Department for
Business, Energy
& Industrial Strategy

RAB MODEL FOR NUCLEAR

Consultation on a RAB model for new nuclear projects

Closing date: 14 October 2019

July 2019

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Any enquiries regarding this publication should be sent to us at:
enquiries@beis.gov.uk

Contents

General information

Why we are consulting

The purpose of this consultation is to set out the basis for our assessment of a Regulated Asset Base (RAB) funding model for nuclear and to seek views from stakeholders on a nuclear RAB model and its high-level design principles.

Consultation details

Issued: 22 July 2019

Respond by: 14 October 2019

Enquiries to:

Electricity and RAB Strategy Team
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1 Victoria Street,
London,
SW1H 0ET

Email: RABconsultation@beis.gov.uk

Consultation reference: Consultation on a Regulated Asset Base (RAB) Model for Nuclear

Territorial extent:

This consultation applies to the energy markets in Great Britain. Responsibility for energy markets in Northern Ireland lies with the Northern Ireland Executive's Department for the Economy.

How to respond

Respond online at: https://beisgovuk.citizenspace.com/energy-strategy-networks-markets/regulated-asset-base-rab-model

Email to: RABconsultation@beis.gov.uk

Write to:

Electricity and RAB Strategy Team

Department for Business, Energy & Industrial Strategy,

3rd Floor Victoria 309

1 Victoria Street,

London, SW1H 0ET

When responding, please state whether you are responding as an individual or representing the views of an organisation.

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with data protection Laws.

If you want the information that you provide to be treated as confidential please tell us but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable UK and EU data protection laws. See our privacy policy.

We will summarise all responses and publish this summary on GOV.UK. The summary will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

Quality assurance

This consultation has been carried out in accordance with the government's consultation principles.

If you have any complaints about the way this consultation has been conducted, please email: beis.bru@beis.gov.uk

Executive summary

For new nuclear projects to be successful in a more competitive energy market, it is essential that there is a sustainable funding model that can attract private finance at a cost that represents value for money to consumers. In his statement to Parliament in June 2018, the Secretary of State for Business, Energy and Industrial Strategy said that the Government would review the viability of a 'Regulated Asset Base' (RAB) model for new nuclear projects and in January 2019 confirmed the Government's intention to publish an assessment of this model by the summer.

RAB models, typically used for funding UK monopoly infrastructure, involve an economic regulator who grants a licence to a company to charge a regulated price to users of the infrastructure. RAB-funded infrastructure has attracted significant investment from private sector capital over the last 20-30 years, with total value of RAB assets in 2018 of c.£160bn.

Our assessment has concluded that, by providing regulated returns to investors, a RAB model has the potential to reduce the cost of raising private finance for new nuclear projects, thereby reducing consumer bills and maximising value for money for consumers and taxpayers.

To deliver these benefits, we believe that a RAB model for new nuclear projects would need to have the following features (described in further detail in this consultation):

a) Government protection for investors and consumers against specific remote, low probability but high impact risk events, through a Government Support Package (GSP);

b) A fair sharing of costs and risks between consumers and investors, set out in an Economic Regulatory Regime (ERR);

c) An economic regulator (the 'Regulator') to operate the ERR; and

d) A route for funds to be raised from energy suppliers to support new nuclear projects, with the amount set through the ERR, during both the construction and operational phases (the 'Revenue Stream').

The purpose of this consultation is to seek views from stakeholders on a nuclear RAB model and its high-level design principles, including risk sharing arrangements.

This consultation will run until 14 October 2019. Responses should be submitted to RABconsultation@beis.gov.uk and will be published unless respondents request confidentiality.

Introduction

1. Nuclear power plays an important role in our current energy mix, with eight nuclear power stations – spread across the country, from Dungeness to Torness – providing around 20% of our total power needs[1]. We have a world-leading civil nuclear sector, covering the full lifecycle of fuel production, construction, generation, decommissioning, waste management and research. Industry estimates that the civil nuclear sector supports 46,000 jobs across the civil nuclear supply chain[2]. In 2016, the government gave the go ahead to the construction of the first nuclear power station in a generation at Hinkley Point C (HPC), and in 2018 signed an ambitious sector deal with the nuclear industry to reduce costs, drive innovation and increase diversity across the sector [3].

2. The United Kingdom recently became the first major economy to legislate for a target of net zero greenhouse gas emissions by 2050[4]. This decision was taken following advice from the independent Committee on Climate Change that a net zero 2050 target was feasible, deliverable, and can be met within the same cost envelope of 1% to 2% of GDP in 2050 as the 80% target when that was set[5].

3. Reaching this target will require ambitious action across the economy to reduce emissions while keeping energy costs low and supplies secure. To ensure that we achieve the transition to net zero in a way that works for households, businesses and the public finances, HM Treasury will be leading a review into the costs of decarbonisation.

4. Meeting net zero will require emissions from the power sector to be reduced to low levels and the deployment of negative emissions technology to offset emissions from those sectors that cannot be completely decarbonised. It is likely that electricity demand will grow significantly by 2050 as other sectors of the economy such as transport and heat are electrified, potentially nearly doubling (or more) from today's levels.

5. To meet this increasing demand, whilst reducing emissions to low levels, there will need to be a substantial increase in low carbon generation – the Committee on Climate Change estimate a four-fold increase may be needed. This is at a time when seven out of eight of our existing nuclear power plants – important contributors to our low carbon generation – are due to come offline by 2030 as they reach the end of their operational lives.

6. As the cost of renewable technologies such as offshore wind and solar continues to fall[6], it is becoming clear that they are likely to provide the majority of our low carbon generating capacity in 2050. However, there will still be a crucial role for low-carbon 'firm' (i.e. always available) power in 2050 – the Committee on Climate Change includes 38% firm low carbon in their further ambition scenario[7] – to meet net zero while maintaining security of supply and keeping costs low.

