



Webinar

Solar Thermal Energy in agriculture

Supporting technology uptake and political incentives

13th June 2023

What is ICaRE4Farms?

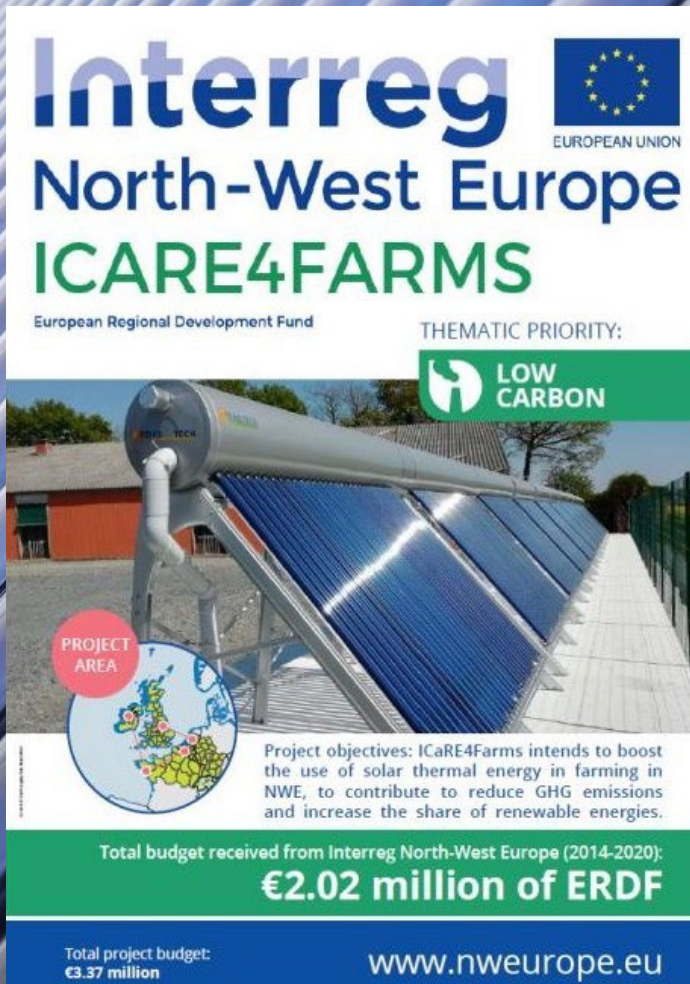
Romain GIANNINI


ICaRE4Farms Project Manager


Laval Mayenne
Technopole (LMT)



Overview of the ICaRE4Farms Project



Interreg  EUROPEAN UNION
North-West Europe
ICARE4FARMS
 European Regional Development Fund

THEMATIC PRIORITY:


PROJECT AREA

Project objectives: ICaRE4Farms intends to boost the use of solar thermal energy in farming in NWE, to contribute to reduce GHG emissions and increase the share of renewable energies.

Total budget received from Interreg North-West Europe (2014-2020):
€2.02 million of ERDF

Total project budget:
 €3.37 million

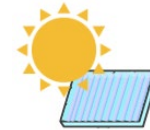
www.nweurope.eu

In few figures:

- ICaRE4Farms (I4F) = INTERREG North-West Europe project (programme 2014-2020)
- Budget (ERDF): 2,05 Millions € / 3,4 Millions € (in total)
- Start Date = 26 September 2019
 End Date = 25 December 2023 (≈ 4 years)
 cf. 1 year of extension due to Covid & Lockdown hinderances

Overview of the ICaRE4Farms Project

Project's Goals:



- Testing and demonstrating the efficiency of new generation solar thermal power plants in different agricultural activities
- Supporting the deployment of this new technology on farms in North West Europe to encourage the use of renewable energy
- Reducing greenhouse gas emissions
- Facilitating energy savings

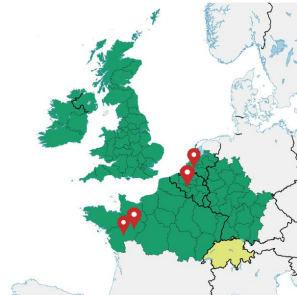
=> **Expected impact:** in 10 years, 1000 operational STE systems in NWE region, saving 92 ktCO₂ per year & creating around 200 jobs

