Interreg North-West Europe ICARE4FARMS
European Regional Development Fund

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Webinar

Solar Thermal Energy in agriculture

Supporting technology uptake and political incentives

13th June 2023

Modelling of the solar installation

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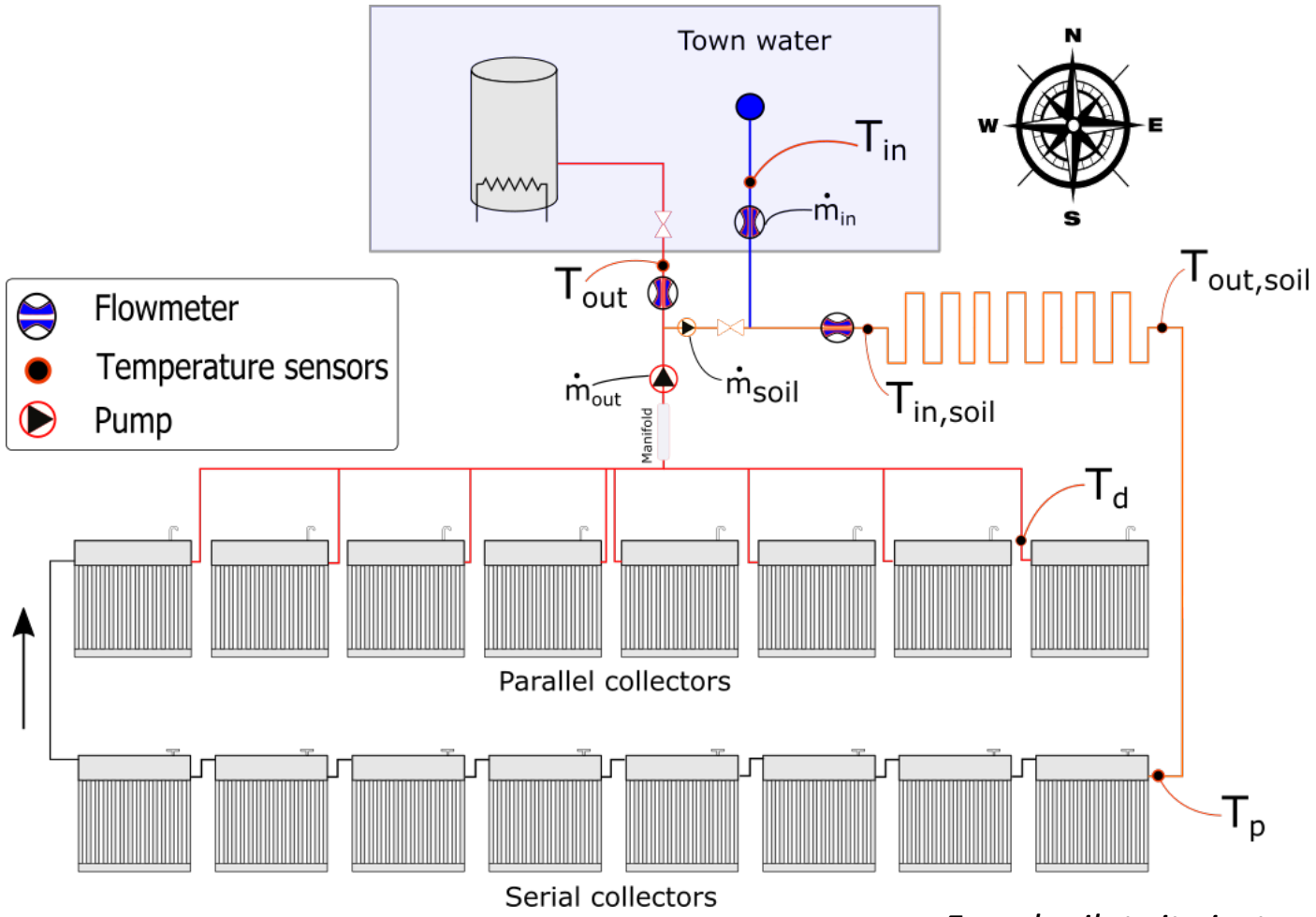
ICaRE4Farms webinar - **Solar Thermal Energy in agriculture -** 13th June 2023

