

Title: Establishment of Great British Nuclear IA No: DESNZ021(F)-23-EMA RPC Reference No: N/A Lead department or agency: Department for Energy Security and Net Zero Other departments or agencies: N/A	Impact Assessment (IA)		
	Date: 13/06/2023		
	Stage: Final		
	Source of intervention: Domestic		
	Type of measure: Primary legislation		
Contact for enquiries: EnergyBill2021@beis.gov.uk			

Summary: Intervention and Options	RPC Opinion: N/A
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Cost of Preferred (or more likely) Option (in 2020 prices)			
Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status
£54m	N/A	N/A	Not a regulatory provision

What is the problem under consideration? Why is government action or intervention necessary?

The British Energy Security Strategy (BESS) in April 2022 committed to establishing a civil nuclear projects delivery vehicle – Great British Nuclear (GBN). The GBN vehicle is necessary to overcome information failure, co-ordination failure, asymmetric information and externality market failures. It will enable Government to mitigate some of the risks associated with nuclear projects, facilitate information flow and knowledge transfer in the nuclear sector, and support net zero and electricity security of supply. GBN was announced in the 2023 spring budget and launched via an existing an existing Government company (GovCo) at the end of March 2023, to begin time-critical activity before legislation is passed.

What are the policy objectives of the action or intervention and the intended effects?

The overall objective is for GBN to provide expertise and operational agility to support delivery of nuclear projects. This requires GBN to:

- begin critical path work associated with site and technology selection by the end of March 2023 (operating via an existing GovCo);
- support the Government’s intention to take two Final Investment Decisions on new nuclear generating capacity in the next Parliament, subject to value for money and all relevant approvals; and
- support the development of nuclear projects to deliver the Government’s ambition for deploying up to 24GW of new capacity by 2050.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Two short-listed policy options have been considered:

(1) Counterfactual (do nothing) – a nuclear delivery vehicle is not set up by Government. The market is left to deliver nuclear projects.

(2) GBN’s role is set out in legislation and (subject to Parliament’s will and classification decision by the Cabinet Office) is a Non-Departmental Public Body (preferred option). This involves initial activities being undertaken by an existing government-owned company trading as GBN ahead of legislation setting out a clear statutory role. Additional resource from the Department for Energy Security and Net Zero (DESNZ) and external consultancy expertise will also be required.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 03/2026				
Is this measure likely to impact on international trade and investment?*			No	
Are any of these organisations in scope?		Micro Yes	Small Yes	Medium Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: N/A	Non-traded: N/A

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY:  Date: 13/06/2023

Summary: Analysis & Evidence

Policy Option 2

Description: GBN is a statutory arm's length body (subject to Cabinet Office classification, a Non-Departmental Public Body).

FULL ECONOMIC ASSESSMENT

Price Base Year 2020	PV Base Year 2022	Time Period Years 2	Net Benefit (Present Value (PV)) (£m)		
			Low:	High:	Best Estimate: -£54m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant	Total Cost (Present Value)
Low			
High			
Best Estimate	£54m		£54m

Description and scale of key monetised costs by 'main affected groups'

There will be costs associated with the set-up of GBN. This includes specific GBN staff, contracted expertise and other costs to support GBN staff and enable the delivery of its activities.

Other key non-monetised costs by 'main affected groups'

There are no other non-monetised costs associated with this legislation.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant	Total Benefit (Present Value)
Low	N/A	N/A	N/A
High	N/A	N/A	N/A
Best Estimate	N/A	N/A	N/A

Description and scale of key monetised benefits by 'main affected groups'

There are no monetised benefits associated with this legislation.

Other key non-monetised benefits by 'main affected groups'

Non-monetised benefits will be unlocked as GBN undertakes its activities and supports delivery of nuclear projects in the UK. Nuclear capacity will contribute to security of supply and the UK's net zero commitments. The involvement of a non-departmental public body supporting nuclear projects will also reduce uncertainty and risk for stakeholders (including in the nuclear supply chain). This will include reducing uncertainty related to the UK's new build nuclear strategy and financing risks. GBN is intended to streamline nuclear development and deployment and therefore reduce the cost and time associated with constructing nuclear projects. This will reduce costs that might be passed on to consumers.

Key assumptions/sensitivities/risks

Discount rate

3.5

Key assumptions of this Impact Assessment include the number of full-time equivalent staff and contractors required to deliver GBN's work programmes and associated salary costs. The main risks are delays to the establishment of GBN which will set back its work programmes and the resulting benefits. There is also a risk that if GBN is unable to attract candidates with the necessary expertise to deliver its work programmes the benefits will not be fully realised.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: N/A
Costs: N/A	Benefits: N/A	Net: N/A	

Evidence Base

1. Background

1. The British Energy Security Strategy¹ (BESS) was published in April 2022 in response to rising global energy prices. It builds on the Government's Ten-point Plan² and Net Zero Strategy³ – and sets out how the UK will accelerate homegrown power, including the Government's ambition for up to 24GW of new-build civil nuclear generating capacity to be in place by 2050. The BESS committed to establishing a civil nuclear projects delivery vehicle, Great British Nuclear (GBN), to help projects through every stage of the development process and develop a resilient pipeline of new builds.
2. The overall vision and objectives of a nuclear programme will be established by HMG. GBN will be responsible for driving delivery of the programme and facilitating the delivery of individual projects. GBN will lead a competitive process to select the best Small Modular Reactor (SMR) technologies with market engagement as the first phase, which launched in April 2023. The second phase – the down-selection process – will be launched in the summer of 2023, with an ambition to assess and select the leading technologies by autumn of the same year. The Government will provide co-funding with technology vendors (subject to future Spending Reviews) that will be deployed by GBN to support the development of these selected technologies. GBN will work with successful bidders on ensuring the right financing and site arrangements are in place. GBN will also support the Government's consideration of further large Gigawatt-scale projects to help us deliver net zero ambitions. GBN will hold the requisite skills (such as project management and technical skills) to ensure support and provide oversight for the development of nuclear projects.

