# TWG Bioenergy and New Value Added Materials

Anita Srdarev & Biljana Kulišić

Ministry of Agriculture & Energy Institute Hrvoje Požar

Croatia

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virtual

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## Croatian Ministry of Agriculture (MPS)

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- Role: overall coordination and support

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- Role: expert support

# TERMS OF REFERENCE

**Develop bioenergy business models that serve defosilization and increase competitiveness of BioEast bioeconomy stakeholders.**

- Embed the existing and future bioenergy players into bioeconomy by:
  - finding new value added materials from bioenergy by-products (waste energy, ash, digestate, CO2, sulphur)
  - create industrial symbiosis (e.g. freshwater pike farming & digestate, detergent & ash, CO2 and food preservation…)
- Identify research topics that are distinctive for BioEast macro-region
- Coordinate with Ministries and BioEast Initiative
- Apply for research funds on specific topics to *deliver knowledge-based, evidence-based concerted policy on bioenergy within bioeconomy*

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# SRIA IN TERMS OF REFERENCE

**ToR: Develop bioenergy business models that serve decarbonisation and increase competitiveness of BioEast bioeconomy stakeholders.**

**SRIA:** Bridge over bioenergy demand (energy sector) with biomass supply (agri-food, forestry)

- Embed the existing and future bioenergy players into bioeconomy by:
  - finding new value added materials from bioenergy by-products (waste energy, ash, digestate, CO2, sulphur)
  - create industrial symbiosis (e.g. freshwater pike farming & digestate, detergent & ash, CO2 and food preservation…)
- Identify research topics that are distinctive for BioEast macro-region
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# LIVESTOCK SECTOR AND GHG EMISSIONS IN THE BIOEAST MACRO-REGION

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# AGRICULTURE AND FORESTRY ACT AS A GHG SOURCE AND SINK – HOW TO HELP THEM?

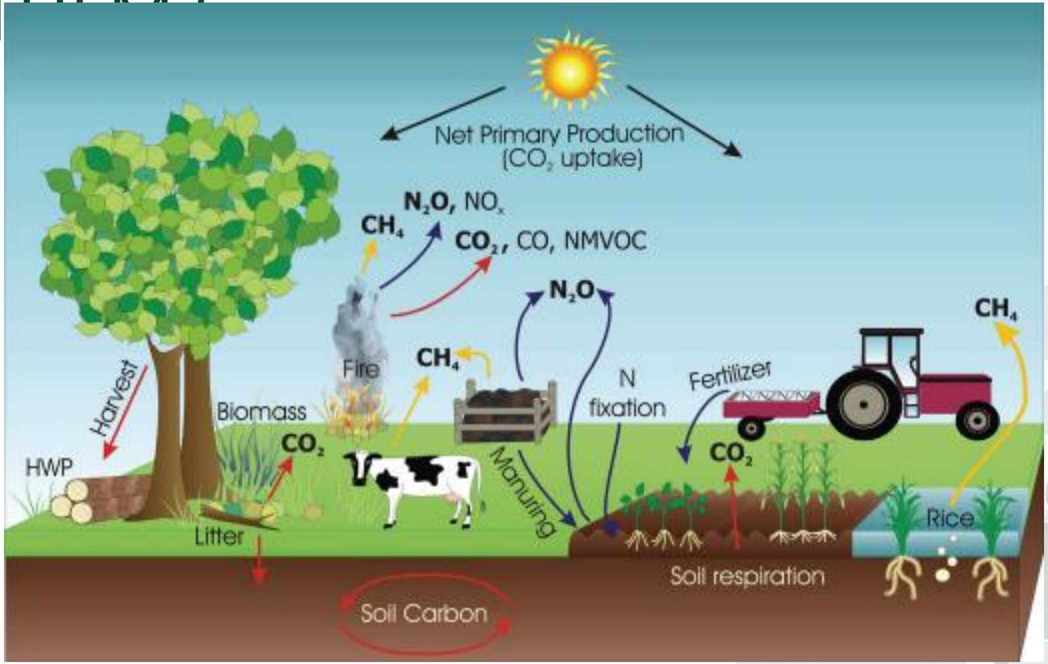
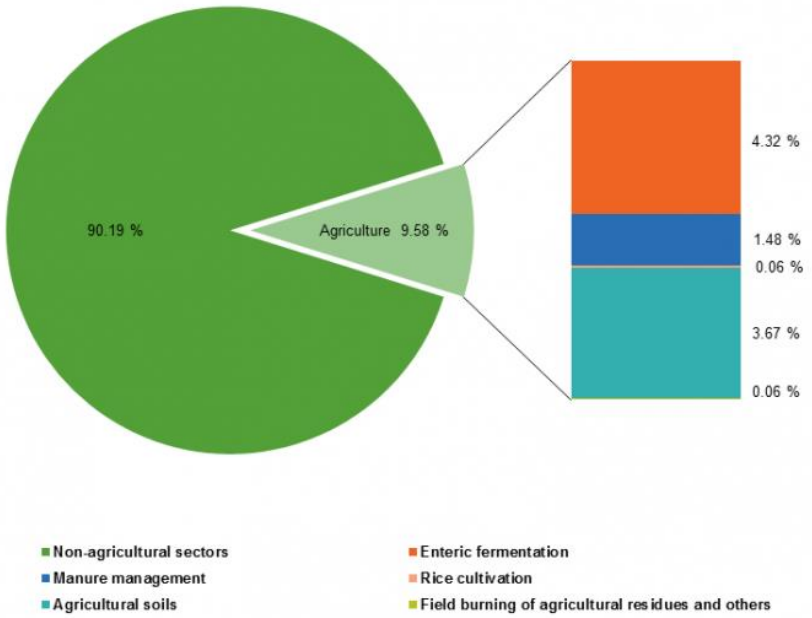



Figure 1:The main greenhouse gas emission sources, removals and processes in managed ecosystems.

