The Role of Energy Management in the Agricultural Sector: Key Prerequisites and Impacts

Ketija BUMBIERE, Sanita SEREDA,
Jelena PUBULE, Dagnija BLUMBERGA

Biosystems Engineering 2023

11.05.2023.

CO_2 DEAL

Project objective:

develop a roadmap for decision makers on effective valorisation of CO_2 in regions of Latvia in an environmentally sound, resilient and businessbased manner in connection with low-carbon circular economy principles.

Latvia's shrinking regions will have a positive effect on

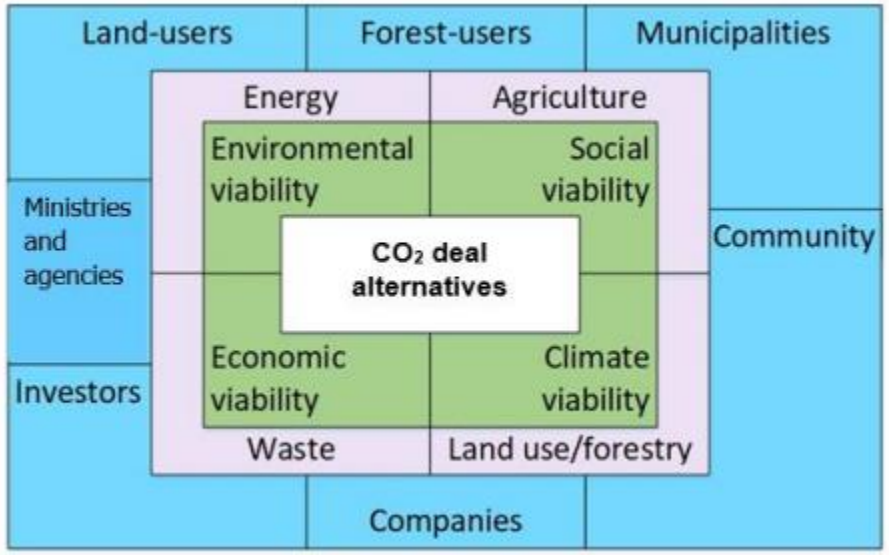
mitigation of climate change,

environmental pollution prevention,

regional economic growth potential,

social welfare and technological acceleration

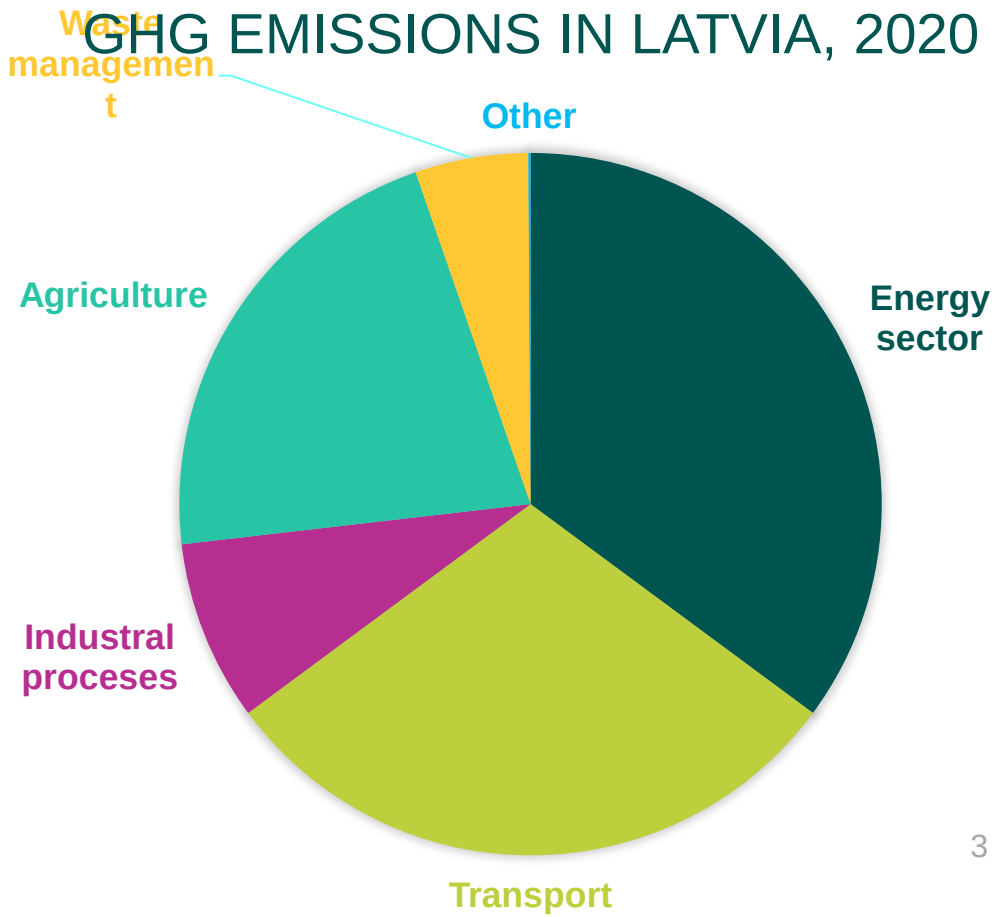
from implementation of CO_2 valorisation technologies.



