

The background of the slide is a dense field of 3D-rendered numbers in various shades of blue and white. The numbers are of different sizes and are scattered across the entire frame, creating a sense of depth and complexity. Some numbers are in the foreground, appearing larger and more detailed, while others are in the background, appearing smaller and more blurred. The overall effect is a digital, data-driven aesthetic.

Artificial Intelligence in UK Manufacturing

The Environmental
Impact

Topics

- ◆ 1. Introduction.
- ◆ 2. The Productivity Headache.
- ◆ 3. Innovation.
- ◆ 4. Decarbonisation.
- ◆ 5. What is Artificial Intelligence.
- ◆ 6. The Environmental Cost of Artificial Intelligence.

1. Introduction

In 2021, the UK Government released the following strategic documents:

- Decarbonisation Strategy (March 21).
- Innovation Strategy (July 21).

These documents place a significant emphasis on Artificial Intelligence (AI) to help solve the UK's productivity and decarbonisation challenges. In September 2021, the UK Government published its National AI Strategy.

There is little doubt that AI algorithms can solve complex problems and support improved decision making within industry. However, these algorithms require significant amounts of data and computing power. There is also a growing body of evidence around the negative impact that this is having on rare earth minerals, the earth's natural resources and energy requirements.

The proposed report looks at the darker side of AI and challenges whether the benefits outweigh the environmental costs. It also looks at the developments in computing that could minimise the negative environmental impacts.

2. The UK Productivity Headache

Growth has been falling for several decades. Productivity has fallen behind comparator countries, and is now around a fifth lower than Germany, France, and the US.

The UK has just experienced the worst decade for productivity growth since the early 1800s.

The estimated average annual increase in UK productivity in the last decade (2010 to 2020) was 0.3% - a fact so noteworthy, that the Royal Society for Statistics made it the 'UK Statistic of the Decade'

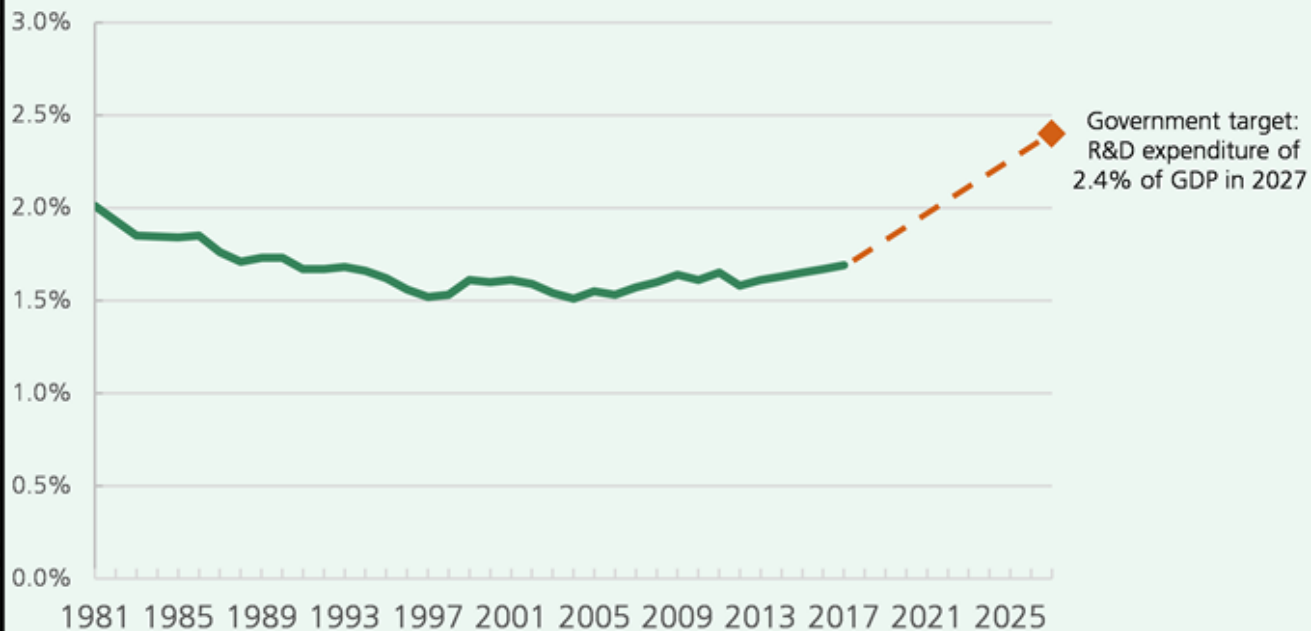
"The UK should be the most innovative country in the world"