Overview of the ICaRE4Farms Project

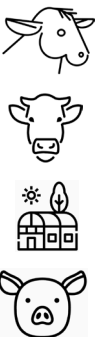
Approaches & Methodology:



- 4 pilot sites for testing domestic hot water production applied in building and process heating (France x2 ; Netherlands ; Flanders)



- 4 agricultural sectors for STE applications
 - *Milk-fed Calf Farm* = Feeding (milk powder + water)
 - *Dairy Farm* = Cleaning of Milking Parlours & Tanks + On-farm processing (cheese, butter, etc)
 - *Pig Farm* = Building Heating
 - *Greenhouses* = Building Heating



Project Consortium

European Consortium:



- 5 partner countries: France, Ireland, Netherlands, Flanders, United Kingdom
- 8 partner entities:
 - Laval Mayenne Technopole (LMT / Lead Partner / FR)
 - Northern & Western Regional Assembly (NWRA / IE)
 - Fengtech (FT / FR)
 - Cornelissen Consulting Services (CCS / NL)
 - Association des Chambres d'Agriculture de l'Arc Atlantique (AC3A / FR)
 - Boerenbond (BB / BE)
 - Université Bretagne Sud (UBS / FR)
 - University of Lincoln (UoL / UK)



Project Consortium

In other words:



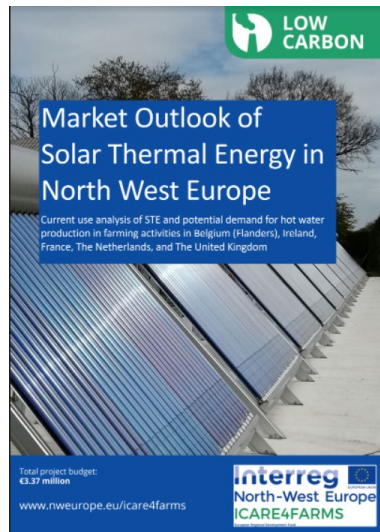
- 1 business support association / incubator
- 1 start-up (providing the Next generation Solar Thermal panels)
- 1 technical studies office
- 2 universities
- 2 agricultural organisations
- 1 regional assembly

ICaRE4Farms Project Activities

Planned Actions & Initiatives

- Market Analysis (Available online at: <https://bit.ly/3wKWlwx>)





Market Outlook of Solar Thermal Energy in North West Europe

Current use analysis of STE and potential demand for hot water production in farming activities in Belgium (Flanders), Ireland, France, The Netherlands, and The United Kingdom

Total project budget: €3.37 million

www.nweurope.eu/icare4farms

interreg
North-West Europe
ICARE4FARMS

LOW CARBON

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Section 1

2 Sectors adapted to STE

Agriculture in NWE is an important part of economic activity and an important actor regarding energy consumption but also its activity of renewable energy production. The purpose of this section is to identify sectors and their potential needs of hot water consumption, which is an important source of CO₂ through 5 countries of North-Western Europe. These sectors usually consume fossil fuels whereas other green energies can be available and appropriate. We will then draw up a profile of each type of farm which could be interested in using an STE application.

STE depends on solar irradiance: as the following map shows, the yearly global irradiance is between 800 and 1,200kWh/m² in the NWE zone.¹¹

The emergence of new technologies offering better solar energy recovery yields could help to a better deployment in the NWE and be beneficial for farmers that use hot water.

The I4F project aims at verifying this hypothesis.

Each country and each region has its own agriculture policies and production systems. It is, therefore, necessary to understand and compare those sectors' needs, hot water to identify the key markets for an STE application in each country.

I. Success factors of Solar Thermal Energy (STE) in agriculture

To identify the different sectors that can be adapted to solar thermal energy, several criteria were taken into account:

- Heating systems that use water as a heat transfer fluid.
- Underfloor heating systems using low temperature water (between 30 and 50°C)
- Energy needs all year round and especially during the summer when the sunshine is the most important.

