

RIVISTA QUADRIMESTRALE
DI
DIRITTO DELL'AMBIENTE

NUMERO 3 - 2022

ROBERTO TALENTI

*Revising the European Regulatory Framework for Livestock-Related GHG
Emissions - Is the EU Really Advancing Towards Climate Neutrality?*



ISSN 2239-964X

ROBERTO TALENTI*

Revising the European Regulatory Framework for Livestock-Related GHG Emissions - Is the EU Really Advancing Towards Climate Neutrality?

TABLE OF CONTENTS: 1. *Introduction.* – 2. *Climate change and the livestock sector: addressing the cow in the room.* – 2.1. *EU meat production and consumption patterns.* – 2.2. *The livestock sector at the EU level: GHG emissions and mitigation potential.* – 3. *European Climate targets for the livestock sector.* – 4. *The Effort Sharing Regulation and the livestock sector.* – 4.1. *The Effort Sharing Regulation and livestock until 2018.* – 4.2. *The Effort Sharing Regulation under the fit for 55 package.* – 5. *The LULUCF Regulation and the livestock sector.* – 5.1. *The LULUCF Regulation of 2018.* – 5.2. *The LULUCF Regulation under the fit for 55 process, the 2021 Proposal.* – 5.3. *The LULUCF Regulation under the fit for 55 process: the Provisional Agreement.* – 6. *Two steps forward and one behind: a last hope in the LULUCF Provisional Agreement.*

1. Introduction

Despite being the flagship regulatory process of the Von der Leyen Commission, the European Green Deal rises not few perplexities among scholars and policy-makers, especially in light of the inherent difficulties of achieving its core objective enshrined, *inter alia*, in the European Climate law, *i.e.*, the carbon neutrality target¹. In line with the commitment to achieve this new and more stringent climate target, as well as with the aim of achieving a 55% GHG emission reduction target by 2030, the European Commission has adopted, as soon as in 2021, the “fit-for-55” package, in order to revise the relevant climate legislation and make it consistent with the new European climate objectives. At the time being, this process of revision is coming to an end, and it is therefore essential to understand if the revision process undertaken with the adoption of the “fit-for-55” makes the EU on track for the achievement of the 55% and climate neutrality targets.

With the aim of starting to tackle this issue, the current research will specifically focus on one sector, *i.e.* the livestock sector. The focus on livestock

* Ph.D. Candidate in environmental and public international law at the Scuola Superiore Sant'Anna (Pisa, Italy). E-mail: Roberto.Talenti@santannapisa.it.

¹ European Commission, COM(2019) 640 final (2019).

is everything but random. In fact, to analyse this specific sector is necessary at least for two reasons: firstly, the livestock sector has a massive environmental and climate impact, so that it would be hardly possible to achieve EU's climate targets without a sound livestock sector's regulation²; secondly, having being defined already in 2008 by Donahue as the «elephant in the room» of climate governance dialogues³ (and still, much more recently, as the «cow in the room» of climate negotiations)⁴, the livestock sector has long been neglected not only by policy- and decision-makers, but also by scholars engaged in the analysis of climate change governance. Accordingly, this paper will try to answer the following research question: to what extent are European GHG emission reduction targets for the livestock sector, also in light of the amendments conducted under the fit for 55 package, consistent with the climate neutrality objective enshrined, *inter alia*, in the Green Deal Communication and in European Climate Law?

Answering to this research question is particularly important for international law scholars because, when it comes to the reduction of EU GHG emissions, not only the compliance with European climate change law, but also compliance with International climate change law is at stake. As a matter of fact, being a Party to the Paris Agreement, the EU shall, *inter alia*, play its role in order to achieve pick in GHG emissions as soon as possible, and carbon neutrality «in the second half of this century»⁵.

When it comes to the limits of the current research, it is important to acknowledge that the setting of more stringent climate targets can just be seen as a first step in the path towards their achievement. Indeed, it is not reckless to say that while the EU's identification of an overall climate change target has represented a first important step, the second one is represented by the fixation of adequate sectorial climate targets, while the third one will concern the adoption of effective implementation measures. Accordingly, having welcomed

² H. LEE-C. BROWN-B. SEO-I. HOLMAN-E. AUDSLEY-G. COJOCARU-M. ROUNSEVELL, *Implementing land-based mitigation to achieve the Paris Agreement in Europe requires food system transformation*, in *Environmental Research Letters*, 2019.

³ D.L. DONAHUE, *Elephant in the Room: Livestock's Role in Climate and Environmental Change*, in *Michigan State University College of Law Journal of International Law*, 2008, pp. 95 ff.

⁴ F. BAS-F. DEFOSSEZ-S. LAKE, *The biggest climate solution missing from COP27: meat reduction*, in *IEEP*, 2022 (link to the article: <https://ieep.eu/news/the-biggest-climate-solution-missing-from-cop27-meat-reduction>).

⁵ Paris Agreement (2015), Art.4(1).

the European Union's identification of the overall climate neutrality target, for reasons of space this work will specifically focus on the analysis of the climate change mitigation framework which has been fixed at the EU level for a peculiar relevant sector (*i.e.*, the livestock sector), and at its process of amendment under the fit-for-55 package. Therefore, the study of the adequacy of any implementation measure will be eventually addressed in research to come.

In order to provide a satisfactory answer to the research question, this paper will be structured as follows. While the first part (§2) of the study will provide an overview of the livestock sector's environmental impact, focusing on atmospheric pollution, in order to justify this paper's focus on such peculiar sector, in its second part (§3), the work will introduce the reader to the inherently problematic issue of identifying European climate targets for the livestock sector. Afterwards, the third part (§4) and the fourth part (§5) of the paper will be respectively dedicated to the in-depth analysis of the Effort Sharing Regulation and the LULUCF Regulation (*i.e.*, the two European regulations which currently fix GHG emission reduction targets directly affecting the livestock sector) by keeping a careful eye on the amendment process that they have undertaken under the 'fit for 55' package, and providing evaluations on the final targets identified with the provisional agreements. Lastly, the fifth part (§6) of the paper will present the final remarks and conclusions of the study.

2. Climate change and the livestock sector: addressing the cow in the room

National legislators have traditionally paid little attention to the mitigation of the livestock sector's environmental impacts, both at the international and at the domestic level⁶. In particular, when it comes to the international climate change regime, it might be noted that, while some rules already indirectly (and marginally) affect the livestock sector at the UN level⁷,

⁶ In this context, particularly interesting and recent exceptions are represented by New Zealand's introduction of a law to tax cattle-GHG emissions, and by the Dutch government's decision to acquire most polluting farms which do not adequate to more stringent environmental standards.

⁷ R. TALENTI, *Climate Change and the Livestock Sector's Mitigation Potential: A Seized Opportunity for the International Climate Regime?*, in *Perspectives on Federalism*, 2022, pp. E-72 ff.

there is still no explicit reference to the necessity of reducing livestock-related GHG emissions in COP decisions⁸. Similarly, not even the UN Convention on Biological Diversity, nor one of its Protocols or COP decisions refer to the necessity to halt and reverse the biodiversity crisis by tackling the livestock sector⁹.

This governance void is particularly problematic, however, in the light of the wide spectrum of environmental problems (biodiversity loss, habitat loss, water consumption, soil degradation, GHG emission)¹⁰, but also of health and social problems (increasing spread of zoonosis, antibiotic resistance, food insecurity, rural abandonment)¹¹ which emerge as a consequence of the livestock sector's expansion.

The consequences arising out of the livestock sector's activities are varied and multifaceted; nevertheless, there is one single factor which should be taken in mind in order to understand why the livestock sector is so problematic, and this factor concerns its inherent inefficiency¹². For instance, it is important to observe that, in order to produce one kg of protein from beef, it is necessary to use more than 33 kg of vegetal proteins and, therefore, to lose during the process an average of 32 kg of vegetal proteins. It is quite evident then, that in a Planet which is already heavily polluted by agricultural activities and in

⁸ The Sharm el-Sheikh Implementation Plan adopted at COP27 only «notes», in its preamble, «the importance of transition to sustainable lifestyles and sustainable patterns of consumption and production» without explicitly referring to the centrality of sustainable diets and food consumption and production patterns.

⁹ The 30 by 30 Agreement reached at COP15 to the Convention on Biological Diversity does not make any mention to the livestock sector, nor to sustainable diets and food production patterns.

¹⁰ B. MACHOVINA-K.J. FEELEY-W.J. RIPPLE, *Biodiversity conservation: The key is reducing meat consumption*, in *Science of the Total Environment*, 2015, pp. 415 ff.

¹¹ See, among the others, R.A. HICKMAN-T. LEANGAPICHART-K. LUNHA-J. JIWAKANON-S. ANG-KITITRAKUL-U. MAGNUSSON-M. SUNDE-J.D. JÄRHULT, *Exploring the Antibiotic Resistance Burden in Livestock, Livestock Handlers and Their Non-Livestock Handling Contacts: A One Health Perspective*, in *Frontiers in Microbiology*, 2021, pp. 1 ff.; IPCC, *Climate Change and Land – Summary for Policymakers*, 2020; Food and Agricultural Organization, *Sustainable Agricultural Development For Food Security And Nutrition: What Roles For Livestock?*, 2016.

