London Borough of Islington

Energy Evidence Base

2020 Addendum

Etude

June 2020

1.0 INTRODUCTION

This addendum provides an update to the Islington **Energy Evidence Base** report prepared by Etude in 2017 and is based on new data and information available in 2020.

Environmental policy has continued to strengthen since publication of the **Energy Evidence Base 2017**. This has been reinforced by a considerable increase in interest from the public, notably including the School strike for climate youth movement and Extinction Rebellion protests in the UK and internationally.

At the national level, the Climate Change Act 2008 has been amended in 2019[1]: the legally binding target to reduce greenhouse gas (GHG) emissions set in section 1 of the Act 2008 is now **Net Zero**. National and local planning policy has a key role to play in tackling Climate Change. Nationally this has been reflected in updates to the National Planning Policy Framework (NPPF). Government policy is supported by key evidence published by the Committee on Climate Change, most notably:

- Net Zero – The UK's contribution to stopping global warming (2019)
- UK Housing – Fit for the future? (2019)

At the local level, 1,490 local jurisdictions including district, county, unitary and metropolitan Councils and 8 combined authorities/city regions have now declared a Climate Emergency and are acting to reduce carbon emissions in their area towards Net Zero. This includes Islington Council, which declared a climate emergency in June 2019 and pledged to work towards net zero carbon emissions from the borough by 2030.

Islington planning policy is looking to contribute to net zero carbon emissions from buildings in the borough by 2030 through ensuring all new buildings are net zero carbon. This addendum adds further analysis and context to the carbon emissions from the London Borough of Islington with this ambition in mind. The **Energy Evidence Base (2017)** showed reductions to 2050; this is maintained but with an accelerated trajectory to 2030 now also included.

Section 2.0 provides an update of the forecast of carbon emissions underpinning the **Energy Evidence Base (2017)**. A revised carbon model has been developed by Etude in 2020.

[1] The Climate Change Act 2008 (2050 Target Amendment) Order 2019 - SI 2019/1056 - came into force on 27 June 2019.

2.0 UPDATE TO THE FORECAST OF CARBON EMISSIONS

The Islington **Energy Evidence Base (2017)** provided a forecast for future energy consumption and carbon emissions based on subnational meter data for gas and electricity, and a bottom-up analysis of the potential reduction for buildings. At the time this was considered a good indicator as 84% of Islington's 2016 emissions reported by BEIS was from domestic and commercial electricity and gas consumption in buildings. The data availability for housing in particular meant that an approximation of potential improvements could be estimated relatively easily.

In this update we are providing analysis of the carbon emissions from all sectors and an updated categorisation. This includes emissions not included in BEIS reported fuel consumption for local authorities: Islington's share of greenhouse gas emissions from waste, aviation, national industry, and refrigerant leakage. These have been estimated from national emissions data by the CCC and portioned to Islington based on proportion of population.

The sectors have been categorised by the 'cause' of emissions (rather than the 'source') in line with the Committee on Climate Change approach to national emissions reporting. This gives a more usable analysis to target reducing emissions than the Greenhouse Gas reporting protocol, and aligns the reported emissions with those that have the power and therefore responsibility to affect them.

2.1 Comparison with Vision 2030: Creating a Net Zero Carbon Islington by 2030.

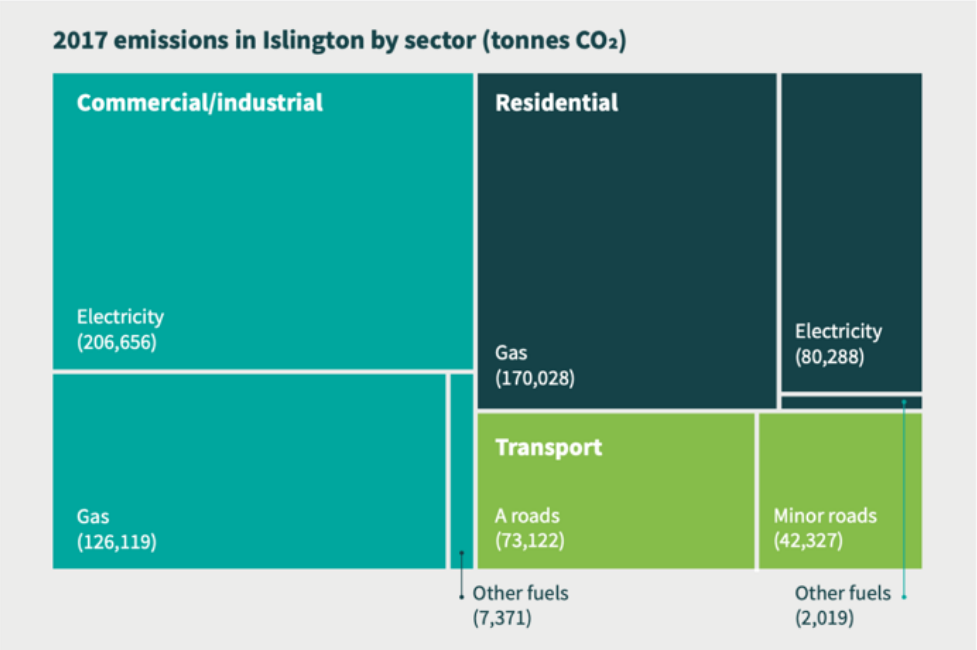
The Islington Council report: ***Vision 2030: Creating a Net Zero Carbon Islington by 2030*** shows the total emissions in the borough from local authority and regional carbon dioxide emissions national statistics published by BEIS.