This led us to identify 5 priority sectors of agricultural activity:

1. **Milk-fed calves breeding** that uses hot water for the production of feed (preconstituted milk)
2. **Pig farms and especially maternity and post-weaning workshops**
3. **Dairy farms** and especially those processing milk onsite
4. **Protected cropping** under heated glasshouses: market gardening and horticulture
5. **Meat poultry breeding**

Section 2

III. Conclusion on Irish agricultural markets: identification of the target segments

Ireland has similar farming methods to the UK and other farms in Northern Europe. Although compared to other European regions, there is no significant data or documentation of Irish farms which have installed or piloted an STE system. To date, the majority of research and investment by both public and private sector has been in Solar PV and Wind Energy.

Dairy farming is the largest sector of the agriculture industry in Ireland. On initial research, it would appear that the STE system would have a practical application in producing hot water for dairy parlours when combined with boilers and heat exchangers. The majority of hot water required on dairy farms is for washing milk parlours and cows before and after milking. Milking typically occurs twice a day, early in the morning and in the evening. 'Taggas and Cori T' tested an STE system in 2010 for a dairy farm application but the results showed that STE systems did not provide sufficient hot water for washing milk parlours in the morning.¹²

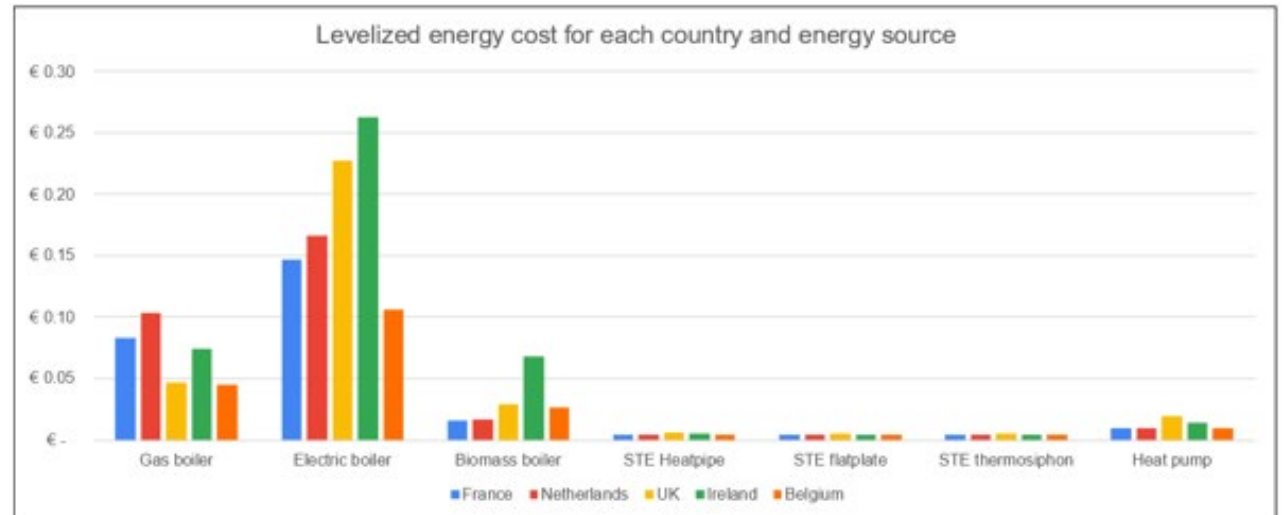
In 2016, the Department of Agriculture, Food and Marine allocated an additional €10 million Renewable Energy Grants for Farms through the Targeted Agricultural Measures Scheme (TAMS). The amendments to the scheme were for the inclusion of solar PV installation on farms on existing current availability under the scheme to all sectors. Grant aid in the pilot phase will be available for 40% or up to 60% of the cost of qualified young farmers to fund the cost of a solar system of 6kWp.¹³ TAMS II first opened in June 2015 and is set to expire in December 2020. This scheme is co-funded by the EU and the national exchequer under the Rural Development Programme (2014-2020) with a total allocation of over €395m over its duration.¹⁴

To date, the majority of STE systems in Ireland have been installed in a domestic setting with no documented investments or installations on farms. Solar Thermal Energy systems requires more research and trials on farm sites in Ireland with the newer and more efficient technologies to give the agriculture sector confidence to invest in such systems. Furthermore, the grant assistance to invest in Renewable Energy are focused on electricity generation (Solar PV and Wind Turbines) and policy would need to change or be updated to incentivise investments in STE systems.

