

The relationship between climate change and agriculture is a contentious, complex and important one. In this series of twelve blogs, UCD Adjunct Professor Frank Convery will explore the context, challenges and potential solutions for dairy, beef and sheep farming in Ireland. Each blog presents key evidence to underpin informed debate and the series seeks to help plot a sustainable future for the sector.

Responses are invited via [earth.institute@ucd.ie](mailto:earth.institute@ucd.ie) and the UCD Earth Institute will host a workshop in association with the UCD School of Agriculture and Food Science and the National Economic and Social Council at the end of the series in December 2022 to discuss the evidence and its implications.

**Professor Tasman Crowe, Director, UCD Earth Institute**



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**New Earth Institute Strategic Priority Projects 2022**

### **3. Climate Performance by Irish Ruminant Farming (Dairy, Beef, Sheep): The European Union (EU) – Climate Policy Developments and Consumer Choices in a Key Market for Irish Food[!]**

**Frank Convery, Adjunct Professor, University College Dublin**

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<https://www.ucd.ie/earth/newsevents/climate-policy-agriculture-ireland-blog/climatepolicyforruminantagricultureinirelandblog3/>.

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*"Ireland will become a **world leader** in Sustainable Food Systems over the next decade. This will deliver significant benefits...and will also provide the basis for the future competitive advantage of the sector".*

### **Food Vision 2030[2]**

"A nation..is a group of people united by a common dislike of their neighbours, and a shared misconception about their ethnic origins".

**Edward A Mortimer Introduction, *People, Nation and State: A Collection of Essays on Nationalism*, (with Robert Fine).**

## **Some Key Points**

EU 27 is now the largest market for Irish ruminant farming (dairy, beef, sheep), consuming in aggregate 37% of Irish output by value in 2021. Unfettered access to this market – enabled by the Single Market, which came into effect from 1992 – is by far the most important and precious economic benefit resulting from our EU membership. Carbon competition arises when food products have credible labelling telling consumers how much CO<sub>2</sub>e is emitted per Kg of product, and it influences some of them to favour low carbon products. The main carbon competition within the EU market will come from local producers from within its member states. The case that if Irish supply was reduced to this market, it would be displaced therein by milk and beef products that would be produced with the average emission intensity globally doesn't stand up to scrutiny. In an ever more turbulent world, the EU is our family. It has decided that global leadership on climate change will be its signature, and that agriculture and land use will be fully integrated into this endeavour. Our leadership niche can be delivery of a successful climate policy for ruminant farming generally and for pasture-based in particular. With smart policies that are delivered with skill and persistence, this can, in Food Vision 2030's words 'provide the basis for the future competitive advantage of the sector'

## **Introduction**

Until recently, relative to its climate policies for energy, transport, housing (heat), industry and waste, EU climate policy for agriculture, forestry and land use (AFOLU) has been an oxymoron. This policy passiveness has explanations: when the European Community first took shape, the memories of starvation and food scarcity were still recent and raw – food security, and an emphasis therefore on production, became a founding concern. Second, greenhouse gas emissions from farming were a relatively small share (~10%) of the total, and net carbon removals by forest and other sources were large. Third, the payoff to political and policy effort was much higher in the non-farming sectors – across the whole of the EU, there are about 17,000 installations in the European Union Emissions Trading Scheme (EU ETS) covering emissions from the energy sector and heavy industry which account for over 40% of total emissions – there are ~10 million farm holdings in the EU. Fourth, farmers and the policy system face delivering multiple public goods – climate, air and water quality, nature conservation – and this complicates both policy design and its delivery by farmers, and the technical choices to deliver cost effective emissions reduction today are limited. Fifth, although the main policy instrument applied at EU level to agriculture – Common Agricultural Policy (CAP) – was shaped in consultation with the Commission, in practise, member states were given a relatively high degree of autonomy as to how it was applied in their jurisdictions, and they mainly chose to favour commercial outcomes and income transfers over the provision of public goods. Finally, for many years, emissions from agriculture reduced over time and carbon storage – mainly in forests – rose – if it's not broken, no need to fix it. However, beginning with the appointment of a new Commission in December 2019, climate policy for the sector have now become a priority at EU level.