This is the same data used in the **Energy Evidence Base (2017)**, however we have used a different categorisation to help the Council understand where policy efforts should be placed.

It should also be noted that the BEIS statistics are based wholly on meter data, and that the breakdown of sectors (domestic/commercial) is based on consumption thresholds, not property information. Gas meters are considered domestic if they have a consumption lower than 73,200kWh/year, for electricity meters a consumption lower than 100,000kWh[2] is assumed as domestic. This means a number of smaller commercial/industrial consumers are categorised as domestic, and larger domestic consumers (for example communal heating systems metered centrally) could be included as commercial. Therefore, some ambiguity over the exact share of emissions exists.

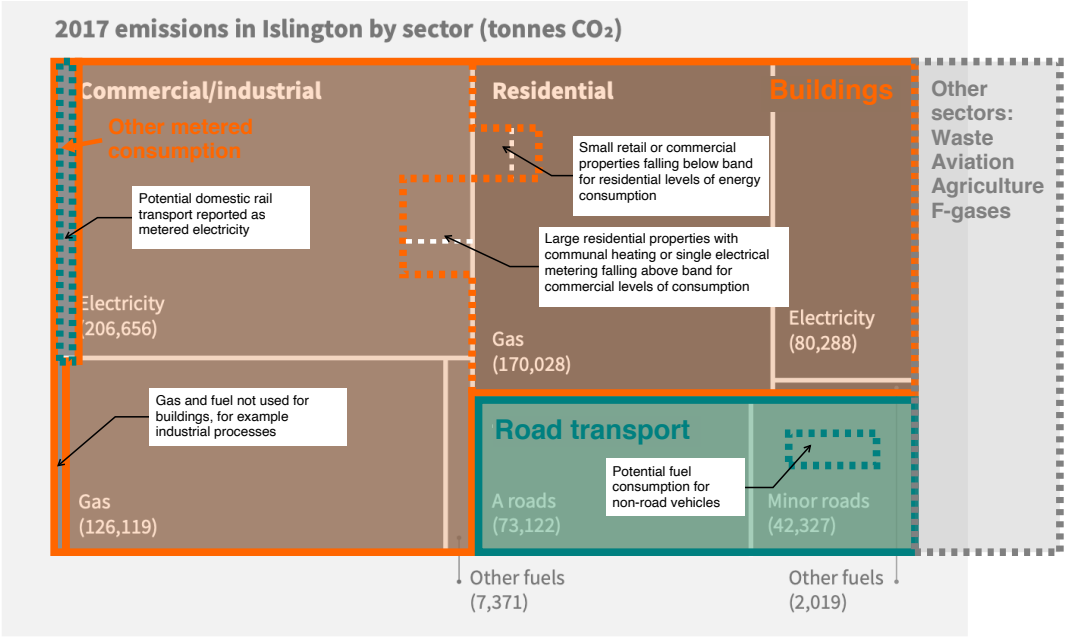
Figure 1 and Figure 2 show carbon emissions reported by sector in Vision 2030, and the corresponding categorisation used by Etude in this analysis.

[2] Sub-national consumption statistics methodology and guidance booklet, BEIS 2019



[14]UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2017

Figure 1 – Islington's carbon emissions by sector from Vision 2030 report.



[14]UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2017

Figure 2 – Islington's carbon emissions by sector showing corresponding categorisation used by Etude in line with the Committee on Climate Change reporting. Additional consideration and ambiguity in statistics is marked.

2.2 Comparison with other carbon emission forecasting tools

Two other tools used for providing carbon emissions forecasts at a local authority level have emerged since the **Energy Evidence Base (2017)** report work was completed, the SCATTER tool by Anthesis[3] and the GLA London's Zero Carbon Pathways Tool[4]. These tools are similar to the work completed by Etude. The SCATTER tool has a similar granularity of analysis, but uses slightly different categories of emissions. The Zero Carbon Pathway tool is higher level. They both use national data for historic local authority emissions. They then apply 'top-down' reductions to each sector over time to give a forecast. This is the same methodology used to provide carbon emissions in the Islington Council report: **Vision 2030: Creating a Net Zero Carbon Islington by 2030**.

The base data for these tools is taken from BEIS sub-national energy consumption by Local Authority, the same data used by the **Energy Evidence Base (2017)** report and updated here. This gives an estimate of the energy and fuel used in Islington based on metered information or sales. The differences are mainly in how the emissions are grouped or assigned, and how reductions are forecast.

A ***top-down analysis*** can provide an excellent overview, and gives a realistic level of breakdown given the data available. However, it does not allow validation of the reduction achieved in each sector. For example: *how do we know that 30% reduction in energy from existing buildings is possible*? Or *what does this mean in terms of an individual property*?

The analysis carried out by Etude attempts to build on the top-down forecast to help answer this question by introducing a ***bottom-up estimate*** of carbon emissions in particular sectors that have data available, and are more relevant to policy changes. The sectors that are considered in the bottom up analysis are shown in Table 1.