[1] https://www.gov.uk/government/statistics/digest-of-uk-energy-statistics-dukes-2018-main-report
[2] https://www.nssguk.com/media/1316/publication-nuclear-workforce-2017-exe-summary.pdf
[3] https://www.gov.uk/government/publications/nuclear-sector-deal
[4] https://www.gov.uk/government/news/pm-theresa-may-we-will-end-uk-contribution-to-climate-change-by-2050
[5] https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/
[6] https://www.gov.uk/government/publications/beis-electricity-generation-costs-november-2016
[7] https://www.theccc.org.uk/publication/net-zero-technical-report/#technical-annexes

7. The technologies currently available to provide this large-scale firm, low-carbon power in 2050 are nuclear and gas with carbon capture, usage and storage (CCUS)[8]. While advances in technologies, system flexibility and energy storage may eventually provide additional options for fully decarbonising the power sector, it is clear that a significant capacity of new nuclear power stations and gas-fired power plants with CCUS, alongside renewables, will also be required.

8. To ensure we have a credible plan for delivering our climate targets while maintaining security of supply and keeping costs low, we must take the necessary enabling steps to deliver the required firm low-carbon capacity based on the current set of options available to us.

9. In that context, the Government believes that we should be prepared to support further new nuclear projects in the years ahead, if they can be delivered at a competitive price and each individual project represents value for money.

10. The first step in driving down costs was the signing of an ambitious sector deal with the nuclear industry which focuses on lowering the cost of new nuclear projects by 30% to ensure nuclear remains competitive with other technologies. Industry is leading work – as part of the implementation of the Nuclear Sector Deal[9] – to establish how that target can be achieved by 2030. This will involve thinking about how, for example, innovative approaches to advanced manufacturing, construction and materials can reduce costs in a range of products and services across the nuclear industry, including for future nuclear technologies.

11. As the Secretary of State for Business, Energy and Industrial Strategy made clear in his statement to Parliament on 17 January 2019, the next major challenge is how new nuclear projects are financed going forward.

12. HPC is being financed by EDF and CGN, with a Contract for Difference (CfD) providing long-term price stability for the generator once the plant begins generating (but leaving construction and operating risk with the investors)[10]. The CfD model was appropriate in this instance as HPC was the first new nuclear project to begin construction in the UK for a generation. At the point the decision was taken to enter into the CfD contract, the European Pressurised Reactor (EPR) technology was not operational anywhere in the world, and similar projects in France and Finland had suffered from significant delays and cost overruns. It was therefore right that all construction and operational risk should sit with the project investors.

13. The context will, however, be different for future new nuclear projects. HPC is now under construction, providing employment opportunities and helping to rebuild the supply chain for new nuclear projects across the UK, providing valuable knowledge and skills[11]. Furthermore, on 24 June this year HPC reached a significant construction milestone with the completion on schedule of the concrete base for the reactor buildings, helping to build confidence in the delivery of further new nuclear projects in the UK. The EPR technology

[8] Bioenergy is another source of firm, low carbon capacity and currently provides around 10% of total electricity generation. It will continue to have an important role in 2050 – particularly in combination with CCUS to provide 'negative emissions' – but supplies of sustainable, low carbon biomass are likely to limit the scale to which this can be deployed in the power sector.

[9] https://www.gov.uk/government/publications/nuclear-sector-deal

[10] https://www.gov.uk/government/news/hinkley-point-c-contract-signed

[11] https://www.gov.uk/government/publications/hinkley-point-c-wider-benefits-realisation-plan (Source: NNB HPC)

has now started commercial operations in China[12], and other technologies that have been proposed for deployment in the UK are either already operational elsewhere or are expected to be operational before they would be deployed in the UK.

14. Despite the progress at HPC, the challenges facing the global nuclear industry have meant that replicating a CfD model for further new nuclear projects has proved very challenging[13]. Few project developers have a balance sheet that can accommodate the £15-20bn cost of delivering a new nuclear project, and financial investors have been unwilling to invest during the construction phase given the long construction period and risk of cost increases and delays. We are therefore looking to work with the sector to develop an alternative funding model for new nuclear projects that can attract private finance at a cost that represents value for money to consumers and are considering its wider applicability to other firm low carbon technologies.

15. This is consistent with the National Audit Office (NAO) report on HPC[14], which recommended that Government consider whether alternative funding models for future new nuclear projects could improve value for money and reduce cost to consumers.

16. In light of the NAO's recommendations, the Government announced[15] in June 2018 that it was willing to consider direct investment into Horizon's proposed Wylfa Newydd nuclear project, alongside investment from Hitachi, Japanese Government agencies and other parties. At the same time, the Secretary of State made clear that it remained the Government's objective in the longer term that future new nuclear projects beyond Wylfa should be financed by the private sector, and that Government would review the viability of a Regulated Asset Base (RAB) model (see box 1) as a sustainable funding model based on private finance, which could deliver the Government's objectives in terms of value for money, fiscal responsibility and decarbonisation. Such a model could ensure taxpayers' money could be invested in vital public services, while continuing to reduce public sector net debt.

17. Despite a concerted effort by all parties involved, Hitachi announced in January 2019 that it was suspending development of the Wylfa Newydd nuclear project. Following Hitachi's announcement, the Secretary of State made a statement to Parliament[16] in January 2019, stating that Government was continuing to review the viability of a RAB model and assessing whether it could deliver value for money for consumers and taxpayers. He confirmed the Government's intention to publish this assessment by the summer.

18. Our assessment has concluded that a RAB approach could present a sustainable and value for money model for funding new nuclear projects. It has the potential to attract significant investment for new nuclear projects at a lower cost to consumers, enabling low carbon power to be delivered at scale. However, there remain significant challenges to delivery of a RAB model for new nuclear projects. These include raising the scale of capital required and establishing an appropriate risk sharing arrangement between the project company, the supply chain, investors, taxpayers and energy suppliers and consumers.