2. Problem under consideration and rationale for intervention

3. The GBN vehicle is necessary to overcome the following market failures:

2.1 Information failure

4. Information failure occurs when agents lack information about economic decisions. Large-scale nuclear power plants have high upfront costs and long construction periods. Any revenue (outside of Regulated Asset Base model) will only be received once the plant is operational. There are risks associated with this such as delivery and cost overruns, uncertain market returns and policy risks. Advanced Nuclear Reactor technologies also represent new and riskier technology development and deployment. There is a need for HMG to give commercial investors confidence by mitigating some of the risk. GBN will address this market failure as its aim is to increase market confidence by improving the deliverability of new nuclear projects and improving clarity on the Government's future nuclear programme.

2.2 Co-ordination failure

5. Co-ordination failure occurs when a group of agents could achieve a more desirable outcome but fail to because they do not co-ordinate in their decision making. The co-ordination cost of bringing together the appropriate agents has led to the private sector developing individual projects in the free market (with some Government involvement). The

¹ Nuclear section: <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy>

² <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

³ <https://www.gov.uk/government/publications/net-zero-strategy>

abandonment of recent projects (such as Hitachi terminating their proposed nuclear project at Wylfa Newydd in Summer 2020) suggests it is unlikely that projects can continue to be delivered in this way, particularly at a pace that can support Government ambitions. Furthermore, for Small Modular Reactors (SMRs), there have been no nuclear projects to date without Government support to facilitate the involvement of the necessary agents.⁴ GBN will co-ordinate and support vendors through lengthy and costly planning, regulatory and licencing processes. GBN will also work with Government on access to potential sites for new nuclear, as all current sites are privately owned or in the ownership of other government departments or arm's length bodies.

2.3 Asymmetric information

6. Asymmetric information occurs when some agents possess more information than others. The developers, vendors and other stakeholders in new nuclear technology have different experience, presence and networks within the technology and UK nuclear sectors. This means that some have a greater knowledge of the market and how to navigate it than others. Therefore, it will be necessary to facilitate information flow and knowledge transfer for nuclear capacity to be deployed at a pace, which is faster than would have been the case without GBN, that can support Government ambitions. GBN will facilitate the development and execution of such a strategy. This will maximise the benefits of a fleet approach encouraging industry investment in development, supply chain and skills.

2.4 Externalities

7. Externalities occur when a cost or benefit of an economic activity is experienced by an unrelated third party. Nuclear plants do not produce direct greenhouse gas emissions during operation, which are known as a 'negative externality'. This means the social cost of emissions may not be borne by the organisation responsible for them. This may lead to overinvestment in technologies with higher levels of greenhouse gas emissions and underinvestment in technologies with low levels (such as nuclear power). There are wider benefits for the UK beyond incentivising private investment decisions. GBN aims to enable a regular rhythm of new nuclear technology deployment over the next 20 to 30 years. This will have wider benefits for the UK's security of energy (electricity) supply and reducing risks around meeting the net zero commitments.

3. Description of options considered

3.1. Long list of options

8. **Option 1 – Counterfactual (do nothing).** In this option, a nuclear project delivery vehicle is not set up by HMG. Instead, the market is left to deliver new nuclear projects.
9. **Option 2 (Preferred option)** – GBN's role is set out in legislation and (subject to Parliament's will and classification decision by the Cabinet Office) is a Non-Departmental Public Body with capability to set up project specific development companies and otherwise support projects. This involves initial activities being undertaken by an existing government-owned company trading as GBN ahead of legislation setting out a clear statutory role (see section 5). Additional resource from the Department for Energy Security and Net Zero (DESNZ) will be required as well as external consultancy expertise.
10. **Option 3 - A slimline "client team(s)" comprising commercial and project management staff sitting within HMG.** The team would conduct procurement to outsource all GBN's activities to the market. These staff would deliver HMG objectives and include a variety of

⁴ See <https://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-power-reactors/small-nuclear-power-reactors.aspx>

expertise such as technology selection, siting, regulation, legal, HR and strategy. This is a non-legislative option.

11. **Option 4** – GBN is established as a **Taskforce or working group within DESNZ**. Additional resource from DESNZ will be required, as well as consultancy expertise. This is a non-legislative option.
12. **Option 5** – GBN is established as an **Executive Agency within DESNZ**. Additional resource from DESNZ will be required, as well as external consultancy expertise and legislation.
13. **Option 6** – GBN is established as a **new delivery body within an existing NDPB** (such as the Nuclear Decommissioning Authority Group or the United Kingdom Atomic Energy Authority). Additional resource from DESNZ and the existing NDPB, as well as further legislation, will also be required.

3.2. Discounted options

14. Options 3, 4, 5 and 6 have been discounted:
 - a) Option 3 would substantially delay (due to procurement) or potentially see a failure to achieve HMG key policy objectives without the availability of the right talent and expertise. It is unlikely that it would meet Government's intention to take two Final Investment Decisions (FIDs) on new nuclear generating capacity in the next Parliament and would ultimately be unlikely to achieve the ambition of up to 24GW by 2050.
 - b) Option 4 precludes recruitment of the required technical expertise to deliver GBN's objectives. This option would therefore fail to meet the objectives of HMG (see section 4).
 - c) Option 5 would require the set-up of a new public body. It would not meet the timeline in the policy objectives for GBN to be operational by the end of March 2023. If this timeline is not met, we will not be able to achieve two FIDs next Parliament.
 - d) Option 6 would not meet the timeline in the policy objectives for GBN. Option 6 would require a substantial restructuring of existing NDPBs to accommodate the shift in focus to HMG's policy objectives, which could have pronounced implications for the existing missions of these NDPBs.

