

Getting the building blocks right: infrastructure priorities for a green recovery

Annex - Net zero infrastructure to promote a resilient recovery

Below we discuss in more detail the main types of infrastructure needed for the UK to meet its environmental goals, where we are now and what can be done to accelerate delivery as part of the economic recovery plan.

A healthier, better connected transport system

Measures: promote active travel, better public transport and clean transport infrastructure (eg EV charging, rail and bus electrification)

Where the UK should be in 2030

Overall, it has been estimated that there needs to be a 16% reduction in car miles driven by 2030, assuming that the government brings forward the ban on the sale of new internal combustion engine (ICE) and plug-in hybrid electric vehicles (PHEVs) to 2030.¹ In the absence of an earlier phase-out date than 2030, miles driven will have to be cut even further, by up to 60 per cent by 2030.² This reduction in demand should be through behaviour change, and increasing investment in public and active transport.

As well as reducing demand for private vehicle use, public transport needs to become lower carbon by 2030. The Committee on Climate Change recommends that 25 per cent of new bus and coach sales should be electrified and 25 per cent should be switched to hydrogen by 2030.³

Alongside this, electrification of all transport should be facilitated by a comprehensive rapid charging network for ultra-low emission vehicles. This is important to support uptake of electric cars over the next decade and should complement a ban on the sale of new polluting vehicles, including hybrids, in 2030. Estimates suggest that, for a scenario where EVs account for 60% of new car and van sales by 2030, at least 1,200 rapid chargers near major roads and 27,000 chargers around local towns and regions are likely to be required to meet service levels by 2030.⁴ If the phase out date for ICE is brought forward to 2030, the number of chargers will be significantly higher: new analysis shows that by 2030 the UK would require 240,000 slow public (3-22kW) and 62,000 rapid public (>50kW) charge points, as well as millions of home charge points.⁵

Where is the UK now?

Overall, spending on sustainable transport infrastructure is not sufficient to get to where we need to be in 2030. For example, investment in walking and cycling made up only 1.2 per cent of total transport spending in 2018-19, or about £400 million, compared to nearly £18 billion spending on railways and £10 billion on local and national roads. This means that spending on walking and cycling by English local authorities outside of London was as small as £6 per person, or £4 per person for rural areas.⁶ Walking levels have remained relatively constant since 2002 in England,

with around 60 per cent of adults walking at least once a week, while miles cycled have remained steady for the past five years (with a small increase since the coronavirus crisis).^{7,8}

Similarly, spending on public transport infrastructure, aside from railways, is very low. In 2018-19, only eight per cent of public sector expenditure on transport was spent on local public transport, and there has been a £234 million fall in funding between 2010 to 2018 for local bus services.^{9,10} Because of this, more than 3,000 bus routes have been cut back or withdrawn in England and Wales over the past eight years.¹¹

The number of miles driven by buses is 22 per cent fewer than ten years ago. On the other hand, the number of miles driven in cars and vans increased by around two per cent between 2018 to 2019. Car miles driven have increased by 15 per cent since 2009, and van miles have increased by 36 per cent.¹²

Spending on electrification, including EV charging infrastructure, rail and buses, has been better. The government recently allocated £500 million to support the roll-out of EV fast-charging infrastructure, and announced £3 billion new spending on buses, including £50 million for electric buses. However, the number of charge point installations still falls short of what is needed for a 2030 ICE phase out date. Analysis by T&E shows that about 4,000 charge points should be installed per month over the next five years, but the average installation rate before the pandemic was of around 800 per month.¹³

Accelerating progress in the near term

Policy: Most importantly, the government needs to set the long term direction for low carbon transport policy, including the infrastructure required, by publishing its Transport Decarbonisation Plan this year. This should set out an ambitious pathway to reducing emissions in the transport sector. There also needs to be long term strategic vision for low carbon public transport and active travel, in a new National Bus Strategy, an updated Cycling and Walking Strategy and a new Traction Decarbonisation Network Strategy (for the unelectrified UK rail network). There also needs to be better guidance and resources for local authorities to be able to plan and implement low carbon travel strategies in their areas, including reforming various planning instruments like Webtag so they prioritise cuts in carbon and demand, rather than journey times.