19. The purpose of this consultation is to set out the basis for our assessment and to seek views from stakeholders on a nuclear RAB model and its high-level design principles,

[12] https://www.edfenergy.com/media-centre/news-releases/taishan-1-connected-to-grid
[13] https://commonslibrary.parliament.uk/science/energy/mind-the-gap-challenges-for-future-uk-energy-policy/
[14] https://www.nao.org.uk/report/hinkley-point-c/
[15] https://www.gov.uk/government/speeches/statement-to-parliament-on-horizon-project-at-wylfa-newydd
[16] https://www.gov.uk/government/speeches/statement-on-suspension-of-work-on-thewylfa-newyddnuclear-project

including risk sharing arrangements. We are consulting on the basis that this model would be introduced alongside our existing model for delivering new nuclear projects, the CfD model, rather than as a replacement. A decision on which model was most appropriate for a particular project would be made on a case-by-case basis. There could be further consultations on specific design features if the Government decides to proceed with implementing the framework for a nuclear RAB model following this consultation.

20. We are also considering whether a RAB model could be applied to other firm low carbon technologies, such as transport and storage infrastructure for carbon dioxide. This is included in a separate consultation on business models for Carbon Capture Usage and Storage (CCUS)[17].

Box 1: What is a Regulated Asset Base (RAB) funding model?

A RAB model is a type of economic regulation typically used in the UK for monopoly infrastructure assets such as water, gas and electricity networks. The company receives a licence from an economic regulator, which grants it the right to charge a regulated price to users in exchange for provision of the infrastructure in question. The charge is set by an independent regulator who holds the company to account to ensure any expenditure is in the interest of users. In the case of a nuclear RAB, suppliers would be charged as users of the electricity system and would be able to pass these costs onto their consumers who also use the electricity system.

In 2016 the model was applied successfully for the first time to a single asset construction project – the £4.2bn Thames Tideway Tunnel (TTT) sewerage project[18]. Much of the c.£1bn of private sector equity finance that was raised to deliver the project came from UK pension funds, representing 1.7 million pensioners, or a quarter of the UK's largest 25 pension funds[19].

RAB-funded infrastructure has received significant quantities of investment from private sector players over the last 20-30 years. As of 2018 the total RAB value across the UK electricity, gas, water and airport sectors is c.£160bn (2018 prices).

Under economic regulation, the cost of transporting a unit of electricity around Britain has fallen by 17% since the mid-1990s, relative to the retail price index[20]. Since 2015 there have been significant improvements in distribution network reliability, currently standing at 99.99%[21]. Customer interruptions have fallen by 11%, and the duration of interruptions has fallen by around 9%[22]. In 2009-10 the average duration of distribution network power cuts was 97 minutes, in 2017-18 it was 36 minutes[23].

[17] https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-business-models
[18] https://www.gov.uk/government/publications/thames-tideway-tunnel-strategic-and-economic-case-costs-and-benefits-2015-update
[19] https://www.nic.org.uk/publications/review-infrastructure-financing-markets-report-nic/
[20] https://www.ofgem.gov.uk/news-blog/our-blog/tougher-price-controls-energy-networks
[21] https://www.ofgem.gov.uk/publications-and-updates/riio-electricity-distribution-annual-report-2017-18
[22] https://www.ofgem.gov.uk/publications-and-updates/riio-electricity-distribution-annual-report-2017-18
[23] https://www.ofgem.gov.uk/publications-and-updates/riio-electricity-distribution-annual-report-2017-18

A RAB model for new nuclear projects

Introduction to a nuclear RAB model

Objectives of a nuclear RAB model

21. Government believes that additional nuclear capacity will be required to ensure a low cost, stable, reliable, low carbon system.

22. Since financing costs are a major component of the price of new nuclear projects, lower financing costs could have a significant impact in driving down the total costs that suppliers and their consumers pay for this power.

23. Recent years have seen the emergence of large volumes of private sector capital looking to invest in infrastructure projects. Governments around the world are seeking ways to access this capital[24], which in the UK primarily comprises pension funds and insurers[25]. This is potentially a major source of the investment required to meet our decarbonisation objectives. For new nuclear projects to attract this capital, it is necessary that the investment proposition is comparable to the other types of infrastructure projects available for investment. This requires the creation of a more typical infrastructure investment profile where investor exposure to risks and their returns are bounded.

24. On this basis, the primary objective of a nuclear RAB model would be to enable the delivery of new nuclear projects and reduce the cost of this additional nuclear capacity. This would be achieved through:

    a) attracting private capital to finance new nuclear projects in the UK;

    b) incentivising the private sector, through robust regulatory mechanisms and competition where possible, to deliver new nuclear projects on time and to budget; and

    c) enabling a financing structure and cost of capital which is as efficient as possible in order to reduce the total financing costs of new nuclear projects to consumers.

Elements of a nuclear RAB model

25. A large-scale new nuclear project bears some similarities with the Thames Tideway Tunnel (TTT) project, in that it is a complex single asset construction project with a significant upfront capital expenditure requirement, long construction period and a long asset life. In developing a potential nuclear RAB model, we have taken the model used for TTT, which was also developed under a RAB, as a starting point, whilst recognising that new nuclear projects are greater in scale and face specific challenges that were not relevant to TTT.

[24] https://www.oecd.org/pensions/private-pensions/institutionalinvestorsandlong-terminvestment.htm
[25] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/520086/2904569_nidp_deliveryplan.pdf

26. We envisage that in order to attract low cost capital at the scale required, a nuclear RAB model would have the following key elements:

    a) Government protection for investors and consumers against specific remote, low probability but high impact risk events, through a set of contractual arrangements (the 'Government Support Package' or 'GSP');

    b) A fair sharing of costs and risks between consumers and investors, established through an 'Economic Regulatory Regime' (ERR);

    c) An economic regulator (the 'Regulator') to operate the ERR; and

    d) A route for funds to be raised from energy suppliers to support new nuclear projects, with the amount set through the ERR, during both the construction and operational phases (the 'Revenue Stream').

These are described further in the following sections.

Government Support Package

27. In order to raise the amount of finance required, Government would need to provide a GSP offering protection to investors for specified low probability but high impact risks that the private sector would not be able to bear – either at all or at an efficient price (as was the case for TTT). The GSP would also protect consumers from exposure to these risks.

