Responding to the productivity challenge in nuclear

Report of the third conference of the #CEnuclear theme group

London, 10th May 2018

Summary

The third conference of the Constructing Excellence nuclear theme group was held in London on 10th May 2018. It addressed investors' views of the sector, which are cautious based on the perceived high construction risk, and this discussion was followed by the launch of the first in the theme group's Productivity Series. The report can be downloaded from the CE website here: http://constructingexcellence.org.uk/challenging-the-mindset-in-nuclear-construction-construction-factory-thinking/.

1. Introduction

Adrian Worker, chair of the #CEnuclear theme group, welcomed attendees. The agenda and list of attendees are attached at Annex A.

2. Investors' burning platform

Simon Flint of Blu-3 gave an overview of investors' views of financing nuclear newbuild in the UK, highlighting the challenges including productivity improvement that must be addressed in the sector if it is to secure investment. This was based on interviews and other discussions which he had undertaken on behalf of the theme group. Simon's slides are attached[1] and a copy of his article is attached at Annex B.

The article covers the development of nuclear renaissance in UK with a free-market-led philosophy, which contrasts with other countries' 'non-financial' drivers for investment. Relative strike prices at the moment are challenging, and the UK government wishes to avoid 'stranded assets'. The 'burning platform' requires a reduction in the cost of production/construction by 20-30%, requiring an initiative which emulates CRINE (North Sea oil and gas) from the early 1990s.

Questions and discussion with Simon Wilde included:

- What were the successful outcomes of CRINE? (NB oil and gas not heavily regulated).
- Regulatory approach needs rewriting.
- Delivery on cost on time as a FOAK would be a breakthrough – instead of 20-30% overspend.
- Strike price – heavily influenced by cost of capital accounting conventions, also need review
- Maybe appropriate for more state involvement – but industry will need to demonstrate productivity improvement = key component of sector Industrial Strategy
- Recognise that HPC's performance will impact positively or negatively on views of the whole sector not just EPR, common cause of all vendors in ensuring success of each other
- EDF targeting HPC1 on cost on time, then HPC2 better, then replication strategy to transfer to Sizewell C
- Low level of construction R&D, nuclear R&D is higher. UK govt has launched its Industrial Strategy Challenge Fund. Many of the R&D challenges are common across infrastructure/construction not just construction. Consider a joint bid on non-competitive R&D to the ISCF?
- Sector needs transparent solid pipeline of £30B in order to stimulate investment and development of strong supply chain. Is this a symptom of our free-market govt philosophy.
- Investors can like construction risk if they can analyse and understand it
- Chinese involvement not a barrier, state-owned entities can make nervous but a JV helps.

---

1 Nuclear ProductivityCompress

- Optimum entry time is to invest in the asset whilst it is changing - last year's HPC cost increase was a concern but once reactor construction is underway then interest will grow
- Requirement for local SMEs appears to make it harder as may not be the most experienced
- Current HPC ROI is at 8.5%, offshore Wind will sell today for 5.5-6% ROI, when operational HPC should be able to sell for 6% - in effect a 2.5% premium for taking construction risk – 1.5-2% demonstrably not enough to interest investors for a 10-year journey
- Comparison with 30-year Treasury Bond at 1.8% shows a massive gap, which is an argument for govt to put up the capital
- Nuclear strike price is not comparing like with like – 24/7 base load vs intermittent, unpredictable which requires storage and backup generation capacity such as CCGT
- Do we need research, or is it about applying what we already know?

2. Challenging the mindset in nuclear construction: 'Construction Factory Thinking'

Adrian Worker presented this new report from the #CEnuclear theme group, which is available below[2] and at this link: http://constructingexcellence.org.uk/challenging-the-mindset-in-nuclear-construction-construction-factory-thinking/. In his Foreword to the report, Adrian writes:

> "[Poor productivity] is not just a perception of the nuclear sector but of the wider construction sector… It needs to be urgently addressed by all involved at all levels if such perceptions are to be altered and greater value delivered to clients reliably and with confidence given to potential investors. It is a burning platform issue which is constraining the development and growth of the sector and therefore the national economy. Changes do need to be led by the major clients and without the creation of an environment where all parties can be successful nothing will change.
>
> Productivity must be a high priority in any delivery model throughout the lifecycle. We also know productivity is an outcome of numerous factors including the environment and structures created by clients and the many inputs and constraints that impact the construction processes. There are views that client capabilities need to be strengthened, delivery models revised, the digital environment embraced and the other factors be improved. We are not seeking to address these aspects in this paper but to highlight the change in thinking required using the proven tools from other sectors to create a new mind set where productivity becomes the norm across all parts of the sector."

