## Joint UNECE/IEA/Eurostat Webinar on Administrative Microdata for Climate Change, Energy and Environment Statistics

### Interim responses prepared by the Central Statistics Office of Ireland

These questions were submitted by people registering for the Webinar. This short question and answer paper provides initial responses to the questions asked during registration. Selected representative questions will be discussed in more detail by the panellists during the Webinar.

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	consumption and the coming energy consumption statistics on this type of
	microdata. From our perspective the following questions are interesting: 1) the use of non-probability samples in official statistics - if this is too a technical
	subject, one could discuss the risks of using non-probability samples; 2) problems
	of using the operative market register like electricity datahub - by now we've
	established that linking is not straight forward
	Computation and thinking to hot original forward.

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### 1. Legal basis for data access

#### Question 1: Privacy?

**Response**: The introduction of GDPR has increased the complexity for national statistical offices of obtaining access to confidential administrative microdata. Sound data protection procedures need to be in place in the statistical office both in its dealings with the data owner and in how staff are given access to confidential administrative. These procedures include:

- The statistical office should engage with the data owner to establish whether the data could be made available and to clarify exactly what the potential contents of the microdata file would be e.g. meter readings or calculated consumption etc.
- A Memorandum of Understanding should be signed between both organisations.
  The MoU should set out the legal basis for providing the data and the specific uses
  that the national statistical office requires it for. The MoU should be reviewed on a
  regular basis and updated as new needs arise or new variables become available
  in the source microdata.
- A Data Protection Impact Assessment (DPIA) needs to be undertaken. The DPIA should identify the risks arising out of the processing of personal data. DPIAs are important tools for reducing risk and for demonstrating compliance with the GDPR.
- A Data Necessity and Proportionality Assessment will outline why access is needed for each variable in the administrative data request. The DNPA should clarify to the data owner how the data will be made use of. A DNPA can also be used internally within the statistical office to determine whether the staff member needs access to the confidential variables.
- There needs to be a secure data transfer mechanism— the data should not be transferred using USB devices or by email. The customer details should be transferred in a separate file.
- Within statistical offices, two levels of access should be provided: an anonymised file for more general users; and a file with customer names in the case of users that require that level of detail. In some cases, the unique variables could be pseudonymised if they are only needed to distinguish one customer from another.
- The establishment of an administrative data unit within the statistical office would ensure that there is consistency in the management of confidential microdata across the statistical office. This unit would be the repository for all confidential administrative microdata and staff would apply to it for access.

### Question 2: Overcoming legal obstacles, improving awareness of stakeholders?

**Response**: The Webinar will discuss the experience of national statistical offices and other bodies in relation to obtaining access to confidential administrative microdata. It may be necessary to obtain advice from national data protection offices to ensure that the data request meets GDPR requirements. Amendments may be needed to statistical legislation to facilitate access to privately-owned data for statistical purposes.

Statistical offices should have mechanisms to make government bodies aware of the statistical potential of administrative microdata e.g. through liaison groups of producers and users. Statistical offices may not be fully aware of new data needs e.g. for statistical data showing the impact of higher energy prices on the viability of enterprises.

### Question 3: How is the access to administrative microdata organized in other countries, what organizational entities are involved?

**Response**: Under the GDPR, access to personal and confidential administrative microdata requires a legal basis. National statistical offices may be best placed to obtain such access. The specific data needs of energy agencies and government ministries can be included as statistical uses in the request made by the NSO. The Webinar country examples will

provide more information at national level from countries that have obtained access to administrative microdata.

### Question 4: General questions on how to implement/interpret this data as well as questions on data access?

**Response**: The statistical coverage of each data source is important in relation to its usefulness. If a very high proportion of households and enterprises are included in the microdata then the dataset will be much more representative. If rural areas are underrepresented then the dataset may need to be weighted up to national level using population and business registers. If the utility meter data are privately-owned or owned at regional level then obtaining access may take longer and be more difficult. These legal aspects will be discussed at the Webinar.

For odometer readings based on vehicle testing, there is generally an exemption from testing for new vehicles under a certain age. Hence metrics such as annual vehicle kilometres may not be fully representative if newer vehicles are not typical of the full fleet. This should not be a difficult problem as these vehicles will eventually be tested and then their activity levels will become known. National vehicle registers could be used to weight the data to the full vehicle fleet.