¹² Consider that, when it comes to feed proteins conversion into animal proteins, the conversion rate is equal to 21% for poultry products, 9% for pork, and 3% for beef. The situation is even more dramatic when the conversion of calories is taken into account (13% for poultry, 9% for pork, and 3% for beef). For more information, look at A. SHEPON-G. ESHEL-E. NOOR-R. MILO, *Energy and protein feed-to-food conversion efficiencies in the US and potential food security gains from dietary changes*, in *Environmental Research Letters*, 2016, pp. 1 ff.

which¹³, at the same time, it will soon be necessary to feed 10 billion people (while there are already «828 million people [who] go to bed hungry every night»)¹⁴, to rely on such an inefficient food technology is increasingly problematic.

Despite the complex range of livestock-related environmental impacts, which also varies depending on the region of the globe, and on the animal species which is farmed¹⁵, given the purpose of this paper, the current paragraph will only focus on livestock-related GHG emissions at the EU level.

2.1. *EU meat production and consumption patterns*

The European Union is one of the largest producers and consumers of animal food at the planetary level. European meat production increased over the last 20 years and, at present, Europe produces more meat than it has ever done before¹⁶. This makes the European continent, with its 19.3% share of the global production, the second biggest meat producer after Asia at the Planetary level¹⁷. In order to reach such a high level of production in spite of its limited territory, the EU has had to become the region with the «highest proportion of land used for settlement, production systems (in particular agriculture and forestry) and

¹³ H. RITCHIE-M. ROSER, *Environmental Impacts of Food Production*, in *Our World in Data*, 2022 (link to the website: <https://ourworldindata.org/environmental-impacts-of-food#key-insights-on-the-environmental-impacts-of-food>).

¹⁴ World Food Programme, *A global food crisis*, 2022 (link to the website: <https://www.wfp.org/global-hunger-crisis#:~:text=2022%3A%20a%20year%20of%20unprecedented%20hunger&text=As%20many%20as%20828%20million,on%20the%20edge%20of%20famine>).

¹⁵ See, among the others, B. MACHOVINA-K.J. FEELEY-W.J. RIPPLE, *op. cit.*; A. SHEPON-G. ESHEL-E. NOOR-R. MILO, *op. cit.*

¹⁶ When it comes to food production, European meat output increased from 51.41 million tonnes in the year 2000, to 56.7 in 2010, and to 65.2 million tonnes of meat produced in 2020. For further information, look at Our World in Data, *Global meat production, 1961 to 2020*, 2020 (link to the website: <https://ourworldindata.org/grapher/global-meat-production>).

¹⁷ *Ibidem*. It is interesting to observe that, Europe is the second biggest global meat producer although the European land just accounts for 6.8% of the Earth's land area, which becomes 7.4% if Antarctica is not considered (by comparison, Asia accounts for 32.9% of Earth's land, if Antarctica's territory is excluded). For further information, look at W.G. EAST, *Europe*, in *Encyclopaedia Britannica*, 2022 (link to the website: <https://www.britannica.com/place/Europe>); P. GOUROU, *Asia*, in *Encyclopaedia Britannica*, 2022 (link to the website: <https://www.britannica.com/place/Asia>).

infrastructure» on Earth¹⁸, employing no less than 68% of its agricultural land for animal production¹⁹. Such a high production of animal products contributes to making Europe the second region of the World in terms of higher daily per capita kilocalorie supply from all foods²⁰, and this positions its calories production capacity well above the recommended calories intake requirement²¹.

On the consumption side, it should be observed that also EU meat consumption patterns have been rising over the last two decades²². Therefore, provided that per capita meat consumption in the EU is forecasted to continue rising up until 2030²³, European per capita consumption of meat is, and will remain for the next decade, almost two times higher than the World per capita consumption of meat²⁴.

Finally, to get a hint of animal food inefficiency, it is interesting to observe that, despite occupying more than 2/3 of EU agricultural land, and despite the very high European per capita animal food intake, animal food (including dairy, eggs, and other animal sub-products) only accounts for 30% of caloric intake at the EU level²⁵.

2.2. The livestock sector at the EU level: GHG emissions and mitigation potential

¹⁸ European Environmental Agency, *Land Use*, 2020 (link to the website: <https://www.eea.europa.eu/themes/landuse/intro>).

¹⁹ European Commission, COM (2020) 381 final.

²⁰ The daily per capita kilocalorie supply in Europe is equal to 3,410 kcal. For further information look at M. ROSER-H. RITCHIE-P. ROSADO, *Food Supply*, in *Our World in Data*, 2019 (link to the website: <https://ourworldindata.org/food-supply>).

²¹ The European calories production capacity stands at 1,900 kcal per person a day. For further information look at *ibidem*.

²² EU meat demand moved from 35.2 million tonnes in the year 2000, to 37.1 million tonnes in 2010, and 37.8 million tonnes in 2020, and it is forecasted to reach, in a business-as-usual scenario, 38.2 million tonnes in 2030. In the year 2020, the per capita consumption of meat in the EU stands at 67.8 kg per year. For further information, look at Organisation for Economic Co-operation and Development & Food and Agricultural Organization, *OECD-FAO Agricultural Outlook 2021-2030*, 2020 (link to the database: https://stats.oecd.org/viewhtml.aspx?datasetcode=HIGH_AGLINK_2022&lang=en).

²³ In a business-as usual-scenario, European meat consumption will reach 69.4 kg p.a. by 2030. For further information look at *ibidem*.

²⁴ World per capita meat consumption nowadays lays at 35kg per year. For further information look at *ibidem*.

²⁵ L. SCHERER-P. BEHRENS-A. TUKKER, *Opportunity for a dietary win-win-win in nutrition, environment, and animal welfare*, in *One Earth*, 2019, pp. 348 ff.

The high levels of European animal food production (and consumption) have a massive impact in terms of its GHG emissions. At a preliminary stage, it is important to understand how does the livestock sector emit GHGs, which GHGs does it emit, and which differences are there among different animals' emissions. Afterwards, it will be possible to look at European livestock-related GHG emissions, and at its mitigation potential.

Firstly, the livestock sector mainly generates GHG emissions as a consequence of two processes, namely «enteric fermentation where specific microbes residing in the rumen produce CH₄ [...] and anaerobic fermentation of livestock manure producing CH₄ and [...] N₂O»²⁶. Further sources of GHG emissions from livestock depend on land-use change due to feed production, and fertilizers use²⁷. It emerges then, that the livestock sector is not really a main responsible of carbon dioxide (CO₂) emissions²⁸, but it is a significant source of nitrous oxide (N₂O) emissions²⁹ and a great source of methane (CH₄) emissions³⁰. It is really important, at this point, to highlight two elements: first, CH₄ and N₂O are very powerful GHGs, with a greenhouse effect which is respectively 25 times, and 298 times higher than that of CO₂ over a 100 years timespan³¹. Second, it is important to bear in mind that CH₄ is a short-lived climate pollutant, as it only lasts in the atmosphere for a 12 years period³²; this means that a phase down of CH₄ emissions (for instance through livestock production reduction) would have both strong and rapid positive effects on the state of climate. Furthermore, if it is true that the livestock sector as such is a

²⁶ V. SEJIAN-R. BHATTA-P.K. MALIK-B. MADIJAGAN-Y.A.S. AL-HOSNI-M. SULLIVAN-J.B. GAUGHAN, *Livestock as Sources of Greenhouse Gases and Its Significance to Climate Change*, in *Intech Open, Greenhouse Gasses*, 2016, pp. 243 ff., pp. 245-246.

²⁷ *Ibidem*.

²⁸ Carbon dioxide accounts for 27% of livestock emissions. For further information, look at Food and Agriculture Organization, *Tackling Climate Change Through Livestock*, 2013.

²⁹ Nitrous dioxide accounts for 29% of livestock emissions. For further information, look at *ibidem*.

³⁰ Methane accounts for 44% of livestock GHG emissions. For further information, look at *ibidem*.

³¹ United States Environmental Protection Agency, *Overview of Greenhouse Gases* (last updated 2022) (link to the website: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>).

³² Centre for Climate and Energy Solutions, *Short-lived Climate Pollutants*, 2018 (link to the website: <https://www.c2es.org/content/short-lived-climate-pollu->

[tants/#:~:text=The%20most%20significant%20short%2Dlived,fossil%20fuel%20production%20and%20combustion](https://www.c2es.org/content/short-lived-climate-pollutants/#:~:text=The%20most%20significant%20short%2Dlived,fossil%20fuel%20production%20and%20combustion))

strong emitter of GHGs, it ought also be considered that not all animal foods have the same climate impact³³.

Having said this, it should not be surprising that, while at the EU level the agriculture sector accounts for 10% of total GHG emissions (this esteem refers to EU-28, GHGs conversion into CO₂eq is calculated over a 100 year's period, and it does not take into account emissions occurring outside the EU as a result of European activities as the production of feed and fertiliser), «the livestock sector is responsible for 81-86% of the agricultural GHG emissions» at the EU level³⁴. This means that, on a 100 years' time span, the livestock sector alone produces more than 8% of total European GHG emissions, and this makes livestock emissions more abundant than EU aviation, shipping, and waste emissions summed together³⁵. Furthermore, if we focus on methane emissions, we can also observe that in 2019 the EU produced 15.2 megatons of CH₄, which represent (on a 20 years' time period) more than 30% of EU GHG emissions³⁶. Importantly, out of these 15.2 megatons of CH₄ emissions, 52.7% are due to the livestock sector, and this makes the livestock sector by far the main sector in terms of methane emissions at the EU level³⁷. This means that, when CH₄ conversion into CO₂eq is calculated over a 20 years' time period, the livestock sector results accountable for more than 15% of total EU-27 GHG emissions.