The model is summarized in the following diagram. Adrian explained that the report was not only relevant for newbuild projects but also for operational sites such as Sellafield and for decommissioning projects. Key messages included:

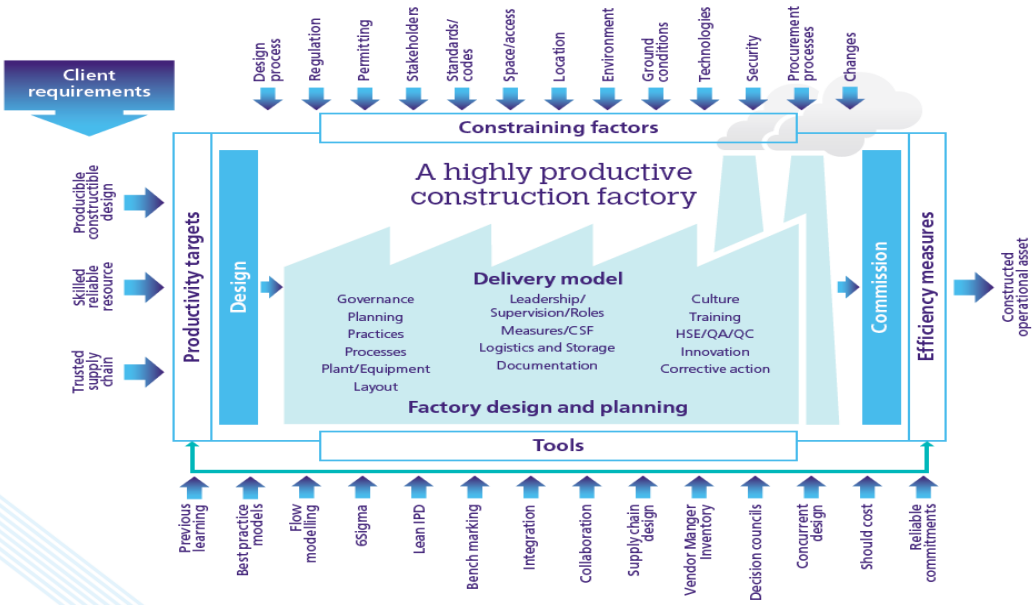
- Focus on 'value stream'
- Establish meaningful and useful productivity measures from the onset
- Design and plan for productivity from onset
- Measure to improve – provide incentives based on client value mechanisms
- Appoint a productivity leads as early as possible
- Use tools and processes available

Weaknesses to address included:

- No standard productivity measures as construction project or construction enterprise
- More practical guides to support – digitalisation, procurement etc.

2

Constructing Excellence factory thin



Ben Pritchard explained that further topics targeted for the Productivity Series included the following:

2) Productivity Handbook of processes and tools (Ben Pritchard)
3) Productivity through Digitalisation (Philip Isgar)
4) Procuring for Productivity (Adam Newbold)
5) Driving Productivity through Programme Management
6) Productive people and skills
7) Benchmarking performance

Ben asked for feedback on whether numbers 5-7 were the right topics. In discussion the following was proposed as additional topics:

8) Design for Productivity (inadvertently left out)
9) Temporary works.

2.1. The case study of Medupi

Alistair Kennedy of WSP presented on the Medupi project, the largest power station in South Africa. The case study exemplified may of the ideas in Factory Thinking report and in particular had deployed Scientific Management principles including lean to achieve a successful project turn-around. Alistair's slides are attached below[3]. Lessons learned included the separation of construction engineering form contract management, the importance of supervision levels and the resource to mentor and sustain supervisor quality, managing 'bulks' as well as critical path, focusing on Planned Promised Kept, and specifying for these issues in the contract.

