



RES4LIVE

ENERGY SMART LIVESTOCK FARMING
TOWARDS ZERO FOSSIL FUEL CONSUMPTION

Newsletter - Issue 7

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H2020 project RES4LIVE 7th Consortium Meeting – by AUA

The 7th Consortium Meeting of the RES4LIVE project occurred on October 6, 2023, in Rome and was hosted by the European Federation of Animal Science (EAAP, Italy). This hybrid meeting allowed virtual attendance for those unable to join physically, fostering fruitful collaboration and communication among the attendees. Riccardo Carelli (EAAP) initiated and moderated the meeting, with over 20 participants representing the 17 RES4LIVE partners. Project Manager Dimitrios Tyrus (AUA, Greece) provided an overview of RES4LIVE's current stage and invited Work Package (WP) leaders to share the project's status, preliminary results, and key achievements within their respective WPs.

With the Work Packages (WP) concerning the adaptation of innovative RES technologies for livestock farms (WP1), and the market available RES and energy efficiency solutions, machinery, and practices for livestock farms (WP2) successfully completed, the meeting commenced with a focus on WP3 activities, addressing the assessment of energy flows on farms, smart control, and simulation. CERTH-iBO presented an analysis of energy demand/consumption and RES availability in typical livestock farms, while PLEGMA showcased the updated features of the smart control system and the platform for microclimate remote monitoring and actuation. Additionally, CERTH-CPERI presented initial results from the numerical platform for energy management and operations optimization. The next steps involve validating the developed platform and applying it to RES4LIVE's specific case studies.

WP4 (“Implementation and testing of the solutions in pilot farms”) identified progress in the implementation and testing of RES solutions in pilot farms. At AUA’s poultry house, the PVs and the smart control system have been successfully installed, along with the heat pump and the ventilation system. While the ventilation system underwent enhancement, further optimization is required to minimize the amount of dust it generates. Concerning the GOLINELLI farm in Italy, and the ILVO farm in Belgium, comprehensive discussions were held on RES interventions. Detailed progress updates on geothermal storage, modular heat pump, PVT system installation, energy retrofitting of the building envelope, and the smart monitoring system were presented in the case of GOLINELLI. For the ILVO farm, detailed data post-installation and commissioning of the PVT and heat pump systems were thoroughly presented. Lastly, regarding the LVAT farm in Germany, extensive information on biomethane and Bio-CNG stations was provided, along with additional data on the welfare barn tube cooling system. It was highlighted that obtaining authorization for the biogas station from German regulatory authorities continues to be a challenging issue.



AUA presented the status of the environmental, financial, and social assessment in WP5, shedding light on the ongoing activities since the last consortium meeting. A more detailed exposition of the preliminary results from the AUA poultry farm's reference system was provided for both Life Cycle Assessment (LCA) and Life Cycle Costing (LCC). In addition, insights into the modeling process of RES technologies, based on their Bills of Materials (BOMs), were shared with the RES4LIVE partners. The forthcoming phase in these activities entails a comprehensive and in-depth modeling and assessment of the project's interventions. The WP5 discussion culminated in an exploration of the developed questionnaire and the relevant data-gathering process, specifically tailored to gauge the social acceptance of the project's interventions. This comprehensive approach aims to align the solutions not only with technical and environmental parameters but also with the societal aspects, ensuring a well-rounded and impactful integration of renewable energy technologies in livestock farming.

EAAP presented clustering activities and policy recommendations for WP6, while WP7 focused on the dissemination, communication, and exploitation of RES4LIVE technological solutions. The meeting concluded with WP8's presentation, offering an overview from managerial, technical, and financial perspectives, including preparations for the 2nd Periodic Report and the Review Meeting. The Project Manager, Dimitrios Tyris, closed the meeting, expressing gratitude for the efficient collaboration and work accomplished according to the initial plan.



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2nd Review meeting – by AUA

As the initial 36-month phase of the RES4LIVE project concluded in October '23, the project's Second Review Meeting (RM) occurred on Friday, January 26, 2024, at EUREC's headquarters in Brussels, Belgium. Representatives from all 17 RES4LIVE partners participated both in person and online, delivering a comprehensive presentation on the project's progress to the REA Project Officer (PO) and two external evaluators. Following each Work Package (WP) presentation, lively discussions ensued, featuring insightful remarks and valuable suggestions from the PO and evaluators. We are delighted to report that the overall evaluation was highly positive, instilling optimism as we strive to maintain, and even surpass, the current level of work quality in the upcoming phases of the project!