Provided the great amount of emissions (and mainly methane emissions) which are due to the livestock sector, scientist have long been calling for climate change mitigation measures that pass through the reduction of

³³ As a matter of fact, while the production of one kilogram of poultry meat causes the emission of 9.9kg of CO₂ equivalent (CO₂eq), 12.3kg of CO₂eq are emitted for any kg of pig meat produced, 39.7kg for each kg of lamb, while 99.48 kg of CO₂eq are emitted for any kg of beef. Just to have a term of comparison, it might be useful to point out that the production of a kilogram of maize, potatoes, and nuts, respectively emits 1.7kg of CO₂eq, 0.5kg of CO₂eq, and 0.4kg of CO₂ eq. For further information, look at J. POORE-T. NEMECEK, *Reducing food's environmental impacts through producers and consumers*, in *Science*, 2018, pp. 987 ff.

³⁴ J. PEYRAUD-M. MACLEOD, *Future of EU livestock: How to contribute to a sustainable agricultural sector?*, Publication Office of the European Union, Luxembourg, 2020, p. 1.

³⁵ European Environment Agency, *Greenhouse gas emissions by aggregated sector*, 2019 (link to the website: <https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-5#tab-dashboard-02>).

³⁶ R. VAN DER VEEN-M. DE VRIES-J. VAN DE POL-W. VAN SANTEN-P. SINKE-J. DE VRIES-B. KAMPMAN-G. BERGSMAN, *Methane reduction potential in the EU. Between 2020 and 2030*, CE Delft, Delft, 2022.

³⁷ *Ibidem*.

animal food production, in order to reduce animal food related GHG emissions. As a matter of fact, as the European Court of Auditors already pointed out in 2021, the only palpable way for reducing livestock-related emissions is to reduce animal food production (and consumption) across Europe. Indeed, the Court did not identify any «effective and approved practices that can significantly reduce livestock emissions from feed digestion without reducing production», and it also stated that «some of these practices encourage production expansion, and may thus increase net emissions»³⁸. Accordingly, in a 2022 study conducted by the University of Delft, it was demonstrated that the adoption of healthier diets at the EU level, less reliant on animal food consumption (and then decreasing EU animal food consumption and production levels), would be the single most significant action mitigating EU CH₄ emissions, as it would curb roughly one third of European livestock methane emissions, and it would then reduce EU overall CH₄ emissions by 15-19% from 2020 to 2030³⁹.

Therefore, although reducing livestock-related GHG emissions will not be an easy task, to tackle the livestock sector will be fundamental in order to reduce EU aggregate GHG emissions, and to make the EU compliant with its climate change mitigation obligations. As a matter of fact, as Westhoek et al. observed, already in 2014, «halving the consumption of meat, dairy products and eggs in the EU would achieve a 40% reduction in N₂O emissions, 25-40% reduction in GHG emissions, and 23% per capita less use of cropland for food production», while also having a positive impact on Europeans' health⁴⁰. Furthermore, as Lee et al. calculated in 2019, to achieve forest area targets in line with the 1.5° C objective without putting at risk European food security «drastic reduction in meat demand is required»⁴¹. In particular, the EU will have to curb its ruminant and non-ruminant meat demand respectively by 57.5% and 56.7%⁴².

³⁸ European Court of Auditors, *Common Agricultural Policy and climate*, 2021.

³⁹ R. VAN DER VEEN-M. DE VRIES-J. VAN DE POL-W. VAN SANTEN-P. SINKE-J. DE VRIES-B. KAMPMAN-G. BERGSMA, *op. cit.*, p. 19.

⁴⁰ H. WESTHOEK-J.P. LESSCHEN-T. ROOD-S. WAGNER-A. DE MARCO-D. MURPHY-BOKERN-A. LEIP-H. VAN GRINSVEN-M.A. SUTTON-O. OENEMA, *Food choices, health and environment: Effects of cutting Europe's meat and dairy intake*, in *Global Environmental Change*, 2014, p. 1.

⁴¹ H. LEE-C. BROWN-B. SEO-I. HOLMAN-E. AUDSLEY-G. COJOCARU-M. ROUNSEVELL, *op. cit.*, p. 4.

⁴² *Ibidem*.

Evidently, it will be crucial for the EU to curb its livestock related GHG emissions. Hence, it is vital to address and evaluate the GHG emission reduction targets that the EU has fixed for the livestock sector in order to understand whether it is on the right track for the achievement of the climate neutrality objective.

3. European Climate targets for the livestock sector

Having understood why is it crucial to address livestock-related GHG emissions, it is time to understand whether the EU has fixed any GHG emission reduction targets directly affecting the livestock sector. At this point, before deepening the level of analysis, it is important to highlight three elements.

Firstly, it must be observed that, in light of the very nature of the livestock sector, livestock-related activities cannot be merely identified under the umbrella of the agriculture sector. As a matter of fact, as it has already been stated in the previous paragraph, the livestock sector also directly has an impact on forests (*e.g.* the expansion of feed production is a main driver of deforestation)⁴³. Therefore, not only the agriculture climate change mitigation targets but also climate targets having an impact on the LULUCF sector (which stands for land use, land use change, and forestry) must be taken into account when looking at measures affecting livestock sector's GHG emissions. It can also be observed that there is already a category which completely includes the whole range of livestock sector's activities, *i.e.* the AFOLU category (which stands for Agriculture, Forestry, and Other Land Use), which indeed is given by the incorporation of both the agriculture and the LULUCF sectors, and which was developed for the first time by the IPCC (*i.e.* Intergovernmental Panel for Climate Change) in 2006⁴⁴. Nevertheless, the EU has never relied on the AFOLU sector category, and for this reason this paper will have to separately address agriculture and LULUCF climate targets adopted at the European level in order to understand whether climate targets affecting the livestock sector have been fixed by the EU legislators.

⁴³ F. PENDRILLA-U.M. PERSSON-J. GODARB-T. KASTNERC-D. MORAND-S. SCHMIDTD-R. WOOD, *Agricultural and forestry trade drives large share of tropical deforestation emissions*, in *Global Environmental Change*, 2019, pp. 1 ff.

⁴⁴ IPCC, *2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 4 - Agriculture, Forestry and Other Land Use*, 2006.

Secondly, it must be reminded that, despite the large variety of secondary law instruments that the EU has produced over time with the aim of tackling climate change, there is just one overarching piece of legislation, *i.e.* the European Climate Law of 2021, that fixes the EU overall climate change mitigation target, and there are three pieces of legislation constituted by the Emission Trading System Directive, the Effort Sharing Regulation, and the LULUCF Regulation that constitute the three pillars of European climate change law. As a matter of fact, each one of these three pieces of legislation identifies a (more or less) stringent GHG emission reduction target for the sectors falling under its scope of application, and each one of them identifies the rules and boundaries within which it is necessary to move in order to achieve the target at stake. Despite the presence of some interlinkages (*e.g.* both surplus and debts generated in the LULUCF sector can contribute to the achievement of ESR's targets, as provided in the flexibility mechanisms)⁴⁵, these three instruments are mutually exclusive; therefore, it is not possible for an economic activity to be simultaneously subject to the rules of more than one of these instruments. However, provided that, at the EU level, the livestock sector is split into a number of GHG emitting activities (*e.g.* enteric fermentation, manure management, feed management, etc.), the livestock sector's emissions are not homogeneously addressed by one single instrument. On the contrary, there are some livestock-related activities which fall under the scope of the Effort Sharing Regulation and others falling under the LULUCF Regulation. Therefore, both these regulations will be analysed in order to understand if they enshrine any (adequate) climate change mitigation target affecting livestock. On this regard, it is also valuable to observe that, while the Emission Trading System Directive surely is the strictest of the three EU climate change instruments, none of the livestock sector's activities falls under its scope of application.

Thirdly, it must be considered that, after the adoption of the European Climate Law in 2021, the European Commission has launched the fit for 55 package, *i.e.* a «set of proposals to revise and update EU legislation» in order to make it line with the 55% reduction target to be achieved by 2030⁴⁶. Among the

⁴⁵ European Commission, Regulation (EU) 2018/842, Art.7.

⁴⁶ European Council, *Fit for 55*, last updated in 2022 (link to the website: <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>).

other legal instruments, also the Effort Sharing Regulation and the LULUCF Regulation have been subject to a process of revision. Therefore, it will be important to analyse how effective this amendment process has been in terms of identification of new climate targets for the livestock sector.

4. The Effort Sharing Regulation and the livestock sector

Provided that the Effort Sharing Regulation (ESR) is a quite complex legal instrument, this sub-paragraph will firstly describe how this regulation works, and how did it manage livestock sector-related GHG emissions in its 2018 version (*i.e.*, before the fit-for-55 revision). Afterwards, there will be a focus on the process conducted under the fit-for-55 package, in order to understand whether and (eventually) how the Regulation changed its way of addressing livestock-related GHG emissions.