Comments in discussion included:

- EDF on a similar journey
- They are improving the quality of performance data
- Ex-Medupi construction manager has now joined EDF
- Lots of evidence but people only appear to act when there is a crisis
- What is stopping us, what are the levers to pull?
- Evidence drives action not blind faith.

3

Alistair Kennedy slides 10 May 2018.pc

2.2. Clients panel discussion

A panel discussion heard the perspectives and responses to Factory Thinking from the following client organisations: Charlie Tasker, Horizon[4]; Melanie Sachar, EDF NNB; Alex Lubbock, IPA, Cabinet Office; Chris Waldon, UKAEA/ITER.
Comments in discussion included:

- Disappointing lack of cross-fertilisation with other projects and programmes
- Nuclear projects don't lose their way during the civils but when it comes to M&E
- Offsite logistics are problematic for the regulator, requirement for an inspection upon arrival at site
- ITER is First Of A Kind, target by 2040
- Difficult contracts, many different internitonal partners
- Integrated teams relying more on simulation for evidence for the regulator
- Factory Thinking is aligned with direction of travel of UK government initiatives, eg Project 13 and presumption of offsite by 5 central departments
- Important balance between addressing the 'nuclear delta' and embracing lessons from other infrastructure sectors
- Replication can be difficult as the workforce may churn rapidly
- ENEC/Abu Dhabi shows the importance of getting the Operator ready.

Reference was made to Japan on a number of occasions, including to the Constructing Excellence study tour in 2011. The report of this tour is attached below[5].

3. "Words into action"

In the final session three breakout groups considered the following questions:

1) What should shape our #CEnuclear work focus?

Whatever will <u>make industry pay attention and take action</u>

- Benchmarking
  - Who has got some data, how share?
  - Case study of 26 hours per m^3 concrete set as target against 'norm' of 43
  - How make CE data relevant to nuclear
  - Support HPC's work on this
  - Engage the NIC on this to agree some standard measures for eg productivity
- Lean tools – how to apply to nuclear construction
- IPD, early engagement of supply chain
- Tier 1 contractors will be motivated by clients – so involve more clients…
- But we also need more tier 1s to engage with us
  - eg Bechtel interested to come with Horizon to the meeting
- Managing constraints – or "yes we can do that BUT do you realise that…"
- Recalibrate the regulator to drive the right behaviours
  - 3 newbuild clients are sharing lessons that arise with regulator – "do you know about this problem the regulator encountered"
  - NB most of sector is NOT in competition so no barrier to sharing lessons learned

---

[4] Charlie gave a short presentation on the Open-top Parallel Construction approach, his slides are here:

Open-top Presentation 1005201 5

CE NIA nuclear construction study tou

- Revisit idea of a user group to share [technical] lessons learned – previous NIC structure of 6 groups including Peter Greenhalgh's on Cost Reduction. Existing focus seems to have been on operational excellence not construction lessons learnt.

2) How do we 'infect' the industry with 'factory thinking'?

Not only nuclear? Emulate construction sector initiatives by getting Factory Thinking into the (Nuclear) Sector Deal (cf BIM mandate, offsite presumption)

- Can we achieve a change of attitude in which instead of say 20%, 50% is seen as transferable from rest of construction/infrastructure
- Set a grand challenge for govt to target, eg against other countries
- Work with IPA, ICG/P13, I3P, CLC, Sector Deal/ISCF (putting the C into NMRC – NB 6 other HVM catapults)
- Target NIC presentation
- Other industry bodies, eg mech and elec trades organisations (ECIA, OCI, JIB, IET)

Need champions, neutral space, XR/HE rating/audit assessment (cf Carnegie Institute's CMMI) – TIP
Monetise the gain for the client, eg productivity gain
1:5:9 hours ratio for factory: construction site: nuclear-specific construction site
An issue that has been around for 40 years without being addressed or resolved, essential now to get investment in new nuclear

3) Individually, what will you do to support the 'factory thinking' initiative?