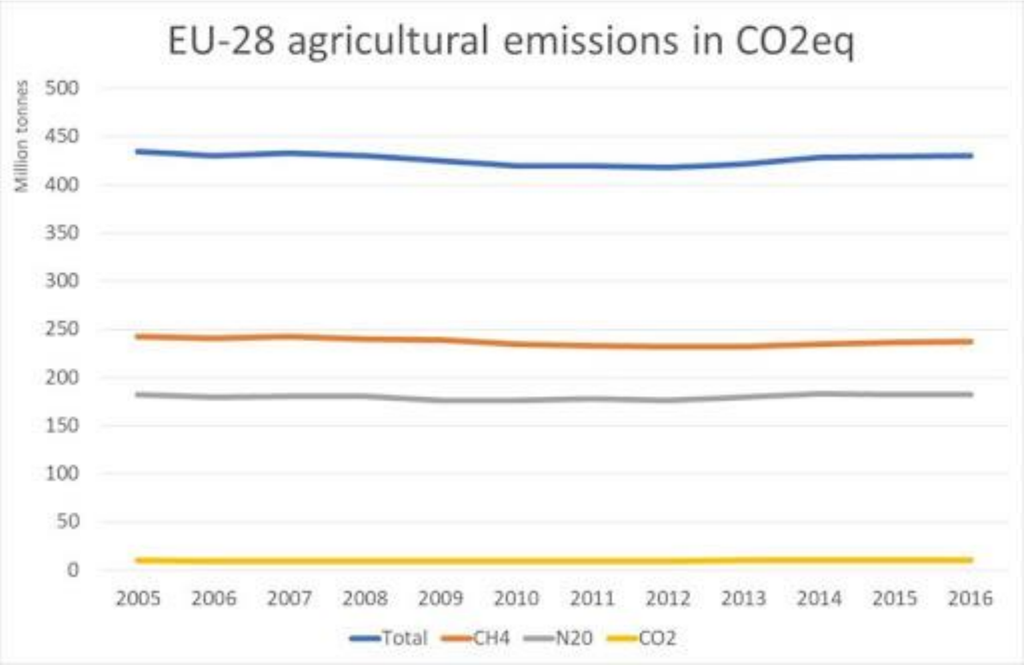
Source: Intergovernmental Panel on Climate Change (IPCC), (2006). "IPCC Guidelines for National Greenhouse Gas Inventories", prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). (IGES: Japan, 2006), 16.


Manure based AD: saving GHG emissions from manure & producing biogas
Including PV or other RES to improve carbon neutrality: carbon neutral livestock farming
Producing organic fertilizer from digestate: reduces need for pesticides & mineral fertilizers; supports expansion of organic agriculture / earning from digestate
Manure based biofuel: saving GHG emissions from transport / earning from biogas
Producing carbon neutral milk: saving GHG emissions from livestock & transport / earning from milk

# CONTRIBUTION OF AGRICULTURE TO TOTAL GHG EMISSIONS (%), EU-28, 2015




Note: Total GHG emissions do not include LULUCF $CO_2$ equivalents.




Source: CAP REFORM: The GHG emissions challenge for agriculture, 2019

# METHANE STRATEGY

EUROPEAN COMMISSION

Brussels, 14.10.2020
COM(2020) 663 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

on an EU strategy to reduce methane emissions

1 $CH_4$ = 25 $CO_2$

Reduction of GHG emissions to >55% by 2030 = 35-37%of reduction of $CH_4$ emissions by 2030 compared to 2005 levels.

In the EU, anthropogenic $CH_4$ emissions sources:

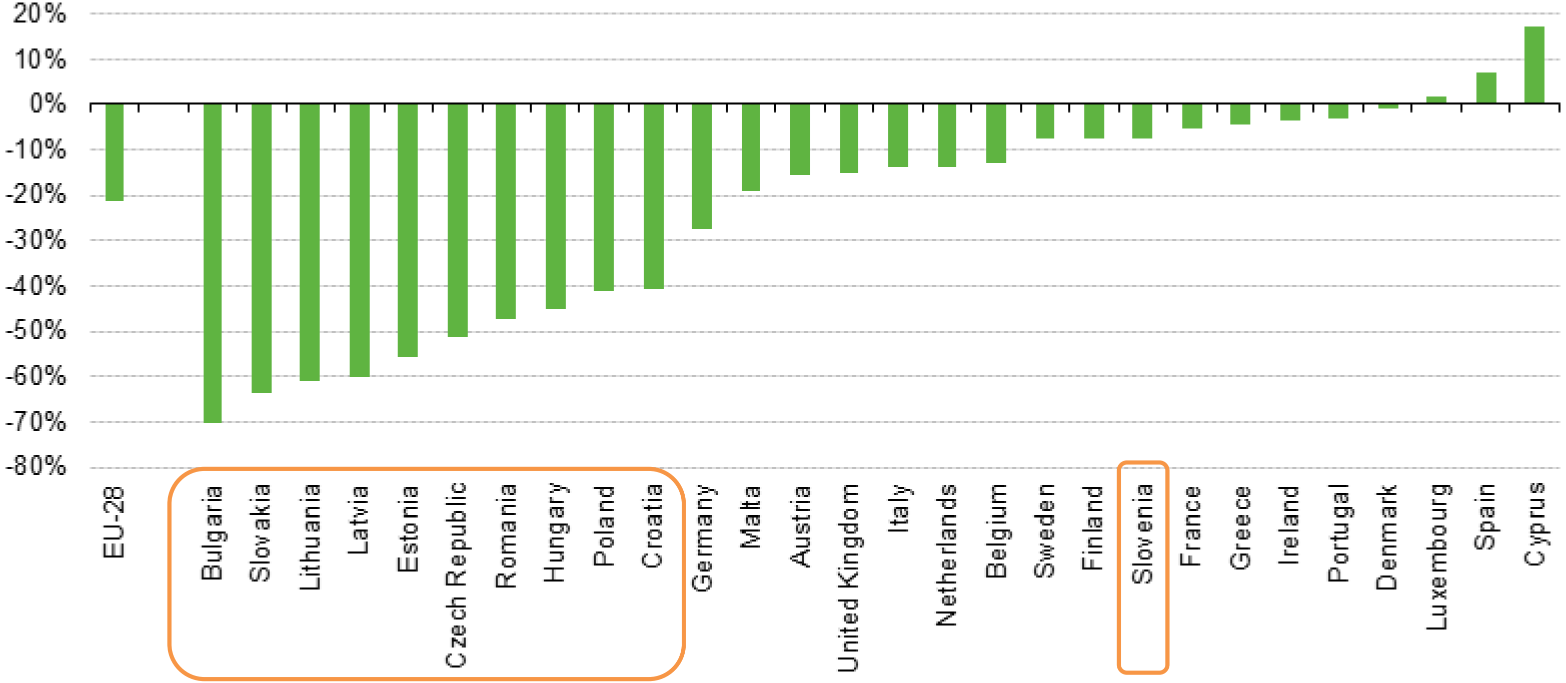
- 53% come from agriculture
- 26% from waste and
- 19% from energy.

# 53% OF CH4 EMISSIONS FROM AGRICULTURE ARE RELATED MOSTLY TO INTENSE PRODUCTION

"There are inherent complexities involved in achieving methane emissions reductions in agriculture as well as in accurately monitoring, verifying and reporting these emissions in that sector. "

Actions that lead to reduced emissions from manure provide additional income to farmers. Through cooperation among farmers as well as within communities, waste and residue streams from agriculture and waste sectors through anaerobic digestion should be valorised. Barriers such as insufficient knowledge and expertise that prevent their wider uptake should be addressed[56]. This underlines the need for the systemic promotion of the related expertise and enabling frameworks, taking into account the specificities of different Member States and production systems.

