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Spatial energy data acquisition for agricultural sector. Latvia case study

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LATVIJAS ATJAUNOJAMO ENERGORESURSU RAŽOŠANAS UN IZMANTOŠANAS EKONOMISKĀ POTENCIĀLA NOVĒRTĒJUMS UN POLITIKAS REKOMENDĀCIJU IZSTRĀDE

27.12.2021

THE AIM OF RESEARCH

Analyse in-depth sectoral data about energy consumption by region and identify different types of energy used for different agricultural processes

The agricultural sector is one of the **most energy-intensive sectors**, and agriculture (including forestry) accounts for **18.4% of total global GHG emissions**

According to 2015 data, the agricultural sector in Europe produces **11% of GHG emissions**

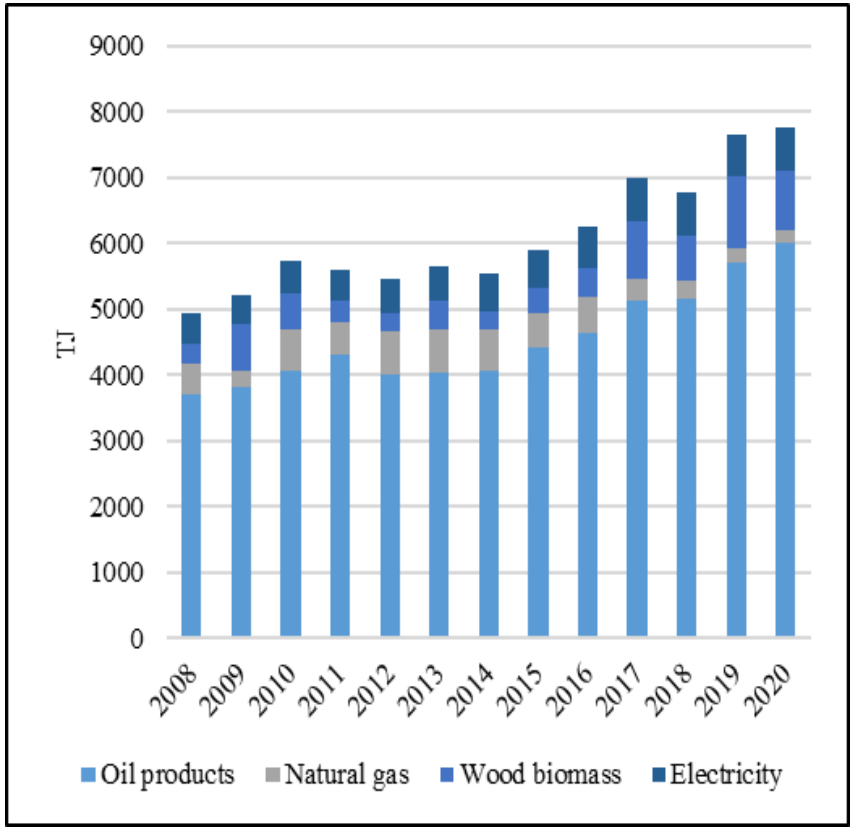
60% of all agricultural emissions **come from livestock**, most from dairy and beef cattle (80%), followed by pig farming (16%) and poultry (4%)

In Latvia the average **usable land per farm has increased** from 19.6 ha (in 2010) to 26.0 ha (in 2019)

