The role of the state in the GB energy market

Executive Summary

July 2024

Executive summary

This paper explores the state's role in the GB energy sector and recommends how it could be extended to support decarbonisation objectives. Our proposals include roles that Great British (GB) Energy, a new publicly owned company, might play.

The state has successfully steered the market towards decarbonisation

Since the energy industry was privatised in the late 1980s and early 1990s, the market has generally determined the sites and technology mix for energy generation, within the government's policy framework. Natural monopoly networks businesses have been responsible for building and maintaining the pipes and wires needed to get energy from production to the customer, under regulatory incentives set by Ofgem.

Over time, the state has progressively introduced market mechanisms that aim to steer outcomes to meet new policy objectives, particularly around decarbonisation. The introduction of carbon pricing accelerated the switching from coal to gas fired generation. Policies to support investment in renewables, such as the Renewables Obligation and Contracts for Difference (CfD) mechanism have enabled the deployment of around 43 GW of renewable capacity. Renewable energy costs have fallen dramatically, and new technologies have successfully come to market. One new nuclear project is under construction (Hinckley Point C), with a further nuclear project (Sizewell C) and several carbon capture and hydrogen projects also in development.

As a result of these policies, carbon dioxide emissions in the GB power sector have fallen by 78% since 1990 – and by 53% across the UK economy as a whole.

Meeting and maintaining net zero carbon emissions will become more challenging

The ambition is to decarbonise the power sector as fast as possible, ideally by 2030. Looking beyond that – to achieve net zero emissions across the whole economy – we need to decarbonise transport, heat, and 'hard to abate' sectors like large industry and aviation. As result, we face the challenge of achieving and maintaining zero carbon power, whilst addressing an unprecedented increase in electricity demand from about 300 TWh in 2030 to around 450-550 TWh, or 55-90% of total energy needs, in 2050. Hence, we present a strong focus on the power sector in this report.

Progression towards this target will require around £350bn to £500bn of investment over the next ten years in the power sector alone – in the face of stiff international competition for finance and resources.

The power sector faces escalating prices, supply chain constraints, and higher interest rates, while the cost of living remains front of mind for end consumers. The energy transition provides the opportunity to stimulate economic growth and create domestic jobs. Some forms of low carbon energy are already cheaper than the alternatives. By lowering dependence on imported fossil fuels, renewables can contribute to more stable and predictable energy costs. However, the level of investment required means that citizens could be saddled with higher energy bills and taxes if the transition is not managed carefully.

Industry is ambitious about decarbonisation, but there are three overarching problems

Many of the pieces of the puzzle needed to deliver enduring decarbonisation pathways are in place. With the right frameworks and incentives, the industry has the necessary ambition, and there is plenty of capital ready to be deployed. The UK benefits from a highly competitive energy market, with many diversified and sophisticated developers seeking to build projects across a broad range of technologies.

However, we identify three overarching problems that must be tackled:

1. We need greater coordination and certainty
2. We need to pick up the pace
3. We need to ensure good value for money

We need greater coordination and certainty

The energy system is highly complex, and there are interdependencies between parts of the value chain that are required to rapidly deliver decarbonised energy. For instance:

- Output from renewables cannot be dispatched as and when needed and is typically located far from customers. Deployment of renewables requires expansion in network capacity, electricity storage, and flexibility to keep pace.
- Grid investment has not kept up with grid connection applications, with over 700 GW in the connections queue across transmission and distribution.
- Offshore grids may require connections to multiple offshore wind farms, oil and gas production platforms, onshore connection points, and possibly neighbouring markets.
- Hydrogen projects must align production with local anchor demand and with the necessary transportation and storage to get to market.
- While the power sector is being decarbonised, decommissioning of the gas grid must be phased carefully with the roll-out of alternative solutions for heating, cooking, and industrial processes.

Aligning all project elements – technical, commercial, financing, planning and regulatory approvals, and offtake – is extremely difficult. As a result, there may be slow progress or sub-optimal whole-system configurations leading to higher costs.

Recent initiatives like the Holistic Network Design and Strategic Spatial Energy Plan are important for creating greater forward visibility and aligning decision-making. However, without greater certainty in terms of project type, volume, and timings, it is hard for the necessary supply chain to develop. This leads to undercapacity and further impedes the speed of deployment.

