The Future of Nuclear: How Will Fission and Fusion Technologies Help Us Reach Net Zero Emissions?

Nuclear fission and fusion hold great promise for contribution to global decarbonisation, but pose difficult investment cases. In this article the authors propose a model which offers a set of metrics to compare suitability and commercial viability of each technology in relation to meeting Net Zero Emissions ("NZE") goals and which would allow stakeholders to monitor each technology's progress over time.

This Part 3 of NECG's series of articles takes the findings from the pieces on SMR and Fusion to peer into the possible future.

PART 3/3

Ruediger Koenig and John Warden, with a panel of experts from NECG

Introduction

Of all the technologies expected to comprise the future decarbonized energy system, as of 2023 the only really proven one is large GEN III/III+ nuclear power plants ('large GW plants'). All other technologies are either – as in the case of hydro, wind and solar power – proven but not able to provide reliable and affordable system solutions[i] without as yet unavailable infrastructure (e.g. grid storage); or subject to natural limitations (e.g. hydro); or still in development whether in terms of scaling (e.g. hydrogen, CCS/CCU) or technical viability (e.g. fusion).

Yet, despite ambitious political decarbonization goals, and despite the safe, efficient and environmentally friendly operating experience of nuclear power plants (NPPs) all over the world, we're not seeing large, global nuclear new build programs for well-known reasons, such as poor new build project execution, access to and cost of finance, difficult public acceptance. We do know the solutions – for example, in 2021 NECG laid out a comprehensive strategy how these obstacles could be overcome[ii]; and the UK, with "Great British Nuclear[iii], and the international community[iv] have been adopting these suggestions – but actual, effective implementation at scale and speed is failing to develop with existing large GW technology.

As an alternative to mitigation of those obstacles to a robust nuclear renaissance, we're seeing strong efforts to develop new approaches that build on the positive operating experience gained in nuclear energy while overcoming or avoiding its shortcomings (Small Modular Reactors – SMRs), and even introducing new additional capabilities (Advanced Reactors – ARs). Yet these new solutions in turn rely on assumptions about future progress to be made, partly in the same areas that progress for large GW plants has been slower than previously hoped.

In the first two articles in this series as well as in earlier articles in atw – international nuclear journal[v]

NECG's "8 Issues" success factors

Issue 1:	The global financial system needs to be able to deliver the scale and profile of financing for large scale deployment of the technology
Issue 2:	The global supply chain must develop the agility and capacity to support large scale deployment of this technology
Issue 3:	Global and national energy markets must adapt to make best use at scale of the technology's advantages
Issue 4:	The technology needs to reach a design level which is commercially deployable and scalable in a timescale suitable to support NZE targets
Issue 5:	The local regulatory system needs to be able to apply globally aligned regulatory principles to large scale deployment of this technology
Issue 6:	This technology must be deployable reliably and efficiently across multiple sites in different jurisdictions, requiring more effective and coordinated site allocation, permissioning and development
Issue 7:	Society and culture must adapt to, accept and support the deployment at scale of this technology
Issue 8:	The technology must be able to develop and deploy at a pace to gain and hold market share against competition from other energy sources

we addressed what needs to be done to facilitate nuclear fission and fusion deployment, i.e. for these technologies to (a) demonstrate technical and commercial feasibility and (ii) to be deployed at a scale, to make a meaningful contribution to global energy supply and decarbonisation goals. We introduced **8 "Issues"** which need to be addressed and we examined where the technologies stand in relation to those.

In this third article we use the eight Issues to develop an investment risk scale to indicate which nuclear technologies[1] are likely to be able to contribute to Net Zero or other goals, and we seek to develop a model which can help policy makers, investors and their stakeholders find some answers to the following questions:

1) Which technology options are most likely to reach commercial viability for deployment at scale, under which assumptions?
2) Which of these technologies is best suited to contributing to decarbonization at scale?
3) How should an investor – Government, Public, or Private – proceed?

Background to our model

Answers to these questions certainly depend on the perspectives of different types of "investors" and their different "objectives". Our reference in this article are the goals associated with Net Zero Emissions in 2050 ("NZE") and accordingly those investors who would be owning/operating the necessary assets: i.e. those who would be driven by cash flows and returns on investment, execution risk, and scalability[2]. Clearly, none of the relevant technology options currently fulfill those investors' needs (criteria): we're not yet seeing huge investment programs in nuclear fission or fusion on a global multi-TeraWatt scale.