Individual pledges included the following:

- Meeting tomorrow, will share with contractor
- Push ideas on project, esp last planner
- Take back and share with rest of team
- Send brochure to Programme manager and talk to Japanese contractor
- Share research from last 50 years
- New version of CEEQUAL and meet with investors
- Talk to BD team about messaging
- Connect with Bath Univ's Innovation Lab
- Explore links with ECI programme
- Look to eg aerospace
- Share document with key contacts and promote value of CE forum
- Share with clients
- Deliver volume 2
- Circulate to as many colleagues as possible as quickly as possible
- Promote at leadership breakfast with Humphrey Cadoux-Hudson – and take copies
- Offer to present at members' meetings, eg a lunch-and-learn session
- Promote Factory Thinking in Digital4Nuclear and deliver volume 3
- Understand previous involvement and agree internal strategy
- Share with colleagues through eg a lunchtime briefing and support Digital4Nuclear
- Learn more about lean.

4. Next steps

In closing, Adrian Worker thanked everyone who had attended and who had delivered the report. He invited any further comments or feedback to him or any other member of the working group, and repeated his earlier offer to come and present to other organisations or at others' events. He welcomed any further volunteers to join the working group delivering the Productivity Series, and people to participate in the proposed workshop to ensure that volume two captures what the members want and allows us to collate real life examples of where the tools have been used and made a positive impact. Finally, he looked forward to welcoming delegates and their guests to the fourth in the Productivity Series of conferences, which would be in the autumn.

#CEnuclear, Constructing Excellence
May 2018

Annex A. Agenda

Time	Content	Speaker
10.30	**Introductions** 1) Welcome 2) Background and objectives 3) Reminder of the last two conferences in 2017	Adrian Worker, chair of the #CEnuclear theme group
10.50	**Investors' 'burning platform'**	Simon Flint, Blu-3, with Simon Wilde, MacQuarrie
11.50	**The Factory Thinking series**	Adrian Worker or Ben Pritchard, #CEnuclear co-chairs
12.15	**Presentation on the case study of Medupi**	Alistair Kennedy, WSP
13.00	*Lunch and networking*	
13.45	**The clients' perspectives and responses to Factory Thinking**	Panellists: 1) Charlie Tasker, Horizon *2)* Melanie Sachar, EDF NNB 3) Alex Lubbock, IPA, Cabinet Office 4) Chris Waldon, UKAEA/ITER
14.45	**Words into Action –** roundtable discussions followed by plenary feedback and action planning	Facilitated by Adrian Worker
16.00	**Updates and any other business** followed by close at 16.25	CE/ECI, NIA, NI

List of Attendees

See overleaf

Andrew	Bell	Director	Kier
Chris	Broadbent	Director	CEEQUAL
Tony	Davies	BD Director	Costain Ltd
Joe	Dowling	Director	CW Infrastructure (UK) Ltd
Simon	Flint	Business Development Director	blu-3
Koichi	Goto	Consultant	JAPAN NUS Co., Ltd
Vic	Grattidge	Civil Engineer	Cavendish Nuclear
Tom	Greatrex	Chief Executive	Nuclear Industry Association
Mark	Greatrix	Associate Director	Waldeck Consulting
Chris	Huntington	Director, Business Development	Jacobs
Philip	Isgar	Director	Sunbeam Management Solutions
Jas	Kalra	Research Fellow	HPC Supply Chain Innovation Lab. School of Management, University of Bath
Alistair	Kennedy	-	WSP
Henry	Loo	Project Co-ordinator	University of Westminster
Alex	Lubbock	-	IPA
Chris	Mann	Head of Technology	ECITB
Ruaridh	Milne	Civil Engineer	Cavendish Nuclear
Malcolm	Ness	Operations Director	Kier Infrastructure
Adam	Newbould	Director	RTFC Consulting Ltd
Giovanbattista	Patalano	Head of Engineering	Orano Projects Ltd
Stephen	POPKISS	Commercial Consultant	SP-CS
Ben	Pritchard	Consultant	Invennt
Duncan	Reed	Digital Construction Process Manager	Trimble Solutions (UK) Ltd
John	Robison	Digital Engineering Lead	Sellafield Ltd
Melanie	Sachar	HPC Project Delivery Model Lead	EDF Energy
Chris	Savage	Industrial Adviser	Nuclear Industry Association
david	Speight	Heasd of Construction	EDF HPC
Charlie	Tasker	Head of Site Management	Horizon Nuclear Power
Anders	Timms	Founder, Lean Leader & Influencer	Ideas Changing Lives Ltd.
Gareth	Vaughan	Manager of Project Operations	Jacobs
Chris	Waldon	-	UKAEA
Don	Ward	CEO	Constructing Excellence
Simon	Wilde	-	Macquarie Capital
Ivor	Williams	Retired	European Construction Institute
Clive	Winkler	Senior Associate	ICW
Adrian	Worker	-	CH2M
Stuart	Young	Technology Lead	COMIT