We need to pick up the pace

Currently, capital deployment rates in the power and gas sectors are around £10-15bn per year, approximately 20-40% of the run rate required to achieve decarbonisation objectives. Lack of capital is not necessarily the problem. Instead, grid connection challenges and supply chain bottlenecks are major factors, as are slow planning processes.

We will rely on innovation and new technologies to meet energy transition targets. We require a step change in the pace at which these technologies are being commercialised and deployed at scale.

We need to ensure good value for money

Moving at pace introduces risks that we overpay and achieve a poor deal for customers. Approaches that have been successful so far may not be optimal to best meet the challenges ahead.

For example, the competitive processes for allocating revenue support to low carbon projects have led to price discovery and cost reduction. However, by definition, projects must fail if the process is to be truly competitive, but that can slow progress and increase risk premia. It also creates uncertainty for the supply chain.

If most projects will be needed to achieve net zero in any case, the current approach may not be cost optimal. Inframarginal rent in current CfD auctions, regret development spend, and increased risk associated with the two-stage seabed lease/CfD allocation process also increase costs to consumers. For example, we estimate that inframarginal rent from CfD auctions of new offshore wind projects to be delivered between 2030-2050 would cost consumers somewhere between £10-35bn more than necessary, under current auction arrangements.

How extending the state's role could address decarbonisation challenges

Working hand in hand with the private sector, we believe that extending the state's role in several areas could help address these issues, thereby:

1. Accelerating the **pace of decarbonisation**
2. **Bringing down the costs of the transition** and returning value to energy consumers
3. Improving the **resilience of our energy system,** with less reliance on imported energy and international supply chains
4. Promoting **economic growth**

Our proposals (Table 1) are grouped according to the four roles we believe the state should play: as a planner, developer, investor, and enabler. We believe these proposals could accelerate decarbonisation of the whole economy by several years (we conservatively estimate two to four years), increase system resilience, and save costs while returning a greater proportion of benefits from the energy transition to citizens. They would also facilitate better alignment between the UK's energy and industrial strategies, enabling economic growth.

Table 1: Summary of our proposals

State role	Summary of proposals
State as a planner	We propose the introduction of a **system architect** that would develop an overarching **strategic plan** to guide technology choices and locational deployment of assets, co-optimising these choices with network development. The strategic plan would define the target technology mix, preferred locations for deploying large-scale strategic assets, and zones for developing smaller-scale assets. The plan should proactively inform the activity of other state actors (such as The Crown Estate and Crown Estate Scotland, GB Nuclear, Ofgem etc) rather than take their activity as inputs. It should also work to a long-term funding envelope, defined independently of gas prices. The system architect would also **identify the most appropriate mechanism for deploying assets**, whether site-specific auctions, targeted tenders, or location-agnostic universal support mechanisms.
State as a developer	We propose a state **project pre-developer** that carries out initial pre-development work for large-scale assets identified in the strategic plan. For large-scale assets, we propose **site-specific mechanisms** to attract private sector investment. This would include a shift to site-specific auctions for revenue support, where relevant. For offshore projects, we propose **consolidating the two-stage seabed leasing and CfD auctions into a single site-specific auction** that takes place following the state's pre-development work. For smaller-scale onshore technologies, we propose that the **state works with** the **Regional Energy System Planner, devolved administrations and local authorities to identify local low carbon development zones** within the broader zones specified in the strategic plan. The state would run tenders for projects in these local zones in return for accelerated planning and connection agreements. We also propose the creation of a **developer for projects on public land**, potentially taking these projects through the entire lifecycle and contracting the private sector to operate them on its behalf.
State as an investor	We propose that the state captures value to consumers where it has carried out pre-development work on large-scale projects in its role as a developer. Taking this value in the form of a **lowest possible strike price** is the most direct route for delivering this value to the consumer, with lower energy costs also supporting wider electrification ambitions. Alternatively, the state could offer a fixed strike price and ask projects to **'bid' equity** as the basis of the competition for the project. In a less constrained fiscal environment (or one that differentiates between debt for investment into assets vs debt for ongoing consumption) the state may choose to leverage its lower cost of capital and **directly invest** into established technologies to generate returns for the benefit of wider citizens.

