



Comprehensive Assessment of the Potential for Efficient Heating and Cooling

Report for Point D Forecast of Demand Trends for Heating and
Cooling Over the Next 30 Years

Report for Ministry of Energy Commerce and Industry (MECI) of the
Republic of Cyprus

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1 Introduction

Annex X of the Energy Efficiency Directive (EU) 2023/1791 requires that the comprehensive assessment of national heating and cooling potentials includes a forecast of trends in the demand for heating and cooling to maintain a perspective for the next 30 years. It goes on to say that the projections should particularly take into account projections for the next 10 years, the change in demand in buildings and industry and the impact of policies and strategies related to heating and cooling.

Pursuant to this requirement, we have used the “With Existing Measures” (WEM) projection of Final Energy Demand (FED) for heating and cooling set out in the 2023 National Energy and Carbon Plan (NECP) and the NECP modelling¹. As required by Annex X, these projections have factored in the anticipated impact of policies, measures and strategies on the demand for heating and cooling out to 2050.

We have made projections of the effect of this FED on Primary Energy Supply (PES) for heating and cooling using projections of fuel splits, including projections for primary energy supply to electricity generation for the same period. This has allowed us to associate primary energy with the final electricity used for the generation of heating and cooling. This gives a full picture of the primary energy inputs to meet heating and cooling demand and helps inform any security of supply issues which might arise in the future.

Finally, using the aforementioned FED fuel split and projections of the fuel split into electricity generation, including the considerable near-term shift from oil to natural gas for electricity generation and the near and long term shift to renewable electricity, we have been able to project the CO_{2e} emissions associated with the heating and cooling demand out to 2050.

In the sections below we present these projections, first for the whole economy and then by sector.

¹ Modelling provided by MECI: ‘BAU - WEM - WAM - WAM high - scenario comparison – 20240426’

2 Projection of Final Energy Demand, Primary Energy Supply and Carbon Emissions

Table 1 and Figure 1 below shows the WEM scenario projected final energy demands by energy type from 2022 to 2050 based on trends shown in the 2023 National Energy and Carbon Plan (NECP), in relation to the demands calculated for 2022 under Point A of the current work. The forecast trend from the NECP has been applied for all fuel types with the exception of DHC, for which the actual NECP figures are applied. This is the methodology for projection of heating and cooling across the whole economy.

It should be noted that ambient heat has not been included within these projections as recommended in the EU directive.

The equivalent data for primary energy supply are presented in Table 2 and Figure 2, and for carbon emissions in Table 3 and Figure 3 – again for the whole economy. These have also been determined from NECP projections applied to situation in 2022 as determined under Point A. The emissions factor for delivered electricity has been determined from the projected WEM fuel mix for each year and is also shown in Table 3. (Note – we have assumed that the forecast fuel mix for electricity beyond 2035 is consistent with the projections estimated in the 2021 report).

Indices for the three parameters are shown together for comparison in Figure 4.

Figure 5 to

Figure 7 give the projections for FED, PES and CO_{2e} emissions, respectively, associated with the residential, service, industry and agriculture sectors.

Table 2-1 Final energy demand (FED) of the heating and cooling sector (PJ) – WEM scenario

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	2045	2050
Electricity	7.03	7.18	7.37	7.52	7.71	7.91	8.12	8.34	8.47	8.53	8.58	8.63	8.69
Heating oil/ Light fuel oil/ Gas oil/ Diesel	8.59	8.76	9.14	9.46	9.54	9.59	9.59	9.52	9.40	9.23	9.06	8.90	9.74
Pet Coke	0.50	0.51	0.55	0.58	0.60	0.53	0.67	0.70	0.73	0.70	0.67	0.64	0.62
LPG	1.57	1.64	1.75	1.86	1.90	1.93	1.96	1.97	1.97	1.97	1.97	1.96	1.96
Biomass	2.56	2.53	2.54	2.55	2.53	2.55	2.57	2.59	2.60	2.54	2.48	2.43	2.37
Solar	3.13	3.37	3.64	3.91	4.03	4.13	4.26	4.39	4.48	4.52	4.56	4.60	4.64
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District Heating and Cooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.26	0.26	0.26	0.26
Non- renewable waste	1.73	1.54	1.27	0.98	0.74	0.54	0.39	0.29	0.22	0.22	0.22	0.22	0.22
Total	25.9	25.53	26.25	26.86	27.06	27.19	27.55	28.06	28.13	27.96	27.80	27.65	27.50
RES share	41.6%	42.00%	42.20%	42.50%	42.90%	43.20%	43.60%	44.70%	45.20%	44.60%	50.30%	56.10%	62.00%
FED index (2022 = 100)	100.00	101.73	104.61	107.04	107.85	108.34	109.77	111.83	112.09	111.43	110.79	110.17	109.58