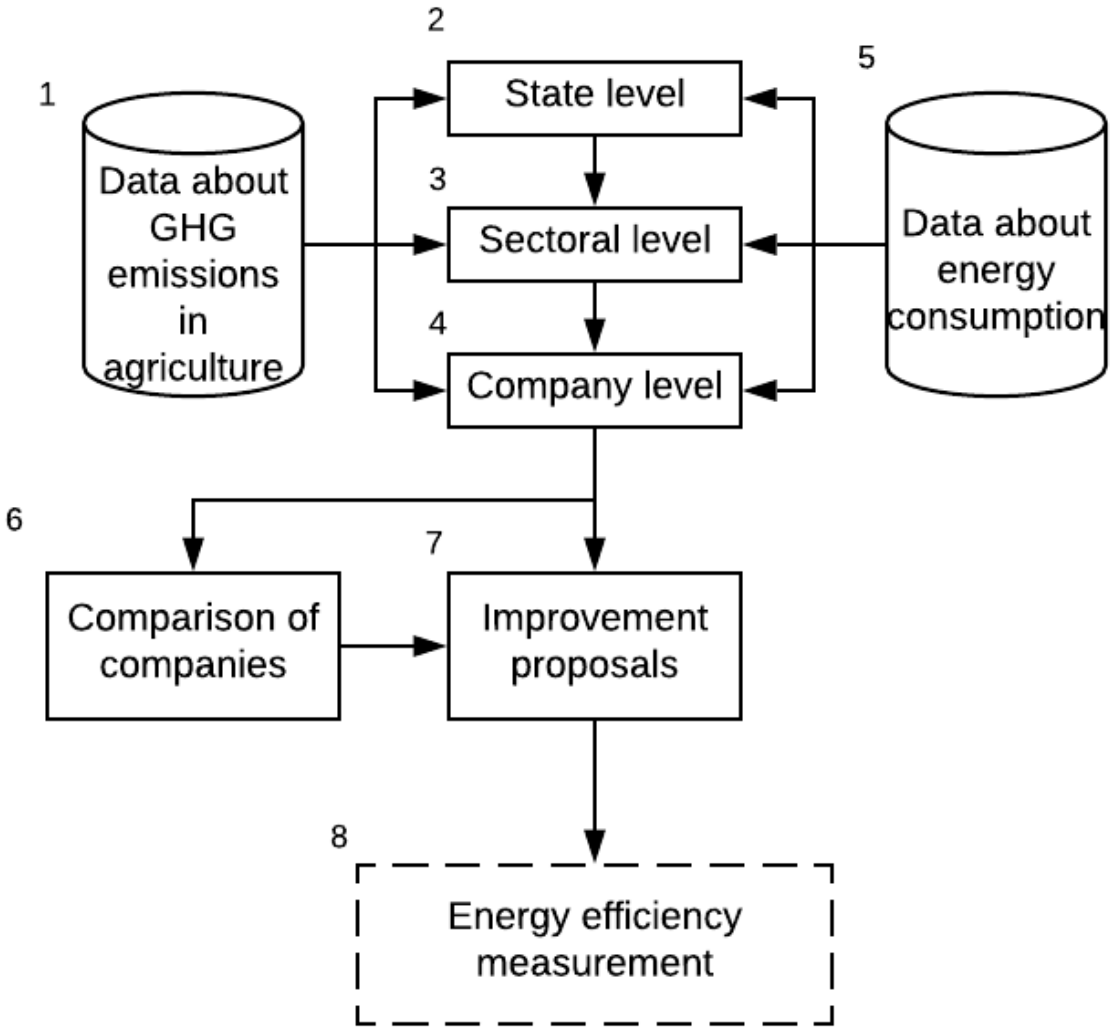
TOPICALITY

Sustainable agriculture to reduce GHG emissions and increase energy efficiency through energy management is a crucial strategy to tackle climate change