Looking forward, for any of these technologies to be able to make a major contribution to NZE goals, they would need to be available for large scale global deployment by the mid 2030s, i.e. firm, final planning and investment decisions would need to be made/prepared within about the next 5 years from now.

So let's take a look at "learning curves" and projections: where do we come from and are we/might we be going? And what are those projections most sensitive to?

The approach we have chosen should not be seen as a predictive model. It is loosely based on the Delphi-Method [vi] and uses a deliberative process: applying our professional judgement, the authors developed a model to combine criteria, scoring and algorithm (details see **Exhibit I**); the criteria were benchmarked aaginst recent market analyses by distinguished third parties {FN} [vii]; the approach and outcomes were tested with our "panel" – and the feedback from this sounding board then informed further iterations in the process. Our final conclusions were reviewed by the panel and the panelists were given the opportunity to add their observations (panelists observations see **Exhibit II** at end of this article).

We believe the resulting method is sufficiently solid to also be used in an individualized context, i.e. it can be applied by other types of investors and stakeholders, with objectives other than NZE:

- e.g. industry players willing to seed new developments
- e.g. special purpose users (autonomous high temperature generation, PU disposal, etc.)
- e.g. private equity seeking high value exit scenarios
- e.g. individual vendors and their global or local supply chains

It allows interested parties to identify key drivers and track their progress over time.

Constructing the model

This series of three articles explores the ability of nuclear technology to deploy at the scales required to support NZE pathways, i.e. scales of hundreds of GWe.[3] Accordingly, in order to assess deployment at these scales we map each technology grouping across two axes:

- **Y-axis – How well suited is this technology to contributing to decarbonisation at scale?** We have chosen a set of metrics which reflect the ability of each technology to contribute as

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[1] For the purposes of this analysis we have used the following technology groupings:
- **Small Modular Reactors (SMRs)** – generally up to 300 MWe but including larger plants designed to be manufactured, assembled and operated as fleets to give scale efficiencies such as GEH BWRX- 300, WEC AP300, Rolls Royce SMR and NuScale VOYGR-6/12. This technology is generally well understood as it is based on existing light water-cooled designs.
- **Advanced Reactors (ARs)** – also known as **Gen IV** reactors, these are fission reactors using novel and innovative fuel types, coolants and materials which offer enhanced performance and safety criteria over currently operating types.
- **Large GW** – water-moderated fission plants with a nameplate capacity of around 1000 MW or more, such as EPR, AP1000, APR1400, ABWR.
- **Fusion**, currently encompassing any project which intends to use fusion as the energy source
- In this paper we do not consider microreactors which have nameplate outputs of < 20MWe.

[2] In our Conclusions below, we'll point out that this effort may need to be carried out by Governments, however this does not contradict the methodology we are proposing

[3] In this paper we are not exploring how each technology may be the best for an individual project, which will have its own local and commercial criteria. Also, Governments, investors and other stakeholders may apply other considerations, such as strategic interests, existing industrial capabilities, other economic development goals that could lead to a preference or greater risk tolerance for certain technologies. – However, as shown below, we do reach conclusions also useful in that context.

much energy as possible at scale, in order to contribute to NZE goals (**Table 1** in Exhibt I).

- **X-axis – How close is this technology to being deployed at scale?** For this axis, as metrics we use the eight issues identified in our first Article in this series, shown in **Table 2**.
- **Using a 10-point scale (Table 3)**, we allocated scores against each metric across the technology groups based on our analysis from Articles 1 and 2, as well as current industry knowledge.

The scoring methodology and some of the key assumptions which led to the score selection are outlined in **Infobox 1**.

It must be stressed that each score comes with a high degree of subjectivity. Individual designs within a technology grouping may also merit differing scores – as an example, some AR designs carry more design risk (Issue 4) than others.

In order to reflect the range of scores across each technology grouping, and to capture how the

EXHIBIT I – DESCRIPTION of Metrics Used

Table 1: Y-axis - How well suited is this technology to contributing to decarbonisation at scale?

