atf animal task force
A European Public-Private Partnership

EAAP
European Federation of Animal Science

2nd one-day symposium
of the Animal Task Force & the EAAP Commission on Livestock Farming Systems

EU policy tools to decrease emissions from the livestock sector

Valeria Forlin
European Commission

European Commission

Outline of the presentation

Policy tools

1. **The EU climate policy framework towards climate neutrality**
    - **Climate Law**
    - **Effort Sharing Regulation**
    - **Land Use, Land Use Change and Forestry (LULUCF) Regulation**
    - **Taxonomy**
2. **Communication on Sustainable Carbon Cycles**
3. **The EU Methane Strategy**

For info:

4. Support to R&I
5. JRC systematic review of scientific evidence

The EU climate policy framework towards climate neutrality

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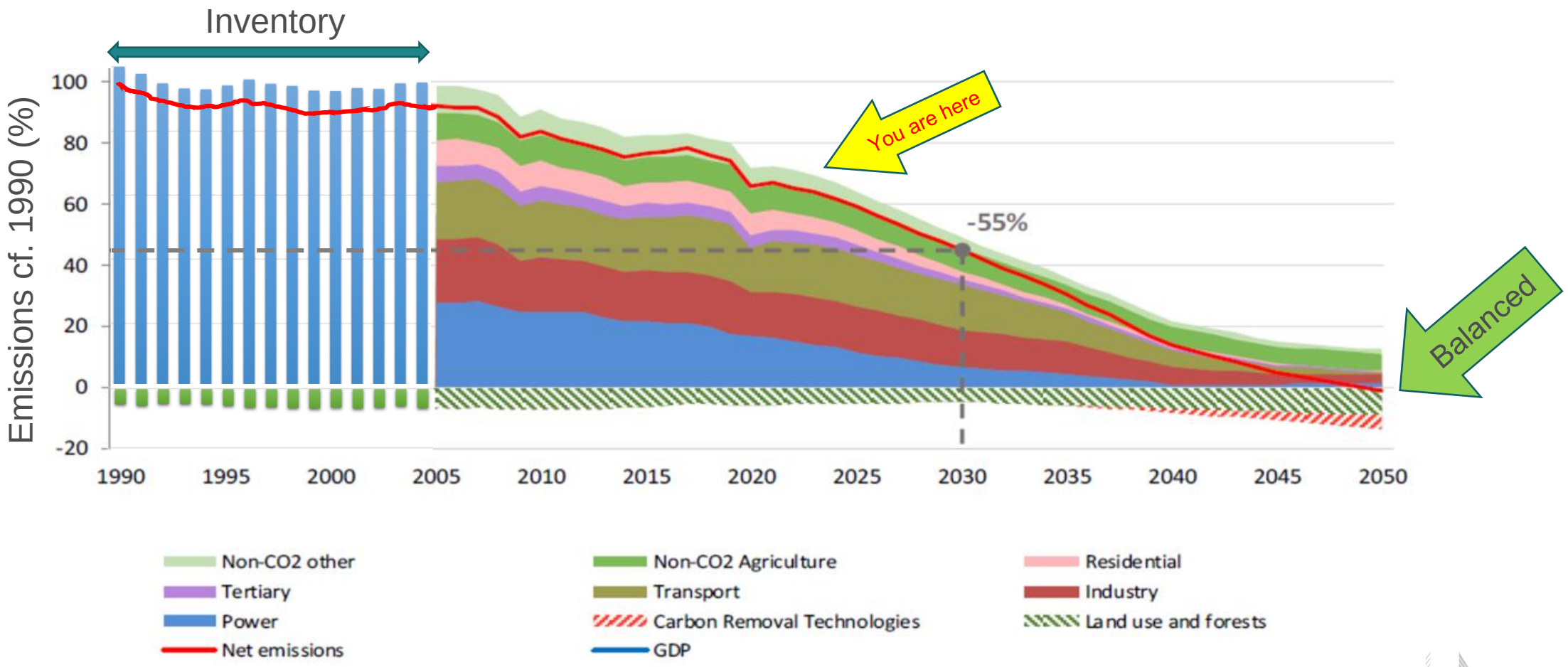
Pathway to climate neutrality: Climate Law



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From the Climate Law to ‘Fit for 55’

- The Climate Law enshrines into legislation the EU objective to become climate-neutral by 2050.
- In July 2021, the Commission adopted a set of proposals to make the EU's climate, energy, land use, transport and taxation policies fit for reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990.