Derived from: Point A and Table 5.2 of the NECP

Figure 1 Final energy demand (FED) of the heating and cooling sector (PJ) – WEM scenario

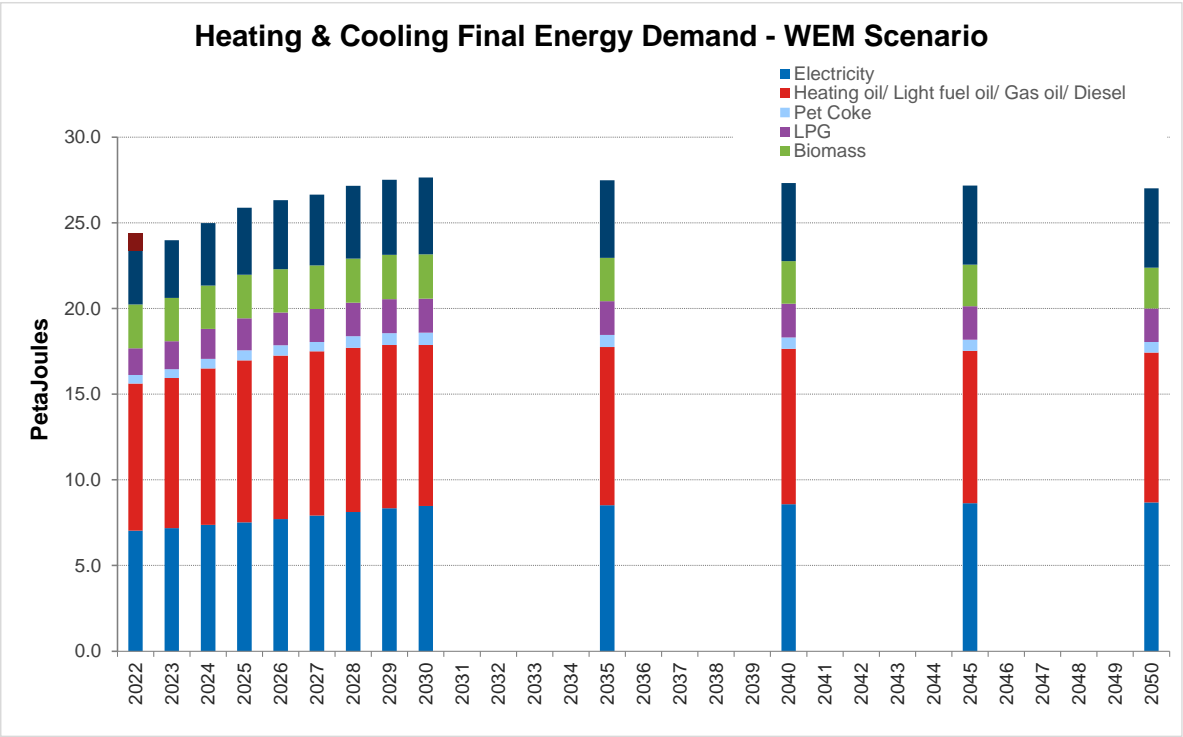


Table 2-2 Primary energy supply (PES) for the heating and cooling sector (PJ) – WEM scenario

