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Metered Electricity Generation

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Presentation Overview

- Reasons for requesting access to electricity generation microdata

- Data source and contents of electricity generation microdata

- Climate and consumption demand influence on electricity generation fuel mix

- Work-in-progress examples of electricity generation microdata

- Conclusions

Reasons for Requesting Access to Metered Electricity Generation Microdata

- The CSO publishes metered electricity consumption microdata, see
  https://www.cso.ie/en/releasesandpublications/ep/p-mec/meteredelectricityconsumption2022/

- Consumption data do not contain information on fuels used to generate the electricity

- Climate Action Plan set an emissions reduction target for electricity generation of 75% in 2030 compared with 2018 levels

- The demand for electricity is expected to increase substantially as we transition towards electric vehicles and heat pumps in energy-efficient buildings

- The generation data are published in real-time in a dashboard format
  https://www.smartgriddashboard.com/#all/generation

- National Statistical Offices can act as a safe repository for important administrative microdata

- Statistics Act, 1993 enables CSO to obtain access to data held by public authorities

At present only a summary monthly excel file by fuel is available to users (see next slide)

2023 Metered Quantities (MWhrs)	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23
Coal	147,183	81,292	125,810	93,601	82,746	99,594
Oil	9,262	49,830	14,929	0	-	-
Peat	38,955	40,168	56,876	54,741	57,294	53,840
Gas	1,238,706	1,154,667	1,294,939	1,289,003	1,421,380	1,358,069
Distillate	1,290	435	797	635	119	3,091
Waste	53,580	38,336	47,494	50,760	55,699	43,995
Wind	1,230,722	1,121,897	1,133,478	977,201	580,238	542,102
Solar	1,909	6,802	15,335	36,659	63,372	55,971
Renewable Hydro	120,934	54,973	81,571	90,658	40,160	7,292
Turlough Hill Generation	24,457	25,206	26,156	24,321	4,847	24,877
Battery Discharging	359	416	751	743	568	573
Other Renewable*	17,843	16,902	18,166	18,706	17,977	11,734
Other Non-Renewable**	1,241	1,157	1,274	1,153	1,519	1,244
Net Generation	2,886,441	2,592,081	2,817,575	2,638,181	2,325,919	2,202,382
Interconnector Imports (EWIC)	98,982	77,083	121,679	100,677	209,633	187,306
North - South Imports	131,357	111,025	132,602	159,950	140,185	137,755
Interconnector Exports (EWIC)	-32,868	-44,121	-29,948	-23,046	-13,049	-4,195
North-South Exports	-24,094	-26,326	-26,393	-17,666	-19,480	-7,505
Turlough Hill Pumping	-38,754	-38,199	-39,215	-35,677	-7,971	-34,837
Battery Charging	-2,970	-2,705	-3,206	-3,550	-3,154	-2,886

Data currently available to users

Data Source and Contents of Electricity Generation Microdata

- The electricity generation microdata are held by the State-owned electric power transmission operator

- They have 15-minute and 30-minute data at generation unit level back to 2016

- Fuels used to generate metered electricity: Battery storage; Biomass/Peat; Coal; Distillate; Gas; Hydro; Oil; Solar; Pumped hydro-storage; Waste; Wind; and other renewable and non-renewable sources

- 15-minute and 30-minute time periods will mirror metered electricity consumption when it becomes available through Smart Meters

- Each generation plant is assigned to a primary fuel but additional data would be needed for plants that use a mix of primary and secondary fuels

- 15-minute data on electricity imports and exports were provided to us

- Electricity consumption to charge batteries and pump water were provided to us

Climate and Consumption Influences on Electricity Generation Fuel Mix

- Link between meteorological conditions and fuel mix used to generate electricity

- Amount of electricity generated from gas and wind often move in opposite directions

- Electricity produced by solar farms reflects day length and sunshine hours

- River flow levels influence the amount of hydro-generated electricity

- In heatwaves, electricity demand for cooling may be observable (not for Ireland!)