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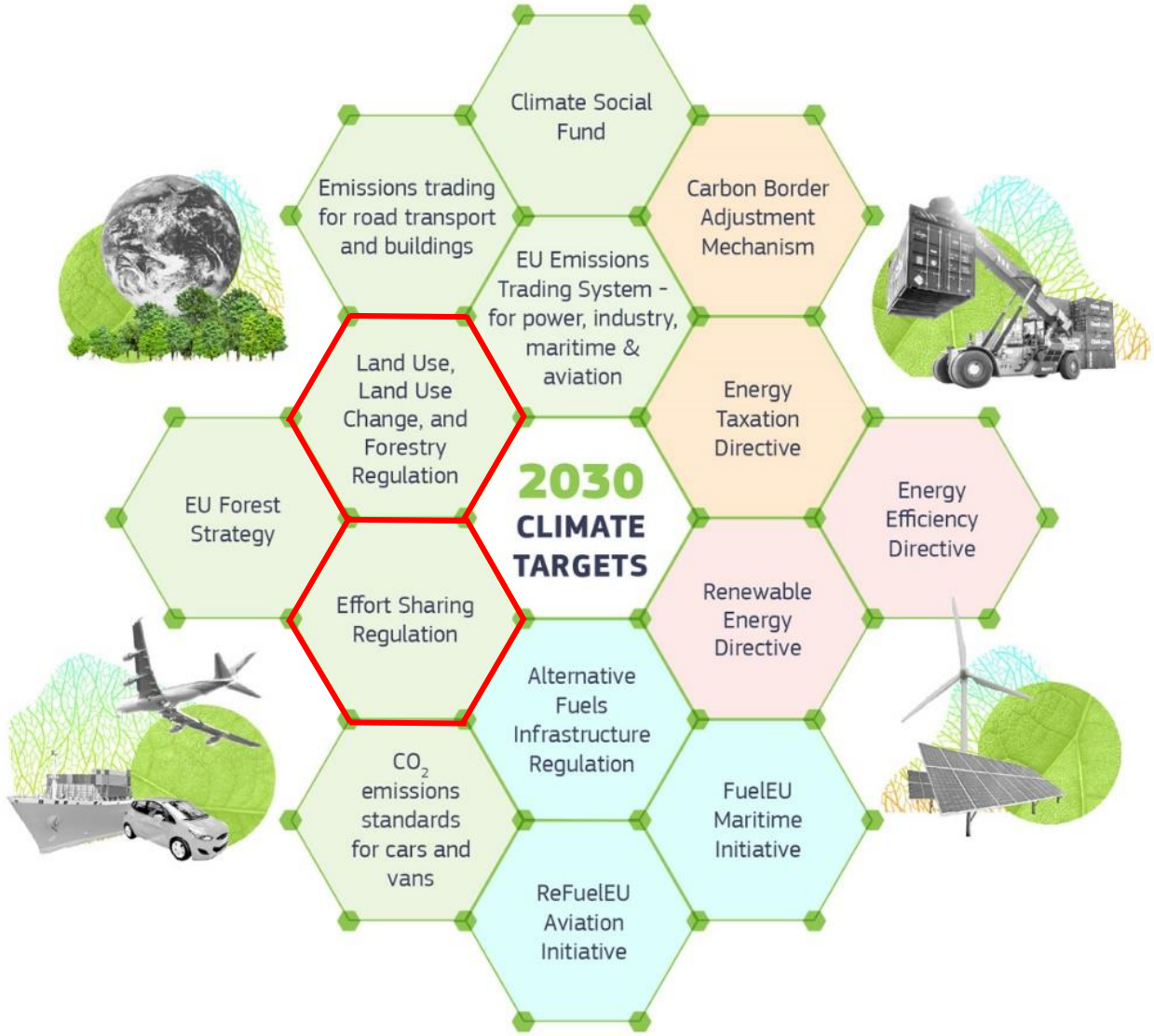
The Fit for 55 Package – Overview



Two pieces of legislation are particularly relevant for the livestock sector:

- The Effort Sharing Regulation
- The Land Use, Land Use Change and Forestry (LULUCF) Regulation

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New Effort Sharing Regulation

Current 2030 target **-29 % compared to 2005**

New 2030 target **-40%** in line with cost efficient projections at the EU level

ESR scope maintained

- Accountability: each MS has a binding annual greenhouse gas emission limit for the period 2021–2030
- Subsidiarity: the choice of measures fulfil these commitments is left to the MS.

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The Land sector – Status quo

Decreasing carbon removals in forests, soils, and wood products

Stable emissions from livestock, fertiliser use, soils

Complex compliance rules under LULUCF and Effort-Sharing Regulation

Reverse the trend

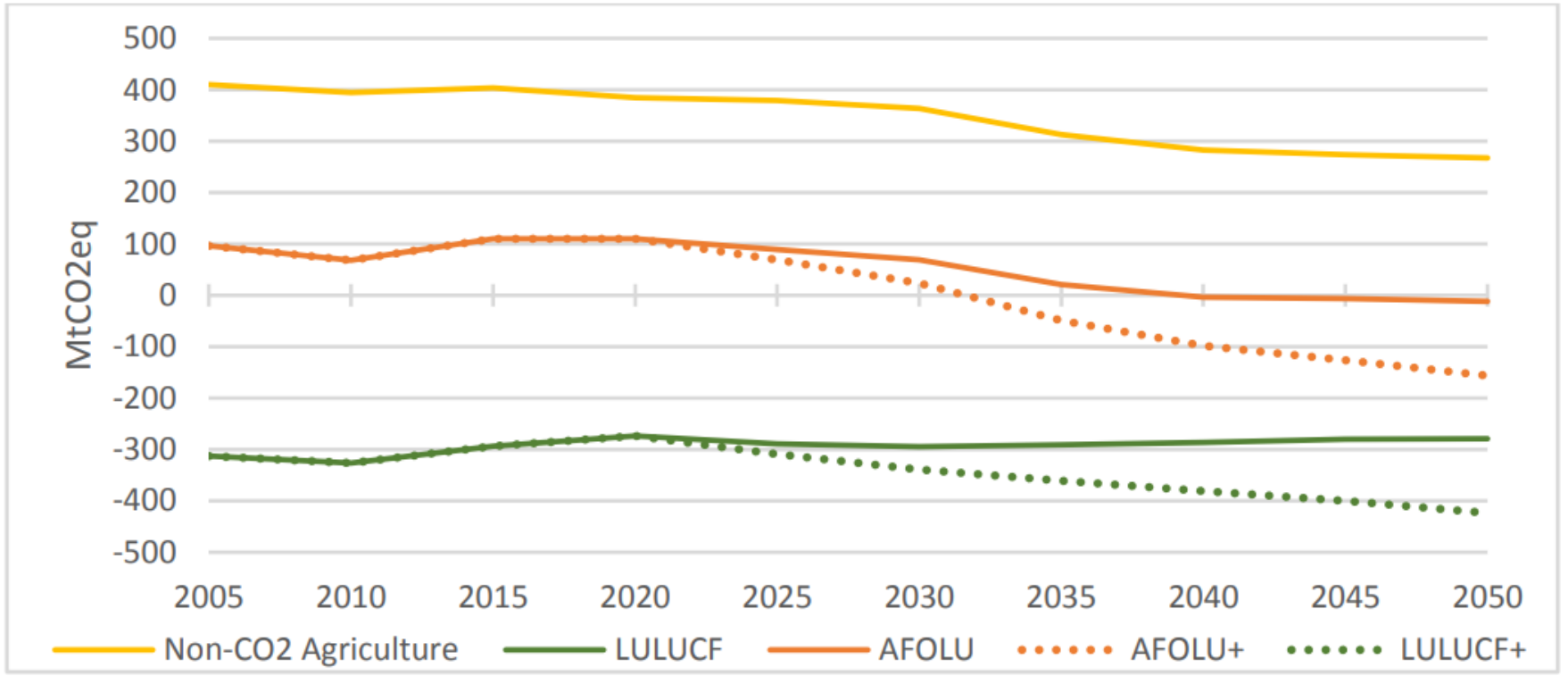
Simpler, more transparent and effective compliance rules and targets