Sector	Additional analysis
Residential buildings	Average energy consumption for different housing types from the NEED database was applied to the types and size of homes in Islington from MHCLG subnational housing information. The number of households was used to account for vacant properties.
Non-residential buildings	The breakdown of non-residential buildings by type was estimated from the public DEC ratings for national and subnational level.
Transport	The projected fuel consumption and carbon emissions forecasts from the Department for Transport have been used to project future emissions for the base case. However, for the net zero carbon trajectory these have been modified based on the national reductions required by the CCC 'further ambition scenario.

[3] *https://www.anthesisgroup.com/scatter-greenhouse-gas-tool-offers-a-quicker-easier-solution-for-cities-to-deliver-comprehensive-climate-action/*
[4] *https://data.london.gov.uk/dataset/london-s-zero-carbon-pathways-tool*

Aviation	UK aviation forecasts have been used to project future emissions for the base case. However, for the net zero carbon trajectory these have been modified based on a much more radical reduction in flying or improved efficiency of aircraft. This is shown as necessary to meet net zero carbon.

Table 1 – Sectors using a bottom-up or alternative analysis to arrive at a carbon emission breakdown and forecast

2.3 Update to the carbon emission factors projections for electricity

The carbon content of electricity has continued to reduce as per the National Grid forecasts used in the **Energy Evidence Base (2017)**. New forecasts from the National Grid and BEIS have become closer and aligned, reduction in carbon emissions has, if anything, accelerated since the date of the report.

Figures 1.01 and 5.13 in the **Energy Evidence Base (2017)** showed historical and projected carbon factors for grid electricity, the updated version of this projection with carbon factors updated to 2019 is shown in Figure 3.

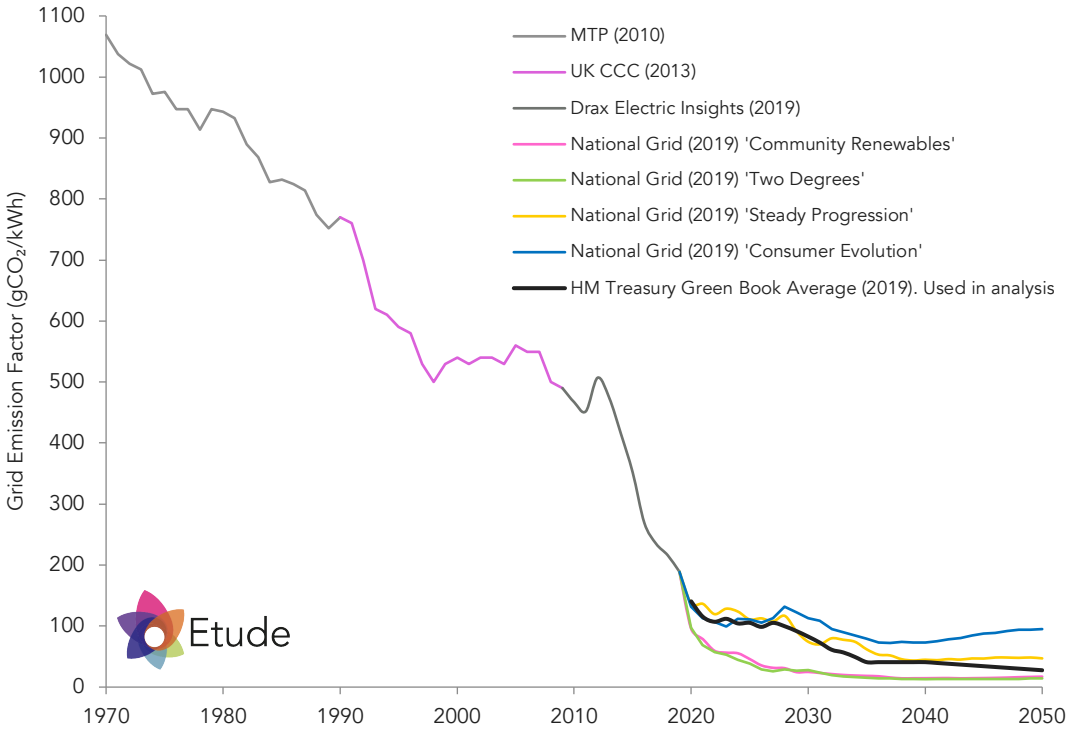


Figure 3 - Historical and projected carbon emissions per kWh of electricity consumed marking the future updated projection used for comparison in this analysis. Data compiled from multiple sources by Etude as referenced.

2.4 Update to the current carbon emissions breakdown by sector

The **Energy Evidence Base (2017)** reported total emissions in the London Borough of Islington, and only gave the breakdown of emissions from energy consumption for gas and electricity for domestic and non-domestic buildings. This analysis has been revised to include emissions from all users and to show the breakdown by sector.

Figure 4 replaces Figures 1.02 and 3.01 in the **Energy Evidence Base (2017)** to show that buildings are still the main source of carbon emissions associated with the London Borough of Islington, and one of the sectors which the Council has most influence on with planning policy. Therefore any attempt to significantly reduce carbon emissions requires strong policy to impact the energy efficiency of new buildings, encourage low energy refurbishment and encourage uptake of low carbon heating.

