

UK Gas Security: Managing Energy Security Challenges and Transition Risks

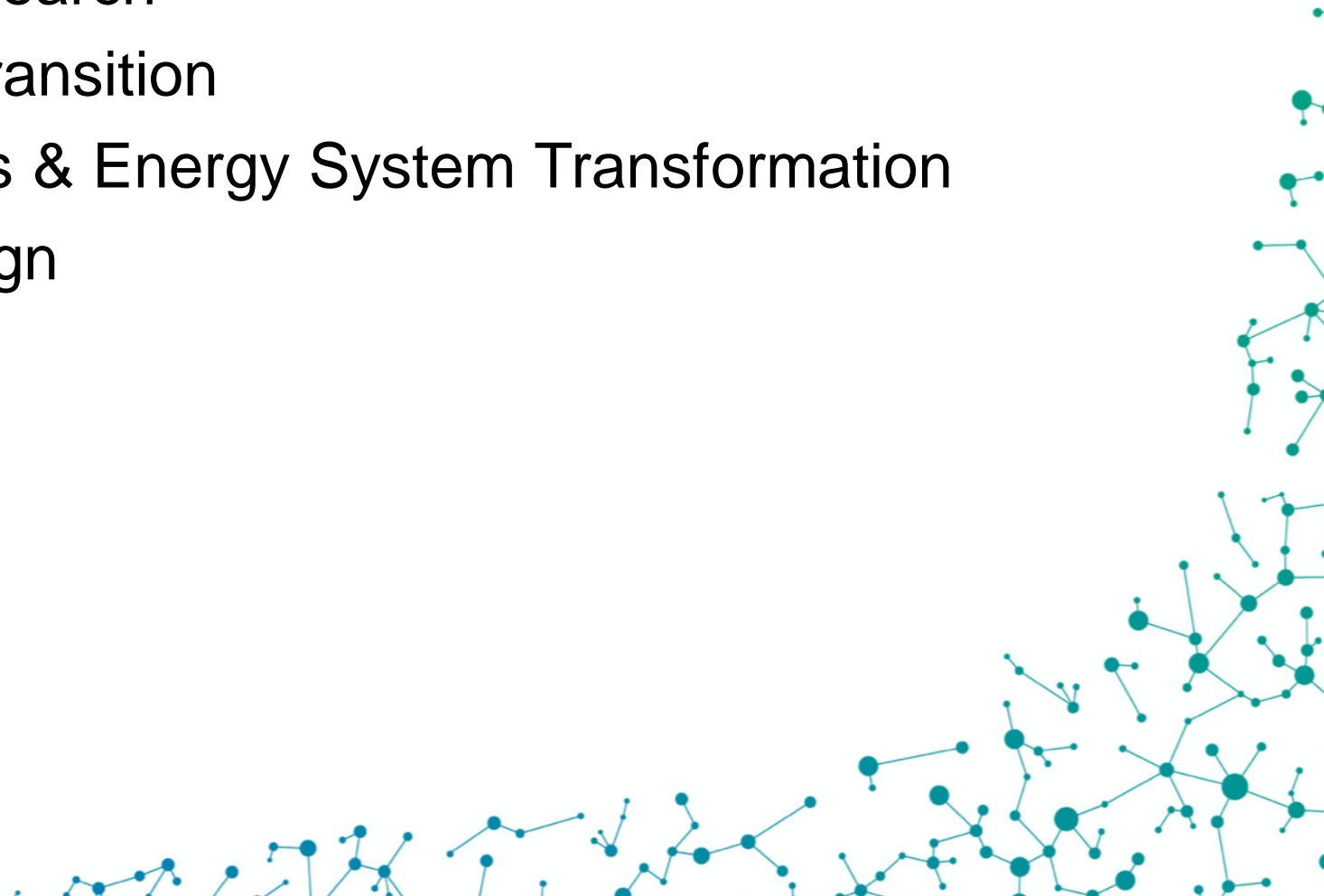
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Plan

- UKERC's Gas Security Research
- The Need for a Managed Transition
- Energy Security, Geopolitics & Energy System Transformation
- Time is now for gas by design



UKERC Gas Security Work

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The UK's Global Gas Challenge Research Report

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The future role of natural gas in the UK

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The future role of natural gas in the UK: A bridge to nowhere?

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ABSTRACT

The UK has ambitious, statutory long-term climate targets that will require deep decarbonisation of its energy system. One key question facing policymakers is the role of natural gas both during the transition towards, and in the achievement of, a future low-carbon energy system. Here we assess a range of possible futures for the UK, and find that gas is unlikely to act as a cost-effective 'bridge' to a decarbonised UK energy system. There is also limited scope for gas in power generation after 2050 if the UK is to meet its emission reduction targets, in the absence of carbon capture and storage (CCS). Without CCS, a 'second dash for gas' while providing short-term gains in reducing emissions, is unlikely to be the most cost-effective way to reduce emissions, and could result in stranded assets and compromise the UK's decarbonisation ambitions. In such a case, gas use in 2050 is estimated at only 10% of its 2010 level. However, with significant CCS deployment by 2050, natural gas could remain at 50–60% of the 2010 level, primarily in the industrial (including hydrogen production) and power generation sectors.