Increase EU carbon removals to at least **310 Mt by 2030**

Climate neutral EU land sector by 2035

Increased carbon removals to balance reduced agricultural emissions, including from livestock and fertiliser use

Towards a climate-neutral land sector



Projected emissions and removals from the Agriculture and LULUCF sectors, EU27.
Source: Impact Assessment accompanying the Climate Target Plan (SWD(2020) 176 final)

European Commission

State of play in the legislative procedure

- 14th July 2021: Commission proposal to amend the LULUCF Regulation
- 8th June 2022: European Parliament adopted its opinion
- 28th June 2022: Council reached a general approach
- Next: trilogues

EU Taxonomy

- A classification system establishing a list of environmentally sustainable economic activities to help scale up sustainable investment
- 2020: main Regulation with six objectives: CC Mitigation, CC Adaptation, water, circular economy, pollution, biodiversity and ecosystems
  - Sustainable = substantially contributing to one objective while not significantly harming the other ones
- 2021: first Delegated Act on sustainable activities for CCM and CCA
  - ➢ Does not include agriculture
- 2022: second Delegated Act for the other four objectives (upcoming)
  - ➢ May include agriculture for its substantial contribution to biodiversity

EU Taxonomy – process

- 2018-2020: Commission gave mandate to a Technical Expert Group (TEG) to support the development of technical criteria for the EU taxonomy. In March 2020, it adopted a final report with a technical annex.
- 2020-2022: Commission is advised by a permanent Expert Group called Platform on Sustainable Finance (57 members and 11 observers from industry, academia, civil society, financial sector) to assist in the further development of the taxonomy.
- After receiving the recommendations from the PSF, the Commission:
  - Is preparing the next Taxonomy Delegated Act (any deviation from PSF recommendations to be justified)
  - Will publish it for stakeholders' feedback (6 weeks)

Communication on Sustainable carbon cycles

COM(2021) 800 final

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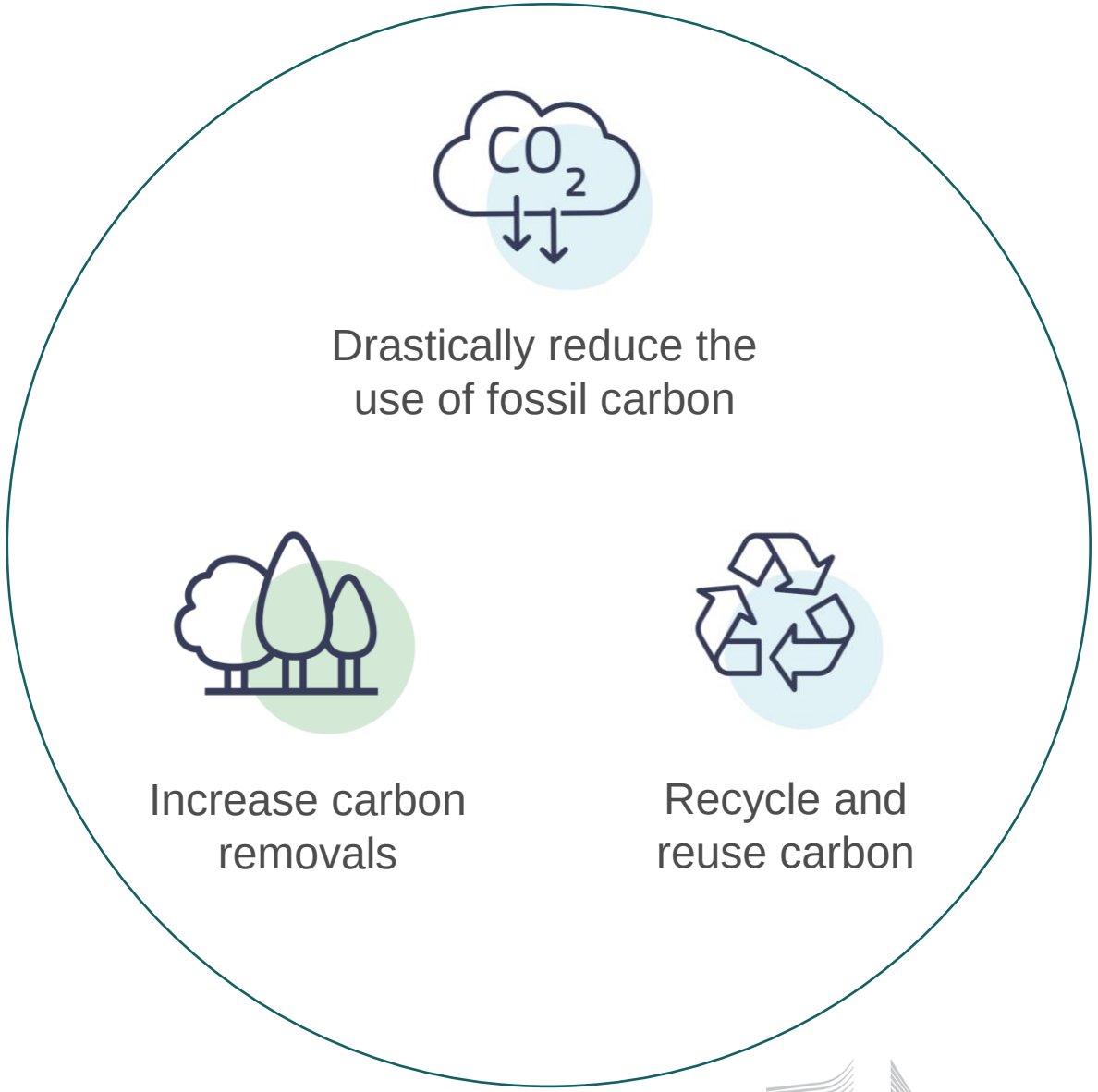
Sustainable carbon cycles