# CHANGE IN EMISSIONS OF METHANE FROM AGRICULTURE (%), 1990-2015

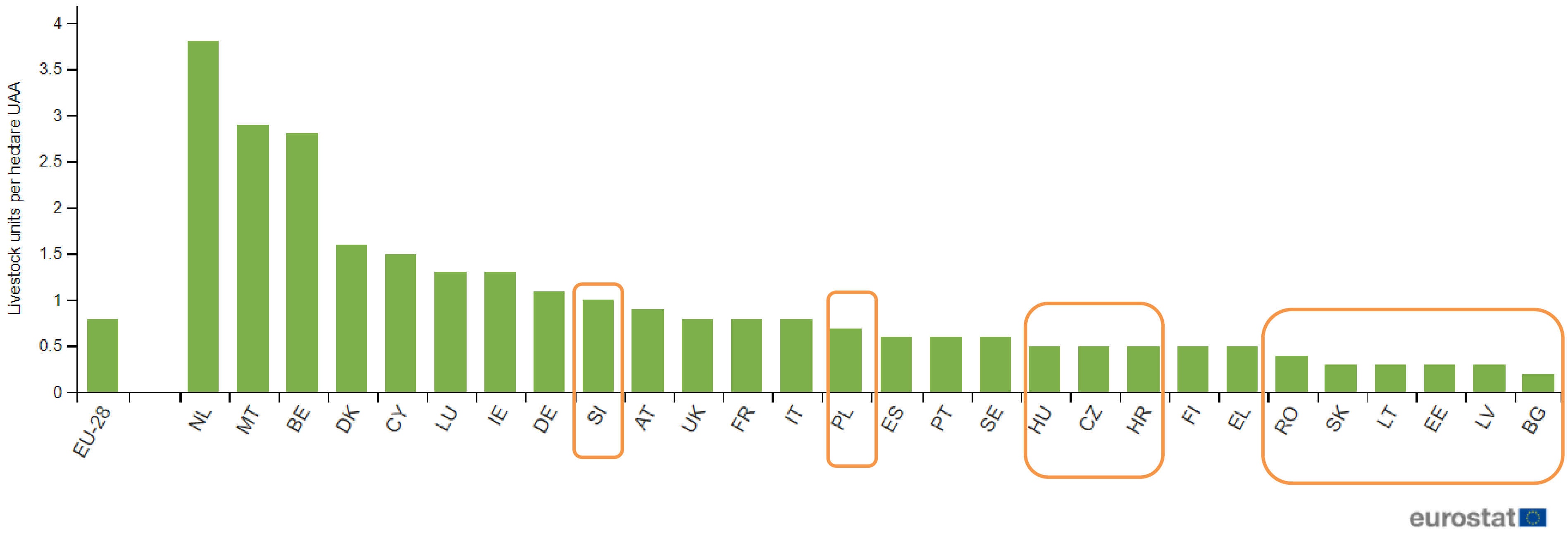


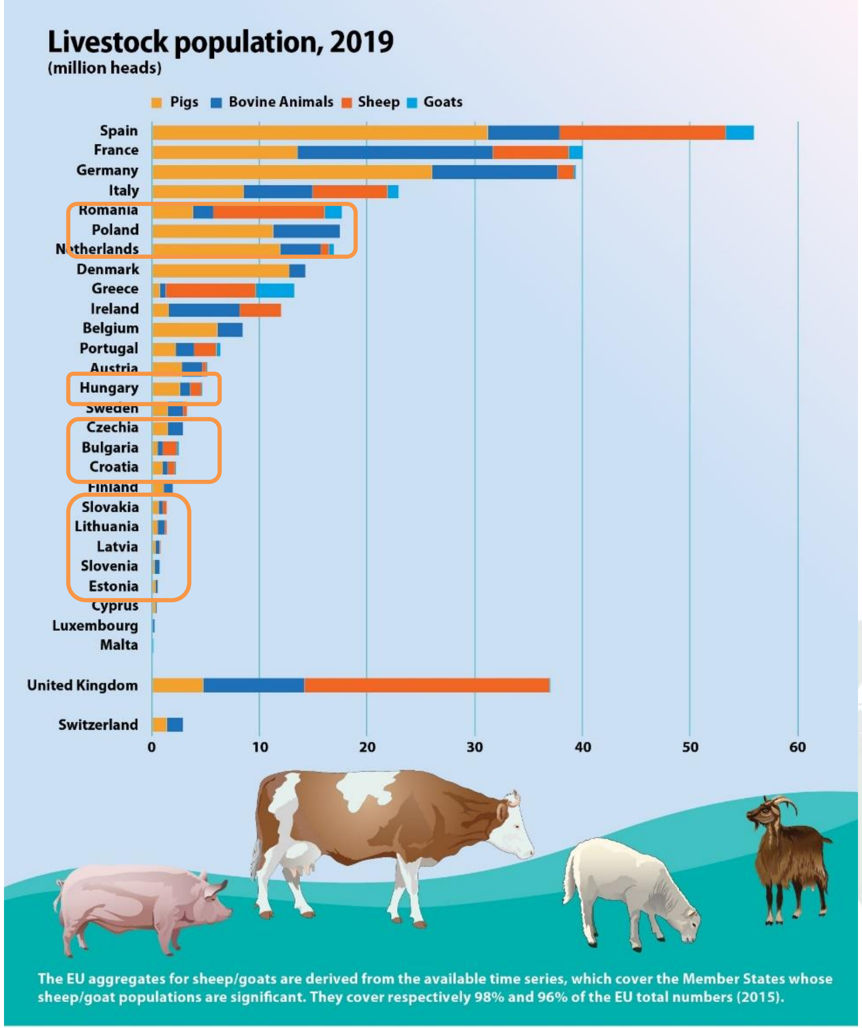



Source: Agri-environmental indicator - greenhouse gas emissions Eurostat, 2018

# TOTAL LIVESTOCK DENSITY, 2016

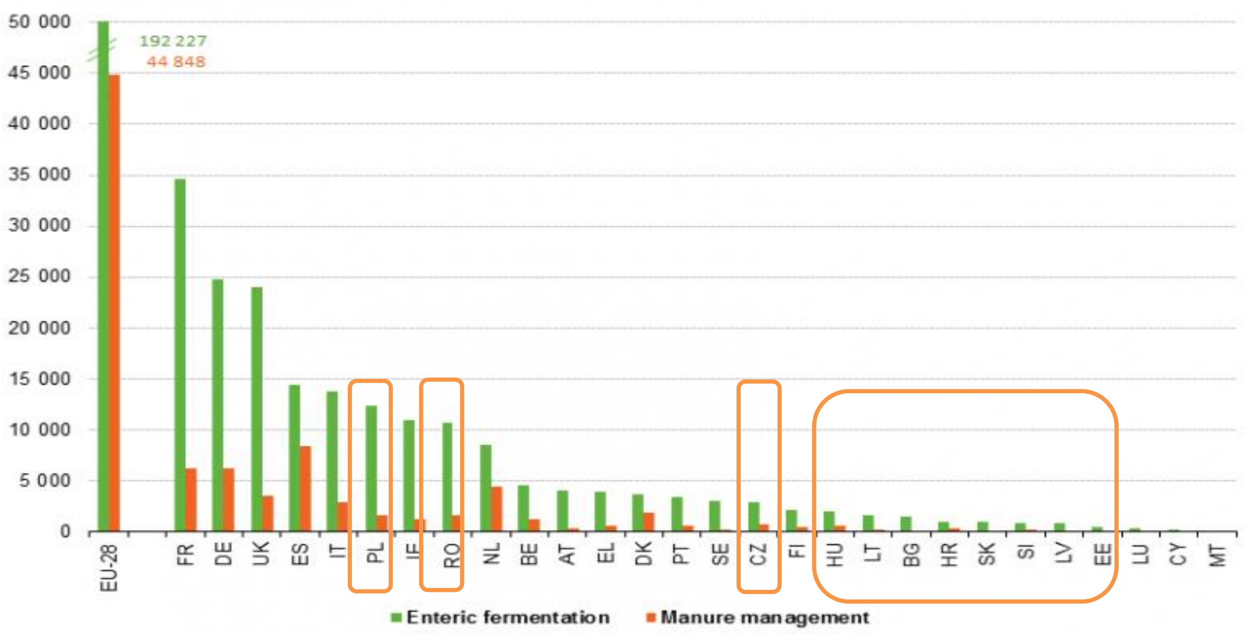
## (LIVESTOCK UNITS PER HECTARE UTILISED AGRICULTURAL AREA)