Annex B. Investing in UK nuclear

"In May 2006, Tony Blair indicated that nuclear was back on the agenda. The mantle was taken up by the Labour administration in the late noughties during which time the world changed. In 2008, the world went through a financial meltdown and the equilibrium of the so-called trilemma of balancing reduced carbon, affordable prices and security of supply had to be recalibrated. Idealism and green policies were subjugated by pragmatism and austerity. The nuclear strategy was put under further pressure in 2011 by the Fukushima disaster and more latterly when oil and gas prices halved.

Against these events nations have revised their industrial and nuclear strategies. The UK industrial strategy or lack of it continues to be shaped by Margaret Thatcher, whose central belief was that free market economics should prevail and that the Government should restrict itself to the defence of the realm and managing the currency. The philosophy of today's energy policy is to allow the private sector to promote projects and to distance the tax payer from development risk.

Thatcher's monetarist principles continue to influence UK economics and today's benchmark is to keep the national debt below 90% of GDP. It is dangerously close to this mark at 84% and therefore there is a preference to exclude large capital expenditure from the government balance sheet. Tipping over 90% will harm the UK's credit worthiness with private investors. Larger debt often leads to the need for higher taxes which will stifle foreign investment, economic growth and full employment. All of which endorses the UK Government's decision to play an enabling role in "keeping the lights on" and shying away from the building of its own power stations.

In contrast, the civil nuclear super powers (France, China, Russia, Japan and Korea) are characterised by state owned industries and the strong links between business and Government. As a consequence, the decision to invest in the UK's nuclear power stations has been made by foreign Presidents as well as CEOs.

The motivation for each state is different but it is more than just headline economics. France has looked to provide contracts and employment for its supply chain. China has sought to gain western acceptance and sees nuclear as part of its broader industrial export strategy entitled "the one belt one road initiative". Japan and Korea are looking for potential outlets for their technology in a market where they can create differential advantage. This contrasts with the low tech manufacturing markets where they are increasingly challenged by the lower cost base of China and other Asian countries. Russia is currently excluded from the UK due to political sanctions.

Meanwhile the UK is looking at mechanisms that can justify its decision making by creating additional social value. Currently projects are negotiated as stand alone with the emphasis on time, budget, safety, sustainability and efficiency. A more long term option would take into consideration the required investment in UK nuclear industry to create a new force to compete in an expanding global market. In turn this will lead to greater social cohesion and the revitalisation of industry.

In the absence of a championed higher vision, the UK's fallback policy is to allow the different national teams to compete for the right to build a nuclear power station. It will allow a range of different technologies instead of selecting one reactor for all of its new fleet. This means that new nuclear power stations will proceed as a series of one off projects. Unlike China, the supply chain does not have clear visibility of a pipeline of similar projects and as a consequence has no long term plans for investment. For the overseas state backed investor, the UK Government's laissez-faire approach can be mystifying and frustrating.

By employing a non-interventionist strategy, the UK has sought to distance itself from development issues. New nuclear is a risky business, costly overruns have plagued Finland's Olkiluoto 3 and France's Flamanville 3. Both of these are using the Areva EPR reactor which has also been selected by EDF at Hinkley Point C.