*To achieve **climate neutrality** at the latest by 2050 and **negative emissions** thereafter, the EU needs to increase carbon removals and establish **sustainable carbon cycles**.*



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Carbon farming

*A **green business model** rewarding land managers for improved land management practices, resulting in carbon sequestration in ecosystems and reducing the release of carbon to the atmosphere.*

Benefits of carbon farming:

- Increased carbon removals
- Additional income for land managers
- More biodiversity and nature
- Increased climate resilience of farm and forest land

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Carbon farming - examples

Afforestation and reforestation according to ecological principles

Targeted conversion of **cropland to fallow**, or of set-aside areas to **permanent grassland**

Use of **conservation tillage, catch crops, cover crops** and increasing **landscape features**

Agroforestry and other forms of mixed farming

Restoration, rewetting and conservation of **peatlands and wetlands**

Blue carbon: coastal wetlands, regenerative aquaculture, marine permaculture

Carbon farming

Challenges

By 2028:

- Access to verified emission and removal data for all land managers

By 2030:

- Contribute to reaching LULUCF target of 310 Mt CO2eq net removals

Study on the polluter-pays principle in agriculture

Report 2021 /16 from the European Court of Auditors on CAP and climate:

"In line with the EU's increased climate ambition for 2030, the Commission should assess the potential to apply the polluter-pays principle to emissions from agricultural activities, and reward farmers for long-term carbon removals"

- *Project starting in September 2022*
- *Study on design options for applying the PPP to GHG emissions from the agricultural sector and for rewarding farmers for long-term carbon removals*
- *Stakeholder activities: expert roundtable, public workshop, online survey*

Next step: A regulatory framework for the certification of carbon removals

Set robust criteria to identify high-quality carbon removals tailored to different types

- Quantification
- Additionality
- Long-term sequestration
- Sustainability

Establish a governance framework to ensure a transparent certification process

- Reliable rules and procedures
- Third-party validation and verification
- Robust registries