The total emissions reported have increased as the share of national emissions from waste, aviation, industry, and refrigerant leakage have now been shown for Islington. These more closely reflect the 'real' emissions in the London Borough of Islington, however still exclude emissions arising in other countries, for example from manufacture of goods or food production. Figure 4 shows the total emissions reported in this analysis compared to that reported by BEIS subnational meter data and included in the **Vision 2030 report**. Adding in these emissions is considered important as Islington have influence over waste streams and travel habits, and F-gas emissions include those from heat pump refrigerants which could become more important.

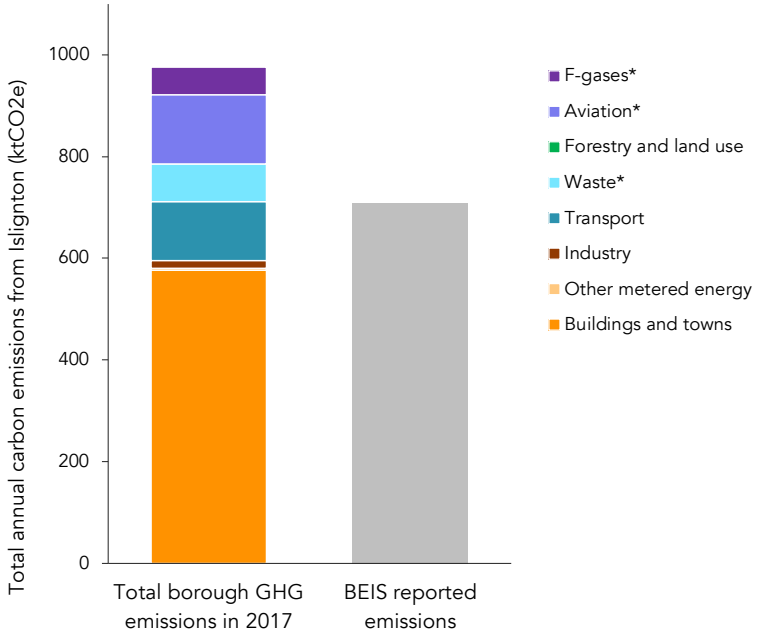


*Figure 4 - Total annual greenhouse gas emissions for the London Borough of Islington in 2017 with breakdown by sector based on user. National reported subnational emissions are shown for comparison (BEIS Subnational emissions 2018 https://www.gov.uk/government/collections/total-final-energy-consumption-at-sub-national-level). *National values apportioned by head of population.*

2.5 Update to the carbon emissions forecast

The **Energy Evidence Base (2017)** gave a forecast of emissions arising from gas and electricity consumption in residential properties only, and made recommendations based on using this as a proxy for other buildings. The **Energy Evidence Base (2017)** also focussed on a timeline to 2050. This analysis has been revised to include emissions from all users, to show the contribution in reductions of emission by sector, and to explore achieving zero carbon by 2030.

To show the scale of the challenge Figure 5 shows a total forecast of emissions for 2030 and 2050 assuming no action is taken, and an estimate of the total emissions that would be required for net zero carbon (assuming a national share of offset). Reduction is from national measures or estimates of the impact of policy already in place. The decrease already forecast through to 2050 is mainly due to the reducing carbon emissions factor of electricity. Although this is a national change, it should be noted that installing solar PV on rooftops in Islington contributes to this reduction.