Pilot site instrumentation

- Establish energy balances
- Validate the numerical model

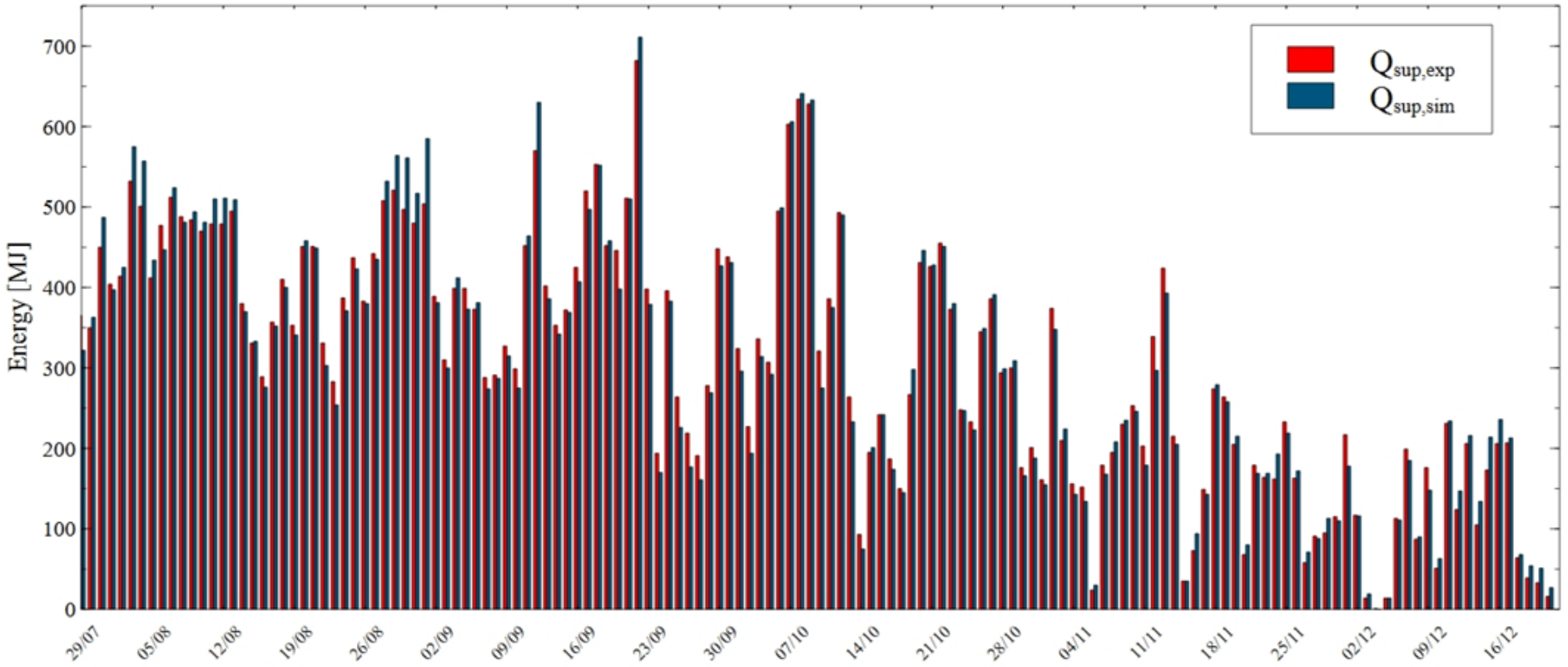


French pilot site instrumentation

Numerical model

- Use of scientific literature
- Calibration work
- Validation (entire breeding cycle)

TRNSYS 18



Comparison between daily energy supplied measured and computed (French pilot site, second breeding cycle 2022)

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Parametric studies

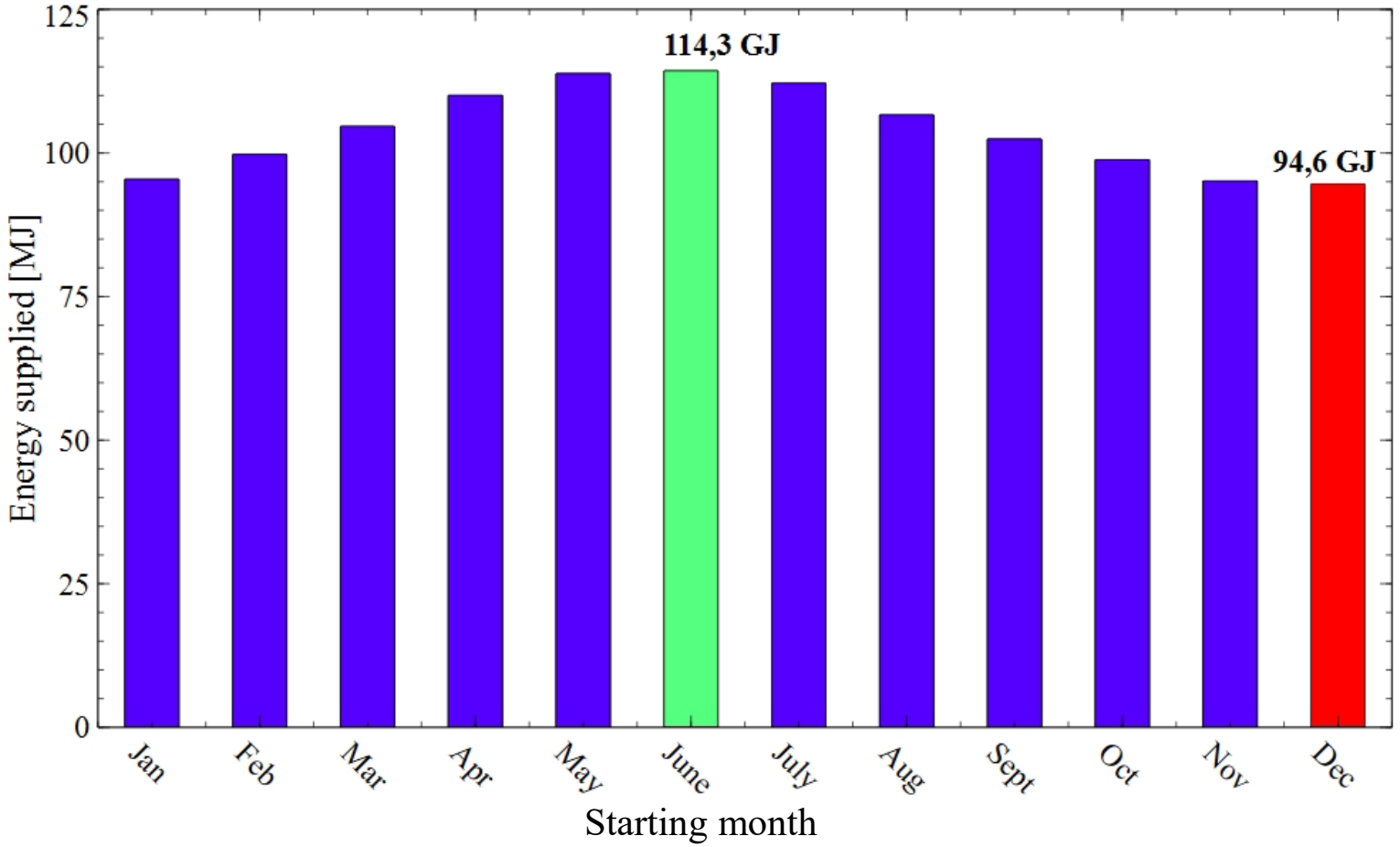
Evaluation of several parameters :