Metric	Definition
High energy density	Confidence in the ability of this technology to provide sufficient quantity of energy when deployed at scale to make a contribution to NZE targets, in as small a land footprint as possible
Always on	Confidence in the ability of this technology to provide reliable energy close to 100 % of the time (dispatchable = match output to demand)
High efficiency output	Confidence in a high output efficiency of this technology
Cost effective	How well does the "commercial benefit" of this technology, when deployed at scale, compare to other energy sources
Multiple applications (grid/non-grid)	Confidence in the ability of this technology to be deployed at scale to support multiple energy source requirements both grid and non-grid

Note: The choice of metrics may vary, depending on the context and objectives of the deployment in a given case for which this assessment model is used.

Table 2: X-axis – How close is this technology to being deployed at scale? (Fulfilment of the "8 Issues")

Metric		Definition
1	Finance	Likelihood of the financial system delivering the scale and profile of financing for large scale deployment of this technology
2	Supply chain	Ability of the global supply chain to develop the agility and capacity to support large scale deployment of this technology
3	Energy Market Design	Likelihood and ability of global and national energy markets to adapt to make best use of this technology at scale
4	Design risk	Likelihood of this technology reaching a (commercially and regulatory) deployable and scaleable design in a timescale suitable to support NZE targets
5	Site licensing systems	Ability and desire of the local regulatory system to apply globally aligned regulatory principles to deploy large scale deployment of this technology
6	Multiple site access	Ability of this technology to be deployed reliably and efficiently across mutiple sites in diferent jurisdictions, requiring more effective and coordinated site allocation, permissioning and development.
7	Industry and social culture	Ability by society and culture to adapt, accept and support the deployment at scale of this technology
8	Competition from other tech	Ability of this technology to develop and deploy at a pace to gain and hold market share against competition from other energy sources

Table 3: Scoring the Metrics

Using a 10-point scale), we allocate scores against each Metric across the technology groups based on our analysis from Articles 1 and 2, as well as current industry knowledge.

1 – 5	(below 50 %)	**red**	Low maturity. Do not invest - risks too uncontrolled or unable to quantify
6 – 8	(to 80 %)	**amber**	Marginal confidence in investment, and marginal confidence in addressing outstanding risks – more of an options investment in case it succeeds.
9 – 10	(above 80 %)	**green**	Broadly acceptable commercial investment with understood controlled risk

It must be stressed that each score comes with a high degree of subjectivity and will change with time as technologies progress. Individual designs within a technology grouping may also merit differing scores – for example, some AR designs carry more design risk (Issue 4) than others.

scores may change over time, we allocated scores at three risk points:

- **N= –5** pessimistic scores, reflecting uncertainty or lack of demonstration of tech ability. This point can also be interpreted as the position of the technology a few years ago; some versions of the technology may not have moved beyond this point. “Where do we come from.”
- **N= 0** our broad assessment of where the technology is at the current time, taking into account recent advances in the leading examples of each technology. ”How much progress has been made, where do we stand, what’s the dynamic.”
- **N= +5** where we assess the technology could be in five years time, assuming that progress continues at an “expected” rate for the leading examples. This point can be interpreted as the optimistic scenario. “Where are we going; where do we need to go.”

For each of the three risk points, for each technology grouping, on each axis, the scores are summed to give three points on a graph in Figure 1. The solid line connecting these points can be taken to represent the learning curve for the technology in the optimistic scenario where things go as expected. Since the N=+5 points are the most favorable future outcomes, based on our professional judgement, **they do not predict a probability of success**:

- The triangular area below the lines shows the range of possible outcomes in practice, depending on actual progress achieved in the critical Issues.

In a second step we consider what might be acceptable levels of risk for investors to engage in either of the technologies at a large scale, and whether any of the technologies would be likely to cross into that area. To begin to answer this question, we overlay a risk template onto Figure 1, shown in **Figure 2**. Here we have the same four lines representing progress of each technology, now overlaid onto areas of the chart representing different risk levels.

What does the model tell us?

We are now in a position to reflect on the questions we posed at the beginning of this article.

Which technology options are most likely to reach commercial viability for deployment at scale?

Our analysis indicates that within a few years, all four technologies have a chance to have reduced the risk across all our eight issues – i.e. progressed far enough along our X-axis that they could become commercially viable. It also shows that none of the technologies currently are at a point where they can be expected to comfortably reach investment grade at the scale necessary to contribute significantly to NZE: i.e. significant progress is needed at a fairly high pace.