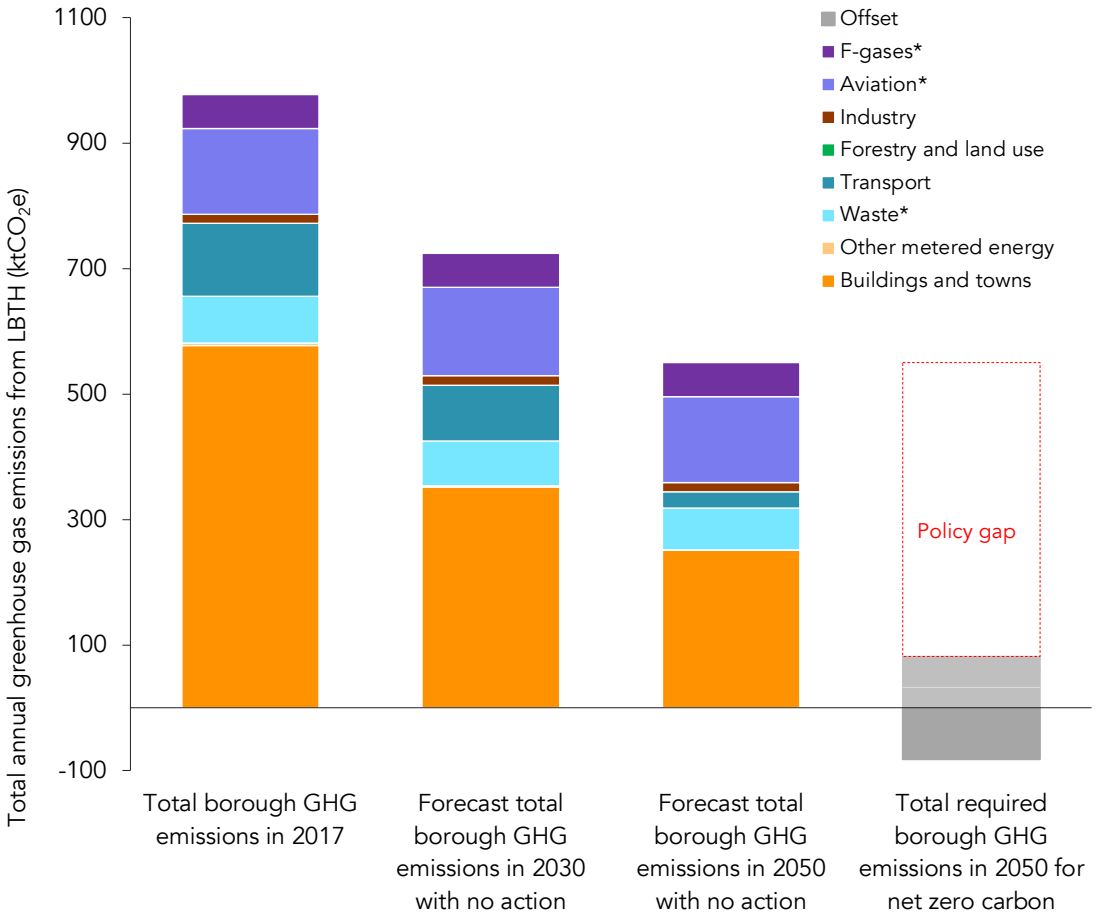


Figure 5 – Total GHG emissions in Islington for 2017, 2030 and 2050 based on no change to policy or national trends. The total carbon emissions required for net zero carbon are shown for comparison along with the corresponding amount of offset. The large reduction is predominantly due to the reduction in carbon of electricity, it should be noted that this is to some extent impacted by the amount of solar PV generation installed locally.

In the **Energy Evidence Base (2017)** Figures 1.04, 1.05, 3.04, and 4.01 gave a forecast of emissions over time and showed the contribution of different policies on reducing this. This analysis shows the same forecast including all emissions arising in the borough. Figure 9 shows the forecast including only NAEI and BEIS reported subnational figures to allow comparison with the Vision 2030 report. None of the graphs include offset of emissions beyond those projected by CCC as a 'core scenario', which in Islington is negligible.

Figure 6 shows the forecast of greenhouse gas emissions over time with no action and compares this with a baseline forecast and the required trajectory for zero carbon emissions by 2050. The baseline forecast includes population growth, new construction and replacement construction, and DfT baseline projections for reduced car use in London.

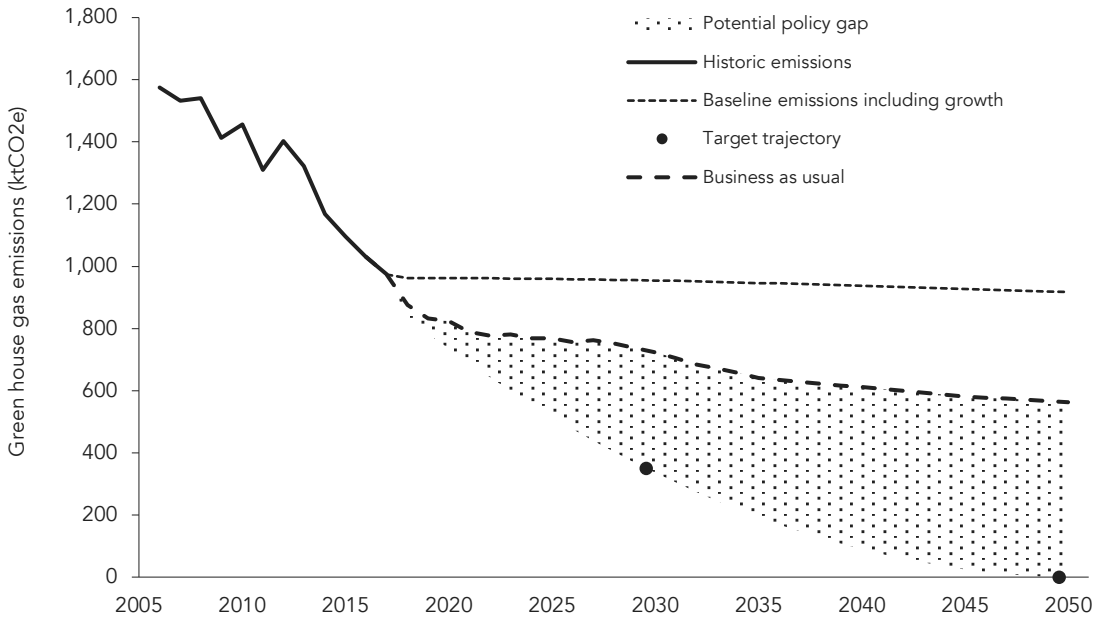


Figure 6 – Annual historic and forecast greenhouse gas emissions for Islington showing the current reduction likely against a baseline case including growth and change of use.