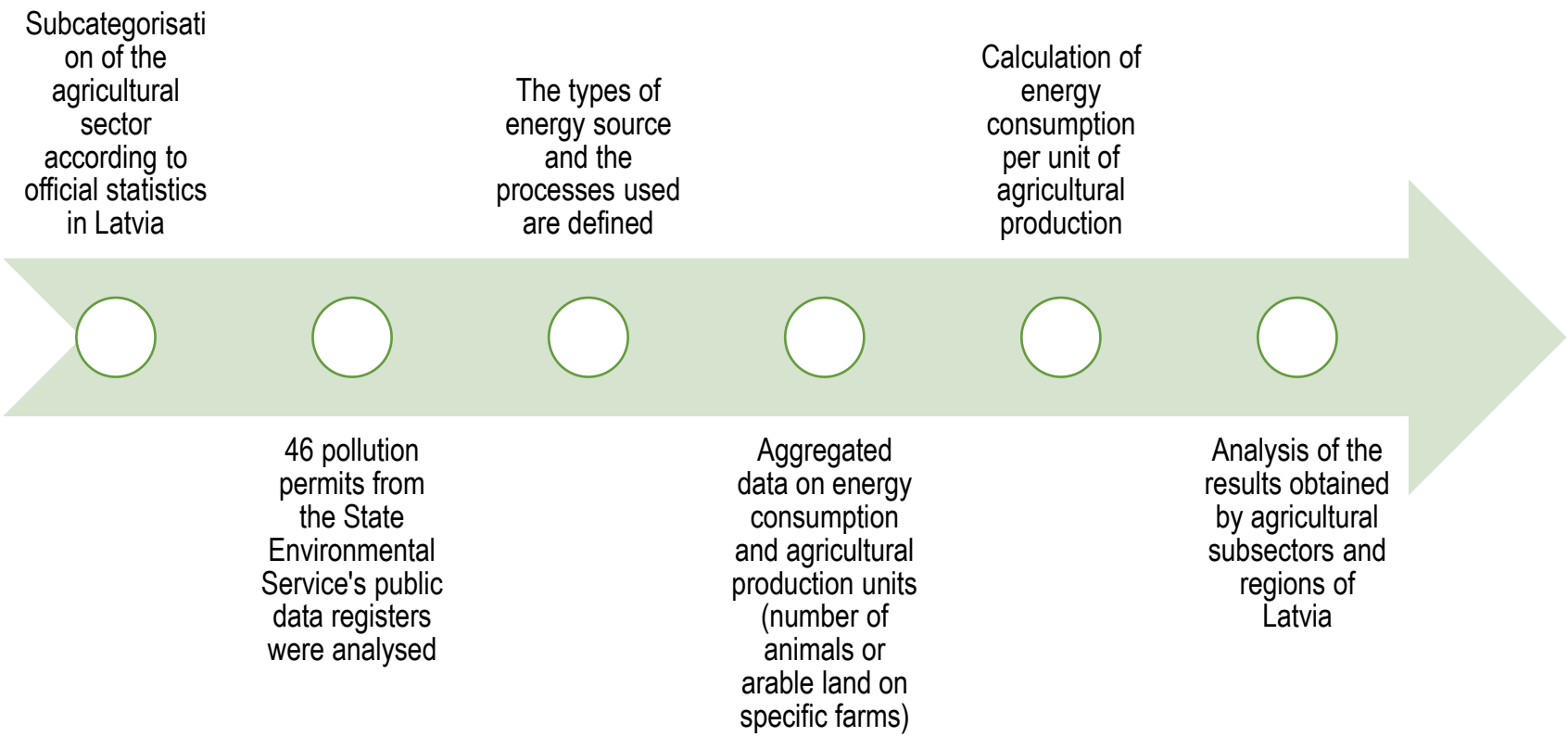
In Latvia agricultural land accounts for **36%** or 2.32 million ha (2017)

In Latvia agricultural sector in 2017 consisted of crop production (43%), dairy farming (15%), pig and poultry farming (6%), and mixed crop and livestock production (15%)

Energy balance data about consumed energy in the agricultural sector show that total **energy consumption has increased** from 5062 TJ in 2008 to 8526 TJ in 2020

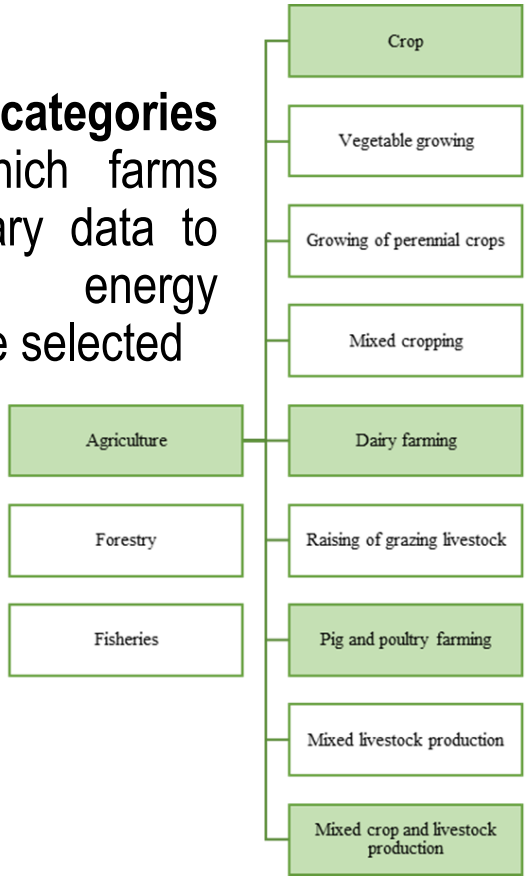


METHODOLOGY (I)