INFOBOX 1

Scoring assumptions

The score for each metric and technology grouping were allocated by the authors based on industry knowledge, professional judgement, and estimates of potential future progress. A full description of the score allocation, and how they may be changing over time, will be the subject of individual client case studies, but some of the key assumptions influencing the scores are as follows:

- fusion can be deployed under current environmental regulation, as already announced in US and UK, and is not subject to licensing conditions appropriate for fission technologies
- currently planned fusion concept demonstrators are proven and the leading fusion technologies are able to be scaled up to power operation in the expected timescales
- advanced reactors continue to demonstrate the potential of the leading designs for non-grid and flexible siting and operation, with key advantages such as
  - high temperature output suitable for industrial uses
  - small footprint allowing siting on industrial sites and near population centres
  - ultra-safe operation which can demonstrate a very small EPZ
  - flexible output, varying over time and demand
- currently announced AR projects in New Brunswick, Texas and Wyoming continue to time and cost
- currently announced light-water SMR projects (such as CFPP Idaho and OPG Darlington) continue to time and cost
- Large GW plants continue to be developed, but remain as long time-scale and capital-intensive projects

Using scores based on these types of assumptions, each technology was scored at each of the three points N= –5, N= 0 and N= +5 over time. The scoring assumptions and the resulting outcomes were tested with the panel of experts and reconsidered in an iterative process.

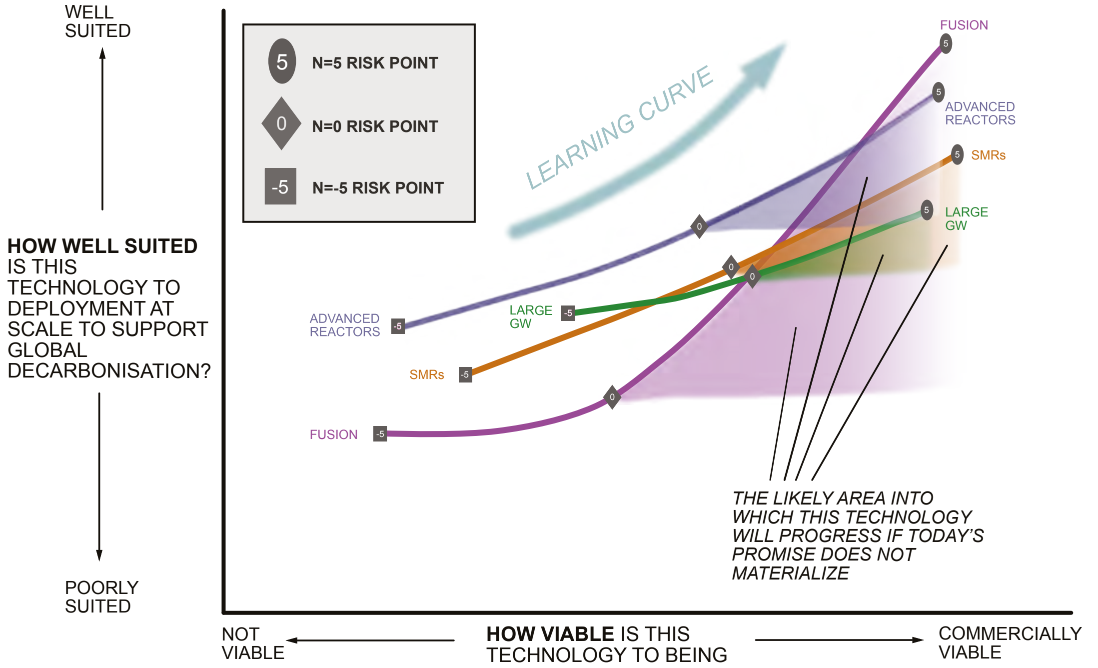

Fig. 1
Progress of Technologies mapped against modelled scores of SUITABILITY and VIABILITY.

LEGEND 1

Analysis of Figure 1

Figure 1 shows four lines, each denoting the range of total scores for each technology group.

The left hand/lower end of each line is the N= –5 risk point. This illustrates the most pessimistic score: where the less viable examples of the technology are now, or where the majority of examples were around five years ago or more.