1. Introduction

Natural gas has the lowest combustion carbon intensity of the three major fossil fuels (see e.g. IPCC, 2006). However, it has been shown that increases in the consumption of natural gas are not sufficient for reducing global greenhouse gas emissions since this would potentially substitute for both higher-carbon fossil fuels, e.g. coal or oil, as well as for lower-carbon or zero-carbon energy sources, such as renewables (McJeon et al., 2014; McGlade et al., 2014) and McGlade and Rhims (2015) examined possible futures for fossil fuels, with a particular focus on the 'bridging' role that natural gas may be able to play during a transition to a global low-carbon energy system. This research found that there is a good potential for gas to act as a transition fuel to a low-carbon future up to 2035 on a global level under certain conditions.

However, a key caveat to the positive conclusion that natural gas can play a 'bridging' role globally is that its potential varies significantly between different regions. While some national-level studies have demonstrated that increases in natural gas consumption, in combination with certain emissions-reduction policies, can help reduce overall greenhouse gas emissions in the United States (Brandt et al., 2014; Moniz et al., 2010), it does not follow that this is the case in all countries and regions around the world. It is also noteworthy that the

International Energy Agency's 'Golden Age of Gas' scenario that explored a future with more natural gas in the global energy system resulted in projected emissions on a trajectory consistent with a temperature rise of 3.7 °C (IEA, 2011), well above the internationally-agreed threshold of 'well-below 2 °C' (United Nations, 2015).

One crucial factor affecting the decarbonisation potential of natural gas is the level of fugitive methane emissions that occur during its production, transportation and distribution. This has been an ongoing source of controversy since the first paper on the subject by Howarth et al. (2011) suggested that such emissions from shale gas extraction were so high that they counteracted all benefits of switching from coal to gas, although multiple papers subsequently contested these findings (Lawrence et al., 2011; Levi, 2013; O'Sullivan and Paltsev, 2012). Nevertheless, it is important to recognise that the UK's long-term decarbonisation objectives (see Section 2.2 below) include only 'territorial emissions', or emissions generated within the country. Any fugitive methane from natural gas produced by the UK is included within its territorial emissions but imported gas is effectively 'carbon-neutral' from an upstream emissions perspective (the UK imported 45% of its gas in 2014). An increase in domestic gas production, such as from its putative shale gas resource (Andrews, 2013) might have lower life-cycle emissions than other sources of imports, such as Liquefied Natural

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Warwick Gas Security Forum (2017-18)



Future UK Gas Security: A Position Paper

Professor Michael Bradshaw



Future UK Gas Security: Upstream Security of Supply

Michael Bradshaw,
Professor of Global Energy,
Warwick Business School



About the UK Gas Security Forum
This briefing reports the findings of the first UK Gas Security Forum, which brought together a range of stakeholders from government, business, academia and academia to consider the impact of Brexit on the UK gas industry. The aim of the forum is to share the latest information and to provide a platform for discussion and debate on the future of the UK gas industry.

Why gas matters
Natural gas plays a critical role in the UK's energy system, providing secure, reliable energy at a competitive price. It is a key component of the UK's energy mix, and its use is expected to grow in the coming years. This report examines the challenges facing the UK gas industry and the steps that need to be taken to ensure a secure and reliable supply of gas.

The Network Interconnector
Brexit is creating a new wave of challenges for the UK gas industry, including the need to ensure a secure and reliable supply of gas. This report examines the challenges facing the UK gas industry and the steps that need to be taken to ensure a secure and reliable supply of gas.

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Future UK Gas Security: Midstream Infrastructure

Michael Bradshaw,
Professor of Global Energy,
Warwick Business School



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Midstream Security Challenges
The UK gas industry faces a range of challenges, including the need to ensure a secure and reliable supply of gas. This report examines the challenges facing the UK gas industry and the steps that need to be taken to ensure a secure and reliable supply of gas.

A Supply Chain Approach to Gas Security
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Future UK Gas Security: The Future Role of Gas?

Michael Bradshaw,
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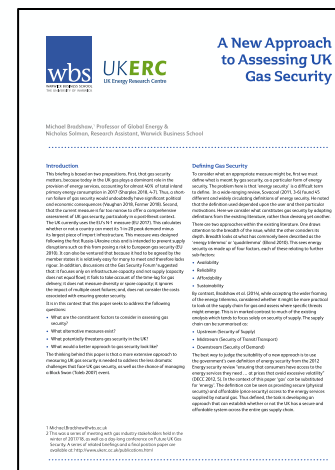


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A New Approach to Assessing UK Gas Security

Michael Bradshaw,
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<https://www.wbs.ac.uk/research/impact/influencing-the-uk-s-energy-security-and-the-future-role-of-gas/>

UKERC Energy Security & Net-Zero Briefings



Natural
Environment
Research Council

Economic
and Social
Research Council

The Future of Natural Gas in the UK's Energy System: managing energy security challenges & transition risks

Date: 16th May 2023

Workshop Location: WBS/The Shard, London

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Context

Over the last decade [UKERC](#) has carried out research on gas security, going back to its 2014 report on the [UK's Global Gas Challenge](#) and more recently the 2018 position paper on [Future UK Gas Security](#). As part of the current phase of UKERC, in cooperation with the Oxford Institute for Energy Studies (OIES), a report will soon be published in the role of LNG in UK gas security. At the same time, over the last four years the Unconventional Hydrocarbons in the UK Energy System ([UKUH](#)) research programme has assessed the role of shale gas in the UK's energy system. The Government's [Powering Up Britain: Energy Security Plan](#) discusses the need to enhance security of gas supply and makes a number of key commitments. The purpose of this workshop is to bring together academic researchers, policymakers, think tanks, NGOs and business representatives to take stock of the UK's short-term energy security challenges and the medium-term challenges associated with decarbonisation of the UK's energy system in line with its Net-Zero ambitions. The presentations and discussion on the day will feed into a subsequent report that is part of UKERC's Energy Security and Net-Zero briefing series.