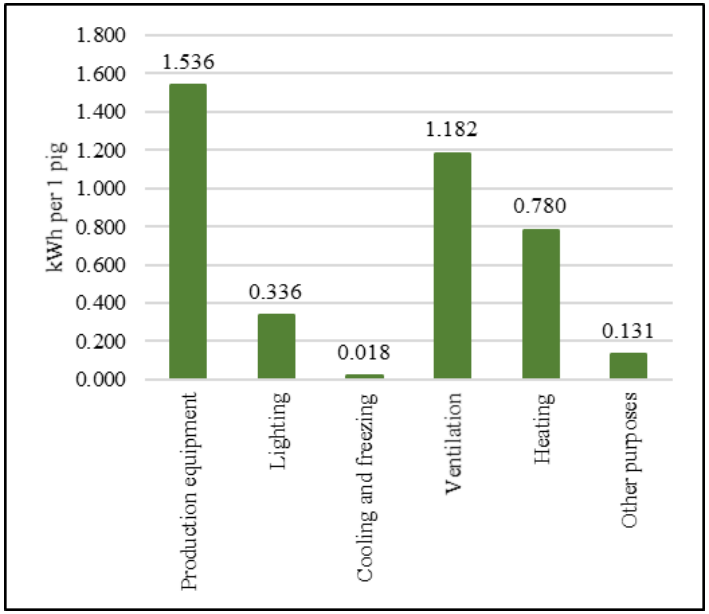


METHODOLOGY (II)

Agriculture sub-categories according to which farms with the necessary data to determine energy consumption were selected



From the data on several pig farms, the **average value for each process was determined**, and the electricity consumption per pig was expressed

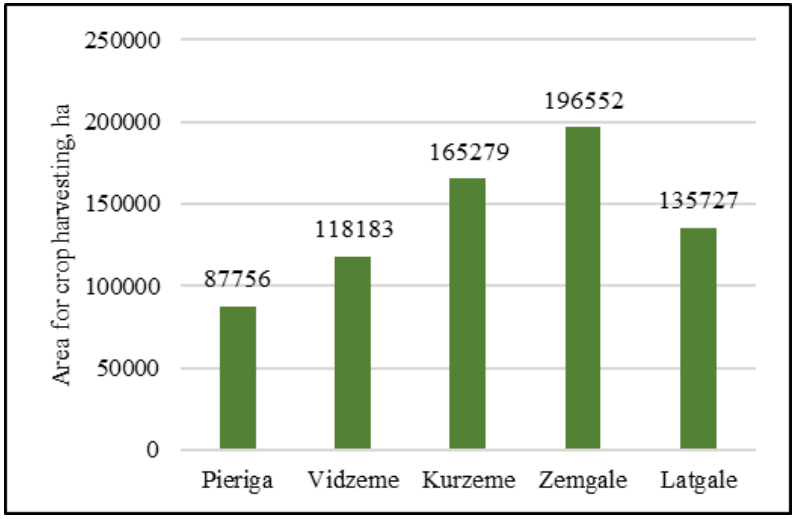


Crop agricultural

The **primary fuels** used in crop harvesting are natural gas, diesel, fuel, wood, and biogas

Energy is mainly used for **production processes and heating**

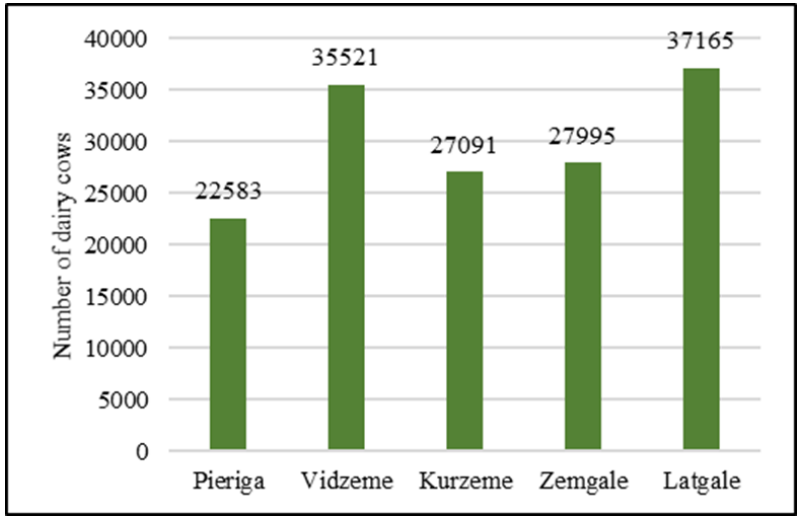
Crop production (ha) in Latvia was 703 498 ha in 2017