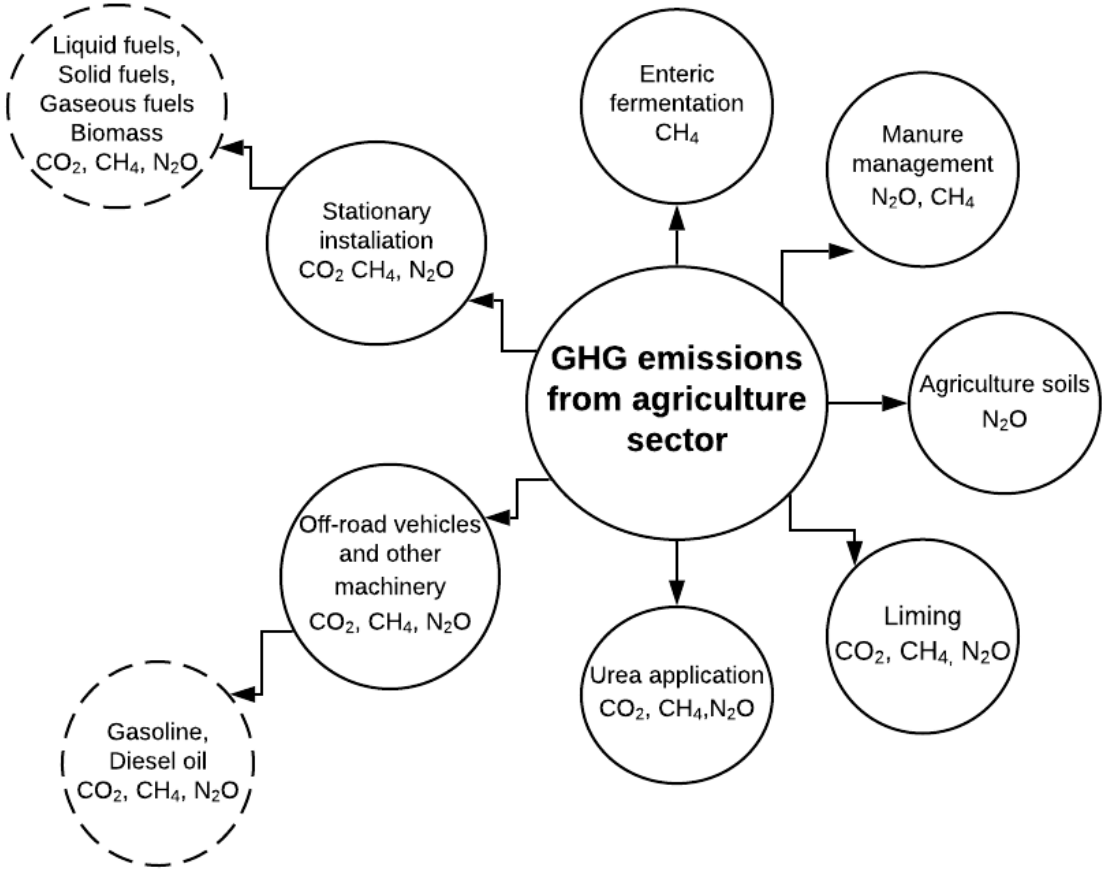
- Agriculture is one of the most energy-consuming sectors in the EU's economy;
- Energy production and consumption is the primary source of greenhouse gas (GHG) production not only in Latvia but also in Europe;
- Part of these emissions was created by the agricultural sector + the agricultural sector generated 21.5% of total emissions in Latvia in 2020, including indirect CO_2 emissions;