#### Question 5: Security, treatment and dissemination of personal data?

**Response**: The Webinar will discuss this topic in more detail but the development of GDPR practices should have ensured that sound practices are already been followed within NSOs:

- Pre-access procedures such as data privacy impact assessments and data necessity and proportionality assessments should have been carried out.
- A formal Memorandum of Understanding should have been signed by both organisations.
- Secure file transfer mechanisms should be in place. Customer and data files should be sent separately.
- There should be well-documented internal procedures within the statistical office for controlling applications for access to confidential microdata.
- If the statistical office creates microdata research files then careful checks should have been made that confidential data cannot be inferred and researchers should have to sign a code of practice before being given access.

The data must be used for statistical purposes only. There are legal restrictions in statistical acts preventing the dissemination of personal data.

### Question 6: How do we protect the privacy of organisations included in microdata?

**Response**: Statistical offices have a legal obligation to protect the confidentiality of the microdata. This obligation applies equally to confidential data collected directly by statistical officers and to personal microdata received by them from utility companies and other data holders. Data protection officers within national statistical offices have a very important role to ensure that the files are used in accordance with data protection regulations.

# Question 7: Use of full covered register from population and housing combined with variables from energy, energy efficiency, environment etc. This is the proposal from EU Commission from Statistical domain Social economy.

**Response**: The initiative in the social economy domain is similar to the approach being proposed for environment, energy, and climate-related statistics. It is encouraging that the EU Commission is supporting a strategy of encouraging the use of administrative microdata. This document provides a short overview of the approach being proposed by the EU Commission <a href="https://www.poch.portugal2020.pt/pt-pt/Documents/KE-02-20-253-EN-N.pdf">https://www.poch.portugal2020.pt/pt-pt/Documents/KE-02-20-253-EN-N.pdf</a>

It would be useful to receive a report on the progress being made by countries to implement this approach in the social economy domain.

### Question 8: The issue related to use of admin data for more purposes needs change in legislation nationally and internationally.

**Response**: The Webinar is an attempt to gather information on existing experiences and to identify the areas where access is more difficult. Any differences in obtaining access to confidential microdata owned by a public authority and by private enterprises is of particular interest.

Question 9: Smart metering needs change in legislation. Data act for access for statistical authorities to get admin data from private admin data holders and authorities is needed. Energy poverty vulnerability definition is impossible without standard way from CENSUS for example to have same methodology.

**Response**: GDPR legislation made provision for the use of personal data for statistical purposes subject to specified safeguards and conditions. Hence NSOs are already permitted to obtain access to utility meter data under the GDPR.

Smart meters will provide much more detailed consumption data than has previously been possible. An important aspect of the introduction of smart meters is the possibility of using different price tariffs to encourage off-peak consumption. Households at risk of energy poverty may try to avoid peak-time charges as much as possible.

Data sharing of smart meter microdata will probably be under much more scrutiny from data protection offices and a more detailed business case may need to be made by statistical offices as to why they require consumption data at sub-hourly intervals.

The volume of smart meter data (17,500 data points per annum for half-hourly consumption data) may place a heavier IT burden on utility companies to provide such volumes in a format usable by statistical offices.

While new legislation may be needed to create a legal basis for statistical offices to obtain access to important privately-held microdata, in the short-term statistical offices could show the statistical value of environment-related microdata held by public authorities as evidence of the need for access to similar private data.

### Question 10: Interested in other countries' use of this data in statistics, and how they have overcome technical and legal barriers to access and use?

**Response**: Examples of current country use are given in the country presentations and Background Note. The Webinar will discuss the main issues around data access. The responses to questions in the legal section of this document contains examples of the actions needed to be taken by data holders and statistical offices before data are transferred. For countries that have obtained access there should be a mechanism for a periodic review between the data owner and the statistical office to ensure that there is an ongoing need for access to the microdata and to check whether the utility company have compiled additional information e.g. geocoding of the meters.

If countries make more widespread use of utility, building, and vehicle microdata then environment-related statistics can incorporate a demographic and social dimension which would provide important insights into more marginalised groups.

#### 2. Data quality assessment

#### Question 11: The main quality assurance tests of the data needed?

**Response**: The utility meter readings should be reliable in that they are being used to bill customers. A time-series analysis of consumption at meter level should identify whether there are any serious problems with the utility microdata.

The odometer reading is collected as part of a vehicle road worthiness check and may not be a mandatory part of the vehicle test. The odometer reading will need to be quality checked e.g. has the decimal place in the odometer display been recorded as a whole unit e.g. 250,001 instead of 25,000.1. A time-series analysis of the odometer readings for a vehicle should be an adequate method of identifying any incorrect readings.