3.3. Short list of options

15. **Option 1**– Counterfactual (do nothing).
16. **Option 2 (Preferred option)** – GBN with a statutory role, suitable for classification as a Non-Departmental Public Body (NDPB) and launched initially via an existing body.

4. Policy objective

17. The overall policy objective is for GBN to provide expertise and operational agility to support delivery of nuclear projects (on a pathway to the Government's ambition of up to 24GW by 2050).
18. This requires that GBN:
 - a) Is operational by the end of March 2023, through an existing GovCo, to begin critical path work associated with site and technology selection.
 - b) Supports Government's intention to take two FIDs on new nuclear generating capacity next Parliament, subject to Value for Money and all relevant approvals.

- c) Supports the development of new nuclear projects required to deliver Government's ambition of up to 24GW of new capacity (of which GBN is one of a number of enablers).

19. See Annex A for the policy Theory of Change.

5. Summary and preferred option with description of implementation plan

5.1. Overview of preferred option

- 20. The preferred option is for GBN to be an arm's length GovCo, anticipated to be classified as a Non-Departmental Public Body (NDPB), with its role set out in legislation. Operational independence from central government and an organisational structure that can be enduring across parliaments is important for the policy to meet the intended outcomes and impacts. Only option 2 can offer this and meet the policy objectives of HMG.
- 21. A NDPB can work within an agreed strategy without being under the day-to-day control of a minister. A NDPB also allows for more innovation and a customised approach to the delivery of HMG's policy objectives given GBN's evolving partnership with the private sector. Whilst GBN employees will still be subject to overall pay policy, the NDPB form allows for terms and conditions specific to GBN, subject to agreed derogations from HMT and Cabinet Office controls, to attract the specialist talent required for delivery of a multi-year complex programme.
- 22. The NDPB approach involves an existing GovCo, British Nuclear Fuels Limited (BNFL), trading as GBN at the outset to begin operations immediately and undertake initial activities. BNFL sits within the existing legislative framework that is applicable to nuclear operations and has the general operating powers of a company. The expedited set-up of GBN using BNFL is essential to enable GBN to hire interim leadership and commence the time-critical activities needed to support delivery of the Government's intention to take two FIDs next Parliament, such as commencing the tech selection process.

5.2. Overview of proposed legislation

- 23. This primary legislation will set out a statutory role for GBN to support the Government's delivery of the BESS. BNFL, trading as GBN, will commence activities and launch within the existing framework, with primary legislation setting out an enduring role for GBN.
- 24. This primary legislation will set out GBN's objects and give the Secretary of State (SoS) power to designate a fully HMG owned GovCo as GBN. It will further provide SoS with powers to give guidance and direction to GBN, and to provide financial assistance to GBN out of monies provided by Parliament, to cover grant-in-aid for GBN's general activities as well as the provision of project-specific funding in any form subject to such conditions as the SoS considers appropriate.
- 25. Primary legislation will provide a standalone legislative basis for GBN's operation. It is not envisaged that secondary legislation will be needed to implement the Government's policy after Royal Assent.

6. Monetised and non-monetised costs and benefits of each option (including administrative burden)

6.1. Monetised costs

- 26. Short-listed option 2 estimates the number of direct GBN full time equivalent (FTE) staff and contracted expertise. Each of these resource areas has a cost which will be accounted for in

this assessment. Other costs to support GBN staff and enable the delivery of its objectives (such as staff office and IT costs) are also included.

6.1.a. Option 2

27. Staff numbers and associated cost estimates are based on international comparison and inputs from industry experts during and after the GBN scoping phase. The scoping phase took place between May and August 2022 and was led by a team of industry experts supported by civil servants and industry secondees. Its objectives were to explore the role for GBN, barriers to nuclear development and lessons learned from nuclear and non-nuclear projects internationally.
28. The scoping phase informed the estimated number of staff and pay scales necessary to complete the work packages required for GBN to meet HMG’s policy objectives up to March 2025. Estimates are specifically based on comparisons with international nuclear projects such as Ontario Power Generation, Canada and Kepco’s project at Barakah, UAE, as well as other NDPBs including the Nuclear Decommissioning Authority (NDA) and High Speed 2 (HS2). These costs will be met by GBN’s budget agreed with HM Treasury. The cost centres and organisation structure have been tested with wider stakeholders across Whitehall and industry experts. Staff recruitment profiles have been estimated in year 1 to reflect the time taken to recruit and commence operations. A range of plus and minus 10% would also be appropriate to apply to the first year’s recruitment profile and costs. This range has been developed with industry experts, using information provided by industry. The degree of uncertainty mainly pertains to the recruitment profile. The figures in Table 1 are a high-level top-down analysis and are subject to change. It should also be noted that GBN will not be committed to spend as per the table below, but exact expenditure will be subject to future spending reviews. Assumptions are detailed in section 8.

Table 1: Option 2 costs (£ 2020 prices). Discounted to 2022 and rounded to 2 significant figures.

	2023/24	2024/25
Direct GBN staffing costs	£6.8m	£17.0m
Contractor costs	£8.2m	£12.0m
Governance board costs	£0.3m	£0.4m
Executive costs	£1.7m	£3.5m
Services costs	£1.3m	£2.1m
Total costs*	£18.0m	£35.0m

* Note that the total may not appear to sum correctly due to rounding.

6.2. Non-Monetised Benefits

29. In option 1 (the counterfactual), GBN is not established and nuclear projects continue to be led by the private sector. Some Government involvement (such as that with Hinkley Point C and Sizewell C) is still expected. We think it is unlikely that projects will be delivered at the pace and scale required due to the market failures detailed in section 2. The potential non-monetised benefits associated with Option 2 are detailed in this section.