## **What changed?**

Climate policy generally has moved up the EU agenda, for the following reasons; impacts of climate change – higher temperatures, more intense weather events, more droughts and flooding, more forest fires etc. – have increased the conviction that the issue is real[3], that the costs of inaction could be very large, and this is reflected at political level. Secondly, it was clear that the global community is failing to do enough to manage climate risk. The conviction therefore took hold that the EU should play a role in changing this, and you can't lead from behind. Finally, the EU decided that sustainability and 'greenness' could be its commercial signature, that this would deliver long term economic dividends, and that it should apply also to its food in the global market.

Given this context, agriculture forestry and land use has come to the fore of climate policy at the EU level because it is clear that climate neutrality by 2050 will be difficult to impossible to achieve if we do not increase carbon storage, the previous trends in

emissions (reduction) and carbon removal (downward) by agriculture and land use stalled in recent years<sup>[4]</sup> and as other sectors reduced emissions, the share contributed by agriculture increased.

As noted in [Blog 1](#), Ireland's ruminant farming exports were valued at €7.9 billion in 2021, of which €2.9 billion (37% of the total) went to the EU, making it the largest single market for the sector. In the 'evidence' section below, this dependence is contextualised in terms of overall production and markets. I follow this with a summary of some of the relevant developments underway and in prospect in terms of climate policy that impinges on the sector, and conclude with my assessment of the key implications

## Evidence

### Production and Markets

A sense of Ireland's dependence on this market can be discerned by some data for 2021 (Table 1)

**Table 1 Exports of Dairy, Beef and Sheep to EU in 2021, and shares by sector and total, Ireland**

DAIRY		BEEF			SHEEP			TOTAL			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Value (000 €)	% Grand Total IRL Dairy Exports	% Total IRL Ruminant Exports to EU	Value (000 €)	% Grand Total Beef Exports	% Total IRL Ruminant Exports to EU	Value (000 €)	% Grand Total Sheep Exports	% Total IRL Ruminant Exports to EU	Value (000s €)	% Total Exports
EU	1,555,043	30.7	54	1,107,183	46.0	38	239,288	62.1	8	2,901,514	37.0
GRAND TOTAL	5,059,581	100		2,406,477	100		385,250	100		7,851,308	100

Source: [Table 2, Blog 1](#). The 30.7% in column (2) is derived as follows:  $(1,555,043/5,059,581) \times 100$ ; the 54.0% in column (3) is derived as follows:  $(1,555,043/2,901,514) \times 100$ .

The EU is our most important market, accounting for 37% of total sales by value in 2021. Dairy depends on this market for 30.7% of its total exports and this share increases to 46.0% for beef and 62.1% for sheep

### Dairy

The competition that Irish farmers encounter in this market comes mainly from local EU farmers

As we can see below, the EU is a global player as regards cow milk production

**Table 2 Cow Milk Production Eight Largest Producers, 2021, Million Metric Tons**

Jurisdiction	Production	Global Rank
EU 27	145.7	1
US	102.6	2
India	96.0	3
China	34.6	4
Russia	32.02	5
Brazil	24.85	6
New Zealand	22.24	7
UK	15.5	8

Source: [Production of cow milk worldwide: major producers 2021 | Statista](#)

It is also of interest that the UK, a key market for Irish output, ranks eighth globally as a producer.

Within EU 27, the top 3 producers (Germany, France and the Netherlands) account for just under 50% of the total, with Ireland supplying 5.8%, and Denmark 3.4%.

**Table 3 Milk Production and the Share of Selected MS on the EU Market -, Volume and % of Total, 2020**

Member state	Volume	Share of Total	Rank
	Mill Tons	%	
Germany	33.2	22.5	1
France	25.1	17.0	2
Netherlands	14.5	9.8	3
Italy	12.7	8.6	4
Poland	12.5	8.4	5
<b>Ireland</b>	<b>8.6</b>	<b>5.8</b>	<b>6</b>
Spain	7.6	5.2	7
Denmark	5.7	3.4	8
Sub Total	119.9	80.7	
Others	27.4	19.3	
Grand Total EU 27	147.3	100	

Source: [Statistics / Eurostat \(europa.eu\)](https://ec.europa.eu/eurostat).

