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Local Green New Deals: Technical Annex

This document sets out the technical assumptions and quantitative methodology for the local scenarios developed for the "*Local Green New Deals: A transformative plan for achieving the UK's climate, social and economic goals locally"* report. In general, we adopted the scenarios and assumptions from previous phases of work from the Centre for Research on Energy Demand Solutions (CREDS). This includes the Positive Low Energy Futures (PLEF)[i], which developed sectoral scenarios to reduce the UK's energy demand by up to 52% by 2050, the Cheaper Bills, Warmer Homes[ii] project, which developed a policy programme for the UK to make significant progress towards decarbonising its housing stock by 2035, and the Place Based Carbon Calculator (PBCC)[iii] - a free tool which estimates the per-person carbon footprint for every Lower Super Output Area (LSOA) in England. The following sections mirror the key technical sections of the main report.

Cheaper, warmer, zero carbon homes

The technical scenarios for the household retrofit programme were based on the Cheaper Bills, Warmer Homes project[1], which developed retrofit deployment scenarios based on an ambitious 6-point policy programme for the UK from 2024 to 2035. To form the basis of the 10-year retrofit scenario, Parity Projects undertook statistical modelling of the energy performance of all homes in the UK. This dataset was based upon the English Housing Survey (EHS) 2019-2020. Subsequently, Parity Projects modelled the impact of a three-phase policy programme, outlined in Figure 1.

This programme would upgrade 23.5m households in just ten years, saving over £25bn/year in energy bills by 2035, with almost all UK homes EPC "C" or better, and a rapid adoption of heat pumps. This would require an £222bn investment over 10 years, with £60bn of public funds to leverage £164bn in private sector investment. The net benefit would be around £361bn for the UK economy. To deliver this programme, 260,000 new workers will be needed, with around 230,000 'indirect' jobs in the wider supply chain. This rollout of heat pumps provides the bulk of the carbon savings from this programme, with the UK electricity grid close to fully decarbonised, by 2035 we modelled the adoption of 9.7 million heat pumps (about 33% of UK homes). This combined program reduces emissions from homes by 218 million tonnes of CO_2 by 2035, or 22% of the required savings from the fifth and sixth carbon budget reductions (2028-2037) under the UK's Net Zero targets.

[1] Full details of this approach can be found at CheaperBillsWarmerHomes.org

Phase	2024 – 2027	2027 – 2030	2030 – 2034+
Description	**Build capacity, bring down cost, train supply chain, help those who need it most, set out regulatory landscape to allow industry to plan**	**Fast paced majority roll out of gov funded programmes now that local gov and industry have capacity.**	**Regs & market drive increasingly self-sustaining transition as households and industry have had time to prepare.**
1. A national plan, through local delivery	**Establish structure and build capacity** £1bn for local authorities to set up area-based delivery units Establish National Retrofit Taskforce National public relations campaign Procure national EPC and stock data Maintain funding for all existing home retrofit programs (e.g., ECO4)	**Strengthen oversight** £500m for local area-based delivery units Whole house plan for all homes Building renovation passport roll out	**Maintain delivery** £500m for local area-based delivery units
2. Tackle fuel poverty	**Target most in need:** £15bn low-income fabric grants 2025 – MEES "C" all social housing	**Scale up delivery:** £30bn low-income fabric grants 2028–- MEES "C" all PRS	**Transition to self-sustaining market:** £3.5bn low-income fabric grants 2030 – MEES "C" owner occupiers (on sale) 2030 – MEES "B" all social housing
3. A Financed renovation for all	**Set the necessary financial and fiscal landscape to carry program forward:** Blended finance model of zero interest loans and grants to 'future-fit' homes 5% VAT on retrofit led renovation up to £5,000 Variable stamp duty based on EPC Move levies from electricity bills into taxation		
4. Fix broken housing standards	**Set a new landscape:** Strengthen housing standards and support enforcement Reform EPC's Minimum performance standards for heat pump installations	**Start market modernisation:** Require pay for performance in new homes and social housing retrofits	**Embed market modernisation:** Require pay for performance in all new retrofits