ec.europa.eu/eurostat

# METHANE EMISSIONS FROM ENTERIC FERMENTATION AND MANURE MANAGEMENT

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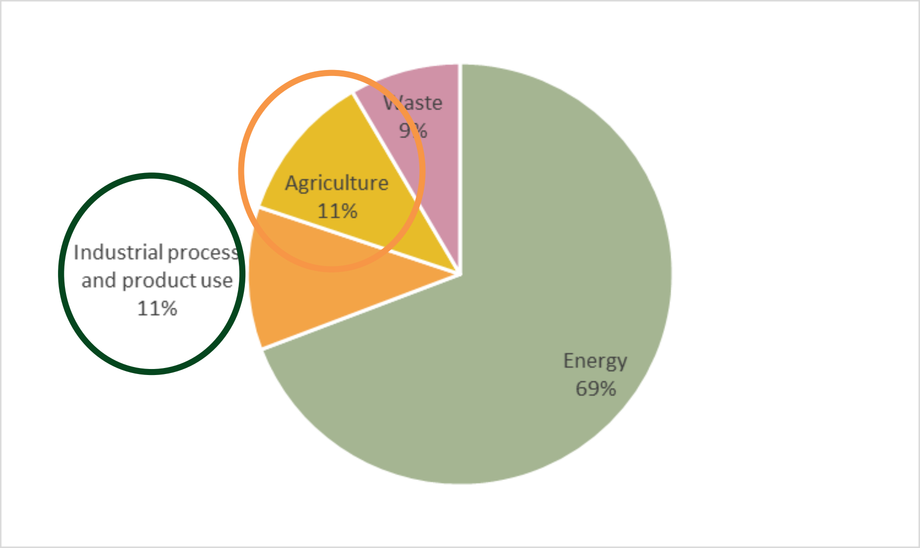
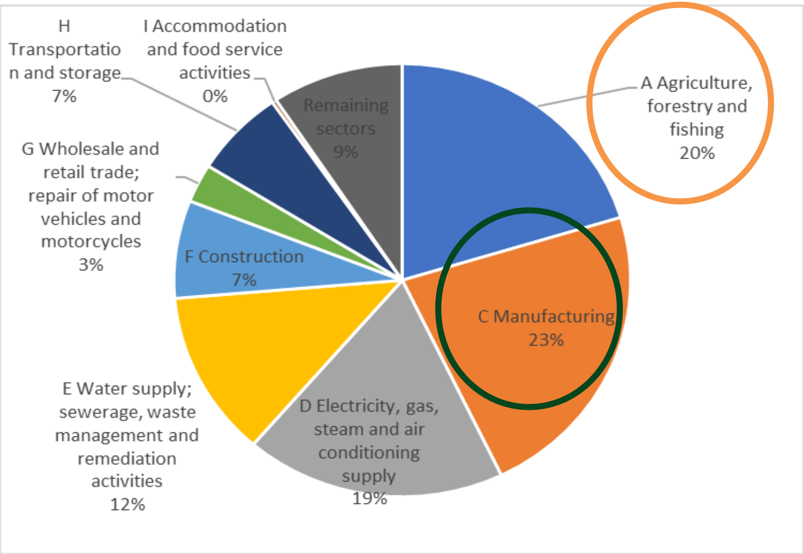
# CHANGE OF PERSPECTIVE FROM GHG EMISSIONS PER SECTOR TO GHG EMISSIONS PER OUTPUT – HR EXAMPLE