Funding: Annual spending on low carbon transport infrastructure should increase: we calculate there is an annual spending gap of £7.9 billion on transport infrastructure over the next four years from 2020-21, to meet the net zero carbon target.

With regards to EV charging infrastructure, the government needs to provide more detail on how it plans to invest the £500 million pledged. While much of the wider EV charging network could be delivered through private financing, public investment will also be key for roll out where cost of grid upgrades would limit coverage or where the business case is weak to ensure national coverage.

Shovel ready: There are also specific ‘shovel-ready’ projects which the government could use in a stimulus package as the economy recovers from the coronavirus pandemic, to create jobs and economic growth. For example, research by the TUC suggests that £1.2 billion of investment would cover the purchase of 4,000 electric buses. This would create 10,000 jobs over the stimulus period of two years.¹⁴ Other work has found that a shovel-ready project to ensure that half of all UK towns and cities have best practice cycle lanes and pedestrianisation, which requires public investment of £7.9 billion, would create 103,000 jobs over the stimulus period of two years. Various combined authorities also have projects that would qualify as shovel-ready and would increase walking, cycling and public transport use.^{15,16}

Similarly, although much of the investment for accelerating EV roll-out is now in place, the government needs to provide more detail on how it plans to invest the £500 million pledged to drive roll-out and create jobs. There are a number of shovel-ready projects that could use this money in the stimulus period, including some of the 54 strategic sites for ultra-rapid chargers that National Grid has identified as needing invigoration, so every person in the UK is within a 30-mile radius of a rapid charger.¹⁷ There is also potential to expand the rural EV charging network. Research suggests that accelerating roll-out of rural EV charging infrastructure to cover 56 per cent of rural businesses, requiring investment of £2 million, could provide 23,700 jobs in manufacture, installation and maintenance over the two year stimulus period.¹⁸

More comfortable, energy efficient homes

Measures: upgrade buildings, install clean heating systems

Where the UK should be in 2030

The Committee on Climate Change estimates that all practicable lofts should be insulated by 2022, six million cavity walls should be insulated and two million solid walls should be insulated by 2030 to meet the fifth carbon budget (under their central scenario), which means 21,000 installations per week.^{19,20} Deep retrofit of buildings should also be scaled up as it would deliver significant carbon savings with fewer numbers of installations. Green Alliance estimates that deep retrofit of four million homes by 2030 would achieve similar emission savings as the measures outlined above.²¹

The Committee on Climate Change also estimates that the UK will need between 2.3 and 3.3 million heat pumps to be installed in existing homes by 2030, with low carbon heat representing a quarter of the share of heat in buildings by 2030.²² It also recommends the installation of ten million hybrid heat pumps by 2035 and one million homes connected to low carbon heat networks by 2030.²³ E3G suggests the UK should set a target to reduce heat related emissions by 50 per cent in 2030 compared to today.²⁴

Where is the UK now?

The energy efficiency of existing buildings is a long way from where it needs to be to reach our targets for 2030. Only about 30 per cent of existing homes are the bare minimum of efficiency needed to meet our net zero target, EPC Band C.²⁵ There are currently only 2,100 insulation measures being installed per week under the Energy Company Obligation scheme compared to the one million measures required to reach the government's goal of all homes being EPC Band C in England in 2035.^{26,27}

The installation of low carbon heat in existing buildings is also very low. Overall 84 per cent of UK homes in GB use mains gas as their main heating fuel, while low carbon heating technologies like heat pumps currently only account for 1 per cent of annual heating system sales.^{28,29} To meet our net zero goals, we need to be retrofitting 20,000 homes a week from 2025 to 2050. The Government's Clean Heat Grant, due to come into effect from 2022, is only attempting to support 12,500 homes a year. At that rate, it would take 1,500 years to install the 19 million heat pumps required to meet our climate goals.³⁰ Some heat pumps may be installed as part of the government's Green Homes Grant, though it is not possible to estimate yet the scale of uptake.

Accelerating progress in the near term

Policy: Overall, the government needs to set out long term strategy and investment plans to upgrade building stock to be low carbon and resilient to future extreme weather events, through a new Building and Heat Strategy that addresses the barriers to households, including cost, disruption and engagement, and new long term funding programmes. It should also set out a vision for the provision of advice, consumer protection and tighter standards for the installation of energy

efficiency and low carbon heating technologies, to ensure that the installations are of the highest quality.

