An Phríomh-Oifig Staidrimh
Central Statistics Office

OECD/UNECE Seminar on SEEA Implementation

13-15 March 2023

Decoupling Emissions from Economic Activity

Clare O'Hara and Gerry Brady
Environment and Climate Division
Central Statistics Office Ireland

2021 Climate Action Plan

- The 2021 Climate Action and Low Carbon Development (Amendment) Act set national emissions reduction targets based on 2018 emissions
- Our objective is to use the economic, social, and environmental data held by the statistical system to assess the economic and employment impact of reducing emissions towards the 2030 targets
- We will focus on sectors with high emissions
- We will use indicators to examine the core statistics underlying the emissions
- We will use a time series approach rather than short-term indicators
- We will include context data such as population trends and life expectancy
- We will use NACE sectors as chapters rather than emissions inventory sectors

Table 1.1 Sectoral Targets, 2030

Sector	Targeted reduction
Electricity	75%
Transport	50%
Residential buildings	40%
Commercial and Public Services buildings	45%
Industry	35%
Agriculture	25%

Eurostat's carbon footprint estimates

- UNFCCC emissions inventories are classified by technical processes such as fuel combustion in transport and the generation of electricity. They are usually compiled by environmental protection agencies
- EU national statistical offices submit annual air emissions accounts to Eurostat under a Regulation
- Eurostat's air emissions accounts are based on a production approach which includes emissions related to exported products and excludes emissions related to the manufacture of imported products
- Carbon footprints include CO_2 emitted to produce the final product, emissions from intermediate inputs, and CO_2 emissions avoided due to importing intermediate and final products
- The carbon footprint estimates use a 'domestic-technology-assumption' to approximate the emissions embodied in imported products by assuming that the imported products are produced with production technologies that are similar to production processes used in EU Member States
- The difference between the consumption perspective and the production perspective is equal to the difference between the emissions due to exports and the avoided emissions due to imports
- The calculation of carbon footprints requires monetary supply and use tables to identify final consumption through an environmentally extended input-output analysis

Additional Approaches

- The broad range of social, economic, and environmental statistical data in NSIs could give additional insights on progress
- Decoupling analyses focused on high output value / low emission services sectors do not measure progress towards reducing absolute emissions
- The IPCC and EEA use the Kaya identity decomposition approach. It decomposes emissions into four key drivers: emissions per unit of energy; energy consumption per unit of output; output per capita; and population growth
- Some high emission sectors may be able to transition without changing their core economic activity e.g. a company with a large vehicle fleet could convert to vehicles using renewable fuels
- Environmental subsidies to finance retrofits could improve energy efficiency ratings to a standard that heat pumps could be used
- Some high emission sectors may need to change their main economic activity e.g. peat extraction
- An Environment Goods and Services Sector could replace jobs lost in high-carbon sectors with green growth employment
- A material inputs survey of manufacturing enterprises would provide quantitative data for physical input-output tables and would provide information on the intensity of use of raw materials
- The cost of climate change adaptation is of interest as this cost is likely to be higher if emissions are not reduced.
- The use of environmental taxes to reduce high emission activities could be examined
- Niche population segments may not be able to afford to transition to lower carbon activities

Analysis Perspective

- Our timescale is 2030 so we are looking for indicators that will show whether progress is being made when data for 2025 and 2026 are available rather than based on current data
- We are not using monthly or quarterly data as they may reflect short-term rather than structural changes
- Choose indicators that are the most relevant for each high-emission sector
- The indicators should show whether producer and consumer activity in the high emission sectors has been disassociated from the consumption of fossil fuels
- Use constant prices for monetary variables
- Use indicators showing consumer behaviour changes
- Use physical supply-use tables to reassign emissions from the producer to the final consumer if available
- An indicator approach leaves more scope for developing the report based on user feedback
- Similar work by other national statistical offices would help to develop a more consistent approach building upon the broad range of data held by statistical offices

Proposed Chapters for Initial Report

- Climate action plan targets
- Agriculture (NACE A01)
- Households as consumers
- Manufacture of cement and other non-metallic minerals (NACE C23)
- Land transport (NACE H49)
- Manufacture of food, beverages and tobacco (NACE C10-C12)
- Environment taxes, Environment subsidies, and Fossil fuel subsidies

Climate Action Plan Targets

- We show emissions, gross value added, and employment by NACE sector
- Examples of some of the highest-emitting sectors are shown below (emissions from electricity generation have been reassigned to the NACE of the final user)
- For example, 38% of emissions are from agriculture, which is a very important sector for the rural economy in Ireland, though only 1% of GVA and 4% of employment numbers nationally are from the agriculture sector

Table 1.3 Greenhouse Gas Emissions, Gross Value Added and Employment by NACE for the Highest Emitting Sectors, 2020

			%
NACE Rev. 2	**% of Total Emissions**	**% of Total Gross Value Added**	**% of Total Employment**
Agriculture (A01)	37.8%	0.9%	4.3%
Households as Consumers	26.5%	-	-
Manufacture of other non-metallic mineral products (C23)	5.8%	0.3%	0.3%
Land transport (H49)	4.6%	0.7%	2.3%
Manufacture of food products, beverages and tobacco products (C10-C12)	2.8%	2.2%	2.4%