- A higher proportion of fossil fuels is used to meet peak demand

- Off-peak Smart Meter tariffs can reduce peak demand which could increase the proportion of electricity generated from renewable energy sources

- Imports could be used to reduce territorial emissions if a higher proportion of the imported electricity is from renewables (or even if it wasn't!)

Our lifestyles are visible in the microdata (breakfast, evening meal, bedtime)

Percentage of Metered Electricity Generation for Gas, Wind, Waste and Solar by Time Period June 2023
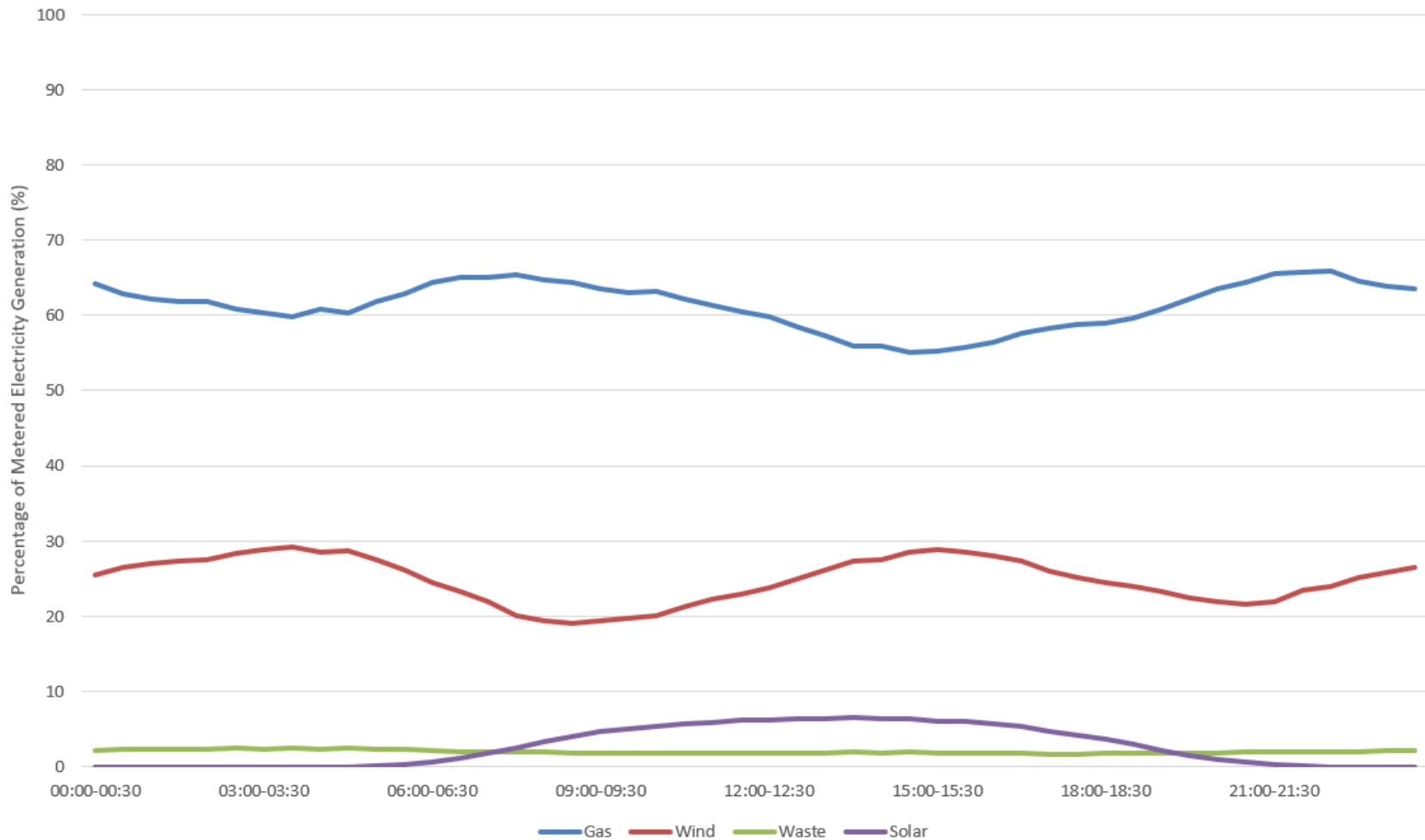
Table 4A: Metered Electricity Generation for All Fuels by Time Period and Month