5. Create 500,000 Green Jobs	**Create new jobs and ensure a just transition:** £300m for new training and apprenticeships £100m to retrain existing workforce	**Keep building capacity:** £50m for training and apprenticeships	**Keep building capacity:** £50m for training and apprenticeships
6. Build a Low carbon heat market	**Support and build market:** £4.5bn for heat pump grants (750,000 heat pumps) Require energy suppliers to offer smart heat tariffs Connect homes to district heat networks (DHN's) where suitable	**Grow to market maturity:** £4.5bn for heat pump grants (2.25m heat pumps as costs drop as market reaches scale) -	**Mandate market transition:** Ban on gas and oil boilers from early 2030's (leading to 1.6-1.8m heat pumps installed per year)
Capital investment summary	**Public investment:** £15bn low-income fabric grants £4.5bn for heat pump grants (750,000 heat pumps) £1bn capacity building and local delivery	**Public investment:** £30bn low-income fabric grants £4.5bn for heat pump grants (2.25m heat pumps) £500m capacity building and local delivery	**Public investment:** £3.5bn low-income fabric grants £500m capacity building and local delivery
	Leveraged private investment: £32.7bn **Total**: £52.2bn	**Leveraged private investment:** £61.9bn **Total**: £96.4bn	**Leveraged private investment:** £69.5bn **Total**: £73bn

Figure 1 Detail of six-point plan from Cheaper Bills Warmer Homes.

Adopting the costings and methodology from the Cheaper Bills, Warmer Homes report, we then downscaled these scenarios to estimate programmes for Greater Brighton (GBT) and North of Tyne (NoT), using the Energy Performance Certificate (EPC) database[iv] and local indices of multiple deprivation[v]. Table 1 below shows the modelled scale and impact of these programmes by 2035, with both regions seeing over 300,000 homes improved, requiring close to £3bn in investment, but generating almost £5bn in bill savings by 2045.

Table 1 Downscaling of Cheaper Bills, Warmer Homes Scenarios to GBT and NoT

	GBT	**NoT**
Share of UK programme	1.33%	1.29%
Number of affected households	315,982	312,621
Total Capital Investment	£2,936,506,520	£2,862,702,963
Total Public Investment	£286,300,756	£1,044,997,397
Cumulative bill saving to 2045)	£4,844,465,424	£4,722,508,387
Total Jobs Created	5,285	5,229
Direct Fuel Poverty Reduction (households)	45,960	45,471
Total CO_2 saving (tonnes) (distribute by share of cost)	2,885,951	2,813,299
Local Area Based Delivery Programme	£26,506,705	£25,790,117
Skills & Training Funding	£6,626,676	£ 6,447,529

The deployment of retrofit measures in both locations will require substantial public and private investment. However, this share of investment is not equal in both locations. Figure 2 shows the share of existing funding commitments for residential energy efficiency as outlined in the 2019 Conservative manifesto, the expected required public investment (whose allocation is based on the relative indices of deprivation), and the remaining private investment required to meet the 2035 targets. As shown in Figure 3, a much larger share of investment in NoT needs to come from the public sector: £1,044,997,397 in NoT, compared with only £286,300,756 in GBT.