Climate Action Plan Targets continued

- The Climate Action Plan targets are set against a background of an increasing population and longer life-expectancy
- Ireland's population increased by 35% from 1991 to 2016
- Life expectancy has increased by 5.5 years for females and by 7.3 years for males in the same time period
- Population projections show we should expect continued population growth to potentially over 6 million in 2051 (from 4.8 million in 2016)

Table 1.4 Population and Life Expectancy, 1991-2016

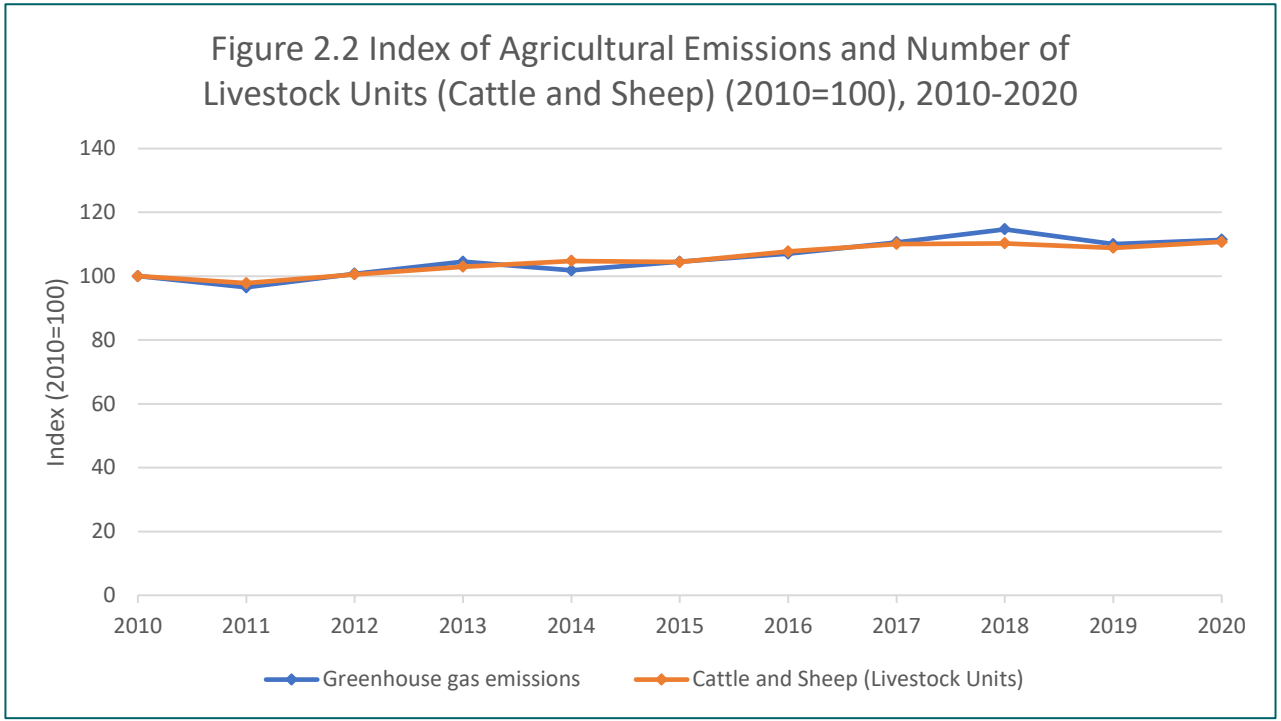
	Life Expectancy at Birth (Years)		Population (Number of persons)	
Census Year	**Females**	**Males**	**Females**	**Males**
1991	77.9	72.3	1,772,301	1,753,418
2002	80.3	75.1	1,971,039	1,946,164
2011	82.8	78.4	2,315,553	2,272,699
2016	83.4	79.6	2,407,437	2,354,428

Agriculture

- We include an annual time series showing sources of agricultural emissions (agricultural activity, fuel use, electricity etc.)
- The main source of the emissions can be identified, and livestock numbers can be shown using a common quantity i.e. livestock units
- We also show an annual time series of emissions along with gross value added and employment data
- If emissions reductions in this sector are achieved, what will be the effect on the rural economy and society?
- A Supply-Use type table shows use of agricultural products – main use (35%) is by the food processing sector (NACE C10), and 55% of food production is exported, so there could be a knock-on economic impact on NACE C10 if dairy and livestock production is reduced

Agriculture

- Livestock numbers are used as a common quantity in the graph, which shows how emissions track numbers of cattle and sheep



Households as Consumers

- The UNFCCC inventory emissions need to be redistributed from sectors such as Electricity and Transport to the final consumption sector. This can be done using NSO statistics, SEEA emission concepts, utility microdata on electricity and gas meters, annual vehicle kilometres combined with vehicle taxation class, etc.
- We show household emissions along with the source of the emissions (see table on next slide),
- Building energy ratings data can show changes in space heating fuel over different construction periods
- Gas and electricity meter data can be combined with building energy ratings to measure the difference in consumption for more energy efficient dwellings
- Utility energy microdata can examine whether customers reduce consumption during periods of higher prices e.g. energy prices in 2022
- Vehicle licensing by fuel type can show the proportion of electric cars in the fleet