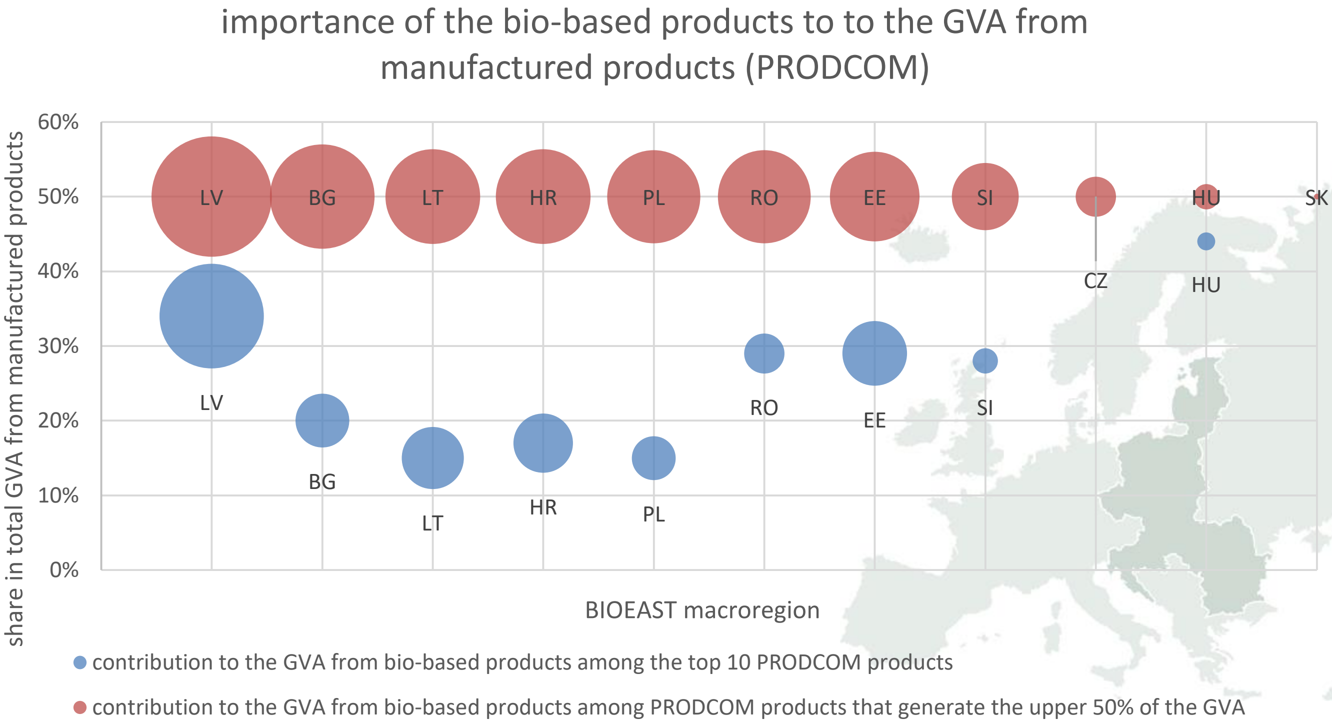



NIR, 2018



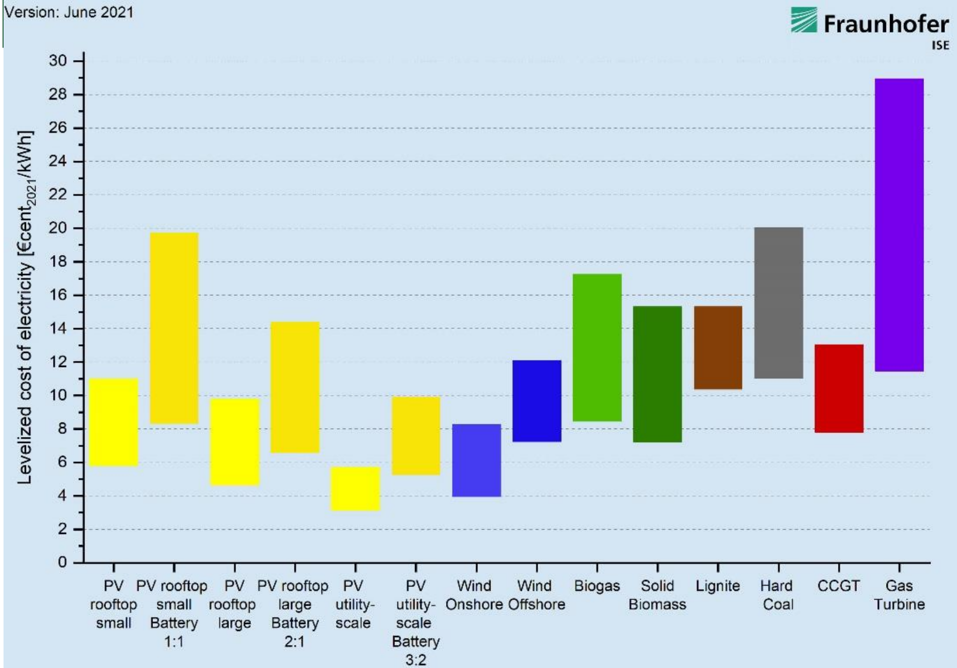

Air Emissions Accounts (AEA), 2018

MEAT AND DAIRY SECTOR ARE IMPORTANT PART OF THE LINEAR BIOECONOMY OF THE BIOEAST COUNTRIES, WHERE RELATED PRODUCTS SUCH AS SAUSAGES, FRESH OR CHILLED MEAT AND CARCASES, MILK AND OTHER FERMENTED PRODUCTS AS WELL AS ALL SORTS OF CHEESE ARE AMONG THE TOP 10 GOODS THAT GENERATE THE MOST VALUE FROM THE PRODUCTION OF MANUFACTURED GOODS