The conservative manifesto of 2017

Setting the target that the UK shall meet the current OECD average for investment in R&D – that is, 2.4 per cent of GDP – within ten years, with a longer-term goal of three per cent.

Gross expenditure on research and development

UK, as a % of GDP



Source: ONS, Series GLBH, and Commons Library calculations

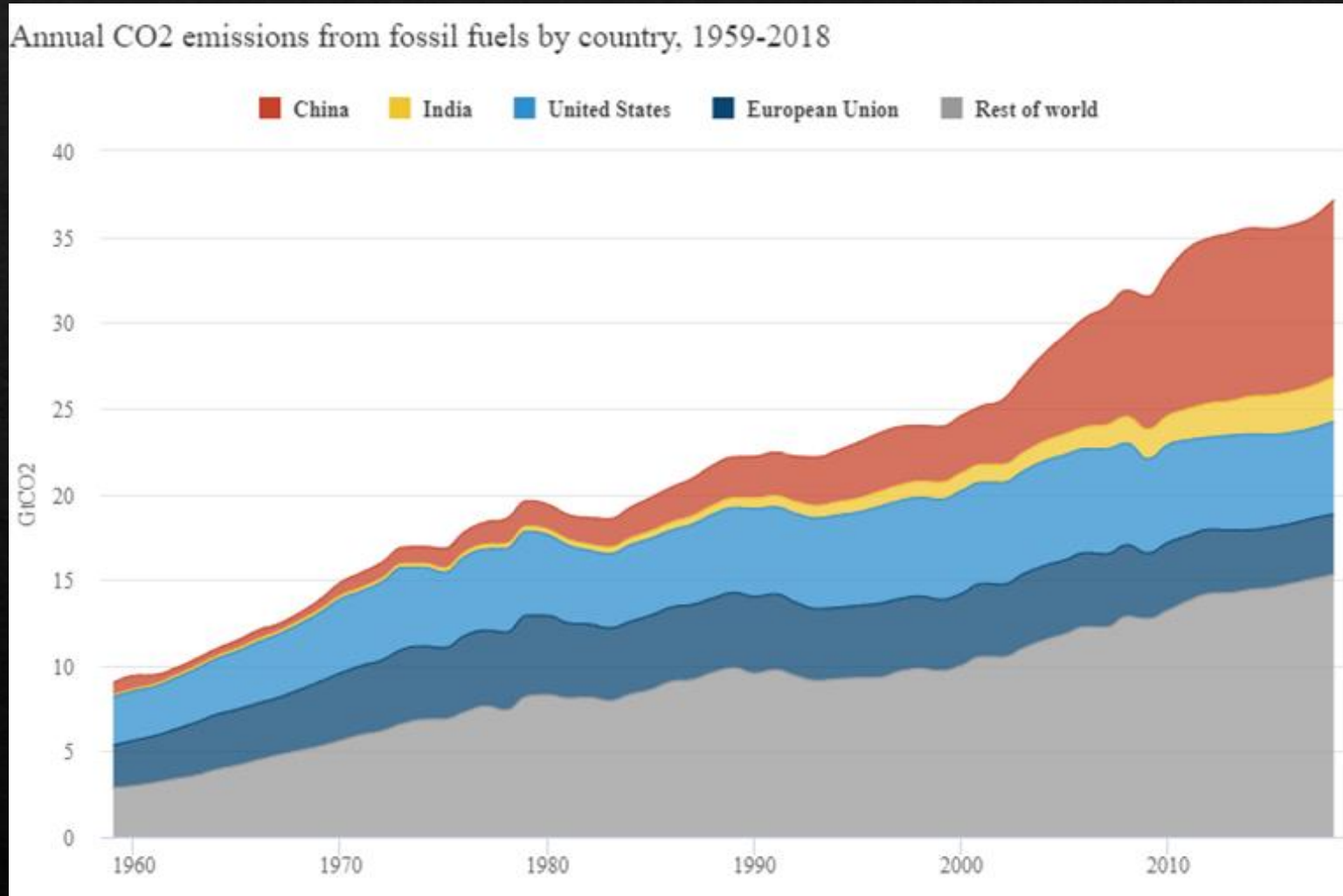
3. Innovation

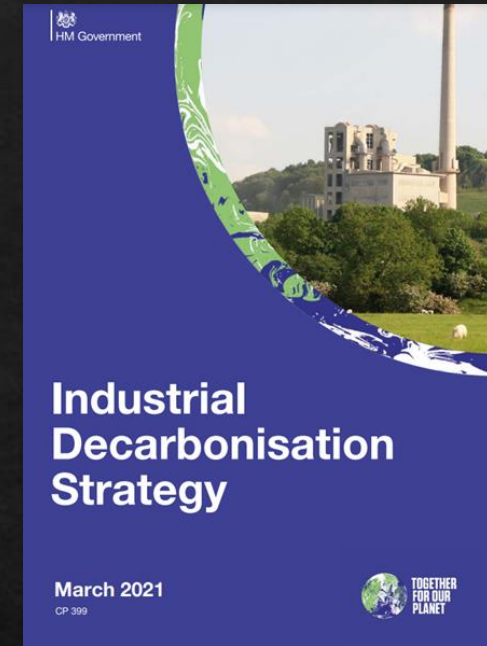
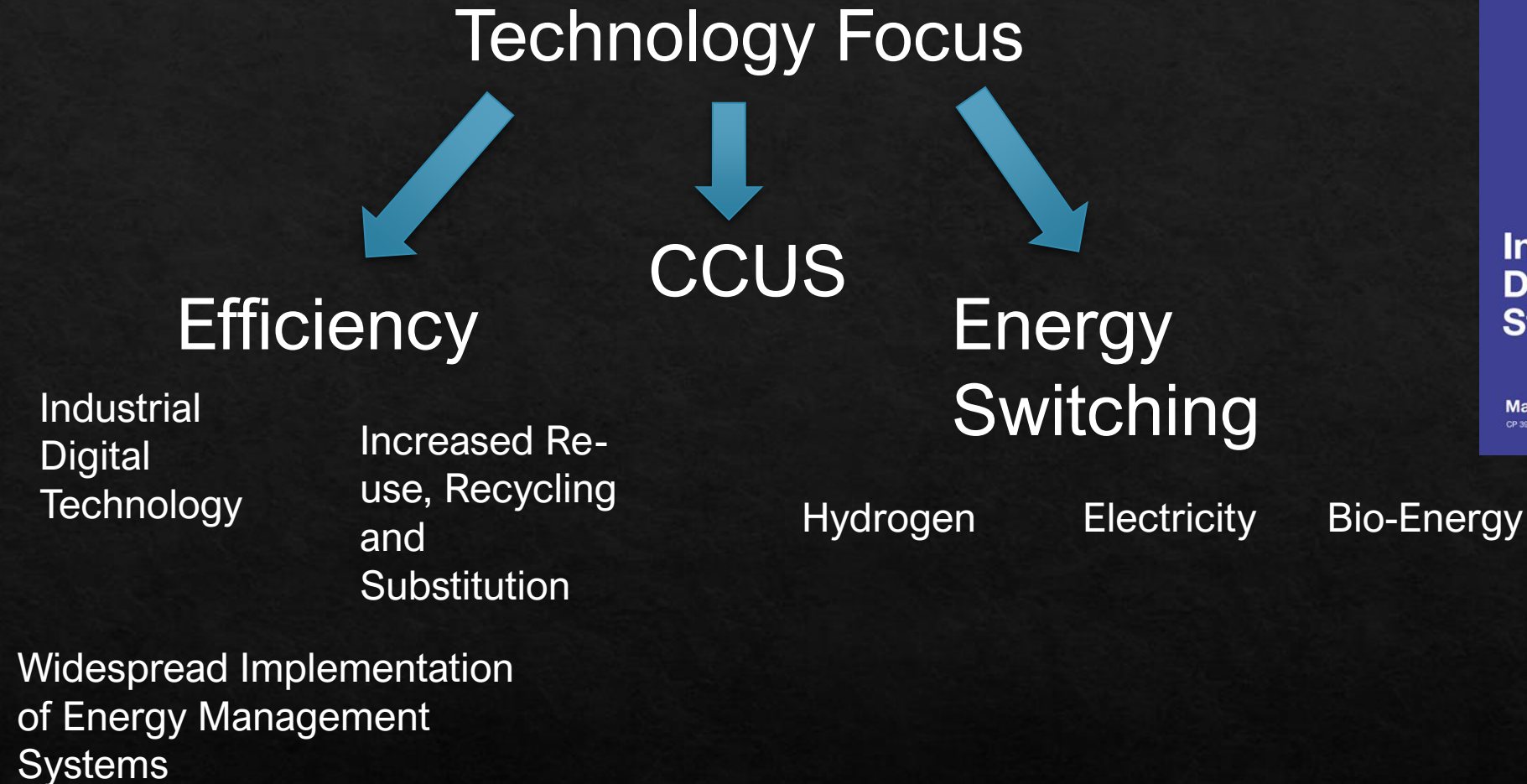
Innovative firms grow faster than other firms.