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	2045	2050
Electricity	16.82	16.75	15.26	14.01	14.41	14.76	15.02	15.40	15.75	13.45	12.19	11.60	11.12
Heating oil/ Light fuel oil/ Gas oil/ Diesel	8.59	8.76	9.14	9.46	9.54	9.59	9.59	9.52	9.40	9.23	9.06	8.90	8.74
Pet Coke	0.50	0.51	0.55	0.58	0.60	0.53	0.67	0.70	0.73	0.70	0.67	0.64	0.62
LPG	1.57	1.64	1.75	1.86	1.90	1.93	1.96	1.97	1.97	1.97	1.97	1.96	1.96
Biomass	2.56	2.53	2.54	2.55	2.53	2.55	2.57	2.59	2.60	2.54	2.48	2.43	2.37
Solar	3.13	3.37	3.64	3.91	4.03	4.13	4.26	4.39	4.48	4.52	4.56	4.60	4.64
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
District Heating and Cooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.26	0.26	0.26	0.26
Non- renewable waste	1.73	1.54	1.27	0.98	0.74	0.54	0.39	0.29	0.22	0.22	0.22	0.22	0.22
Total	34.89	35.10	34.14	33.34	33.76	34.03	34.44	35.12	35.41	32.88	31.41	30.61	29.93
PES index (2022 = 100)	100.00	100.59	97.86	95.57	96.77	97.54	98.72	100.66	101.49	94.25	90.04	87.73	85.80

Derived from: Point A and Tables 15, 16, 55 and 56 of the NECP Impact Assessment Deliverable 5

Figure 2 Primary energy supply (PES) for the heating and cooling sector (PJ) – WEM scenario

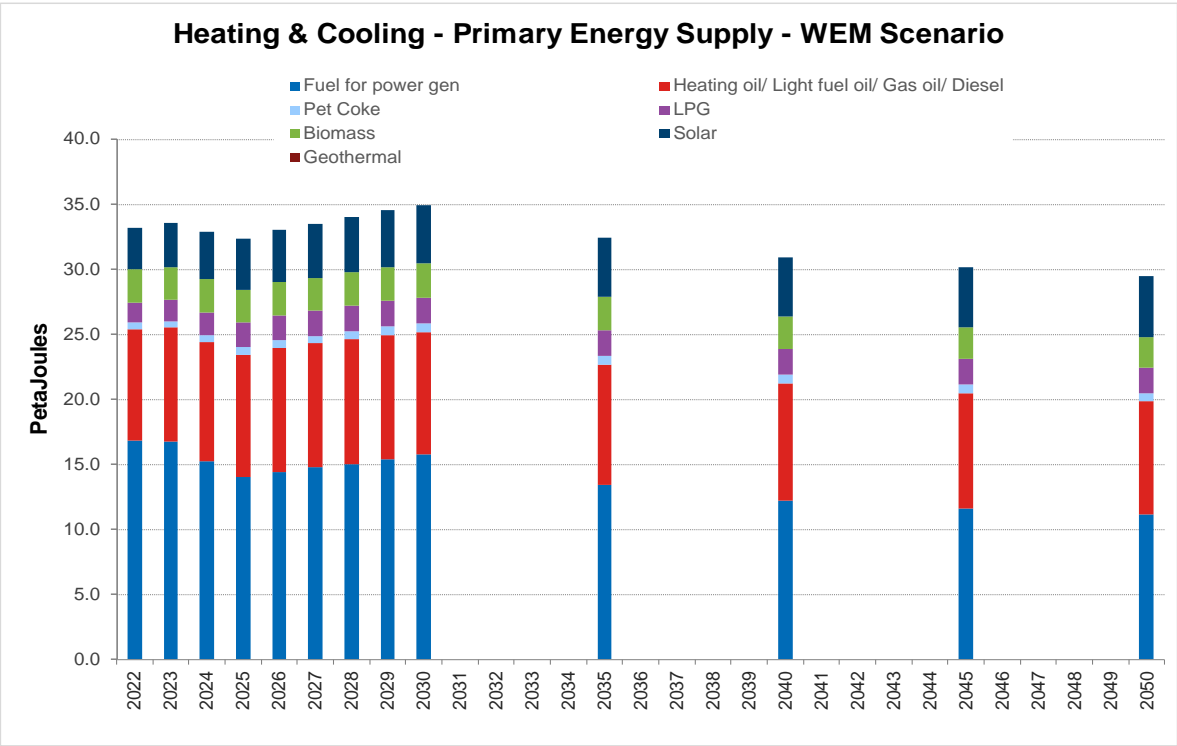


Table 2-3 Carbon dioxide equivalent emissions for the heating and cooling sector (ktCO_{2e}) – WEM scenario²

