



RES4LIVE

ENERGY SMART LIVESTOCK FARMING
TOWARDS ZERO FOSSIL FUEL CONSUMPTION

Report on scientific conferences, publications and final conferences

Deliverable 7.7

WP7. Dissemination, Communication, Exploitation

Project title

RES4LIVE - Energy Smart Livestock Farming towards Zero Fossil Fuel Consumption

Grant agreement: 101000785


From 1st October 2020 to 30th September 2024

Prepared by: EAAP

27/09/2024



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DELIVERABLE FACTSHEET

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| Deliverable no. | Deliverable D7.7 Report on scientific conferences, publications and final conference |
| Responsible Partner | EAAP |
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| Dissemination level | |
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| | PP = Restricted to other programme participants (including the EC) |
| | RE = Restricted to a group specified by the consortium (including the EC) |
| | CO = Confidential, only for members of the consortium (including the EC) |


Approvals/ Document history

| | Company/ Institution |
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PARTNERS SHORT NAMES

AUA - AGRICULTURAL UNIVERSITY OF ATHENS

UNIBO – UNIVERSITY OF BOLOGNA

ATB - LEIBNIZ INSTITUTE FOR AGRICULTURAL ENGINEERING AND BIOECONOMY

EV ILVO - RESEARCH INSTITUTE FOR AGRICULTURE, FISHERIES AND FOOD

UGENT - GHENT UNIVERSITY

CERTH - CENTRE FOR RESEARCH AND TECHNOLOGY-HELLAS

AU - AARHUS UNIVERSITY

LVAT - LEHR- UND VERSUCHSANSTALT FÜR TIERZUCHT UND TIERHALTUNG GROß KREUTZ E.V.

PSYCTOTHERM - G. LIGEROS & SIA OE

PLEGMA LABS- PLEGMA LABS TECHNOLOGIKES LYSEIS ANONYMOS ETAIRIA

CRMT SAS - CENTRE DE RECHERCHES EN MACHINES THERMIQUES

TERRA - TERRA ENERGY


MG SUSTAINABLE - MG SUSTAINABLE ENGINEERING AB

CETRI - CENTER FOR TECHNOLOGY RESEARCH & INNOVATION LTD

GOLINELLI - GOLINELLI GIULIO

EAAP - FEDERAZIONE EUROPEA PER LA ZOOTECNICA

EUREC - EUREC EESV

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PUBLISHABLE SUMMARY

The work for Deliverable D7.7, titled "Report on Scientific Conferences, Publications, and Final Conferences," was conducted within the broader scope of WP7 activities related to "Dissemination – Communication – Exploitation" of project results.

Deliverable D7.7 compiles all activities undertaken by RES4LIVE partners in the following areas:

- Publications in high-impact journals focusing on agriculture, livestock farming, renewable energy, and energy efficiency
- Participation in international scientific conferences and workshops covering topics such as agriculture, livestock farming, renewable energy, and energy efficiency
- Non-peer-reviewed articles published in agriculture, livestock farming, and renewable energy magazines

The continuation of these activities has been planned beyond the project's completion.



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1 INTRODUCTION

Deliverable D7.7, titled "Report on Scientific Conferences, Publications, and Final Conferences," was developed within the framework of WP7 activities, focusing on the "Dissemination – Communication – Exploitation" of project outcomes.

This report summarizes the various actions carried out by RES4LIVE partners, including:


- Publications in high-impact journals related to agriculture, livestock farming, renewable energy, and energy efficiency
- Attendance and presentations at international scientific conferences and workshops in these same fields
- Non-peer-reviewed articles published in specialized magazines covering agriculture, livestock farming, and renewable energy

These activities are scheduled to continue even after the project's conclusion.