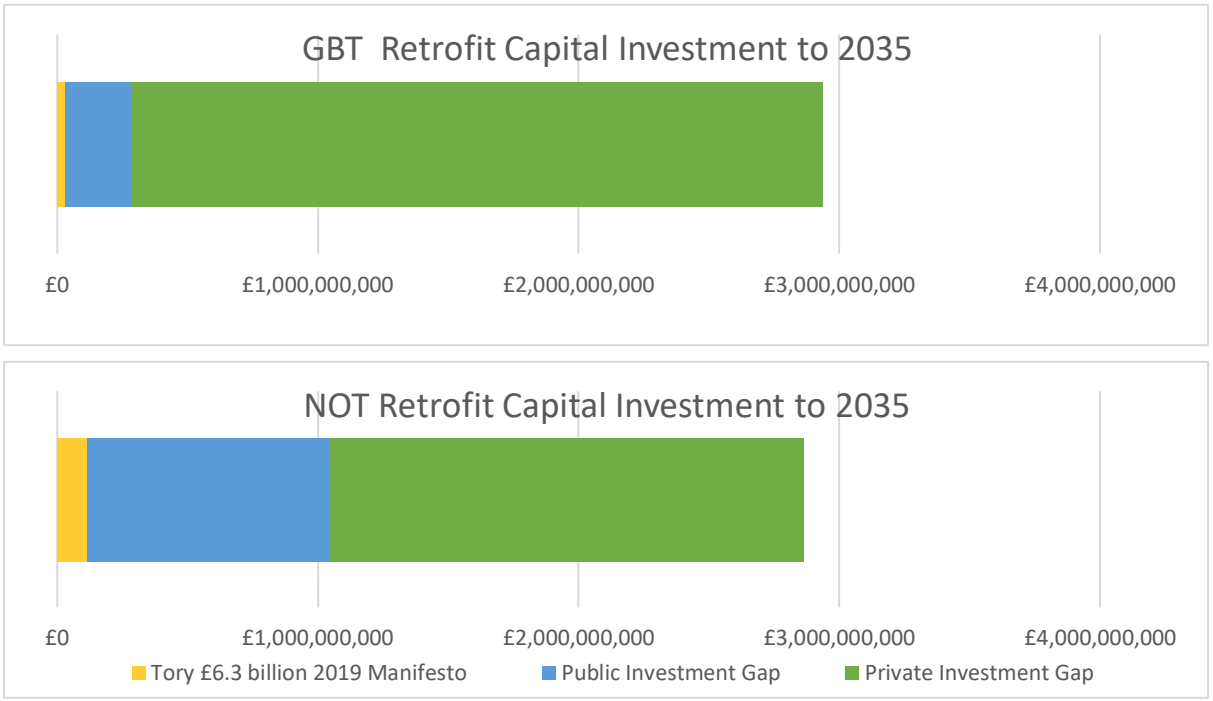

Figure 2 Existing committed investment, and required public and private investment to 2035.

The proposed retrofit financing mechanism assumes that homes in income decile 1 receive 100% of the capital cost as grant funding, with deciles 2, 3 4 and 5 receiving 80%, 60%, 40% and 20% grant shares respectively. When examining the relative share of households in different income deciles, it becomes clear that a far greater share of households in NoT are in the lowest income deciles than in GBT and thus receive a much greater share of public investment (Figure 4).