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	2045	2050
All fuels ³	2,277	2,248	1,949	1,778	1,770	1,771	1,786	1,780	1,778	1,494	1,330	1,239	1,162
CO _{2e} emissions index (2022 = 100)	100.00	98.71	85.59	78.07	77.71	77.77	78.43	78.17	78.09	65.61	58.41	54.40	51.03
CO _{2e} emissions factor for delivered electricity (tCO _{2e} /PJ) ⁴	174,060	165,821	118,528	91,561	89,230	89,028	87,998	85,791	85,552	53,906	36,596	27,898	20,898

² Based on Net Calorific Values

³ District Heating and Cooling is a new fuel type, not present in the 2021 report. The current Point F report only recommends DHC where recovering heat from Dhekelia Power Station, postcode 7502. This is recovering waste heat directly off the engines, which is currently being wasted, thus the Carbon Factor for this heat is assumed to be approximately 0.

⁴ Biomass/Biofuels for power generation in future years are assumed to have same mix and thus Carbon Factor as in 2022. At present only biogas is used for power within the current biofuel category, and this is assumed to be consistent in the carbon projection.

Figure 3 Carbon dioxide equivalent emissions for the heating and cooling sector (ktCO_{2e}) – WEM scenario

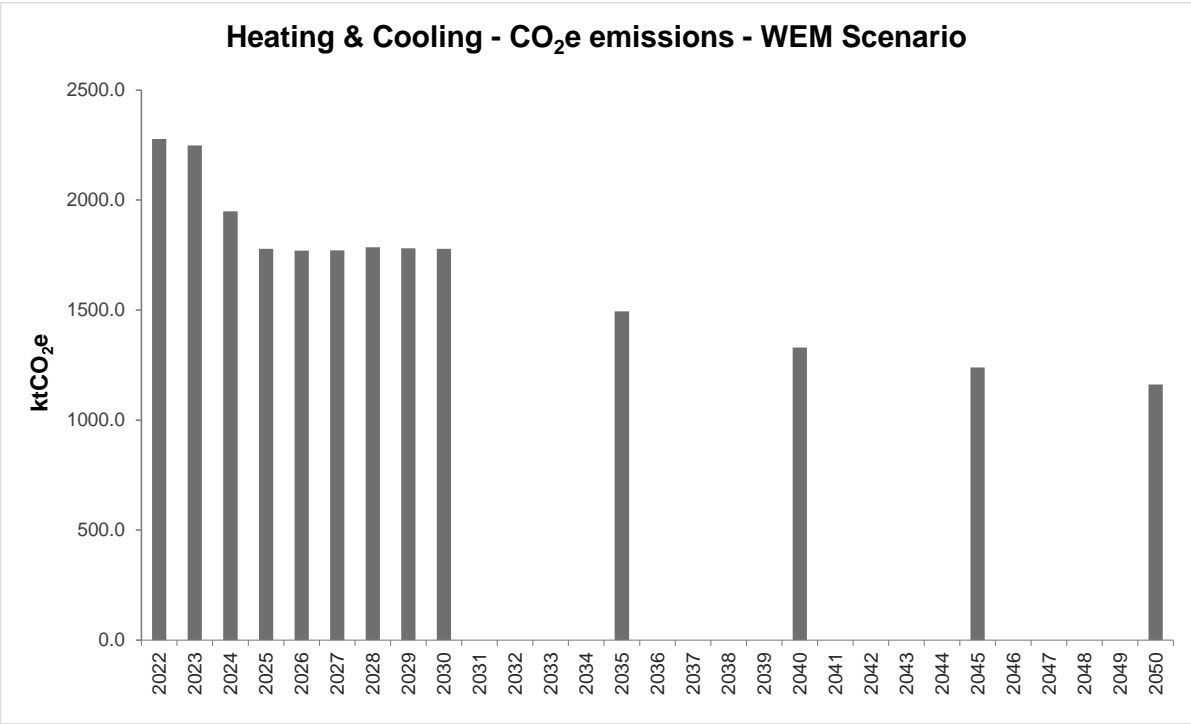


Figure 4 Carbon dioxide equivalent emissions for the heating and cooling sector (ktCO_{2e}) – WEM scenario