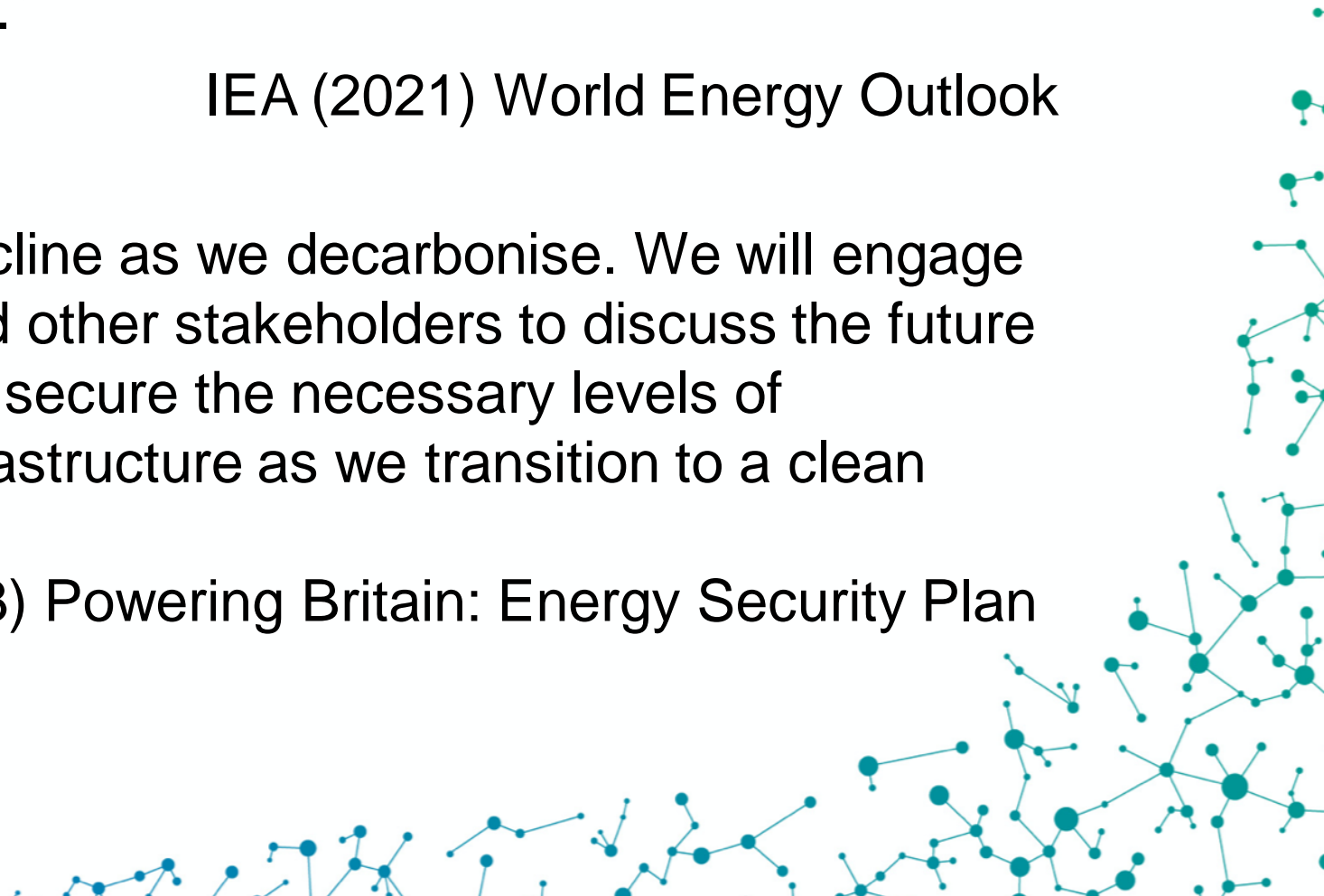
The Need for a Managed Transition

“Unless the transition is well managed, remaining customers of natural gas would be at risk of supply shortages or volatility during the process of phasing out supply lines or delivery.”