The Methane Strategy

An EU strategy to reduce methane emissions COM(2020) 663 final

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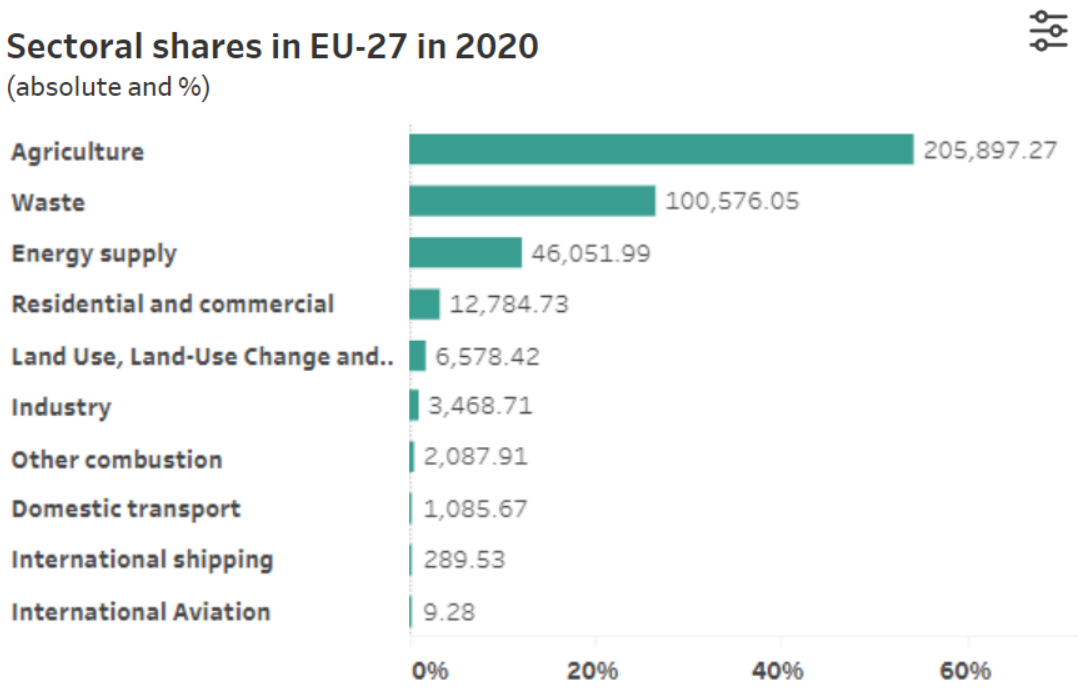
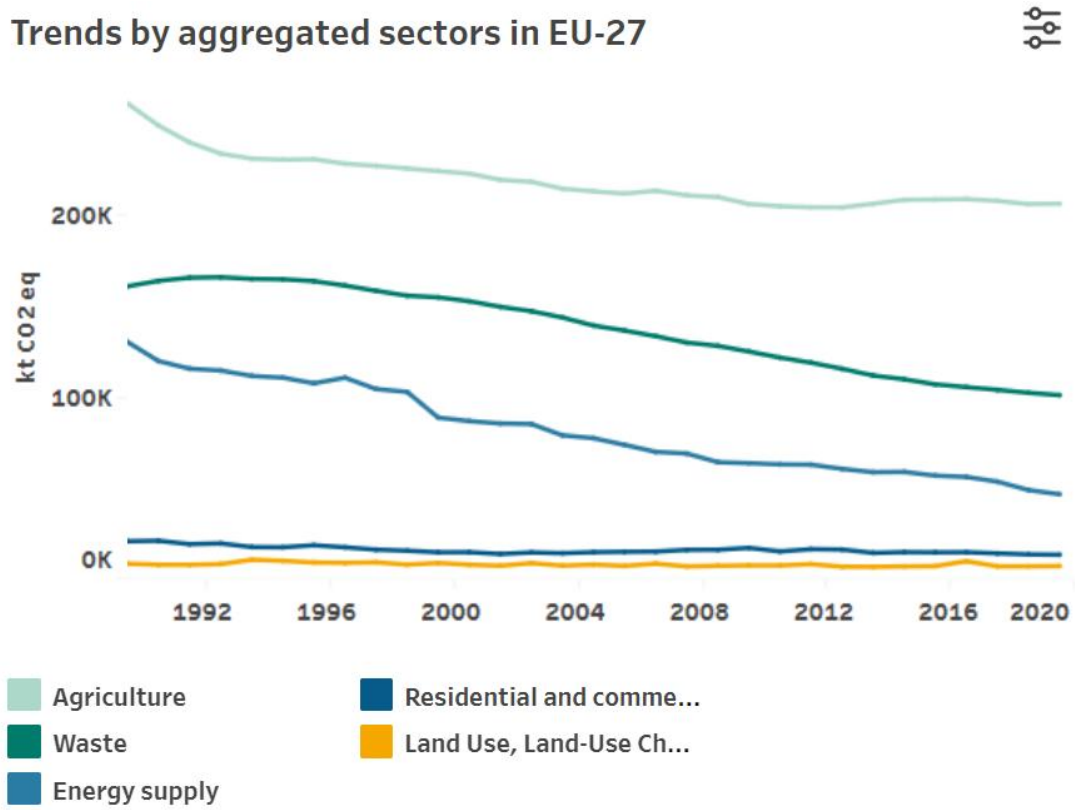
Methane emissions in the EU





EEA greenhouse gases - data viewer (link)

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Cross-sectoral actions

Reporting

- More accurate measurement and reporting methodologies for methane emissions […] will contribute to a better understanding of the problem and better inform subsequent mitigation measures.

*Objective: "**make Tier 3 methane reporting by energy, chemical and agricultural companies more widespread across the EU**"*

- Challenge in the **agricultural sector**: high number of actors involved
  - temporary objective: apply Tier 2 approaches & improve disaggregation of emission factors
  - final objective: achieve Tier 3

Cross-sectoral actions

Establishing an international methane emissions observatory

- tasked with collecting, reconciling, verifying and publishing anthropogenic methane emissions data at a global level
- Initially covering oil and fossil gas sectors, to be extended to agriculture once comparably reliable methodologies are established

✓ Launched at G20 Summit on the eve of the COP26 in Glasgow

Cross-sectoral actions

Satellite detection, Copernicus and aerial monitoring

✓Copernicus Atmosphere Monitoring Service: satellites + ground measurement stations to monitor atmospheric CH4 concentrations and detect leaks

Review of relevant environmental and climate legislation

✓Proposal to expand the scope of the **Industrial Emission Directive** to cover largest cattle, pig and poultry farms and more focus on methane

✓Fit for 55 review of **Effort Sharing Regulation**

Cross-sectoral actions

Opportunities in biogas production

- Non-recyclable human and agricultural waste (i.e. manure) and residue streams can be utilised in anaerobic digesters to produce biogas or in biorefineries to produce bio-materials and intermediate bio-chemicals

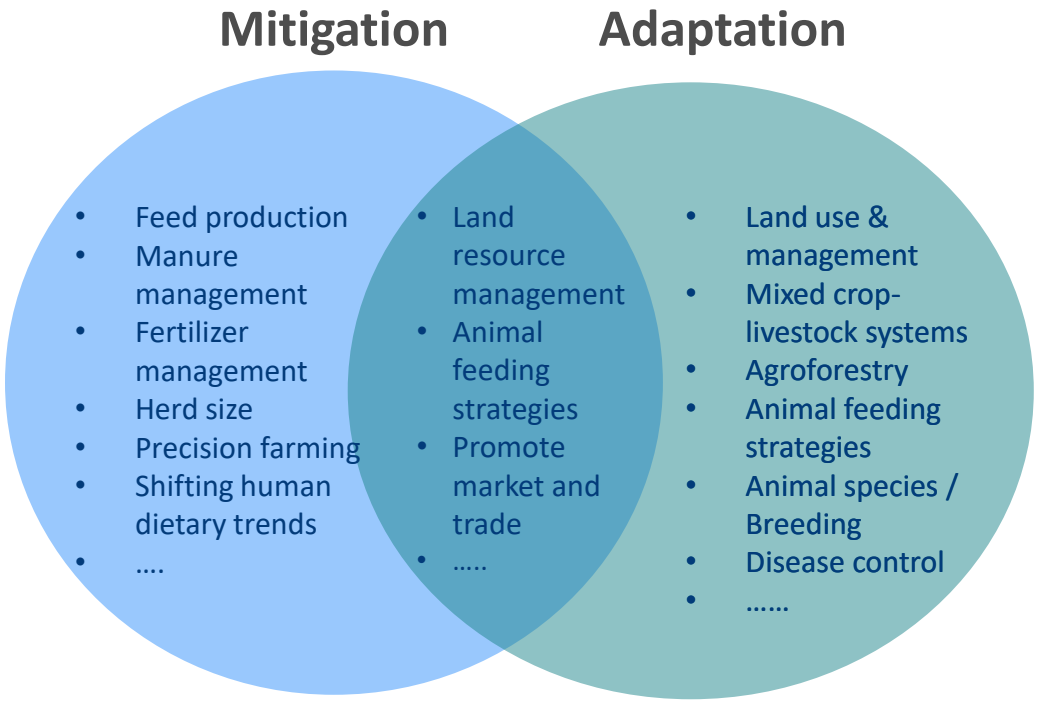
✓Biomethane Action Plan (accompanying the REPower EU Plan)