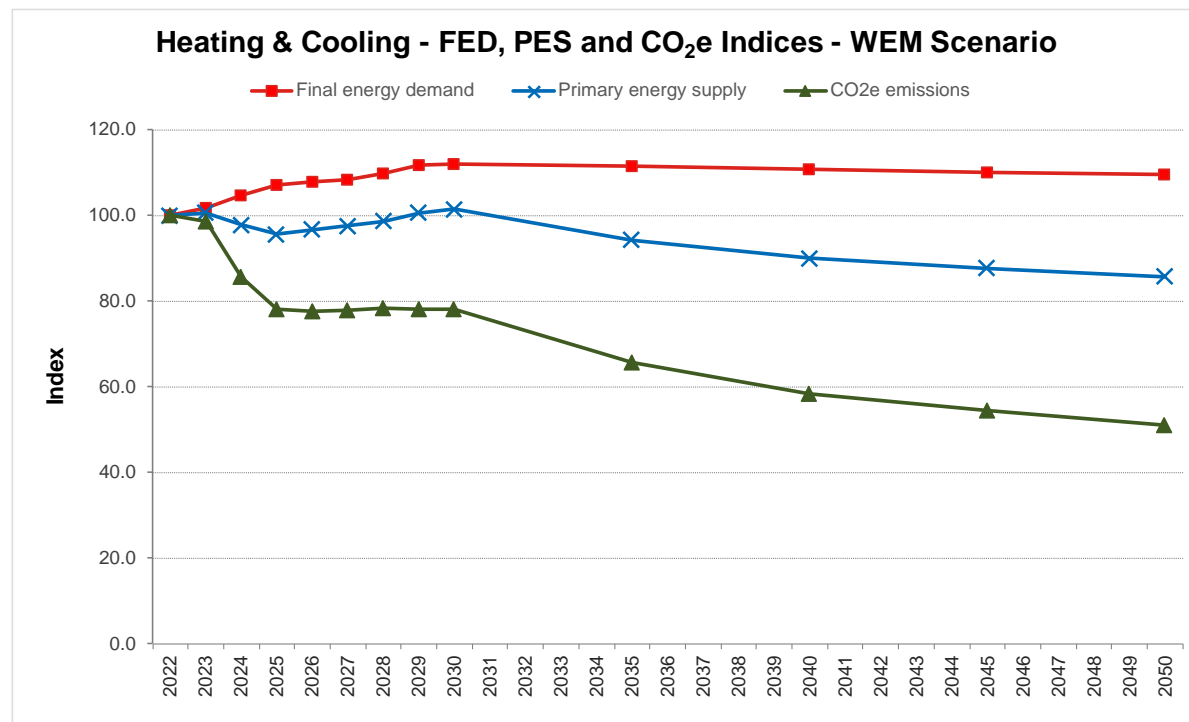


Figure 5 Sectoral (FED) of the heating and cooling sector (PJ) – WEM scenario

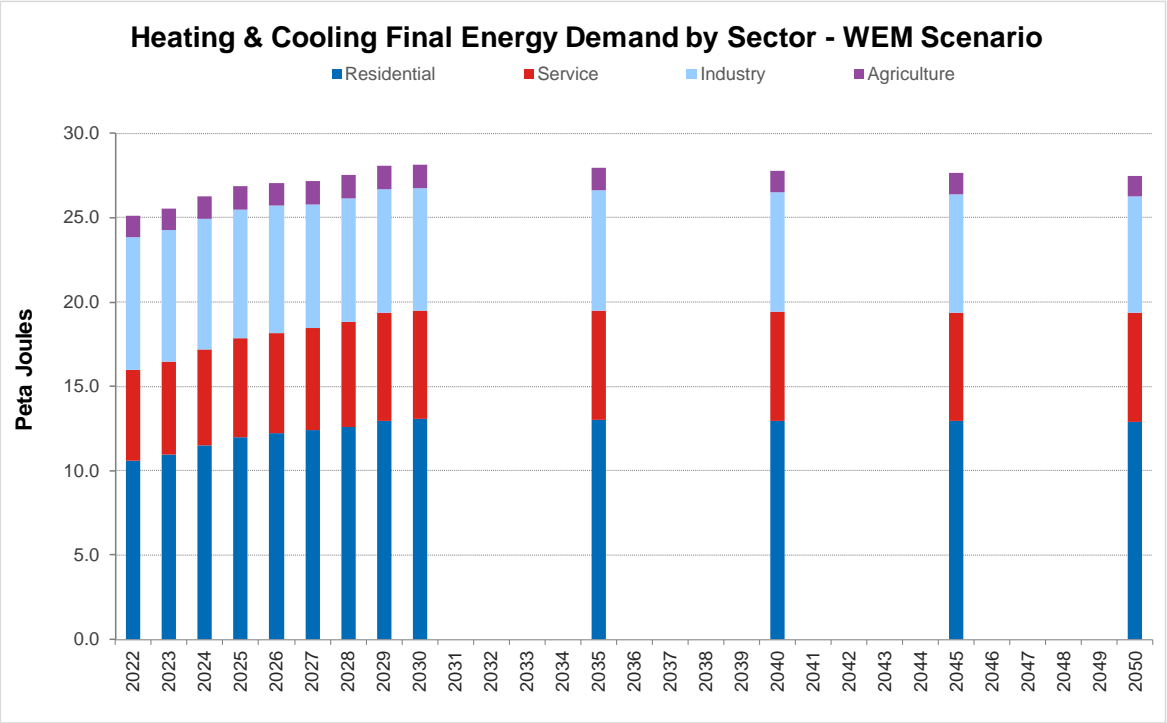


Figure 6 Sectoral (PES) for the heating