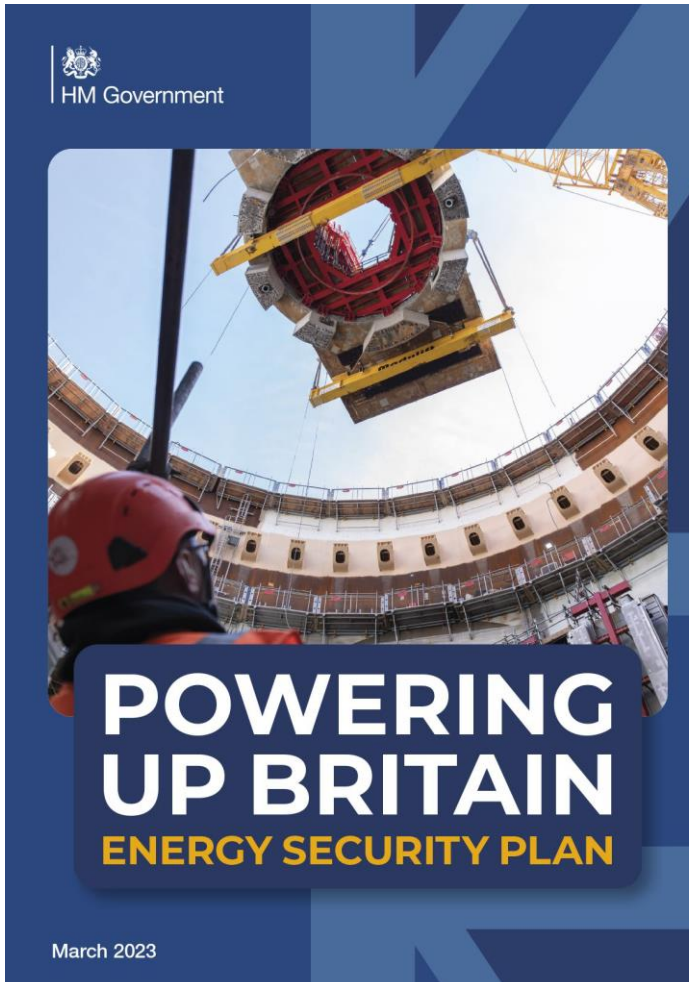
IEA (2021) World Energy Outlook

“The future demand for gas will decline as we decarbonise. We will engage with industry, consumer groups and other stakeholders to discuss the future of the gas system and how we can secure the necessary levels of investment in resilient, efficient infrastructure as we transition to a clean energy system.”

UK Government (2023) Powering Britain: Energy Security Plan



Energy Security & Net Zero



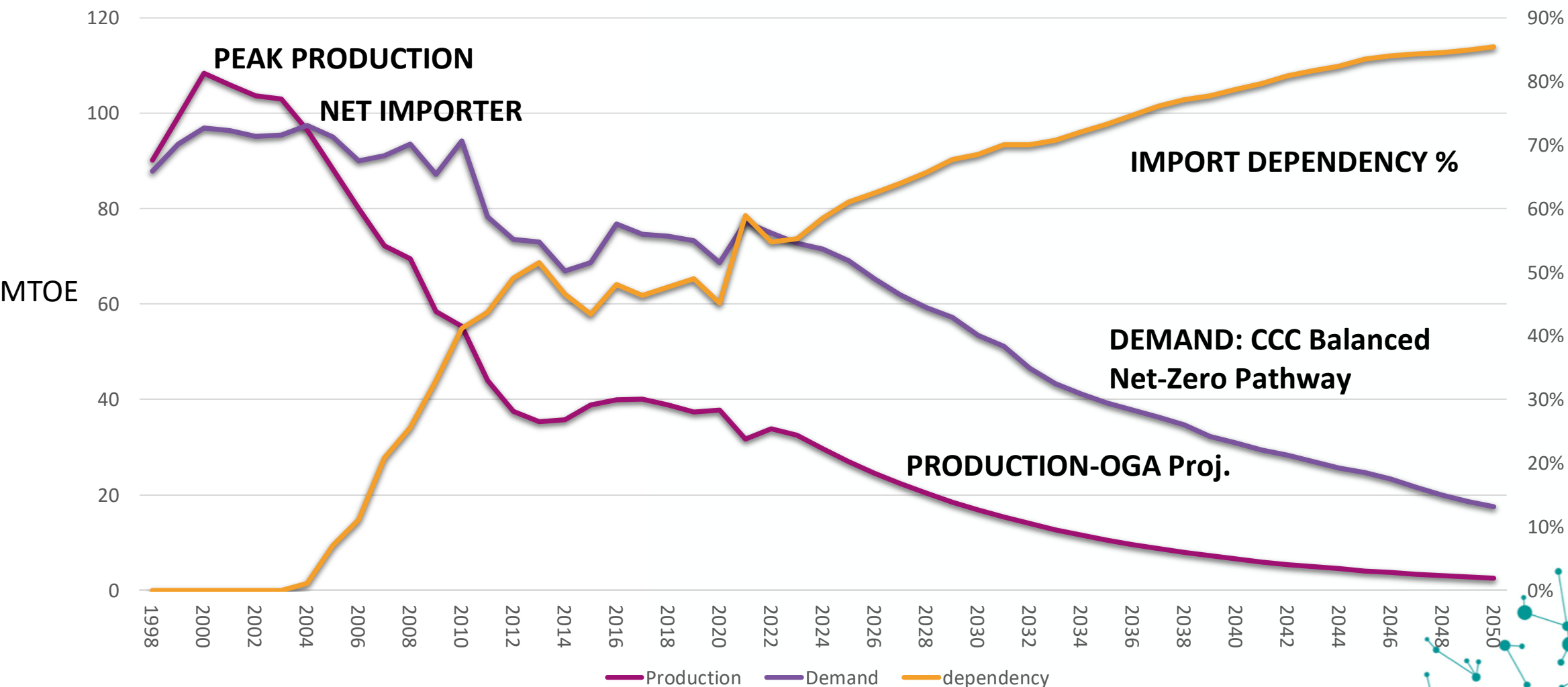
“Energy security necessarily entails the smooth transition to abundant, low-carbon energy. If we do not decarbonise, we will be less energy secure. We want our energy to be cheap, clean and British..”