METHODOLOGY



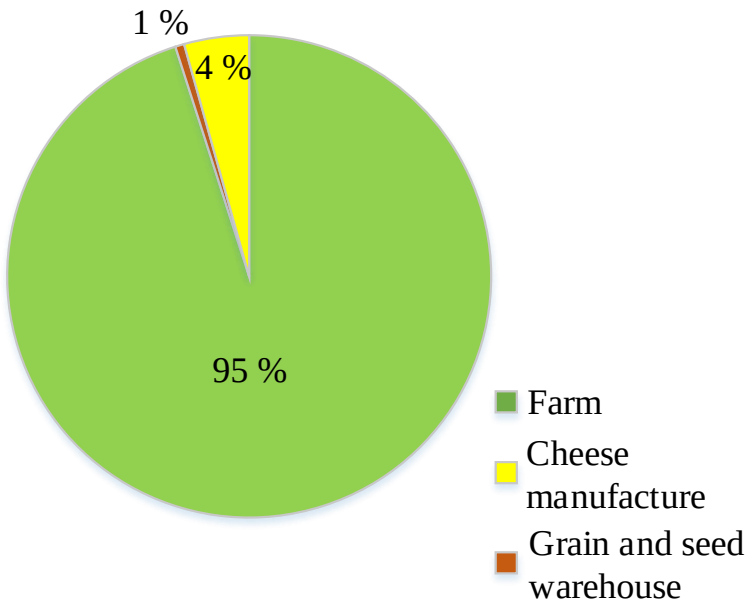
THE AIM OF THE RESEARCH



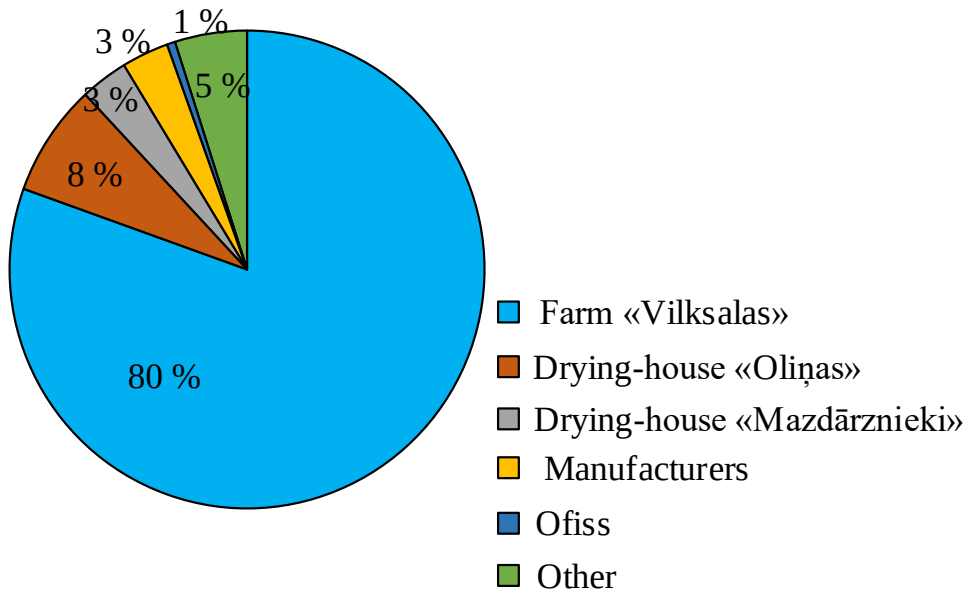
- To measure the potential energy and emission savings from implementing energy management actions;
- To propose a framework for the energy management system in the agricultural sector on a company level.

SHARE OF ELECTRICITY CONSUMPTION BY SECTORS

COMPANY ”A”

