

Event Brief: Sovereign Maker Mandate & Cross-Sector Innovation

- **Event Title:** *"The Sovereign Maker Mandate: Cross-Sector Innovation for a Resilient CAF"*
- **Hosts:** Steven Green & Clive Morgan (TDI Canada)
- **Keynote Speaker:** Lt Gen (Retd) Richard Nugee (Author of UK MOD Climate and Sustainability Report)
- **Context:** UK–Canada bilateral session on climate change, security, and Defence resilience

Introduction

This Event Brief covers the overview of the Climate Change & Security (CC&S) session delivered by Team Defence Information Canada into the concept of 'Triple-Use' in the delivery of resilient and sovereign Defence on 20th July, 2026. The summary that follows is not a verbatim recording of the session, or everything that Lt Gen (Retd) Richard Nugee stated, but is the summation of all discussion and questions.

Strategic Frameworks & Keynote Concepts

1. The Triple Use Framework (NATO Article 3 Integration)

Lt Gen Nugee introduced Triple Use as a strategic evolution beyond traditional dual-use technologies, rooted in NATO Article 3 (which establishes a resilient homeland as a prerequisite for effective military Defence):

- **Defence:** Harnessing university research, advanced materials, energy harvesting, and AI for combat capability.
- **Resilience:** Adopting systems thinking that prioritizes "just-in-case" over "just-in-time" logistics, diversifying supply chains, and protecting critical national infrastructure (CNI).
- **Sustainability:** Circular economy principles, non-virgin material usage (recycled carbon fibre/Kevlar/batteries), and shifting from a "hunter-gatherer" supply model to self-sustaining power generation.

Key Analogy: *Armed forces represent the hardened steel tip, but the resilient homeland is the wooden shaft—without a strong shaft, the tip cannot be delivered.* **Example:** Dispersed wind turbines serve as an ideal triple-use capability: geographically distributed (defence resilience), sovereign energy generation (national resilience), and clean power (sustainability).

2. Active Systemic Resilience (ASR)

Participants detailed Systemic Resilience as a deliberate doctrine shift away from passive asset hardening:

- Focuses on removing non-value-adding activities while deliberately inserting system redundancy to absorb shocks.
- Positions capability management as a continuous, campaign-oriented posture capable of adapting to emergent risks, delivering regenerative stewardship across interdependent systems.

3. Global Threat Environment & Chokepoint Risks

- **Geopolitical Volatility:** The current operating environment was framed as the most dangerous in living memory. Ukraine war doctrine demonstrates that drones dominate frontlines, shifting heavy armour (tanks) to reserve "cavalry" roles deployed to exploit breakthroughs, fundamentally altering demand signals.
- **Maritime & Supply Chokepoints:**
 - **Straits of Hormuz:** Controls ~25% of global oil/gas and ~33% of global fertilizer trade.
 - **Panama Canal:** Draft reductions due to severe drought directly impact movement of critical goods.
 - **Fertilizer & Famine:** UN warnings highlight potential famine risks across Africa and Asia tied directly to fertilizer and logistics bottlenecks.
- **Threat Drivers & Political Instability:** Regular cyber-attacks and disinformation campaigns targeting the UK (attributed to Russia and China). High political churn (UK on its 7th PM in 10 years) conflicts with the long-term planning needed to counter NATO-warned timeline threats (e.g. potential European conflict scenarios within 9 months to 3 years). Super El Niño forecasts compound these hazards.

4. Operational Energy, Decarbonization & Platform Feasibility

- **The Drivetrain Debate:**
 - **Pure Electric / Pure H₂:** Pure electric or bulk hydrogen tanks are currently unviable at scale for heavy military platforms due to weight, storage volume, and tactical risks.
 - **Hybrid & Solid-State Alternatives:** Solid-state hydrogen storage (non-flammable, higher energy density) combined with hybrid powertrains provides superior peak and baseload power.
 - **Geological Hydrogen:** Naturally occurring subterranean hydrogen—offering zero-production-energy costs—was highlighted; Capt. Besmir Shurdha is exploring this with the US Air Force.

- **Field Modifications:** Hybrid hydrogen-diesel engines (90/10 split) are being trialled in Alberta for mining loaders and transit buses.
- **Energy Efficiency vs. Demand:** EV drivetrains offer better kWh-for-kWh efficiency than diesel, but military platforms' insatiable energy appetite negates gains. Demand reduction must be engineered into early procurement.
- **Pragmatic Benchmarks:** The NATO Sustainable Aviation Fuel (SAF) protocol—requiring all aircraft to be capable of a 50% SAF blend without mandating its immediate exclusive use—was cited as a balanced adoption model.

5. Supply Chain, Critical Minerals & Advanced Materials

- **China's Refining Dominance:** China controls ~70% of lithium refining and ~75% of cobalt refining despite lacking raw extraction monopolies (a position built over 15–20 years).
- **Strategic Options:**
 1. Expand circularity, material reclamation, and battery recycling.
 2. Rely on China (assessed as an untenable Defence risk).
 3. Build sovereign refining capacity (long-term, capital-intensive, energy-heavy).
- **Icelandic Processing Model:** Shipping raw ore to locations with abundant, cheap clean energy (e.g., Iceland for aluminium) remains a cost-effective model for critical refining.
- **Deep Supply Chain Blind spots:** A post-Brexit UK MOD audit revealed prime contractors could only map supply chains 2 to 3 tiers deep—failing to reach the 6 to 8 tiers needed to uncover deep-tier dependencies on China and Continental Europe.
- **Material Breakthroughs:** Uplift360 successfully flew a drone constructed from recycled carbon fibre. Tested at 80% effectiveness for 80% of the cost of virgin carbon fibre, drawing interest from GKN, Airbus, Boeing, and Babcock post-DSEI.