The quality of utility meter data should improve as the data collection method moves from estimated, utility staff and customer readings to smart meter actual readings.

#### Question 12: System sustainability?

**Response**: The utility meter data (electricity, gas, and water) should be available on an ongoing basis if they are used to bill customers for their consumption. The legal basis for obtaining the confidential administrative microdata should be sustainable if the necessary procedures have been followed and there are sound practices for protecting the microdata within the statistical offices.

#### Question 13: What methodologies or tools could we use in poor countries?

**Response**: Household and enterprise surveys are expensive to carry out especially if there is a field force involved. Administrative microdata are collected by other organisations usually as part of the performance of their functions. This can vary from taxation returns to birth certificates to utility meter data. Hence there should be no data collection costs for a statistical office using administrative microdata.

The IT systems required to process administrative microdata should not be particularly different to that required for processing a survey. There may be additional work required to geocode the data or to classify it by local authority. Over time the holders of the administrative microdata could be encouraged to add statistical value to their files by collecting unique identifiers that would make it easier for the data to be merged with statistical registers. The national statistical office may have an opportunity to influence the development of less computerised administrative data to increase its future statistical value.

Utility customer registers could provide a basis for building business and household survey registers. New meters could be used as a mechanism for maintaining household sample survey registers during intercensal periods.

### Question 14: How do you manage classifications across a wide range of administrative sources?

**Response**: The use of unique identifiers in administrative microdata can enable microdata files to be linked by statistical offices using person, household, and enterprise registers. The classifications in those registers can then be used e.g. main business sector of enterprises.

Building energy audits would benefit from using classifications for type of dwelling (e.g. mid-floor apartment), main space heating fuel, and period of construction that are consistent with those used by the statistical office in the Census of Population. This would facilitate data quality checking and weighting.

In general, it seems better to create mechanisms to link the microdata with statistical registers held by statistical offices so that existing statistical classifications can be brought into the administrative microdata by the statistical office through data matching.

### Question 15: Is administrative microdata readily available or how is it processed?

**Response**: Utility meter microdata can be made available as consumption in a particular period or as meter readings. Detailed meter readings would require a transformation into more standard consumption periods such as monthly or quarterly periods. If the consumption is calculated by the utility company, then it should be consistent with their billing data.

Vehicle odometer readings relate to the vehicle test date. The time series of odometer readings for a vehicle need to be checked and any errors corrected. The difference between two odometer readings can be distributed equally between the two dates or adjustments can be made for seasonality. The readings can be converted into annual vehicle kilometre estimates.

# Question 16: New available data sources that we did not think about? Other statistics/indicators to quality check our data? Break in series or revise back in time?

**Response**: The administrative microdata being examined by this Webinar are underused for statistical purposes. Increasing costs and response rate difficulties associated with direct data collection is making alternative administrative data sources more attractive. The increased computerisation of administrative microdata is making the data more timely and more readily available.

The administrative microdata can be used both for separate publications and for incorporating into existing survey data. Inevitably there may be some inconsistency and statistical offices will need to understand the causes of any significant differences.

The microdata generally relate to a location or to a vehicle so changes in the occupants or in the owner need to be taken account of to understand changes in the time series. In some cases, administrative microdata can be used to identify behaviour changes e.g. if a person who owned a diesel car changes to a hybrid or electric vehicle. The characteristics of vehicle owners by fuel type of or of the energy ratings of dwellings by occupant characteristics can provide important new insights for policy formation.

# Question 17: Examples of using technology to collect information under an intersectional approach (machine learning, AI, satellite or drone images)? Advantages and disadvantages? Preconditions to use this kind of tool?

**Response**: The datasets in focus for the Webinar are utility meters, building energy audits and vehicle odometer readings. The technology associated with the utility meters is advancing towards smart meters where the meter readings are sent directly to the utility company on a very frequent basis e.g. every 30 minutes.

With the evolution of electric vehicles, it may be possible for statistical offices to obtain detailed information about location, driving speeds etc. that would improve emissions estimates as well as providing a wealth of data for transport planners. An analysis of satellites imagery may be more relevant for other types of data collection such as land use and condition.

In the short-term, the challenge may be for statistical offices to obtain access to the administrative data.

