National Infrastructure Commission Baseline report consultation

Written submission by Green Alliance

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About Green Alliance

Green Alliance is an independent think tank and charity focused on ambitious leadership for the environment. Since 1979, we have been working with the most influential leaders in business, NGOs and politics to accelerate political action and create transformative policy for a green and prosperous UK.

Responses

Question 1: Do the nine challenges identified by the Commission cover the most pressing issues that economic infrastructure will face over the next 30 years? If not, what other challenges should the Commission consider?

The nine challenges all address pressing issues to ensure infrastructure helps to deliver the net zero emission target and is fit for a green economy. However, we would recommend that, in examining these challenges, the Commission explicitly explores the scope for deep energy and resource demand reduction, as a cross cutting challenge and priority that is relevant to all nine areas.

Evidence from Centre for Research into Energy Demand Solutions (CREDS) highlights that reducing energy demand is key to accelerate and de-risk decarbonisation, and to lower the UK's environmental impact at home and abroad.[1] It also supports a more cost effective transition while delivering a wealth of co-benefits to communities across the country.

We recommend that the Commission explores the implications of these kinds of scenarios for infrastructure, as it presents significant opportunities to lower delivery risk and costs, and that it includes recommendations for how government could enable energy and resource demand reduction through infrastructure delivery.

Question 5: What are the main opportunities in terms of governance, policy, regulation and market mechanisms that may help solve any of the Commission's nine challenges for the Next Assessment? What are the main barriers? Your response can cover any number of the Commission's challenges.

As mentioned in our response to question 1, there are significant benefits in terms of emission reductions, cost effectiveness and other co-benefits from taking more ambitious action to deliver products and services in ways that reduce energy demand. Government has started to acknowledge these opportunities, for example in setting the ambition to make active travel and public transport the preferred option for people to travel, or acknowledging the role of resource efficiency and tackling embodied carbon in construction in lowering emissions from industry. However, so far policy, regulations and investments to make these a reality have been limited.

[1] Centre for Research into Energy Demand Solutions (CREDS), 2021, *Positive low energy futures*, https://low-energy.creds.ac.uk/the-report/

Some sector specific barriers and priorities that are relevant to the Commission's challenges:

- Power sector: the government's commitment to achieve a decarbonised power grid is welcome. To ensure effective delivery, government should, first of all, accelerate action on no regret options. This should include: developing a strategic framework to speed up and maximise offshore wind deployment; setting ambitious targets and policy for delivery of significant onshore wind and solar capacity, in line with the CCC's recommendations; ensuring progress in establishing storage capacity and flexibility. The government should also publish in 2022 a strategy for delivery of the 2035 power decarbonisation target, setting out how it plans to maximise the role of renewables and a timeline for decision points to ensure effective deployment of infrastructure needed for security of supply. Without clarity from government on its delivery strategy, there is a significant risk to hold back private sector investment and that the target will not be delivered. For more information on priority areas to achieve the target, see Green Alliance's briefing.[2]
- Heat and energy efficiency in buildings: government action to improve the energy efficiency of buildings and decarbonise heat has been insufficient so far. Policy u-turns over the past decade have led to a significant drop in investments in efficiency and heat decarbonisation, undermining growth in the required supply chains. The heat and building strategy made some welcome progress on heat decarbonisation, especially through the phase out of gas boilers by 2035, funding for heat pumps and the consultation on mandating the sale of heat pumps for boiler manufacturers. However, the scale of investment in heat pumps is insufficient to deliver the government's proposed target for 2028 of 600,000 installations per year, let alone the CCC's recommended level. Lack of clarity around the role of hydrogen in heating creates confusion among consumers and local authorities, holding back investment even in areas where hydrogen is extremely unlikely to be a solution. And funding in energy efficiency is insufficient, with no support for those 'able to pay'.[3] A more comprehensive programme of regulation, multi-year public investment and public engagement is needed to ensure UK buildings are fit for net zero.[4]
- Circular economy: action on the circular economy should not be confined to the role of the waste sector. While recycling infrastructure is important, it is even better to intervene upstream during infrastructure design, planning and commissioning. This can ensure that infrastructure is compatible with a circular economy from the start, rather than trying to solve problems at the end of life stage. This can be supported through measures such as ecodesign, building standards, public procurement and support for innovations in circular infrastructure design and associated digital technologies.
- Hydrogen: While the government has committed to a twin track approach to promote both blue and green hydrogen production, and blue hydrogen could support near term decarbonisation while green hydrogen production is scaled up, the residual emissions associated with fossil based hydrogen make it unsuitable for 2050. Therefore, the government should make sure that there is a clear roadmap to transition entirely to green hydrogen by 2050. In order to maximise emissions savings, and avoid the delivery of unnecessary hydrogen infrastructure, government should also ensure it is taken up for those targeted applications where there is no other viable decarbonisation option.
- Greenhouse gas removals: there are a number of concerns associated with greenhouse gas removals (GGR), including that overreliance on them might deter mitigation action, the scale at