The middle point on each line is the N= 0 point. This illustrates where we assess good examples of each technology are at present.

The right hand/upper point on each line is the N= +5 point, where we estimate that the best examples of each technology could be in the next five years, in an optimistic scenario, based on efforts we see being made today.

We can interpret the lines as representing a learning curve, mapping potential progress from

- higher to lower commercial/delivery risk (X-axis left to right) and
- increasing confidence that the technology can be deployed at a scale to make a contribution to Net Zero goals (Y-axis bottom to top).
- So for a technology to be (a) commercially viable and (b) deployable at a required scale, it should be as close to the top right of **Figure 1** as possible.

The triangular coloured regions illustrate the likely area into which each technology will progress to if today's promise does not materialize.

At N= –5, large GW technology is closest to the top right, showing that a few years ago, large GW plants were most likely to be the technology of choice, but even so still came with significant risk. Fusion technology at N=-5 is nearest to the bottom left corner, reflecting its lack of concept demonstration or scalability at that point; some of the more esoteric fusion concepts may still be around this point.

At N= 0, the chart shows our assessment of risk and scalability today. Our scores show that, whilst large GW technology has regained confidence over the past few years, SMR and AR technology have caught up, reflecting increased policy and market confidence in the viability and scalability of these technologies. Indeed, the position of SMRs and ARs further up the Y-axis compared to large GW recognizes the wider potential for deployment at scale for these types of reactor. Fusion at N= 0 is still somewhat further to the bottom left, illustrating that the technology, despite its potential, still has to generate credibility to be seen as a viable scalable contribution to Net Zero.

At N= +5, we see a significant potential change in comparative position of the technologies. Fusion has rapidly gained in both commercial confidence and demonstrable scalability and is now closest to the top right, signifying that of all the technologies this could have the greatest commercial viability and ability to deploy at scale to provide the energy contribution to Net Zero goals. ARs are a close second, having continued to surpass SMR technology as the expected AR advantages become increasingly demonstrable and confidence grows in use and performance of the advanced coolants and materials. Large GW technology has continued to advance but capital cost and public sentiment continues to hamper the feasibility of large-scale deployment.

However, since the N= +5 points are the most favorable future outcomes, based on our professional judgement, the triangular area below the lines shows there is a broad range of possible outcomes in practice, depending on actual progress achieved in the critical Issues – with most scenarios for all technologies not achieving the necessary breakthrough. This demonstrates the need for careful monitoring.