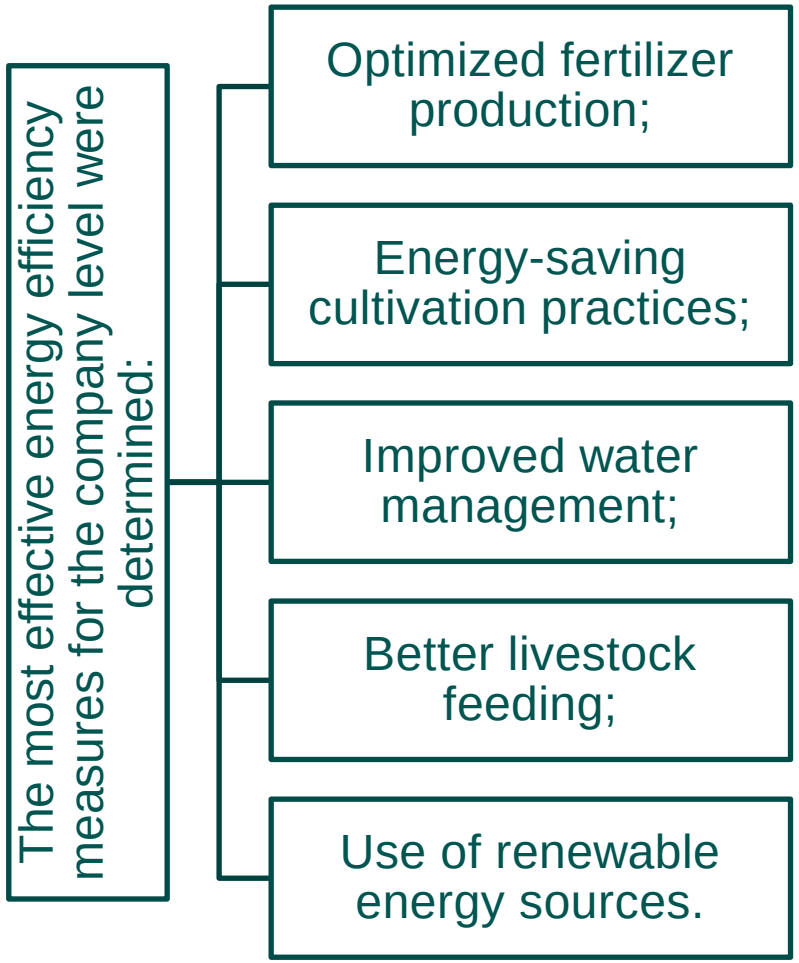


COMPANY ”B”



RTU IESE

RESULTS FROM LITERATURE REVIEW



All found information was summarised and applied in companies, thus proving the efficiency of the developed measures.

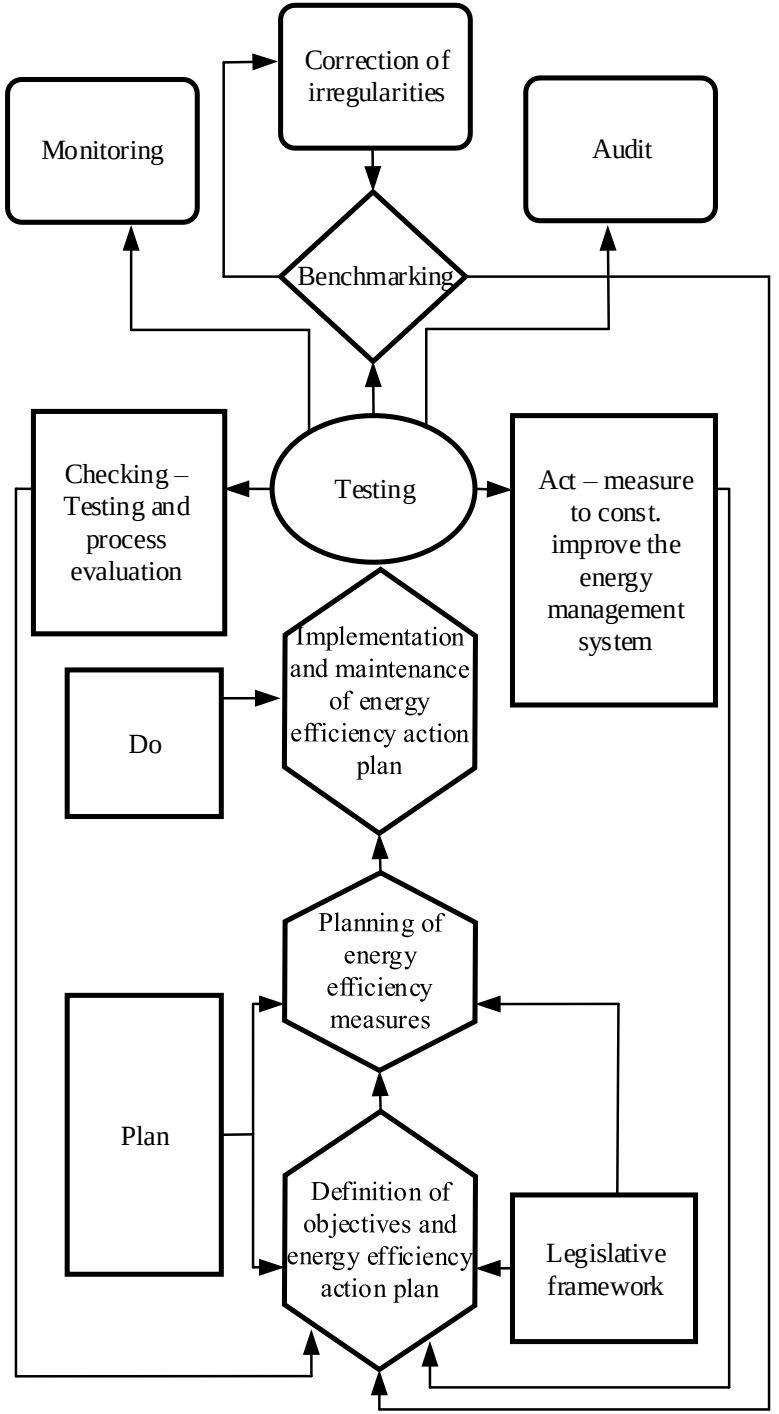
By introducing these measures, the emission level, the consumed energy, and resources, also expenses can be reduced.