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2 SCIENTIFIC CONFERENCES


- **Employment opportunities in the agri-food and energy sector - INASO-PASEGES** - online conference - 18 March 2021 - AUA presented the RES4LIVE project.
- **EUBCE 2021 – 29th European Biomass Conference & Exhibition** - online conference - 26-29 April 2021 - AUA poster: RES4LIVE – Energy Smart Livestock Farming Towards Zero Fossil Fuel Consumption.
- **34th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS)** - Taormina - 28 June- 2 July 2021 - UGENT and ILVO: Modelling the energetic performance of a pig stable.
- **LivAge Action – Final Conference** - online - 9-10 September 2021 - AUA presented the RES4LIVE project.
- **12th Conference of Hellenic Association of Agricultural Engineers** - online - 21-22 October 2021 - AUA presented the RES4LIVE project.
- **Solar World Congress 2021** - virtual conference - 21 October 2021 - MG posters: a) Evaluation of a solar concentrating photovoltaic thermal collector (CPVT) in a dairy and swine farm in Europe; b) Evaluation of a solar photovoltaic thermal (PVT) system in a dairy farm in Germany.
- **Workshop on the implementation of Green Deal and Farm to Farm Strategy in the agro-food sector** - online - 10 December 2021 - AUA presented the RES4LIVE project.
- **3rd Greek AgroFossilFree Lab** - Arta, 12 May 2022 - RES4LIVE Project participated in an AgroFossilFree workshop regarding the energy consumption profile of Greek livestock facilities, the existing barriers that slow down the green transition and ideas for policy recommendations - AUA presented the RES4LIVE project .
- **1st AgroFossilFree Transnational Innovation Workshop for Greenhouses** - Athens - 14 June 2022 - AUA presented the RES4LIVE project.
- **Geosciences for a Sustainable Future** - Turin - 19-21 September 2022 - UNIBO: Investigations and modelling for a practical application of borehole thermal energy storage.
- **12th International AIIA Conference** - Palermo - 19-22 September 2022 - UNIBO: A pilot system to replace fossil energy with renewable sources in pig barns.
- **EUSEW – European Sustainable Energy Week** - Brussels - 19-23 September 2022- AUA: presented the RES4LIVE project.
- **AgEng-LAND.TECHNIK 2022 Conference** - Berlin - 22-23 November 2022 - a) AUA: RES4LIVE: Energy smart livestock farming towards zero fossil fuel consumption; b) UNIBO: A pilot system to replace fossil energy with renewable sources in pig barns; c) UGENT: Cost-effective implementation of renewable energy sources in livestock barns.
- **The XX CIGR World Congress 2022 – Sustainable Agricultural Production** - Kyoto - 5-9 December 2022 - a) UNIBO: Decarbonization livestock structures: retrofit of a pig barn using renewable sources; b) AUA: Defossilizing modern agriculture: Solutions and Pathways for Fossil-Energy-Free Farming.
- **Studienamiddag Studienamiddag: varkensonderzoek uitgelicht** (research afternoon: pig research in the spotlights) - on line - 9 May 2023 - ILVO presentation.

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- **36th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS)** - Gran Canaria - 25-28 June 28 2023 - UGENT and ILVO: Economical and Ecological Optimization of Renewable Energy Solutions for Thermal Demands of Livestock Farms.
- **ISES Solar World Congress 2023** - New Delhi - 30 October- 4 November 2023 - MSG Sustainable and UNIBO: Experimental assessment of a solar photovoltaic-thermal (PVT) system in a livestock (swine) farm in Italy.
- **IEEE International Workshop on Metrology for Agriculture and Forestry- MetroAgriFor** - Pisa - 6-8 November 2023 - UNIBO: An Integrated Renewable Energy Plant With Smart Monitoring System for Sustainable Farming.
- **PorciForum** - Lleida - 6-7- March 2024 - UNIBO: Temperaturas elevadas – Instalaciones eficientes para hacer frente al calor – High temperatures – Efficient facilities to cope.
- **6th CIGR International Conference 2024** - International Commission of Agricultural and Biosystems Engineering - Jeju Island - 19-23 May 2024 - UNIBO: Renewable Energy Based Solution for Heating Livestock Buildings: Design and Realization of a Case Study.
- **AIIA 2024: Biosystems engineering promoting resilience to climate change** - Padua - 17-19 June 2024 - AUA, PSYCTOTHERM: An integrated renewable energy system for the decarbonization of a laying hens farm in Central Greece.
- **37th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS)** - Rhodes - 30 June-5 July 2024 - UGENT: a) AUA, PSYCTOTHERM, UNIBO: Performance investigation of a dual-source heat pump for a swine nursery barn in northern Italy; b) UGENT and ILVO poster: Experimental set-up and comparison of a thermal load model for livestock barns.
- **AgEng 2024 Conference Agricultural Engineering challenges in existing and new agroecosystems** - Athens - 1-4 July 2024 - a) UNIBO: Renewable Sources and Energy Retrofitting Solutions for Microclimatic Control in Pig Barns; b) AU: Verifying the reliability of CFD domain decomposition technique on modelling the flow inside naturally ventilated cattle barns; c) CERTH: Smart Control Strategies for Optimal Environmental Conditions and Minimum Energy Requirements in Livestock Facilities; d) AUA, LTB, UNIBO, ILVO, UGENT, CMRT: Progress on Pilot Systems for Energy Smart Livestock Farming towards Zero Fossil Fuel Consumption; e) ILVO, Thermal and electrical performance evaluation of a hybrid solar system for a livestock farm in Belgium.
- **ECPLF 204, The 11th European Conference on Precision Livestock Farming** - Bologna - 9-12 September 2024 - a) UNIBO: Control of the environmental conditions in a nursery barn through a smart heating system and renewable energy sources; b) UGENT and ILVO: Heating Strategies in Farrowing Compartments: Exploring Configurational Options and the Feasibility of Solar Systems Integration.