✓2022 LIFE call for proposal encourages projects which address production of biogas and biomethane from waste and residue streams

✓Upcoming guidance for the revision of National Energy and Climate Plans will focus on REPower EU Plan, including Biomethane production

Promising mitigation practices for the agricultural sector

- **breeding**, herd health and animal welfare
- improving **animal diets** (mix of feed materials), feed additives, and feeding techniques
- valorising waste and residue streams from agriculture and waste sectors through **anaerobic digestion**
- **manure** management (use in fertilisers and biogas generation)
- societal shift to **more balanced diets**



Actions for the agriculture sector

✓setting up an expert group on methane emissions

- develop an inventory of best practices, available technologies and innovative technologies (upcoming)
- propose a digital carbon-navigator template (upcoming)

✓encourage methane-reduction measures and carbon farming measures in CAP Strategic Plans

Support to R&I on GHG mitigation in the livestock sector

European Commission

LIFE projects

- LIFE-Dairyclim (Feeding strategies to decrease methane emissions and carbon footprint of dairy cows in Belgium, Luxembourg and Denmark)
- LIFE BEEF CARBON (Demonstration actions to mitigate the carbon footprint of beef production in France, Ireland, Italy and Spain)
- LIFE+FORAGE4CLIMATE (Forage systems for less GHG emission and more soil carbon sink in continental and mediterranean agricultural areas)
- SheepToShip LIFE (Looking for an eco-sustainable sheep supply chain: environmental benefits and implications)

LIFE projects

- Life LowCarbon Feed (Climate Change Mitigation trough an innovative goat feed based on agricultural waste recycling)
- LIFE AgriCOlture (Livestock farming against climate change problems posed by soil degradation in the Emilian Apennines)
- LIFE SMART AgroMobility (Processing of livestock waste, for the production of biomethane for use in agricultural vehicles and biofertilizers)
- LIFE CARBON FARMING (Development and implementation of a result-based funding mechanism for carbon farming in EU mixed crop livestock systems)

LIFE projects

- LIFE CLINMED-FARM (Towards a Mediterranean Climate Neutral Farm model)
- LIFE MiCliFeed (Mitigating climate impact of small ruminants through innovative feeding approaches)
- LIFE Green Sheep (Demonstration and dissemination actions to reduce the carbon footprint in European sheep farming)

R&I project funded by FACCE ERA-GAS*

*Not exhaustive list

	Diets	Feed additives & materials / Microbiome	Manure management	Breeding / Genetic	LCA	Precision Livestock Farming	Emission measurements, predictions / NI
CEDERS	✓		✓				✓
METHLAB	✓	✓					
RumenPredict	✓	✓		✓			✓
CCCFarming	✓	✓	✓	✓	✓	✓	✓
GrassToGas	✓	✓		✓		✓	✓
SEASOLUTIONS		✓			✓	✓	
GrASTech	✓	✓			✓	✓	✓
MELS			✓				✓
Milkey					✓	✓	✓
M4Models			✓				✓
FarmSustainBI	✓					✓	

A snapshot of initial findings 1/3

GrassToGas

Strategies to mitigate GHG emissions from pasture-based sheep systmes

UK FR UY NO IE NZ TR

- Rumen volumes were larger in more feed-efficient individuals (in selected male sheep)
- Ruminal microbiota alone does not help in predicting classes of feed intake or residual feed intake
- Body size (weight) is the largest predictor of feed intake
- Data on benchmark CH4 emissions from different gas-measuring platforms (Greenfeed, Portable accumulation chambers) suggest there are significant differences between platforms. TBI

GrASTech

Precision Livestock Farming (PLF) technologies to reduce GHG emissions intensity of pasture-based cattle systems

BE FR UK

- Grazing trials: CH4 was 12% lower than in confinement. Methane intensity (g CH4/kg fat & protein corrected milk) was 10% lower in grazing treatment.
- Data analysis on animal production, behaviour and health in progress
- Review of near-to-market PLF tools. Focused on technologies for estimating CH4, and techniques to measures production efficiency
- Identification of new methodologies for measuring CH4 in controlled and in-field environments

Milkey

Decision support system for sustainable and GHG optimised milk production in key European areas

DE PL GR BE IE FR NO

- Development of a trend monitoring system and emission monitoring system separately.
- Definition of environmental and economic sustainability indicators. Template and protocols for data collection and multi-criteria sustainability assessment delivered.
- Multi-criteria decision tree (DEXi) with scaling factors for the 3-pillar sustainability has been developed

European Commission

A snapshot of initial findings 2/3

CCC Farming

Climate Care Cattle Farming systems – reducing GHG and ammonia emissions while maintaining the social-economic outlook of the farm business