Nevertheless, the Chancellor has pledged 1.2% of GDP towards infrastructure. Although this does not help energy per se, Treasury would appear to be open minded and is looking at different options to generate a value for money nuclear solution. Indeed, the NAO has encouraged this by finding that

there are better ways of creating value to the consumer within the nuclear option than the agreed formula for Hinkley Point C.

To secure a risk free project at Hinkley Point for the consumer, the Government has agreed to pay £92.50 per megawatt hour for 35 years. The value of this has been estimated as an income over its full life of £160bn or £2.65bn per year for its first 35 years. Operating costs will be £1bn which results in £1.65bn being repatriated to foreign shareholders. Other power generating technologies can produce electricity at half this price which has resulted in accusations that nuclear represents poor value for money. It remains a political football and for the nuclear sceptics, proof that Hinkley Point C at some stage will be shelved.

The strike price has a number of cost components and these act as a good summary of the headings for where investors and owners perceive the risk. Key components are:

- Operating
- Decommissioning
- Planning and consenting
- Construction
- Financing
- Programme

Each UK nuclear project has demanding set up costs which are currently being met by the client body before it has a contractual agreement ie the commitment to sell electricity at a fixed price over a period of time. Nuclear projects are lumpy exercises and CEOs have to tie up a considerable amount of equity without a return for say five years.

This becomes longer if the project is delayed and therefore the “construction programme” becomes a major factor. The UK construction industry is perceived as being inexperienced, short on skills in certain areas and containing productivity shortcomings. Arguably these are negotiating ploys in assessing risks to agree a strike price. However, there is a perception that nuclear projects will attract the construction “B Team”.

The strike price commitment allows the investor comfort and potentially a good return. However EDF spent £2bn in developing an acceptable business case before the £92.50 strike price was finally accepted. After Centrica withdrew from its consortium, it negotiated with China General Nuclear Power Group (CGN) a 33.5% stake in Hinkley Point C and an unconfirmed 20% for Sizewell C. For the Chinese the prize is the switch in the Hinkley Point shareholdings for Bradwell where CGN is thought to have 66.5% and EDF 33.5%. Bradwell will allow the introduction of a Chinese reactor, Hualong One.

Funding and financing remain hot subjects for Hitachi (Wylfa and Oldbury). The FT reported that both Japanese and UK governments may be drawn into the financing model following visits by Philip Hammond and Greg Clark to Japan. The UK Government would look to have an off-balance sheet minor shareholding and the scheme may be dependent on Japanese soft loans. Set up costs are compounded by Hitachi being a manufacturer with little experience of being the client or the operator and it is having to acquire both these skills.

The UK for the last 20 years when faced with a major infrastructure project which contains risk or is troubled by programme has turned to Bechtel. Hitachi has followed suit and Bechtel’s commitment is to “bring Wylfa Newydd safely into delivery to cost and budget in collaboration with local communities and our partners.”

A simple formula is that a chief executive is only prepared to lockup 5% of his Enterprise Value that is unlikely to realise any income for 5 years. 5% of EDF’s and Hitachi’s Enterprise Value is $4bn and $3bn respectively. EDF seems to have found a way around this ceiling but Hitachi will require considerable UK and Japanese Government support to close its funding gap.

Toshiba (Moorside) is considerably smaller than Hitachi. Before its public announcement over its financial difficulties, it was gingerly proceeding through the necessary consenting steps. Toshiba

desperately needs a funding injection. Both CGN and Korea's Kepco have expressed interest in providing support in exchange for creating an opportunity for their reactors.

2019 will be an interesting time for investors and politicians. It is the time when construction is scheduled to be well under way at Hinkley Point C with site work on the reactor about to start. By 2019 four EPR reactors will be on line at Taishan (China), Olkiluoto and Flamanville. It also coincides with the initial conclusion of the Brexit talks. The UK will be anxious to be able to announce some meaningful trade deals as it exits the EU. Top of the target list will be arrangements with Japan, China and arguably Korea.