As regards trade, the EU in 2021 was a large net exporter of dairy products to the rest of the world, with exports valued at €15.4 billion, and imports at €1.0 billion. Ireland – column (3) – is a relatively major exporter; in 2021, it contributed 34.6%, 12.3%, 11.8% of butter, skim milk powder (SMP) and cheese respectively to EU exports, by volume.

**Table 4 Dairy Exports and Imports, by Product, EU 27, 2021**

Product	Exports				Imports	
	Total Vol (000s Tons)	IRL Vol (000s Tons) and % of total Vol	Total Value (Mill €)	% Total Value	Total Vol (000s Tons)	Total Value (Mill €)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Butter	225	77.8 (34.6)	1,152	7.5	27.8	104
Butter Oil	33	-	174	1.1	18.9	86.9
Cheeses	1,385	163.9 (11.8)	6,604	42.8	193.3	900.2
SMP	788	97.3 (12.3)	2,050	13.3	31.9	75.6
WMP	298	31.2 (1.8)	1,061	6.9	11.2	36.1
Whey Powder	715	80.4 (11.2)	1,022	6.6	42.0	37.6

Fresh	1,693	-	1,682	10.9	605.9	273.7
Condensed	341	-	568	3.7	36.5	30.2
Caseines	95	-	733	4.7	17.0	125.4
Lactose	277	-	388	2.5	18.1	25.9
TOTAL EU 27	5,850	-	15,434	100	1,002.6	1,695.7

Source: eu-dairy-historical-trade-series\_en\_0 (1).pdf p. 1

**Table 5 EU 27 Source of Imports for Selected Products, 2021**

Product	Total Import Volume (000s tonnes)	3 largest sources of imports – share of total volume in brackets - %
Butter	28	UK (86.7%); US (5%); NZ (4.3%)
SMP	32	UK (66.9%); US (17.5%); Norway (5.9%)
WMP	11	UK (90%); NZ (8.2%); Ukraine (2.7%)
Cheese	196	UK (66%); Switzerland (30.7%); Serbia (0.97%)
Whey Powder	42	UK (73.3%); Norway (17.4%); Belarus (2.6%)

Source: eu-dairy-historical-trade-series\_en\_0 (1).pdf, pp.3-7

## Beef

As regards global production, the EU ranked 4<sup>th</sup> in 2021 (Table 6) and Ireland ranked as the 5<sup>th</sup> largest producer within the EU, contributing 8.7% of total supply (Table 7)

**Table 6 Leading Global Beef Producers, 2021**

Jurisdiction	Amount	Rank
	Mill tons carcass weight	
US	12.730	1
Brazil	9.850	2
China	6.980	3
<b>EU 27</b>	<b>6.855</b>	<b>4</b>
India	4.195	5
Argentina	3.000	6
Mexico	2.150	7
Australia	1.888	8

Source: [Leading beef and veal producing countries worldwide 2022 | Statista](#)

**Table 7 Beef Production, Annual Data EU 27, and selected member States, 2021**

Member State	Volume	Share of Total	Rank
	Mill tons	%	
France	1.424	20.9	1
Germany	1.072	15.8	2

Italy	0.748	12.3	3
Spain	0.718	10.5	4
<b>Ireland</b>	<b>0.595</b>	<b>8.7</b>	<b>5</b>
Poland	0.555	8.2	6
Netherlands	0.430	6.3	7
Belgium	0.247	3.6	8
Sub Total	5.789	85.1	
Others	1.017	14.9	
Grand Total EU 27	6.806	100	

Source: [Beef production \(europa.eu\)](#)

The EU imports a very small share of supply, with volume (0.283 million tons in 2021, amounting to only 4.16% of domestic EU production (Table 8)

**Table 8 EU Imports Beef and live animals Tonnes cwe carcass weight equivalent, 2021**

Source	Amount	% Total
Argentina	75,579	26.7
Brazil	81,601	28.8
Uruguay	80,138	28.3
US	14,825	5.2
Australia	8,937	3.2
NZ	4,392	1.5
Grand Total	283,409	100

Source: European Commission, 2022: BEEF CMO *beef-veal-market-situation\_en\_0.pdf*  
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## Policy Action at EU Level