mwh

Time Period	January	February	March	April	May	June	All
19:30-20:00	67,738	61,460	66,499	58,398	54,437	51,260	359,792
20:00-20:30	65,742	60,193	65,314	57,612	54,023	50,540	353,423
20:30-21:00	63,388	58,090	62,982	57,096	53,223	49,445	344,224
21:00-21:30	62,336	56,894	61,492	56,822	53,513	48,805	339,862
21:30-22:00	59,087	53,942	58,222	53,533	52,279	47,133	324,196
22:00-22:30	56,923	52,006	56,441	51,845	51,119	46,926	315,261
22:30-23:00	53,656	49,300	53,262	48,350	47,215	44,876	296,661
23:00-23:30	53,148	48,563	52,653	46,348	45,009	43,722	289,441
23:30-24:00	51,562	47,262	51,427	45,347	43,474	42,680	281,754

mwh for 2023, Solar

Solar	January	February	March	April	May	June	All
04:30-05:00	.	.	.	.	.	0	0
05:00-05:30	.	.	.	.	5	30	36
05:30-06:00	.	.	.	0	52	126	178
06:00-06:30	.	.	0	6	164	279	449
06:30-07:00	.	.	13	47	364	499	923
07:00-07:30	.	0	72	143	661	808	1,685
07:30-08:00	0	11	189	319	1,005	1,155	2,679
08:00-08:30	1	66	327	569	1,445	1,570	3,978
08:30-09:00	18	169	461	836	1,908	1,985	5,377
09:00-09:30	64	304	623	1,155	2,253	2,267	6,667
09:30-10:00	128	439	780	1,411	2,556	2,465	7,780
10:00-10:30	201	561	860	1,593	2,810	2,646	8,670
10:30-11:00	268	674	941	1,718	2,965	2,799	9,364

Table 5C Metered Electricity Generation for Wind by Time Period and Day June 2023 (MWh)

Wind	1	2	3	4	5	6	7	8
00:00-00:30	310	346	173	155	226	212	226	622
00:30-01:00	314	354	164	146	215	206	230	647
01:00-01:30	301	361	149	133	208	190	216	645
01:30-02:00	261	365	141	131	200	181	203	654
02:00-02:30	243	358	124	131	180	178	187	676
02:30-03:00	239	349	109	111	156	180	190	689
03:00-03:30	225	340	99	101	146	178	201	730
03:30-04:00	218	323	98	101	142	172	224	736
04:00-04:30	217	318	89	104	140	153	240	742
04:30-05:00	206	317	81	111	128	135	240	752

Conclusions

- CSO has around 75 million records but are still receiving some 2016-2018 data and some other missing data and doing data quality checking. We will publish first monthly release for July 2023 in September or October.

- Emissions are more related to electricity generation than to electricity consumption

- Electricity generation microdata by fuel in short time period intervals should be available in many countries as it is a basis for making payments to generators

- Short interval time periods should mirror Smart Meter electricity consumption

- The data can provide a basis for setting off-peak tariff rates to lower emissions by flattening peak demand

- The proportion of electricity generated from renewable energy sources can be calculated

- The data are very timely

- National Statistical Offices can ensure that the historical electricity generation microdata are available in the future for statistical purposes by obtaining a copy of it now