7

ENERGY MANAGEMENT FRAMEWORK

FOR THE AGRICULTURAL SECTOR

ON THE COMPANY LEVEL



EASY-TO-IMPLEMENT PROPOSALS FOR ENERGY SAVINGS

Company ”A” – 14% savings

- ☐ Replacing inefficient lighting systems with new efficient ones;
- ☐ Use of fuel-efficient tires (if replaced by ten vehicles);
- ☐ Use of engine lubricants (if used in 10 vehicles).

Company ”B” – 20% savings

- ☐ Use of fuel-efficient tires (if replaced by ten vehicles)
- ☐ Pump replacement

9

EASY-TO-IMPLEMENT PROPOSALS FOR GHG EMISSION REDUCTION

Company ”A”

- [ ] A transport use with a hybrid-type energy system

Company ”B”

- [ ] Manure and agricultural residues transferred to bioenergy production facilities
- [ ] Use transport with a hybrid-type energy system
- [ ] Use of control systems for fuel economy.

10

RESULTS

If the agricultural companies implemented the GHG emission reduction measures, the emission level would decrease by about 43%.

However, it is possible to conclude that there is not one specific recipe that all companies should follow because each, depending on the company's level of development, operational specifics, and applied practices, needs to individually develop a plan for reducing emissions and increasing energy and resource efficiency to achieve maximum productivity at the lowest costs and emissions.

CONCLUSIONS

The energy management system can and should be implemented by agricultural companies;

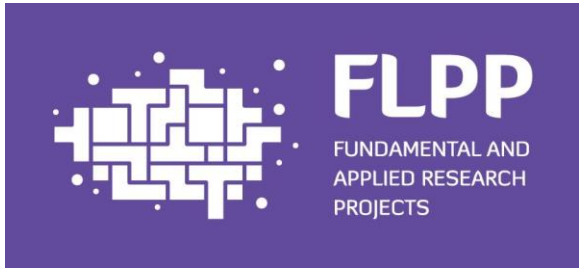
It would reduce energy consumption, optimise costs, and reduce GHG emissions;

The surveyed companies should follow the initial monitoring of energy consumption data to understand where electricity and heat are consumed the most and the potential for reducing this amount;

It would be advisable for agricultural companies to install an intelligent energy system (a sustainable energy supply system that contains information on energy consumption and options for reducing it based on monitoring the system's performance);

Policy and agricultural guidelines should focus on optimizing farming and manure management.

This research is funded by the Latvian Council of Science, project CO_2 Deal: Effective Valorisation of CO_2 for Decarbonised Regional Development, project No. lzp-2020/1-0302



Institute of Energy Systems and Environment

Prof., Dr.sc.ing. Jelena Pubule
jelena.pubule@rtu.lv