### European Union Policy Architecture

Key actors include: the *European Commission*, which has singular responsibility for proposing legislation, and is also the key agent for ensuring implementation; the *European Council of Ministers*, which represents member states and, together with the *European Parliament*, makes decisions on legislative proposals; the *European Court*, which enforces legislation. The *European Council* comprises the political leadership of the EU and is a key source of high-level strategy. In the development and implementation of climate policy, within the Commission, the Directorate Generals for Climate Action is in the driving seat. DG Agriculture and Rural Development (DG AGRI) and DG Environment are also important actors. The *European Environment Agency* has responsibility for monitoring performance, and reports on the effectiveness of policy, while the *Joint Research Centre* (JRC) is a key source of scientific expertise.

### Monitoring Reporting and Verification (MRV)

Effective climate policy is only possible if there is *monitoring* of emissions and carbon storage at both macro and ground (emitter/storer) levels, if *reporting* thereon is credible and frequent, and results are independently *verifiable* (MRV). The Commission is actively pursuing monitoring, reporting and verification as regards relative climate performance information that is available to consumers ('the fork') and emissions and carbon storage information that is available to farmers and other relevant land owners.

The next stage is the development and implementation of policies that ensure that emissions are avoided and reduced and carbon is stored at scale. After setting the wider climate policy context, developments on this front are summarized below.

### The wider context – European Green Deal

This is the signature achievement of the EU, as led by President Ursula von der Leyen and her Commission team (2019–2024). The European Climate Law, adopted on July 9, 2021, set a legally binding commitment for Europe’s economy and society to become climate neutral by 2050, set the intermediate target of reducing net greenhouse gas emissions domestically by at least 55% by 2030 (with 1990 as base). Climate neutrality by 2050 means achieving net zero greenhouse gas emissions for EU member states as a whole, mainly by cutting emissions, removing carbon, investing in green technologies and protecting the natural environment.[5]

Where agriculture forestry and land use fits into this is as follows.[6]

“The European agriculture and food system, supported by the [Common Agricultural Policy](#), is already a global standard in terms of safety, security of supply, nutrition and quality. Now, it must also become the global standard for sustainability. A shift to a sustainable food system can bring environmental, health and social benefits, as well as offer fairer economic gains.

The EU’s goals are:

- to ensure food security in the face of climate change and biodiversity loss
- reduce the environmental and climate footprint of the EU food system
- strengthen the EU food system’s resilience
- lead a global transition towards competitive sustainability from farm to fork”

Seven Actions (of which 4 have climate-specific implications) will be used to drive the achievement of the above goals: Common Agricultural Policy reform and the European Green Deal; Common Agricultural Policy Strategic Plans; Organic farming action plans; Welfare of farmed animals; nutrition labelling; EU agri-food promotion policy; sustainable use of pesticides.

### Farm to Fork

The *Farm to Fork Strategy* is seen as a key vehicle for the advancement of the sustainability agenda.[7]

It sets the following targets to be achieved by 2030:

**Table 9. Key Actions, Farm to Fork, 2030**

Action	Amount (%)
• Pesticide Use	↓50
• Nutrient Losses	↓50
• Fertiliser Use	↓20
• Sale of anti-microbials for farmed animals	↓50
• Organic Farming	25% of farmed land
• Biodiversity	At least 10% of land area with high diversity status

Source: [Farm to Fork Strategy \(europa.eu\)](#)

In addition to the above, there are two EU initiatives which, if acted upon, could prove to be influential. The first is a revision of the Industrial Emissions Directive that would apply to methane and ammonia emissions from farms with over 150 livestock units (LSU). This would set best practice emissions’ performance benchmarks, to apply from 2027. Under the new rules, in addition to large pig and poultry farms, which have been in scope already, cattle producers with over 150 LSU would also be covered.[8] This represents about 13% of farms, together responsible for 60% of the EU’s livestock emissions of



ammonia and 43% of methane. If adopted and implemented in its current form, the Directive would reduce methane emissions at EU level by 265kt/year (229 kt for cattle, 36 kt for pigs and poultry) and ammonia emissions by 128 kt/year (50 kt for cattle, 78 kt for pigs and poultry).