6.2.a. Savings associated with GBN’s activities

30. Nuclear projects are highly complex infrastructure projects. The abandonment of previous projects has cost billions of pounds. GBN will mitigate the delivery risk and has the potential to make substantial savings. These savings are expected to be larger than the costs estimated in section 6.1.

31. The potential cost and time savings for stakeholders related to new nuclear deployment are likely benefits of GBN's work. GBN will streamline the stages and processes associated with deploying new nuclear technology. GBN's anticipated activities include (but are not limited to): running a competitive technology selection process, providing co-funding to support the development of these selected technologies while seeking private sector investment, and working with successful bidders to ensure the right financing and site arrangements are in place. The level of development funding will be subject to future Spending Reviews. GBN will hold the requisite skills (such as project management and technical skills) to ensure support and provide oversight. The involvement of a NDPB in supporting nuclear projects will reduce the cost of uncertainty around the UK's new build nuclear strategy and technologies in earlier stages of development. Reduced uncertainty will improve investment in development, supply chain and skills.
32. Nuclear projects require significant amounts of development and construction funding. Having a delivery body vehicle to propose and deploy development funding, structure financing arrangements and be involved in projects via development companies will improve industry confidence in the UK, thus reducing financing risks associated with nuclear technologies. While working within the existing regulatory regime, GBN is also intended to help streamline the nuclear technology development and deployment process and therefore reduce costs. If, for example, GBN's work contributed to a 1% overall capital cost reduction of a large-scale nuclear plant costing £25bn, this would result in a £250m capital cost saving. A 0.0022% reduction in cost would be required to offset the £54m total cost associated with GBN's set-up. Similarly, a 1% overall capital cost reduction of a small modular reactor costing £2bn would result in a £20m capital cost saving. A 0.027% reduction in cost would be required to offset the £54m total cost associated with GBN's set-up. One funding model for nuclear plants is a Regulated Asset Base (RAB) model. This passes on costs to consumers during construction and therefore we expect reducing the total cost of a plant will reduce these consumer bill impacts associated with future plants funded in this way. Reducing the time to develop and build new nuclear also has the potential to offer consumer savings, as alternative energy sources (i.e. gas plants) with higher marginal costs are less likely to be required.

6.2.b. Environmental Benefits

33. The purpose of GBN is to enable and streamline the deployment of new nuclear power stations (that are otherwise unlikely to be built). GBN should enable a wider variety of nuclear technology vendors, both local and overseas, to come forward with their proposals. This could support a regular rhythm of new nuclear deployment in the 2030s and 40s and the Government's ambition for the deployment of up to 24GW of nuclear capacity by 2050. This will contribute to security of electricity supply in the UK, help reduce electricity costs to consumers and contribute to the UK's net zero commitments.
34. BEIS's *Modelling 2050: Electricity System Analysis* paper sets out the Power Sector Optimisation (PSO) analysis which underpinned the Net Zero Strategy.⁵ This highlighted the interactions between the different types of generation technologies and demonstrated that total costs are minimised when there is a good balance of firm, intermittent and flexible generation capacity in the system.
35. The Energy White Paper⁶ showed that electricity demand may more than double by 2050. In turn, the power sector may need to more than treble low-carbon capacity in that period to meet this demand whilst also reducing emissions.⁷ While there are many capacity mixes that may achieve this, our modelling work has shown that increasing nuclear capacity up to

⁵ <https://www.gov.uk/government/publications/modelling-2050-electricity-system-analysis>

⁶ Figure 3.2: <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

⁷ Annex O: <https://www.gov.uk/government/collections/energy-and-emissions-projections>

potentially 24 GW increases the number of low-cost options available and therefore decreases the risk of not achieving net zero.

7. Direct costs and benefits to business calculations

36. There are not expected to be any direct costs to businesses due to this legislation. Companies working on nuclear or in the relevant supply chain may want to read about and understand the new organisation and how it will operate which would lead to familiarisation costs, but this is not an obligation of the legislation as it does not immediately affect any business.
37. We have limited evidence to inform the estimate of time taken to read and understand the legislation. However, simply assuming a reading speed of 200 words per minute, 500 words per page and the legislation being around four pages long, it would take around 10 minutes to read the legislation setting out GBN's role. We believe it is unlikely that parties in the nuclear industry would read the GBN legislation in great detail, given its focus on government processes and operational arrangements rather nuclear-specific issues. We do believe, however, that there would be interest in news stories related to GBN's announcement, its website, and other publications it puts out. There will also be further interest in detail published on the technology selection process. Given the difficulty in estimating the time taken to review this, we have based the calculation on the legislation, allowing one week for this as a conservative assumption. Assuming one manager reviews the legislation, wage estimates from ONS annual survey of hours and earnings suggests a median weekly wage of £891.10⁸ (compared to the all employee median weekly pay of £620.60). Non-wage costs are accounted for with a 24.6% uplift⁹. This estimates a total weekly wage of £1,110.
38. We also have limited data to inform the number of parties that might be interested in familiarising themselves with GBN. However, we expect that the number of parties will likely be larger than those reviewing the legislation directly. There are currently around 20 main vendors within the Small Modular Reactor (SMR), Advanced Modular Reactor (AMR) and large-scale nuclear space that are interested in the UK market.¹⁰ There will also be developers, financiers and supply chain companies associated with each vendor. In comparison to this, the Low Carbon and Renewable Energy Economy (LCREE) Survey¹¹ asks UK businesses to self-classify themselves into 17 low carbon and renewable energy sectors. This estimates around 500 companies in the UK nuclear power sector (2021) with an upper estimate of around 1,000 companies. It is important to note that without access to the underlying data we are unable to estimate the number of parties that would be interested in reading the legislation from the LCREE Survey. Furthermore, the LCREE Survey considers 2021 data and the estimate of the main vendors in the nuclear space considers 2023. Over time the number of parties interested in GBN's legislation is likely to change as companies exit and enter the nuclear sector. Given the uncertainty around both the number