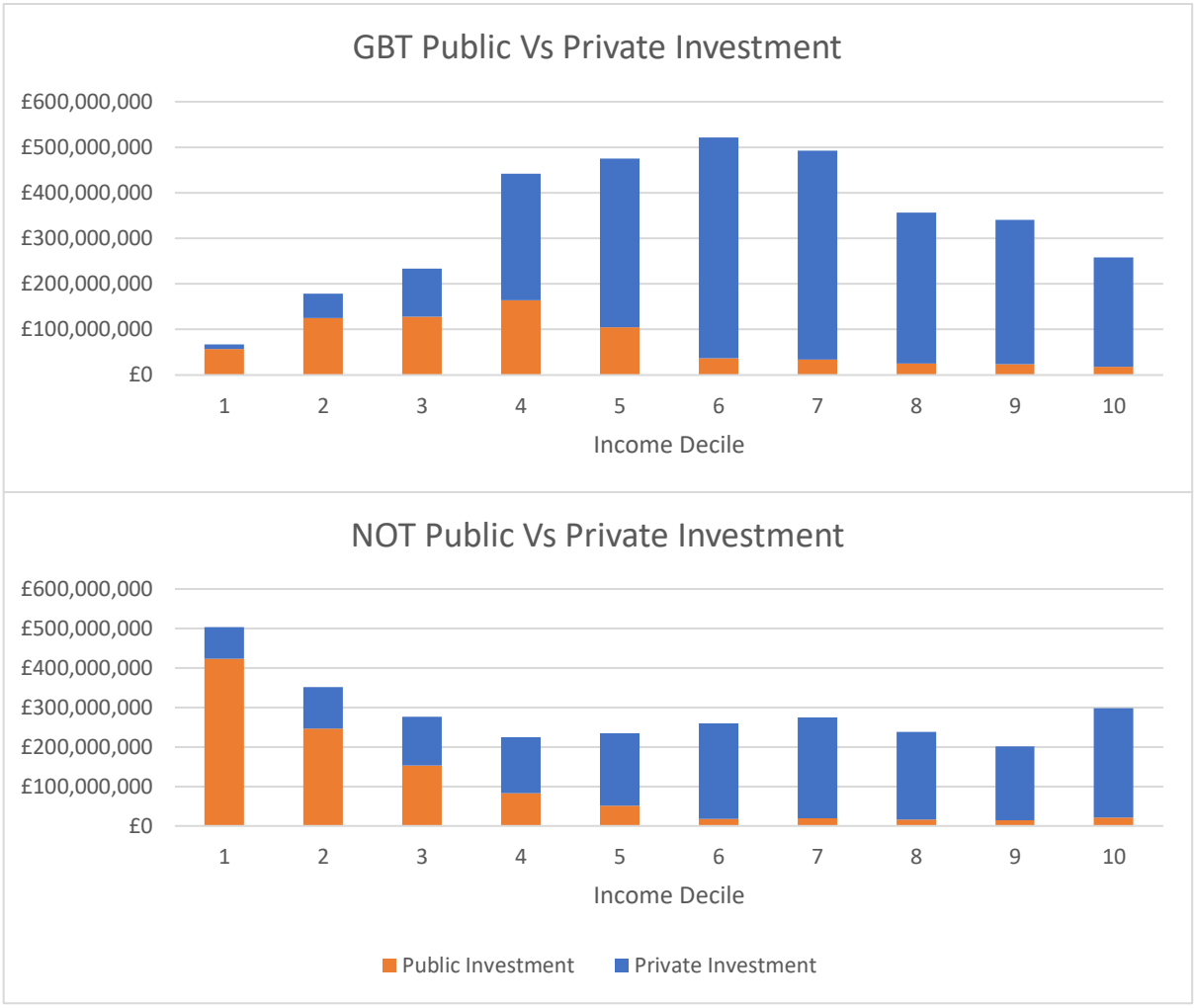

Figure 3 Public vs private investment across income deciles.

Scaling down the 260,000 new construction workers and 240,000 wider supply chain jobs required by the national programme to the local scale would mean 5,229 and 5,285 new jobs in NoT and GBT respectively. We estimate this would require £6,626,676 (GBT) and £6,447,529 (NoT) investment in new apprenticeships[2] and retraining programmes in each region. Moreover, delivering the programme will require significant capacity building in terms of local marketing, outreach, and one-stop-shop delivery programmes. Cheaper Bills, Warmer Homes estimates putting in place the structures and systems for a National Retrofit Plan and Local Delivery would require around £50m per 500,000 homes retrofitted, or around £2bn for the programme we outline in this report. This would include A Household Engagement Strategy and Local One-stop-Shops serving every community.

[2] Each apprenticeship support was costed in at around £2,000, assuming this would eb co-funded by industry

Of the £2bn required to deliver this programme nationally we estimate this local area-based delivery programme/one-stop shop rollout would require £26,506,705 in GBT and £25,790,117 in NoT.

Public Transport, Car free zones and active travel

The local public transport scenarios were developed using the overall national targets from the PLEF report. However, the starting point for each LA was taken from data on the relative share of commuting journeys made by different transport modes from the CREDS Place Based Carbon Calculator (PBCC), which provides data down to the lower super output level. This takes account of the fact that any national modal changes in transport journeys will start from different baselines. Here we adopt the PLEF "Transform" scenarios for 2040 which assume passenger car journeys are only 79% of today's total, while bus journeys are 166% and train and light rail journeys are 144% compared to the baseline. We also adopted the PLEF figures for public transport investment over this same period, although computed them on an annual basis to 2040.

Figure 4 (NOT) and Figure 6 (GBT) show the percentage of total distance travelled by different transport modes between 2022 and 2040 under the PLEF, while Figure 5 (NoT) and Figure 7 (GBT) show total distance travelled by different transport modes. Although bus journeys increase by 66% overall, their relative composition of all journeys made increases from 9% to just 12% (156,440,328 passenger km/year) in NoT and 6% to 7% (117,579,832 passenger km/year) in GBT.