4.1. The Effort Sharing Regulation and livestock until 2018

The Effort Sharing Regulation of 2018 is one of the three pillar instruments of European climate change law and, accounting for 60% of EU domestic GHG emissions⁴⁷, it is the one with the broadest scope of application. While the overall objective of the Regulation is to reduce by 30%, at the EU level, the GHG emissions falling under its scope of application by 2030 (adopting the year 2005 as a baseline)⁴⁸, it must be observed that different States have different emission reduction targets⁴⁹. Importantly, not only CO₂ emissions, but the emissions of all main GHGs are accounted in the Effort Sharing Regulation of 2018⁵⁰, and this makes the ESR potentially sensible to the strong CH₄ and N₂O emissions which are associated with the livestock-related activities. Furthermore, it is important to observe that, within the ESR

⁴⁷ European Commission, *Effort sharing 2021-2030: targets and flexibilities*, last updated in 2021 (link to the website: https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en#documentation).

⁴⁸ European Commission, Regulation (EU) 2018/842, Art.2.

⁴⁹ Member State emission reduction targets range from a minimum of 0% reduction target (as in the case of Bulgaria), to a maximum of 40% emission reduction (it is the case for Sweden). For more information, look at Regulation (EU) 2018/842, Art.4(1).

⁵⁰ The Regulation accounts for the emission of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulphur hexafluoride. For further information look at Regulation (EU) 2018/842, Art.3(1).

framework, the responsibility for compliance falls on Member States, which every year between 2021 and 2030 shall maintain their GHG emissions within the limit defined by a linear trajectory⁵¹.

If, on the one hand, the measures established by the ESR might seem not too loose, on the other hand, two caveats need to be done. Firstly, it is important to point out that Member States, in their effort to fulfil their yearly reduction targets, can rely on a number of flexibility mechanisms (*i.e.* borrowing, banking, and transfer)⁵², which give them the right to postpone the achievement of their mitigation commitments. Secondly, and importantly given the object of this research, it is crucial to underscore that emission reduction targets must be achieved, by each Member States, at the aggregate level, and not for each one of the sectors covered by the Regulation⁵³. This implies that emissions associated with some of the sectors listed in the ESR might remain constant (or could even rise) provided that they are compensated by emission reductions occurring in other ESR sectors (from now on this phenomenon will be referred to as «inter-sectorial compensation»).

Having said this, it is time to focus on the ESR's scope of application, while keeping a special eye on livestock-related GHG emissions. Indeed, while the ESR applies, *inter alia*, to the agriculture sector⁵⁴, it is Decision 2005/166/EC to present the break-down of the agriculture sector, and to identify both enteric fermentation and manure management (of «cattle», «buffalo», «sheep», and «other») as agriculture-related GHG emissions⁵⁵.

It is quite evident then, that at least a part of livestock-related GHG emissions (*i.e.* both the portion associated with enteric fermentation, which alone represents the main source of livestock methane emissions, and the portion associated with manure management) is indeed covered by the Effort

⁵¹ Regulation (EU) 2018/842, Art.4(2).

⁵² Regulation (EU) 2018/842, Art.5.

⁵³ Regulation (EU) 2018/842, Art.1.

⁵⁴ Regulation (EU) 2018/842, Art.2(1).

⁵⁵ Indeed, while Article 2(1) clearly states that the Regulation applies to «source categories of energy, industrial processes and product use, agriculture and waste as determined pursuant to Regulation (EU) No 525/2013», so that the inclusion of «agriculture» among the ESR sectors results apparent, it is also important to understand which livestock-related emissions are included in the «agriculture» category. Following this line of enquiry, Regulation 525/2013 states at Art.2(c) that it applies, *inter alia*, to «GHG emissions falling within the scope of Article 2(1) of Decision No 406/2009/EC» which, in turn, applies to 'categories listed in Annex I». Annex I to Decision No 406/2009/EC refers to the emission categories of Decision 2005/166/EC.

Sharing Regulation of 2018. Nevertheless, particularly problematic is not only the low aggregate mitigation target, which only points at a 30% GHG emission reduction (while the European Climate Law aims at a 55% reduction target by 2030)⁵⁶, but also the high level of discretion that Member States have, not merely as a consequence of flexibility mechanism, but mainly because of their possibility to mitigate other ESR GHG emitting sectors without necessarily tackling the livestock sector (*i.e.*, inter-sectorial compensation). As a matter of fact, the scope of the Effort Sharing Regulation of 2018 extends to a very broad range of sectors, so that, while a clear mitigation target for livestock is visibly missing, also the reduction of livestock-related emissions in order to achieve the overall (and quite loose) emission reduction target is easily avoidable.

4.2. *The Effort Sharing Regulation under the fit for 55 package*

In July 2021 the European Commission proposed to amend under the fit for 55 package, *inter alia*, the Effort Sharing Regulation of 2018. The most glaring change introduced with the 2021 amendment is the increase of the overall ESR target from the previous 30% to the current 40% reduction of GHG emissions to be achieved by 2030⁵⁷. In this new context, then, individual Member States' targets will range from a minimum of 10% reduction to a maximum of 50% reduction by 2030, keeping the year 2005 as a baseline⁵⁸.

In terms of flexibility mechanisms and scope of the ESR, the situation has not strongly changed under the fit for 55 revision. Indeed, while the flexibility mechanisms and the yearly linear trajectory rule have just been subject to marginal changes⁵⁹, the number of sectors falling under the scope of the Effort Sharing Regulation has slightly been reduced as a consequence of the expansion of the number of sectors included in the revised Emission Trading System Directive (and, *ipso facto*, then subtracted from the scope of the ESR)⁶⁰.

In November 2022 the European Commission has reached a provisional agreement with the European Parliament and the Council on the revision of the

⁵⁶ Caveat: The Effort Sharing Regulation of 2018 and the European Climate Law of 2021 adopt two different baseline years (*i.e.*, 2005 for the ESR, and 1990 for the Climate Law).

⁵⁷ European Commission, COM (2021) 555 final, Art.1(1).

⁵⁸ COM (2021) 555 final, p. 3.

⁵⁹ COM (2021) 555 final, Art.1(3).

⁶⁰ European Commission, COM (2021) 551 final, Artt.1(2)(a)-30b(b).

Effort Sharing Regulation and, when writing this research, the new ESR legislation has not yet been published in the Official Journal of the Union⁶¹. Nevertheless, it can be stated that the revised proposal for the Effort Sharing Regulation, as it was presented by the Commission in 2021, does not introduce any significant improvement in terms of mitigation of livestock sector's GHG emissions. As a matter of fact, although the increased ESR target (from 30% to 40% GHG emission reduction by 2030) surely has to be welcomed (even though it would be interesting to know if this 40% reduction target will be sufficient to put the EU on track, *inter alia*, for the achievement of the climate neutrality objective), the presence of strong flexibility mechanisms and of a number of sectors falling under the scope of the ESR continues making the mitigation of livestock-related emissions everything but mandatory. Probably, it is the same structure of the ESR which would need to be put into question, in order to move from the fixation an overall ESR reduction target (as it exists nowadays) to the introduction of some minimum targets to be reached within each ESR sector, at least for specific activities having a particularly high mitigation potential (*e.g.*, livestock sector-related activities).

5. *The LULUCF Regulation and the livestock sector*

As it has already been observed, the very separation of the agriculture sector from the LULUCF sector (*i.e.*, the lack of recognition of the AFOLU sector) at the EU level is particularly problematic when it comes to addressing livestock-related GHG emissions. As a matter of fact, within the EU regulatory framework, livestock-related activities fall into two separate macro-categories (*i.e.*, agriculture and LULUCF) and, for this reason, livestock-related GHG emission mitigation targets fall under two different regulatory umbrellas. The aim of this sub-paragraph, then, is to investigate the LULUCF Regulation and its post-2018 changes (*i.e.* during the fit for 55 package) in order to understand whether any relevant measure in terms of livestock's emission targets has been introduced over time.

5.1. *The LULUCF Regulation of 2018*

⁶¹ European Commission – Press release, *European Green Deal: EU reaches agreement on national emission reductions from transport, buildings, waste and agriculture*, 2022.

The LULUCF Regulation of 2018 is the first EU piece of legislation including binding climate change mitigation commitments concerning the LULUCF sector⁶². In fact, a long time has passed before fixing binding mitigation targets for the LULUCF sector, both because of the historical difficulty of identifying suitable accounting methodologies for LULUCF⁶³, and because of the different interests that EU Member States have when it comes to regulating the sector at stake⁶⁴.

The LULUCF Regulation identifies, at Article 4, emission neutrality objectives to be reached, for the LULUCF sector, in the periods 2021-2025 and 2026-2030⁶⁵. Importantly, and differently from the ESR, the LULUCF Regulation disciplines a fewer number of GHGs⁶⁶, but it still includes those which are more relevant when it comes to, *inter alia*, livestock-related activities. In addition, it is also the case of underscoring that, as well as the ESR, also the LULUCF Regulation puts the responsibility for compliance upon Member States, and it presents strong flexibility mechanisms which, beyond allowing the transfer of carbon credits from ESR sectors to LULUCF sectors and vice versa, also allow for transfer of LULUCF credits among Member States, and for banking of carbon credits accumulated in the 2021-2025 period to the 2026-2030 period⁶⁷.

Evidently, the LULUCF Regulation has the undisputed merit of identifying binding emission targets for the historically problematic LULUCF

⁶² As a matter of fact, before the establishment of Regulation (EU) 2018/841, the previous Regulation 525/2013 only established a mechanism for monitoring and reporting of EU GHG emissions, while Decision 529/2013/EU identified specific accounting rules for the LULUCF sector «as a first step towards the inclusion of those activities in the Union's emission reduction commitment».