28. Examples of specific risks that might be protected by a GSP are: (a) risk of cost overrun above a remote threshold, (b) disruption to debt markets, (c) certain risks for which insurance is not available in the market, and (d) political risks.

29. For the protection described in (a) above, it is envisaged that the threshold capital expenditure amount (the 'Funding Cap') would be identified prior to the GSP being issued and set by Government at a level at which there was only a remote chance of construction costs reaching this level. The Funding Cap would be set based on robust project diligence and global benchmarking of comparable projects.

30. Options for dealing with the remote risk of cost overrun beyond the Funding Cap would be developed. It is proposed that, in the event capital expenditure beyond the Funding Cap was required, the Regulator would have the option of deciding whether further financing would be reflected in higher regulated charges. Similarly, whilst investors would not be committed to finance capital expenditure beyond the Funding Cap, they could choose to do so. If investors decided not to provide finance beyond the Funding Cap, Government could choose to either provide the finance required to complete the project (in return for commensurate ownership and governance rights), or to discontinue the project and make a discontinuation payment to investors.

Economic Regulatory Regime

The Economic Regulatory Regime and Allowed Revenue

31. It is envisaged that a nuclear RAB model would require an ERR in which a licence was granted to a project company entitling it to charge nuclear RAB payments (the 'Allowed

Revenue') in exchange for performing its functions (the construction and operation of a nuclear plant). The amount of Allowed Revenue would be determined by the Regulator, and this would effectively govern the way in which risk was shared between investors and users of the electricity system (suppliers and their consumers).

32. The Allowed Revenue would be expected to be based on a set of 'building blocks' that would enable the project company to recover its costs (if approved by the Regulator) and to generate a return on capital invested to finance those costs. Indicative building blocks are set out below:

Figure 1: Allowed Revenue building blocks

33. The 'Weighted Average Cost of Capital' (WACC) would be the cost of capital allowed by the Regulator (see paragraphs 45 – 48 below).

34. The 'RAB' (also referred to as the Regulatory Capital Value or RCV) would be the total cumulative capital expenditure as incurred and approved as being efficient by the Regulator, as adjusted for indexation and Depreciation (for more detail, see paragraph 35 below).

35. The 'Depreciation' building block would allow repayment of the initial capital cost of the RAB value during its operational life so that, by the end of operations or earlier, all capital invested in the plant and approved as efficient by the Regulator would be paid back to investors. There are several options to shape the profile of the RAB repayment over its lifetime i.e. the profile of Depreciation.

36. Below is an illustrative figure showing the RAB balance during construction and the operational life of the plant, assuming that it is depreciated on a 'straight line' (real) basis down to zero.

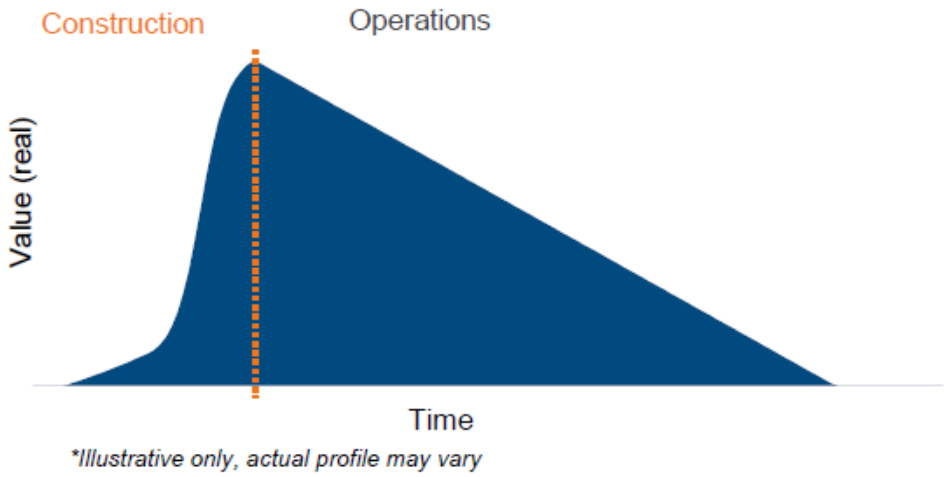

Figure 2: Evolution of RAB balance over project life

37. The 'Funded Decommissioning Programme' (FDP) building block would make provision for the decommissioning and waste management costs associated with a new nuclear project. It is envisaged that this building block would apply from the point of nuclear operation for the remainder of the period in which a regulated Allowed Revenue was charged, with incentives placed on costs within the project company's control.

38. The Allowed Revenue would be charged during both the construction and operational period, with charges increasing over the construction period in line with the cumulative project spend, as illustrated in the figure above. Such an approach would both reduce the scale of the financing challenge and the cost of financing (and so, increase deliverability of the financing, whilst reducing total cost to suppliers and their consumers). A potential challenge with this approach is that it would expose suppliers and their consumers to the risk that they provide construction-phase funding for a plant that is never completed. However, a robust due diligence process (see paragraphs 70-74 below) would be used to ensure that only projects where the risk of non-completion was highly remote would be granted a nuclear RAB licence and GSP.

39. The right to charge the Allowed Revenue set through the ERR could run for the construction phase and an operational phase similar to the design life of a plant (for example, 50 or 60 years). However, it would also be possible under a nuclear RAB model to set the ERR over a shorter period than the expected life of the plant (e.g. 35 years, the length of the CfD for HPC). A decision on this would be made as part of the overall design of the ERR for each new nuclear project, with regard to factors likely to enable best value for money for consumers, including affordability for suppliers and consumers, the expected cost of capital, the expected life of the plant and financing considerations.