[2] Green Alliance, 2021, *Power sector decarbonisation briefing*
[3] EEIG, 2021, *Analysis of the heat and buildings strategy*
[4] EEIG, 2020, *Turning stimulus into recovery*

which engineered solutions can be delivered sustainably, and the allocation of limited capacity across hard to abate sectors, with questions around whether specific sectors (eg aviation) should be allowed to access cheaper nature based solutions, or whether they should support development of more expensive engineered options, which otherwise would be challenging to pay for by less well off sectors such as farming. Green Alliance has previously argued for a new Office for Carbon Removal to ensure effective governance of greenhouse gas removals, as well as the introduction of two targets, one for residual emissions and one for removals, to promote emission mitigation action. Ensuring effective governance will be vital to futureproof delivery of infrastructure such as DACS, BECCS and CCS, including by mitigating potential trade offs, avoiding delay in private sector investment, and strengthening public buy in.[5]

Challenge 1: The digital transformation of infrastructure – the Commission will consider how the digital transformation of infrastructure could deliver higher quality, lower cost, infrastructure services.

Questions 6 & 7

Digital technology can play an important role in enabling energy and resource efficiency savings, and support the delivery of new low carbon products and services. Examples include: enabling a flexible power grid; promoting greater visibility of materials in buildings and infrastructure, to enable maintenance, refurbishment and material reuse; providing greater insight into energy and resource use in business, which can help strengthen the business case for investment in more efficient solutions; and supporting greater use of multi-modal, integrated transport options. [6]

However, without explicit consideration of environmental impacts, digital adoption could lead to unintended consequences. For example, uptake of connected autonomous vehicles without prioritising public transport and shared mobility could lead to significant congestion and increase in energy and resource use associated with a large number of unnecessary vehicles.

It could also lead to missed opportunities. For example, adoption of digital technology in the construction sector has mainly been limited to supporting building construction and, to some extent, in use, while on the contrary there has been very limited effort to incentivise the development and use of digital applications for building refurbishment and material reuse, despite the significant environmental footprint of construction waste.[7]

While there are a number of barriers to digital adoption and development of digitally enabled products and services (including skills, data governance etc), we have identified that a lack of join up between digitalisation and environmental policy is also preventing these applications.[8]

A number of steps are needed to ensure effective deployment of these solutions, including: ensuring government sets a requirement for digital adoption to prioritise environmental outcomes, while also supporting opportunities for digitalisation and data to policy aimed at environmental improvement; ensuring there are the policy drivers for data gathering and utilisation for environmental improvements

[5] Green Alliance, 2020, *The flight path to net zero*
[6] Green Alliance, 2020, *Smart building*; Green Alliance, 2020, *A smarter way to save energy*
[7] Green Alliance, 2020, *Smart building*
[8] Green Alliance, 2020, *Smart and green*

in key sectors such as transport, manufacturing, construction and land use; strengthening digital skills; tackling the environmental footprint of digital infrastructure itself. [9]

2. Reaching net zero

Challenge 2: Decarbonising electricity generation – the Commission will consider how a decarbonised, secure and flexible electricity system can be achieved by 2035 at low cost.

Question 8: What are the greatest risks to security of supply in a decarbonised power system that meets government ambition for 2035 and what solutions exist to mitigate these risks?