Funding: We calculate there is an annual spending gap of £3.5 billion on sustainable buildings infrastructure over the four years from 2020-21 to be on track for the net zero carbon target. While the Green Homes Grant, which could deliver an additional 600,000 low carbon upgrades to homes, is a welcome new funding stream, it will only be sustainable if it is part of a year on year investment programme, with a wider strategy surrounding it regarding consumer advice, protection and engagement.³¹

Shovel ready: While the installation of home energy efficiency measures have dropped significantly in recent years, a number of projects can provide a model of delivery, including Warmer Sussex, Ecofurb and Cosy Homes Oxfordshire.³² Different local authorities have also put forward housing efficiency as part of their shovel ready projects, including a spending ask of £50 million from the West Midlands Combined Authority to help eliminate fuel poverty in 50,000 homes by 2022; and of £250 million from Liverpool City Region Combined Authority, which will be used for extensive refurbishment of 6,500 homes.^{33,34}

There are also projects that could provide a basis to scale up whole building retrofit. London already has a pipeline of 1,000 homes for deep whole house retrofits. An injection of public funding of additional £250 million, on top of the £50 million that the government has already committed to, could support a pipeline of 40,000 housing units. This would help to bring down costs of this type of retrofit permanently while supporting high skilled employment across the country.

Shovel-ready low carbon heat projects include one by Kensa, a heat pump provider, which estimates that, with funding support for adoption, it could deliver ground source heat pumps to 5,000 high rise tower blocks, supporting 2,000 jobs and saving up to 12Mt of carbon per year.³⁵

Natural infrastructure that increases resilience

Measures: ecosystem creation and restoration, including peatland restoration and afforestation

Where the UK should be in 2030

Overall, the Committee on Climate Change recommends planting up to 50,000 hectares of new woodland a year, which would provide a net sink of 15.2MtCO₂e a year by 2030, to support rapid decarbonisation towards net zero.³⁶ They also recommend bringing 80 per cent of forests in the UK into active management, compliant with the UK Forestry Standard by 2030, to maximise carbon sequestration.³⁷ Our own analysis shows that, achieving an even higher afforestation rate of 70,000 hectares per year over the next ten years, alongside other measures, would help put the land use sector on track to reach net zero by 2040.³⁸ Any new woodland should be in appropriate locations, at the right scale and supporting appropriate species.

The UK also needs to rewet an estimated 468,000 hectares of peatland by 2030.³⁹ And at least 50 per cent of lowland peat agricultural soils, which produce the highest emissions per area than other types of peatland, should be in sustainable wetland management by 2030.⁴⁰ The UK government has an ambition to end peat use in horticultural products by 2030.

Natural infrastructure should be restored and expanded in urban centres. This should include promoting green spaces such as parks and green streets, as well as investment in canals and other waterways to meet water quality targets.

Where is the UK now?

Tree cover in the UK is at around 13 per cent, lower than the European average of 38 per cent.⁴¹ Tree planting rates across the UK as a whole are below what is needed to achieve a net zero carbon economy by 2050. The UK is currently only planting 13,000 hectares of woodlands a year.⁴² However, rates of planting are not even across the UK, Scotland accounted for 80 per cent of new planting in the UK in 2018-19, meaning other nations are underperforming in their tree planting programmes.⁴³

Peatlands occupy around 12 per cent of the UK land area but only 22 per cent of this is in a pristine state and provides some extent of carbon sequestration.⁴⁴ The remaining peatlands, including 94 per cent of the UK's lowland peat, is in various states of degradation.⁴⁵ At least 18.5 million tonnes of greenhouse gas emissions, mostly carbon dioxide, are emitted from degraded peatlands every year in the UK. And England, which has a quarter of the UK's peatland area, is responsible for 55 per cent of these emissions.

Natural infrastructure is also limited in urban centres. About 1 in 5 of the population of England lose out on the benefits of quality local green space, 11.6 million people in England live in neighbourhoods which are deprived of green space. Across the country, only 38% of SSSIs are in good condition, 41% of species are in long-term decline and 1 in 10 are threatened with extinction.

Finally, there is poor data on the environment. Many protected sites have not been assessed for many years and large sections of the countryside have not been mapped for important habitats, while many waterbodies and farms are rarely monitored or inspected. Limitations in environmental information, such as the lack of granularity and accuracy in Defra's Living England maps, compromise the Government's ability to accurately assess the state of nature outside the protected area network.

