "open door" events. This would provide opportunities for farmers to continue sharing their experiences and for follow-up with other farmers who have adopted the technology.

- b. Organising regional events** that bring together RE actors and stakeholders to network and share information. Creating opportunities for stakeholders to meet locally could be part of the mission of public authorities at the local and regional level.
 - c. Using existing clusters and networks** to spread the word about RE and innovation can help raise awareness and promote greater uptake of these technologies.
- Establishing stronger connections between innovators, companies and educational institutions to raise awareness about STE.** By linking companies with education institutions, it would be possible to organise field visits and work on small projects to raise awareness among the next generation and introduce them to this lesser-known form of energy. Student projects are an excellent way to generate new ideas and bring fresh perspectives to the field. Companies and educational institutions could work together to host students for field visits and foster connections with experimental farms, for instance. By collaborating in this way, it is possible to facilitate greater awareness and understanding of STE among students and the wider community.