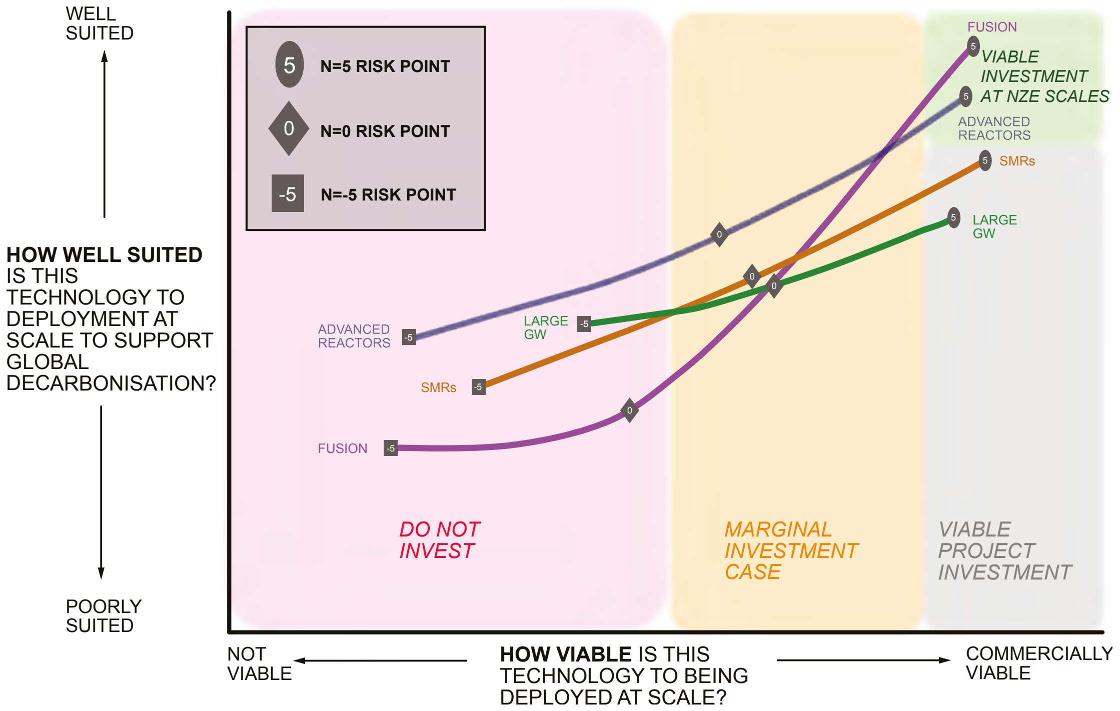

Fig. 2
Progress of technologies mapped against modelled scores of SUITABILITY and VIABILITY, overlaid on a color risk scale.

LEGEND 2
Explanation of risk template on Figure 2

The risk template can be interpreted as follows:

- **Red zone:** Do not invest; risks too uncontrolled or unable to quantify; ability to contribute to large-scale deployment not demonstrated. This is the area below 50 % on the X-axis.

- **Amber zone:** Between 80 % and 50 % on the X-axis. Marginal confidence in investment, and marginal confidence in addressing outstanding risks – more of an options investment in case it succeeds.

- **Green zone:** Acceptable commercial investment with controlled deployment risks (the top 20 % on the X-axis). The top 20 % on the Y-axis are deemed likely to be deployable at a scale to contribute to Net Zero on a standalone basis.

- **Grey zone:** Acceptable commercial investment with controlled risks (top 20 % on X-axis); suitable for individual projects but not clear that it can be deployed at scale to contribute to NZE (lower 80 % on Y-axis. This might be due to special national/regional use cases (e.g. a fleet of large GW plants in France or China, specialized reactors to consume legacy Plutonium).

Which of these technologies is best suited to contributing to decarbonization at scale?

Of the four technologies we have considered, fusion and ARs could progress far enough up the Y-axis in our chart to demonstrate significant ability to deploy at the scale required to be able to deliver the amount of energy needed to contribute to global decarbonisation.

This is not at all to suggest that SMRs and large GW plants would not have an important part to play, but our analysis is based on which technology is assessed as best deployable at significant scale and numbers, across multiple and varied sites, and we conclude that fusion and AR could best meet this requirement – if all goes well. We also show that they carry the greatest uncertainty reaching their potential.

How should an investor – Government, Public, or Private – proceed?

Reviewing the necessary learning curves and risk profiles described above, we can see that investors and public policy makers who are seeking to contribute significantly to decarbonization at scale, should seriously consider fusion and AR technologies. If either of these technologies were able to reach their optimal success rate, they would achieve a competitive advantage over GW and “traditional” SMR designs. However, there are still serious unresolved issues; i.e. development risks ahead for these technologies. Near term project investment opportunities exist with light water SMR and GW scale technologies, which are closer to viability and which would be easier to deploy where local conditions are favorable e.g. due to prior experience and existing local industrial and human resources.

LEGEND 3
Example of a drill-down to the 8 Issues for a particular technology Figure 3

As shown above the aggregate "learning curve" and risk profile for the different technologies gives an indication what progress is expected and needs to monitored.

Using the example of large GW plants, **Figure 3** demonstrates how the **8 Issues** are scored and tracked: there are some issues that need urgent attention (here: Finance, Site Licensing and Multiple Site Access); others that will require steady long-term progress (Industry and Social Culture) and others that can be considered relatively stable (Design Risk). GW plants have a particularly strong sensitivity to Issue 8 "Competition From Other Technologies ..." not only do they need to find their place in a future energy market but they could be replaced by more versatile Advanced Reactors or made obsolete by Fusion.

