Policy Brief No10

Building Management Systems (BMS) for Agricultural Constructions

What is the challenge?

- Most agricultural constructions **lack advanced control systems**, leading to inefficient energy usage and high operating costs.
- Maintaining optimal environmental conditions for livestock facilities and greenhouses is a **major challenge without an appropriate monitoring and control system**.
- Barn environmental conditions impact the **livestock health and productivity**, while in greenhouses climate control plays also significant role for the **plant stress and final yield and quality**.
- **Excessive consumption of water** due to the lack of efficient water management strategies and technologies leads to waste and increased water scarcity concerns.
- Farmers often **lack real-time data insights** to optimize resource allocation, identify inefficiencies, and make informed decisions.
- **Lack of awareness** among the farmers regarding the benefits and potential cost savings associated with implementing BMS.
- Farmers are usually **reluctant towards installing BMS** and associated infrastructure due to the high upfront costs of implementing both a BMS and retrofitting outdated infrastructure.
- **Lack of technical expertise** is another challenge, as it is not readily available within the livestock industry, making it challenging for some facilities to adopt these systems.
- **Lack of regulations / incentives** that encourage the implementation of BMS in livestock facilities.

Policy Recommendations

Even though livestock facility owners rely on traditional practices and expertise acquired through years of experience, having set long-standing practices and cultural norms that prioritize manual operations over automated systems like BMS, the benefit of deploying efficient BMS for their facilities is significant. To tackle the existing challenges and increase the adoption of BMS we recommend:

- Provide incentives for farmers to install BMS in their livestock facility to have a **clear view of energy consumption in the current status**, assist in fast and precise **energy audits** (See Policy Brief "Farm Energy Audits") and provide evidence of the impact on energy consumption of any intervention proposed by the auditor.
- Since most farms already have control systems in their agricultural facilities (e.g., irrigation systems, feeding systems, waste management systems), **incentives for integrating them into a holistic BMS** should be given for comprehensive and integrated control.
- Offer **financial incentives** (e.g., grants, subsidies, or tax benefits) to assist livestock facility owners with the required initial investment of installing BMS, in order to promote widespread adoption.
- Raise awareness through **training programs and campaigns** which educate livestock facility owners about the benefits of BMS, including energy savings, improved animal welfare, and reduced environmental impact.
- Develop and enforce **regulations mandating the implementation of BMS** in new livestock facility constructions or major renovations (e.g., establishing energy efficiency and environmental performance standards that include the use of BMS), incentivizing compliance through rewards.
- Allocate **funding for research and development** initiatives focused on developing and applying BMS technologies in livestock facilities. More specifically, finance R&D for optimisation of existing BMSs for other uses (i.e., commercial and industrial buildings) to **cover the needs of agricultural buildings** that have specific characteristics (e.g. high humidity in both livestock facilities and greenhouses, significantly increased temperature during summer period, high amounts of dangerous gases and odours from waste for animals' well-being, different climatic needs for plants and animals based on the period of the season, etc.). In addition,

finance R&D for **cheap sensors** needed for climate and well-being control that are not easily affected by high humidity, excessive heat, gases, and dust.

- Provision of **free governmental technical assistance and guidance** to livestock facility owners regarding the planning, installation, and operation phases of BMS through training workshops, consulting services, and access to expert advice to address any technical challenges or concerns.
- Foster partnerships between government agencies, industry associations, technology providers, and financial institutions to **create a supportive ecosystem for BMS adoption**, as a common workplace that allows sharing of best practices, case studies, and success stories that demonstrate the benefits and feasibility of implementing BMS in livestock facilities towards defossilisation in agriculture.

Expected Impacts

- BMS may optimize energy consumption in livestock facilities, resulting in **potential energy savings of up to 30%**.
- Precise monitoring and control of environmental conditions for livestock (e.g., temperature, humidity, hazardous gases) through control of Heating, Ventilation, Air Conditioning (HVAC) and creating optimal conditions for livestock, leading to **improved productivity and reduced mortality rates**.
- Possible **integration of BMS with waste management systems** could increase the profit of farmers, with simultaneous reduction of greenhouse gas emissions from the timely waste extraction and the optimum feed to anaerobic digesters.
- Implementation of **water management strategies through BMS utilisation**, including monitoring and using water-efficient equipment, minimizing water consumption and reducing reliance on fossil fuel-driven water pumping and treatment processes.
- Data-Driven Decision-Making utilizing data collected and analysed by the BMS would allow farmers to make **informed decisions, optimize resource allocation, and identify inefficiencies** for more sustainable practices.
- **Integration and maximization of RES** through the BMS (e.g., solar panels) would be possible, reducing reliance on fossil fuel-based electricity.

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