NL IT LV DE LT UK FR PL US BR IL

- Reviewed practices / technologies on reducing emissions at systems level (grazing, feeding, housing, storage, spreading)
- Simplified method for emission monitoring and measurement (CH4, CO2, N2O, NH3)
- Nutrient Cycle Assessment performed using 3 tools: CAP'2ER, Agrecalc, ANCA

MELS

Mitigating GHG emissions from livestock systems

DE IE DK NZ FR CL PL GR

- Enriching of DATAMAN database with emission data from Mediterranean countries, Eastern Europe, China and S.America
- Emission data processed. Emission mitigation data identified and categorized. Review of existing country-specific GHG accounting tools for manure management systems and managed soils
- Open-access farm-scale DSS prototype is under development - for countries lacking such a tool

M4Models

Manure management for methane mitigation – improved inventory modelling to support policy actions

DK DE NL SE

- New in-vitro method for estimating CH4 production rates tested, modified and used for on-farm monitoring.
- A prototype incubator developed. Quantification of CH4 and CO2 production at low T° achieved. Portable system planned.
- Effects of storage period and T° on residual biogas potential has been investigated: 90 d storage -> up to 66% of biogas potential lost
- Information to set up country specific model for pig and dairy farms has been acquired

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A snapshot of initial findings 3/3

SEASOLUTIONS

Seaweeds and seaweed-ingredients to reduce enteric methane emissions from pasture based sheep, cattle and dairy cows.

IE NO CA SE DE UK

Characterisation of 74 native and harvestable seaweeds and generation of 27 seaweed ingredient extracts.

Selected seaweed and extracts assessed for their ability to reduce CH4 emissions in *in-vitro* models.

Extruded pellets containing active seaweed extracts made and characterised for bioactives.

First trials initiated. Initial results indicate that the seaweed and extracts reduced emission by 12-14%

CEDERS

Capturing effects of diet on emissions from ruminant systems

NL, UK, FR, DK, SE, DE, IE, FI, NZ

General dietary options to reduce CH4:

- Rumen bypass: Starch, fat, protein
- Reduce crude fibre
- High feed intake - higher digestibility - higher rate of rumen degradation / fermentation

Reduce N content and fibre content to mitigate CH4 and N emissions, BUT -> diet optimization to prevent trade-off

Preliminary results from GHG models compared to IPCC values: lower enteric CH4 for intensive feeding conditions under confinement, higher values for grazing

FarmSustainaBl

Enabling Smart Livestock Farming Technologies for Environmental Sustainability using Blockchain

GR RO DK

Overview of modelling and simulation approaches for DSS

Testing of best machine-learning models for forecasting air-pollution concentrations

Development of the web-based platform to be used as one stop shop for farm sustainable services

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Other related projects (Horizon programme)

Horizon 2020

Pathways FOR SUSTAINABLE FOOD — *Pathways for transitions to sustainability in livestock husbandry and food systems*

BovReg Understanding cattle genomes — *Identification of functionally active genomic features relevant to phenotypic diversity and plasticity in cattle*

GENE-SWitCH — *The regulatory GENomE of SWine and CHicken: functional annotation during development*

GENTORE — *Genomic management Tools to Optimise Resilience and Efficiency*

GERONIMO GENOME AND EPIGENOME ENABLED BREEDING IN MONOGASTRICS — *Genome and epigenome enabled breeding in monogastrics*

Feed-a-Gene — *Adapting the feed, the animal and the feeding techniques to improve the efficiency and sustainability of monogastric livestock production systems*

Rumigen — *Improving ruminant breeding through sustainable technologies*

Horizon Europe

Dedicated topic in Work Programme 2021: **Resilient livestock farming systems under climate change** *(€12M), Beneficiary: Relivestock*

Possible topic in Work Programme 2023-2024 (published this autumn)

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Local innovation projects

EIP-AGRI Operational Groups
~60 Operational Groups

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Systematic review of scientific evidence by the JRC

https://wikis.ec.europa.eu/display/IMAP/IMAP+Home+page

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Review of farming practices (2021-2022)

- Agroforestry
- Organic systems
- Fallowing
- Landscape features
- Fertilisation strategies
  - Organic fertilisation
  - Green manure
  - Enhanced efficiency fertilisers
  - Nitrification inhibitors
  - Low ammonia emission techniques
- Soil amendments
  - Lime or gypsum
  - Biochar
- Pesticide reduction strategies
- Crop rotation
- Intercropping
- Cover crop
- No tillage, reduced tillage, conservation agriculture
- Grassland:
  - Grassland management
  - Grassland conservation and restoration
  - Grazing
- Livestock practices
  - Manure land application
  - Manure storage
  - Manure processing
  - Livestock dietary manipulation
  - Livestock housing techniques