State role	Summary of proposals
	Taking equity stakes in projects is also a means to protect the consumer/taxpayer from the risk of excess returns. Although, the alternative, which we favour, would be the use of **gainshare mechanisms** which could be applied where the state lacks confidence in the effectiveness of competition to drive fair prices. In the current fiscal environment, we suggest the state focusses direct investment into **higher risk, emerging technologies,** including in the supply chain, to support innovation and commercialisation. The design of such investment should ensure citizens share in long-term value, technology and intellectual property (IP) created through the projects, rather than only in the projects themselves. Finally, and assuming limited investment in established technologies, we recommend consideration of **longer term CfDs** (i.e. more than 15 years) such that the cost of capital of projects is reduced and spread over a longer timeframe, with lower strike prices as a result.
State as an enabler	We propose **planning system reforms** that would help unlock potential projects and would support delivery of our proposals for an expanded state role as a planner and as a developer. We believe that greater forward visibility and certainty coming from the strategic plan will tackle the root cause of **supply chain challenges**. The benefits of this – combined with targeted state investment and grant funding, and other incentives and initiatives in train such as Sustainable Industry Rewards – will need to be understood before further interventions are considered. We propose building on existing structures to enhance **coordination of innovation**, with an overarching strategy defined in alignment with the strategic plan. We propose a **public energy procurer** that coordinates energy procurement for public bodies, including offtake from projects developed on public land.

Mechanisms for extending the state's role

Many of our recommendations work in the direction of travel pursued in recent years, though they go further than existing intent. For example, the ongoing move of the National Energy System Operator (NESO) into state ownership with additional system planning responsibilities is a step towards the system architect option we set out in this paper. Our proposals build on this to give the system architect responsibility both for defining the high-level technology mix and locational deployment. The system architect would also be responsible for defining the most appropriate mechanism for deploying the assets it defines in the plan.

Entities such as GB Nuclear and The Crown Estate are already taking on greater pre-development responsibilities for nuclear, small modular reactor, and offshore wind projects. Our proposals would build on these roles, also extending this approach to a broader range of onshore assets. Following this pre-development work, the state would then hold auctions in which the private sector competes to develop and own the projects, with the state capturing some of the project value.

To implement the proposals in this paper, we recommend:

- **State as a planner:** NESO's role should be extended further to take on the proposed system architect function.
- **State as a developer:** The state should take on the proposed pre-development roles, capturing value from these activities by taking equity stakes and/or by passing cost savings on to customers. The state would likely need to leverage existing capability that exists within TCE, GB Nuclear, and the private sector. A credible option which could be introduced quickly is for TCE to take on pre-development activities for offshore assets, building off the existing skills and capabilities TCE has already been developing. Over time, either through partnerships or through upskilling of its own capabilities, TCE could develop a similar role for large-scale onshore assets.
- **State as an investor**: GB Energy could also play the investor role, or this could be done separately via the UK Infrastructure Bank, or an evolution of that organisation. At a minimum, GB Energy would need to be sufficiently well capitalised to invest in the projects that it is developing.
- **State as an enabler:** The enabling roles could mostly be delivered through existing organisations.

Figures 1, 2, and 3 summarise our proposed reforms and organisational responsibilities. Figure 1 summarises the existing role of the state in the deployment of system assets. Figure 2 overlays this with the set of roles that we propose in this report, and Figure 3 further overlays the organisations that could undertake these roles.

Protecting short-term decarbonisation while enabling long-term net zero emissions

We recognise that several proposals in this paper represent significant structural changes to roles and responsibilities between the public and private sectors, which would not be without risks and downsides. There are questions about whether the state can allocate scarce resources as efficiently as the market, and whether it can attract the skills and capabilities needed to undertake the roles we propose.

There are interactions between our proposals and ongoing market reforms, most notably the government's Review of Electricity Market Arrangements (REMA). A more expansive role of the state could impact on the benefits case of certain reforms within REMA. However, we believe that our proposals will work in combination with reforms which seek to maximise the strength of operational and locational signals for system users and encourage flexibility.

The new government has targeted a decarbonised power sector by 2030 and is introducing several policies to enable this. New measures include planning reforms which make it easier to develop low carbon projects, particularly onshore in England and Wales, and the introduction of a 'Mission Control for Clean Power' which has been tasked with setting and tracking the approach to deliver a decarbonised power system.

The proposals contained in this report can also contribute to near-term decarbonisation trajectories before 2030 but are likely to have biggest benefit into the 2030s and beyond, coinciding with the significant step up in electricity demand which will be driven by widespread electrification.

