Project co-financed by the European Regional Development Fund

Supporting the rural green transition

through

The MED Greenhouses project

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Project Coordinator of MED Greenhouses project

Short description

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The project ***mainly capitalized*** *the results of LIFE+ "Adapt2change" project by* ***promoting***, ***disseminating*** *&* ***transferring*** *innovative Greenhouses in the MED area, minimizing* ***water*** *&* ***energy*** *demand.*

The project ***stimulated*** ***environmental*** ***awareness*** *on issues related to* ***energy & water*** ***efficiency*** *&* ***sustainable production***, *contributing to* ***Green Growth*** *& promoting* ***sustainable development***.

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Challenges

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- The greenhouse agriculture sector is one of the most resource intensive (soil, energy, water) sectors and at the same time essential and critical for the prosperity of MED countries.
- The total area covered by greenhouses has been significantly increased worldwide over the last years in order to meet increased food demand.
- Conventional greenhouses – which are widely applicable in the Mediterranean area – use fossil fuels in order to provide heating or cooling and maintain temperatures necessary to grow plants during winter or summer.
- The energy crisis constitute an important factor that farmers have to face.
- Furthermore, Climate Change is affecting agricultural production causing water scarcity, extreme weather conditions etc., that need to be faced.
- **Thus, a switch from conventional to more efficient use (in terms of water, energy and other resources) is a priority in agriculture.**



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Challenges

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- *Addressing Climate Change, coping with:*
  - ***Water scarcity***
  - ***Water pollution***
  - ***Extreme weather conditions***

- *Addressing issues of agricultural production:*
  - ***Water availability***
  - ***Increased cost of energy***
  - ***Increased cost of raw materials***
  - ***Increased market competition***
  - ***Increased demand for product quality***
  - ***Loss of agricultural land for other activities***

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Partnership & Involved Regions

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Objectives & Achieved Results

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Project Objective: To improve eco-innovation capacities of public & private actors in the greenhouse/agriculture sector through stronger transnational cooperation, knowledge transfer and better networks between research bodies, businesses, public authorities and civil societies.

Project Results:

1. Developed, promoted & integrated policy Recommendations in local & regional planning in order to boost eco-innovative investments at transnational level.
2. Established an Agricultural Innovative Cluster in the MED area creating synergies & cooperation mechanisms between the actors of quadruple helix.
3. Increased the capacity building of the members of the innovative cluster through knowledge transfer & training courses.

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Project's Main Outputs Reached

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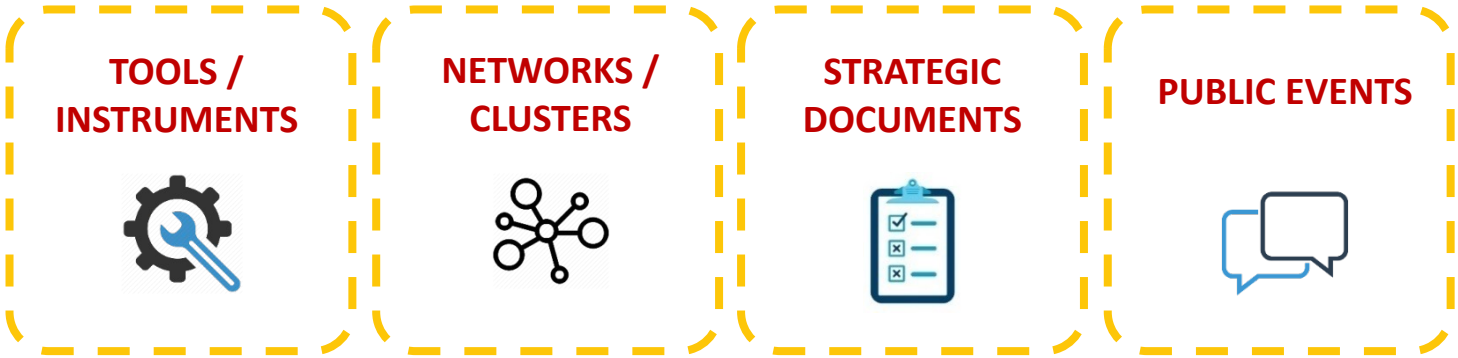
Main outputs: 2 tools, 2 Strategic Documents & 1 Cluster