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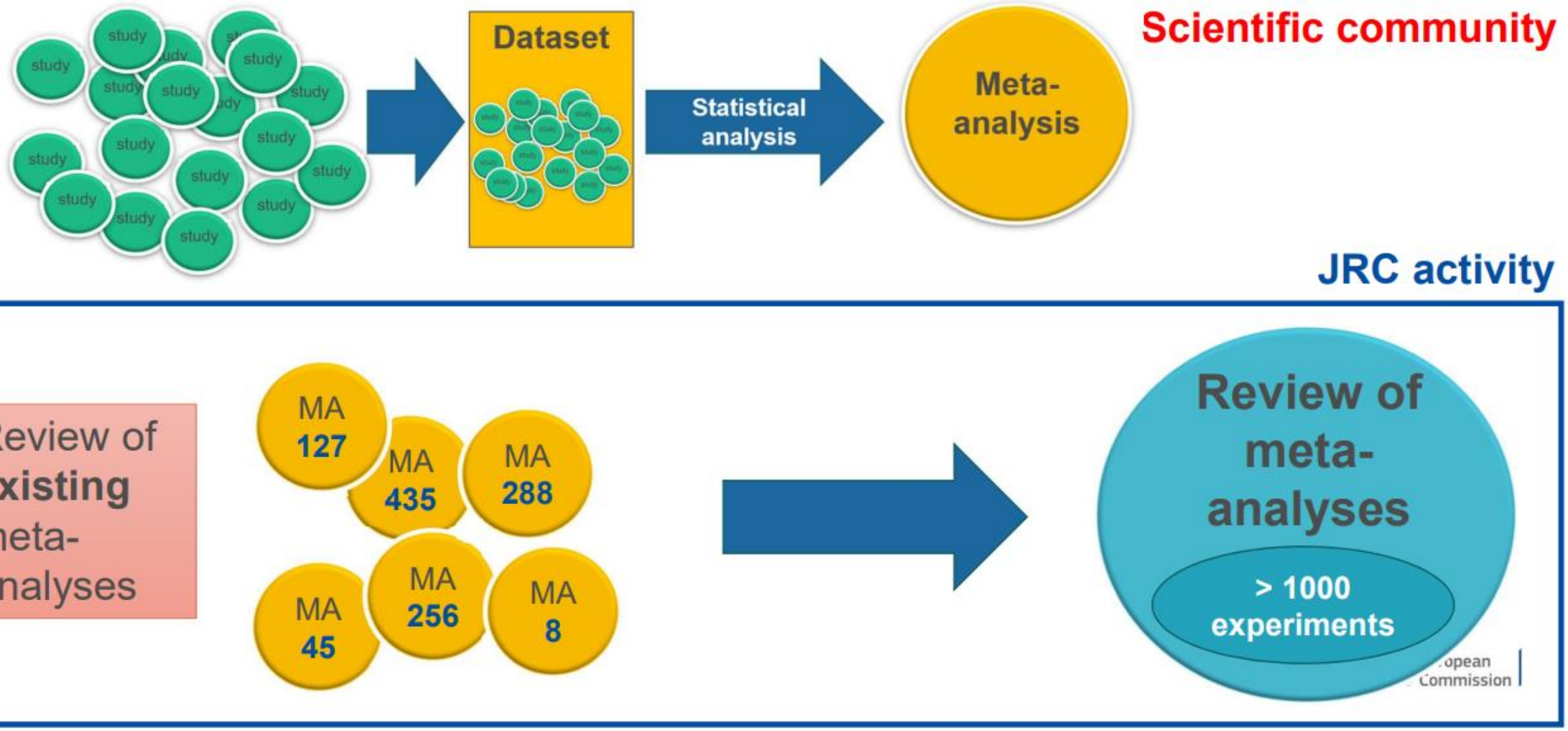
What is a systematic review of meta-analyses?



Example: impact of livestock dietary manipulation – synthesis table

Impact	Metric	Intervention group	Intervention	Control	Positive	Negative	No effect	Uncertain*
Decrease GHG emissions	CH_4	Diet formulation	Dietary legumes	Grass pasture/silage	0	0	0	1 (1)
			Forage with higher digestibility	Forage with lower digestibility	0	0	0	1 (1)
			High concentrate level in diet	Low concentrate level in diet	0	0	1 (1)	1 (1)
			Low CP diet	No reduction of dietary CP	0	0	1 (1)	1 (0)
			Tannin-rich forages	No tannin-rich forage	0	0	0	1 (1)
		Feed additives	Coccidiostats and histomonostats	No feed additive	3 (3)	0	1 (1)	1 (1)
			Lipids	No lipid	4 (3)	0	3 (2)	1 (1)
			Non specified feed additives	No feed additive	0	0	0	1 (0)
			Nutritional additives	No feed additive	0	0	0	1 (1)
			Sensory additives	Monensin›	0	0	1 (1)	0
			Sensory additives	No feed additive	6 (5)	0	5 (5)	3 (3)
			Technological additives	No feed additive	1 (1)	0	3 (3)	0
			Zootechnical additives	No feed additive	8 (6)	0	2 (2)	2 (2)
	GHG	Diet formulation	High concentrate level in diet	Low concentrate level in diet	0	0	1 (1)	0
		Feed additives	Nutritional additives	No feed additive	1 (1)	0	0	0
	N_2O	Diet formulation	Low CP diet	No reduction of dietary CP	0	0	1 (1)	1 (0)
			High concentrate level in diet	Low concentrate level in diet	0	0	0	1 (1)
		Feed additives	Coccidiostats and histomonostats	No feed additive	0	0	0	1 (1)
			Non specified feed additives	No feed additive	0	0	0	1 (0)
			Technological additives	No feed additive	0	0	1 (1)	0
			Zootechnical additives	No feed additive	0	0	0	1 (1)

	Meta-analyses
Total n°	30
N° on GHG emissions	23 (1147 single studies)

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Example: impact of livestock dietary manipulation – main results

- **Diet formulation**: no effect on CH4 emissions
- **Feed additives**: some categories (coccidiostats, lidips and zootecnical additives) are effective for reducing CH4 emissions but not N2O emissions.
- Influencing factors: Feed additive type and rate. Livestock type.
- Trade-off: Most do not have yield decrease except low crude protein diet and lipids;
- Knowledge gap: There is the need of studies on the whole-farm modelling in different feeding scenarios.

The JRC systematic review…

- …ensures access to the best current scientific evidence with a lower risk of bias
- …provides quantitative results to be used for
  - policy assessment (e.g. CAP Strategic Plans)
  - modelling scenarios (emissions factors, parameters) and
  - national GHG inventories (better representation)
- Dissemination
  - Public Wiki: https://wikis.ec.europa.eu/display/IMAP/IMAP+Home+page
  - Workshops with relevant stakeholders will be organized