

Photovoltaics (PV) and Photovoltaic Thermal (PVT) Collectors and Systems for agricultural constructions rooftops

What is the challenge?

- Agriculture has **high energy demands for heat and electricity**.
- Heat consists of 50% of the total energy consumption, while electricity only 20%. The costs of the energy consumption in greenhouses are up to 50% of the production costs and are the second largest operating cost.
- There is **little renewable energy penetration in agriculture**, as farms do not have the investment capability of modernizing their energy systems. Many still use oil, gas, and biomass as the main fuel.
- Fossil fuel costs are likely to rise in the future, and **electrification cannot be the only alternative to heating as this would overwhelm the grid**, especially with the inclusion of electric vehicles in the future.
- Other renewable energy solutions are available such as wind, heat pumps, geothermal, etc. However, a mixed solution is necessary that will not depend on, and over saturate the electric grid.
- Solar photovoltaic (PV) panels and solar thermal collectors exist however both are necessary to deliver electricity and heat, consuming a lot of land and space.
- PVT technology is the **most efficient way to harness heat and electricity from the sun for a given space**. As land is abundant in agriculture, PVT fields are easily deployed on land and rooftops that may also provide benefit to the agricultural operation in some way such as to provide shading for crops or livestock. Complete electrification of heat will be a very difficult task as this would double the load on the current grid, which would require massive investment.
- Although PV technology is on the rise and costs are lowering due to policy incentives, there are **very few incentives for solar thermal and none for PVT**. PVT technology mostly cannot benefit from individual benefits for PV and solar thermal, even though the technology is the same.

Policy Recommendations

EU Level:

- PV systems should be expanded to all livestock and agricultural building rooftops that can support their installation in a net metering format to reduce electricity bills.
- **Impose stricter carbon tax** to fossil fuel usage to disincentivise its use and purchase.
- Establish a **short- and long-term EU-wide strategy for the adoption of renewable and low-carbon fuels in agriculture**, including feasible targets and specific taxation and incentives based on life cycle assessment processes.
- **Treat the transformation to zero CO₂ emissions as an investment with proper assignment of value**, allowing farmers and industry to plan accordingly, with a well-to-crop approach to enable a wide portfolio of options.
- **Promote research** that offers comprehensive reviews and studies on optimised PVT systems, along with supporting the correct solutions to market scale.
- **Awareness raising** of state-of-the-art PVT technologies among farmers, contractors, and advisers through demo farms and flagship eco-schemes.
- **Build capacity within the agricultural industry** around the use and opportunities of PV and PVT and share such research and innovation findings with key actors in the industry.

Member state Level:

- **Better recognise** PVT technology as a viable and efficient solution for renewable electricity and heat.
- **Facilitate support and subsidies** for PVT technology and solar thermal just like is being done for PV technology, along with favourable investment plans for those that wish to invest in a new system.
- **Incentivise SMEs and business** that are leading the conversation and implementation on renewable energy deployment and innovation.

- Incentivise agriculture by **supporting the renovation and purchase of renewable energy systems** such as PVT technology.
- **Promote and support local businesses** developing and manufacturing PV and PVT products to ensure supply chain is kept within the EU at a maximum.
- Incentivise agriculture by **supporting the renovation and purchase of renewable energy systems** such as PVT technology. For instance, in Ireland, The Solar Capital Investment Scheme (TAMS) provides an investment grant to farmers to improve the energy efficiency of farm buildings or their equipment. The investment grant can cover up to 60% of total installations costs for up to 62kWp or smaller solar PV system.
- In Italy, the Ministerial Decree of 19 April 2023 to be financed under the PNRR, Mission 2, Component 1, Investment 2.2 "Parco Agrisolare" contains the procedures for submitting applications for access to the construction of photovoltaic systems to be installed on buildings for productive use in the agricultural, zootechnical and agro-industrial sectors. On 21 July 2023, the new Notice was issued pursuant to the Decree of the Minister of Agriculture, Food Sovereignty and Forests n. 211444 of 19 April 2023. The Notice relates to the financing of photovoltaic systems to be installed on buildings for productive use in the agricultural, livestock and agro-industrial sectors, with the residual resources of the PNRR measure M2C1 I 2.2 "Parco Agrisolare". The available resources amount to approximately 1 billion euros. Among the main innovations of the new tender: (i) increase in the maximum aid intensity up to 80% for companies involved in primary agricultural production and agricultural transformation into agriculture; (ii) introduction of the new case of shared self-consumption; (iii) participation of companies in aggregate form; (iv) possibility of creating photovoltaic systems on the roofs of agricultural buildings with power up to a maximum of 1,000 kWp per system; (v) doubling of the maximum admissible expenditure for accumulation systems up to 100,000 euros; (vi) doubling of the maximum eligible expenditure for recharging devices up to 30,000 euros; and (vii) maximum expenditure per beneficiary equal to 2,330,000 euros.
- In the Netherlands, there are subsidies for stimulation sustainable/renewable energy production that include PV installation in rooftops.

Expected Impacts

- Renewable heating and electricity from the sun has no operational carbon footprint, and if sourced locally, its **manufacturing carbon footprint is very low**.
- PVTs offer an **efficient (currently up to 80%) method** of harnessing heat and transferring it for domestic hot water use and space heating. Combining the production of heat and electricity in one panel, reduces the space used per energy output by half.
- If deployed on a large scale, PVTs can offer a levelized cost of heat of 0.02-0.05€/kWh which is a **big reduction compared to current electricity and fossil fuel prices**. Payback on investments can be as low as 2-6 years.
- There will be a decrease in **risk of price volatility and level** can remain at a constant, which is important as energy is a high share in agricultural costs.
- **Energy security for farms will increase**, as most energy will be produced locally.
- If the supply chain is kept local, then the capacity for renewable energy manufacturing and deployment within Europe will be enhanced.
- Investments in PVT will **likely pay off quicker** as prices for components and systems decrease, favouring the economy.
- PVT awareness will assist to **create a trend to invest in the technology**.
- Subsidies, support, and favourable financial schemes will accelerate market uptake of the PVT technology and allow for a quicker energy transition.

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