- Gap Analysis & Policies Recommendations
- Joint MED Action Plan transferring innovative greenhouses in the MED area
- E-learning platform (including training course material) & Webinars
- Tailored policy recommendations for the establishment of mechanisms favouring the collaboration of key actors of the 4-helix
- Establishment of Agricultural Transnational Innovative (ATI) Cluster & a Memorandum of Agreement

All the deliverables are available at:

https://medgreenhouses.interreg-med.eu/what-we-achieve/deliverable-database/



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Innovative MED Greenhouses

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The need for sustainable agriculture, led us to the development and the implementation of Innovative Geothermal hydroponic Greenhouse minimizing water and energy consumption, contributing also to Circular Economy & Green Growth.

The MED Greenhouses were constructed in the Larissa (Greece) and Zygi (Cyprus) in the context of "LIFE+Adapt2change" project, aiming to valorize clean forms of energy, based on geothermal energy, and applying them for the heating, cooling (for greenhouses mainly for dehumidification) and every other operational need of the greenhouses.

https://www.youtube.com/watch?v=8K-PWkGxlpw

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Introduction of MED Greenhouses

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Introduction of MED Greenhouses

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Production: **600** tn of tomato/ha/year

Conventional Production: 150-250 tn/ha/year

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Introduction of MED Greenhouses

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Subsystems:

- Natural cooling & ventilation system
- Dynamic cooling & ventilation system
- Heating system
  - Geothermal heat pumps
  - Oil boiler
- Curtain / thermal insulation curtain system
- CO_2 Enrichment System
- Air Drying System
- Hydroponics system
  - Closed System
  - Open system
- Central System Control System

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Introduction of MED Greenhouses

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- Natural cooling & ventilation system (Top windows)

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Introduction of MED Greenhouses

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- ❑ Natural cooling & ventilation system
- ❑ Dynamic cooling & ventilation system
- ❑ Heating system
  - Geothermal heat pumps
  - Oil boiler
- ❑ Curtain / thermal insulation curtain system
- ❑ CO_2 Enrichment System
- ❑ Air Drying System
- ❑ Hydroponics system
  - Closed System
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Introduction of MED Greenhouses

Geothermal Energy Subsystem

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- The greenhouses' energy needs for cooling, heating and conversion of water vapour are being covered by a vertical closed loop geothermal system which is built next to the greenhouses, exploiting the available shallow geothermal energy field.
- This system offers significant advantages over other forms of energy as it is a renewable energy source which does not burden the environment with additional pollutants, reducing carbon emissions footprint.
- MED Greenhouses are based on Geothermal Heat Pumps Systems that exploit shallow geothermal energy (exploitation of stored energy of low depth rock and surface / ground water with temperatures <25°C)

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Introduction of MED Greenhouses

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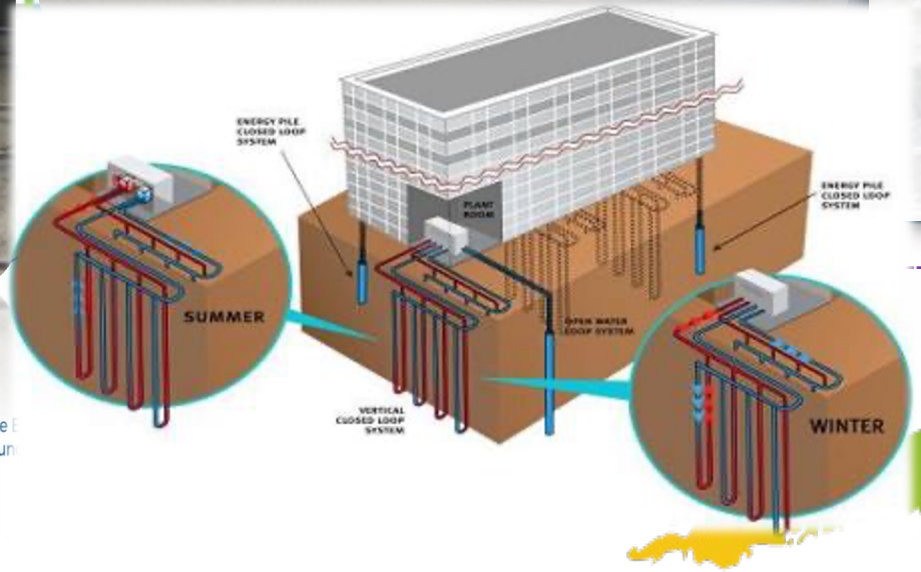
Geothermal Energy Subsystem