⁸ ASHE 2022 provisional:

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/occupation4digitsoc2010ashetable14>

⁹ Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Hourly_labour_costs#Hourly_labour_costs_ranged_between_.E2.82.AC7.0_and_.E2.82.AC46.9_in_2021

¹⁰ In the AMR space the main vendors are: U-battery, Moltex, Terrapower, X-energy, Westinghouse, Shearwater and a Japanese design High Temperature Gas Reactor at demo stage. In the SMR space there is: a UK-led consortium, ARC Clean Energy (Canada), CNEA (Argentina), GE-Hitachi (US/Canada), NuSclae Power (US), TerraPower/GE-Hitachi (US), EDF led consortium (France), Westinghouse (US/Canada), Kairos Power (US), Global First/Ultra Safe Nuclear Corporation (Canada), Moltex (Canada), X-Energy (US) and Holtec (US). EDF is currently the only developer building a large-scale new nuclear plant in the UK.

¹¹ <https://www.ons.gov.uk/economy/environmentalaccounts/methodologies/lowcarbonandrenewableenergyeconomy/lcreesurveyeqmi>

of companies that might be interested in reading the legislation and the time take to read and understand the legislation, we have presented sensitivity analysis in the table below.

Table 2 – Illustrative familiarisation cost estimates (2020 prices, 2022 base year, £, rounded to 1 significant figure) [Source: DESNZ analysis]

Time taken to read and understand legislation	Number of parties potentially interested in reading the legislation		
	20	500	1,000
1 day	£4,000	£100,000	£200,000
5 days (central assumption)	£20,000	£500,000	£1,000,000
10 days	£40,000	£1,000,000	£2,000,000

39. We estimate the associated familiarisation costs are most likely to be between around £20,000 and £1m (2020 prices, 2022 base year) but could be as high as £2m. The familiarisation cost is not included in the headline figures in the Summary section as it is not an obligation of the legislation. We also expect any cost to businesses incurred to be offset by the cost savings discussed in section 6.2.a which are very broadly estimated to be at least in the tens of millions of pounds.

8. Risks and assumptions

8.1. Risks

40. The risks and their mitigations are discussed below.

41. **Delays:** Delays to the operationalisation of GBN will set back its work programmes and the resulting benefits identified in section 6.2. GBN’s benefits may also not be fully realised if any delay means nuclear capacity cannot be deployed fast enough to support net zero commitments. The risk of this is expected to be somewhat mitigated under Option 2 by BNFL, as an existing GovCo, undertaking initial activities at the outset. However, legislation is expected to fully realise GBN’s impacts in the long term.

42. **Inability to hire necessary expertise:** If GBN is unable to hire the FTE staff necessary to support its activities, it will also not be able to deliver its work programmes and resulting benefits. Similarly, if there are delays in hiring the staff necessary there is the same risk as detailed in the previous paragraph. One option in this scenario would be to engage more contractors to fill any gaps in GBN’s workforce – this may address staff shortages but is likely to increase costs over its agreed budget. Arrangements for GBN to offer commercially competitive salary packages should help mitigate this risk.

8.3. Option 2 assumptions

43. Costs for GBN staff, contractor, governance, executive and services are estimates based on international comparisons and have been informed by inputs from industry experts during and after the GBN scoping phase. The values used for these assumptions are subject to change and are provisional as ongoing discussions continue, for example the remuneration agreements are still subject to change. GBN staff costs include salary, non-consolidated performance-related pay and benefits-in-kind for a higher concentration of expert staff based on other similar NDPBs. Pension costs have been based on typical public sector costs and national insurance costs have been calculated in line with Government national insurance rates. Basic office and facilities management costs have been assumed from other NDPBs. The contractor costs are based on the average daily rate of a Senior consultant from the

Crown Commercial Service's Management Consultancy Framework Three (MCF3).¹² Governance costs are related to GBN's assumed Governance Board. This assumes one Chair and five other non-executive directors, however, the exact structure of the board is yet to be finalised. The executive costs include the total remuneration package based on a comparative industry benchmark analysis across wider advanced manufacturing, technical and scientific industries.¹³ Pension, national insurance and office and facilities management costs are consistent with GBN direct staffing costs. Once permanent recruitments are made, any relevant arrangements will be reported under the Cabinet Office senior officials 'high earners' salaries Transparency Data. Services costs covers IT systems, insurance, rent and facilities management, finance system, human resources system, procurement system and travel booking, employee assistance and independent escalation. Assumptions for the cost of each area are based on market testing, information from the Government Property Agency and similar office costs in the NDA estate. The Department intends that it and GBN will publish further information on costs within the Annual Report and Accounts and GBN corporate and business plan at the appropriate point.

9. Impact on small and micro businesses

44. Section 7 details an illustrative familiarisation cost estimate for businesses that might be interested in reading and understanding the GBN legislation (however this is not an obligation of the legislation). If small and micro businesses are included in the number of parties that are interested in reading the legislation, they will face a familiarisation cost. We would expect the main vendors in the nuclear sector to be larger businesses, with small and micro businesses in the supply chain. However, we are unable to quantify this without specific data on businesses size within the nuclear sector. GBN could also help reduce the red tape small and micro businesses might come up against, as it is expected to streamline the development and deployment process of nuclear projects.