Construction cost risk

40. The ERR would need to govern how construction cost overruns would be accounted for in the RAB model and how the project would be incentivised to remain efficient. The objective for any RAB model in setting this incentivisation and risk sharing approach would be to put maximum incentive on investors (and minimum risk on consumers and taxpayers) subject to ensuring that the project could be financed at an efficient cost of capital, with the overall objective of achieving best overall value to consumers. There are two potential approaches to achieving this in RAB models:

    a) **'Ex post' cost settlement**: At set periods, the Regulator could review the costs actually incurred by the project company and decide on a discretionary basis, in accordance with regulatory principles, which costs should be allowed as part of the RAB in the Allowed Revenue calculations. This would enable the Regulator to penalise the project company for inefficient spending by preventing it from accruing to the RAB; or

    b) '**Ex ante' cost settlement:** A target total construction cost would be set for the project company which would be used as the Baseline for incentivisation and risk sharing. If construction costs increased above the Baseline, a portion of the additional costs would be added to the RAB, such that the impact would be shared between investors and suppliers (and through them, their consumers). It would also operate the other way – if costs came in below the Baseline, suppliers and their consumers would share the benefits with investors. An additional tool could involve the reduction or suspension of investor returns in delay scenarios (which are closely correlated with cost overrun scenarios). The Baseline costs would be set at the point the nuclear RAB licence was granted, following a robust due diligence process carried out by Government and the

Regulator. This was the approach adopted by TTT. More detail on the ex ante approach is set out in Box 2.

41. Our initial analysis indicates that the ex ante approach is likely to be more appropriate for new nuclear projects because it could both:

    a) incentivise investors to bring to bear their collective experience in project diligence and oversight to prevent risks materialising; and

    b) provide clarity and certainty to investors, suppliers and consumers, which is particularly important for a large single-asset project with a complex and relatively long construction period. Combined with the GSP provisions for Government finance above the Funding Cap (see paragraphs 27-30 above), this would enable Government to estimate maximum potential exposure for suppliers and their consumers before additional/increased regulatory discretion. It would also enable investors to calculate the maximum impact that cost overruns could have on their returns and therefore to price their investment efficiently, which in turn should reduce overall cost to suppliers and their consumers and ensure value for money.

42. A final decision would be taken on this as part of the detailed design of the ERR for a particular project. This would be subject to further development.

Box 2: Overview of potential RAB risk sharing in construction

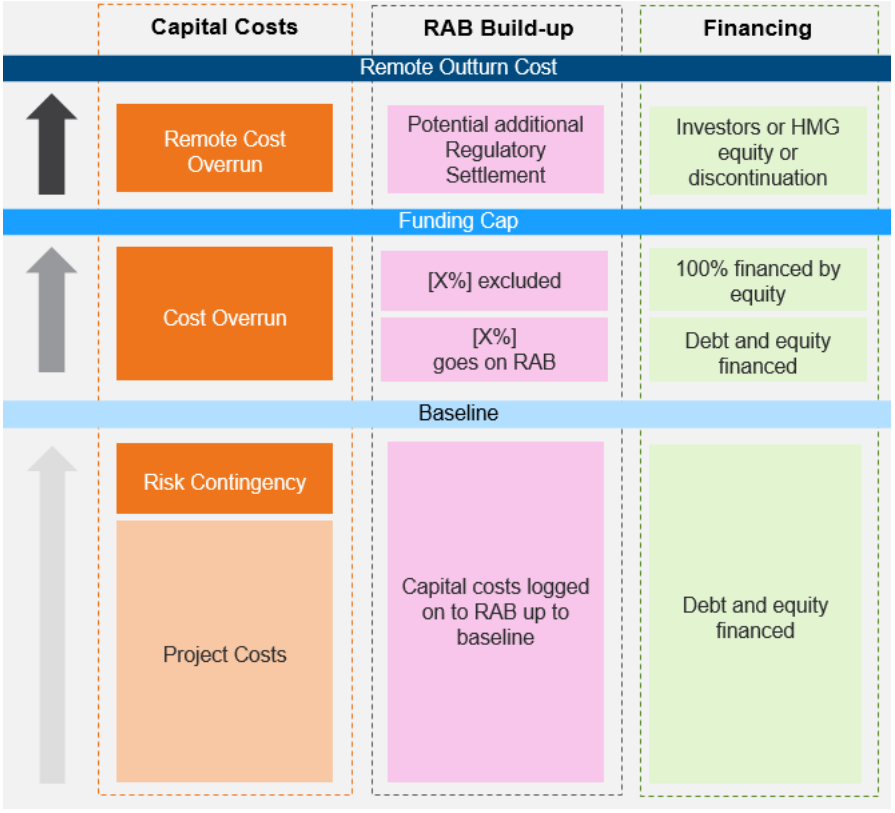

Figure 3: Illustration of how an ex ante risk sharing approach could work during the construction phase. This is based on the approach used on TTT.

A Baseline construction cost would be set at the point the RAB licence is granted, for the purposes of establishing regulatory incentives under the ERR. It would be the forecast cost of the project with a provision for reasonable risk contingency.

If project costs exceeded the Baseline, some of the additional costs would be borne by contractors through the supply chain or by insurers, depending on circumstances. Any extra costs that fell to the project company would be assessed and scrutinised by the Regulator or independent technical assessor. In limited circumstances, such costs could be entirely excluded from the RAB (e.g. where the costs were not justified by accounts and records or arose due to fraud or gross negligence or imposed by fine). Otherwise, under the ex ante model, cost overruns that fell to the project company would ultimately be shared between investors and consumers (through their suppliers).

The precise ratio of risk sharing would be subject to calibration when the ERR was set for a particular project.

Other project risks

43. Construction cost risk is one of the main risks associated with a new nuclear project. However, there are a number of other risks in a new nuclear project, some of which apply to any infrastructure project. Examples include financing costs (e.g. risk of a rise in interest rates), performance risk (e.g. risk that the plant generates less electricity than expected), regulatory risk (e.g. change in safety standards) and 'end-of-asset-life risk' (e.g. changes in the cost of decommissioning). Other than those risks of the kind identified in paragraph 28, to be protected by a GSP, the allocation of the above risks between consumers (through suppliers) and investors could be determined and calibrated on a project specific basis.

