



Thermochemical Fluids in Greenhouse Farming

Case studies – Greenhouses in Spain and Italy

The objective of the Case Study is to analyse boundary conditions in two representative European countries: Spain, with the largest extension of horticultural greenhouses in Europe, and Italy identified as an initial potential market for TheGreefa. Five cases were selected: unheated Almería-type greenhouses in Spain (1); unheated multispans greenhouses in Spain (2) and Italy (3) and heated multispans in Spain (4) and Italy (5).



Figure 1. Almería greenhouses.

The Almería greenhouses (70% of area in Spain) have investment costs of 15-20 €/m² and productivities lower than 15 kg/m². They require the lowest energy consumption of 1-1.5 kWh/m² (30-50 GJ/ha), for the irrigation and ventilation systems, producing emissions of 95-280 kg CO₂ eq/tn.

Unheated multispans greenhouses, with investment costs of 25-80 €/m², allow productions greater than 15 kg/m². The higher costs obligate farmers to sign contracts directly with supermarket chains to ensure a profit. The greater use of metal in the structure increases the emissions to 150-1200 kg CO₂ eq/tn.

Heated greenhouses, with investment of 45-58 €/m² in Spain and 70-160 €/m² in Italy, can obtain productivities above 20 kg/m². The cost of energy for heating represents 20-40% of the total. The heating increases energy consumption to 4600 GJ/ha in Almería and 9000-13000 GJ/ha in Italy, with emissions values of 900-3500 kg CO₂ eq/tn.



Figure 2. Interior of an Almería type greenhouse.

In heated greenhouses thermochemical fluids could be used to reduce the cost of heating energy and their environmental impact, whereas in unheated multispans greenhouses could be mainly used to cooling and humidity control.



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