10. Wider impacts (consider the impacts of your proposals)

10.1. Public Sector Equality Duty

45. The Public Sector Equality Duty (PSED)¹⁴ analysis in respect of GBN has identified a potential distinction between opportunities for those with protected characteristics due to hiring from a nuclear workforce that has high concentrations of particular demographics. Data suggests age and gender present discrepancies in the nuclear industry. For example, the Nuclear Workforce Assessment (2021)¹⁵ states 20% of the workforce identify as female. In comparison to this, the 2021 Census¹⁶ estimates 51% of the population in England as female. The Nuclear Workforce Assessment (2021) also states 35.2% of the workforce is aged over 50, and 20% of the workforce were over 54 in 2019¹⁷. There is limited data surrounding the remaining seven characteristics. However, extrapolating from wider STEM sector data, it can be assumed the same inequalities are applicable to the nuclear industry

¹² <https://www.crowncommercial.gov.uk/agreements/RM6187>

¹³ <https://www.kornferry.com/>

¹⁴ Evidence considered includes: Next Generation Nuclear Industry Council 'Future workforce consultation' (July 2022), Nuclear Workforce Assessment (2021), Nuclear Industry Associate (NIA) Jobs Map (2021), Future Nuclear Enabling Fund response data (2022), data on protected characteristics of the employees of applicants for the Future Nuclear Enabling Fund. As well as PSED for Nuclear Energy (Financing) Bill, Sizewell C Project Government Investment Decision, Nuclear Fuel Fund, Medical Radionuclide Innovation Programme.

¹⁵ <https://www.nssguk.com/media/2781/nwa-2021-summary-final.pdf>

¹⁶ <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/demographyandmigrationdatacontent/2022-11-02>

¹⁷ <https://www.nssguk.com/media/2018/nuclear-workforce-assessment-2019-full-report-final.pdf>

(for example an 88% white workforce in comparison to 81%¹⁸ of the working age population being from white ethnic groups). Therefore, it can be assumed that employment opportunities arising from GBN would disproportionately benefit white, older, male workers. GBN will prioritise diverse and inclusive recruitment principles to lead the industry and mitigate some of the issues identified.

46. Furthermore, if the Regulated Asset Base model is used to fund new nuclear, there are implications for low-income households. These are fully explored in the PSED for the Nuclear Energy (Financing) Act 2022¹⁹, which identified four Protected Characteristic Groups (PCGs) which may be disproportionately affected by the increase to consumer bills resulting from a RAB model. Older age groups will be charged but are less likely to realise the benefits of commercial operation. Low-income households also pay more towards energy costs as a percentage of their disposable income compared to the average household (5% on average, 23% in lowest income decile). The protected characteristics disproportionately represented in low-income households include ethnic minority, disability and pregnant/maternity leave groups. Therefore, the RAB model would disproportionately increase the bills of these groups in the short-term but disproportionately decrease the bills of these groups over the long-term.
47. When GBN begins to characterise sites for nuclear development there are likely to be significant impacts on local communities. These communities will likely be spread across Britain and the organisation will offer direct and indirect employment and training opportunities for suitably qualified people including those with protected characteristics. For example, GBN offices are expected to be located in a city centre outside of London with good transport links and office facilities. None of the protected characteristics groups (including disabled groups) should be precluded from employment, although there are the discrepancies in the nuclear workforce identified in paragraph 50. GBN will also attract workers with specialist skills in various areas of nuclear related expertise. This will bring people working in related supply chains to the community and offer local businesses indirect employment opportunities in addition to the direct employment opportunities. Changes to development and consent planning may also have impacts for disabled groups, although are not dealt with in the legislation currently under consideration.
48. The analysis from the GBN legislation PSED identified no impacts separate to those already highlighted in terms of recruitment or location. The approach taken to the set-up of GBN is a purely technical matter, designed to facilitate the delivery of HMG's policy objectives for GBN (with further projects being subject to their own PSED assessment at a later date). As such we do not anticipate legislation will have adverse impacts on any groups of individuals that share protected characteristics, while it is anticipated that such groups will benefit from the positive impacts related to GBN's outcomes being available sooner thanks to the expedited set-up process.

10.2. Environmental principles policy statement

49. The five environmental principles set out in section 17(5) of the Environment Act 2021 can be described as the:
- a) integration principle
 - b) prevention principle
 - c) rectification at source principle
 - d) polluter pays principle and

¹⁸ <https://www.ethnicity-facts-figures.service.gov.uk/uk-population-by-ethnicity/demographics/working-age-population/latest#:~:text=85.6%25%20of%20working%20age%20people%20were%20White%2C%208.1%25%20were,people%20identified%20as%20White%20British>

¹⁹ <https://bills.parliament.uk/bills/3057/publications>

e) precautionary principle

These are internationally recognised benchmarks for environmental protection and enhancement. In preparation of the policy for GBN, consideration has been given to each.

50. This policy alone is not expected to have any direct environmental impacts. Secondary impacts are expected because GBN will help to streamline the delivery of new nuclear projects and thus enable a regular rhythm of nuclear deployment. All nuclear projects enabled by GBN must comply with the assessment requirements set out in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (amongst other assessment regimes such as those relating to the historic environment, habitats and water) and would therefore be expected to factor in the Environmental Principles outlined above. Section 6.2.b details how nuclear capacity can support the 2050 net zero target. However, the PSO analysis does not estimate wider environmental impacts such as land use changes, biodiversity changes and emissions during construction.
51. Lifecycle analysis can be used to assess the overall greenhouse gas impact associated with all stages of the life cycle of a plant (for example procurement of raw materials, construction, operation and decommissions). The Committee on Climate Change (CCC) estimates lifecycle emissions of nuclear and counterfactual technologies in a 2013 report, *Reducing the UK's carbon footprint*, as shown in Table 3.²⁰ The report presents results from previous studies as well as their own estimates:

Table 3 – Lifecycle emissions estimates [Source: CCC Reducing the UK's carbon footprint report]

	Literature estimates (gCO ₂ e/kWh)	CCC estimates (gCO ₂ e/kWh)
Nuclear	5 – 55	3 – 10
Onshore Wind	7 – 20	4 – 7
Offshore Win	5 – 24	3 - 5
Gas CCS	90 - 245	60 - 120
Solar PV	40 – 80 (crystalline silicon modules)	around 55 (crystalline silicon technologies)
	20 – 45 g/kWh (cadmium telluride modules).	around 30 (cadmium telluride technologies)