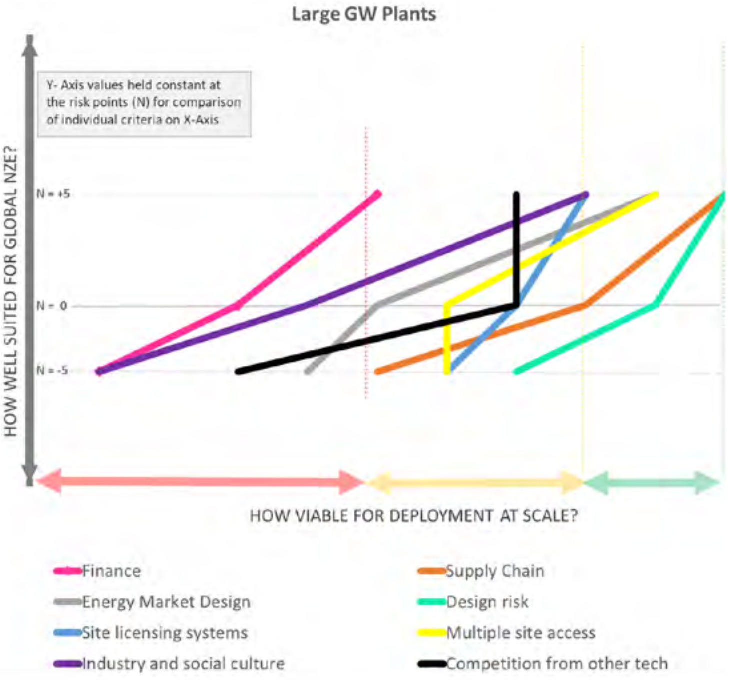

Fig. 3
Example of a drill-down to the 8 Issues for a particular technology.

Taken together, **Figure 2** shows that (i) only Fusion or AR could possibly by themselves fulfill the nuclear NZE-contribution, but (ii) most likely a combination of all technologies will be needed – (iii) which means it is necessary to pursue several of them. This is in fact what Governments (such as for example CAN, F, UK, US, CZ, PL) are actively supporting, in different ways.

So, the critical question for an investor or other stakeholder is, how well are the development programs on track: what are the key drivers, how much progress will be needed how fast, and is progress being made at the required speed. Our model offers a monitoring framework overall and for individual technologies. **Figure 3** provides an example how this could be drilled down to individual technologies and their individual Issues.

Conclusion

The challenge of even approaching the 2050 NZE goals is a huge one for mankind, which will take all our available clean energy sources, whether renewable, nuclear or geophysical, working in collaboration. The nuclear industry is positioned to make a significant contribution to decarbonization but at the current moment in 2023, governments, policy makers and investors are faced with a wide and perhaps bewildering range of choices in nuclear energy – not just which vendor to choose, but which technology, some of which have not yet demonstrated that they work, particularly at a scale which can contribute to Net Zero. Each technology still has a significant range of issues to address if it is going to position itself to be commercially viable and deployable at the scales required. As we pointed out in the first two articles of this series, if fusion can be demonstrated to work in this decade, the window of opportunity for SMR fission energy may be short-lived, and nobody wants to end up as the Betamax of the nuclear renaissance.

So, in this, the third article, we have developed a method of analyzing the issues facing each technology, and its potential for contributing to Net Zero goals. We conclude that fusion, closely followed by advanced reactors, would be best placed to help mankind if these thechnologies progress as hoped. We must again stress that at an individual national, sector, or project level other technology choices may be more appropriate. But at some point, considering the huge size of the challenge, we must also decide what is best at the macro scale. How confident can we be about our conclusions? The authors do not have a crystal ball and the scores here are based on broad assumptions about the risk and performance of each technology; however, there is a methodology inherent in the metrics and scoring which has developed an objectivity in the outcomes. Our scoring is open to debate and alternative views, but at the very least we offer a considered view which we hope will be taken into account by decision makers.

In this series of articles, we hope to provoke debate and engender an urgency for consensus over how to move forward with technology choice. The need to maximize global efforts towards Net Zero is too important to do anything else. **Our analysis does not result in any surprising result – a "prudent mix" has always been a wise path to follow. What we have demonstrated however is (i) that this outcome can be shown to result from a set of metrics which in turn let us focus on what are the key issues and sensitivities that drive those results, (ii) to demonstrate how those results differ between technologies and (iii) that tracing these over time can visualize the actual progress made or not made.**

This can inform a decision-making pathway for the different types of investors and stakeholders and allow for coordinated efforts between market and policy makers.

We happily invite challenges or new insights to be shared over time.