The system consi



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Advantages compared to Conventional GH

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Energy Performance

✓ The mean Energy reduction (Kwhe) can be up to **67%**.

Water Efficiency

✓ Working as a closed hydroponic system the MED Greenhouses can reduce water consumption by up to **45%**
✓ This reduction can reach **70%**, compared to open filled cultivation practices.
✓ Considering the additional water retention systems installed inside the MED Greenhouses (i.e. rain-water re-circulation systems), the water re-use can reach, in some cases **100%**
✓ The cooling system of the MED Greenhouses (capacity of 150 W m-2) has the potential to increase the water use efficiency by up to **75%**.

Environmental Benefits

✓The mean CO_2 emissions reduction can be ranged between **46-52%**.
✓The use of fertilizers can be reduced by approximately **30%** compared to an open hydroponic system; this reduction can reach and surpass **60%** compared to open cultivation practices.

Conclusions and recommendations

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- Agriculture in general is resource intensive, and greenhouses are a particularly resource-intensive agricultural method.
- The green transition for greenhouses means drastically reducing the use of energy, water, fertiliser.
- Innovative practical solutions in form of "green" greenhouses exist and are proven. But they need support for their wider uptake.
- Local and regional policy makers are invited to study and implement the integrated policy recommendations available from the MED Greenhouses Project.

Thank you for your attention!

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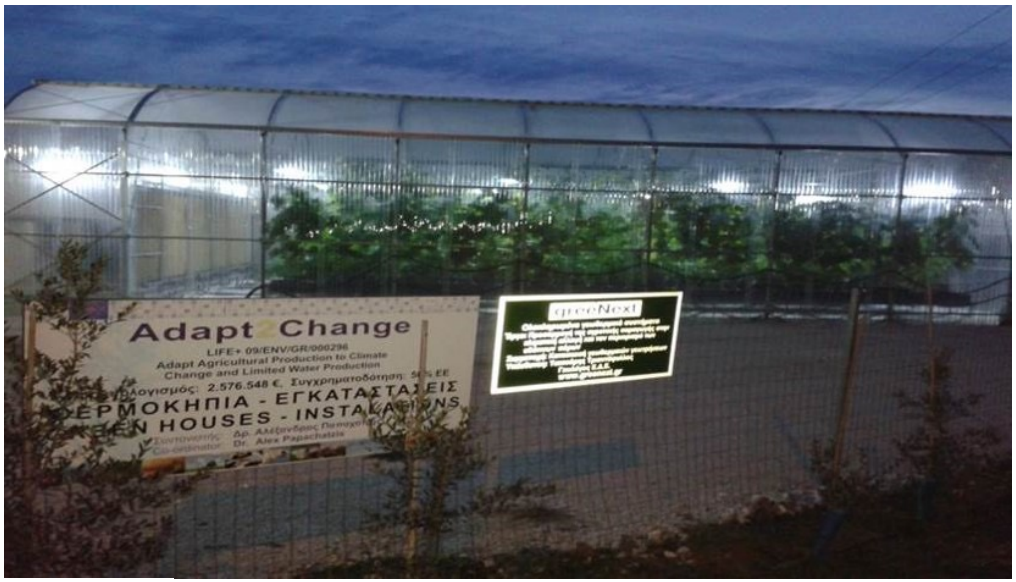
https://medgreenhouses.interreg-med.eu/



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