52. In summary, HMG policy for GBN considers each of the Environmental Principles in the following way:

- a) **Integration principle:** In the development of the policy for GBN, consideration has been given to the 'integration principle' particularly as adverse environmental effects such as habitat loss and land take could result from nuclear and counterfactual technologies. Site-specific ecological impacts will vary and depend on the significance of the species and habitats affected. However, these impacts can be expected to be mitigated and offset in addressing site selection and planning for individual projects. Those assessments will be site and project specific.
- b) **Prevention principle:** Table 3 illustrates how the policy behind GBN will comply with the 'rectification at source', 'integration' and 'prevention' environmental principles. The increased rate of deploying low carbon energy via nuclear projects will help to address the cost of emissions from the production of energy from unabated fossil fuels and would

²⁰ Reducing the UK's carbon footprint and managing competitiveness risks, Committee on Climate Change (2013), available at: <https://www.theccc.org.uk/publication/carbon-footprint-and-competitiveness/>.

therefore help to address the environmental harms that would otherwise be incurred as negative externalities without the development of new nuclear. GBN will help to ensure that environmental damage via emissions is reduced given the low carbon footprint of nuclear plants. Nuclear power is also energy dense: it produces a significant amount of energy from a very small land area. By way of example, Hinkley Point C, will power 6 million homes from just a quarter of a square mile.

- c) **Rectification at source principle:** See b.
- d) **Polluter pays principle:** Any operator applying for a Nuclear Site Licence for a new nuclear power station must submit a Funded Decommissioning Programme (FDP) to the Secretary of State for approval, as required by section 45 of the Energy Act 2008. The objective of the FDP is to ensure that the operator has secure funding arrangements in place to meet the full costs of decommissioning and its full share of waste management and disposal costs. GBN's support of new nuclear projects will have already factored in any pollution costs from waste produced by nuclear sites, with the cost borne by operators of such sites and it therefore meets the polluter pays principle.
- e) **Precautionary principle:** The precautionary principle is applied as a matter of course in nuclear safety regulations and will therefore be integral to the nuclear projects that GBN will facilitate.

11. A summary of the potential trade implications of measure

- 63. The impacts from this measure are not considered to impact international trade and investment. This Impact Assessment considers the establishment and set-up of GBN which will not impact trade and investment. However, GBN's subsequent work will likely have an impact.