If implemented carefully, we believe our proposals can work effectively alongside other policies that promote short-term decarbonisation objectives, while providing a strong foundation for the even greater challenge of delivering economy-wide net zero emissions by 2050.

Once in place, we believe that proposed reforms could deliver:

- **Pacier delivery of low carbon infrastructure** allowing for acceleration of whole energy system decarbonisation by approximately two to four years due to enhanced coordination and efficiencies in project development and deployment.
- **A reduction in the £350-500bn of capital investment in the power sector** that needs to be deployed to deliver decarbonisation.
- **A transfer of up to £35bn from producers to consumers out to 2050** for offshore wind alone, with the potential for additional transfers of surplus for other low carbon technologies.
- **Savings of up to c. £1bn in regret development expenditure** for offshore wind projects that ultimately fail, with similar benefits possible for onshore projects.
- **More efficient deployment of network infrastructure and system assets**, reducing the total volume of infrastructure needed to deliver decarbonisation.
- **Greater certainty for the supply chain**, leading to more investment, growth in green jobs, and more domestic capacity.
- **A reduction in constraint costs** which are projected to reach £3bn per year in the late 2020s.
- **Acceleration of innovation** and commercialisation of new technologies.
- **Additional resilience in the energy system** as a result of a more coordinated transition.

Figure 1: Role of the state under the existing arrangements (after the NESO becomes a public body)