⁶³ A. SAVARESI-L. PERUGINI, *Article 5: Sinks, Reservoirs of GHG and Forests*, in G. VAN CALSTER-L. REINS (eds.), *Commentary to the Paris Agreement*, Edward Elgar, Cheltenham-Northampton, 2021.

⁶⁴ A. SAVARESI-L. PERUGINI-M.V. CHIRIACÒ, *Making sense of the LULUCF Regulation: Much ado about nothing?*, in *RECIEL*, 2020, pp. 212 ff.

⁶⁵ More specifically, while the first commitment period includes GHG emissions and removal from afforested land, deforested land, managed cropland, managed grassland, and managed forest land, the second commitment period also accounts for GHG emissions and removals due to managed wetland. For further information, look at European Commission, Regulation 2018/841, Art.2(1).

⁶⁶ Only CO₂, CH₄, and N₂O fell under the scope of the LULUCF Regulation. For further information, look at Regulation 2018/841, Art.2(1).

⁶⁷ Regulation 2018/841, Art.12.

sector⁶⁸. Moreover, it regulates a number of sectors (*e.g.* managed cropland, and managed grassland) and it accounts for the emissions of specific greenhouse gasses (*i.e.*, CO₂, CH₄ and N₂O) which can be reconducted to the livestock sector.

Notwithstanding this, the LULCF Regulation of 2018 still presents some shortcomings; indeed, as Savaresi et al. already pointed out, the Regulation «fails to fully capture emissions and removals from EU forests», it «does very little to incentivize virtuous forest management in the EU», and does not address «the perverse incentives associated with the use of biomass in the EU»⁶⁹. Moreover, also some of the flexibility mechanisms identified at Article 12 might be problematic. Firstly, the possibility to transfer carbon credits (in case of GHG removals exceeding emissions) from the LULUCF sector to ESR sectors might be counterproductive, as the «CO₂ emission into the atmosphere is more effective at raising atmospheric CO₂ than an equivalent CO₂ removal is at lowering it»⁷⁰. Secondly, and always in light of the very fact that to remove GHG emissions from the atmosphere is not equal to preventing that same amount of GHG emissions, the possibility of banking LULUCF carbon credits from the first (2021-2025) to the second (2026-2030) commitment period is not really justified by the voice of science. In fact, while the achievement of carbon negative emissions should surely be incentivised, the possibility of doing so through the establishment of banking instrument should absolutely be put aside, as this would counter the very *raison d'être* of the instrument at stake (*i.e.*, the achievement of carbon negative emissions)⁷¹.

Finally, as long as the mitigation of livestock-related GHG emissions is concerned, two further elements need to be highlighted. First, it should be noted that the scope of application of the LULUCF Regulation only concerns Member

⁶⁸ In fact, the regulation introduces the climate neutrality objective in the LULUCF sector which, beyond being functional to the achievement of the European Climate Law targets, is also compliant with the obligations set forth at Art.5 of the Paris Agreement.

⁶⁹ A. SAVARESI-L. PERUGINI-M.V. CHIRIACÒ, *op. cit.*

⁷⁰ K. ZICKFELD-D. AZEVEDO-S. MATHESIUS-D. MATTHEWS, *Asymmetry in the climate-carbon cycle response to positive and negative CO₂ emissions*, in *Nature Climate Change*, 2021, p. 613.

⁷¹ In fact, the introduction of banking instrument, despite incentivizing carbon negative emissions in the first commitment period (2021-2025) would allow the use of 'carbon credits' to compensate a lower performance in the second commitment period (2026-2030). This would not, in the end, result in carbon negative emissions, but just in carbon neutral emissions. However, to point at carbon neutral emissions is problematic in light of the findings of K. ZICKFELD-D. AZEVEDO-S. MATHESIUS-D. MATTHEWS, *op. cit.*

States' territories⁷². Therefore, all the deforestation activities occurring outside EU borders as a consequence of European livestock production and consumption patterns are not accounted by the LULUCF Regulation. Second, and not surprisingly, provided that the LULUCF Regulation of 2018 keeps a stark distinction between agriculture-related and LULUCF-related GHG emissions, and given that enteric fermentation and manure management are already under the ESR's scope of application, the most outstanding GHG emitting activities associated with the livestock sector remain uncovered by the LULUCF Regulation. It is out of doubt that the movement of these activities (*i.e.*, enteric fermentation and manure management) from the ESR's regime to the LULUCF Regulation's regime would constitute a strong move in the path towards the enhancement of livestock-related GHG emission mitigation targets, as it would put the most polluting livestock-related activities into a narrower group of regulated sectors (thus reducing the margin for inter-sectorial compensation) which aim at the climate neutrality target, instead of pointing at a 30% reduction target as identified in the ESR of 2018 (which has turned into a 40% emission reduction target after the fit-for-55 revision).

5.2. The LULUCF Regulation under the fit for 55 process, the 2021 Proposal

In July 2021, the European Commission proposed an ambitious reform to the 2018 LULUCF Regulation. Notwithstanding the permanence of some shortcomings, the 2021 Proposal addresses many of the main limitations which have been identified in the original Regulation.

Starting from its shortcomings, it is the case of observing that the Proposal, as well as the LULUCF Regulation of 2018, maintains quite strong (and to some extent problematic) flexibility instruments; most of all, the possibility of transferring carbon credits from LULUCF sectors to ESR sectors established at Article 12(2). Nonetheless, it is already among the flexibility mechanisms that a relevant improvement brought about by the Proposal must be identified, *i.e.*, the elimination of Article 12(3) of the 2018 LULUCF Regulation, and therefore the elimination of the possibility to bank carbon credits from the first to subsequent commitment periods. The second limit

⁷² European Commission, Regulation 2018/841, Art.2(1).

which has not been resolved by the Commission's Proposal concerns the territorial scope of application of the (proposed) LULUCF Regulation. As a matter of fact, as well as the 2018 Regulation, also the 2021 Proposal only applies «on the territories of Member States»⁷³, while disregarding extra-EU land-use degradation which is generated as a consequence of European production and consumption systems. Nevertheless, even in this case, two very important caveats need to be done. Firstly, in December 2022 the European Parliament and the Council have reached an agreement, always under the fit for 55 process, to establish a Carbon Border Adjustment Mechanism (CBAM)⁷⁴. The CBAM, whose main aim is that of contrasting the so called «carbon leakage» phenomenon⁷⁵, and which is complementary to the latest Commission Proposal on the Emission Trading System Directive⁷⁶, directly taxes the import of non-EU producers' emissions, and therefore indirectly impacts the production of goods produced outside the EU which have a strong carbon footprint⁷⁷. Secondly, and most importantly for both the LULUCF sector and the livestock sector, in December 2022 the European Parliament and the Council also reached a provisional agreement on the establishment of a Regulation on the import and export of «commodities and products associated with deforestation and forest degradation»⁷⁸, which prohibits the European import and export of «relevant commodities» (*i.e.*, cattle, cocoa, coffee, oil

⁷³ European Commission, COM (2021) 554 final, Art.2.

⁷⁴ European Commission, *Infographic - Fit for 55: how does the EU intend to address the emissions outside of the EU?*, 2022 (link to the website: <https://www.consilium.europa.eu/en/infographics/fit-for-55-cbam-carbon-border-adjustment-mechanism/>).

⁷⁵ It is the transfer of polluting EU companies outside the EU territories aimed at avoiding the abidance the relatively more stringent EU climate change rules.

⁷⁶ See European Commission, COM (2021) 551 final.

⁷⁷ The process of introduction of the CBAM has not been an easy one. Notably, among the stakeholders who have starkly opposed its introduction it is the case of mentioning European highly emission-intensive companies operating on international markets which, before the establishment of the CBAM, had the possibility to rely on the free-auctioning of ETS-credits. Indeed, before the establishment of the CBAM, free auctioning of ETS-credits was the best (and only) means at disposal of the EU for contrasting the phenomenon of carbon leakage. For further information, look at E. WOERDMAN, *The EU Greenhouse Gas Emissions Trading Scheme*, in E. WOERDMAN-M.M. ROGGENKAMP-M. HOLWERDA (eds.), *Essential EU Climate Law*, Edward Elgar, Cheltenham-Northampton, 2015; H. VAN ASSELT, *The Design and Implementation of Greenhouse Gas Emission Trading*, in C.P. CARLARNE-K. GRAY-R.G. TARASOFSKY (eds.), *The Oxford Handbook of International Climate Change Law*, Oxford University Press, Oxford, 2016.

⁷⁸ European Commission, COM (2021) 706 final.

palm, soya and wood) which are not deforestation-free⁷⁹. The introduction of this anti-deforestation Regulation, especially in light of the introduction of «cattle» within the list of «relevant commodities», represents an important step in the contrast to livestock-related deforestation and forest-degradation, and it effectively complements the lack of extra-territorial application of the 2021 LULUCF Regulation Proposal.

