

# COVID-19 and Net Zero: challenges and opportunities for the built and urban environment

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- In 2008 the UK set an ambitious goal of decreasing its greenhouse gas emissions by 80% of 1990 levels by 2050; on 27 June 2019 the Government legislated to increase its ambition, committing to net zero emissions by 2050 (i.e. a reduction of 100% compared to 1990 levels).
- The Climate Change Act also sets legally binding interim targets for five-year Carbon Budget periods. In the short-term, policy decisions aim to meet the 4th and 5th carbon budgets (CB4, 2023-27, and CB5, 2028-32) with a requirement for the 6<sup>th</sup> Carbon Budget to be set during the first half of 2021.
- Under the Paris Agreement, each signatory must publish a Nationally Determined Contribution (NDC) which is a signal of their "highest possible ambition" and the UK's 2030 NDC will set tone for ambition at COP26.
- While we have made strong progress to date, UK emissions are currently projected to significantly exceed our legal emissions caps (Carbon Budgets 4 and 5, 2023-32) and a considerable step change is required.

Department for Business, Energy & Industrial Strategy

18 January, 2021

## National Infrastructure Strategy

Fairer, faster, greener

HM Treasury

Describes how the government will:

- Boost growth and productivity across the whole of the UK, levelling up and strengthening the Union.
- Put the UK on the path to meeting its net zero emissions target by 2050.
- Support private investment.
- Accelerate and improve delivery.

#### HM Government

#### **The Ten Point Plan** for a Green Industrial **Revolution**

Building back better, supporting green jobs, and accelerating our path to net zero

November 2020

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Point 1 Advancing Offshore Wind



Delivering New and Advanced Nuclear Power

Accelerating the Shift to Zero Emission Vehicles

Green Public Transport, Cycling and Walking

Jet Zero and Green Ships

Greener Buildings

Investing in Carbon Capture, Usage and Storage



Protecting Our Natural Environment

Green Finance and Innovation

203 Department for Business, Energy & Industrial Strategy

4 10 Point Plan

#### To achieve net zero by 2050, an economy-wide transformation is required

#### Land Use / **Buildings (Domestic)** Greenhouse gas removals Transport **Business & Industry** Power **Natural Resources** 28% of emissions 25% of emissions 15% of emissions 15% of emissions 15% of emissions Ministry of Housing, Department for Department for Department for Department for Department for Department Department Department Communities & Business, Energy Business, Energy Business, Energy Business, Energy Business, Energy for Environment for Environment Local Government for Transport & Industrial Strategy & Industrial Strategy & Industrial Strategy Food & Bural Affairs & Industrial Strategy & Industrial Strategy Food & Rural Affairs Green Homes Grant - £2bn to £100 million to research and Transport Decarbonisation Carbon Capture & Storage -Energy White Paper to be Nature for Climate Fund support homeowners and landlords develop Direct Air Capture £640m to plant 30K trees and plan: Part 1 announced in March £800m to establish CCS in at published this autumn in upgrading the energy 2020 restore 35K hectares of technologies least two UK sites. performance of their homes peatland £160 million to make the UK a Ultra-low emission vehicles world leader in clean wind Red diesel reform, removing Public Sector Decarbonisation £2.5bn for charging infrastructure Landmark Environment Bill the entitlement to use red energy Scheme - £1bn to upgrade public and extending Plug in-Grants to announced sector buildings diesel from most sectors from 2023 April 2022 Onshore wind and solar Flood Defences - £5.2bn (over **Social Housing Decarbonisation** projects will be able to bid for Clean Transport Package - £5bn six vears) **Fund** - £50m for innovative contracts in the next Contracts Heavy Industry -£350 million over five years to create a new era approaches to retrofitting social for Difference allocation round to cut emissions in heavy for walking and cycling including Green Recovery Challenge housing planned to open in 2021 4,000 new zero carbon buses industry Fund - £40m to support environmental charities and local Building techniques - £26m to Automotive Transformation Fun authorities More than £100m of innovation support advanced new d-£10m for the first wave of R&D and industrial strategy funding building/construction techniques to projects now available into Advanced Nuclear R&D. Recommitted to planting 75,000 cut costs/carbon acres of trees every year by 203 Department for

Business, Energy & Industrial Strategy

#### ILLUSTRATIVE COMMITMENTS - NOT EXHAUSTIVE



#### Systems and highly interrelated – policy challenges interlinked





## **Flourishing Systems**

cdbb

Flourishing

systems

This paper advocates a visio for infinitructure that is

Gille Smart Infrastruct

People-focused – recognising the fundamental role of infrastructure in the social, economic and environmental outcomes that determine the quality of people's lives.

Systems-based – recognising infrastructure as a complex, interconnected system of systems that must deliver continuous service to society.

It articulates how the industry should re-envision itself to unlock greater value for people, from the systems.

UNIVERSITY OF CAMBRIDGE A vision for infrastructure that is:

**People-focused** – recognising the fundamental role of infrastructure in the social, economic and environmental outcomes that determine the quality of people's lives.

**Systems-based** – recognising infrastructure as a complex, interconnected system of systems that must deliver continuous service to society.





**COVID-19 and Net Zero** 



Morawska et al. , Env. Intl, <u>142</u>, 2020.

Future Ventilation 9



#### What Goes Into a Net-Zero Home? Houses can be built with such energy efficiency that their electricity needs are offset by a few



#### **Defining a Digital Twin**



Represents assets in the physical world with a digital model



Is NOT just a data model. It must include relational interaction



Looks and feels like the real environment



Connects with relevant time data to ensure the model mirrors reality





Simulates models forward with varying degrees of fidelity



# **BEIS & BIM – Building Information Modelling**



- BIM is the management of information through the whole life cycle of a built asset, from initial design all the way through to construction, maintaining and finally de-commissioning, through the use of digital Modelling.
- Building Information Modelling allows design and construction teams to communicate about design and coordinate information across different levels that has been unseen before.

HM Government

Industrial strategy: government and industry in partnership



Building Information Modelling

# **BIM – Building Information Modelling**

#### Liverpool station

### Victoria Station







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## **Smart City**

# Data driven

# Sustainable, resilient and prosperous

# User-focused and flexible



OFFICIAL-SENSITIVE - for INTERNAL HMG USE ONLY

# Summary



There is a significant challenge presented by Net Zero that is pervasive.



Is there a juxtaposition between the post-Covid world and Net Zero in terms of ventilation?



Digital twins offer a multitude of possibilities in the built environment – merge of physical and digital critical to delivery of Net Zero





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