ICaRE4Farms Project Activities

Planned Actions & Initiatives

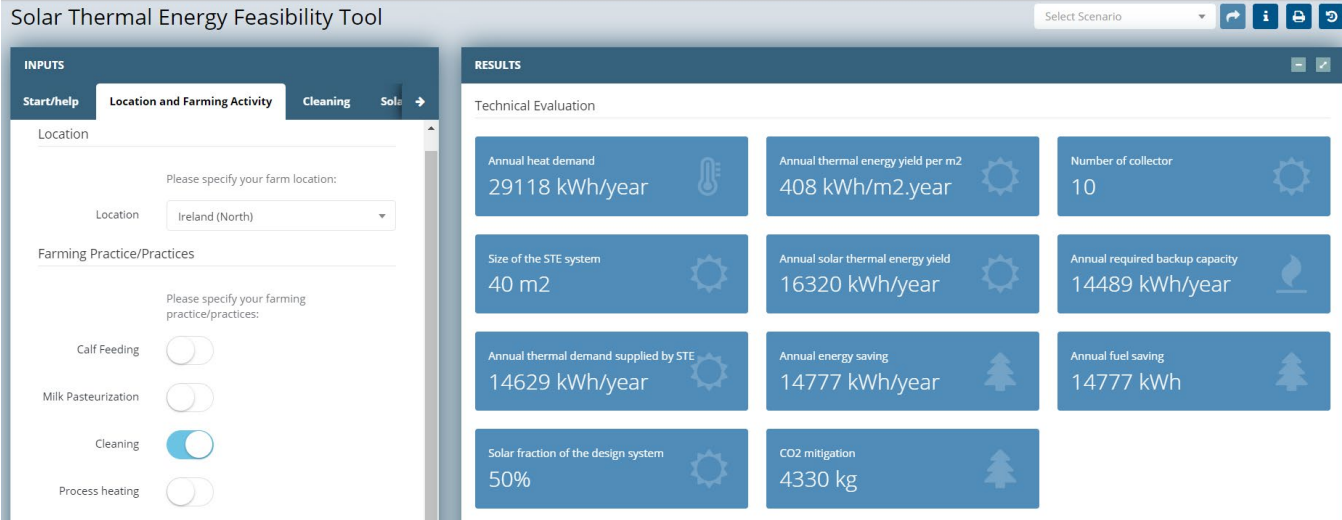
- Technology Assessment Tool



ICaRE4Farms Project Activities

Planned Actions & Initiatives

- Feasibility Tool (Achieved)
<https://app.molnify.com/app/ccssolarfeasibilitytool>





The screenshot displays the 'Solar Thermal Energy Feasibility Tool' interface. The 'INPUTS' section on the left includes a 'Location and Farming Activity' tab with a dropdown menu set to 'Ireland (North)'. Under 'Farming Practice/Practices', 'Cleaning' is selected with a toggle switch, while 'Calf Feeding', 'Milk Pasteurization', and 'Process heating' are unselected. The 'RESULTS' section on the right, titled 'Technical Evaluation', shows the following data:

Parameter	Value
Annual heat demand	29118 kWh/year
Annual thermal energy yield per m2	408 kWh/m2.year
Number of collector	10
Size of the STE system	40 m2
Annual solar thermal energy yield	16320 kWh/year
Annual required backup capacity	14489 kWh/year
Annual thermal demand supplied by STE	14629 kWh/year
Annual energy saving	14777 kWh/year
Annual fuel saving	14777 kWh
Solar fraction of the design system	50%
CO2 mitigation	4330 kg

ICaRE4Farms Project Activities

Planned Actions & Initiatives

- Case Studies (Achieved / <https://bit.ly/3G4ZI6O>)