To achieve the 2035 power decarbonisation target and ensure security of supply, government should follow a hierarchy of solutions, starting from energy demand reduction (through energy efficiency and strategic deployment of infrastructure across other sectors eg limiting demand car EVs and ensuring targeted hydrogen deployment), maximising flexible solutions such as demand side response, interconnectors and storage, and maximising the role of renewables.[10] Green Alliance is currently conducting further research on the mix of technologies and policy interventions that can help ensure security of supply, and we will make sure to share any relevant findings and reports with the Commission.

Challenge 3: Heat transition and energy efficiency – the Commission will identify a viable pathway for heat decarbonisation and set out recommendations for policies and funding to deliver net zero heat to all homes and businesses.

Questions 9 & 10

One of the main barriers to heat decarbonisation and energy efficiency has been the lack, or inconsistency, of government policy and funding.[11] This has limited uptake of these measures, and has undermine growth in the respective supply chains.

Furthermore, energy efficiency hasn't been treated as an innovation opportunity that can benefit from new construction methods and industrialisation, with the result that interventions tend to constrained to incremental improvements and with limited opportunities for cost reductions. In this respect, one area that could offer a promising route to delivering deep emission reductions, while also boosting the productivity of the construction sector and creating high skilled jobs, is whole building retrofit. These innovative home retrofits, like Energiesprong, could cut a home's emissions by up to 90 per cent, but require economies of scale to come down in costs.[12] By providing funding on a commit and review basis, conditional on costs coming down to an agreed level, and supporting a pipeline of projects, government could establish whole building retrofit as an innovative solutions to upgrade UK buildings. Given the potential benefits, we recommend that the Commission, in addressing challenge 3, examines the scalability of this type of home efficiency intervention and steps needed for government to realise its full potential.

Currently, lack of clarity from government around the role that heat pumps, hydrogen or heat networks are likely to play across different parts of the country, is causing confusion amongst the public and holding back local action, despite there being areas where, for example, hydrogen is very unlikely to

[9] Green Alliance, 2020, *Smart and green*
[10] Green Alliance, 2021, *Power sector decarbonisation briefing*
[11] EEIG, 2020, *Turning stimulus into recovery*
[12] Green Alliance, 2019, *Reinventing retrofit*

prove cost effective. There are also concerns that blending hydrogen into the gas grid will lead to further confusion and delay in the uptake of heat pumps. In its next National Infrastructure Assessment, we would welcome recommendations on heat decarbonisation to also consider priorities at regional level, and to advise on government interventions needed to accelerate local action where there is greater certainty on the optimal decarbonisation option or on options that can be excluded.

Challenge 4: Networks for hydrogen and carbon capture and storage - the Commission will assess the hydrogen and carbon capture and storage required across the economy, and the policy and funding frameworks needed to deliver it over the next 10-30 years.

Question 11: What barriers exist to the long term growth of the hydrogen sector beyond 2030 and how can they be overcome? Are any parts of the value chain (production, storage, transportation) more challenging than others and if so why?

Hydrogen will play an important role in decarbonising parts of the economy where other options such as energy and resource efficiency, or electrification, will not be possible. Given the limited availability of green hydrogen, especially in the near term, government policy should ensure uptake is targeted at applications that most need it, such as heat in industry, steel, aviation, shipping and long duration storage in the power sector. While the government's Hydrogen strategy does identify industry, power and transport as priority sectors in the near term, it suggests significant more uncertainty in after 2030. Furthermore, plans to blend hydrogen into the gas grid to divert a limited resource away from the priority areas indicated above. Therefore much more specific policies and incentives are required to ensure targeted hydrogen deployment. Targeted deployment will also help to limit the need for expansion of the power grid, and help to deliver decarbonisation more efficiently and cost effectively.