44. It is likely that, in line with existing economic regulatory practice in networks, a risk that investors were unable to control would in most cases sit with consumers, but where investors could control a risk, they would be incentivised as far as possible to minimise that risk.

Cost of capital and yield to investors

45. Generally, the WACC for RAB assets is determined administratively by the relevant economic regulator through benchmarking of the cost of capital based on their specific sector knowledge. However, the TTT project took a different approach and used a competition between capital providers to set the initial WACC, to apply during the construction phase and the early years of the operating phase. The WACC for TTT will then be re-set by Ofwat (The economic regulator of the water sector in England and Wales) at regular intervals during the operating phase. A mechanism to set the WACC competitively might also be an appropriate approach for a nuclear RAB model but would need further consideration, given the amount of capital required to finance a new nuclear project.

46. Regardless of the approach taken, the intention would be to establish a WACC that was the minimum needed to raise sufficient capital for the project, so as to keep the overall cost to suppliers and their consumers as low as possible.

47. It is expected that the ERR and GSP could enable a return to investors to be paid out on a regular basis, including during the construction phase. This would:

    a) enable the project to attract the capital required from, for example pension and insurance funds (who need to ensure that assets match liabilities), and

    b) reduce overall cost to suppliers and their consumers by reducing the total amount of finance required to be raised (by avoiding the compounding of interest and equity returns).

48. Returns to shareholders would likely be capped during construction to incentivise project performance, and we would need to consider whether they should be suspended during a delay / cost overrun scenario.

Electricity consumers

49. As described in the Introduction, delivering net zero while maintaining security of supply and keeping costs low is likely to require a significant amount of firm low carbon power, such as nuclear, as part of a diverse generation mix. The cost of electricity to consumers is made up of several components aside from costs of building and operating power plants,

including the networks that transport electricity from where it is generated to where it is used, and the cost of ensuring that reliable electricity is available at all times. This means that it is not possible to work out the cheapest overall system simply by comparing the costs of different generation types – it is necessary to model all the elements of the system under a range of different scenarios to understand what generation mixes are likely to be lowest cost.

50. The cost to consumers and taxpayers of a nuclear project is affected by the cost of building (i.e. the 'overnight' capital cost) and operating the project, and the cost of financing the project (i.e. the WACC). Reducing these costs is important in ensuring a minimised overall cost to consumers.

51. As set out in the Introduction (see paragraphs 1–19), industry and Government committed in the Nuclear Sector Deal to seek to drive down construction costs, and the nuclear RAB model would be intended to reduce the cost of financing nuclear projects.

52. The final WACC achieved for a new nuclear project under a nuclear RAB model would be determined at financial close (see paragraphs 45-48). It would depend on various factors such as market conditions at the time (e.g. the cost of debt), alternative investment opportunities for investors, the quality of the project itself and the risk sharing arrangements under a RAB model, including the terms of the ERR and GSP. However, we believe it is likely that a RAB model would allow a significant reduction in WACC to be achieved, due to the reduction in risks to which investors would be exposed.

53. The RAB would also reduce overall financing costs through the payment of Allowable Revenues during construction (see paragraph 38), which should further reduce consumer bills.

54. As these reductions would be achieved by sharing risks with consumers and taxpayers, it would be important we take the probability and impact of these risks into account when assessing value for money.

55. Our initial view, consistent with NAO analysis in their report on Hinkley Point C[26], is that a nuclear RAB model has the potential to significantly reduce the £/MWh price and that these consumer savings would be robust to significant cost overruns or construction delays[27]. A detailed value for money assessment (see paragraph 74), factoring in the probability and impact of different potential outturn scenarios, would be carried out prior to any decision to grant a RAB licence and GSP to a specific project.

56. It would also be crucial to minimise the likelihood of risks materialising. We would envisage this being done by:

    a) Subjecting proposed new nuclear projects to a robust assessment through a structured diligence process (paragraphs 70-73) before the granting of a nuclear RAB licence and GSP.

    b) Placing strong incentives on investors through the ERR to build the plant on time and to budget and to operate it efficiently. The Regulator would play a key role in protecting the interests of consumers throughout the regulated life of the plant.

[26] https://www.nao.org.uk/report/hinkley-point-c/
[27] NAO found that for a project with a WACC of 6% (nominal), costs could overrun by between 75% - 100% before consumers costs would be equivalent to that of a project with a WACC of 9% (nominal).

c) Ensuring that appropriate risk was taken by the contractors supplying equipment and services to the project company under the key project contracts.

Role of the Regulator

57. The Regulator would be responsible for economically regulating a new nuclear project.

58. We currently consider that the Regulator should have responsibility for protecting the interests of consumers, whilst having regard to the ability of the project company to finance the project i.e. construction and operation of the plant.

59. Several regulatory functions would interface in the operation of a nuclear RAB model, including environmental, safety and security regulation as well as the economic regulation discussed here. The Regulator would work with the Environment Agencies and the Office for Nuclear Regulation (ONR, the safety and security regulator for the nuclear industry in the UK) to ensure that safety and environmental protection were paramount in decision making. The intention would be to draw on existing experience of cooperation between economic, safety and environmental regulators in other regulated businesses, whilst also taking account of any considerations specific to the nuclear sector. Each regulator would retain its complete statutory independence.

60. No entity currently carries out the role of Regulator in the nuclear sector, and so a new body or existing entity would need to be appointed to carry out this role. This entity would need to build capability to effectively fulfil the remit, and to gain consumer, supplier and investor confidence in the expertise and independence of the entity. We anticipate that Government, the Regulator and other relevant regulators would need to work closely together as their respective functions were established.

Consultation Questions

Question 1: Have we identified a model which could raise capital to build a new nuclear power station and deliver value for money for consumers and taxpayers?

Question 2: Do you have any comments on the components of the Economic Regulatory Regime as described?

Question 3: Do you have views on how consumer interests are protected under the proposed approach? What else should be considered to protect consumer interests?

Question 4: Do you agree that consumer risk sharing could be value for money for consumers if it achieves a lower expected overall cost for consumers compared to a Contract for Difference model?