#### 3. Country use examples

### Question 18: What kind of administrative microdata has been proven useful, and for which purposes?

**Response**: The potential uses of the utility meter, building energy ratings, and odometer data are widespread and go far beyond environment, energy, and climate related uses including the following:

- New utility meters could be examined as an input into gross fixed capital formation arising from new buildings.
- New electricity meters could be used to compile estimates of the delivery and location of new homes.
- New meters may be useful in examining how urban areas are extending into what were previously natural landscapes e.g. on the edges of cities and in tourism locations.
- Electricity consumption levels and trends can be used as an input into measuring the level of vacant and holiday homes.
- The electricity and gas consumption figures can be combined with building energy ratings and socio-demographic data to gain insights into energy poverty and other policy concerns.
- Building energy ratings can be used as an input into the calculation of residential property price indices to control for quality differences.
- Smart meter data at half-hourly intervals combined with price data would show whether off-peak price reductions are lowering peak consumption. This can enable a higher percentage of renewable energy to be used if carbon intensive power plants do not have to be started up to meet peak consumption.
- The consumption of electricity by electric vehicles can be difficult to measure. Public
  charge point meters may be individually identifiable in the meter customer
  databases and EV charging in residential consumption patterns or in home charging
  grants schemes.

Question 19: Have some countries/organizations been successful at acquiring administrative energy data from utilities or smart meter data? If so, how did the acquisition process go, what were the challenges and how were they overcome? What is the data being used for (i.e. survey replacement, developing new indicators, data linkages with other administrative files)?

**Response**: The country presentations and the Background Note for the Webinar contain examples of country level use. The presentations at the Webinar will present information on difficulties encountered in obtaining access and on the legal elements required to assure the data holder that the microdata can be provided for statistical purposes under the GDPR.

The UNECE Conference of European Statisticians approved an in-depth review of the use of environment, energy, and climate-related microdata to be undertaken during 2023. The review will collect more information on the situation at country level particularly in relation to differences in obtaining access caused by public and private ownership.

The data can be used to quality check existing data sources, to fill data gaps, to produce new more disaggregated indicators such as consumption size classes, for more detailed geographical analyses, and to link the data with social data sources.

#### Question 20: What are relevant indicators?

**Response**: The microdata can provide information on many indicators. For example, changes in the main space heating fuel from natural gas and oil to electricity as building energy efficiency ratings improve. This change can arise from the installation of heat pumps and through improved insulation reducing the overall demand for a household.

The utility microdata can be used as the equivalent of survey and census returns to publish tables by consumption size class or to examine consumption changes at meter level between two periods in response to a substantial price increase or to extreme temperatures.

Longitudinal analyses of the microdata at meter or vehicle and building level can provide indicators that may not be possible from using sample surveys.

#### Question 21: Data availability per country?

**Response**: The 2022 Expert Forum on Climate Change-related Statistics country questionnaire collected information on the use of the utility and other microdata at country level. The Expert Forum will collect more detailed information on the situation at country level in conjunction with a UNECE Conference of European Statisticians in-depth review of the use of environment, energy, and climate-related microdata.

### Question 22: Methods for combining (sample) data? How to deal with representativeness, sample bias and consistency of data?

**Response**: Ideally microdata would be made available at the lowest level possible to facilitate statistical analysis. If the statistical office is entitled to receive person, household, and enterprise level data, and has a definite statistical purpose for requiring it, then the data should be requested at that level of detail. The greater granularity in the microdata should improve the potential for combining it with other related microdata to achieve added statistical value. The utility company may have daily data for customers using large amounts of electricity and gas.

The microdata can be combined at household level or at a more aggregated level such as local authority. The presence of common unique household or enterprise identifiers in the microdata are necessary to combine two files at household level. Another example of combining the meter data is if all of the meters relating to an enterprise could be combined using a common unique business reference number for the enterprise.

Access to combine two confidential microdata files may only be possible under statistical legislation e.g. electricity meters and energy performance certificates. Combining an administrative microdata file with a statistical data source such as a population census would add socio-demographic data to the utility consumption.

#### Question 23: Waste microdata?

**Response**: Environment protection agencies may collect detailed information on the waste generated by facilities operating within integrated pollution control licensing. Waste collection company customer databases may hold detailed information on the types and weight of waste collected from each customer. Trans Frontier Shipments of waste may be another useful microdata source.

Vehicle, building, and population registers may make it possible to weight the data to be nationally representative.

#### Question 24: Use of utility meter data?

**Response**: The responses to other questions have provided information for this question. In some cases, the microdata could be used for other domains such as for social and business statistics and for national accounts. The country presentations show examples of the use of utility meter microdata at country level. Research agencies may be interested in obtaining access to an anonymised research file for more detailed analyses.

