Green growth and Net Zero policy in the UK: some conceptual and measurement issues

EXECUTIVE SUMMARY

Climate change remains one of the biggest and most complicated issues facing the modern world. The main policy approaches to tackling this issue is to reduce emissions from greenhouse gases (GHGs) to zero by 2050. This Net Zero approach is the stated policy of the UK and the European Union, with China aiming for 2060 and India aiming for 2070.
It is an enormous task to decouple the UK economy from fossil fuels consumption, which has powered its economy since the first industrial revolution, while trying to boost the UK's lagging productivity.

One of the approaches is green growth, which has been recognised by policymakers as sustainable growth that delivers win-win outcomes for society based on the assumption that it fosters environmental protection while at the same time speeds up (or does not reduce) the pace of economic growth. But it's difficult to track how effective that is using conventional measurement.

This research discusses the challenges for an advanced economy with a Net Zero target to grow Total Factor Productivity (TFP). Despite the popularity of green growth and a green industrial revolution concept, it shows that they are difficult to pin down, both theoretically and in terms of measurement.

Green growth

The World Bank describes green growth as 'growth that is efficient in its use of natural resources, clean in that it minimises pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters'. The operational definition is GDP growth without emissions growth - i.e. an absolute fall in emission intensity.

Green growth builds on the concern for sustainable development which dates back several decades. It includes the debate around the role of conventional GDP growth in reducing poverty and inequality vs the short- and long-term health and environmental consequences of fossil fuel driven economic development.

Green economy

This term was first coined in a 1989 report commissioned by the UK Government by a group of leading environmental economists called ***Blueprint for a Green Economy*** but it did not explicitly define the term. The United Nations Environment Programme defines a green economy as one that simultaneously grows income and improves human well-being 'while significantly reducing environmental risks and ecological scarcities'.

One concept of green growth advocates poverty reduction and global equity and aligns with the UN Sustainable Development Goals. The other places high priority on transformation in industry and energy, with public-private collaboration, and the use of energy policies and innovations aimed at enhancing labour productivity and energy efficiency. Proponents of green growth, such as OECD, the UNI Environment Program and the World Bank argue it can enhance both environmental performance and economic well-being in both the short and long term. Critics say conventional economic growth will be stifled due to economic constraints required for sustainable growth.

At the core of green growth in the developed economies is a reduced reliance on fossil fuels and a switch away from these dirty fuels to alternative zero-carbon energy sources such as wind, solar, hydro or nuclear power.

Greenhouse gases (GHGs) are gases in the earth's atmosphere that trap heat. An increase in the GHGs means the earth's natural greenhouse effect has changed and this increase is a key cause of global warming and climate change. GHGs include the natural gases of **carbon dioxide**, caused by the burning of fossil fuels and large-scale deforestation and the main contributor to climate change; **methane**, which is released by cattle farming, landfill waste dumps and the traditional production of oil and gas; and **nitrous oxide**, which is produced through the large-scale use of fertilizers, fossil-fuel combustion and biomass burning. Industrial gases – **hydroflurocarbons**, **perflurocarbons** and **sulpur hexafluoride** are present in small concentrations but trap atmospheric heat very effectively.

Source: The National Grid

To read more about the research synthesised in this Executive Summary and for a full list of sources, please read The Productivity Institute Working Paper 24, *Green growth and Net Zero policy in the UK: some conceptual and measurement issues* by Victor Ajayi and Michael Pollitt from the Energy Policy Research Group based at Cambridge Judge Business School, Cambridge University.

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GDP Measurement Issues

Gross Domestic Product (GDP) measures the size of a country's economy and can be measured three ways – the total value of goods and services (output) produced; everyone's income; or what everyone in the country has spent.

GDP is important for understanding the business cycle and to estimate long-run growth but is not a measure of welfare and does not capture economic inequality or sustainability. It only accounts for the production measure while other factors that influence living standards (natural environment, leisure, inequality, mortality, morbidity, crime) are not property accounted for.

The effects of climate change are not always accurately captured using GDP - for example, the electricity produced and sold by an electric utility is included in GDP but the negative impacts on global warming associated with electricity production are not properly accounted for in GDP.

To account for the impact of sustainability, an adjusted measure of GDP is being undertaken by the UK Office National Statistics (ONS) to incorporate the depletion of natural resources and the degradation of the environment.