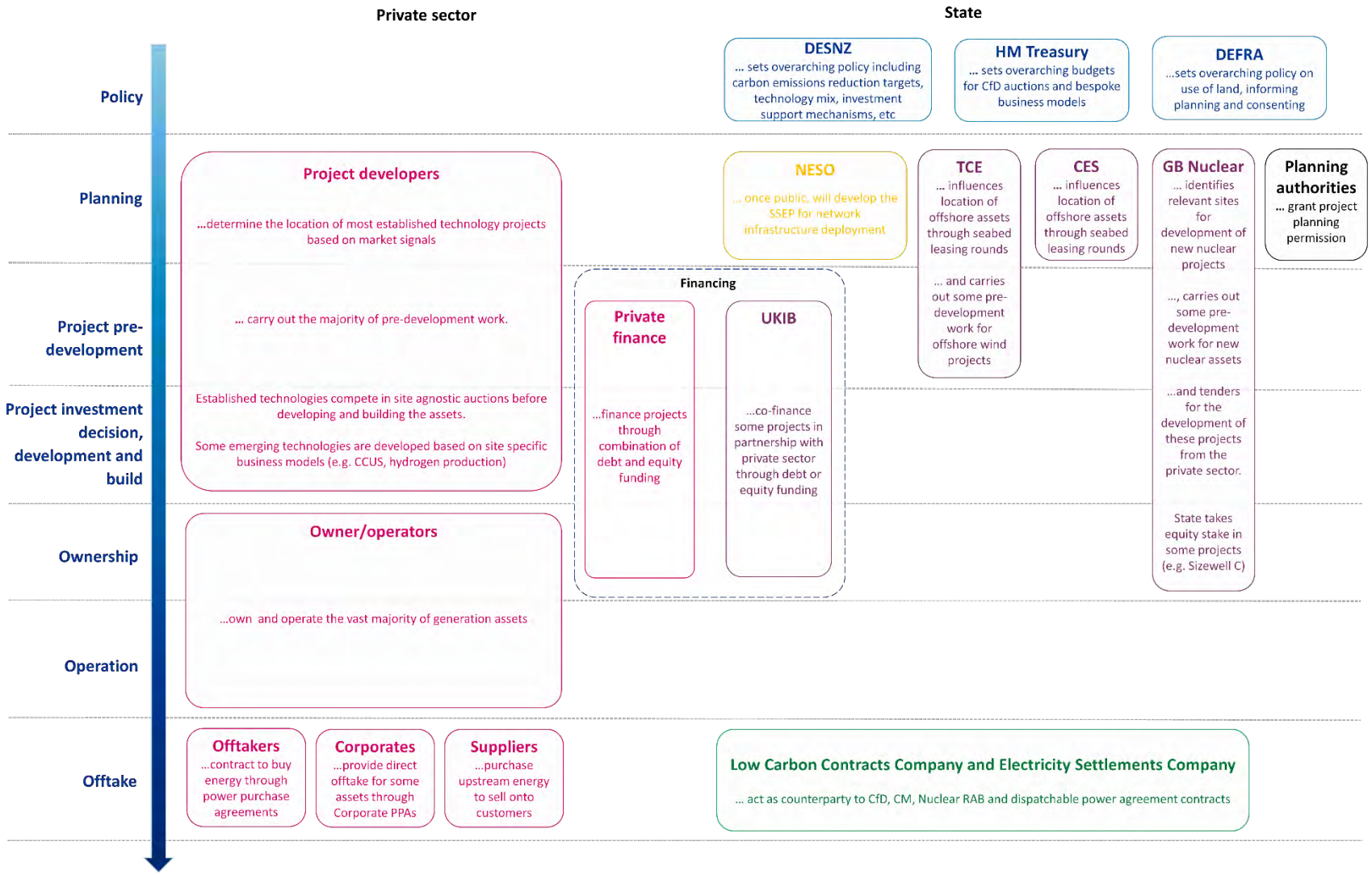
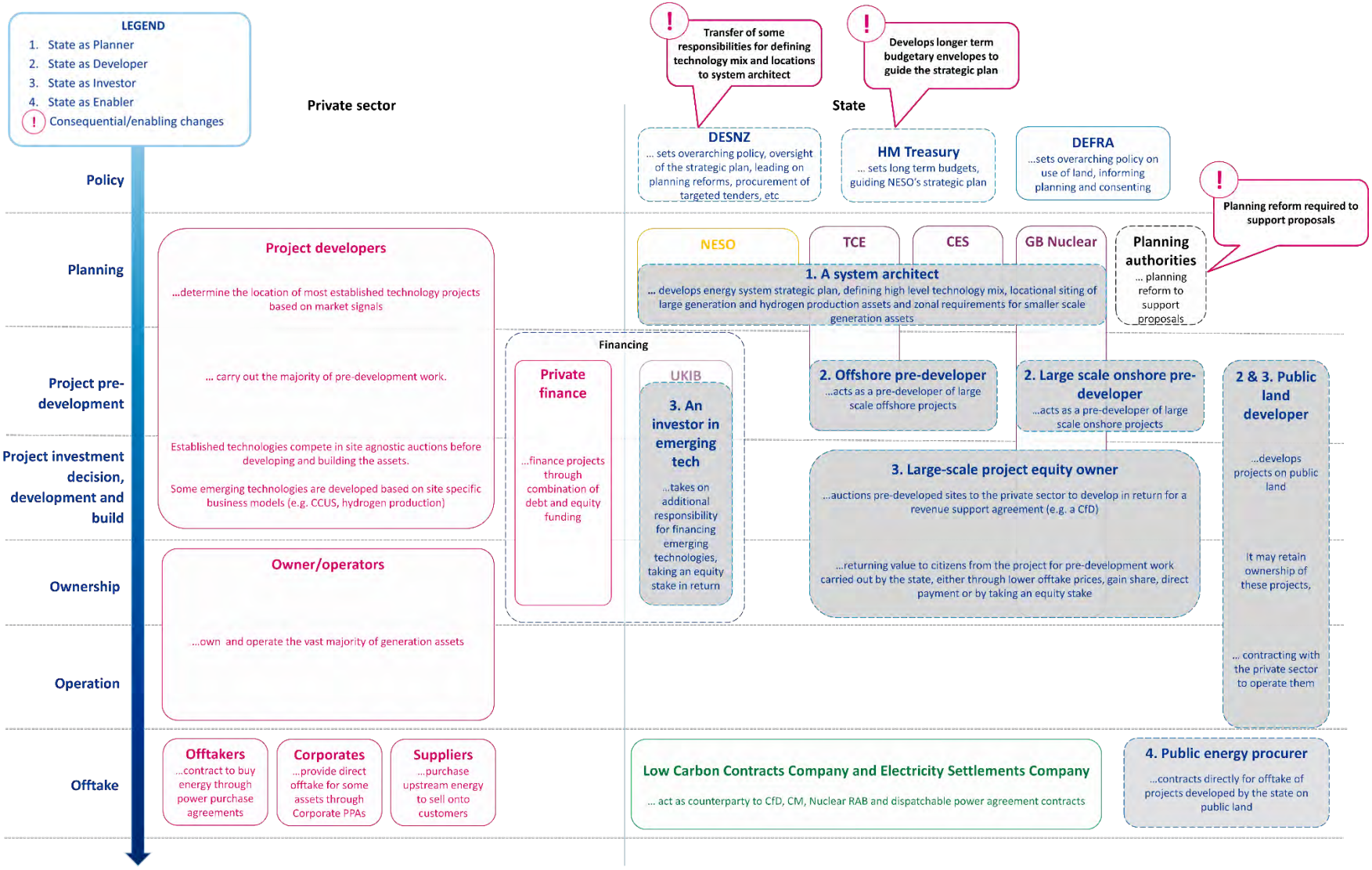
