UNITED NATIONS
ECONOMIC COMMISSION FOR EUROPE

Working paper 5
26 August 2022

CONFERENCE OF EUROPEAN STATISTICIANS

Expert Forum for Producers and Users of Climate Change-Related Statistics
29-30 September 2022, Geneva

USE OF ADMINISTRATIVE MICRODATA FOR CLIMATE-RELATED STATISTICS IN IRELAND

Prepared by Gerry Brady, Central Statistics Office, Ireland

Abstract

The paper gives examples of the use of administrative microdata to develop climate-related statistics. These include utility meter data for electricity, gas, and water consumption as well as other sources such as energy efficiency audits.

The paper gives examples of how statistical value can be added by combining microdata from different data sources using unique identifiers. Building energy ratings are based on imputed energy consumption. Linking actual electricity and gas consumption with the energy ratings microdata show whether a major building retrofit scheme of older dwellings would be likely to reduce the energy consumption of households.

Vehicle registers and car road worthiness tests data can be used to examine trends in the transition to hybrid and electric vehicles and the financial risk of stranded assets from ownership of diesel and petrol vehicles by large haulage enterprises and public passenger transport companies.

I. CONTEXT

1. The 2021 Climate Action and Low Carbon Development (Amendment) Act set legally binding national emissions reduction targets. The overall target is a 51% reduction in emissions by 2030 compared with 2018 levels. The Act set sectoral reduction targets for Electricity (-70%), Transport (-50%), Commercial and Public Buildings (-45%), Residential Buildings (-40%), Industry (-35%), and Agriculture (-25%). National emissions inventories will show the annual progress towards these targets. Statistical data could provide information on sub-groups within each sector.

II. LEGAL ACCESS TO ADMINISTRATIVE DATA

2. The Statistics Act, 1993 permits the CSO to request confidential microdata from public authorities for statistical purposes. Under the Act, the CSO obtained access to electricity, gas, and water meter data. The Act was used to receive a lot of other environment-related information such as energy efficiency audits, vehicle odometer readings, Emissions Trading Scheme, Large Industry Energy Network, and Public Sector Energy Efficiency schemes.

III. EXAMPLES OF USE OF MICRODATA

A. Utility microdata

3. The comprehensiveness of administrative microdata gives it the potential to measure progress towards sectoral targets without having to undertake new statistical surveys if the microdata cover a high proportion of household and enterprise populations. Electricity meters are very comprehensive and can be used for many additional specialised purposes such as analysis of vacant and new dwellings, and maintenance of a business register. In Ireland, gas and water meters typically cover urban areas and customers located close to the main pipelines.

4. The electricity meter data are received annually. The files include customer location details, quarterly electricity consumption for residential and small and medium enterprises and daily data for a small number of very large energy users. The CSO publishes an annual statistical release showing consumption by user group and quarter for detailed geographical areas. The file was used to identify data centres by doing searches using customer name, address, and consumption level. The CSO published a thematic report which showed that data centres used more electricity in 2021 than all rural households combined, see https://www.cso.ie/en/statistics/energy/datacentresmeteredelectricityconsumption/

5. The gas meter data covers around half of the residential sector as well as enterprises connected to the mains gas network. The CSO receives the file annually. The files include customer details and quarterly electricity consumption for residential and small and medium enterprises. Monthly data are available for the largest consumers. The CSO publishes an annual statistical release showing consumption by user group and quarter at a detailed level of geography, see at https://www.cso.ie/en/statistics/energy/networkedgasconsumption/

6. The water meter data covers around half of the residential sector as well as enterprises connected to the public supply network. The CSO receives the file annually. The files include customer details and monthly meter readings. The CSO publishes an annual statistical release showing consumption by month at a detailed level of geography. In Ireland residential customers are not charged for water on a consumption basis. Householders do not know their consumption levels as the meters are located in manholes on the footpath outside dwellings. A statistical analysis by the CSO showed that the highest decile of metered households accounted for 36% of household consumption indicating that there is significant wastage due to leaks between the meter and the dwelling. The statistical release is available at https://www.cso.ie/en/statistics/waterandwastewater/domesticmeteredpublicwaterconsumption/

B. Energy efficiency of buildings

7. The Climate Action Plan set a target of a 40% reduction in emissions from residential buildings by 2030. The Energy Performance of Buildings Directive is the underlying basis for monitoring the energy performance of residential and non-residential buildings. The Sustainable Energy Authority of Ireland maintains a database of all energy rating audits. The CSO publishes these on a quarterly basis. The data show trends in main space heating fuels, dwelling type, and total floor area. New dwellings and dwellings being sold or rented are required to have a Building Energy Rating audit undertaken. Well over half of all dwellings have had an audit.