When it comes to addressing the strengths of the Commission's Proposal, and especially those related to the identification of emission targets for the livestock sector, the most relevant and revolutionary element which needs to be highlighted undoubtedly is the inclusion of «enteric fermentation» and «manure management» within its scope of application. As a matter of fact, the Proposal of 2021 establishes that, from the year 2031, enteric fermentation and manure management will no longer be covered by the ESR regime, and will fall under «scope 3» emissions regulated by the LULUCF regime⁸⁰. This implies, first of all, that the entire range of livestock sector-activities and processes will no longer be split among two different regulation's regimes (as it has been up until now)⁸¹, but it will be entirely put under the umbrella of a unitary Regulation (*i.e.*, the LULUCF Regulation). Such an innovation is particularly relevant as it enables, for the first time, the establishment of a coherent European system for the regulation of all livestock-sector related GHG emitting activities. Second of all, this constitutes a terribly important move in the direction of strengthening livestock-related climate targets, since the LULUCF Proposal of 2021 would require, *inter alia*, the achievement of carbon neutrality (of scope 1, scope 2, and scope 3 sectors) by 2035, and the production of negative emissions from 2036 onwards. In fact, given the limited margin for inter-sectorial compensation provided by the Commission's LULUCF Proposal (especially when compared to the Effort Sharing Regulation), and given the very stringent climate targets it establishes (*i.e.*, carbon neutrality by 2035, and carbon negative emissions thereafter), the 2021 Proposal imposes a new, coherent, and stringent GHG emissions' mitigation target for the whole range of livestock sector's activities.

Furthermore, additional changes which have to be welcomed concern the introduction, in the 2021 Proposal, of a linear trajectory to be complied with

⁷⁹ European Commission, COM (2021) 706 final, Art.3.

⁸⁰ *i.e.*, emissions by sectors identified at COM (2021) 554 final, Art.12(3).

⁸¹ Namely, between the Effort Sharing Regulation and the LULUCF Regulation.

in the period 2026-2030, and the identification of a «310 million tonnes CO₂ equivalent» target of GHG removals to be achieved by 2030⁸². In fact if, on the one hand, the carbon neutrality target identified in the LULUCF Regulation of 2018 for the period 2026-2030 has been eliminated, on the other hand, the Proposal of 2021 has established, for this second commitment period, an obligation for Member States to respect yearly emission reduction targets pointing at achieving this unedited 2030 objective.

Finally, it can be said that, despite the permanence of some room for improvement (*e.g.*, the still existing possibility to transfer carbon credits from the LULUCF to the ESR system remains problematic), the Commission's Proposal for a Regulation of the LULUCF sector represents a terrific step forward from the Regulation of 2018, especially when it comes to the identification of effective mitigation targets for the livestock sector. Indeed, firstly and foremost the enlargement of its scope of application, with the inclusion of enteric fermentation and manure management under scope 3, but also the elimination of the possibility to bank carbon credits among different commitment periods, and the general aim to pursue negative emissions (for scope 1 and scope 2 sectors by 2030, and for scope 1, scope 2, and scope 3 sectors together from 2036 onwards)⁸³, represent a valuable enhancement of the LULUCF Regulation, and allow for a unitary and more stringent regulation of the livestock sector, with the identification, for the first time, of explicit GHG emission mitigation targets affecting the whole range of the livestock sector-activities.

5.3. The LULUCF Regulation under the fit for 55 process: the Provisional Agreement

In November 2021 the European Parliament and the Council have reached a Provisional Agreement on the LULUCF Regulation's Amendment, under the fit for 55 package⁸⁴.

⁸² European Commission, COM (2021) 554 final (2021), Art.4(2).

⁸³ *Ibidem*. Artt. 4(2)-4(4). Caveat: The LULUCF Regulation of 2018, on the contrary, did not make any mention to «negative emissions».

⁸⁴ European Council, *'Fit for 55': provisional agreement sets ambitious carbon removal targets in the land use, land use change and forestry sector*, 2022 (Link to the website: <https://www.consilium.europa.eu/en/press/press-releases/2022/11/11/fit-for-55-provisional->

When looking at the Provisional Agreement, it can be observed that, on a positive note, both the flexibility mechanisms and the commitments identified in the 2022 Agreement remain quite similar to those identified in the 2021 LULUCF Regulation Proposal. Indeed, the deletion of Article 12(3) of the LULUCF Regulation of 2018 and the consequent elimination of the possibility to bank carbon credits from the first to subsequent commitment periods has been kept in the Provisional Agreement. Moreover, both the emission neutrality objective (for scope 1 sectors) in the 2021-2025 period, and the «310 million tonnes CO₂ equivalent net removals» target to be reached by 2030 have been maintained in the latest version of the LULUCF Regulation⁸⁵. On this regard, however, it is important to observe that, regrettably, the explicit obligation to obtain «negative emissions» from 2036 onwards (which was present at Article 4(4) of the 2021 Commission's Proposal) has been removed from the 2022 Provisional Agreement.

Notwithstanding this, the most despicable change introduced with the Provisional Agreement on the LULUCF Regulation of 2022 undoubtedly concerns the elimination of both enteric fermentation and manure management from the group of sectors listed in Article 2 and which, therefore, will not fall anymore under the LULUCF Regulation's scope of application. As a matter of fact, while Article 2(3) of the 2021 Proposal listed the aforementioned livestock-related sectors (*i.e.*, scope 3 sectors), this paragraph has been completely removed from the 2022 Provisional Agreement, as well as the provision enshrining an emission neutrality commitment for scope 3 sectors in the period 2031-2035⁸⁶.

Provided the line of inquiry that this research has followed, the reasons why the exclusion of enteric fermentation and manure management from the scope of application of the Provisional Agreement on the LULUCF Regulation is lamentable should result quite apparent. In fact, while the inclusion of these sectors within the LULUCF Regulation regime would have represented a strong move towards the identification of effective livestock-related GHG emission reduction targets, as it would have allowed a coherent regulation of all livestock-related activities under one comprehensive piece of legislation (what

agreement-sets-ambitious-carbon-removal-targets-in-the-land-use-land-use-change-and-forestry-sector/).

⁸⁵ Council of the European Union, 10857/21 + ADD 1-3 - COM(2021) 554, Artt. 4(1)-(2).

⁸⁶ European Commission, COM(2021) 554 final, Art.4(4).

is more, aiming at a quite strong GHG emission reduction target), its exclusion preserves the split of livestock sector activities among two regimes (*i.e.*, those established under the ESR and the LULUCF Regulation), and it keeps the most emitting livestock-related activities (namely, enteric fermentation and manure management) under the Effort Sharing Regulation umbrella, bringing about all the inherent problems of this Regulation which have been mentioned in the preceding paragraphs of the current research (*e.g.*, inter-sectorial compensation, lower emission reduction targets, excessively loose flexibility mechanisms, etc.). It can be inferred that, the changes introduced by the 2022 Provisional Agreement, when compared to the 2021 Commission's proposal, represent a strong step back in the process of identification of climate targets for the livestock sector.

It has to be stated, though, that references to enteric fermentation and manure management are not completely absent in the Provisional Agreement of 2022. In fact, Article 16a of the Provisional Agreement establishes that the Commission «shall submit a report to the European Parliament and to the Council, no later than six months after the first global stocktake agreed under Article 14 of the Paris Agreement, [which] shall include an assessment of the need for and feasibility of applying this Regulation to» a list of sectors, including enteric fermentation and manure management⁸⁷. This process shall be conducted «in particular with regard to the need for additional Union policies and measures, in view of the necessary increase in greenhouse gas emissions reductions and removals in the Union»⁸⁸. Therefore, there still seems to exist some glimmer of hope for a re-introduction of these sectors under the LULUCF Regulation's scope of application. Provided that the global stocktake envisaged by the Paris Agreement shall take place in the year 2023⁸⁹, new major updates are likely to emerge in the months to come. Therefore, it will be fundamental to pay due attention to this reporting process⁹⁰, which might once and for all recognize the necessity to establish a strong regulation of the livestock sector (*inter alia*, through the identification of clear livestock emission targets), or could, alternatively, water back all hope for this virtuous and necessary change.

⁸⁷ Council of the European Union, 10857/21 + ADD 1-3 - COM(2021) 554, Art.16a('2).

⁸⁸ Council of the European Union, 10857/21 + ADD 1-3 - COM(2021) 554, Art.16a('2).

⁸⁹ Paris Agreement (2015), Art.14(2).

⁹⁰ Namely, the one referred to in 10857/21 + ADD 1-3 - COM(2021) 554, Art.16a('2).

6. Two steps forward and one behind: a last hope in the LULUCF Provisional Agreement

In conclusion, in order to provide an answer to the research question, it can be stated that, given the scientific evidence showing the detrimental climate impact of livestock-related activities, the absence of clear climate targets for the livestock sector is no longer acceptable. Overall, the fit for 55 process has undoubtedly brought about some positive changes in the process of identifying some European livestock-related climate emission mitigation targets. As a matter of fact, it has made more stringent both the climate targets and the flexibility mechanisms related to livestock-activities falling both under the ESR and the LULUCF Regulation. Nevertheless, the revision process has not been linear nor unhindered, and the Provisional Agreements reached under both regulations remain very far from establishing of an adequate livestock sector emission mitigation objective.

Indeed, having underscored the ambitious climate commitments undertaken by the European Union and both enshrined in the European Green Deal (in terms of political commitments) and in the European Climate Law (under the shape of legally binding commitments), the current study has highlighted the contribution, which is of primary importance according to scholars as van der Veen at al., and essential according to scholars as Lee at al., which the livestock sector will have to make in order to allow the achievement of European climate change objectives. Accordingly, this study was devoted to the identification and scrutiny of the (potential) climate targets for the livestock sector enshrined in the EU legislation. As a matter of fact, notwithstanding that both adequate climate targets and coherent implementation measures are necessary in order to curb EU's (as any polity's) GHG emissions, the current research has specifically focused on the first of these two branches of measures, and it will leave the assessment of (eventual) implementation measures aimed at achieving GHG emission reductions in the whole range of livestock sector's activities to studies to come.