Revenue stream

61. Whilst the regulatory regime would set the amount of Allowed Revenue that a new nuclear project could charge, a nuclear RAB model would need a route for funding to flow from suppliers to the project company – a **'revenue stream'**. We would expect suppliers to decide how best to reflect these costs in their consumer tariffs.

62. There are important differences between existing revenue streams and the characteristics of a nuclear RAB model that could require a bespoke revenue stream:

    a) under a nuclear RAB model, revenue would likely be channelled to the project company in both the construction and operational period; and

    b) a nuclear RAB model would entail a variable £/MWh price (calculated by reference to the Allowed Revenue from time to time) allowing for the revenue stream to be adjusted by the Regulator as circumstances change. This is different to the CfD where the "strike price" is fixed.

Design considerations for a revenue stream

63. We think that a revenue stream for a nuclear RAB model would likely need to:

    a) give investors confidence that the revenue stream was a reliable way to channel funding so that the project company is able at all times to meet its financing, construction and operating costs;

    b) take account of how current electricity markets function (both the retail and wholesale markets) and how they might change in the future;

    c) ensure that those who make payments for a new nuclear project should directly benefit from doing so;

    d) avoid significant fluctuations to the revenue stream; and

    e) incentivise the project company to respond to appropriate price signals in the market.

64. In order to achieve these objectives, one way that the revenue stream could be designed would be as follows:

    a) An intermediary body collects payment from suppliers and passes this onto the project company.

    b) In *construction*, the project company is not yet selling power into the wholesale market and therefore participating suppliers are charged their share of the **total** Allowed Revenue, according to their share of the market at that time.

    c) In *operation*, the project company sells its power into the wholesale market, and suppliers are charged their share of the Allowed Revenue minus the revenue the project company would expect to receive if power was sold in the wholesale market at a specified reference price.

d) The difference payment could be based on generation output, as is the case under CfDs for renewables and HPC; however, alternative models (e.g. payment based on availability such as the one adopted in the Capacity Market) would be considered as part of the design process.

e) Suppliers could pass the cost of the payment obligation onto their consumers, as they do with other regulated costs and could likewise reimburse their consumers (as happens under a CfD) in periods where suppliers receive payments from the project company (e.g. when the Allowed Revenue is lower than the project company's revenue from power sales). The design process would need to consider how these charges could be made in more detail, in consultation with suppliers and consumer representatives.

f) The mechanism to determine a participating supplier's proportion of the charge would need to be decided. Ofgem's Targeted Charging Review[28] would likely be considered as part of the design process.

g) It is likely that the project company would need credit arrangements to be in place to ensure the revenue stream was a reliable means of channelling funding.

h) The project company should be incentivised to behave commercially during operation and maximise its market revenues, including being incentivised to respond to the pattern of energy demand (for example carrying out refuelling and planned maintenance in low-demand periods).

Intermediary body

65. If a version of the model described above were to be used, a revenue stream would need an intermediary body to charge and collect payment from suppliers, and to pass this onto the project company. Both suppliers and the project company would need to have confidence that the organisation which took on this function had the capability to do so effectively.

66. This would likely mean that, as a minimum, an intermediary body would need to be able to carry out the following activities:

    a) billing and settlement with suppliers and the project company;

    b) forecasting of supplier payment obligations in advance of payment, to allow for suppliers to reflect these costs appropriately in their consumer tariffs; and

    c) implementation of appropriate credit support/collateral mechanisms.

67. It is not currently envisaged that the intermediary body would play the role of Regulator or exercise any regulatory or contractual authority over the project company.

68. Given its importance to the effectiveness of the revenue stream, it is likely that an intermediary body would be expected to have the following characteristics:

[28] https://www.ofgem.gov.uk/electricity/transmission-networks/charging/targeted-charging-review-significant-code-review

a) be insolvency-remote (and there would be mechanisms in place to swiftly replace the intermediary in the unlikely event of its insolvency);

b) have credibility with market participants and investors;

c) have the capacity and capability to carry out the required activities;

d) be able to access the data required to carry out its billing, settlement and forecasting functions; and

e) be fully compliant with the relevant Financial Conduct Authority (FCA) rules and guidance.

69. Following our analysis of responses to this consultation, should we decide to proceed with introducing a nuclear RAB model, we would continue to work though the design considerations of the revenue stream. We would envisage revisiting revenue arrangements on a project by project basis.

Consultation Question

Question 5: Do you have views on the potential way to design a revenue stream for a nuclear RAB model that we describe, and are there alternative models we should consider?

A nuclear RAB assessment process

70. It would be important for the Regulator and Government to carry out a robust process of structured diligence to assess whether a new nuclear project should be granted a nuclear RAB licence and GSP. This would help to ensure that project risks were fully understood, limited and minimised. Equally, taking a structured approach to the project assessment would be valuable for potential developers who felt their project was appropriate to be considered for a nuclear RAB.

71. The assessment framework would need to draw together the activities of the Regulator, Government and the project company into a consistent and coherent process. These activities would be specific to the granting of a nuclear RAB licence and associated GSP and would remain separate from other regulatory processes such as the Development Consent Order (DCO)[29] and granting of the Nuclear Site Licence (NSL)[30]. That said, we would expect the granting of a nuclear RAB licence to be informed by the granting of, or substantive progress towards, the DCO and NSL.

72. The framework could be structured over a number of key 'decision gates' at which point Government and the Regulator would consider whether they had sufficient confidence in a project to allow it to proceed to the next stage. For a decision granting the project a nuclear RAB licence, and for the Government to agree to contractual provisions for a GSP, a project would need to have successfully passed through the relevant decision gate(s).

73. Such an assessment framework would allow Government and the Regulator to:

    a) assess the deliverability of a project and its applicability to be granted a nuclear RAB licence and GSP;

    b) assess project risk in order to calibrate the ERR incentive regime and GSP appropriately, ensuring that, for each new nuclear project, the right balance was being struck between financeability and consumer/taxpayer protection;

    c) assess the value for money of a project to consumers and taxpayers (see below);

    d) assess broader strategic and societal considerations; and

    e) make the grant of a nuclear RAB licence and GSP conditional on a demonstration that the project was amongst other things, value for money, compatible with applicable State aid rules and following industry best practice in areas such as engineering, project management, governance arrangements etc.