While blue hydrogen might play a role in reducing the UK's emissions in the near term (to help maximise decarbonisation while renewable capacity is scale up), in line with the Climate Change Committee's recommendation set out in its sixth carbon budget advice, the UK should aim to transition entirely to green hydrogen production by 2050. Green hydrogen, produced with clean power, is the only truly zero emission hydrogen production route, while blue hydrogen, even under the best case scenario, will have residual emissions. The government's Hydrogen Strategy sets out a twin track approach that fails to provide a clear roadmap to transition away from blue hydrogen production by 2050. Establishing such roadmap, and ensuring policies such as the proposed business models and low carbon hydrogen standards support that transition, will be vital not only to ensure the appropriate scale of supply chains, but also to avoid lock in of blue hydrogen infrastructure.

Finally, there is need for more extensive stakeholder engagement in policy development on hydrogen, as this will help futureproof policy and strengthen public support.

3. Climate resilience and the environment

Challenge 7: Waste and the circular economy – the Commission will examine the role of the waste sector in enabling the move towards a more circular economy.

Question 14: What are the barriers to and solutions for expanding recycling capacity, both now and in the future to deliver environmental and net zero targets?

We welcome the Commission's plan to examine routes to enable the circular economy. Crucially, as the circular economy is not only, or even mainly, about recycling, we recommend that the Commissions explores higher value solutions such as extending product lifetimes through measures such as leasing &

sharing models, and design for repair, reuse and remanufacturing. These, combined with waste prevention measures, can reduce the material and carbon footprint of products.

Barriers to & solutions for expanding recycling capacity:

- **Unaccountable waste exports:** Much of what is currently recorded as recycled is exported, with very little accountability over its final destination and treatment, even when it is legal. Solution: Better enforcement of rules aimed at ensuring exports only go to suitable treatment facilities would incentivise expansion of domestic recycling.
- **Incentives to incinerate waste:** The economic incentives favour waste energy from waste (EfW), as it does not face a tax equivalent to Landfill Tax, generates income from energy, and is not subject to ETS. In addition, long term contracts lock local authorities into providing minimum quantities of waste for burning, disincentivising reuse and recycling. Solution: widen Landfill Tax to a Residual Waste Tax that also covers EfW; subject EfW to the ETS scheme along with other power producers; a moratorium on new EfW plants.
- **Lack of producer incentives:** Where producers face cheaper costs for raw materials than for recycled inputs, and do not face the waste management costs of the items they produce, they have little incentive to incorporate recycled content or to design for durability, reuse and recyclability. Solution: extended producer responsibility (EPR) schemes can shift these incentives, and the pace needs to be increased on these; taxes on raw materials such as the Plastic Packaging Tax can generate market demand for recycled materials.
- **Inadequate ecodesign rules:** Product standards can ensure that items are designed for reuse, repair and recycling, for instance by making it easier to dissemble items and by banning the use of hazardous substances. Solution: strengthen ecodesign regulations and expand them to cover many more products—from consumer goods to buildings and infrastructure.
- **Inadequate waste collection and separation:** To incentivise recycling in the UK, we need to provide high quality recyclate that waste management firms can turn into a profit. Solution: accelerate measures to standardise and expand curbside recycling collections; accelerate roll-out of reformed EPR schemes and deposit return schemes; regular review of materials that frequently contaminate recycling batches, such as compostable plastics.
- **Lack of information on recycling infrastructure and waste flows.** There is no database of recycling facilities in the UK; and work has stalled on the development of a National Materials Datahub that could facilitate more efficient, value-added use of waste streams. Solution: invest in better mapping of waste infrastructure and material flows.

Question 15: What is the likely environmental impact of waste streams from construction across economic infrastructure sectors, over the next 30 years, and what are the appropriate measures for addressing it?

Construction, demolition and excavation generated 62 per cent of total UK waste in 2018 (Defra). However, there are significant opportunities to reduce waste. Improving resource efficiency in the construction sector could reduce emissions by 79.14 MtCO2e between 2023 and 2032 (Green Alliance, 2018, *Less in, more out*).

Measures to promote this include:

- **Requiring reporting of, and setting targets for, embodied emissions.** The concept of embodied emissions in building materials and components should be integrated into building regulations and the planning system. A roadmap should be established to introduce requirements for first

reporting, and then setting targets to reduce, embodied emissions. These requirements should be embedded in the planning system and building regulations.