Description of this pig farmer's solar plant	The technical and economic results of this pig farmer	Interreg North-West Europe ICARE4FARMS
<ul style="list-style-type: none"> • 12 FengTech ETF2 units arranged in 3 rows of 4 => 48 m2 of sensors  	<p>RETURN ON INVESTMENT</p> <p>After 1 year of use (since January 2021), Mr Loaec has recorded an annual saving of €5,780 (49%).</p> <p>PROFITABILITY OVER 10 YEARS</p> <p>The investment excluding the subsidy (€30,000), financed by a 10-year loan - i.e. an annual repayment of €3,300 - it appears that the savings generated are greater than the annual repayment of the loan, bearing in mind that the installation has an estimated lifespan of over 30 years.</p> <p>PIG FARMER'S DATAS</p> <p>Excluding subsidies, the total investment has a payback time of 8 years and 6 months (50,000 / 5,780).</p>	<p>Solar thermal energy in agriculture - Pig Farm Application</p> <p>Challenges & Goals</p> <p>Heating is the number one energy expense!</p> <p>It alone represents 46% of the consumption of a farrow-to-finish farm.</p> <p>The challenge of solar energy is to significantly reduce energy consumption</p>
<p>Investment for the solar installation</p> <ul style="list-style-type: none"> • Total Investment = 50 000€ Excl. Tax => 46 000€ of ETF2 collectors (including installation) => 4,000 for the construction of the concrete slab and the connection trenches • Subsidies Subsidies of up to 40% under a French Regional Aid (Brittany) 	<p>Project funded by:</p> <p>Interreg North-West Europe ICARE4FARMS www.nw-europe.eu/icare4farms</p>	<p>However, this free energy source can only be used in livestock buildings equipped with water heating systems such as hot plates.</p>

ICaRE4Farms Project Activities

Planned Actions & Initiatives

- Measurements and collection of data on site

On the ICaRE4Farms pilot site 1,
Week 20, May 16-22 2022
using Solar Thermal Energy

There was an energy saving of

73%

which meant not using

123KG

of propane gas preventing



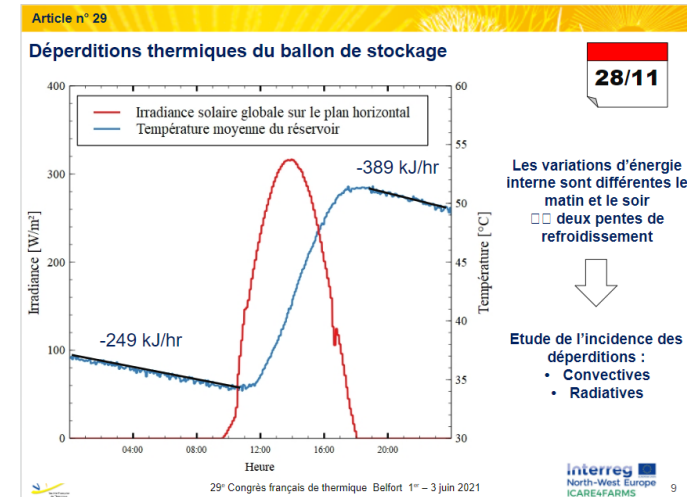
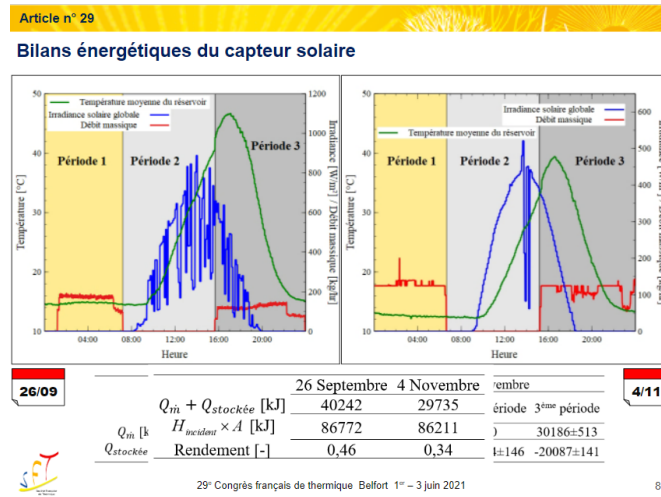
of CO2 being released