“We will move towards energy independence by aiming for a doubling of Britain’s electricity generation capacity by the late 2030s, and we remain absolutely committed to maximising the vital production of UK oil and gas as the North Sea basin declines....”

“Where we need to import energy, we will ensure this is built on relationships with strong, trusted partners and diversified sources of supply. But we recognise that we cannot be complacent and will build in resilience to our system...”

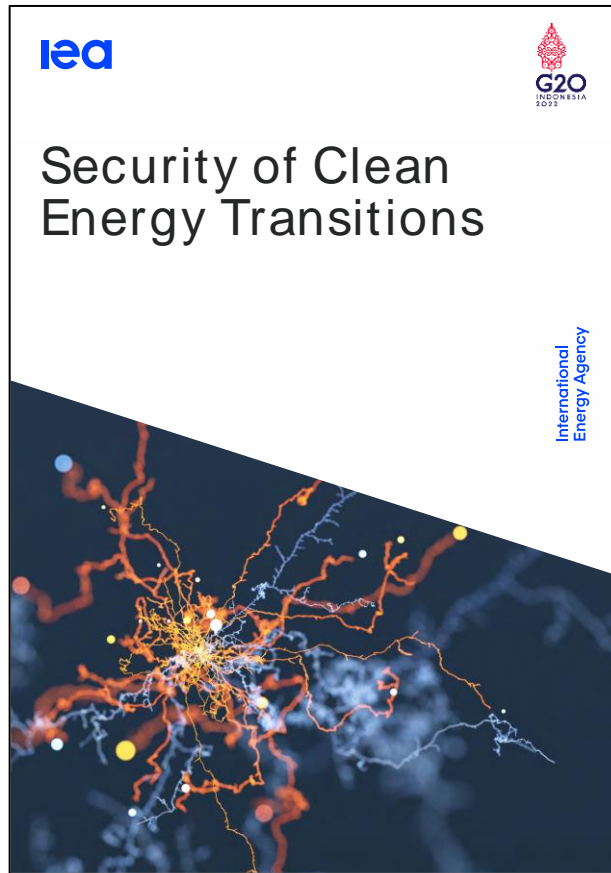
“A rapid shift to clean energy generation and greater energy efficiency provides the most effective route to ensuring both climate and energy security, helping to avoid risks associated with dependency on fossil fuel imports.”

Future Demand, Supply and Import Dependence



Source: NSTA

IEA (2022) Report for G20: Security of Clean Energy Transitions



“... energy security is evolving, and the extent and type of risks to energy supplies are broadening, requiring countries to anticipate and manage both existing and newly emerging energy security challenges. Accelerated transitions are likely to amplify both old and new security factors, requiring the bolstering of resilience and emergency response capacities to ensure the uninterrupted flow of affordable energy.”

<https://www.iea.org/reports/security-of-clean-energy-transitions-2>

Defining Energy Security

The [IEA defines Energy Security](#) as:
the uninterrupted availability of energy
sources at an affordable price.