Accelerating progress in the near term:

Policy: Overall, there needs to be clarity around the future of land management once we leave the European Union, as well as updated strategies from the government that set out the future for sustainable practices in land management, including the Tree Strategy and the Peat Strategy. These strategies must set out ambitious policies that restore 100 per cent of semi-natural upland and lowland peatland, end management practices that damage peatland habitats and support new woodland creation in appropriate locations, at the right scale and supporting appropriate species through new funding streams and removal of barriers for landowners. The 25 Year Environment Plan commits to establishing an additional 25 large Nature Recovery Areas (NRAs) as part of a Nature Recovery Network that integrates biodiversity across the urban and rural landscape.

Defra should also identify opportunities for strengthening the domestic market for ecosystem services. As previously explored by Green Alliance, private funding could support nature based solutions that can reduce emissions from land use and support flood risk mitigation and cleaner water with new revenue streams alongside government funding. This would allow farmers to go further in their efforts to restore the environment, beyond what the new environmental land management system is likely to support.⁴⁶

Funding: we estimate an annual spending gap on natural infrastructure of £2 billion over the next four years to be on track for the net zero emissions target. This includes £1 billion investment in terrestrial and aquatic habitat creation (which would provide an injection of funding for nature restoration ahead of the roll out of Environmental Land Management), at least £1 billion in boosting natural infrastructure in urban centres across the country, and a one off investment of £150 million to improve environmental data for sustainable land use.

Existing funding should also be directed to maximising climate and nature solutions. For example, the government should invest a much bigger share of the £5.2 billion planned to tackle the risks of flooding and coastal erosion in sustainable drainage systems and nature-based solutions, in addition to the £200 million it has already allocated to this.⁴⁷

Shovel ready: There are a number of projects which provide short term jobs and economic growth as part of an economic stimulus. This includes 330 projects put together by Wildlife and Countryside Link which, together, create or enhance over 200,000 hectares of habitat including woodland, scrub, heath, grassland, peatland, wetlands and coastal habitats. This includes planting at least 4.5 million trees or 8,500 hectares of new woodland and reforestation. They estimate, with a £24 million investment, some of these projects, which are shovel ready, could provide 5,000 jobs in the short term in the environmental sector, and 5,000 jobs in delivery and the supply chain.⁴⁸

To promote natural infrastructure in urban centres, interventions could be targeted to the areas where economic deprivation, poor health outcomes, and low environmental quality overlap. A large proportion of this urban natural infrastructure could be delivered by a National Nature Service, as proposed by Wildlife and Countryside Link.

A rapid census could be undertaken with the support of expert bodies like Natural England, working with national and local biological recording schemes and environmental NGOs and leveraging citizen science as well as technologies such as geospatial planning and satellite imaging.

Better resource use to support a circular economy

Measures: resource efficiency in production and expanding the reuse, repair, remanufacturing and recycling sectors

Where the UK should be in 2030

The transition to a circular economy is a currently untapped area of climate policy. Just improving the use of resources in five key sectors: textiles, electronics, food and drink, vehicle manufacturing and construction, could provide over 92MtCO₂e of carbon savings over the fifth carbon budget, whilst boosting productivity and profits of manufacturers.⁴⁹

Under the EU's Circular Economy Package, the UK aims to achieve a 65 per cent municipal waste recycling rate by 2030, but the Committee on Climate Change recommends that this should be set even higher, at 70 per cent.⁵⁰ Alongside increasing recycling of materials that enter the waste stream, the UK should also focus on significant reduction of waste generated across a range of products and materials. For example, under the UN's Sustainable Development Goals, the UK should be aiming to halve food waste by 2030.