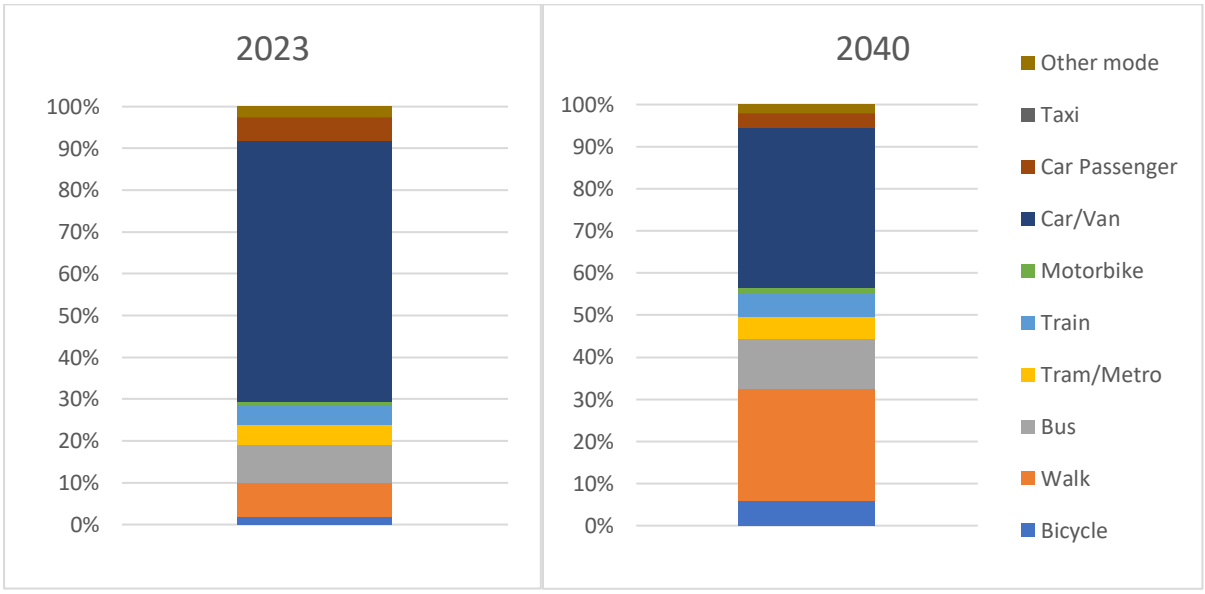

Figure 4 % of total distance travelled by different transport modes NoT

In the case of train journeys, GBT is starting from a much higher baseline with train travel constituting 26% of all distance travelled in 2022 (810,260,500 passenger km/year), rising to 29% in 2040 (1,166,775,120 passenger km/year), due to the relatively extensive rail network that serves the south coast and the routes up to London via Gatwick airport. NoT starts from a much lower baseline with only 5% of total distance travelled by rail (123,294,303 passenger km/year) although with a similar 5% proportion (120,319,099 passenger km/year) using a tram or metro system – i.e., the Tyne and Wear Metro. However, based on the PLEF scenarios we do not see the relative 5% share of all distance travelled increasing in NoT, despite a 44% increase in distance travelled via these modes (52,940,404 (metro), 54,249,493 (train)).