### Question 25: Production data used to calculate air pollution levels using fuel consumption data to estimate pollutant emissions?

**Response**: The utility microdata can be used to improve the quality of business energy use surveys. The electricity and gas consumption figures in a business energy survey can be compared with the utility data if there is a means of aggregating meters to enterprise level and of linking the utility data with the business register.

The building energy ratings could be used to identify locations where there is a high usage of solid fuels for domestic heating and this could be compared with air quality levels.

The vehicle odometer microdata can be used to classify annual vehicle kilometres by fuel type and the taxation class of the vehicle. Information at local authority level on the owner of the vehicle would enable air quality data to be compared with fuel type by vehicle kilometre statistics. The presentation by the Turkish Statistical Institute provides an example of how annual vehicle kilometre figures can be used to make estimates of fuel consumption.

The gas meter data can be used to show trends in the gas consumption of gas-fired power stations to generate electricity.

Statistical and administrative microdata can be used in conjunction with air quality and health data at local authority level to identify black spots where policy interventions are needed to improve air quality.

Question 26: The availability and use of administrative microdata associated with the environment, such as the data of the meter of the communal enterprise, changes in the climate and the environment. The experience of countries to improve environmental statistics through the use of administrative microdata. The development of information on the micro level for the SEEA.

**Response**: The use of large-scale administrative microdata is well-established in social, business, and National Accounts statistics. The datasets can come from taxation authorities, social welfare ministries, birth and death registrations, health records, etc.

Their use is less well-established in environment, energy and climate statistics. Large-scale environment-related administrative files create an opportunity to look at the data from a micro pint of view – person, household, enterprise – as well as from a more detailed geographical view if the administrative microdata cover a large proportion of the population.

The country presentations and Background Note contains some examples of existing use. Combining two environment-related administrative microdata files would create a new dataset with added statistical value for the statistical and research communities.

Buildings with an "A" energy rating could be regarded as part of the environmental goods and services sector.

### Question 27: Type of data available and entities, specially related with environmental accounts.

**Response**: There are many potential sources of environment-related administrative microdata. The Webinar has focused on a small number of large-scale datasets. Examples of other datasets include: excise clearances of fuels by taxation authorities; forestry grants; individual environment tax and subsidy schemes; meteorological data; agrienvironment data on fertiliser and pesticide sales; water abstraction registers; etc.

Building energy audits collect a huge amount of information and act essentially as a housing conditions survey.

Vehicle road worthiness tests could be used to estimate fuel consumption and emissions from road transport vehicles.

### Question 28: What experiences do organisations have of bringing together different sets of microdata?

**Response**: Combining two administrative microdata files requires the statistical office to have a legal basis for gaining access to both datasets. The utility companies need to have been informed that the statistical office intended combining related datasets e.g. electricity and gas meter consumption at meter level.

Both datasets will need to have unique identifiers that enable them to be combined. For example, in Ireland the building energy ratings dataset contains the electricity meter number which makes matching with electricity meter microdata straightforward. The resulting analysis showed that more energy efficient dwellings used less electricity per square metre but that newer more energy efficient dwellings had a larger floor area than older less efficient dwellings

https://www.cso.ie/en/statistics/energy/householdelectricityconsumptionbybuildingenergyratings/

### Question 29: Use of full covered register from population and housing combined with variables from energy, energy efficiency, environment etc.

**Response**: Census results can be used to correct administrative microdata that are not representative nationally. Vehicle registers could also be used to reweight odometer microdata to correct for vehicles that were not required to undergo a road worthiness test. Combining Census data with building energy ratings allows an analysis of household composition from the Census by energy rating

e.g. <a href="https://www.cso.ie/en/statistics/social/domesticbuildingenergyratingsfromasocialperspective/">https://www.cso.ie/en/statistics/social/domesticbuildingenergyratingsfromasocialperspective/</a>

# Question 30: Want to hear about admin data sources being used in other countries, particularly in relation to adoption of energy efficient products and building efficiency.

**Response**: The building energy audits collect information on the use of heating pumps and on the insulation values of doors, windows, attics, and walls. In cases where buildings have been substantially renovated to improve their energy efficiency, it would be possible to look at the impact on actual energy consumption and on whether there was a change in the main space heating fuel if energy efficiency audits have been conducted both before and after the retrofit.