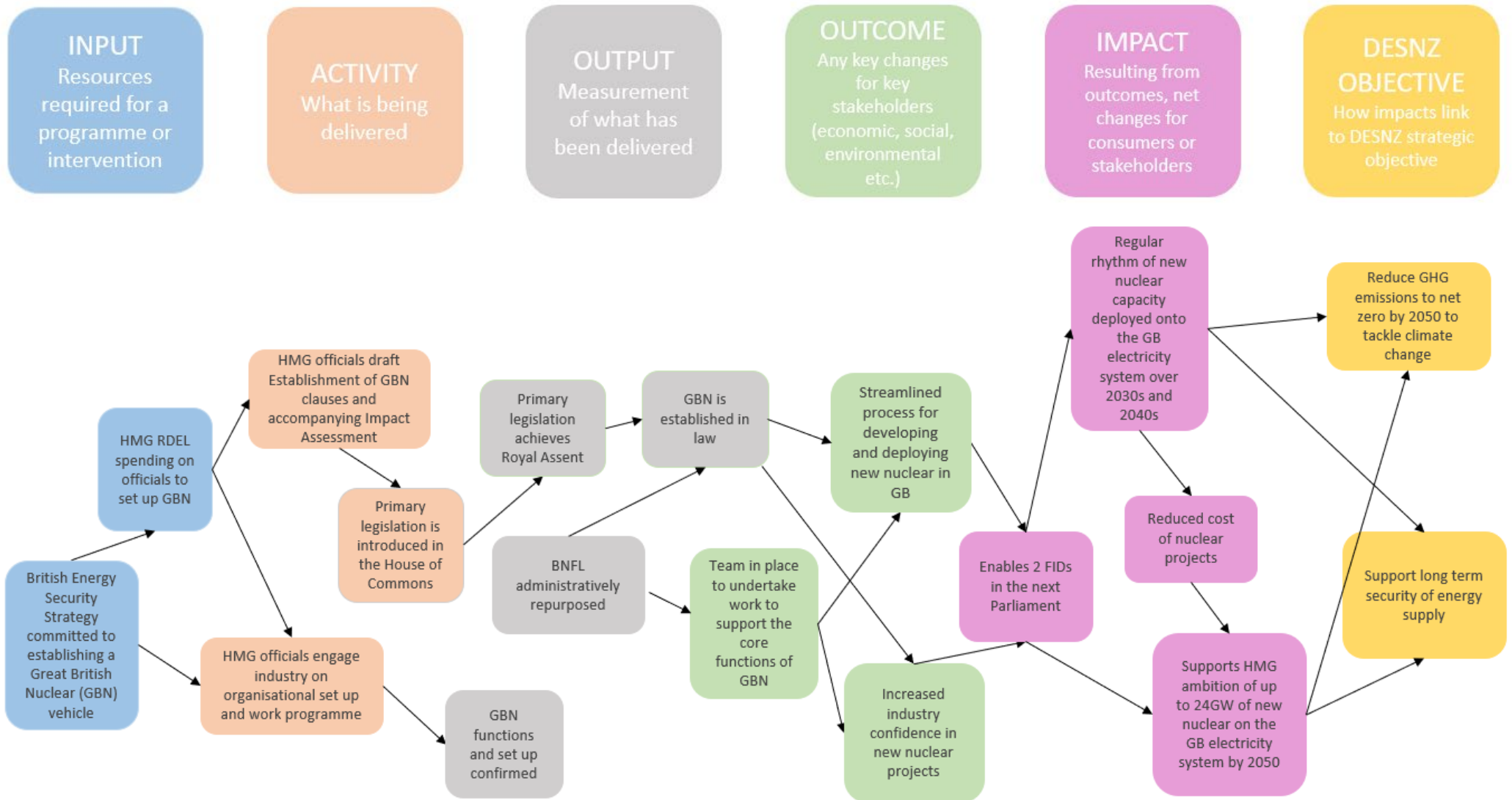
12. Monitoring and Evaluation

- 64. The monitoring and evaluation plan for GBN considers the first two years of GBN. Beyond March 2025 the ongoing work of GBN will be regularly monitored and evaluated in a manner consistent with other arm's length bodies.
- 65. When BNFL was last active, it met the relevant test to be classified as a public corporation. However, since it no longer generates its own income, if it was reclassified now, we anticipate that it would likely be classified as an NDPB and so equivalent controls have been applied to ensure public funds are subject to appropriate controls. Before legislation, an interim framework agreement will set out the roles and responsibilities of Government and BNFL t/a GBN. Subsequent governance and controls will be subject to any provision made by Parliament and classification by the Cabinet Office. Once they have been determined, a framework agreement which reflects GBN's status will be entered into with the company designated as GBN (should legislation proceed as first drafted) and its articles may be updated accordingly.
- 66. In the interim, we expect that data collection, monitoring and reporting requirements will be consistent with those placed on other NDPBs. Regular data is expected to be collected by GBN and reported to HMG on the delivery of agreed outputs, outcomes and benefits. Example areas of data collection could include progress on hiring staff and the necessary contracted expertise. Monitoring activity to collect baseline data could also be undertaken at the launch of GBN (i.e. BNFL t/a GBN), prior to any significant work being undertaken. We expect GBN (initially as BNFL t/a GBN and then the company designated as GBN) will report to HMG in the following ways:
 - a) GBN will operate management, information and accounting systems so it can review its financial and non-financial performance against budgets and targets set out in its corporate and business plans. It will report financial and non-financial performance

(including performance to deliver ministers' policies) and the achievement of key objectives regularly.

- b) It will inform the shareholder department of any changes that make it more or less difficult to achieve its policy objectives.
 - c) GBN's performance will be formally reviewed by DESNZ at least twice a year.
 - d) The responsible Minister will meet the Board, Chair and Chief Executive once a year.
 - e) DESNZ's Principal Accounting Officer will meet the Chief Executive at least once a year.
 - f) The draft legislation, as introduced, will require GBN to provide an annual report to SoS which is then to be laid before Parliament, together with its accounts.
67. We also expect information sharing provisions between GBN and HMG, such as:
- a) DESNZ has the right to access all company records and personnel for any purpose for example, shareholder audits and operational investigations.
 - b) GBN will provide the shareholder department information about its operations, performance and individual projects or expenditure as required.
 - c) The department and HMT may request data from GBN as set out in central guidance (unless prohibited by law). This may include requiring the appointment of a senior official to be responsible for the data sharing relationship.
 - d) GBN will provide monthly information to the department to enable it to monitor: GBN's cash management, its draw-down of grant-in-aid, forecast outturn by resource heading, data required for the Online System for Central Accounting and Reporting and for its compliance with any Cabinet Office Controls or agreed derogations (or required to meet any condition in settlement letters).
68. Process and impact evaluations could be used to assess GBN's delivery of the programme and its effectiveness. These would consider high-level evaluation questions such as:
- a) What has been the impact of the GBN entity, and did it achieve HMG's original policy objectives? How did GBN generate any attributed effects and did these differ across different stakeholder groups?
 - b) How effective and efficient has GBN been?
 - c) How effective were the measures taken to attract the right mix of suitably qualified people to work in GBN and improve the capability of GBN's ability to expand its workforce if necessary? Did this vary for different areas of skills and expertise?
 - d) What are the implications of the process and impact evaluation findings for the future of the British new nuclear sector and the potential for the deployment of a steady rhythm of new nuclear capacity deploying onto the GB electricity system in the 2030s and 2040s?
69. An impact evaluation exploring GBN's outcomes could consist of a theoretical approach (such as through simulation, contribution, or qualitative analysis) and potentially a quasi-experimental approach comparing against a do-nothing counterfactual. Suitable impact evaluation methods could include a combination of focus groups and interviews with key stakeholders, surveys and simulation exercises to assess counterfactual assumptions and data.

Annex A: Theory of Change



Theory of Change: Risks and Assumptions

In relation to the inputs, we assume that since the publication of the British Energy Security Strategy RDEL spending is delivered to allow GBN to be operationalised. Following this, activities included engagement with industry and stakeholders on the organisational set-up and work programmes of GBN. GBN legislation is subsequently introduced in the House of Commons as an activity.

There is a risk that the long-term policy objectives might not be achieved if there are delays with the necessary legislation beyond this Parliament. Operationalising BNFL t/a GBN within the existing framework – until legislation is passed – should help mitigate this risk in the short-medium term and will allow a team to be recruited to deliver GBN's work programmes.

There is a risk if GBN is unable to hire staff with the expertise necessary, that the resulting outcomes and impacts are not fully realised. An ability for GBN to offer commercially competitive salary packages, subject to HMG agreement, should help mitigate this risk.

An anticipated policy outcome for GBN is increased industry confidence. If industry and investors are more confident in the development and deployment of nuclear, Government is more likely to deliver investment decisions to enable 2 FIDs in the next Parliament and a subsequent regular rhythm of nuclear capacity deployment. GBN will support the Department objectives of reducing Green House Gas emissions to net zero by 2050 and supporting long term security of energy supply given nuclear plants can provide baseload low carbon energy.