



An Phríomh-Oifig Staidrimh
Central Statistics Office

Matching Gas Consumption Microdata with Statistical Data using GIS

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Overview

- Legal basis
- Main outcome (new statistical release)
- Adding value through data matching (Census of Population, Fuel poverty, Building Energy Ratings, Business Register)
- SDGs and geography
- Further geocoding opportunities
- Conclusions



CSO Access to GNI Meter Data

- Networked gas distribution system is operated by Gas Networks Ireland
- CSO issued data access request under the Statistics Act, 1993
 - - Energy Consumption of Households Regulation (EU) No 431/2014
 - - Non-domestic final energy consumption by NACE (Regulation 538/2014)
- Quarterly consumption data for dwellings and smaller non-domestic customers and monthly data for large non-domestic customers
- File had X/Y coordinates from Ordnance Survey Ireland / An Post GeoDirectory file (register of all postal addresses in Ireland)



Gas Meter Statistical Release

- <http://www.cso.ie/en/releasesandpublications/er/ngc/networkedgasconsumption2016/>
- Annual and quarterly trends
- Detailed geography (county and Dublin postal districts)
- Difference in Winter and Summer median domestic use approximates with central heating consumption
- Low seasonality may indicate use of other fuels for heating
- Low usage may indicate fuel poverty or higher energy efficiency dwelling
- Allow for price changes and temperature variations

Networked Gas Consumption

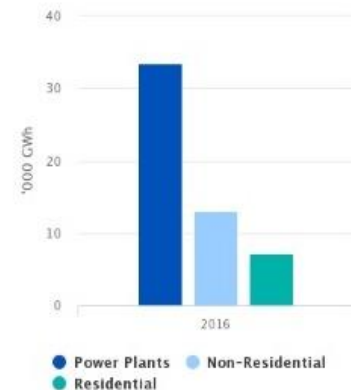
2016

Residential Sector

Year	% of row				Gigawatt hours
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	
2011	53	20	8	19	8,012
2012	42	26	8	25	7,713
2013	45	30	6	19	7,752
2014	49	24	7	21	6,867
2015	47	25	8	21	7,262
2016	43	28	6	23	7,175

January-March accounted for 43% of residential gas consumption in 2016

Figure 1: Networked Gas Consumption by Sector 2016 ('000 GWh)