Provided the focus on EU livestock's GHG emission mitigation objectives, the research has analysed the two pieces of European legislation which regulate and identify emission reduction targets for livestock-related activities, *i.e.* the Effort Sharing Regulation and the LULUCF Regulation.

Already at this stage, a first critical juncture of the EU system has been identified: namely, the split of livestock-related activities (and respective targets and rules to be followed) under the umbrella of two different regulations.

Afterwards, the analysis has revealed that most European livestock's emitting activities are regulated under the Effort Sharing Regulation which, despite having increased the overall GHG emission reduction target with the amendment conducted under the fit for 55 package (*i.e.*, ESR's GHG emission reduction objective moved from 30% to 40% by 2030), still does not establish a satisfactory livestock sector's GHG emission reduction framework. As a matter of fact, while the issue of inter-sectorial compensation remains particularly troublesome (*i.e.*, the possibility, given the long list of sectors falling under the ESR's scope of application, to focus on mitigating the GHG emission of other ESR sectors, while maintaining stable or even increasing livestock-related emissions), also the presence of strong flexibility mechanisms allows EU Member States to continue postponing the adoption of measures which need to be taken in order to reduce livestock's emissions. As this research has already pointed out, a structural rethinking of the ESR's architecture would be desirable, and it could materialize, *inter alia*, through the introduction of a minimum GHG emission reduction threshold to be achieved in any sector (or at least in those having the highest mitigation potential) falling under the ESR's scope of application.

Subsequently, also the LULUCF Regulation of 2018 has been analysed, as well as the process that it has undertaken under the fit for 55 package. While in its original 2018 form the LULUCF Regulation only addressed a residual part of the entire livestock sector's GHG emissions (*i.e.*, emissions due to deforestation and forest degradation caused, only within the EU territory, by livestock-related activities), the 2021 Commission's Proposal introduced some unprecedented improvements among which the most notable surely is the introduction of enteric fermentation and manure management within its scope of application. Such a change is particularly relevant as it would strongly reduce the margins for inter-sectorial compensation (as the number of sectors listed in the LULUCF Regulation is more limited than the number of sectors regulated under the ESR), it would place enteric fermentation and manure management within a group of sectors which are bound to much more stringent climate targets (*i.e.*, carbon neutrality by 2035 and negative emission thereafter, instead of the 40% reduction target by 2030, enshrined in the last version of the ESR),

and it would, for the first time, place the entire range of livestock sector's activities under the umbrella of a sole and coherent regulation. This change, if it was confirmed in the LULUCF Regulation's Provisional Agreement, would have constituted a unique step towards the identification of an effective climate target for the livestock sector, then strongly increasing the chances of meeting the climate targets identified by both the European Green Deal and the European Climate Law.

Regretfully, as it has been noted in the previous sub-paragraph of this research, the 2022 LULUCF Provisional Agreement has made a blatant step back by dismissing Article 2(3) of the 2021 Commission's Proposal, *i.e.*, the provision including, *inter alia*, enteric fermentation and manure management under the LULUCF Regulation's scope of application. Quite evidently, the introduction of such a change has frustrated the most significant improvements introduced with the 2021 version of the LULUCF Regulation, and it therefore leaves the livestock sector's emission reduction framework in the same situation of uncertainty and vagueness which used to characterise the EU system up until 2018.

Importantly, the European Green Deal fixes unprecedentedly high climate ambitions, and this borough scholars as Chiti to assert that it «can be interpreted as a project aimed at managing a transition from one phase of the European integration process to another»⁹¹. Nevertheless, while the potential for change brought about by such a transition could surely be praised, it is fundamental to acknowledge that the publication of the Green Deal Communication just represents the first step of a much longer journey that the EU will have to undertake in order to move towards zero net emissions, and any misstep during this process could fatally compromise EU's capacity to achieve the Communication's core objective. The European Green Deal will require the adoption of scientifically sound and politically bold actions in order to be truly implemented, and it will be necessary to fairly balance the different interests at stake (ecological, social, and economic) by bearing in mind that, while in the short term it might seem easier to compromise on the ecological dimension, in the long-term there will be no reason for referring to any other dimension if there will be no ecological dimension sustaining life on Earth.

⁹¹ E. CHITI, *Managing The Ecological Transition Of The Eu: The European Green Deal As A Regulatory Process*, in *Common Market Law Review*, 2022, pp. 19 ff., p. 20.

It is desirable, then, that the Commission will conduct this fair balancing exercise when it will implement Article 16a of the 2022 LULUCF Provisional Agreement. As a matter of fact, Article 16a enshrines the obligation for the Commission to produce a report within 6 months after the first global stocktake (that will take place in 2023) in which it shall evaluate the need for and feasibility of introducing, *inter alia*, enteric fermentation and manure management within the LULUCF Regulation's scope of application from 2031 onwards. While this could prove to be a great opportunity for the final and definitive insertion of the complete array of livestock-related activities under the LULUCF Regulation, and it could therefore enhance the transition towards the climate neutrality objective, it could also put a conclusive headstone on the process of improving the regulation of livestock-related GHG emissions, and therefore constitute a fatal misstep for the entire Green Deal architecture.

References

Primary Sources

- Council of the European Union, 10857/21 + ADD 1-3 - COM(2021) 554 (2022)
- European Commission, COM(2019) 640 final (Green Deal Communication) (2019)
- European Commission, COM(2020) 381 final (A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system) (2020)
- European Commission, COM(2021) 551 final (2021)
- European Commission, COM(2021) 554 final (2021)
- European Commission, COM(2021) 555 final (2021)
- European Commission, COM(2021) 706 final (2021)
- European Commission, Decision (EU) 406/2009/EC (2009)
- European Commission, Decision 2005/166/EC (2005)
- European Commission, DECISION No 529/2013/EU (2013)
- European Commission, Directive (EU) 2018/2001 (Renewable Energy Directive) (2018)
- European Commission, Directive (EU) 2018/410 (ETS Directive) (2018)

- European Commission, Regulation (EU) 2018/1999 (on the Governance of the Energy Union and Climate Action) (2018)
- European Commission, Regulation (EU) 2018/841 (LULUCF Regulation) (2018)
- European Commission, Regulation (EU) 2018/842 (2018)
- European Commission, Regulation (EU) 2019/631 (Regulation on CO2 emission performance standards for new passenger cars) (2019)
- European Commission, Regulation (EU) 2021/1119 (European Climate Law) (2021)
- European Commission, Regulation (EU) 525/2013 (2013)
- European Commission, Regulation 2018/841 (2018)
- Paris Agreement (2015)

Secondary Sources

- CHITI E., *Managing The Ecological Transition Of The Eu: The European Green Deal As A Regulatory Process*, in *Common Market Law Review*, 2022
- DONAHUE D.L., *Elephant in the Room: Livestock's Role in Climate and Environmental Change*, in *Michigan State University College of Law Journal of International Law*, 2008
- European Court of Auditors, *Common Agricultural Policy and climate*, 2021
- Food and Agricultural Organization, *Sustainable Agricultural Development For Food Security And Nutrition: What Roles For Livestock?*, 2016
- Food and Agriculture Organization, *Tackling Climate Change Through Livestock*, 2013
- HICKMAN R.A.-LEANGAPICHART T.-LUNHA K.-JIWAKANON J.-ANGKITITRAKUL S.-MAGNUSSON U.-SUNDE M.-JÄRHULT J.D., *Exploring the Antibiotic Resistance Burden in Livestock, Livestock Handlers and Their Non-Livestock Handling Contacts: A One Health Perspective*, in *Frontiers in Microbiology*, 2021
- IPCC, *2006 IPCC Guidelines for National Greenhouse Gas Inventories - Volume 4 - Agriculture, Forestry and Other Land Use*, 2006
- IPCC, *Climate Change and Land – Summary for Policymakers*, 2020

- LEE H.-BROWN C.-SEO B.-HOLMAN I.-AUDSLEY E.-COJOCARU G.-ROUNSEVELL M., *Implementing land-based mitigation to achieve the Paris Agreement in Europe requires food system transformation*, in *Environmental Research Letters*, 2019
- MACHOVINA B.-FEELEY K.J.-RIPPLE W.J., *Biodiversity conservation: The key is reducing meat consumption*, in *Science of the Total Environment*, 2015
- PENDRILLA F.-PERSSON U.M.-GODARB J.-KASTNER T.-MORAND D.-SCHMIDT S.-WOOD R., *Agricultural and forestry trade drives large share of tropical deforestation emissions*, in *Global Environmental Change*, 2019
- PEYRAUD J.-MACLEOD M., *Future of EU livestock: How to contribute to a sustainable agricultural sector?*, Publication Office of the European Union, Luxembourg, 2020
- POORE J.-NEMECEK T., *Reducing food's environmental impacts through producers and consumers*, in *Science*, 2018
- SAVARESI A.-PERUGINI L., *Article 5: Sinks, Reservoirs of GHG and Forests*, in VAN CALSTER G.-REINS L. (eds.), *Commentary to the Paris Agreement*, Edward Elgar, Cheltenham-Northampton, 2021
- SAVARESI A.-PERUGINI L.-CHIRIACÒ M.V., *Making sense of the LULUCF Regulation: Much ado about nothing?*, in *RECIEL*, 2020
- SCHERER L.-BEHRENS P.-TUKKER A., *Opportunity for a dietary win-win-win in nutrition, environment, and animal welfare*, in *One Earth*, 2019
- SEJIAN V.-BHATTA R.-MALIK P.K.-MADIAJAGAN B.-AL-HOSNI Y.A.S.-SULLIVAN M.-GAUGHAN J.B., *Livestock as Sources of Greenhouse Gases and Its Significance to Climate Change*, in *Intech Open, Greenhouse Gasses*, 2016
- SEVERIN F.-GEDEN O., *The Changing Role of International Negotiations in EU Climate Policy*, in *The International Spectator*, 2015
- SHEPON A.-ESHEL G.-NOOR E.-MILO R., *Energy and protein feed-to-food conversion efficiencies in the US and potential food security gains from dietary changes*, in *Environmental Research Letters*, 2016