# BIOGAS FROM MANURE SAVES METHANE E

Cluster 5: Climate, Energy and Mobility



# ANAEROBIC DIGESTION (AD) IS AN EFFECTIVE GHG EMISSION REDUCTION TOOL

| BIOGAS FOR ELECTRICITY (*) | | | | |
|---|---|---|---|---|
| Biogas production system | | Technological option | Greenhouse gas emissions savings – typical value | Greenhouse gas emissions savings – default value |
| Wet manure (¹) | Case 1 | Open digestate (²) | 146 % | 94 % |
| | | Close digestate (³) | 246 % | 240 % |
| | Case 2 | Open digestate | 136 % | 85 % |
| | | Close digestate | 227 % | 219 % |
| | Case 3 | Open digestate | 142 % | 86 % |
| | | Close digestate | 243 % | 235 % |

| BIOGAS FOR ELECTRICITY – MIXTURES OF MANURE AND MAIZE | | | | |
|---|---|---|---|---|
| Biogas production system | | Technological option | Greenhouse gas emissions savings – typical value | Greenhouse gas emissions savings – default value |
| Manure – Maize 80 % - 20 % | Case 1 | Open digestate | 72 % | 45 % |
| | | Close digestate | 120 % | 114 % |
| | Case 2 | Open digestate | 67 % | 40 % |
| | | Close digestate | 111 % | 103 % |
| | Case 3 | Open digestate | 65 % | 35 % |
| | | Close digestate | 114 % | 106 % |
| Manure – Maize 70 % - 30 % | Case 1 | Open digestate | 60 % | 37 % |
| | | Close digestate | 100 % | 94 % |
| | Case 2 | Open digestate | 57 % | 32 % |
| | | Close digestate | 93 % | 85 % |
| | Case 3 | Open digestate | 53 % | 27 % |
| | | Close digestate | 94 % | 85 % |

Article 29 Sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids fuel

Source: RED II; Annex VI

# BIOGAS HAS GREAT POTENTIAL TO AID THE FARMS’ INCOME ACROSS THE BIOEAST MACRO REGION NOT ONLY REDUCE CH4 EMISSIONS

Source: Biogas barometer 2020

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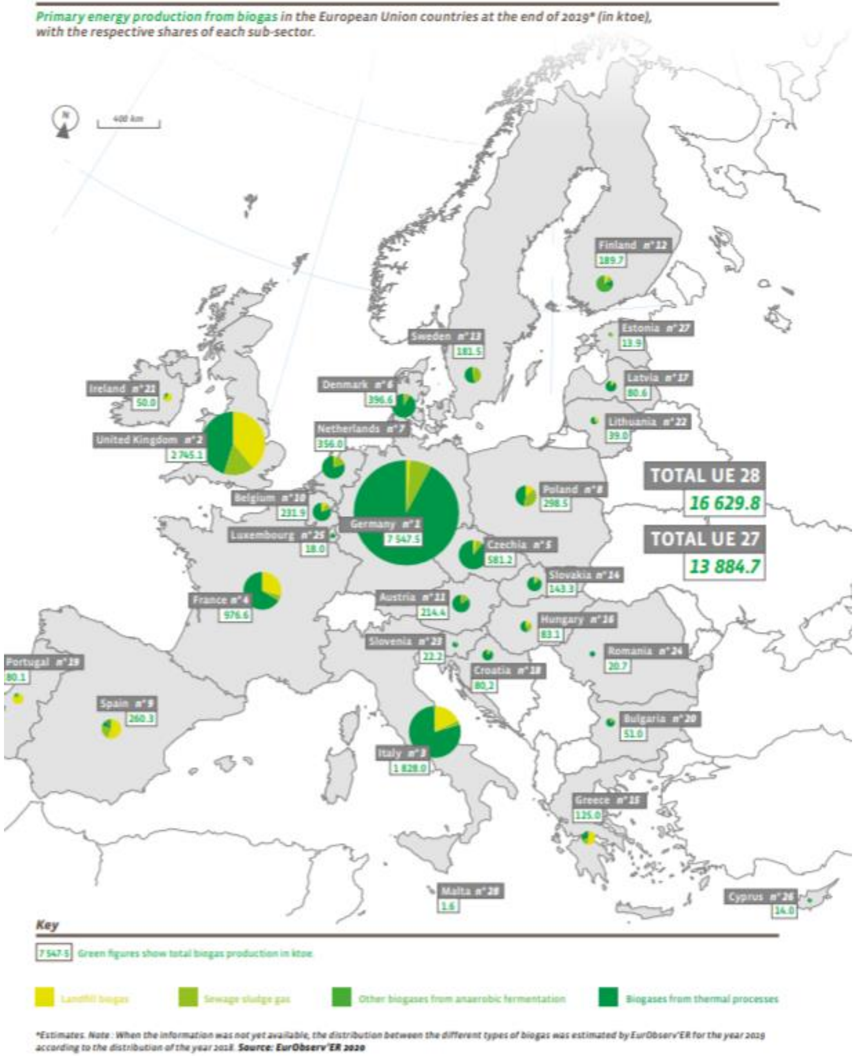


# MANURE TREATED WITH AD HAS IMPROVED PROPERTIES AS FERTILIZER. IS DIGESTATE AN ORGANIC FERTILIZER?

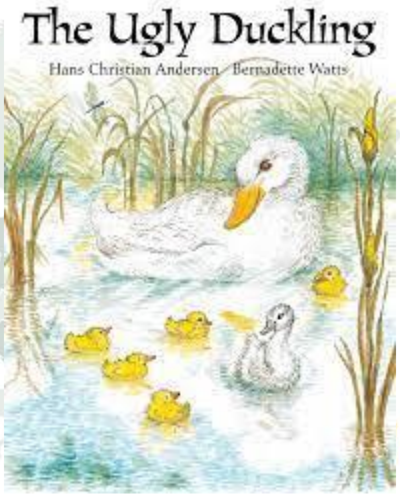
Under the Green Deal's Farm to Fork strategy, the European Commission has committed to a target of at least 25% agricultural land under organic farming by 2030. Coming from a current starting point of just 8.5%, the Commission has its work cut out for it."