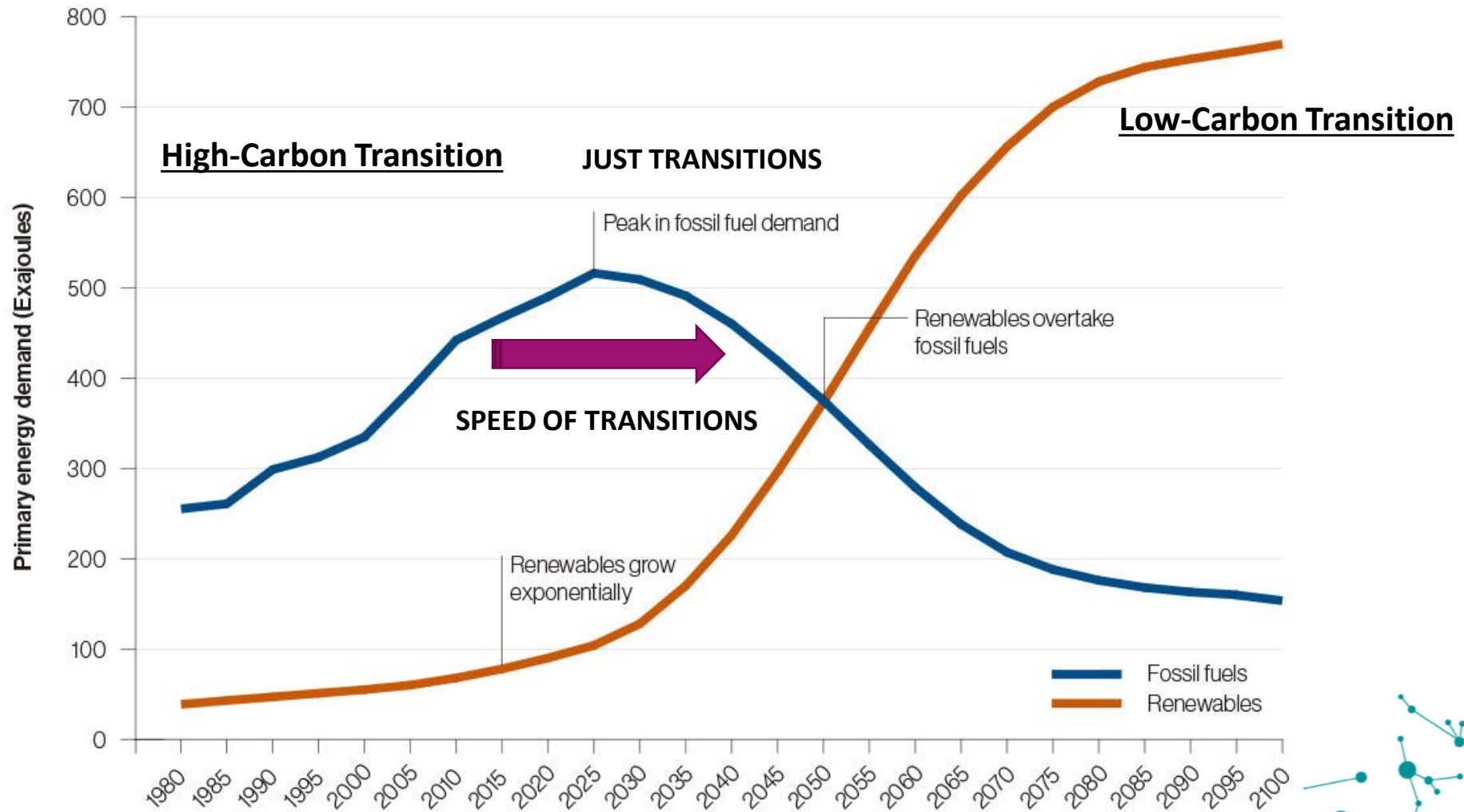
Energy security has many aspects:
long-term energy security mainly
deals with timely investments to
supply energy in line with economic
developments and environmental
needs.

On the other hand, **short-term
energy security** focuses on the ability
of the energy system to react promptly
to sudden changes in the supply-
demand balance.

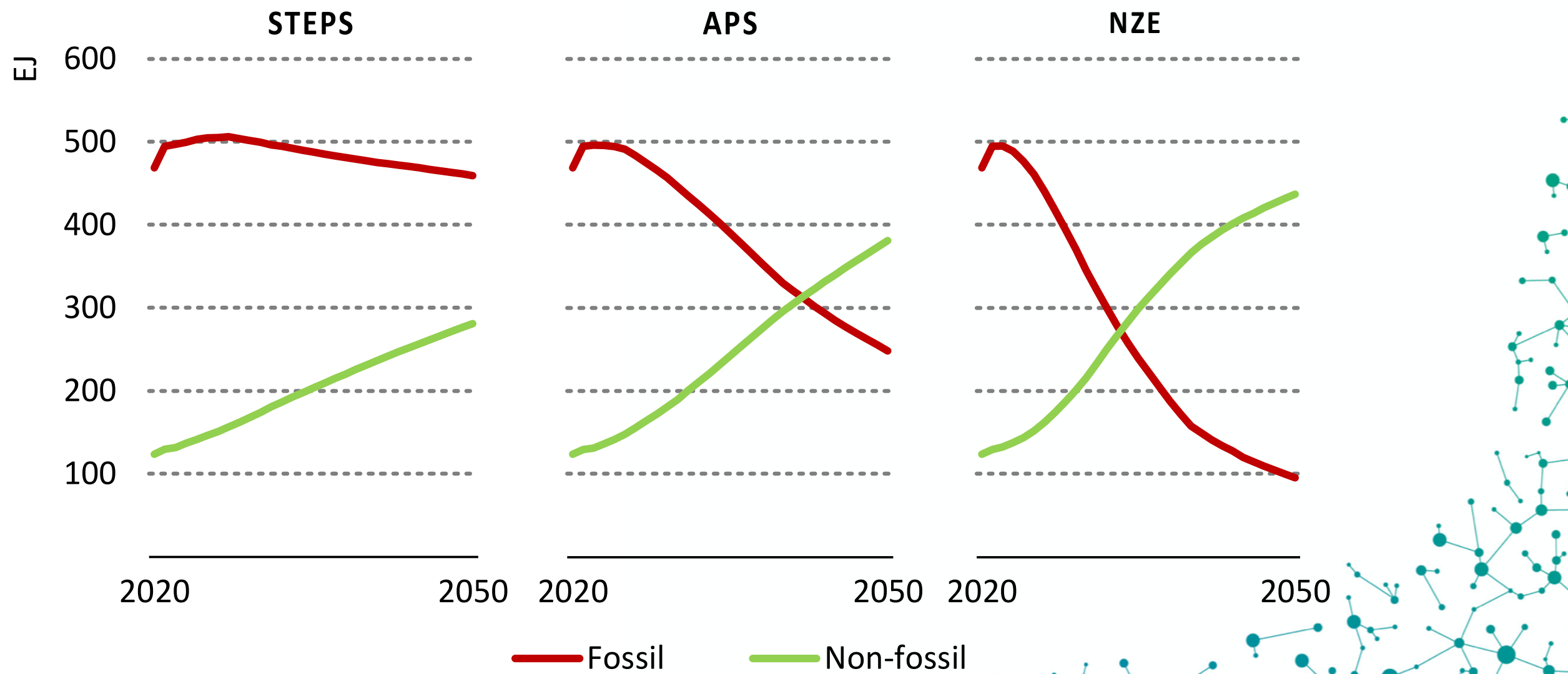
In his 2008 Energy Security study
the late Malcolm Wicks MP identified
three dimensions:

- **Physical security:** avoiding
involuntary interruptions of supply;
- **Price security:** providing energy at
reasonable prices to consumers;
and
- **Geopolitical security:** ensuring
the *state* retains independence in
its foreign policy through avoiding
dependence on particular nations.