Green growth and GDP

Green growth would herald a fundamental alteration to the composition of GDP, with less priority on increased material throughputs.

Decoupling GDP from the flow of emissions is different from decoupling economic activity from the environmental and material resource use on which continued economic expansion relies.

Hence, green growth can be regarded as being proof of a steady state economy (one that seeks a balance between production growth and population growth) where increasing throughputs in the economic system is no longer the objective.

This raises the challenge of decoupling GDP growth from material throughput and carbon emissions in a relatively short period of time. This also reinforces the divided views about whether a permanent decoupling might guarantee an endless economic growth. Hence, the question remains whether the pursuit of green growth is a guaranteed route to continuous economic growth or a route to economic stagnation.

Meeting global temperature targets

At the global level, it has been argued that in order to meet global temperature targets under the Paris Agreement, about 33 percent of oil reserves, 50 percent of gas reserves and more than 80 percent of proved recoverable coal reserves must remain unburned.

Therefore, oil, gas and energy intensive industries which are at the heart of stock markets and pay disproportionate dividends as well as whose operation and income rely on fossil fuel production or utilisation will suffer losses. Thus, the end of the carbon economy could imply financial value destruction.

Total Factor Productivity (TFP)

This is a measure of economic performance which examines the overall efficiency with which labour and capital inputs are used together in the production process. TFP, also known as Multi-Factor Productivity, is part of GDP growth that cannot be explained by changes in labour and capital inputs. The TFP growth framework is based on value added instead of gross output, implying that intermediate inputs have been excluded from output, so that productivity growth can occur only through value-added. The Office for National Statistics measure TFP quarterly and annually.

Coal, the most carbon intensive fossil fuel, was once synonymous with UK economy. Phasing it out completely is key to the UK achieving its emissions reduction. The share of coal employment in total employment in UK averaged 2.3% p.a between 1913 and 2018 but is now negligible and its barely used in the UK energy system. Coal did not run out in the UK - it was simply left in the ground as being too high cost to be worth extracting.

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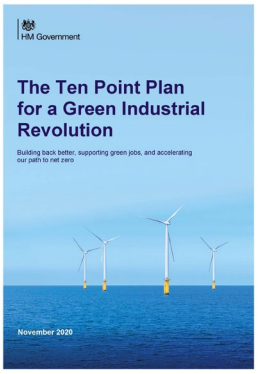
UK Green industrial policy and the green industrial revolution

Green industrial policy is a UK focus not only to fast-track economic recovery from the COVID-19 pandemic but also for promoting sustainable growth. However, green industrial policy is premised on the need to complement environmental and energy policies with strategic measures to reduce inequality and unemployment in the country.

The Ten Point Plan for a Green Industrial Revolution as set out by the UK Prime Minister in 2020 spans energy, transport and industry, including the mobilisation of government funding, amounting to £12 billion. In general, the Plan is centred on the combination of energy policies and innovation incentives aimed at boosting labour productivity and energy efficiency including:

1. Advancing the offshore wind
2. Driving the growth of low hydrogen
3. Delivering new and advanced nuclear power
4. Accelerating the shift to zero emission vehicles
5. Green public transport, cycling and walking
6. Jet zero and green ships
7. Green buildings
8. Investing in carbon capture, usage and storage
9. Protecting our natural environment
10. Green and finance and innovation



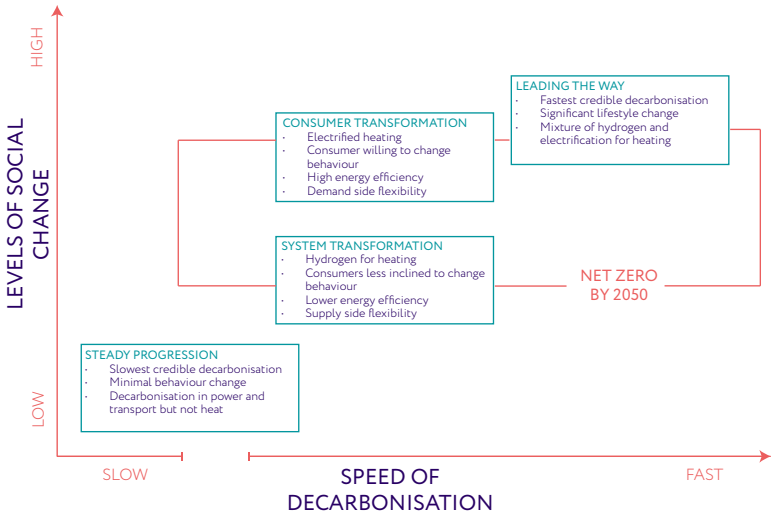
There are concerns about the ability of the Plan to facilitate any far-reaching green industrial revolution in the UK; some aspects are non-market activity, like walking; in others, like hydrogen and carbon capture, there is little UK experience.