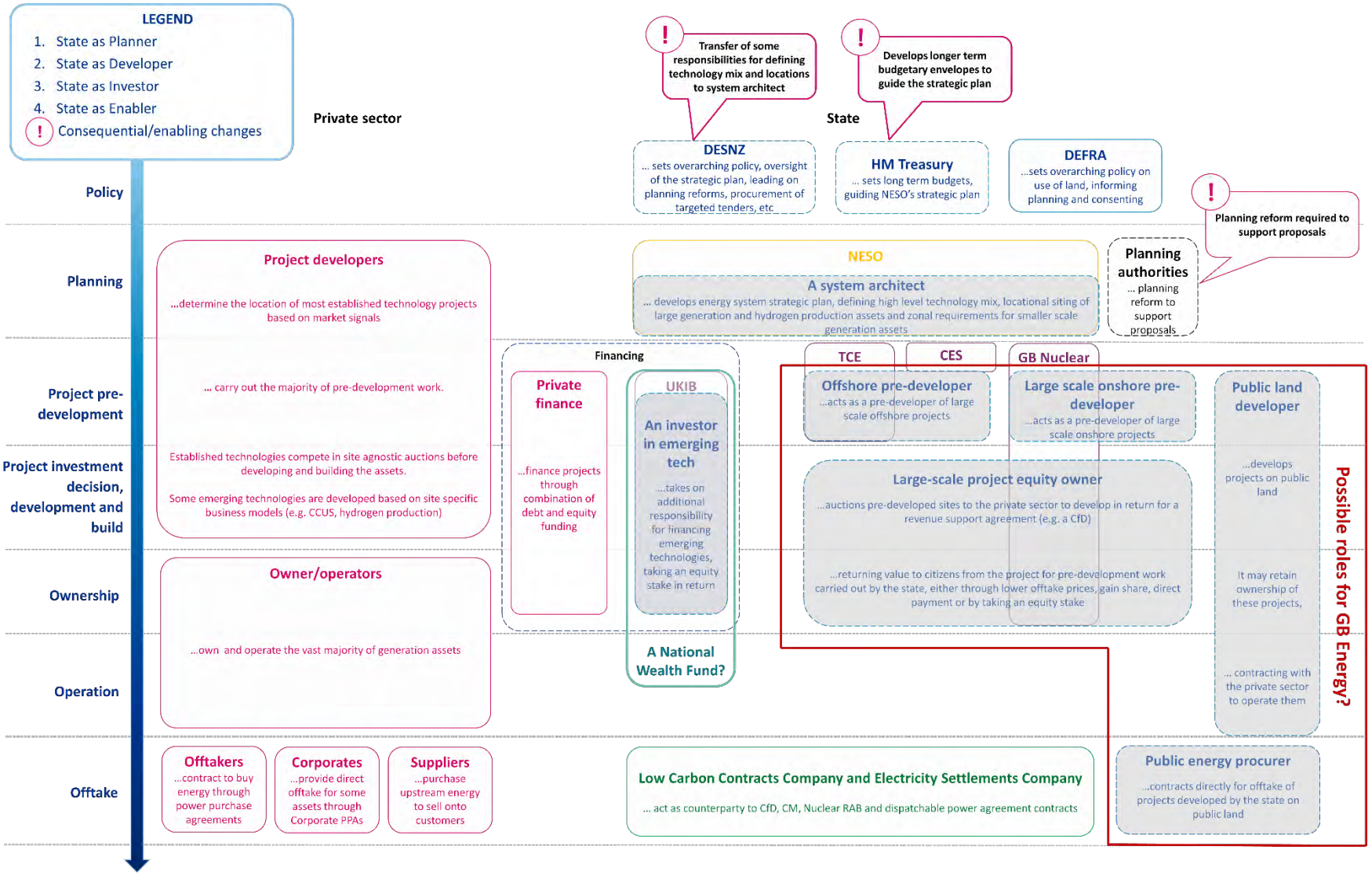


