Frazer-Nash Insights

Challenges and opportunities facing defence in achieving the Net Zero Carbon 2050 mandate

Perspectives from across our defence community

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Naomi Heming, Frazer-Nash Consultancy February 2021

The Defence Sustainability Conference 2021 highlighted the scale and complexity of the challenge facing defence in achieving its part of the Net Zero Carbon 2050 mandate.

Frazer-Nash hosted a panel discussion during the conference to discuss both the challenge and opportunity identified from the different layers within the defence community; from strategic decision and policy making in the Ministry of Defence (MOD), through to technology and platforms development, and estates and logistics provision.

This paper provides distilled insights from the panel discussion, with the aim of prompting further investigation into the key themes by the MOD.

Delivered in collaboration with:

Security and accessibility of fuel

The ability to supply, transport, store and access a variety of low carbon and green fuels in support of global operations and movement of troops will be critical to success. With a number of different green fuel technologies under development – including hydrogen, ammonia, synthetic fuels, biofuels and electric power – there is a proliferation of choice; each fuel with its own benefits and drawbacks. However, with no crystallised view and direction from the UK Government and UK MOD on what are going to be the fuels of choice, it is difficult for technology, power systems and platform providers to make key design and investment decisions, and for the MOD Force Commands to understand what the future operational landscape looks like.

It is therefore paramount that this issue is overcome as a matter of priority.

Many other countries are already placing their chips on the table. For example, Saudi Arabia has invested £5 billion in the build of a hydrogen and ammonia production plant in order to transport hydrogen to the rest of the world, staking its claim in the international market. To some extent, Scotland is already taking its own stand, and is emerging as a leader in Offshore Wind. It has already demonstrated that the ability to generate hydrogen and synthetic fuels from wind is profound, and with an indigenous transportation infrastructure the Scottish Government has the potential to promote and create its own hydrogen infrastructure, including hydrogen vehicles and hydro-chains.

But how do we pick the right fuel?

It is unlikely that there will be one single fuel approach to answer the operational needs of defence. Whilst the Single-Fuel Policy has provided great commercial benefit and ease of interoperability, it is possible that we will need a Multi-Fuel Policy in the future.

With the range of performance, climatic, transportation and storage challenges, as well as cost, it is expected that we will need to look at a combination of low carbon technologies to deliver UK Defence's agenda and enable future global agility. Not only to fight today's battles, but those of the future too.

This of course will mean we will need to work with our coalition partners in order to achieve a unified approach to future green fuels.

And whilst the ability of the UK Government to influence and impact the wider global market on the approach to future green fuels is debated, due to our relatively small size in comparison to some of our global neighbours – such as the USA – it can be credibly argued that our international presence still holds command and attention.

As one of our panellists Howard Lungley (Frazer-Nash) commented during the debate, the UK needs to:

> *"Be a Leader. Don't be afraid. We need to back the technologies we believe will be successful. That's how you secure our advantage in the technological race..."*

> *"…Whilst the UK only generates 2% global emissions, that's 1 in 50. In a room of 50 people, 1 person can successfully influence the other 49."*

We need to clearly articulate our ability to lead and influence the agenda, rather than wait for it to be set for us to follow.

How to get the UK government and MOD to commit and stick to a long term strategy?

One of the age-old problems we face in establishing and successfully delivering on a long term strategy, is our ability to stick to a long term plan whilst also recognising we need to enable agility, for example, as technologies evolve and develop.

With a UK political system enabling manifesto shifts on a five year basis, and regular MOD post role changes, how does the MOD ensure coherency and adherence to a long term plan? This is considered to be one of the key weaknesses in the MOD's ability to achieve long term operational planning.

Whilst the MOD rotational assignment system has many strengths in giving people exposure to a wide variety of posts and challenges, so ensuring that by the time they reach leadership levels they have well rounded experience, the regular movement of people through posts and the associated retention of corporate knowledge amidst changing agendas, priorities and goals, can impede the continuity of approach.

As Captain Damian Exworthy (Strategic Command) described during the debate:

> *"Horizons are short and tied in to the tenure of people at the top."*

On this issue, Damian suggested is "an awful lot of re-inventing of the wheel" with corporate knowledge either being lost or forgotten about. Embedding a long term plan and instilling responsibility to own and deliver against it, is a key challenge the MOD needs to overcome.

The need for a collaborative approach

It has been widely recognised by Defence Climate Change leaders Lt Gen Richard Nugee and Lt Gen Richard Wardlaw that a collaborative approach across the Defence ecosystem is going to be key in order to deliver change. But how can this be achieved?

Our panellists discussed that an approach to this resides on two levels:

First, there is the moral level, which requires every individual to personally recognise the necessity to decarbonise in order to limit the catastrophic effects of climate change. And that it is a collective problem we need to work together to resolve.

Second, that collaborative and formal partnerships are going to be vital in order to collectively shape, develop and deliver change to achieve Net Zero.

As Luke Tattersall from Babcock International Group commented:

> *"There is no silver bullet… no single organisation in isolation can provide a single solution to the problem."*

We have the opportunity to draw together multi-disciplinary collaborative teams from across defence and non-defence sectors to address a communal need. A combination of MOD, industry, academia, research and development (R&D) providers all working towards a common purpose, enabled to speak freely, in order to deliver innovative thinking and change.