To achieve these targets, circular economy infrastructure has to be expanded. For example, we estimate that, by 2030, between 21-31 new closed loop plastics recycling plants would be needed to support a more circular economy for plastics across England; similarly, 15 new closed loop recycling plants would be needed for textiles by 2030, using innovative processes to enable 'clothing to clothing' recycling across a wide spectrum of fibres; and 17 recycling reprocessors, specialising in particular electronic appliances, would require either investment in new plants or the repurposing of existing facilities.⁵¹ The UK's supply of end of life batteries for electric vehicles could also support between 13 and 33 recycling plants in England by 2030.⁵²

Beyond improving resource efficiency, industry must also decarbonise the way that processes are fuelled, through electrification of industrial processes, using low carbon fuels or by capturing the emissions generated when fuels are burnt. These technologies are not discussed in this analysis, but further information can be found in the Committee on Climate Change's 2019 report *Net zero: the UK's contribution to stopping global warming* and the 2018 report *Hydrogen in the low carbon economy*.

Where is the UK now?

There has been limited progress towards a circular economy. The UK recycling rate has flatlined at around 44 to 45 per cent of household waste since 2011.⁵³ Rates of waste being incinerated in England doubled between 2012 and 2018, with at least 90 incinerators operational in the UK and 50 more proposed or in development. Nearly 40 per cent of England's household waste was incinerated in 2018, and about 12 per cent went to landfill.⁵⁴

In the resources and waste strategy, sustainable production is given theoretical prominence in its first chapter. But it largely lacks an outline of the concrete steps needed to promote better use of resources in production and business models, despite the current lack of infrastructure to support a circular economy (as highlighted by Green Alliance analysis for plastics, textiles and electronics).⁵⁵ There is no assessment

of the kinds of infrastructure and systems needed for such businesses to succeed. This adds to the current lack of a comprehensive list of facilities for recycling, repair, remanufacturing or reuse, making it difficult to plan the future development of the circular economy in the UK.⁵⁶

Accelerating progress in the near term:

Policy: Most importantly, the government should set out concrete programmes of action on the circular economy, building on the feedback it has received in recent consultations on its Resources and Waste Strategy. Much greater emphasis needs to be placed on better product design, to ensure greater durability, reparability (including through the availability of spare parts), reuse and remanufacturing.⁵⁷ And policy is needed to ensure that, once products reach the end of their first useful life, they can be repurpose productively within the economy, including through effective reprocessing and use of secondary raw materials.⁵⁸

To encourage correct infrastructure for a more circular economy, the government should carry out an infrastructure stocktake to assess the country's current capacity for reuse, repair and recycling, to facilitate planning for more circular waste system in the future. The government should also accelerate plans to establish a national materials database to provide more granular insight on the flow and stocks of materials across the economy.⁵⁹

Funding: The government should invest £400 million in low carbon industry and circular economy infrastructure over the four years from 2020-21. This should be spent on a business resource efficiency programme for better design, durability, reuse, refurbishment and high quality recycling.

Shovel ready: There are a number of initiatives that could be used as a basis to accelerate the transition to a circular economy. For example, reduction in packaging use could be supported through infrastructure and logistics for refilling containers, building on lessons from initiatives such as 'bring your own' container, as successfully trialled by the supermarket chain Waitrose for products like pasta, cereals and coffee. There is also significant potential to scale up the reuse sector, which for some products currently relies on more informal channels or the charity sector. For example, 55% of people would be 'likely' or 'very likely' to buy secondhand electronics.⁶⁰ Already now, about ten per cent of electronics are reused at the end of their first life, often through informal channels. Similarly, while reuse of clothing is largely supported through the charity sector, it could be significantly expanded by widening access to second hand clothing through resale alongside new sales and increasing leasing options, as already trialled by some companies.⁶¹

The government should also build on ongoing research and innovation by Innovate UK and the Catapults, and the successful National Industrial Symbiosis Programme (NISP) and the Resource Efficient Business (REBus) pilot projects. Between 2005 and 2013 more than £27 million of public funding was invested in NISP for England, to help redirect surplus resources from one industrial process for use in different processes. And the REBus projects have worked with several businesses across the UK to develop circular economy business models, resulting in more than €5.6 million in financial benefits while saving more than 60,000 tonnes of material.⁶²

A cleaner, cheaper energy system

Measures include: Low carbon energy systems

Where the UK be in 2030

Overall, the Committee on Climate Change recommends that low carbon power should reach between 75-85 per cent of overall generation in 2030, reducing emissions to below 100g of carbon per kWh. This requires a further 50-60TWh of low carbon generation that needs to be contracted to come on line by 2030⁶³. The NIC also suggests that between 86GW and 99GW of generation must be deployed by 2030, including at least 40GW of offshore wind, providing two thirds of generation in the UK to the end of 2030.⁶⁴