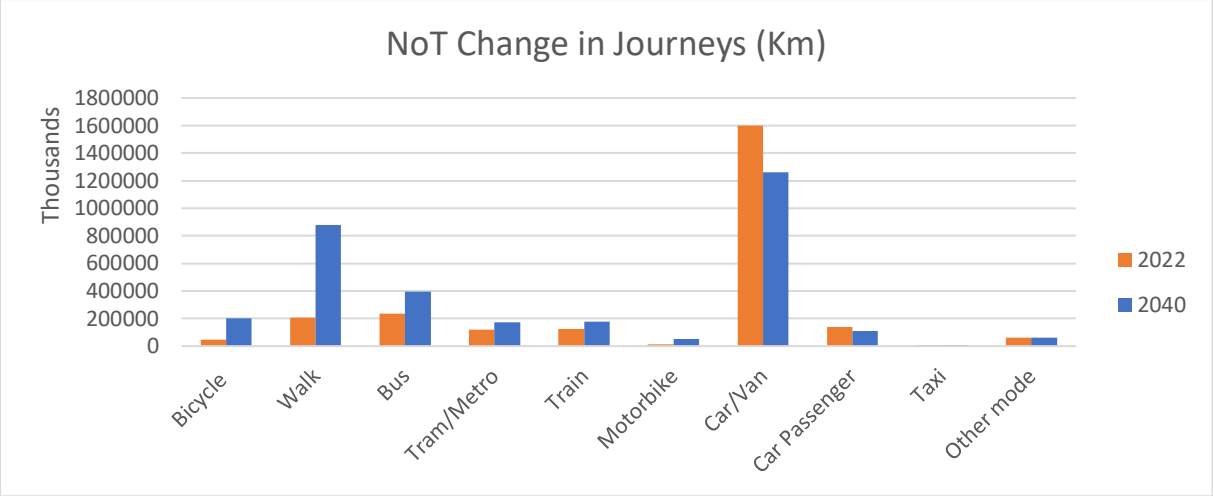

Figure 5 total distance travelled by different transport modes NoT

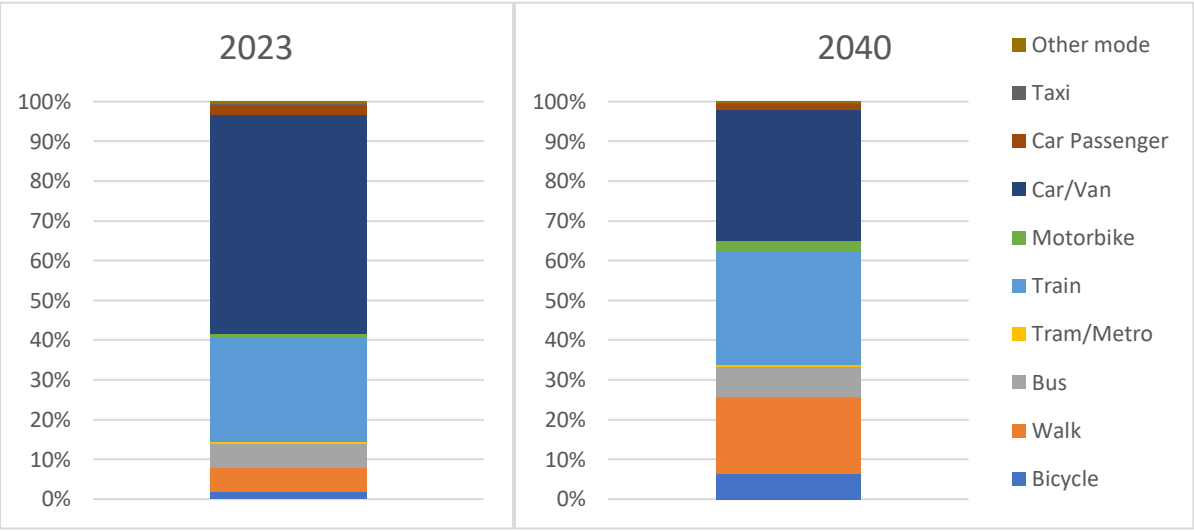

Figure 6 Percentage of total distance travelled by different transport modes GBT.

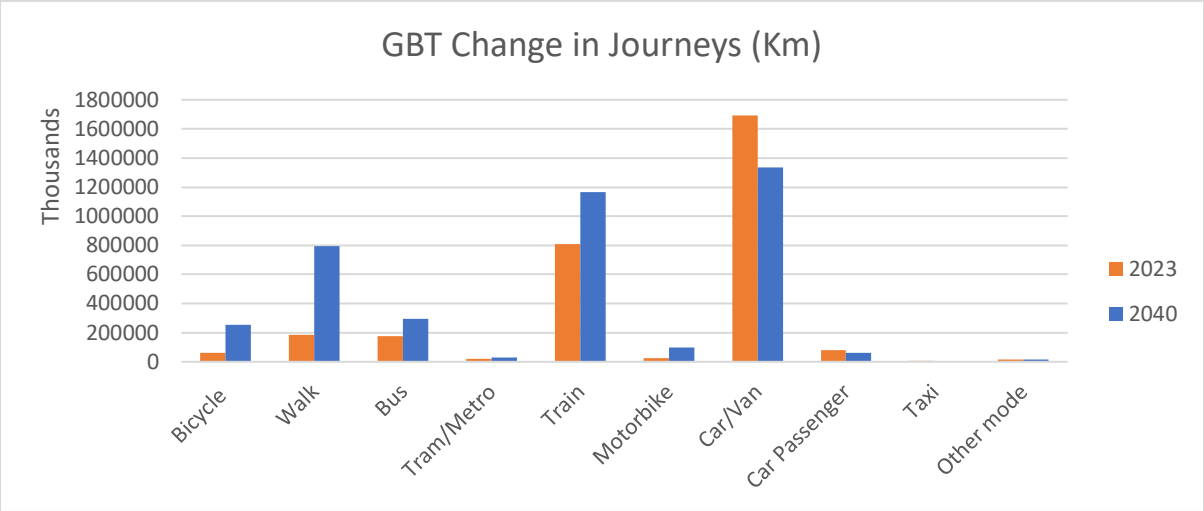

Figure 7 total distance travelled by different transport modes GBT.

The PLEF report also includes estimates on the required investment to meet these goals.