The second is the Just Transition Mechanism, which “provides targeted support to help mobilise around €55 billion over the period 2021–2027 in the most affected regions, to alleviate the socio-economic impact of the transition [\[9\]](#). With the decision by government to close the peat-powered electricity plants in the Midlands, and to phase out commercial peat harvesting for home heating, it seems likely that most of Ireland’s €84.5 million allocated funds under this scheme will be used to support the transition in the Midlands away from peat fired generation.[\[10\]](#).

### **Third Pillar for Agriculture, Forestry and Land Use (AFOLU)**

At present, EU climate policy is delivered by two pillars. The first is the European Union Emissions Trading Scheme (EU ETS) which sets an (ever shrinking) cap on emissions from the power sector, heavy industry, and domestic air travel, covering about 40% of total emissions; the second pillar covers emissions not addressed in EU ETS, namely those from agriculture, transport additional to domestic air travel (mainly road), light industry not covered by EU ETS, heat from buildings, waste etc. Emissions from this second pillar are regulated by the Effort-sharing Regulation whereby each member state is given an aggregate quota covering all these emissions for the relevant time period, and they have a legally binding obligation to meet this target. However, there are flexibility provisions that in the past have made compliance for member states who overshoot their emissions relatively painless.[\[11\]](#)

There has been discussion around expanding the coverage of EU ETS to include transport which would shrink the size of pillar 2 commensurately, and creating a separate pillar 3 from 2030, which would be confined to agriculture forestry and land use (AFOLU)[\[12\]](#). An area where there is some policy impetus is carbon removal now being called ‘carbon farming’

### **Member State Level**

All member states must comply with EU rules, including those that forbid price or other discrimination within the EU against goods or services from other member states. However, member states are free under the Effort Sharing Regulation to develop and implement domestic policies that drive emissions reduction.

For three reasons, I find Denmark and its potential positioning in the EU 27 dairy products market intriguing. From a credible source [World Resources Institute (WRI)] it commissioned a comparative analysis of the sector’s climate performance, including CO<sub>2</sub>e emissions intensity, benchmarked against other EU countries and international competitors; using 2017 data, the carbon footprint (total production basis) of its dairy output was ranked 2<sup>nd</sup> best (after Sweden) out of 13.[\[13\]](#) Secondly, there is discussion about introducing a Danish voluntary labelling scheme, ahead of EU developments.[\[14\]](#) Finally, it has signed a memorandum of understanding on Climate Smart Dairy Collaboration with California.[\[15\]](#)

The Netherlands is the 3<sup>rd</sup> largest milk producer in the EU (Table 3). Farming there is under pressure because of farm-related damage to water quality, and the ensuing decision of the courts, with a focus on nitrates. Since nitrogen is implicated in up to 40% of emissions, it may be that the Netherlands will become a champion performer as regards emissions reduction and CO<sub>2</sub>e intensity of its products. Bovaer is a methane reducing food additive which was developed by DSM, a Dutch company with a turnover in 2020 of €9.2 billion. It has been licenced for use in the EU, Brazil and other countries. This is being tested in Ireland and New Zealand, but its use is likely to be most cost-effective for indoor containment systems. A combination of action on reducing nitrous oxide emissions at scale, and the use of Bovaer that reduces methane emissions, could see the Netherlands’ dairy sector deliver a very competitive carbon footprint (it ranked joint 5<sup>th</sup> with Spain in the WRI assessment – See Table 9 of [Blog 1](#)).

### **Environmental Non-Governmental Organization (ENGO) Engagement - Environmental Defense Fund (EDF)**

The Environmental Defense Fund (EDF) is one of a small number of ENGOs founded in the US who have the funding,[\[16\]](#) scale and ambition to aim to help maximize the prospects of achieving emissions reduction at scale.[\[17\]](#) Since 2020 EDF has become a global organisation with offices in 4 anchor regions: US, India, China and Europe. The work in the EU is led by the Environmental Defense Fund Europe (EDFE), registered in Amsterdam. EDF prioritises a small number of major ambitions in areas where there has been relatively little effort at scale thus far; identifying the essential elements that are most likely to deliver emissions’ reduction at scale; learn by doing as it supports these elements;



pragmatism; persisting over a long time when this is justified and cutting its losses when it is not. After more than a decade of progress on controlling methane emissions from the oil and gas sector, it has decided to add reducing methane emissions from farming at scale to its portfolio.