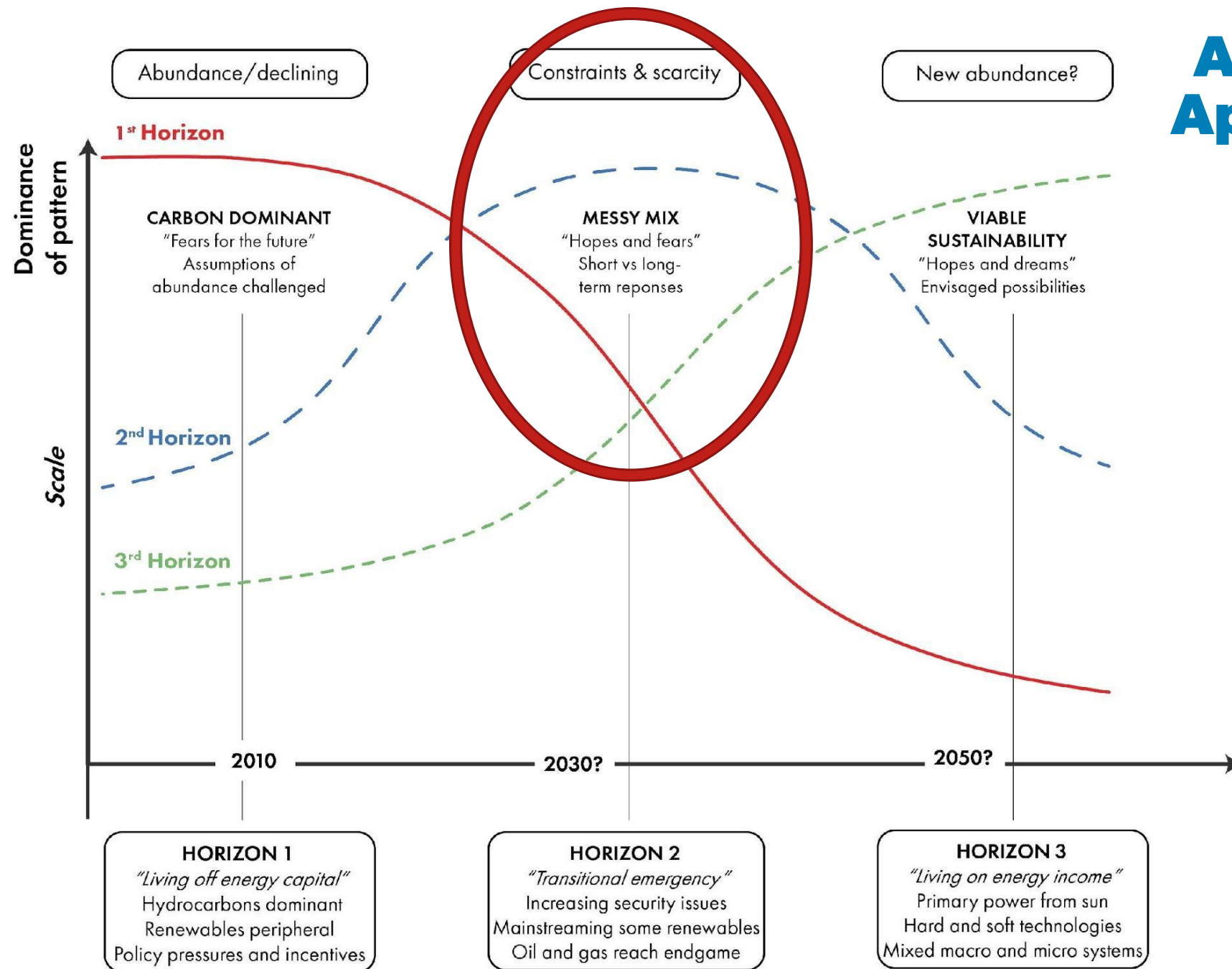
Geopolitics & Energy System Transformation



IEA WEO 2022: Fossil and non-fossil energy supply



A 'Three Horizons' Approach to Energy System Transformation



Adapted from "Energy Security and Climate Change" by Bill Sharpe, Anthony Hodgson, & Ian Page. Discussion Paper, International Futures Forum, 2006, Aberdour

Gas by Design?

“The government recognises that the implications of the transition to clean energy could create uncertainty in the gas market, including for consumers. We will act decisively to mitigate this risk. As long as natural gas remains an important part of our energy mix, we will continue to ensure that consumers can rely on secure gas supplies at affordable prices via an appropriately resilient and flexible network that is also efficiently regulated.