Innovation is also at the heart of promoting wellbeing and quality of life for UK citizens, ensuring our global contribution to help solve the world's biggest challenges.

Artificial Intelligence is identified as one of seven technology families where the UK has globally competitive R&D and industrial strength.

4. Decarbonisation





Recent advances in AI offer opportunities to rapidly increase the efficiency of energy systems and help reduce emissions across a wide array of climate change challenges.

5. What is Artificial Intelligence?

- ◆ Algorithms enabled by constraints, exposed by representations that support the making of models that facilitate an understanding of -

Thinking

Perception

Action

UK AI Strategy

The ambition - AI will become mainstream in much of the economy and action will be required to ensure every sector and region of the UK benefit from this transition;



6. The Environmental Cost of AI

- ◆ Strategic Earth Minerals – Batteries are the engine of the 4th Industrial Revolution. There is a huge demand for Lithium. The excavation, processing and transportation of this mineral that is mined for use in Lithium-ion batteries creates a significant carbon footprint.
- ◆ Rare Earth Minerals – Many of the Earth's rare minerals are used in computing – hard drives, batteries, graphics etc..
- ◆ A Life Cycle Analysis performed by in 2019, determined that running a single Natural Language Processing model produced more than 0.3MtCo₂e emissions. The Annual emissions for UK Industry is 84MtCo₂e
- ◆ Data Centres consume enormous amounts of electricity and water.

References

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- ◆ Towards an Equitable Digital Society: Artificial Intelligence (AI) and Corporate Digital Responsibility (CDR) – Elliot, Price, Shaw, Spiliotopoulos, Ng, Coopamootoo, Moorsel – Online – May 2021.
- ◆ Is the Carbon footprint of AI too big? – Kobielus – InfoWorld – 2020.