2nd Greek National Workshop – by AUA

The 2nd Greek National Workshop held in the framework of the RES4LIVE project, centering on egg-laying hens, successfully convened on Thursday, December 11, 2023, at the Agricultural University of Athens (AUA). The meeting served a dual purpose: first, to present the solutions proposed by the project, and secondly, and most importantly, to identify challenges and explore alternative prospects for integrating Renewable Energy Source (RES) technologies in poultry farms. The intended beneficiaries, including egg producers, poultry farm manufacturers, policymakers in the poultry farming sector, and scientists-researchers specializing in animal production and renewable energy sources, actively participated in these discussions.

Among the diverse participants were prominent figures such as producers contributing significantly to the national turnover of the Greek egg industry (e.g., [VLACHAKIS SA](#), [MEGAFARM SA](#)), as well as established manufacturers (e.g., [ANITEC LP](#), [V. Karabinas SA](#)). The RES4LIVE project team introduced and expounded upon the proposed solutions, facilitating a comprehensive dialogue wherein participants delved into the advantages, issues, challenges, and potentialities associated with implementing RES technologies in poultry housing facilities.



A highlight of the workshop was the visit to the Agricultural University of Athens' experimental egg-laying hens facility, where innovative RES systems are currently in operation. Invited stakeholders, including the aforementioned producers, manufacturers, policymakers, and researchers, actively contributed their insights, observations, and suggestions, which will be integral to refining and advancing the RES solutions.

The outcomes of this workshop will be communicated to the European Commission (EC), laying the groundwork for substantive discussions on the necessity for new policies in the EU agri-food sector. Through these efforts, we aim to enhance the comprehensiveness, cost-effectiveness, and tailored applicability of RES4LIVE's solutions in diverse contexts.





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2nd Italian National Workshop – by UNIBO



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On the 21st of February 2024, at the premises of Bologna's Department of Agricultural and Food Sciences (DISTAL), a workshop titled "The Energy Transition in Livestock Farming: Problems and Perspectives *Co-design meeting among stakeholders*" took place. The meeting was open to stakeholders, technicians, entrepreneurs and operators in the agricultural sector and bodies and organizations involved in the energy transition process of the agro-livestock supply chain. The meeting was coordinated by Stefano Benni, Associate Professor of Rural Construction at the University of Bologna, who gave an overview of the RES4LIVE project. Presentation available [here](#). Sarah Magrini, Head of Environment and Territory Area Coldiretti Emilia Romagna, presented the point of view of Coldiretti, which brings together 1.5 million associated Italian farmers: Farms in the energy transition: concerns and requests. Presentation available [here](#). Dr. Marco Alberghini, representing Terra Viva Association of Free Agricultural Producers, articulated the perspectives of farmers, drawing from several experiences and opinions. Presentation available [here](#). Corrado Fantuzzi of STET-Agri followed, delving into the nuances of livestock building design and the evolving challenges faced by technicians and companies in the field. Presentation available [here](#). Guglielmo Golinelli, a member of the Agriculture Commission of the Chamber of Deputies and a breeder, shed light on the legislative landscape, providing a panoramic view of national policies. Presentation available [here](#). Dr. Davide Montagnini then presented the case study of his own agricultural company, a farm of 500 dairy cows, located in the Bologna plain, with a 200kW photovoltaic system which is scheduled to double, a 300 kW biogas plant powered with 30,000 t/year of wastewater, with the possibility of doubling and preparing the connection to the methane pipeline network for a possible upgrade to biomethane.

The Rural Construction Research Group at DISTAL, University of Bologna, discussed the implementation of a pilot project on renewable energy technologies in livestock farming, focusing on RES4LIVE and the Golinelli Agricultural Company.





Finally, during the round table and discussion (presentation available [here](#)), participants began with a presentation on climate-changing emissions linked to various human activities, including agriculture. They engaged in dialogue, emphasizing the significance of proposed ideas and interventions. Specifically, they stressed the need for guidelines, policies, and regulations to boost agri-food production while facilitating the integration of renewable energy sources compatible with agricultural practices. Additionally, incentives for enhancing energy efficiency in agricultural and livestock buildings were highlighted. Professor Daniele Torreggiani emphasized the importance of integrating these topics into the education and training of young agronomists at all academic levels. Finally, he illustrated the next international conference ECPLF2024, i.e. the 11th European Precision Livestock Farming Conference “PLF-Welfare-Sustainability nexus”, scheduled in Bologna from 9 to 12 September 2024. In particular, the workshop scheduled for the 9th September is presented, dedicated to the new challenges for the agricultural and livestock world, in which interested stakeholders will participate. The program and further information on the event are available [here](#).