Dairy farming

Electricity is consumed for milk cooling, milk harvesting, water heating and pumping, lighting, and other processes

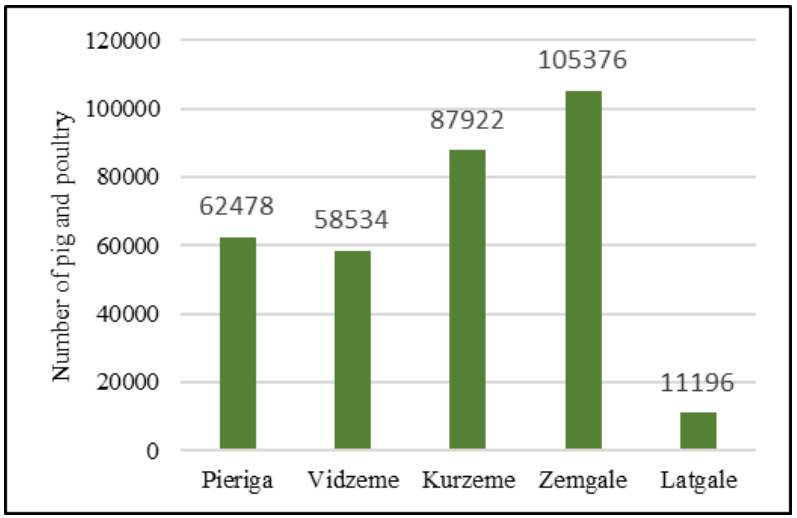
The **most energy-intensive process** results differ, as some researchers believe it is a **milk cooling process**, but others indicate that **milk harvesting or water heating** consumes the most electricity



Pig and poultry farming

In Latvian, data about pig farming and poultry farming is defined as one sub-sector

Pig farming is widespread in Zemgale and Kurzeme, but **poultry farming** is widespread in Zemgale and Pieriga



Mixed crop and livestock production

There are no more in-depth statistics regarding this subsector available

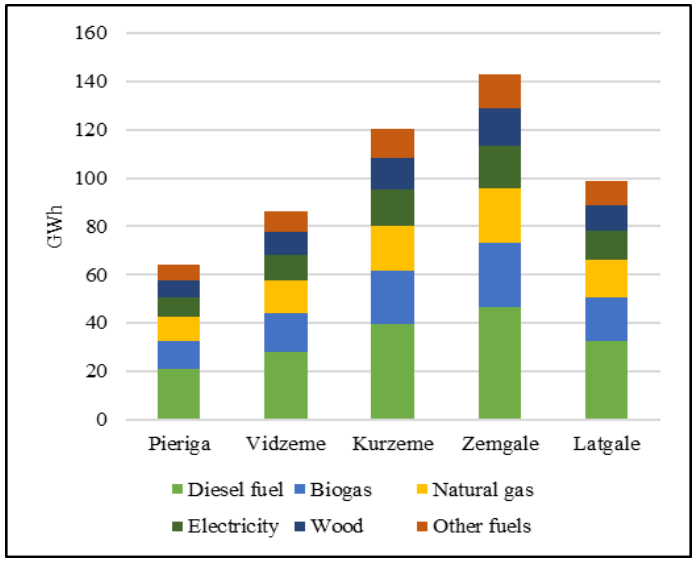
The majority of the mixed agriculture sub-sector in Latvia is **pig farming with additional crop production**

Number of **farms varies from year to year** - in 2010, there were 10 814 farms, but in 2013 there was an increase to 12 257 farms

In 2016, mixed farms decreased to only 10 319 mixed agriculture farms

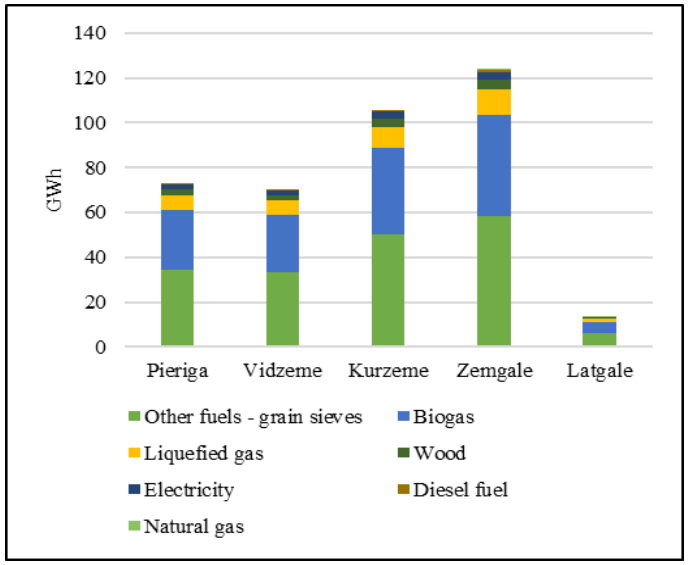
RESULTS (I)