## Assessment

### Production and Markets

- Unfettered access to its market is by far the most important and precious economic benefit resulting from our EU membership.

O'Rourke (2018)<sup>[18]</sup> attributes Irish prosperity to two factors: joining the EU in 1973, and (especially) the creation of the Single Market in 1992, which allowed guaranteed access to a huge growing and dynamic market; its share of exports to the economically relatively sclerotic UK fell from 61 per cent in 1972 to 31 per cent in 1992 and to 14 per cent in 2015. He also noted that Irish independence was 'essential in exploiting the opportunities that the European Union afforded' (p. 146) with the combination explaining why growth in per capita GNP from the 1990s far exceeded that experienced in Northern Ireland Scotland and Wales. This general point applies also to Ireland's food exports.

- The EU public is also arguably the most 'climate sensitive' in the world. It would be beyond feckless to threaten our high standing with its consumers by failing to match the competition in the metrics that are emerging to demonstrate climate responsible performance.

As shown in [Blog 1](#), it is not convincing when the data used to support our case as regards the climate footprint of Irish dairy products is 18 years old

When you combine the antiquity of the evidence with the fact that there has been no improvement in the carbon efficiency of Irish dairy since 2015 (see [row \(1\)](#), [Table 4 \(Blog 1\)](#)) it could be challenging to be in Justice Marilyn Huff's court<sup>[19]</sup> defending today's Irish carbon performance.

- It is clear that the main carbon competition within the EU market will come from indigenous competition from within its member states, and that if Irish supply was reduced to this market, it would not be displaced therein by milk and beef products that would be produced with the average emission intensity globally.<sup>[20]</sup>

## The New EU Climate Policy for Agriculture, Forestry and Land Use

- You can't lead from behind.

In an ever more turbulent world, the EU is our family. It has decided that global leadership on climate change will be its signature, and that agriculture and land use will be fully integrated into this endeavour. Our leadership niche within the EU and globally can be delivery of a successful climate policy for ruminant farming generally, and for pasture-based in particular. With smart policies that are delivered with skill and persistence, this can, in Food Vision 2030's words 'provide the basis for the future competitive advantage of the sector'.

The step change in EU policy is evident in many dimensions, but three strike me as of particular significance:

- Taking on the metrics challenge at both farm and consumer level.

The EU aspires to be a global leader in this space. It is an early mover, but both the US (see [Blog 5](#)) and the UK (see [Blog 4](#)) could move quickly and get there first. Irish farmers and companies could well face different carbon footprint metrics in each of its three largest markets. In all three, the best guarantee of having a competitive carbon footprint is to reduce emissions and store carbon at scale.

- The mandate (decision of the Council and the Parliament) to ring fence 25% of Direct payments under the Common Agriculture Policy (CAP) to be used to progress emissions reduction and carbon storage.

The role of the new CAP in addressing climate change pressure by Irish farming is so important, that I devote a separate Blog to it (Number 10) and to the complementary policies that will be needed if Irish producers are to fulfil the promise of Food Vision 2030 and “become a world leader in Sustainable Food Systems (SFS) over the next decade” (Blogs 11 and 12).

- The third is to take on carbon removals as a key challenge and opportunity.

This is bad and good news for Ireland. The bad news is that, almost uniquely within the EU, [21] Ireland’s land and wetlands are net emitters of carbon and the main potential carbon removal machine – tree planting – has collapsed, with the Irish annual planting rate over the past 9 years peaking at 6,700 hectares in 2012, then reducing to ~2,400 hectares by 2020. [22] The good news is the same: the opportunities are large, and the baseline effort is so modest that, with the correct policies and effective implementation, it will be possible to advance at scale.

- It is significant that the Environmental Defense Fund has decided to help find ways that work to reduce emissions from ruminant farming at scale in the EU. It would not have taken this step unless it judged that there was a prospect of success.