[29] https://infrastructure.planninginspectorate.gov.uk/application-process/the-process/
[30] http://www.onr.org.uk/licensing.htm

Value for money assessment

74. We envisage that new nuclear projects would not be granted a nuclear RAB licence or GSP unless they could be shown, at the time the licence was granted and GSP signed, to offer value for money for consumers and taxpayers. When assessing value for money of new nuclear projects, Government would be focussed in particular on whether the project was expected to contribute to the target of net zero emissions by 2050 and deliver security of supply, at a lower total electricity system cost for consumers than alternatives without the project. It is currently envisaged that the value for money test would take into account:

    a) the cost of the project, having regard to safety and environment protection and risk transfer to suppliers (and, therefore, their consumers) and to taxpayers;

    b) overall cost of the electricity system to consumers over time under different scenarios (including with and without the plant);

    c) wider benefits, specific to the project, which would influence a decision as to whether, on balance, proceeding was in the interests of consumers and taxpayers.

Consultation Question

Question 6: Do you have views on our proposed approach to assessing a new nuclear project under a nuclear RAB model and determining whether it is value for money for consumers and taxpayers?

Next steps

75. The consultation period will last for 12 weeks and close on 14 October 2019.

76. We will be engaging with interested stakeholders during the 12 week consultation period so that we can capture a range of views on the principles of a RAB model and its applicability to finance future new nuclear projects, alongside the existing CfD model.

77. Following our analysis of responses, should we decide to proceed with introducing a RAB model to facilitate delivery of new nuclear projects, there could be further consultations on the specific design features of a nuclear RAB model.

Annex 1: Consultation questions

Question 1: Have we identified a model which could raise capital to build a new nuclear power station and deliver value for money for consumers and taxpayers?

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Question 6: Do you have views on our proposed approach to assessing a new nuclear project under a nuclear RAB model and determining whether it is value for money for consumers and taxpayers?

Annex 2: Glossary

Defined Term	Definition
Allowed Revenue	A regulated revenue amount (in £) which the project company would be entitled to receive under its economic licence in return for constructing and operating a nuclear power plant.
Baseline	The baseline project capex costs set for the purposes of establishing regulatory incentives under the ERR.
Capacity Market	A market-based mechanism that incentivises reliable generating capacity to be available to ensure security of electricity supply.
Capex	Capital Expenditure.
CCUS	Carbon Capture, Usage and Storage
CfD	Contract for Difference.
CGN	China General Nuclear Power Group.
Consumers	The consumers in the UK who receive electricity from energy suppliers.
Cost of capital	Cost of finance, being the return that investors (equity and debt) expect for providing capital to a company
DCO	Development Consent Order. A statutory instrument granted by the Secretary of State to authorise the construction and development of a Nationally Significant Infrastructure Project, such as a new nuclear power plant.
Depreciation	The allocation of the cost of assets to periods in which the assets are used.
EDF	Électricité de France
ERR	Economic Regulatory Regime. This is the regime that would be put in place for economic regulation of the nuclear power plant.
EPR	A third-generation pressurised water nuclear reactor.
FDP	Funded Decommissioning Programme. A programme which makes financial provision for the costs of decommissioning, waste management and disposal associated with a new nuclear project.
Funding Cap	A threshold capital expenditure amount, set at a level such that there was only a remote chance of construction costs reaching this level
GDA	Generic Design Assessment. An assessment process that allows the Environment Agency and Office for Nuclear Regulation to scrutinise new nuclear power stations before they are built.
GSP	Government Support Package.
Horizon	Horizon Nuclear Power. A UK nuclear energy company and a subsidiary of Hitachi Ltd.
HPC	Hinkley Point C nuclear power plant currently under construction in Somerset.
MW	Megawatt (1,000,000 Watts)
MWh	A MW of electricity used for an hour.

NAO	The National Audit Office
Negative emissions technology	Technology that removes emissions, such as Biomass carbon capture and storage.
Net Zero	The commitment by the Government to legislate to reduce greenhouse gas emissions to net (i.e. including the use of negative emissions technology) zero by 2050.
NSL	Nuclear Site Licence
Nuclear Sector Deal	A Sector Deal set-up between the Government and the nuclear industry, published in 2018 as part of the Industrial Strategy.
Ofgem	The Office of Gas and Electricity Markets. The regulator for gas and electricity markets in the UK.
Ofgem's Targeted Charging Review	Ofgem review into the way in which costs of the network used to transport electricity to homes, public organisations and businesses are recovered.
ONR	The Office for Nuclear Regulation. The safety regulator for the nuclear industry in the UK.
RAB	Regulated Asset Base. The total cumulative capital expenditure as incurred and approved as being efficient by the Regulator.
RAB model	A type of economic regulation typically used in the UK for monopoly infrastructure assets such as water, gas and electricity networks, the application of which to nuclear power plants is considered in this consultation.
Revenue Stream	A route for funds to be raised from energy suppliers (and indirectly their consumers) to support new nuclear projects, with the amount set through the ERR, during both the construction and operational phases
Regulator	The economic regulator of a project company under a RAB model.
RIIO-1	Revenue + Incentives + Innovation + Outputs. The network price controls set by Ofgem.
TTT	Thames Tideway Tunnel project
WACC	Weighted Average Cost of Capital
Wholesale Market	The UK wholesale electricity market, where electricity is traded between suppliers, generators, traders and customers.
Wylfa Project	The proposed new nuclear power plant at Wylfa Newydd, in Anglesey, North Wales.

This consultation is available from: www.gov.uk/government/consultations/regulated-asset-base-rab-model-for-nuclear

If you need a version of this document in a more accessible format, please email enquiries@beis.gov.uk. Please tell us what format you need. It will help us if you say what assistive technology you use.