ICaRE4Farms Project Activities

Planned Actions & Initiatives

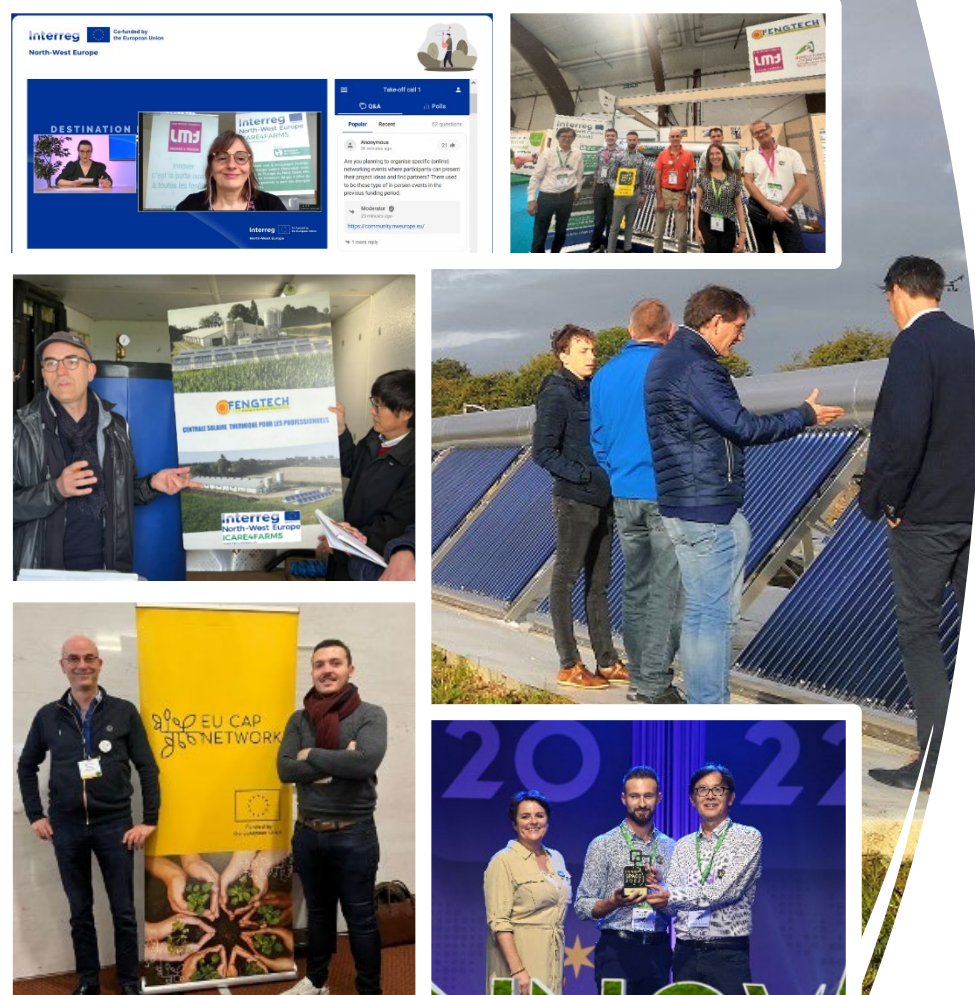
- Modelisation of functioning



ICaRE4Farms Project Activities

Planned Actions & Initiatives

- Several sets of events
 - Showcases, with end-users, distributors and installers
 - Training actions upon the Feasibility tool (installers)
 - Market Development Events, with farmer associations & chamber of agriculture/commerce
 - Awareness-raising & Information Campaigns, with renewable energy associations & local utilities
 - Participation in policy events, with regional, national and European stakeholders & policy-makers
 - Info-days & Dissemination events, with media & local stakeholders
 - Participation in conference and other scientific events



ICaRE4Farms Project Activities

Planned Actions & Initiatives

- Calls for Application
(Online at: <https://bit.ly/3G4ZI6O>)
 - Application Form EN:
<https://bit.ly/3fXocUD>
 - Term of References EN:
<https://bit.ly/3NROsfV>
 - Also Available in French & Dutch