If all goes well over the next two years, then private investors may wish to enter the market. EDF has flirted with offloading 15% of its stake in Hinkley Point C. Development risk will be better understood in 2019 and there will be less likelihood of currently unknown potential deal breakers surfacing. It is these uncertainties that prevent investors involvement. Known risks can be managed although the preferred way is to wrap them up contractually and offload them in the form of a turnkey lump sum EPC contract.

Hinkley Point C with a capital cost of £18bn was seen to have an internal rate of return of 9%. However this has dropped to 8.5% as the budget has had to be extended and any delays will further damage this at the rate of 20 base points for every 6 months. Nevertheless the private investor sees the defined income stream as a good return and may be prepared to go as low as 6% to secure a steady secure income for 35 years. Indeed, for some pension funds, locking up the investment for 2 to 5 years followed by a long payout period fits their pension profile.

Investors will look to be invited to join the party rather than going through an expensive competition to earn the right to invest.

The UK continues to be for equity investors only and holds little attraction for debt financing or the stock market. In contrast China which has a clear line of sight of 200 nuclear power stations is financed using 60-80% debt.

The challenge for the construction industry and for Team UK is to present a formula which gives confidence to both the UK Government and the foreign investor to invest in UK nuclear. With the emergence of renewable energy and small modular reactors, industry needs to propose a compelling argument. This will require industry and government to work together to reduce the strike price from £92.50 per megawatt hour to £60 – a 35% reduction. A simplistic approach is to share this problem 50:50. Assuming that Government can support the financing and account for 17.5%. Can the supply chain target a 20% reduction in the capital costs? A different mindset and approach can deliver a different outcome.

Constructing Excellence has developed a fresh approach which has received backing from a wide range of supporters. Now is the time to read, challenge and develop its model to put good words into actions."

The author Simon Flint is Business Development Director of Blu-3 and a member of the Constructing Excellence nuclear theme group. The views expressed are his own and not necessarily those of Blu-3 or Constructing Excellence.

References

1. https://www.nao.org.uk/wp-content/uploads/2016/07/Nuclear-power-in-the-UK.pdf
2. https://www.theguardian.com/world/2017/may/12/the-900bn-question-what-is-the-belt-and-road-initiative
3. https://www.theguardian.com/business/2006/oct/17/utilities
4. https://www.ft.com/content/61bd8f0a-9181-11e7-bdfa-eda243196c2c?mhq5j=e5
5. https://www.ofwat.gov.uk/wp-content/uploads/2015/11/pap_pos_tms_acqtmskemble.pdf
6. https://www.ft.com/content/e018d83a-835f-11e7-a4ce-15b2513cb3ff?mhq5j=e5
7. https://www.theguardian.com/business/2016/aug/25/how-worried-should-we-be-about-national-debt-uk-us-fiscal-austerity

8. http://www.telegraph.co.uk/business/2016/02/19/how-large-is-the-uks-national-debt-and-why-does-it-matter/
9. http://www.independent.co.uk/news/business/news/uk-remains-top-foreign-investment-destination-signs-brexit-impact-grow-ey-steve-varley-a7750031.html
10. https://www.ft.com/content/8204883c-c2eb-11e6-9bca-2b93a6856354
11. http://www.bechtel.com/projects/horizon-wylfa-newydd/
12. http://www.telegraph.co.uk/business/2017/09/19/china-mulls-moorside-nuclear-rescue-deal-deepen-roots-uk-plants/
13. https://www.ft.com/content/36bee56a-3a01-11e7-821a-6027b8a20f23
14. http://uk.reuters.com/article/uk-EDF-nuclear-britain/EDF-says-hinkley-point-cost-could-rise-3-billion-pounds-timing-slips-idUKKCN0Y30Q6
15. https://www.ft.com/content/5bd0f8e6-f240-11e7-ac08-07c3086a2625
16. “After Hinkley - How to Contract for the rest of the nuclear programme” by Dieter Helm
17. Hinkley Point nuclear project by Andrew Ward, FT Energy Editor
18. Interview with Stephen Vaughan of Rothschild
19. Interview with Vicky Parker and Mahul Patel of KPMG
20. Interview with Simon Wilde of Maquarie