- Tilt angle, orientation
- Location
- Number of serial collectors
- Breeding cycle starting month
- Required temperature

On the energy supplied, on the coverage ratio and on the GHG emission reduction

Results of the simulations

- 13 months simulation over two breeding cycles



Highest production : Starts in June

- Energy supplied = 114,3 GJ
- 8902 kg.eq.CO_2 saved
- 51,8% reduction GHG emission

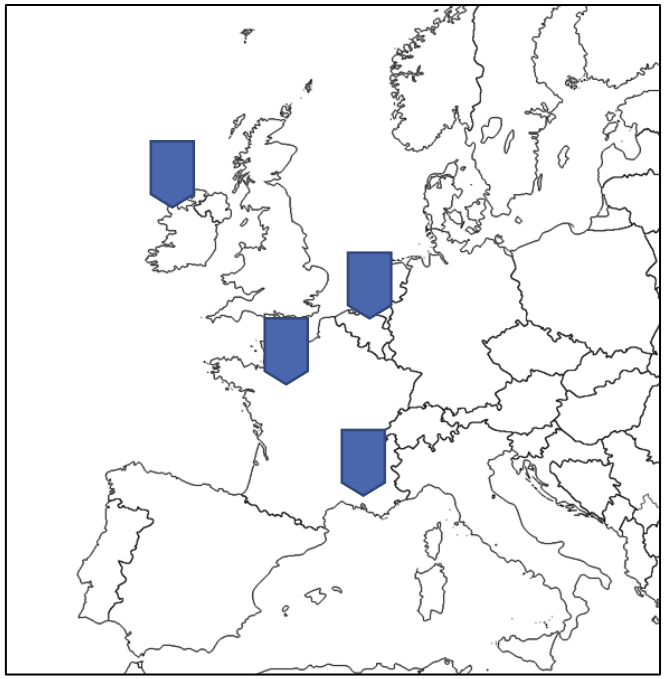
Lowest production : Starts in December

- Energy supplied = 94,6 GJ
- 7368 kg.eq.CO_2 saved
- 42,1% reduction GHG emission

Results of the simulations

- Variation of orientation and inclination
  - Evaluation of the energy supplied for 4 different locations

Cumulative energy increases with favourable weather conditions → South and 45° are the best configurations → Evaluation of the impacts if the best configuration can't be used



Study in 4 european cities :

- Saint-georges-du-rosay
- Herselt
- Sligo
- Marseille

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Scientific publications

Gambade J., Noël H., Glouannec P., Magueresse A., *«Modelling of "Water-in-glass" Solar Water Heaters installation»* ICSREE 2022, IOP Conference Series: Earth and Environmental Science https://doi.org/10.1088/1755-1315/1050/1/012004

Gambade J., Noël H., Glouannec P., Magueresse A., *« In-situ assessment of a solar vacuum tube collectors installation dedicated to hot water production »* REEE 2022, Energy Reports. 8 (2022) 605–615. https://doi.org/10.1016/j.egyr.2022.10.160

Gambade J., Noël, H., Glouannec, P., «Estimation « in situ » de l'efficacité de capteurs solaires sous vide pour la production d'eau chaude». Congrès Française de Thermique 2021 doi : https://doi.org/10.25855/SFT2021-029

Three more scientific papers to be published