2.6 Achieving net zero carbon by 2050

Figure 7 shows the forecast of greenhouse gas emissions over time to achieve Net Zero carbon by 2050. The contribution of decreasing emissions from each user is shown. The assumptions used aim to put the impact of the proposed policy changes suggested to the Local Plan in the context of a broader push towards Zero Carbon. Therefore changes in all sectors have been included.

The forecasts have been set up to use the most aggressive reductions possible for sectors that are not affected by policy, and then approximate the impact of policy changes for retrofit, new buildings, low carbon heat and renewables uptake. For example, significant increase in renovation of private homes and switch to electric vehicles. This is a conservative approach to allow the proposed policy to be

tested against the overall carbon emissions reduction strategy targeted by Islington of achieving net zero carbon by 2030. The analysis rules out savings in other sectors compensating for a relaxed policy and achieving zero carbon through market changes.

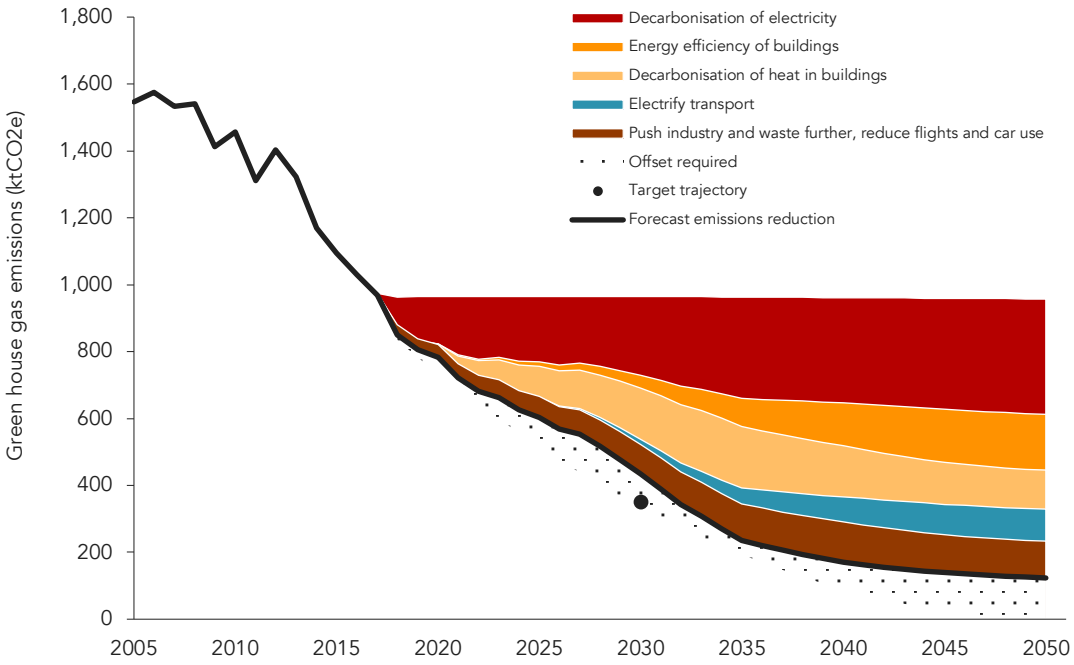


Figure 7 – Annual historic and forecast greenhouse gas emissions for Islington showing the required reduction to achieve zero carbon by 2050, and the contribution of reductions in emissions from each user.

Figure 7 shows an approximate forecast for the suggested policies alongside very significant reductions in other sectors. It can be seen that total emissions in 2050 are approaching around 100ktCO$_{2e}$ which is a radical reduction of over 90% over 2010 levels.

This quantity of emissions is considered a reasonable level to offset to make achieving net zero possible[5].

The forecast is very dependent on a wide range of changes in all sectors and a wide range of stakeholders including leadership from central government.

[5] Total national levels of greenhouse gas reduction shown by the CCC are 80 to 175MtCO$_{2e}$. Counting per capita and weighting for the opportunity for reductions in different region it is suggested that 10% residual emissions in a London Borough or 80-150ktCO2e for Islington, is a reasonable target to remove annually through national schemes.

The headline changes are listed below, items that the Islington Local plan will have an impact on are highlighted with blue text:

- **Decarbonisation of electricity -** The electricity grid decarbonises in line with the latest HM Treasury projections.

- Energy efficiency of new buildings**.** From 2025 all new dwellings achieve an average heating energy demand of less than 20kWh/m^2/year and a total energy consumption (energy use intensity) of less than 35kWh/m^2/year. This is considered equivalent or similar to requiring compliance with the full Fabric Energy Efficiency Standard (FEES) at planning, plus some improvement in efficiency of appliances and consumer goods.

- **Energy efficiency of existing homes.** 90% of existing homes refurbished with most completed in the 2030s to achieve an average stock level heating energy demand of less than 60kWh/m^2/year and similar improvements in appliances and consumer goods as new builds. This is not possible to link directly to an EPC rating, but is an improvement significantly beyond EPC 'C'. The Council could use carbon offset funds to achieve some of this ambition.

- Decarbonisation of heat in buildings**.** Achieve a carbon content of heat of less than 40g/kWh by 2040. The modelled scenario has a 90% reduction in commercial gas consumption by 2050, all gas boilers are replaced by low carbon heat equivalent to a large take of electric heating with 50% direct electric, 50% heat pumps.