Figure 2: Summary of the expanded role of the state under our proposal



S

Figure 3: Potential organisational responsibilities for the role of the state



Authors and Contributors

Duncan Sinclair
Partner, Energy Policy & Regulation, Baringa

With his three decades in the industry, Duncan has been at the heart of the various phases of market reform over the years. He thrives on interrogating the consensus view and looking for new angles.

Despite the huge changes he has witnessed, Duncan believes that the biggest challenges and most exciting times for the industry lay ahead.

Lewis Heather
Director, Energy Policy & Regulation, Baringa

Lewis Heather has been working on key areas of energy policy, regulation, and economics for nearly 15 years, first as an economic regulator and then as a consultant. He is passionate about supporting the industry transition to net zero carbon emissions. Lewis works closely with government and commercial clients to help them with their most difficult challenges.

Alex Townsend
Manager, Energy Policy & Regulation, Baringa

Alex has been working in energy economics, policy, and regulation for 15 years. At Baringa, he works with a range of government and private sector clients, with a particular focus on electricity networks, interconnectors and CCUS. Prior to joining Baringa, Alex spent most of his career working in the UK Civil Service in DECC, BEIS and the CCC.

Ravi Gurumurthy
CEO, Nesta

Ravi is the Chief Executive of Nesta, the UK's innovation Foundation. Ravi also leads the Behavioural Insights Team, otherwise known as the 'Nudge Unit', which has conducted over 1000 trials globally.

Ravi was one of the architects of the Climate Change Act 2008, when working as a Strategic Advisor to David Miliband. He was also Director of Strategy at the Department of Energy and Climate Change from 2010-2013. Ravi has held a number of non-executive roles, including at the Environmental Defense Fund.

Andrew Chittenden
Senior Independent Advisor

Andrew Chittenden has worked as a consultant in the energy sector for 30-years and was a founding partner at Baringa. He now works as a senior independent advisor on energy policy, and recently supported HMG with its response to the Energy Crisis.

He is a non-exec at the Behavioural Insights Team and has worked with Nesta on its Energy Mission.

Funding and wider contributors

This study has been supported by the European Climate Foundation. Responsibility for the information and views set out in this study lie with the authors. The European Climate Foundation cannot be held responsible for any use which may be made of the information contained or expressed therein.

Our team would also like to thank all of those who volunteered their time to provide thoughts on the role of the state through confidential bilateral interviews.

Their input was invaluable to inform and test thinking throughout the project, and to arrive at the conclusions captured in this report.

About Nesta

We design, test and scale solutions to society's biggest problems. Our three missions are to give every child a fair start, help people live healthy lives and create a sustainable future where the economy works for both people and the planet.

For over 20 years, we have worked to support, encourage and inspire innovation. We work in three roles: as an innovation partner working with frontline organisations to design and test new solutions, as a venture builder supporting new and early-stage businesses and as a system shaper creating the conditions for innovation. Harnessing the rigour of science and the creativity of design, we work relentlessly to change millions of lives for the better.

Find out more at nesta.org.uk

About Baringa

Founded in 2000, Baringa is now a global management consultancy operating across sectors including energy, financial services, consumer products and services and government.

In the energy market, Baringa helps large organisations, governments and policymakers to navigate the energy transition by doing one or more of the below:

1. Analyse and design markets and policy.
2. Determine strategy and investment decisions.
3. Identify new commercial opportunities and manage risk.
4. Structure and run more effective businesses.

All underpinned by a depth of energy market modelling.

Our goal is to put people first and create impact that lasts. We are an accredited B Corporation and have held Great Places to Work status for over 15 years. We now have 1,800+ people and 130+ partners operating globally from hubs in Europe, the US, Asia and Australia.

Find out more at baringa.com

nesta

Baringa

The role of the state in the GB energy market

Executive Summary

This study has been supported by the European Climate Foundation. Responsibility for the information and views set out in this study lie with the authors. The European Climate Foundation cannot be held responsible for any use which may be made of the information contained or expressed therein.