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## Biography

**Frank Convery** has degrees [B. Ag and M.Ag (Forestry)] from UCD. Encouraged by the late Seamus Sheehy, he went to the US and took a PhD in Forestry Economics (State University of New York). After a distinguished academic career in the US (Duke University) he returned to Ireland as research professor at ESRI before being appointed as Heritage Trust Professor of Environmental Studies at UCD where he led the successful application for the funding of the UCD Earth Institute. He chaired the boards of the Sustainable Energy Authority of Ireland (SEAI) (2002–2007), Comhar Sustainable Development Council (2006–2010) and served on the Climate Change Committee (2016–2020) chaired by John FitzGerald, and the AgriFood 2030 Committee chaired by Tom Arnold. The latter produced *Food Vision 2030*. From 2014 to 2018, he was chief economist with the Environmental Defense Fund, New York. His passion is finding ways to bring the weight of learning down to where things are done; his ambition for the sector is the same as Food Vision 2030’s: “Ireland will become a **world leader** in Sustainable Food Systems (SFS) over the next decade. This will deliver significant benefits...and will also provide the basis for the future competitive advantage of the sector”.

## Footnotes and references

- [1] Alan Matthew's Blog is a continuing source of great insight: [www.caproreform.eu](http://www.caproreform.eu)
- [2] [gov.ie](http://gov.ie) – Food Vision 2030 – A World Leader in Sustainable Food Systems ([www.gov.ie](http://www.gov.ie)) p.9
- [3] See: [EAERE-Magazine-N.16-Spring-2022.pdf](#) for details.
- [4] EEA 2020 trends and drivers of EU greenhouse gas emissions.pdf Figure 3.1 p 14
- [5] [European Climate Law \(europa.eu\)](#)
- [6] [Agriculture and the Green Deal | European Commission \(europa.eu\)](#)
- [7] [Farm to Fork Strategy \(europa.eu\)](#), and associated fact sheet: [factsheet-farm-fork\\_en.pdf.pdf](#)
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- [10] [gov.ie](http://gov.ie) – Minister announces launch of public consultation on Ireland's Territorial Just Transition Plan ([www.gov.ie](http://www.gov.ie)).
- [11] Comptroller and Auditor General, 2019. Chapter 9 [2018-annual-report-chapter-9-greenhouse-gas-related-financial-transactions.pdf \(audit.gov.ie\)](#). From Table 9, p 136 we see that Ireland's overrun of emissions by 2020 was expected to range between 10.53 and 13.69 million tons of CO<sub>2</sub>e. These would be paid for by purchasing Certified Emissions Reduction (CERs) units at an estimated cost per ton ranging from €0.20 to €1.00, resulting in a total outlay between €2.10 million and €13.69 million.
- [12] <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0554>
- [13] See: [Table 9, Blog 1](#), and World Resources Institute (Searchinger et al), 2021. *A Pathway to Carbon Neutral Agriculture in Denmark*, WRI on page 53 (Table 3.1) [carbon-neutral-agriculture-denmark.pdf \(wri.org\)](#).
- [14] [Denmark to introduce voluntary climate labelling ahead of a planned EU-wide roll out – Retail Insight Network \(retail-insight-network.com\)](#).
- [15] [California and Denmark Sign MOU on Climate Smart Dairy Collaboration | Dairy Business News](#). Since 2015, California has been leading the decarbonization of its ruminant farming sector in the US (see Blog 5 for details).
- [16] Its total operating support in fiscal 2021 was \$371 million. [Environmental Defense Fund, Incorporated \(edf.org\)](#), p. 7.
- [17] Declaration of Interest. I was chief economist at EDF from 2014–2018, based at its headquarters in New York city
- [18] O'Rourke, Kevin, 2018. *A Short History of Brexit*, Pelican Books, Random House. Pp. 146, 148
- [19] On Feb 3, 2019, in her California court, she found in favour of Ornu's 'grass-fed' claims
- [20] This case is made in Blog 6 by some of the 'complacent's'.
- [21] The only other member states that are net emitters are Denmark and the Netherlands – see European Environment Agency 2022. [Greenhouse gas emissions from land use, land use change and forestry – European Environment Agency \(europa.eu\)](#)
- [22] See [Table 5, Blog 1](#) for details.