Adding up the aim of halving pesticides and decrease by 20% fertilizers use, manure-based digestate could find its place as a valuable source of both farmers' and societal benefits.

# ANAEROBIC DIGESTION (AD) IS AN EFFECTIVE GHG EMISSION REDUCTION TOOL FROM MANURE, FOSSIL FERTILIZER APPLICATION AND FOSSIL ENERGY USE

Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture and Environment

Can AD for ~~biogas~~ biofuel & ~~digestate~~ organic fertilizer lead towards carbon neutral meat, egg and dairy products?



# PRESENTERS

***James Gaffey*** *is Co-director of the Circular Bioeconomy Research Group at Munster Technological University in Ireland. He is Principal Investigator on a number of bioeconomy projects at EU and National level. He is part of the core programme development in team in Ireland's first postgraduate degree in Bioeconomy. He is a member of the Government-appointed expert advisory group to Ireland's National Bioeconomy Forum, and he was a member of the Expert Advisory Group overseeing the Impact Assessment of Circular Biobased Europe, the successor programme to the BBI JU. James has particular experience working on bioeconomy initiatives within Ireland and Europe's agri-food and livestock sector.*

***Sami Vinkki****, grew up on the milk farm in Northern Finland and gained much experience for cattle farming and building. That gave him a strong determination to help livestock farmers with his skills and knowledge. He works as Building Engineer and Sales Director and one of the owners of Demeca Oy and represents livestock farmers at COPA-Cogeca.*

BIO east

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BIO EAST SUP

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under Grant Agreement No 862699

# CLUSTER 5: RED II; ANNEX VI

Article 29 Sustainability and GHG emissions saving criteria for biofuels, bioliquids and biomass fuel

Biomass fuels shall fulfil the sustainability and GHG emissions saving criteria (…) in installations producing electricity, heating and cooling or fuels with a total rated thermal input (…) equal to or exceeding 2 MW in the case of gaseous biomass fuels. MS may apply the sustainability and GHG emissions saving criteria to installations with lower total rated thermal input.

The GHG emission savings from the use of biofuels, bioliquids and biomass fuels taken into account for the purposes referred to in paragraph 1 shall be:

**(a)** **at least 50 %** for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations in operation on or before 5 October 2015;

**(b)** **at least 60 %** for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 6 October 2015 until 31 December 2020;

**(c)** **at least 65 %** for biofuels, biogas consumed in the transport sector, and bioliquids produced in installations starting operation from 1 January 2021;

**(d)** **at least 70 %** for electricity, heating and cooling production from biomass fuels used in installations starting operation from 1 January 2021 until 31 December 2025, and

**(e)** **80 %** for installations starting operation from 1 January 2026. FUTURE

# ANNEX VI

| Biogas production system | | Technological option | Greenhouse gas emission savings – typical value | Greenhouse gas emissions savings – default value |
|---|---|---|---|---|
| BIOGAS FOR ELECTRICITY (*) | | | | |
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| Biomethane production system | Technological options | Greenhouse gas emissions savings – typical value | Greenhouse gas emissions savings – default value |
|---|---|---|---|
| BIOMETHANE – MIXTURES OF MANURE AND MAIZE (*) | | | |
| Manure – Maize 80 % - 20 % | Open digestate, no off-gas combustion (¹) | 62 % | 35 % |
| | Open digestate, off-gas combustion (²) | 78 % | 57 % |
| | Close digestate, no off-gas combustion | 97 % | 86 % |
| | Close digestate, off-gas combustion | 113 % | 108 % |
| Manure – Maize 70 % - 30 % | Open digestate, no off-gas combustion | 53 % | 29 % |
| | Open digestate, off-gas combustion | 69 % | 51 % |
| | Close digestate, no off-gas combustion | 83 % | 71 % |
| | Close digestate, off-gas combustion | 99 % | 94 % |
| | Open digestate, no off-gas combustion | 48 % | 25 % |
| | Open digestate, off-gas combustion | 64 % | 48 % |

| Biogas production system | | Technological option | Greenhouse gas emissions savings – typical value | Greenhouse gas emissions savings – default value |
|---|---|---|---|---|
| BIOGAS FOR ELECTRICITY – MIXTURES OF MANURE AND MAIZE | | | | |
| Manure – Maize 80 % - 20 % | Case 1 | Open digestate | 72 % | 45 % |
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| | | Close digestate | 93 % | 85 % |
| | Case 3 | Open digestate | 53 % | 27 % |
| | | Close digestate | 94 % | 85 % |
| Manure – Maize 60 % - 40 % | Case 1 | Open digestate | 53 % | 32 % |
| | | Close digestate | 88 % | 82 % |
| | Case 2 | Open digestate | 50 % | 28 % |
| | | Close digestate | 82 % | 73 % |
| | Case 3 | Open digestate | 46 % | 22 % |
| | | Close digestate | 81 % | 72 % |