- **Incentivise refurbishment over new build**. Refurbishment of existing stock requires fewer materials (so less embodied carbon and other environmental impacts) while reducing pressure on land use. Simple measures such as cutting VAT on refurbishment should be accompanied by steps to address embodied emissions (see above).
- **Incentivise circular design.** Policy should incentivise adoption of emerging methods such as modular and off-site design, and increased reuse of building components and materials. Measures to explore include extended producer responsibility and other ways of making it more expensive to send demolition waste to landfill; updates to Building Standards; use of public procurement; requirements for private sector procurement of major infrastructure projects.
- **Facilitate reuse.** Build the data infrastructure around construction material flows, to facilitate reuse of components and materials at highest value.

4. Levelling up

Challenge 8: Urban mobility and congestion – the Commission will examine how the development of at scale mass transit systems can support productivity in cities and city regions and consider the role of congestion charging and other demand management measures.

Question 16: What evidence is there of the effectiveness in reducing congestion of different approaches to demand management used in cities around the world, including, but not limited to, congestion charging, and what are the different approaches used to build public consensus for such measures?

Government should take decisive action to promote these measures now, in order to futureproof the transition to net zero in the event that EV uptake falls short of what the CCC has recommended. Our analysis finds that, if EV uptake were to be in line with DfT's more pessimistic scenario, traffic would need to be reduced by 27 per cent compared to 2019 levels, to meet the UK's climate targets.[13] Efforts to reduce road traffic would also deliver benefits such as reducing congestion, which cost the UK economy £8 billion in 2018 alone, and improving air quality.

Reducing traffic and demand for car use will require investment into public transport and active travel infrastructure, and government should ensure local areas are appropriately resourced to develop local transport plans that are aligned with net zero and promote car free travel.

There is extensive evidence that housing developments across England have been poorly designed and locked people into car based living. [14] Low carbon transport must also be embedded into local planning decisions to improve convenience and therefore increase patronage. This includes setting requirements for housing developments to be build where low carbon transport options are available or can be supported, with a requirement for such options to be available day one of residency.

Further options to support traffic reduction include schemes such as congestion charging and clean air zones. Existing schemes in Singapore, Germany, New Zealand and France demonstrate that there is political and practical feasibility to road pricing schemes. For successful implementation in the UK, such schemes should be well communicated to the public to ensure buy-in and designed with equity in mind, including by complementing it with greater access to alternatives such as public transport. This also

[13] Green Alliance, 2021, *Not going the extra mile*

[14] Transport for New Homes, Garden villages and garden towns: visions and reality;

applies for potential changes to national level road taxes. Given that road pricing is indicated as a likely replacement of fuel duty, as the UK transition to EVs, the Treasury should not delay public engagement around the future of road taxes, in order to ensure its effective design and uptake.

Clean Air Zones are a further example of schemes that can help reduce the number of private vehicles travelling in a certain area. As with road pricing, their implementation needs to be properly communicated to the public, they should be designed to mitigate impacts on vulnerable groups, and should be complemented by greater access to cleaner transport options, as emphasised in our report.[15]

Low traffic neighbourhoods could also help. The first low traffic neighbourhood (LTN) in London, Waltham Forest reduced traffic volumes by over half within the residential area. This impact was also felt on surrounding roads outside of the LTN. Additionally, the LTN had a positive correlation with the increase in active travel. NatCen stressed that to improve the implementation of Low Traffic Neighbourhoods, consultations must be informative, evidence-based, and inclusive.

Challenge 9: Interurban transport across modes – the Commission will consider relative priorities and long term investment needs, including the role of new technologies, as part of a strategic multimodal transport plan.

Question 17: What are the barriers to a decision making framework on interurban transport that reflects a balanced approach across different transport modes?

Any decision-making framework should include reference to the emissions per mile travelled for each mode of interurban transport used and prioritise those with lower emissions. This would see improved infrastructure for existing services, such as rail and coaches, and encourage further electrification of the rail network and bus operators. It would also likely see the deprioritisation of aviation, as a highly polluting mode of transport, including discouraging airport expansion. A framework should also include reference to the ease with which users have access to public transport modes, especially in rural and low-income areas, to ensure equity in access to travel.

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[15] Green Alliance, 2021, *The case for clean air zones*