Zemgale (143 GWh) and Kurzeme (120 GWh) consume the most energy **in crop sub-sector**, with **diesel** (167 GWh) and **biogas** (95 GWh) as popular energy sources for crop production



Crop sub-sector energy consumption

In the **pig and poultry subsector**, Zemgale (124 GWh) and Kurzeme (106 GWh) consume the most energy and commonly used energy sources are **grain sieves** (183 GWh) and **biogas** (140 GWh)



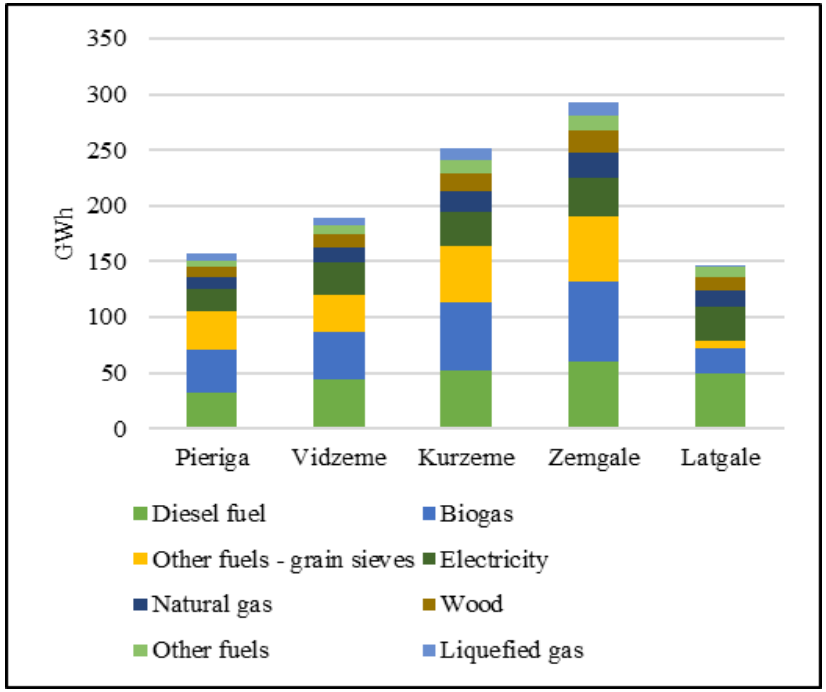
Pig and poultry farming sub-sector energy consumption

RESULTS (II)

In Latvia in agricultural sector **diesel, biogas** and other fuels such as grain sieves, and electricity are the most consumed energy sources

Kurzeme and Zemgale **have higher energy consumption** in the agricultural sector, as **crop and pig farming** are popular agricultural sub-sectors in these regions

Data on energy consumption by the agricultural subsector were compared and validated with the agricultural sector data from the 2017 Latvian Energy Balance **showing the coincidence of total consumption**



The energy consumption of the agricultural sector by region of Latvia

CONCLUSION

- Zemgale region **consumes 35% of the total energy used** in the agricultural sector, and the most **popular sub-sector is crop production** (36% of country's crops are produced), and 35% of all diesel fuel is consumed in agricultural processes
- Kurzeme region **consumes 26% of total energy**, and region produces 26% of all crop production
- The Latgale region **consumes the least energy** in the agricultural sector, accounting for only 11% of the country's total. **Dairy farming is widespread** in the region, with 25% of the country's dairy production
- Vidzeme is accounting for **24% of the country's dairy production**. Electricity consumption in Latgale and Vidzeme regions is higher than in other regions due to the **large amount of electricity consumed in the dairy sector**
- The Pieriga region has average values in the agricultural subsector, but **poultry farming is widespread** in this region and accounts for 36% of the total subsector
- The obtained data can be further **used in a more complex modeling tool**, such as system dynamics models, which allows **forecasting different development scenarios** for the agricultural sector

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