- **Electrify transport –**99% of road journeys are by electric vehicle by 2050.
- **Push industry and waste further, reduce flights and car use:**
    - Further Road journeys in Islington are reduced by 50%
    - **National emissions from waste reduced by 65%.** In line with Committee on Climate Change further ambition scenario. The Local Plan can contribute to this through; ensuring recycling storage is sufficient and convenient in new buildings, applying environmental standards for the use of recycled materials in development, providing policy to support the circular economy and ensuring sufficient land is provided locally to manage any residual waste.
    - **National industry emissions reduced by 80%**. In line with Committee on Climate Change further ambition scenario.
    - **National aviation reduced and efficiency improved.** 60% reduction in emissions in line with Committee on Climate 'Core scenario'.

These changes are ambitious yet practical and achievable. The scale of change requires clear leadership from the Council, coupled with community, private and national Government initiative.

2.7 Accelerating change to target 2030 zero carbon

The Council have recently committed to targeting zero carbon for the borough by 2030. The definition for what emissions are included within this zero carbon target is not yet set out, however the forecast and changes in Figure 7 show that it would not be possible to achieve net zero carbon emissions for all sectors with the proposed local plan policy changes in **the Energy Evidence Base (2017)**. More radical changes would be required that would also need to be supported by wider changes in national policy and consumer habits, for example through tightened minimum energy requirements for existing homes and reduced car travel respectively.

Etude have used the forecast model to test what zero carbon by 2030 would look like and present two further scenarios. Figure 8 shows a similar forecast with more aggressive assumptions targeting net zero carbon by 2030. This achieves residual emissions of around 250ktCO_{2e} by 2030, reduced from 400ktCO_{2e} in 2030 in the scenario targeting zero carbon by 2050. This would achieve a significant reduction in cumulative emissions through to 2050.

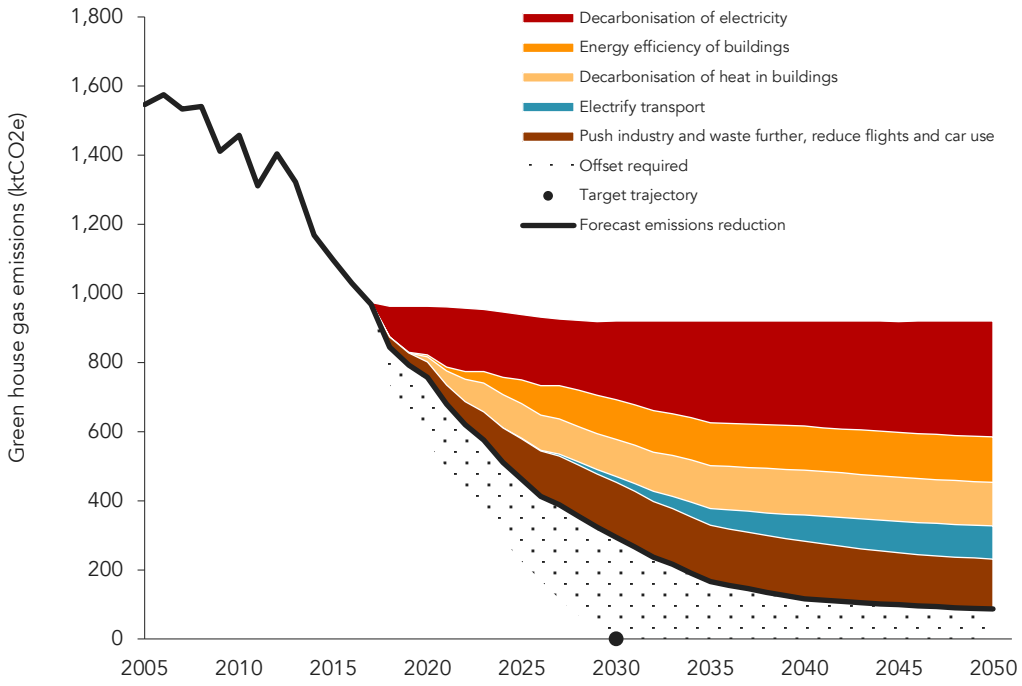


Figure 8 - Annual historic and forecast greenhouse gas emissions for Islington showing a forecast targeting achieving net zero carbon by 2030, and the contribution of reductions in emissions from each user. Even with very aggressive measures it is difficult to accelerate carbon reduction ahead of the decarbonisation of electricity.

Figure 9 shows the same forecast targeting net zero carbon by 2030, but only includes emissions from users reported in the NAEI and BEIS subnational reporting information for local authorities. This achieves around 110ktCO_{2e} by 2030. These models both use the most optimistic and radical changes thought possible, including lifestyle changes such as travel habits. The model demonstrates that

accelerating greenhouse gas emissions reductions ahead of the decarbonisation of the electricity grid is very challenging.