=> The Submission & sSelection process has been successfully halted after retrieving our 17 complementary sites



ICaRE4Farms Project Activities

ProPlanned Actions & Initiatives

- Communication & Long-term Perspectives (factsheets, community building, etc)



Agriculture in North-West Europe and its potential for STE application

The European Context: a driver for change

- Reducing greenhouse gas emissions & developing renewable energy (Green Deal) is a goal of reducing by 50% the greenhouse emissions
- Large consumer of fossil fuels BUT leading producer of green energy
- Solar Thermal Energy (STE) is an economical and available alternative to conventional energy

Agriculture in North-West Europe (NWE)

- Turnover: between 5.6 and 77.2 billions €
- Largest agricultural sectors: pig, vegetables, milk products, sheep, beef, veal, cropping
- Number of Farms: between 23 000 & 403 000 in each country of 80 000-1000 in the NWE area
- Average Size: between 24 and 84 hectares (rank depends on the country)

Energy for agriculture in north-west europe

- Consumption in Million of tons oil equivalent: between 0.21 and 3.8
- Consumption in Million of tons CO₂e: between 5.8 and 79
- Share in Emission (in CO₂e):
 - Gas: between 27 and 41
 - Electricity: between 103 and 136

Success Factors for solar thermal energy in agriculture

- Heating systems that use water as a heat transfer fluid
- Underfloor heating systems using low-temperature water (between 30 and 50°C)
- Energy needs all year round and especially during the summer when the sunshine is the most important

Priority sectors (in theory)


- Milk Poultry Breeding
- Pig Farms (Maternity & Post-Weaning)
- Milked Cows Breeding
- Protected cropping under greenhouses
- Dairy Farms without on-site processing

Next Generation STE system Specifications & energy cost

ICARE4Farms (H4) Project

- European project / Interreg NWE-Funds EU
- (60% - 2,02 M€ out of 3,35M€ budget)
- Goal: Contributing to the Green Deal and EU objectives toward environmental transition. Update and dissemination of STE systems in Europe
- Means:
 - Next Generation STE systems allowing both economical & greenhouse gas emissions savings
 - Sampling and review of implementation criteria in 5 North-western Countries

4 PILOTE SITES



"Solar thermal": An efficient way to produce hot water on the farm

- The latest generation of solar water heaters can cover more than half of the domestic hot water needs of farms
- An interesting solution to limit your energy purchases (gas, electricity, fuel oil, etc) and reduce your carbon footprint.

ICARE4Farms PROJECT PARTNERS

- Project management by L'AVANT-MARCHÉ TECHNOLOGIE
- 8 partners in 5 European countries (France, Ireland, United Kingdom, Netherlands and Belgium) and several subsidiaries
- Type of actors in the project:
 - 3 business support association
 - 2 startup solar equipment
 - 1 Technical studies office
 - 2 Universities
 - 2 agricultural organizations
 - 1 regional assembly

For more information

www.pi.chambagri.fr
 www.nw-europe.eu/icare4farms

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interreg North-West Europe ICARE4FARMS

European project ICARE4Farms

THE PROJECTS OBJECTIVES

- Test and demonstrate the efficiency of the generation cost reduction of solar thermal energy in different agricultural activities
- Support the deployment of this technology on farms in both west Europe and north-west Europe to encourage the use of renewable energy
- Reduce greenhouse gas emissions
- Facilitate energy sale to

French pilots for local calls



16 FENGTECH (type water heaters (solarium tubes) 4000 l of power installed since June 2021)

Recherche

Accueil Réseau Emplois Messages Notifications


ICaRE4Farms Vue super administrateur

Toutes les pages Contenu Statistiques Activité

ICaRE4Farms

1) — English Version en

On Thursday 19th May, French partners from Fengtech (Liquan Feng & ...voir plus



0:08

Présentation Site Vaucelle Icare4Farms 19/05/2022

vous et 7 autres personnes 1 commentaire - 1 page

J'aime Commenter



Thank you for your attention !!!