# Question 31: We carry out a few surveys, and data collected are used by EPEA and ETEA. We are interested in type of administrative microdata for climate change. Which type of statistic surveys or administrative microdata could use for instance?

**Response**: Climate mitigation may be the most relevant use of the selected administrative microdata. Building energy ratings can indicate whether new dwellings and commercial premises are being built to a higher standard e.g. due to more strict building regulations. More energy-efficiency should result in a reduced demand for heating and may enable a switch to using heat pumps.

Environmental subsidy schemes could support homeowners who want to undertake refurbishment work such as insulating walls, attic, windows, and floors. These subsidy payments can be used for environmental protection and expenditure accounts (EPEA).

Vehicle odometer data can show the transition to electric vehicles in terms of annual vehicle kilometres – the latter is more meaningful than the number of electric vehicles if they are being used for shorter journeys than diesel and petrol vehicles. Buildings with an

A-rated energy performance certificate could be considered part of the environmental goods and services sector.

Longitudinal analyses of utility meter data could provide insight into long-term trends in consumption at meter level. These meter level trends may help to identify population segments that need financial assistance to avoid energy poverty and to reduce their consumption of fossil fuels.

The electricity and gas meter microdata can be used to cross-check the quality of business energy use surveys and of estimates of household energy consumption.

# Question 32: To what extent can we implement the most appropriate methods used that help in statistical and collecting data related to climate change, energy and the environment?

**Response**: Administrative microdata can complement statistical surveys in various ways. Their statistical value will be increased if they can be matched with business registers so that NACE codes can be added to the files and with household and building registers that would enable the microdata to be used with social data.

The Smart meter electricity microdata received by Statistics Denmark contain business and address identifiers. Similarly the Turkish Statistical Institute can match their vehicle microdata with their business register to get NACE codes.

It may not be possible to undertake sample surveys at a scale large enough to produce estimates at local authority level whereas administrative microdata may enable more geographical based estimates to be published. Small surveys may not be as robust as administrative microdata for publishing consumption size class tables.

# Question 33: When are information holders (institutes, persons, companies) motivated to share microdata about themselves? Can you share successful experiences?

**Response**: Climate change is relevant for all households and enterprises. Public authorities understand the statistical potential of their data to a greater extent than before and may be willing to make anonymised files available as Open Data. There is a need for energy and environmental agencies and statistical offices to engage with public authorities in relation to how they can increase the statistical value of their microdata.

#### Question 34: Statistical data from the industrial sector.

**Response**: Environmental protection and sustainable energy agencies may collect detailed information on energy consumption and emissions from industrial firms. Utility microdata may contain unique identifiers that allow the business sector of the customer to be identified.

### Question 35: I would like the experiences of other countries, which new data sources have been introduced.

**Response**: The webinar is focusing on a small range of important administrative microdata sources to share experience and to encourage other countries to engage in discussions at national level and within the statistical office on the possibility of obtaining access to those datasets. More consistent progress can be made across countries by sharing national situations and national experiences.

The country presentations at the Webinar will provide experiences from seven countries and the moderated discussion may bring more country examples to light.

#### Question 36: About utility meter data

**Response**: Electricity meter microdata may be the most used by statistical offices as they may be the most nationally representative. The utility meter microdata can be used for many purposes including the identification of new buildings and for making estimates of vacant dwellings and holiday homes. Seasonal peaks in consumption in scenic areas could be used as an input into measuring tourism in areas of high environmental value.

Consumption size class analyses could be used to identify groups where more policy intervention may be needed if climate goal targets are to be met without leaving anyone behind.

In some countries it may be possible to combine electricity, gas, and water microdata at household level. This could provide information on the environmental resource demand at dwelling level and how it varies across socio-economic groups. Reducing peak demand can result in avoiding having to build new power stations and water treatment plants.

#### 4. Use for energy statistics

### Question 37: What are the methods and areas for the use of administrative records in energy statistics?

**Response**: There are many possible uses of the selected datasets for energy statistics:

- The utility microdata can provide both total metered consumption of electricity and natural gas as well as very detailed disaggregations by meter type, consumption period, and geography.
- The time series data can show how customers responded to price changes and periods of extreme temperatures.
- The meter data can be used to quality check business and social surveys that collect related data.
- If the statistical office uses Emissions Trading Scheme returns then the electricity meter readings can be used to insert a figure for electricity consumption if that is not collected in the ETS.
- The customer databases can be used to compile thematic reports e.g. consumption by data centres.
- The microdata can be used as an input into social surveys relating to energy poverty.
- In cooler climates, differences between winter and summer consumption can give an indication of the amount of consumption used for heating.
- Fuel consumption by vehicle and fuel type can be estimated from vehicle odometer readings.