While some of this will be large scale low carbon generation, like large offshore wind farms, some should be small scale, community owned projects. Community Energy England estimates that, with the right policy and financial support, the community energy sector could grow by 12-20 times by 2030, providing 5.3GW of generation, enough to power 2.2 million homes, and save 2.5 MtCO₂ emissions.⁶⁵

There also needs to be growth in the storage sector. National Grid estimates we might require up to 15GW of storage capacity out to 2030 to meet our net zero emissions target, which might include batteries in electric vehicles supporting local networks as back up.⁶⁶

A clean energy system will also require scaling up infrastructure for low carbon fuels or carbon capture and storage. These technologies are not discussed in this analysis, but further information can be found in the Committee on Climate Change's 2019 report *Net zero: the UK's contribution to stopping global warming* and the 2018 report *Hydrogen in the low carbon economy*.

Where is the UK now?

The UK has seen a large increase in renewable generation over the past decade, with renewables increasing from seven per cent of annual generation to 34 per cent in 2018.⁶⁷ Combined with nuclear and biomass, the UK's power is generated by over 50 per cent of low carbon sources; and in the third quarter of 2019, renewables on their own generated more than fossil fuels for the first time in the UK's history.⁶⁸ However, there is still a gap in deployment to 2030: for example, the government is committed to supporting the deployment of 40GW of offshore wind by 2030, against the 8GW currently deployed. The UK also has 13GW of solar and 12GW of onshore wind, compared to 29-38GW and 14-18GW respectively recommended by the National Infrastructure Commission.⁶⁹

There is also a gap on community generation of low carbon power, heat and storage. Funding for community energy projects was found to total only £3.7 million in 2019. Community energy in the UK currently contributes 265MW of renewable electricity generation and 13.1MW renewable heat to the energy system, while 39 communities are involved in energy storage projects.⁷⁰ But the sector has been negatively impacted by recent reductions in subsidy support and unclear strategy from the

government, cutting the financial case for many community energy projects.⁷¹ Energy battery storage also has a long way to go, with only about 900MW of energy storage deployed across the UK since 2015.⁷²

Accelerating progress in the near term

Policy: The government must first set out its strategy for reaching its ambitions on low carbon power by publishing the Energy White Paper. This should provide the expected pathway for the energy sector to reach the net zero goal, including the expected roles of different types of technologies (including nuclear, hydrogen and carbon capture and storage) and the criteria for the next Contracts for Difference (CfD) auctions for solar, onshore wind and offshore wind.

The community energy sector must also be supported to access emerging opportunities, ensuring the long term growth and impact of the sector: the removal of feed-in tariffs and the absence of other supportive policies have limited and curtailed its growth.

Funding: The government recently announced that they would be doubling support for renewables in the next CfD auctions, scheduled for 2021, and invest £160 million for upgrading port infrastructure. The government set out a target for installing 40GW of offshore wind and 1GW of floating offshore wind by 2030. But, to achieve this, there needs to be a strategy to 2030, including more frequent CfDs or alternative routes to market, to significantly scale up the pipeline of new renewable energy projects over the course of this parliament.⁷³

Shovel ready: Estimates show there are 18GW of shovel ready renewable energy and battery storage projects in the pipeline which, if accelerated, would provide over 200,000 jobs and contribute £125 billion to the economic recovery.⁷⁴ This includes 4.7GW of onshore wind, 1.9GW of solar PV, 4.5GW of battery storage and 7GW of offshore wind. Including 'shovel-ready' projects, there is 60GW of renewable capacity in the pipeline in the UK, across offshore wind, onshore wind, solar and battery storage.

Industry estimates that an auction that secured 10.8GW of wind energy capacity would bring forward private investment of over £20 billion during the project's initial construction phase, with over £17 billion in offshore wind and over £3 billion in onshore wind. This investment will support over 12,000 new direct jobs over the 2024-26 period.⁷⁵

Endnotes

- ¹ UK Energy Research Centre found that there needs to be a 16% reduction in miles travelled per person in a private car (as either driver or passenger) from 2020 to 2030 through lifestyle and social change only. C Brand, et al, 2020, *Road to zero or road to nowhere? Disrupting transport and energy in zero carbon world*
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