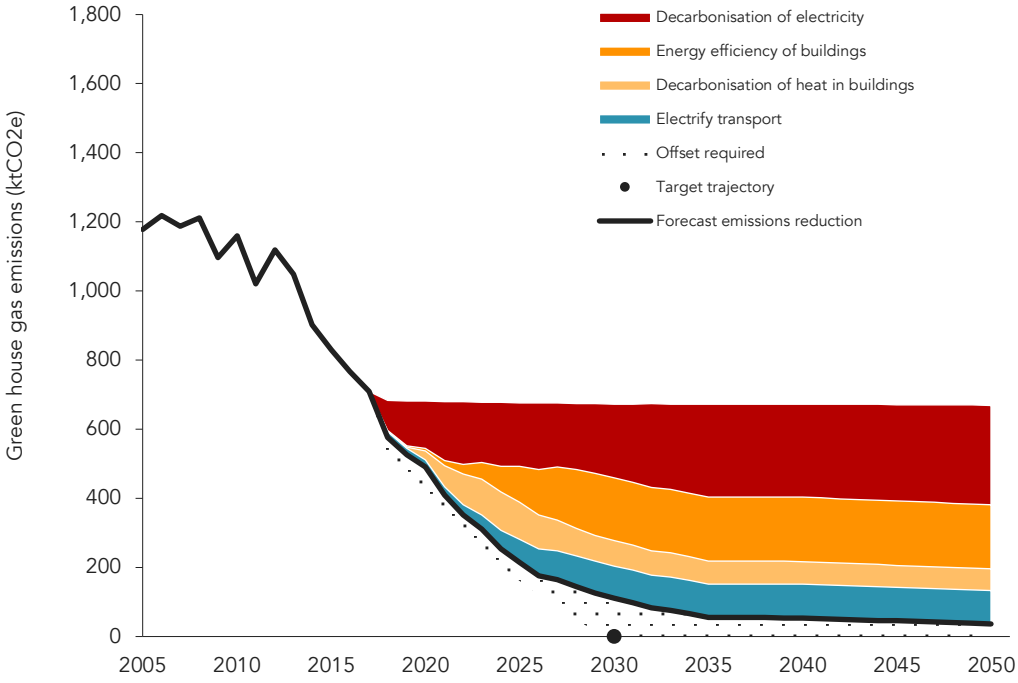


Figure 9 - Annual historic and forecast greenhouse gas emissions for Islington including only subnational emissions reported by BEIS and showing a forecast targeting achieving net zero carbon by 2030, and the contribution of reductions in emissions from each user.

Key changes over the 2050 target forecast are:

- **Majority of existing dwellings are refurbished by 2030**. To reduce the average heating energy consumption to less than 60kWh/m^2/year for 80% of dwellings. There is currently very little local or national policy driver to enable this to happen.
- **Decarbonisation of heat is accelerated.** Carbon content of heat is reduced equivalent to 90% of buildings heated by heat pump by 2035.
- **Accelerate electrification of transport**. 90% of road journeys in Islington are by electric vehicle by 2030.
- **Further reduction in air travel**. National aviation emissions are reduced by 90% before 2040. This is a national change

These changes are not directly impacted by the Local Plan, however introducing local policy drivers alongside national efforts could have an effect. For example wide deployment of electric vehicle charging points, policies to move away from gas boilers.

2.8 Dealing with residual emissions – Carbon offset

2.8.1 Quantifying the residual emissions

We have estimated that greenhouse gas emissions in Islington will have to reduce to **approximately 270ktCO$_{2e}$/year by 2030** and to approximately **100ktCO$_{2e}$/year by 2050**. For 2050 this is approximately a 90% reduction in emissions from 2010 levels.

These residual emissions will have to be offset for London Borough of Islington to be 'Net Zero Carbon' and to meet global emissions targets. The Committee on Climate Change indicates that in a net zero scenario, residual emissions in 2050 should be no more than 3% of current emissions across the UK. Over 80% of residual emissions in 2050 are forecast to occur in the aviation, agriculture, industry and waste sectors. This means that acceptable residual emissions in other sectors such as buildings and transport are almost zero.

2.8.2 Strategies to address residual emissions

Forestation offers the only practical strategy to remove atmospheric carbon available with current technology. Total potential is very limited, therefore emissions must be reduced as much as possible first. In Islington the total potential tree planting will only make up a very minor fraction of the offset requirement, therefore trading with other local authorities will be required.

Housing Retrofit to fit heat pumps and improve building fabric efficiency can reduce emissions and fuel poverty, while improving air quality. It can also accelerate reduction in operational emissions, however it does not directly reduce atmospheric carbon and is only an 'offset' option in the short term if the work would not otherwise happen.

Solar Panels fitted to buildings use sites that have already been developed to provide cheap and clean electricity that is essential to power heat pumps and electric cars. It also does not directly reduce atmospheric carbon.

Renewable Energy funded by developers or the Council, but installed on greenfield sites outside of the borough contributes toward decarbonisation of the electricity grid. It also cannot reduce atmospheric carbon.

Carbon Capture and Storage (CCS). Drax power station is amongst a handful of Bioenergy with Carbon Capture and Storage pilot projects worldwide, which the CCC view as an essential technology. It is currently capturing just 1 tonne of CO2 per day, so is not a viable option at present. Carbon Capture and Storage may have a place for mopping up unavoidable emissions from very hard to treat sectors such as certain industry niches. However the technology is unproven, expensive and must not be relied upon to justify business as usual.