- TALENTI R., *Climate Change and the Livestock Sector's Mitigation Potential: A Seized Opportunity for the International Climate Regime?*, in *Perspectives on Federalism*, 2022
- VAN ASSELT H., *The Design and Implementation of Greenhouse Gas Emission Trading*, in CARLARNE C.P.-GRAY K.-TARASOFSKY R.G. (eds.), *The Oxford Handbook of International Climate Change Law*, Oxford University Press, Oxford, 2016
- VAN DER VEEN R.-DE VRIES M.-VAN DE POL J.-VAN SANTEN W.-SINKE P.-DE VRIES J., *Methane reduction potential in the EU. Between 2020 and 2030*, CE Delft, Delft, 2022
- WARD J.D.-SUTTON P.C.-WERNER A.D.-COSTANZA R.-MOHR S.H.-SIMMONS C.T., *Is Decoupling GDP Growth from Environmental Impact Possible?*, in *Plos One*, 2016
- WESTHOEK H.-LESSCHEN J.P.-ROOD T.-WAGNER S.-DE MARCO A.-MURPHY-BOKERN D.-LEIP A.-VAN GRINSVEN H.-SUTTON M.A.-OENEMA O., *Food choices, health and environment: Effects of cutting Europe's meat and dairy intake*, in *Global Environmental Change*, 2014
- WOERDMAN E., *The EU Greenhouse Gas Emissions Trading Scheme*, in E. WOERDMAN E.-ROGGENKAMP M.M.-HOLWERDA M. (eds.), *Essential EU Climate Law*, Edward Elgar, Cheltenham-Northampton, 2015
- ZICKFELD K.-AZEVEDO D.-MATHESIUS S.-MATTHEWS D., *Asymmetry in the climate-carbon cycle response to positive and negative CO₂ emissions*, in *Nature Climate Change*, 2021

Web Sources

- BAS F.-DEFOSSEZ F.-LAKE S., *The biggest climate solution missing from COP27: meat reduction*, in *IEEP*, 2022 (link to the article: <https://ieep.eu/news/the-biggest-climate-solution-missing-from-cop27-meat-reduction>)
- Centre for Climate and Energy Solutions, *Short-lived Climate Pollutants*, 2018 (link to the website: <https://www.c2es.org/content/short-lived-climate->

pollutants/#:~:text=The%20most%20significant%20short%2Dlived,fo
sil%20fuel%20production%20and%20combustion)

- EAST W.G., *Europe*, in *Encyclopaedia Britannica*, last updated in 2022 (link to the website: <https://www.britannica.com/place/Europe>)
- European Commission – Press release, *European Green Deal: EU reaches agreement on national emission reductions from transport, buildings, waste and agriculture*, 2022 (link to the website: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6724)
- European Commission, *Effort sharing 2021-2030: targets and flexibilities*, last updated in 2021 (link to the website: https://climate.ec.europa.eu/eu-action/effort-sharing-member-states-emission-targets/effort-sharing-2021-2030-targets-and-flexibilities_en#documentation)
- European Commission, *Infographic - Fit for 55: how does the EU intend to address the emissions outside of the EU?*, 2022 (link to the website: <https://www.consilium.europa.eu/en/infographics/fit-for-55-cbam-carbon-border-adjustment-mechanism/>)
- European Council, *'Fit for 55': provisional agreement sets ambitious carbon removal targets in the land use, land use change and forestry sector*, 2022 (Link to the website: <https://www.consilium.europa.eu/en/press/press-releases/2022/11/11/fit-for-55-provisional-agreement-sets-ambitious-carbon-removal-targets-in-the-land-use-land-use-change-and-forestry-sector/>)
- European Council, *Fit for 55*, last updated in 2022 (link to the website: [Fit for 55 - The EU's plan for a green transition - Consilium \(europa.eu\)](https://www.consilium.europa.eu/en/press/press-releases/2022/11/11/fit-for-55-provisional-agreement-sets-ambitious-carbon-removal-targets-in-the-land-use-land-use-change-and-forestry-sector/))
- European Environment Agency, *Greenhouse gas emissions by aggregated sector*, 2019 (link to the website: <https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/>)
- European Environmental Agency, *Land Use*, 2020 (link to the website: <https://www.eea.europa.eu/themes/landuse/intro>)
- GOUROU P., *Asia*, in *Encyclopaedia Britannica*, last updated in 2022 (link to the website: <https://www.britannica.com/place/Asia>)

- Organisation for Economic Co-operation and Development & Food and Agricultural Organization, *OECD-FAO Agricultural Outlook 2021-2030*, 2020 (link to the database: https://stats.oecd.org/viewhtml.aspx?datasetcode=HIGH_AGLINK_2022&lang=en)
- Our World in Data, *Global meat production, 1961 to 2020*, 2020 (link to the website: <https://ourworldindata.org/grapher/global-meat-production>)
- RITCHIE H.-ROSER M., *Environmental Impacts of Food Production*, in *Our World in Data*, 2022 (link to the website: <https://ourworldindata.org/environmental-impacts-of-food#key-insights-on-the-environmental-impacts-of-food>)
- ROSER M.-RITCHIE H.-ROSADO P., *Food Supply*, in *Our World in Data*, last updated 2019 (link to the website: <https://ourworldindata.org/food-supply>)
- United States Environmental Protection Agency, *Overview of Greenhouse Gases*, last updated in 2022 (link to the website: <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>)
- World Food Programme, *A global food crisis*, 2022 (link to the website: <https://www.wfp.org/global-hunger-crisis#:~:text=2022%3A%20a%20year%20of%20unprecedented%20hunger&text=As%20many%20as%20828%20million,on%20the%20edge%20of%20famine>)

ABSTRACT

Roberto Talenti – *Revising the European Regulatory Framework for Livestock-Related GHG Emissions - Is the EU Really Advancing Towards Climate Neutrality?*

Achieving the climate neutrality target enshrined both in the European Green Deal and in the European Climate Law represents one of the most crucial but also formidable challenges that the European legislator will have to face. Provided that the process of revision of the EU legislation undertaken under the fit for 55 package is coming to an end, it is vital to assess whether it put the EU on track for the pursuit of the net zero emissions objective. With the aim of starting to tackle this issue, the current research will try to understand to what extent is the EU regulatory framework for livestock-related GHG emissions, also in the light of the fit for 55 revision, consistent with the climate neutrality target. The focus on the livestock sector is not random. Indeed, despite having been put at the margin of the attention of both policy-makers and scholars, the livestock sector represents a main and still rising source of GHG emissions both at the European and global level. Even more, no future scientific or technological improvement is needed in order abate livestock-related GHG emissions, but “merely” the political willingness to accept and incentivise a reduction in production and consumption patterns of animal food products.

KEYWORDS: *European Green Deal; climate neutrality target; livestock sector; fit for 55; Effort Sharing Regulation; LULUCF Regulation.*

Roberto Talenti – *Analisi del quadro normativo europeo per le emissioni di gas serra legate all'allevamento - L'UE sta davvero avanzando verso la neutralità climatica?*

Il raggiungimento dell'obiettivo di neutralità climatica sancito sia dal Green Deal europeo che dalla Legge europea sul clima rappresenta una delle sfide più cruciali, ma anche tra le più ardue, che il legislatore europeo dovrà affrontare. Poiché il processo di revisione della legislazione europea intrapreso

nell'ambito del pacchetto *fit-for-55* sta volgendo al termine, è fondamentale valutare se esso ha posto l'UE sulla strada giusta per il perseguimento dell'obiettivo delle zero emissioni nette. Col fine di iniziare ad affrontare questo tema, la presente ricerca cercherà di comprendere in che misura il quadro normativo UE per le emissioni di gas serra legate all'allevamento, anche alla luce della revisione *fit-for-55*, sia coerente con l'obiettivo di neutralità climatica. L'attenzione prestata al settore zootecnico non è casuale. Infatti, nonostante sia stato tradizionalmente messo ai margini dell'attenzione di politici e studiosi, esso rappresenta una delle principali, e tuttora in aumento, fonti di emissioni di gas serra a livello sia europeo che globale. Inoltre, per ridurre le emissioni di gas serra legate agli allevamenti non sono necessari futuri miglioramenti scientifici o tecnologici, ma "semplicemente" la volontà politica di accettare e incentivare una riduzione dei livelli di produzione e consumo di prodotti alimentari di origine animale.

PAROLE-CHIAVE: *Green Deal europeo; obiettivo di neutralità climatica; settore zootecnico; pacchetto fit-for-55; regolamento sulla condivisione degli sforzi; regolamento LULUCF.*