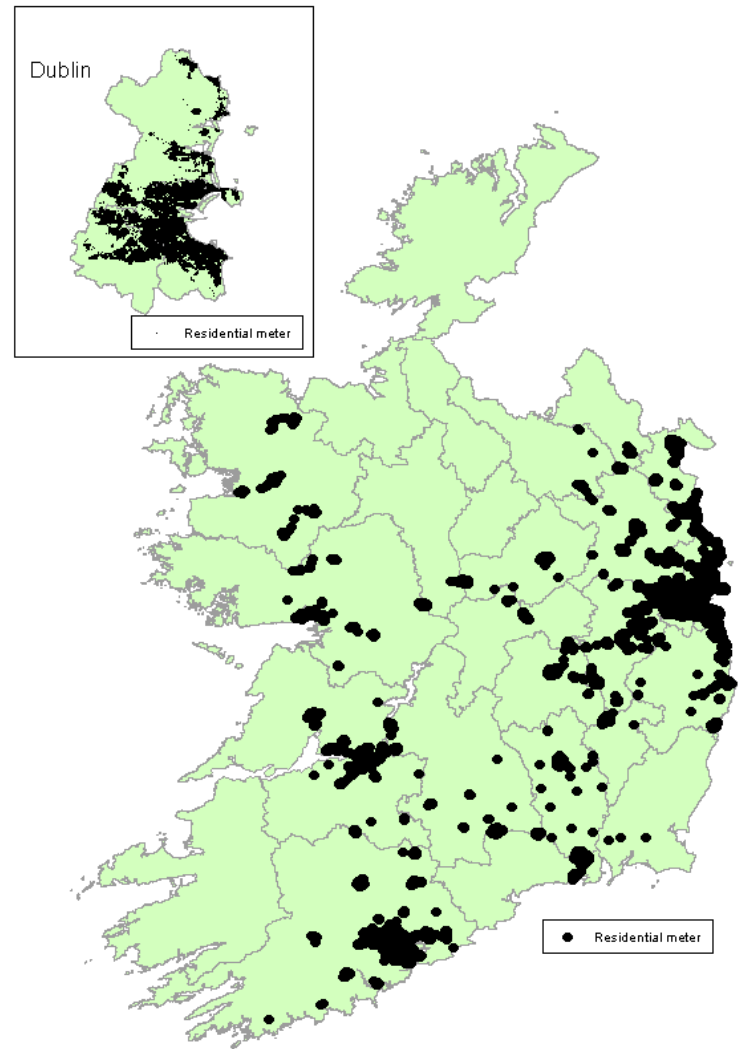
Source: CSO Ireland

There is strong seasonal variation in networked gas consumption by households. The January to March quarter had by far the highest consumption varying from 53% of total residential usage in 2011 to 43% in 2016. In contrast July to September accounted for only 6% of total residential consumption in 2016 (see Headline Table and Table 2D). Consumption was less seasonal in other sectors with the third quarter of 2016 accounting for 27% of total usage by power plants and for 20% in the non-residential sector (see Tables 2B and 2C).

Power plants accounted for 62% of total networked gas consumption in 2016 compared with 24% by the non-residential sector and 13% by the residential sector (see Table 1 and Figure 1). This pattern was broadly similar in 2011 to 2015.



Location of Residential Meters





Selected Dublin Postal Districts Consumption

	<i>Median kilowatt hours</i>					
Dublin Postal District	2011	2012	2013	2014	2015	2016
Dublin 7	12,567	10,897	11,363	9,616	10,136	10,105
Dublin 8	8,554	8,550	7,471	7,316	7,540	7,476
Dublin 9	11,616	11,893	12,298	10,425	11,058	10,774
Dublin 10	11,857	11,764	10,864	9,679	9,749	8,718
Dublin 11	12,392	11,567	11,412	9,803	10,347	10,167
Dublin 12	12,205	12,568	10,928	9,005	10,830	10,337
All Dublin Postal Districts	12,137	11,778	11,595	10,038	10,548	10,377



Matching with Census of Population

- X/Y coordinates direct link to Census of Population
- Census questions influencing energy consumption:
 - Type and age of dwelling
 - Socio-economic characteristics of household: number of persons; working; unemployed; age; health status
 - Number of rooms
 - Tenure status (owned or rented)



Census Research

- Does consumption vary by socio-economic status of household?
- Is disability status a factor?
- Influence of number of persons?
- Does consumption vary by age, type, and size of dwelling?

- Solid fuels are more harmful to health and to the environment
- Difference between households using gas central heating and neighbouring households using solid fuel heating?



Building Energy Ratings

- Use Eircode derived from X/Y via GeoDirectory/ECAD to link with domestic Building Energy Ratings (BER) microdata
- Compare actual with modelled gas consumption in BER
- Examine consumption differences in similar type and age dwellings that have different BER ratings e.g. variations in demographic and socio-economic characteristics



Non-Domestic Energy Use

- Lack of data on final energy consumption by NACE sector especially in the services sector
- Non-domestic gas customers could be matched with CSO business register to obtain NACE codes
- Around 28,000 non-domestic GNI customers
- Need for CSO business register to be geocoded to realise its full potential e.g. through link to GeoDirectory



Sustainable Development Goals

Some SDG indicators require geocoded data to identify vulnerable populations at a regional and local level

- **Goal 3:** Good health and well-being
- **Goal 7:** Affordable and clean energy
 - By 2030, ensure universal access to affordable, reliable and modern energy services
- **Goal 12:** Responsible Consumption and Production
 - Rationalise inefficient fossil-fuel subsidies
- **Goal 13:** Climate action



Geocoding Statistical Needs

- Pressure from economic and social activity on ecosystems
- Impact of proximity to border on place of work, place of residence, house prices, fuel sales, population diversity
- Health status and high levels of industrial activity
- Calculate small area carbon footprints
- Water Framework Directive (catchment pressures)
- UNECE and EU require countries to map air pollutants to a $0.1^\circ * 0.1^\circ$ EMEP longitude/latitude grid every four years
- Integrating data through geocoding, e.g. gas, domestic water, and domestic BER files are all coded to Dublin postal district level



Conclusions

- X/Y coordinates can be used to link microdata at building level
- - apartments will have the same X/Y
- Resulting dataset has added analytical value
- National data strategy needs to prioritise geocoding of data
- GeoDirectory and Eircode should underpin new registers
- Geocoded data can be used to check quality of interpreted satellite imagery
- 35% of addresses in Ireland are not unique and not well structured so address matching is not practical