Scientific paper on renewable energy system – by MG



© MG

MG Sustainable Engineering AB (Sweden) and the University of Bologna (UNIBO, Italy) have published a scientific paper on the renewable energy system (RES) installed at the Golinelli swine farm in Italy. The paper is published in the Solar Energy Advances journal in 2024 and describes the system design including initial insights into the RES system installed as part of the RES4Live project. MG Sustainable Engineering was responsible for designing the Solar PVT system to deliver heat to the UNIBO designed borehole thermal energy storage (BTES) system. The heat in the BTES is stored for use in the winter, and is used by a 35kW heat pump designed by Psycotherm (Greece) to deliver final space heating. The PVT system replaces fossil fuel consumption in one of the barns on the farm, utilizing electrical energy from the collectors to operate a heat pump and provide electricity to the barn. The hybrid solar system, along with energy storage, is expected to save approximately 20,850 kgCO₂ per year. The performance of the PVT system, solar central, and BTES is rigorously analyzed to evaluate its overall performance and its capability to reduce carbon emissions and replace fossil fuel consumption in the agricultural sector. The partners involved in this installation are now monitoring and performing an environmental, economic, and technical evaluation. [Here you can read the full article.](#)

RES4LIVE project at AGROTICA exhibition – by CERTH

Our Project's current progress and results have been presented over the 4-day [AGROTICA exhibition](#) which took place in Thessaloniki, Greece in the past February. Farmers, researchers and students had the chance to be informed about RES4LIVE's activities by our partners in iBO/CERTH. AGROTICA is the leading exhibition event for the agricultural economy in the Southeast Europe, takes place every 2 years and is visited by more than 150,000 people.



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Partner team: EAAP, UNIBO and Golinelli

European Federation of Animal Science (EAAP)



The European Federation of Animal Science (EAAP) is a federation whose members are national organizations working in the animal science sector from 35 countries of Europe and the Mediterranean area. EAAP has extensive experience in the promotion of scientific research and its dissemination and application into practice. EAAP has also a long tradition in the development of dissemination tools, training activities for scientists and the organization of international conferences. Moreover, EAAP has extensive experience in publishing both at a scientific and technical level. EAAP has been responsible for communication, dissemination and knowledge transfer activities within more than twenty EU-funded projects – since FP6 – and technical themes. By developing online channels such as websites and social media, EAAP facilitates access to data and knowledge for scientists and technicians from all over Europe and the rest of the world. EAAP has a large database with more than 6.000 contacts of scientists and research institutes active in the field of animal science, coming from European and Mediterranean countries. EAAP has also 11 Study Commissions and several Working Groups focused on analysing and managing issues related to different aspects of animal science and the livestock industry. EAAP is co-founder and co-owner of the academic journals *Animal* and *Animal Frontiers*. *Animal*, the international journal of animal biosciences has been recognised with a 2021 Impact Factor of 3.730, ranking 8/63 in the Agriculture, Dairy & Animal Science category and 10/144 in the Veterinary Science Category. While, *Animal Frontiers*, reached an Impact factor of 6,762 which put this journal as 2nd in the 63 ranked journals of Agriculture, Dairy & Animal Science category. In the TechCare project, EAAP is in charge of leading Work Package 7 – “Dissemination, communication and exploitation of results”. To know more about EAAP visit [the website](#).



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University of Bologna (UNIBO)



UNIBO -Department of Agricultural and Food Sciences

The Alma Mater Studiorum – Università di Bologna, the oldest university in the Western world, paves the way for innovation through an increasingly rich programme catalogue, cutting-edge research, a constant and increasingly broad international perspective and a strong third mission. Since it was founded 1088, the Alma Mater Studiorum has been student-centred, hosting prominent figures from the science and arts communities. With five campuses (Bologna, Cesena, Forlì, Ravenna, Rimini) and a branch in Buenos Aires, it offers a diversified course catalogue that is tailored to the needs of present-day society: over 200 degree programmes among its 31 departments and 5 schools are offered to over 82,000 students. 3,600 graduates are enrolled in PhDs and other 3rd-cycle

programmes. Ranked in the top 200 on the two most prestigious international university rankings, the Alma Mater is considered the leading university in Europe for student mobility (Erasmus+). One of the most active in terms of leadership and participation in European research and academic cooperation projects, the University of Bologna has formed alliances with industry and public/private organizations. It is also a hub of international networks: beyond its close European links, it enjoys multiple connections with America, Africa, Asia and Australia.

UNIBO participates in RES4LIVE through the Department of Agricultural and Food Sciences (DISTAL) and the Department of Civil, Chemical, Environmental and Materials Engineering (DICAM) Distal is a leading institution with a strong commitment on research and knowledge transfer and high rates of approved projects in competitive calls. Its research encompasses Agricultural Engineering, vegetable and animal production, food science and technology, and economics. The main mission of DICAM is to carry out advanced research in the sectors from the design, construction and operation of structures and infrastructure, to the study of the materials with which they are made and on which they are based, up to their insertion in and impact on the territory.