All presentations and posters are available in the “Conferences” folder on the [RES4LIVE project website](#).

Participation in scientific conferences is expected to take place even after the end of the project.

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3 PUBLICATIONS


3.1 Peer-reviewed publications

- [Energy Use in the EU Livestock Sector: A Review Recommending Energy Efficiency Measures and Renewable Energy Sources Adoption](#) - B. Paris, F. Vandorou, D. Tyris, A.T. Balafoutis, K. Vaiopoulos, G. Kyriakarakos, D. Manolakos, G. Papadakis - Applied Sciences 2022, 12, 2142 - 18 February 2022.
- [Thermodynamic assessment of heat stress in dairy cattle: lessons from human biometeorology](#) - S. Foroushani, T. Amon - International Journal of Biometeorology - 11 July 2022.
- [Evaluation of a solar photovoltaic thermal \(PVT\) system in a dairy farm in Germany](#). - S. Hosouli, A. Loris, I.V. Pazmiño, A. Naidoo, G. Lennermo, H. Mohammadi, J. Gomes, Solar Energy Advances 2023, Volume 3 - 31 January 2023.
- [Development of a Pilot Borehole Storage System of Solar Thermal Energy: Modeling, Design, and Installation](#) - F. Tinti, P. Tassinari, D. Rapti, S. Benni - Sustainability 2023, Volume 15, Issue 9 - 30 April 2023.
- Assessment of the biochemical methane potential of in-house and outdoor stored pig and dairy cow manure by evaluating chemical composition and storage conditions - J.E. Hilgert, C. Herrmann, S.O. Petersen, F. Dragoni, T. Amon, V. Belik, C. Ammon, B. Amon - Waste Management, Volume 168, 1 August 2023.
- [Evaluation of a solar photovoltaic thermal \(PVT\) system in a dairy farm in Germany](#) - S. Hosouli, J. Gomes, A. Loris, I. Acosta Pazmiño, A. Naidoo, G. Lennermo, H. Mohammadi - Solar Energy Advances, Volume 3, 2023 - 3 January 2024.
- [Experimental assessment of a solar photovoltaic-thermal system in a livestock farm in Italy](#) - D. Murali, I. Acosta-Pazmiño, A. Loris, A. Clemente García, S. Benni, F. Tinti, J. Gomes - Solar Energy Advances, Volume 4 - 6 January 2024.

The goal of “at least 5 peer-reviewed articles”, as described in the Grant Agreement (GA), has been achieved. The publication of least 2 peer-reviewed articles is pending at the moment, and 3-5 are expected after the end of the project.

3.2 Non-peer-reviewed publications

- [Renewable energy tech for livestock production](#) - website article - 18 January 2021 (ILVO).
- [RES4LIVE: Energy Smart Livestock Farming Towards Zero Fossil Fuel Consumption](#) - Agrocapital - 19 April 2021 (AUA).
- [Perché sui tetti delle stalle gli impianti fotovoltaici](#) - Informatore Zootecnico n. 5 - 15 March 2022 (UNIBO).
- ILVO doet onderzoek naar slimme energietoepassingen - Varkensbedrijf - 23 March 2023 - Interview (ILVO).