and cooling sector (PJ) – WEM scenario

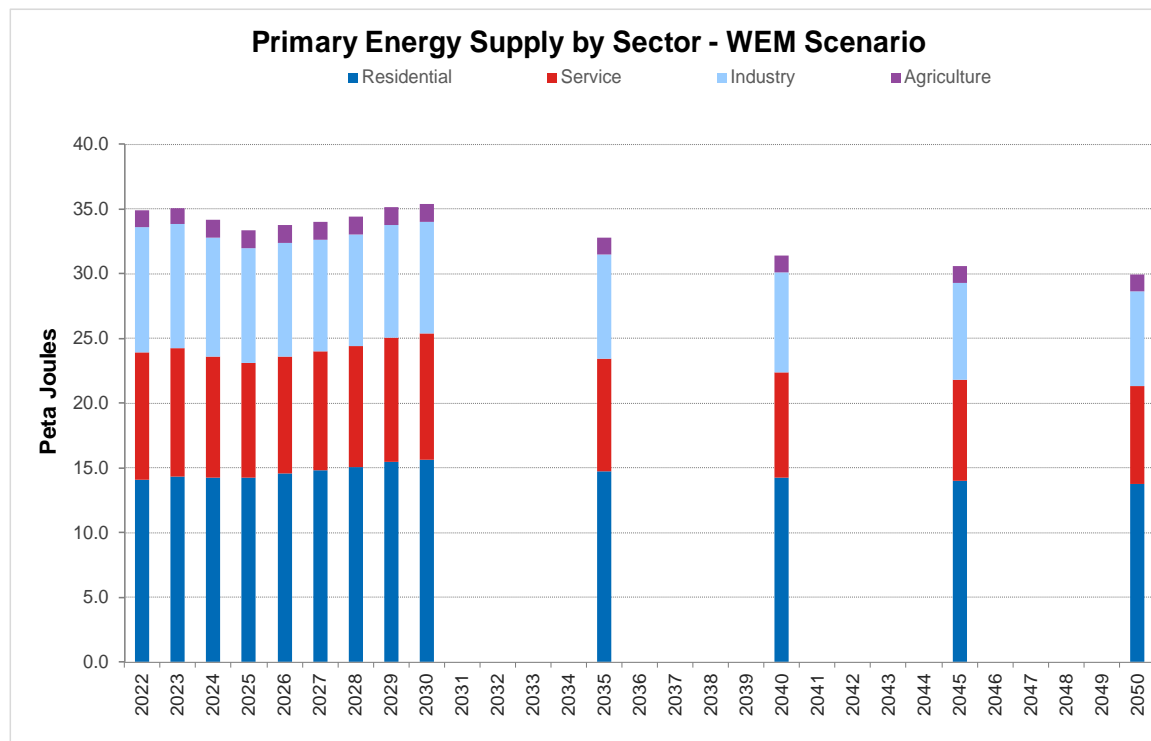


Figure 7 Sectoral carbon dioxide equivalent emissions for the heating and cooling sector (ktCO_{2e}) – WEM scenario