The Research Team has expertise in the design, monitoring, and analysis of farm buildings and the relevant equipment and in geothermal energy. Moreover, it got expertise on the application of renewable energy systems to the farming sector, with focus on numerical modelling and design. The Team has developed several experimental installations in different typologies of farm buildings and has signed several agreements with livestock farms and companies of the agri-food and energy sectors.



Supervision by UNIBO of RES4LIVE installations in Italian farm: Francesco Tinti is checking the collectors



Within RES4LIVE, UNIBO Team is in charge of coordinating the activities concerning the Italian pilot farm, where it coordinated the planning of the integrated RES system and designed a geothermal storage plant and the energy retrofitting of a farm building. UNIBO supervised then the installation of the systems and is currently collecting and processing the data about the performances of the RES solution adopted. Moreover, UNIBO is responsible of carrying out national workshop in Italy for the co-design through stakeholders engagement: two out of three events have already taken places and the third one has been planned. Finally, besides the involvement in the project management and in manifold tasks, UNIBO is responsible for the Inventory of best practices of RES4LIVE in livestock farms, which is currently ongoing.



*From left to right: Stefano Benni, Marco Bovo, Daniele Torreggiani, Patrizia Tassinari, Alberto Barbaresi, Enrica Santolini
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Golinelli Farm (Golinelli)



Aerial view of the farmyard.

AZ. AGR. GOLINELLI GIULIO is an historical farm in the Modena plain area since 1948. It mainly operates in the cereal crops sector and breeding pigs for breeding and fattening, in compliance with the Protected Designation of Origin specification and attentive to animal welfare and biosafety standards. In the 2000s he supported the idea of photovoltaics by collaborating with a company producing energy from renewable sources. The farm is in continuous development and therefore in search of self-sufficient energy solutions and production techniques with low environmental impact. The Golinelli farm in Mirandola is run by the brothers Giacomo, Guglielmo, Gilberto and Gregorio, together with their father Giulio and uncle Gabriele. The company is located on the

Falconiera historic farmland. According to historical reconstructions, the lands were cultivated since the Bronze Age and maintained in the era of Roman domination and only in the late Middle Ages they passed to the Pico family (whose best-

known exponent is the philosopher Giovanni Pico della Mirandola), who made these lands with crops and livestock until the eighteenth century. In 1948 the land of the farm was purchased by great-grandfather Attilio Golinelli and grandfather Ruggero, the forefathers, then conducted until 2007 with immense dedication by his grandfather flanked by his three sons Giorgio, Gabriele and Giulio. Today it is administered by the fourth and young generation of the Golinelli brothers.



Farmers with tractors and friends

The company ranges from the breeding of heavy pigs, whose destination is the PDO Parma ham, to the specialized cultivation of melons, watermelons, pumpkins and tomatoes, as well as to the haymaking and the cultivation of cereals as in the best Emilian agricultural tradition. The pigs are appreciated and rewarded for the virtue of their meats, as they are



Equipment of Golinelli farm

scrupulously bred to guarantee genuine food for young and old consumers. The farm's production ethics focuses on integrated control, on the reduction of the use of chemicals, on water saving and on km 0. The farm philosophy is oriented towards sustainability, innovation and respect for the agricultural tradition of the territory. The farmers believe that quality is an investment that starts from love for nature, good soil fertility, animal welfare and the enhancement of traditional genetics. The work has its deep roots in the family, in the passion and commitment that for four generations has led towards excellent, healthy and genuine agricultural production.





Golinelli Farm represents a pilot case therefore it is mainly involved in WP4 "Implementation and testing of the solutions in pilot farms". However, the partner is also involved in the other Work Packages, especially where the consultation of commercial is required. The farm has indeed contributed to WP6 "Clustering through stakeholders engagement", with particular reference to the preparation of and the active participation in the Italian workshops.



Golinelli team © all pictures Golinelli

Coming events

List of the upcoming events with RES4LIVE project partners' attendance.

EVENT	DATE	LOCATION	PARTNERS INVOLVED
			
CIGR 2024	19 – 23 May 2024	Jeju, Korea	UNIBO
InterSolar 2024	19 – 21 June 2024	Munich, Germany	MG
AgEng 2024	1-4 July 2024	Athens, Greece	AUA, UNIBO
EuroSun2024	26 – 30 August 2024	Limassol, Cyprus	MG
75th EAAP Annual Meeting	1 – 5 September 2024	Florence, Italy	AUA, CERTT, ATB, LVAT, UNIBO, UGENT, AU, ILVO
ECPLF 2024	9 – 12 September 2024	Bologna, Italy	AUA, UNIBO

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