6. Soil Resilience & Food Security

- **Land Use Disparity:** 75% of UK-grown agricultural food feeds livestock (primarily beef/lamb). Reducing livestock feed dependency frees vast arable land for direct human food security.
- **Soil Degradation:** 70 years of inorganic chemical fertilizers have caused nitrogen/phosphate oversaturation, degrading soil structure and reducing yields. Transitioning to legumes, cover crops, and organic inputs improves soil health, restores natural flood mitigation, and builds homeland Defence resilience.
- **Lessons from Ukraine.** Heat signature and supply chain footprint expose forces to threat leading to reduced, packaged, chemical heated food and distribution of food to troops not troops to central kitchen. [Link](#)

- **Hydroponics and Agritech.** Opportunities to ‘farm’ forwards especially in static bases in high North explore opportunities for UK/Can experimentation.

7. Programmatic Updates & Workstreams

- **Sustainable Support Strategy (SSS) / Towards Self-Sufficiency (TSS) Refresh:** Led by Ash (Lee), shifting messaging away from ESG/Net Zero terminology toward operational resilience metrics: water, food, energy, precious metals, and advanced materials. Approached using the Pan-Defence Lines of Development (DLOD) - TEPIDOIL¹
- **Digital Product Passports (DPP):** 20-week tasker launched to create an information note (led Neil Palmer (Rolls Royce), and Richard Burrows (UK MOD National Armaments Director Group (NAD))). Focuses on material circularity, and resilience in Defence Critical Raw Materials. [Link](#)

Next Steps

TDI Canada: Releasing a 6-part article series on self-sustaining forces, Defence industrial strategy, and High North resilience (first article expected in ~2 weeks).

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Get in touch and collaborate:

- Steve.Green@TeamDefence.Info
- Clive.Morgan@TeamDefence.Info

¹ **UK TEPIDOIL Matrix:** Detailed for Canadian participants as the UK MOD framework for capability planning across 8 Defence Lines of Development (Training, Equipment, Personnel, Infrastructure, Doctrine, Organisation, Information, Logistics).

Attendees

Here is the list of attendees who introduced themselves in the MS Teams chat, formatted with their name, organization, focus area, and provided links:

Name	Organization	Focus / Interest	Links
Ash (Lee)	UK MOD	Refreshing the Sustainable Support Strategy (SSS) and Towards Self-Sufficiency (TSS), focusing on Climate Change & Sustainability (CC&S) driving supply chain resilience.	—
Simon Foale	Dstl (Defence Science and Technology Laboratory)	Dstl Relationship Manager for Dstl and Team Defence Information (TD-Info).	—
Chioma Okoro	Alberta Innovates (Canada)	Senior Program Manager, Aerospace, Defence, and Advanced Materials.	—
Sallie-Ann	HyProMag	Commercial Manager; recycling end-of-life Neodymium Iron Boron magnets with hydrogen to manufacture new magnets.	—
Robin	BAR Associates	Supporting UK innovative small businesses; delivering presentations to Canada Land ISR Programme, Navy, and SOF.	
Capt Besmir Shurdha	Canadian Army (DND)	Leading diesel replacement initiatives (solid-state hydrogen storage for military platforms, zero-emission heavy logistics, hydrogen-powered Light Armoured Vehicle/LAV).	Canada.ca Hydrogen Project
Matt	NA-L&S (National Armaments – Logistics & Support)	Lead Data Steward.	—
Maria Ryden	VizworX	Senior Product Manager working on virtual command centre platforms.	
Tim McCarthy	Arcadis	Technical Director Defence & Security; Land Platforms, Systems Engineering, Supportability, Through-Life Capability Management.	Arcadis
<i>Un-named Rep</i>	Critical Mineral Challenge Centre (University of Exeter)	Advancing the responsible production of critical minerals.	Critical Minerals Challenge Centre
Nigel Whittaker	Consultant (Kelowna, BC); Retired UK & CAF Officer	Consulting on Canadian DND project for Proactive Deterrence of Grey Zone Threats; critical infrastructure resilience.	—
Kelly Shaw	Prairies Economic Development Canada	Senior Business Officer, Defence & Aerospace Initiatives.	—
Desiree Wartenbe	LED Smart Inc. (Canada)	Supplier to CAF, UK Forces, US Navy, and Coast Guard for LED lighting, controls, and AI communications protocols.	LED Smart Military
Chris Courtaux	UK Navy	Author of the UK Navy Infrastructure Resilience Action Plan (energy/water resilience, climate adaptation, efficiency through 2060).	—

Ben Neimark	Queen Mary University of London	Principal Investigator on UKRI-ESRC "Critically Green" project (GHG, social, political, and geopolitical footprints of critical mineral supply chains).	Critically Green
Quintin Bell	QinetiQ UK (Former RAF)	ILS & Supportability Lead.	—
Sarah Martin	RAF Climate Change & Sustainability Team	Portfolio Manager.	—
Michael Giudice	York University (Canada)	Researcher on whole-of-government approaches to deterrence of sub-warfare threats.	—
Gary Mepsted	QinetiQ UK	Capability Lead for Power Sources.	—
Brett Quigley	Tarkka Manufacturing Solutions (Calgary)	President & CEO; carbon fibre thermoplastic composite airframes and servo-free biplane drones for GPS-denied/Arctic ops under Canada's DND IDEaS program.	—