Households as Consumers

- In 2020 46% of household emissions were from heating, 32% were from transport
- A Covid effect can be seen in 2020 when comparing heating and transport emissions from previous years
- Household emissions as a percentage of total emissions were fairly constant over the three years shown in the table but had decreased steadily from 31.4% of the total in 2010

Table 3.1 Greenhouse Gas Emissions by Households as Consumers, 2018-2020

	'000 tonnes CO2-equivalent		
Households	**2018**	**2019**	**2020**
Greenhouse Gas Emissions	16,570	15,892	15,402
of which			
Household heating	*41%*	*41%*	*46%*
Transport (private household vehicles)	*36%*	*38%*	*32%*
Electricity consumption	*21%*	*19%*	*20%*
Other	*2%*	*2%*	*2%*
Household emissions as a percentage of total emissions	26.4%	26.4%	26.5%

Households as Consumers

- New builds are increasingly using electricity as the main space heating fuel in Ireland with a transformation occurring in a short time period as electricity went to 49% of new builds in 2015-2019, then to 86% of new dwellings in 2020-2022
- This is a positive development provided a switch from fossil fuels for generating electricity takes place

Table 3.2 Main Space Heating Fuel by Period of Construction, 2000-2022

			%
Period of Construction	**Mains Gas**	**Heating Oil**	**Electricity**
2000-2004	41	36	19
2005-2009	45	31	19
2010-2014	47	31	18
2015-2019	46	5	49
2020-2022	13	0	86

Households as Consumers continued

- Homes with the best energy efficiency ratings (A/B) use less electricity per square metre
- However the lowest rated homes (F/G) use less than C-, D- and E-rated homes, a possible indicator of energy poverty
- Improving the energy efficiency of older homes could reduce the demand for heating

Table 3.4 Building Energy Ratings and Mean Electricity Consumption per square metre, 2015-2021

	Mean kilowatt hours per square metre				
Year	**A/B Rating**	**C Rating**	**D Rating**	**E Rating**	**F/G Rating**
2015	38	73	74	75	64
2016	36	73	74	75	63
2017	35	72	74	75	64
2018	38	77	80	80	67
2019	35	70	73	74	63
2020	40	77	80	81	68
2021	42	75	79	79	67

Households as Consumers

- We include a table of data from our Environmental Subsidies and Similar Transfers release showing the amount of grants and tax reliefs for households for retrofits, electric vehicles and solar panels
- These policy measures are part of the actions being taken to lower emissions

Table 3.5 Emissions-related Transfers to Households, 2018-2020

			€ million	*%*
Type of Transfer	**2018**	**2019**	**2020**	**2020/2018**
Energy Efficiency Grants	81	100	106	31%
Electric Vehicle Grants and Reliefs	38	71	65	71%
Renewable Energy Grants	0	4	7	

- Electric vehicles made up only 0.6% of taxed private cars in 2020

Table 3.6 Private Cars by Taxation Year and Fuel Type, 2020

					%
Taxation Year	**Petrol**	**Diesel**	**Hybrid**	**Electric**	**Total**
2020	37.9	58.2	3.2	0.6	100

Environment Taxes, Environment Subsidies, and Fossil Fuel Subsidies

- Existing SEEA modules can be analysed to examine whether financial incentives and disincentives can be linked with consumer behaviour change.
- The impact of carbon tax, excise tax, pollution levies, etc. on sectors with high emissions could be examined – do enterprises pass on any additional costs or do they reduce emissions
- Fuel taxes per litre can show the extent to which governments are using carbon taxes as a policy instrument

Table 7.1 Energy Taxes per Litre on Selected Fuels, 2020

€ per litre

	Petrol	Road diesel	Kerosene (Household Heating)	Marked Gas Oil (Household Heating)	Marked Gas Oil (Agricultural Use)
Total Energy Tax per Litre	0.63	0.51	0.07	0.16	0.12
of which Excise	*0.55*	*0.42*	*0.00*	*0.05*	*0.05*
of which Carbon Tax	*0.06*	*0.07*	*0.05*	*0.08*	*0.05*
of which NORA Levy	*0.02*	*0.02*	*0.02*	*0.02*	*0.02*

Conclusion

- NSIs have the broad range of data that can be used to monitor progress towards climate action targets and the ensuing effects on economic sectors
- The challenge is in choosing suitable indicators that can give a good picture of the trajectory we are on
- Using indicators gives us flexibility in terms of changing and improving the release
- We are interested in working with and getting feedback from other NSIs on how to best use our official statistics to contribute to this area
- We selected a few of the indicators from the release for this presentation to give a clearer picture of what we are trying to do
- We are looking at longer term trends (e.g. ten years or more) and as we get closer to 2030 we think the release will become more and more interesting
- We are focusing on the biggest emitters and we have redistributed all fuel and electricity use to the end user
- Agriculture is responsible for a high proportion of emissions but is an important contributor to rural employment