“This will require the right governance, markets and infrastructure. We will work with industry, consumer groups and other partners to understand the impact of delivering net zero on gas infrastructure, market participants and consumers. This will enable us to determine how the gas system will need to evolve to ensure the market and regulatory signals are in place that incentivise the right level of investment and maintenance throughout the transition. We will address the implication of the transition for consumers, particularly households in fuel poverty, so that support can be provided to those who most need it.”

Time is now for 'Gas By Design'

Gas by Default

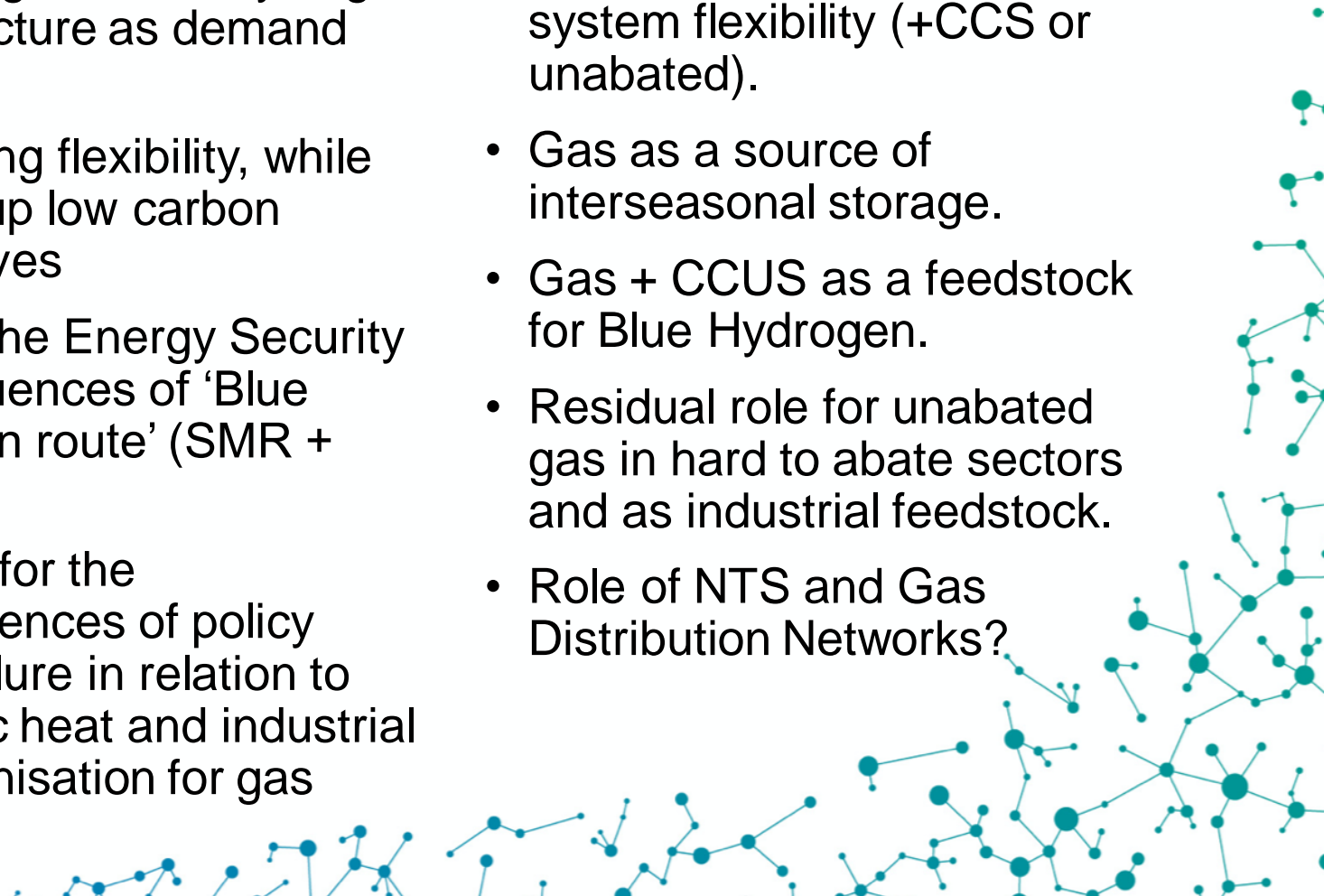
- Adequate Infrastructure
- Diversity of Supply
- Maximising Economic Recovery from the UKCS to slow growing import dependence
- Reliance on market forces to secure gas on global markets
- Net-Zero policies will drive significant reductions (40%) in gas demand to 2030.

Gas by Design

- Managing the viability of gas infrastructure as demand falls
- Rewarding flexibility, while scaling-up low carbon alternatives
- Assess the Energy Security Consequences of 'Blue Hydrogen route' (SMR + CCUS)
- Prepare for the consequences of policy delay/failure in relation to domestic heat and industrial decarbonisation for gas security

Gas for Net-Zero?

- Gas a source of power system flexibility (+CCS or unabated).
- Gas as a source of interseasonal storage.
- Gas + CCUS as a feedstock for Blue Hydrogen.
- Residual role for unabated gas in hard to abate sectors and as industrial feedstock.
- Role of NTS and Gas Distribution Networks?



Thank You

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