Green jobs imply potential job losses in traditional carbon-intensive sectors (oil and gas) due to necessary decline (under Net Zero) in demand for their goods and services. These workers will need to adapt and transition to new carbon neutral industries.

Studies have shown that the UK oil and gas sector lost more than 70,000 direct jobs in addition to those in the supply chain between 2014 and 2017, with about 80,000 workers projected to exit the sector between 2018 and 2035 as result of natural attrition. Research has shown renewable projects create fewer jobs, with the exception of solar.

Energy sector productivity under Net Zero

To illustrate the challenge of raising, or even maintaining, the level of TFP in the electricity sector in the years up to 2050, the researchers created a worked example of projected growth under Net Zero. The example, which can be read in full in the paper, used detailed projections of electricity supply and demand from National Grid Electricity System Operator (NG ESO), the system operator of the Great Britain's electricity grid. They have set out four scenario frameworks help to identify a spectrum of separate, credible pathways to decarbonise the UK energy system by 2050.



Adapted from National Grid ESO

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How the circular economy could help green energy resource constraints

The continuous use of minerals and elements essential for the low-carbon transition could possibly exacerbate social and environmental challenges. The rapid deployment of clean energy technologies has meant a significant rise in demand for certain rare minerals. And wind turbines have a typical operational lifespan of 20-25 years from commissioning, generating large volume of composite material waste from end-of-life blades. This waste generation is a serious problem due to the type of materials used and their complex composition.

The friction between economic and ecological interests could be reconciled by implementing a so-called 'circular economy' which underscores economic development with the minimum amount of harmful environmental impacts. It emphasises reduced material consumption and increased material recycling. Instead of the 'take, make, use and dispose' approach, the circular economy focuses on the 4Rs of **reducing, reusing, recycling, and recovering** materials in production–consumption activities.

A key indicator of the circular economy is resource productivity, as measured by material reuse, recycling rate and the rate of waste.

Resource productivity

Resource productivity quantifies the relationship between the size of the economy and total amount of natural resources directly used in an economy by businesses for economic production and by households. It is expressed by the amount of GDP generated per unit of direct material consumed i.e. the ratio of a country's GDP to the domestic consumption of materials. Resource productivity offers insights to meaningful progress in decoupling economic growth from natural resources depletion. The value of resource productivity will increase if the economy is growing at a faster rate than the consumption of raw materials.

One research study found that renewable energy sources had a positive influence on economic growth at the EU level and another found that that circular economy, proxied by resource productivity, has a positive effect on economic growth across the EU.

Despite the popularity of green growth and a green industrial revolution concept, this paper shows they are difficult to pin down theoretically and in terms of measurement. Advanced economies that minimise environmental impact will struggle to grow under conventional measures of GDP. Adjustments to GDP measurement might make a difference but it is difficult to imagine that that difference will be large.

Conclusion

- While green growth and a green industrial revolution are popular concepts, they are difficult to pin down both theoretically and in terms of measurement.
- Advanced economies that minimise environmental impact will struggle to grow under conventional measures of GDP. Adjustments to GDP measurement might make a difference but it is difficult to imagine that that difference will be large.
- Even in an energy sector such as electricity where total demand is expected to grow under Net Zero, there is a big challenge to raise TFP.
- More careful measurement of the quality of output and non-price factors are needed as Net Zero policies are implemented. Making sure that measured productivity accurately reflects progress towards Net Zero goals will be important given the potential for current measures of productivity to misrepresent the overall welfare impact of Net Zero policies.
- Pursuing and measuring the circular economy and the extent to which material is actually re-cycled and reaching true environmental sustainability looks more necessary.
- Lower cost low carbon technologies will also be beneficial and can relatively reduce the inputs required across the economy to meet Net Zero, improving currently measured productivity.

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