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- [Studienamiddag: varkensonderzoek uitgelicht](#) (research afternoon: pig research in the spotlights) - website article - 5 May 2023 (ILVO).
- [Hybridizing PVT energy with heat pumps, borehole storage](#) - PV Magazine - 6 February 2024.
- [Ontdek deze live demo's tijdens de ILVO Agritechdag](#) - website article - 2 April 2024 (ILVO).
- [Durf Denken](#) - web site article - 24 June 2024 (ILVO).

4 THE FINAL EVENTS OF RES4LIVE

The final event of RES4LIVE was organized in two steps:

1. A more traditional and scientifically focused final conference was held on 3rd September 2024; the conference was organized in a hybrid format, with 35 in-person attendees, and 8 online; the session was streamed, recorded and made available on the RES4LIVE website (see below).
2. An online policy session was held on 19th September 2024 and attended by 22 participants.


4.1 The RES4LIVE Final conference

The RES4LIVE Final Conference was held on Tuesday, September 3rd, as part of the 75th EAAP Annual Meeting in Florence, Italy. This event marked the culmination of the project's research and development efforts toward achieving fossil-free livestock farming.



The conference showcased key findings and technological advancements to stakeholders, with a focus on sustainable energy solutions for intensive livestock farming. The presentations covered a wide range of innovative approaches aimed at enhancing energy sustainability in the livestock sector, including:

- A review of energy use in the EU livestock sector, highlighting recommendations for energy efficiency measures and the adoption of renewable energy sources
- The role of energy auditing in intensive livestock farming facilities
- A simulation model for renewable energy systems in livestock barns, with insights from three case studies
- The AgEnergy platform – a tool designed to search for and evaluate fossil-energy-free technologies and strategies
- Strategies for ensuring a sustainable livestock sector amid climate transition

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- An integrated renewable energy system for de-fossilizing a commercial swine nursery barn
- Heat Pump HVAC systems as part of an integrated renewable energy solution for climate control in a laying hen house
- Geothermal energy concepts for livestock applications, including analysis of energy savings, life cycle costs, and animal welfare considerations
- Life Cycle Impact Assessment of an integrated PVT-BTES-Heat Pump system for a commercial swine farm in Italy
- Modeling thermal conditions at the animal level, with a review focusing on swine and cattle
- Experimental investigation of how renewable energy transition affects thermal comfort at the animal compartment level in pig farms
- Compact Bio-CNG farm fuel production from anaerobic digestion: A look at hollow fibre permeation and hybrid compression for technically and economically viable small-scale biofuel production




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The agenda, the presentations and the video of the final conference can be found [here](#).

4.2 Online Policy Session


On 19 September, RES4LIVE held an online session presenting the policy recommendations based on the research and development efforts in the project, which focused on incorporating technological advancements and sustainable energy solutions to intensive livestock farming practices. The session began with an introduction to the project by Dimitrios Tyris, Project Coordinator (AUA). The eight policy recommendations were then presented by Anna Spoden and Nicolas de la Vega (EUREC). The policy recommendations centred around policy needs and approaches in the following focus areas:

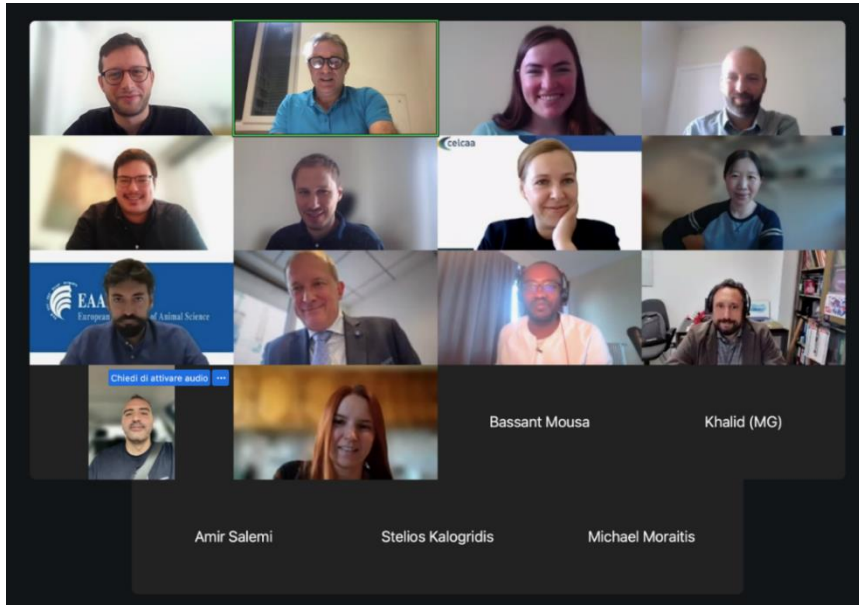
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- The Common Agricultural Policy (CAP)
- Renewable Energy Technologies (BioCNG, PVT, Heat pumps)
- Country profiles for RES4LIVE pilot farm locations: Belgium, Germany, Greece, Italy
- Agricultural Building Standards
- Diversifying farmers' income streams


Following the presentation of the policy recommendations, Anna Spoden led a panel discussion regarding the barriers and opportunities to renewables in livestock farming. The discussion featured project partners Alexander Loris (MG Sustainable Engineering), Petros Tegenaw (ILVO), and Apostolos Gkoutas (Psycrotherm). Petros Tegenaw noted the installation processes at ILVO, including the energy demands of the farm and the practical challenges which were encountered, including the limitations of the building for the space and weight of installations as well as the cost and limited availability of certified plumbers for installation. He also spoke about the national workshops and direct discussions with farmers which took place during demonstration days, which indicated that investment costs are the main hurdle for RES investment. Alexander Loris, the technical expert on PVT technology in the project, spoke about the installation process and the different systems for each farm and stressed the benefits and efficiencies of combined PVT and heat pump systems (especially by reducing grid congestion). Skills and high installation costs due to the lack of skilled workers are major barriers to uptake; for all farms, the installation cost was over the material cost. Finally, Apostolos Gkoutas explained the innovative heat pump systems completed during the course of the project as well as the benefits of combined heat storage technology (such as with PVT and heat pumps, or heat pumps and geothermal units) to combat fluctuating energy costs.

A second panel discussion followed, focused on the future of EU agriculture. Featuring Jurgen Tack (Secretary General, European Landowners' Organization) and Nelli Hajdu (Secretary General, The European Liaison Committee for Agricultural and Agri-Food Trade), the Strategic Dialogue on the Future of EU Agriculture was presented. The Strategic Dialogue was a 7-month initiative to bring together experts from across the European agri-food sectors to determine policy recommendations and align political discourse more fully in the agri-food industry. Both speakers presented the work of the Strategic Dialogue, including its recommendations for a systematic approach for benchmarking different certification systems for farming (e.g. Nitrates Directive; water quality; GHG reduction). The Strategic Dialogue also recommended specific financing measures, such as a temporary Just Transition Fund for agriculture and an EU-wide animal welfare labelling scheme. It is clear that agriculture will play a bigger role in European policy, particularly as it affects the European energy sector, economy, and trade. Yet as the Strategic Dialogue was not based on scientific fact or technical studies, it is imperative that projects such as RES4LIVE ground policy to scientific learning and technical studies. In closing, Dimitrios Tyris reflected on the need to connect the project's technical work with the bigger policy picture and to understand the project's achievements as a step forward in a longer journey towards a more sustainable EU agricultural future.

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The video of the event is available [here](#), while the agenda is available [here](#).

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5 CONCLUSIONS

Throughout its duration, the RES4LIVE project achieved the following key milestones:

- Participated in 24 conferences and workshops, delivering 30 presentations and displaying 4 posters.
- Published 7 open-access papers in peer-reviewed journals, alongside 8 articles in non-peer-reviewed journals and magazines.
- Organized the RES4LIVE final event, which brought together 65 participants, both in-person and online.

These activities are set to continue even beyond the project's conclusion, ensuring the sustained dissemination and impact of its findings.