8. The most notable trends, since the series began in 2009, are much more energy-efficient new dwellings and a change to using electricity as the main space heating fuel. The series shows that older dwellings in inner city areas are typically the least energy-efficient and hence most in need of a substantial

retrofit. See the results at https://www.cso.ie/en/statistics/energy/domesticbuildingenergyratings/

C. Adding value by combining microdata

9. If customer files contain a common unique identifier, then it becomes possible to achieve new insights without any additional data collection. The CSO has a policy of encouraging public authorities to record unique personal, business, and geographical identifiers in the datasets where appropriate. As previously mentioned, under the Statistics Act, national statistical institutes can obtain access to confidential microdata from public authorities. The CSO is uniquely positioned to undertake analyses of combined confidential microdata files.

10. A recent example of a combined dataset analysis examined how household gas consumption varied by energy rating, dwelling type, period of construction, and floor area. The report found that the most energy efficient dwellings had more total floor area. They consumed more gas but had a lower consumption on a kilowatt-hours per square metre metric. The report showed that the least energy-efficient dwellings used less gas possibly due to the use of alternative supplementary fuels or a lack of income resulting in the home not being adequately heated. The release is available at https://www.cso.ie/en/statistics/energy/householdgasconsumptionbybuildingenergyratings/

11. The building energy ratings file was combined with Census of Population returns to characterise how the socio-economic situation of households varied by energy rating. The research showed that a change of ownership was often the underlying reason for a major upgrade to the energy efficiency of a dwelling. The CSO report can be found at https://www.cso.ie/en/statistics/social/domesticbuildingenergyratingsfromasocialperspective/

12. The electricity meter data was used by the CSO as part of the evaluation of unoccupied dwellings in the 2022 Census of Population. The Census field force is not always able to make contact with the occupants so alternative administrative data can provide a sound basis for constructing a Census return or for confirming that the dwelling was probably vacant on Census night.

13. The CSO Business Energy Use survey is compiled from a combination of survey returns and administrative data held by the Environmental Protection Agency and the Sustainable Energy Authority of Ireland. Electricity and gas meter data are also used for data checking and imputation. The Background Notes to the statistical release describes the various data sources used, see https://www.cso.ie/en/statistics/energy/businessenergyuse/

D. Developing a broader range of environment statistics

14. The CSO obtained information on fertiliser and pesticide sales from the Department of Agriculture, Food and the Marine and published them as new statistical releases. A further release on Gross Nutrient Balances will be published using data from the same Department. These releases combined with agricultural statistics provide important information on trends in emissions from the agricultural sector. The releases are available at https://www.cso.ie/en/statistics/agri-environment/

15. In preparation for a new Eurostat legal module on Forest Accounts, the CSO obtained data from the Department of Agriculture, Food and the Marine on afforestation and area under forestry. The CSO used existing foreign trade data to compile a new release on Exports and Imports of Wood and Paper Products. The new statistical releases are available at https://www.cso.ie/en/statistics/forestry/

16. To meet the Eurostat requirements, the CSO publishes a broad range of environmental accounts. These include Environmental Taxes, Environmental Subsidies, and Fossil Fuel Subsidies. These releases are compiled from existing administrative and statistical data. The releases show trends supporting and working against a reduction in emissions. The releases are available at https://www.cso.ie/en/statistics/environmentaccounts/

17. The Sea-Fisheries Protection Authority provides the CSO with an annual file of fish landings tonnages and catch value. The data show the distribution of landings by port and by species and the proportion of landings in Ireland accounted for by foreign-registered trawlers. Time series analysis can provide indications as to whether the landings are at a sustainable level. The statistical release is available at https://www.cso.ie/en/statistics/fishery/fishlandings/

18. Monthly statistics on excise clearances of unleaded petrol, autodiesel, marked gas oil, and kerosene provide a short-term indicator on emission trends, see the releases at https://www.cso.ie/en/statistics/energy/fuelexciseclearances/

E. Work-in-progress

19. Transport fuel use comprises a high proportion of emissions. Vehicle road worthiness test data have high statistical potential to understand in more detail how vehicles are used (owner location and availability of public transport, fuel type, etc.). The Environment division of the CSO is currently checking the quality of the microdata e.g., mis-reporting between kilometres and miles, inclusion of a decimal place in the odometer reading, odometers in older vehicles going around the clock, etc. The aim is to calculate annual kilometres travelled by different types of vehicles. The data should give new insight into how electric vehicles are being used as well as information on their reliability over time.

20. The sectoral emission targets need to be achieved in the context of maintaining a healthy economy. National statistical offices are well-positioned to compare sectoral economic data with trends in emissions. Trends in employment and value added will show whether the sectors can green their production processes while remaining economically viable. The CSO is preparing a new release that will show historical emission, economic, and employment trends.

21. The most onerous project that we are working on is a Climate Data Rescue of detailed daily meteorological data generally covering the period 1870 to 1959. The project includes seven meteorological stations. The longest time series goes back to 1829 for the Phoenix Park in Dublin. The data will show long-term trends in indicators such as heatwaves, drought, and storms. More information is available at https://www.cso.ie/en/methods/climateandenergy/csoclimatedatarescue/

* * * * *