As Howard Lungley from our panel commented:

> *"Defence is unique in that it has a common purpose – other industries don't have that. Defence could be a test bed to showcase to other industries"*

If you look at the problem through a different lens, then the opportunity for defence to enable and engender a collaborative approach is great. There are obvious challenges that need to be worked through to achieve this vision: competition, knowledge and intellectual property sharing, and incentivisation, to name a few. And these will need to be thoroughly considered, with challenges to existing commercial structures required.

But there are good examples to look to, as Kevin Daffey (Rolls-Royce) explains:

> *"The EU Framework 7 already enables collaborative development of low maturity technologies for commercial exploitation and competition in the future once developed to TRL 4-5…*

> *Learnings can also be drawn from the aerospace industry, where supply chain collaborates on the development of core technology elements which will provide the building blocks for future systems and platform competition."*

So what's our starting point? How do we work out our existing carbon footprint and what needs to change?

To get started we need to understand our existing carbon footprint. To get a grip on what the hot spots and the key priority areas are, then build in the detail.

Working on an 80:20 rule – where are the biggest emissions, which by placing the greatest effort against will deliver you the greatest return?

In order to understand this, you first need to understand which emissions you have control over, and those that you can affect a high degree of influence.

As Howard Lungley commented:

> *"You can't change what you can't measure."*

In reality, whilst conceptually straight forwards, it can be practically difficult to ascertain your carbon footprint due to the sub-divided nature of defence.

For example, the largest three individual sites for MOD emissions are naval dockyards. Despite being a key in-service support function, the Navy owns responsibility for the bases and Strategic Command acts as the glue. To further complicate it, Babcock operate the bases but don't own all the assets or all the people.

As a result of this, Chief of Defence Logistics and Support's (CDLS's) reach doesn't extend into the dockyards and, conversely, Babcock doesn't own all of the estate and Navy Command doesn't have complete ownership over the bases either. It's a complicated picture, and as Capt Damian Exworthy highlights:

> *"We need to ensure we don't duplicate or miss areas due to the way defence is set up."*

We therefore need to establish what the boundaries of an organisation are. Scope 3 carbon baselining is a sound starting point when dealing with this issue.

Data and data integrity is key to understanding your position

Opportunity resides in the ability to exploit data in order to inform:

- What your carbon footprint is
- Where major gains can be made
- The measurement and verification of savings

Having an effective data management system, and assuring quality and confidence of data will be vital in order to achieve a robust data approach to carbon management. With the rise of data analytics becoming part of business as usual, and increased use of artificial intelligence (AI) and automation to inform business performance and decision making, leaning into digital transformation of organisations could deliver significant opportunity in tackling this part of the problem.

What would be the one thing we should do tomorrow to effect change?

To round off our panel discussion, our panellists were each asked what would be the one thing they would do tomorrow (if they could) to affect positive change to support successful achievement of the Net Zero Carbon 2050 mandate.

Here are their top five suggestions for the defence community to consider:

Luke Tattersall, Babcock International Group:

1. **Data management.** Establish a clear, solid position of the baseline. Establish a strong position from which to move forwards.

Kevin Daffey, Rolls-Royce:

2. **Have an investment strategy with substantial funding.** Consider both defence and civil commercial opportunities for exploitation.

Howard Lungley, Frazer-Nash:

3. **Where there's a will there's a way.** It takes time to bring a whole organisation round and achieve universal consensus. Send every employee on a course, to get them up the same learning curve – after all, we're only seven years away until we hit the carbon quota level which will tip 1.5°C and move us into a crisis situation.

Captain Damian Exworthy, Strategic Command:

4. **Take time.** Whilst this seems like the opposite of what we need to do, we need to take time to do our preparation and homework and do this right the first time round.

"Don't fix bayonettes to charge at the problem and knock down the wrong targets."

And finally, from myself as Chair:

5. **We need clear communication, engagement and collaboration in order to effect change as a defence community.** We need MOD to work on enabling these communities of interest to exist, and challenge our existing commercial mechanisms in order to enable true collaboration.

Closing remarks

It is clear through the debate that significant progress has been made across defence in getting companies and individuals thinking and acting upon the sustainability and climate change agenda. But there is also a lot to do, and many challenges to be unravelled.

The Defence Sustainability Conference has proven that there is a collective desire to work together, and many opportunities available to both UK defence and organisations that are proactive and innovative in their thinking.

It's going to be a long journey though. And there will need to be a consistent and enduring drive, if we are going to achieve our goal which, for our future's sake, we have no choice but to deliver.

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Thanks to Team Defence Information for hosting the Frazer-Nash panel discussion and to our distinguished guests for giving their time and thoughts to support the debate.

Captain Damian Exworthy,
Head of Concepts and Force Development, Strategic Command

Kevin Daffey,
Director of Marine Systems and Automation, Rolls-Royce Power Systems

Luke Tattersell,
Group Energy Manager, Babcock International Group

Howard Lungley,
Sustainability Services Lead, Frazer-Nash

Frazer-Nash helps organisations deliver innovative systems, engineering and technology solutions to make lives safe, secure, sustainable, and affordable.

We work closely with our clients providing specialist advisory support to tackle the challenging issues facing their business.

The challenge posed by Climate Challenge for the planet is huge: the pace and impact of technological change is both a part of the problem and, potentially, part of the solution.

Integrated approaches will be essential to safeguard the security of energy and food supplies, the decarbonisation of power, ensure future operational capability, and to increase climate change resilience.

Our Systems Approach combined with deep technical, technological and analytical expertise, is ideally suited to address these challenges; unravelling complexity to achieve clarity and actionable insight is what we do.

In conjunction with our Clients, we are working to make the world a more sustainable place.

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