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We note that these criteria, and their practical relevance, are highly dependent on a number of subjective viewpoints. E.g. energy market design is one of the 8 Issues we also consider; also see this NECG publication on market failure https://nuclear-economics.com/32-market-failure-the-book/

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EXHIBIT II – PANELIST'S CLOSING OBSERVATIONS

Jay Brister, Blue Sky Nuclear

Addressing the role of technology investors

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Investment in fission and fusion technologies will evaluate the role of government, policies, projected economics, and the viability of future projects (not an all inclusive list). I would rank the role of government as the most important for nuclear. You can see the range of topics in the views from my colleagues. The investment decision will be made on the ability to maximize government support, minimize risk, and investor confidence in the stated performance/returns provided by the technology.

Investment in fission is a play for a party that will also benefit from the deployment of the technology via their own business line or supply chain. Doosan, Dow, others. There aren't many direct investment players in fission technology. Stand-alone nuclear investment firms like Segra Capital are the exception more so than the rule. The biggest hindrance to large scale investment in fission is the looming FOAK delivery risk by a single party (whether it be GW scale or an SMR/AR design). Risk sharing by creating an investment consortium of owners/operators is an idea beginning to form in the market to address this risk, as well as a model for project ownership and delivery.

Investment in fusion is a long-term investment with massive potential returns. The market has cooled after some very large investment rounds in 2021 and 2022. Recent fundraising efforts have not yielded these large investments and there has been some loss of momentum by some developers. Leading developers are building demonstration machines to deliver a proof of concept of their approach to fusion. Performance of these demonstration machines over the next 24 months will be the catalyst to trigger additional investment, and potentially very large investment in those company(ies) with successful demonstration(s).

Edward Kee, NECG

Addressing the role of Government

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The role of government in nuclear and fusion power is very important. Implicit in this article is the assumption that nuclear and fusion projects will be developed and owned by private companies. Another view is that only governments can manage the risk profile, long life, and other aspects of a nuclear power or fusion project. Government nuclear programs are proven, as demonstrated in the French, Chinese, and Russian nuclear programs and in the dominance of state-owned nuclear companies in the export market. Even if nuclear and fusion projects are developed by private companies, the role of government will be very important and these projects will depend on the national or regional (e.g., EU/EC) policy decisions related to:

- What carbon reduction goals have been established and how are nuclear or fusion technologies and applications considered in measuring national/regional carbon reduction goals?
- What national/regional subsidies or incentives are developed and funded for nuclear or fusion research, development, technologies, and applications?
- How and how much will national or regional governments participate in the development and funding (e.g., grants, loans/loan guarantees, equity, etc.) of nuclear or fusion projects?
- Will countries/regions place requirements on load-serving electricity companies to source some or all capacity and electricity from nuclear or fusion projects?
- Will countries/regions penalize/tax/prohibit competing technologies (e.g., natural gas-fired or biomass-fired generation) and fuels linked to carbon emissions? A well-designed carbon tax on fossil fuels could dramatically shift the economics of and incentives for nuclear and fusion projects.

Even with some government intervention, it may be difficult to enhance the economics and lower the risk of nuclear or fusion projects to levels that will be acceptable to private companies.

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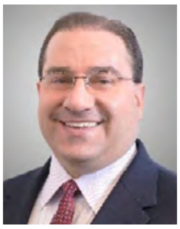
For a Project Developer, what are the key considerations when selecting a nuclear technology as a key element in the overall project?



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- What is the suitability of technology to intended use (e.g., high temperature to achieve greater efficiencies in hydrogen production)?
- What is the technological lineage of the design? Is it a further advancement of an existing design, something that has been demonstrated at a national laboratory, or something with no demonstration record?
- Who are the strategic partners in the technology?
- Is there a first project underway? What is the project pipeline thereafter? Are the timelines and market assessments realistic?
- Is there an operating partner? Is there an operating solution being offered?
- What is the project delivery approach?
- Is there significant government support (both federal and state/provincial)? Is the vendor getting support from multiple governments?
- What is the regulatory strategy and progress? Is the vendor using an experienced and respected regulatory authority?
- What is the experience of vendor team, including size of team?

Ultimately, from a project developer perspective, what matters comes down to: suitability to purpose, deliverability, licensability, financeability, economic viability, and overall credibility.