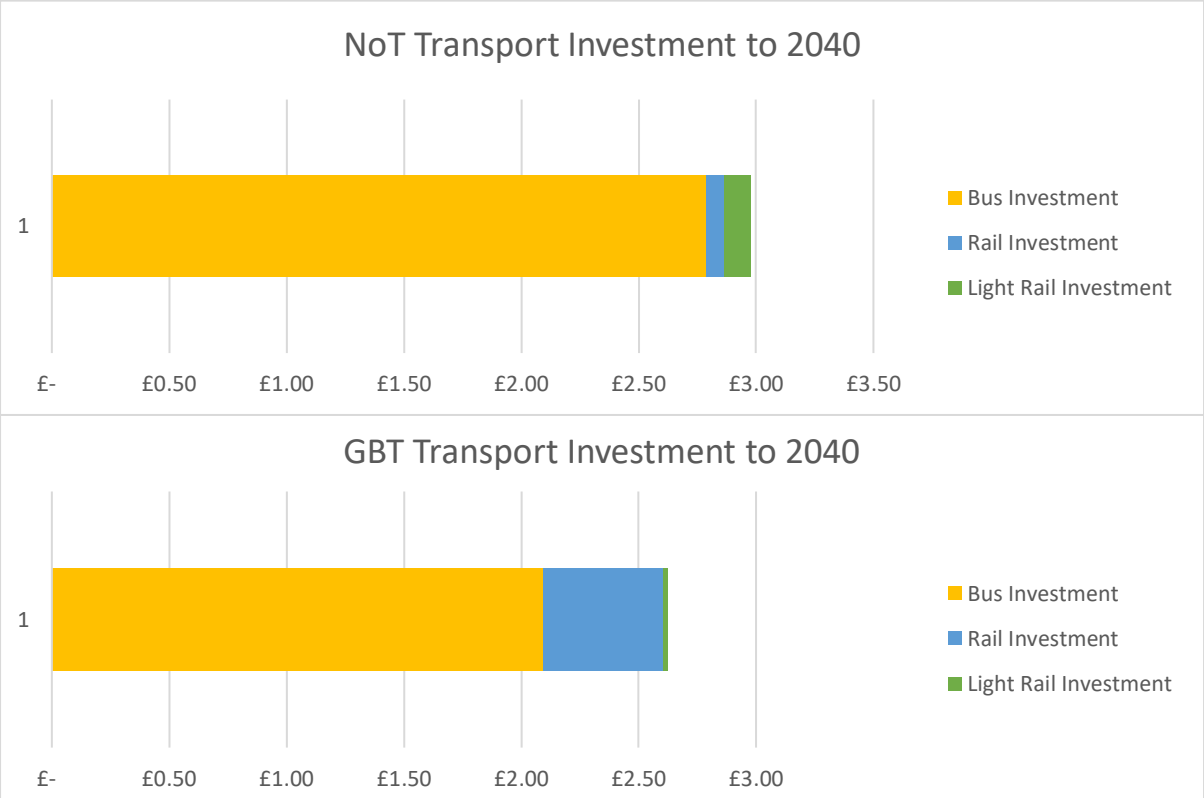

Figure 8 Public transport investment to 2040.

Here, we use the increase in passenger kms required to compute an investment per km figure. Using the same scaling methodology as above, we estimate the required investment for the NoT and GBT in Figure 8 below. The figure clearly shows the investment programme is dominated by the cost of bus investment, largely a product of the need to expand and fully electrify the bus fleet in each location, costing an estimated £2.1bn in GBT and £2.79bn in NoT to 2040. GBT sees a substantial £510m invested in the rail system, while NoT sees an increase of £110m in light rail investment. However, in our proposed scenarios for an expansion of the Tyne and Wear Metro and a Brighton and Hove Tram system, would likely be more costly.

Green Infrastructure

The Green Infrastructure scenarios were derived from the PLEF afforestation targets, again using the "Transform" scenario. Here, nature-based solutions are promoted ahead of biomass carbon capture and storage. In this scenario, it is assumed that by 2040 a cumulative 218.8Mt of carbon is sequestered using afforestation approaches. For simplicity we assume that the majority of this is achieved via 30-year mixed broadleaved native woodland on mineral soil, which sequesters an average of 255 tCO_2/ ha[vi]. Achieving this level of sequestration using broadleaved native woodland would require a reforested area of 2338km^2 or around 0.96% of the UK's land area, or 1.4% of the suitable land.

In scaling these goals down to our regional focus, we used the government Land Use in England Database[vii], which provides land use data at the local authority level. Here, we assume that only a sub-set of land would potentially be available for afforestation, namely landfill and waste disposal; agricultural land; and natural land. Figure 9 (GBT) and Figure 10 (NoT) show the dominance of rural local authorities in this reforestation picture, with Northumberland having a greater share of potential than the other LAs combined.