# Question 38: Is administrative microdata used as auxiliary data in SEEA-accounts, in particular Air Emission Accounts and Physical Energy Flow Accounts, and what is the added value?

**Response**: The use being made of the administrative microdata will probably vary from country to country depending on the availability of other data sources. The administrative microdata may be used as an input into the compilation of energy balances which are then used to compile physical energy flow accounts. They may be used for quality checking business energy use survey returns. They can be used to improve the disaggregation by NACE sectors especially in relation to improving the quality of the data for enterprises with very high electricity or gas consumption.

The administrative microdata may be more timely and enable more geographical disaggregation than sample surveys with high non-response rates.

The number of new homes built to the highest energy efficiency standards can be used as an input into compiling statistics on the environmental goods and services sector.

# Question 39: I am particularly interested in building energy performance certificates and vehicle tests data in energy, as I am responsible for compiling Physical Energy Flow Accounts in my country.

**Response**: There is considerable statistical potential in building energy performance certificates. In some countries the results of the audits are available through a central database for researchers e.g. <a href="https://ndber.seai.ie/BERResearchTool/ber/search.aspx">https://ndber.seai.ie/BERResearchTool/ber/search.aspx</a> (around one million records) and <a href="https://epc.opendatacommunities.org/">https://epc.opendatacommunities.org/</a> (around 24 million records).

Combining the energy performance certificates with actual electricity and meter consumption datasets can show how consumption per square metre varies by building energy rating.

The vehicle odometers can be used to calculate annual vehicle kilometres and to estimate fuel consumption and emissions based on the characteristics of the vehicle and whether the owner lives in an urban or rural location. The vehicle road worthiness test collects an extensive amount of information on the vehicle performance. The utility data can be used to improve surveys that are inputs into the PEFA module.

### Question 40: How has the use of administrative microdata improved sectoral consumption statistics?

**Response**: If the utility meter microdata customer databases can be integrated with business registers, then much more detailed sectoral statistics would become available e.g. a more detailed breakdown of the Services sector. The utility companies may be using different tariff structures for high and low consumption customers and this categorisation can make it easier to identify households e.g. lower voltage connections.

It may be possible to use the utility meter data with electricity and gas consumer prices for personal consumption and expenditure statistics in National Accounts e.g. <a href="https://www.cso.ie/en/statistics/energy/trendsinmeteredelectricityandgasbills/">https://www.cso.ie/en/statistics/energy/trendsinmeteredelectricityandgasbills/</a>

### Question 41: Use of utilities (measured, metering etc.) data in national GHG inventory for Energy sector?

**Response**: Energy balances are an important input into the GHG emission inventories. The energy balances are typically compiled by energy agencies using a mixture of top-down and small surveys methods to distribute the data by sector. Statistical offices can use the administrative microdata as an input into compiling bottom-up estimates that use a business register to weight the data as necessary. Improving the consistency of the top-down and bottom-up estimates will improve the usability of energy survey results for compiling the energy balance.

#### Question 42: Use in Renewable Energy Share statistics?

**Response**: Electricity can be generated from various fuels. It may be possible to combine statistics on the fuels used to generate electricity each day with daily consumption data for the largest customers. This could allow the proportion of electricity made from renewable sources to be calculated over an annual period.

#### Question 43: Collection of data on non-energy use of products?

**Response**: The enterprise names in the utility company customer database may make it possible to identify companies that are using gas for non-energy purposes, e.g. as a feedstock for ammonia and fertilizer production. The company may be using gas for other purposes also but a combination of the business sector of the company and the gas consumption levels could be a basis for surveying companies for non-energy use of gas.

#### Question 44: Questions related to air emission accounts compiling?

**Response**: The microdata can be used to improve the quality of energy statistics enterprise surveys. The results of these surveys may be used to compile air emission accounts e.g. NACE disaggregation by fuel.

Odometer microdata can be used to improve estimates of road transport emissions.

Building energy ratings audits could be used to collect information on the use of secondary heating fuels in households.

Question 45: Statistics Finland is currently working to base household energy consumption and the coming energy consumption statistics on this type of microdata. From our perspective the following questions are interesting: 1) the use of non-probability samples in official statistics - if this is too a technical subject, one could discuss the risks of using non-probability samples; 2) problems of using the operative market register like electricity datahub - by now we've established that linking is not straight forward.