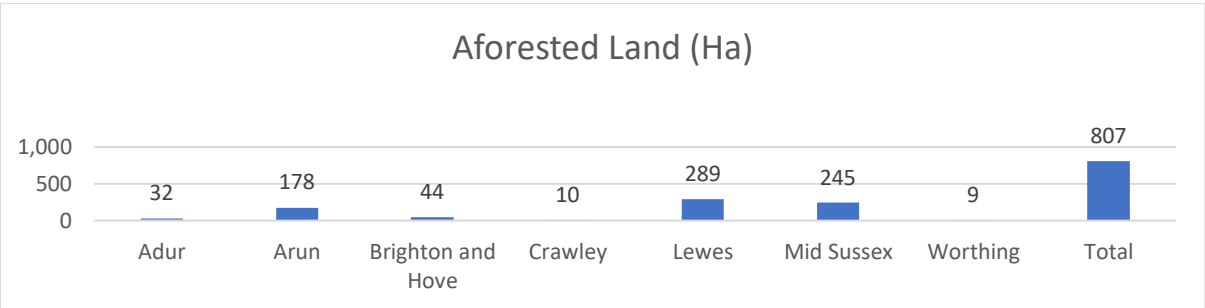

Figure 9 Required land for afforestation in GBT.

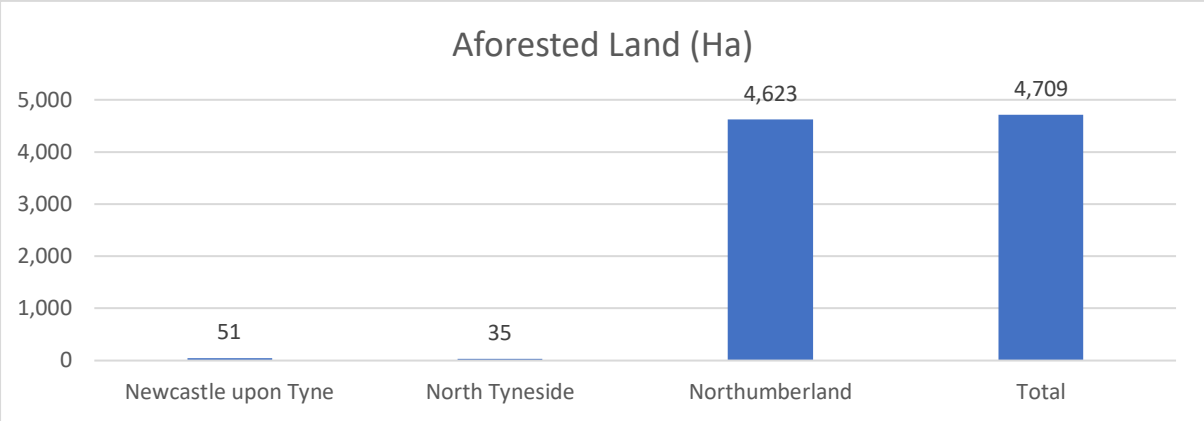

Figure 10 Required land for afforestation in NoT.

To estimate the costs of carbon sequestration we use data from the Woodland Carbon Guarantee, which typically provides landowners and forest managers between £10-20/tonne (£15 central) for afforestation projects in the UK. Table 2 shows these afforestation costs and carbon savings for both Not and GBT based on the "Transform" scenario for 2040.

Table 2 Afforestation carbon sequestration costs

	Afforested Land (Ha)	tCO2	Carbon Sequestration Costs
North of Tyne			
Newcastle upon Tyne	51	48193	£722,897
North Tyneside	35	32400	£486,000
Northumberland	4,623	4326499	£64,897,479
NoT Total	4,709	4,407,092	£66,106,375
Greater Brighton			
Adur	32	29626	£444,388
Arun	178	166702	£2,500,526
Brighton and Hove	44	40907	£613,608
Crawley	10	9651	£144,764
Lewes	289	270414	£4,056,211
Mid Sussex	245	229326	£3,439,891
Worthing	9	8355	£125,323
GBT Total	807	754,981	£11,324,710
£/ha			**£ 14,038**

References

[i] https://low-energy.creds.ac.uk/

[ii] https://www.cheaperbillswarmerhomes.org/

[iii] https://www.carbon.place/#8/51.482/-0.151

[iv] https://epc.opendatacommunities.org/

[v] https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

[vi] https://publications.naturalengland.org.uk/publication/5419124441481216

[vii] https://www.gov.uk/government/statistics/land-use-in-england-2022