**Response**: The electricity and gas meter microdata can provide important information for household energy consumption statistics. There may be variables within the microdata file that enable households to be identified separately from small businesses and farms. For example, the utility companies may have classified each meter into a tariff category based on expected consumption with households and small businesses separated from customers that need a higher voltage supply.

The utility companies may have identified customers including households that are exporting electricity to the grid.

The meter data can be used as a longitudinal file to examine long-term consumption trends at customer level (taking into account that the occupants may change). Such analyses could be linked with daily meteorological readings to examine the impact of climate change on household energy consumption.

The utility microdata become much more useful if they include unique identifiers such as property and enterprise identifiers. This would create the possibility of treating them as administrative data samples that could be weighted using national statistical registers. The number of households in the utility files offer an opportunity to compile consumption size class tables and to compare median and mean consumption etc.

Ideally national statistical offices would obtain customised microdata files from the utility companies rather than using a research data hub that may not contain the full customer details.

#### Question 46: How do we calculate emission when there is limited data?

**Response**: If there are limited statistical data sources available then it is worthwhile undertaking a detailed study to document the availability of administrative microdata in public authorities and in government departments. Company reports and environment regulatory reports may be useful data sources at company level.

The national statistical office could take a proactive role by undertaking an inventory of policy needs and data sources at public and local authority level.

### 5. Use for social and climate change statistics

Question 47: Administrative microdata linked with socio-demographic surveys to produce new innovative environment-related statistics? To measure leave no one behind such as differences by household type in energy and water poverty issues (access and affordability)?

**Response**: This is one of the most interesting and innovative potential uses of environment-related administrative microdata. There are two main options in relation to combining the administrative microdata with survey data. The presence of a unique identifier in the utility microdata may make the data matching process reasonably straightforward. An alternative approach would be to collect the unique identifiers (meter point reference number, vehicle registration number) as part of business and household surveys so that the survey can be combined with the administrative microdata.

Administrative microdata may have far more coverage than what could be collected using a sample survey hence it could be disaggregated into more useful segments such as persons living in poorer communities and elderly persons living alone. Households that consume far less electricity or gas than the median consumption could provide insights into energy poverty or into their use of alternative fuels such as coal and wood.

The transition to electric vehicles may differ depending on whether the vehicle owner lives in an urban or rural area. Similarly rural households may not have the same heating fuel options as urban households. Hence having geo-coordinates in the administrative microdata or being able to use unique identifiers to add them to the microdata would provide additional statistical value.

The scope to improve the energy efficiency of an old house may depend on the financial situation of the owner and on whether the dwelling is rented or owner-occupied. Being able to combine administrative and survey microdata can provide a broader understanding of the socio-economic circumstances of households.

### Question 48: What is the availability of gender data or sex disaggregated data on climate change? How can we strengthen availability of these statistics?

**Response**: The selected datasets can be analysed at household level more than at person level. If the datasets contain a unique household identifier then they could be linked with socio-demographic data such as Census of Population datasets. Census data contains information on household composition which could be used to introduce a gender dimension e.g. lone parent households.

Households that decrease their electricity and gas consumption when prices rise may not be able to afford to keep themselves adequately warm. Longitudinal analyses could be undertaken of trends in consumption at meter level and trends in energy prices for households.

### Question 49: I am studying how climate change affects people's well-being. I am interested in knowing what kind of information is available?

**Response**: Extreme weather can affect people's health particularly their breathing and result in short-term hospital stays for persons who are unable to keep their homes adequately warm or cool. Mortality risk can increase in very hot weather. Excess winter and summer mortality can be analysed by examining a combination of meteorological and cause of death data. Building energy ratings, income and living condition surveys, and energy costs could be combined to produce estimates of the proportion of households in energy poverty.

#### Question 50: Examples of climate change administrative microdata?

**Response**: Energy performance certificates and vehicle odometer readings can provide information on trends affecting climate change. The administrative microdata can show trends towards using electric vehicles and heat pumps.

The microdata can be used to analyse the drivers underlying emissions and to identify sectors that are responding more slowly to climate change concerns. Affordability may be the main problem preventing households changing to electric vehicles or improving the energy efficiency of their dwelling. Combining the administrative microdata with sociodemographic microdata can enable policy-makers to have a more nuanced understanding of the progress being made towards reducing carbon emissions.