NSW GOVERNMENT | Chief Scientist & Engineer

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Mr Clarke McNamara
Aviation White Paper and Reform
Department of Infrastructure, Transport, Regional Development,
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Dear Mr McNamara

Aviation White Paper Terms of Reference (TOR)

On behalf of Professor Durrant-Whyte, thank you to you and your colleagues for taking the time to speak with our office and for the opportunity to provide feedback on the TOR.

As discussed, regulatory clarity for a range of use cases and a whole of supply chain approach are key to enable the necessary R&D, testing and scaling to be undertaken and sectoral opportunities secured.

Our preferred approach is for an integrated view of the future aviation sector, ranging from small uncrewed aircraft systems (sUAS or drones) to larger crewed and uncrewed craft including electric vertical and conventional (eVTOL and eCTOL) technologies for cargo and passengers. Given operational inter-dependencies, a whole of system vision is needed, encompassing on-ground and in-air infrastructure and services and connected to industry, R&D and technology priorities including manufacturing, sustainable aviation fuels and robotics.

In 2022, the NSW Government released the *20-Year R&D Roadmap* which sets out a long-term vision for NSW to produce more world-leading new technologies, products and services, and develop and sustain future industries. The Roadmap provides guidance on areas of R&D that are well aligned with NSW's competitive advantages and strategic needs.

This office is currently developing a NSW drones action plan under the Roadmap that builds on this state's competitive advantages in digital technologies. These capabilities are relevant to the broader aviation sector and include robotics, software, AI, data analytics and sensing. NSW also has strengths in energy technologies (storage and power fuels) that will underpin the viability and sustainability of the aviation sector. The role of R&D in developing, testing and scaling technologies and systems inter-operability and its contribution to future jobs and business growth should be explicitly recognised in the TOR.

Attached are more detailed observations that focus on these dimensions. Our office has spoken with Transport for NSW and will leave more detailed comment on e-aviation to that agency.

Yours sincerely

Dr Darren Saunders
A/ NSW Chief Scientist & Engineer

cc. Katherine Bryant, A/Director Aviation White Paper and Reform Branch
Naa Opoku, Assistant Secretary. Safety and Future Technology Branch

Aviation White Paper - Terms of Reference

Scope

- Drones are not referred to in the TOR. We advise explicit inclusion and an integrated view of the future aviation sector from a technology development and operations perspective which incorporates small uncrewed aircraft systems (sUAS or drones) to larger scale capabilities including electric vertical and conventional craft (eVTOL and eCTOL) for cargo and passengers.

  Future aviation cannot be effectively planned for absent considerations for the development of the drone industry and drone operations. The broader aviation sector will be interacting with drones within Australian airspace and therefore needs to develop integrated regulatory and operational systems allowing for safe use of airspace. Drones can drive further demand for technologies such as sustainable fuels and batteries, sensing and communication systems relevant to the broader aviation sector.

- The role of R&D, including developing, testing and scaling technologies and systems inter-operability should be explicitly included in the TOR. R&D drives innovation, attracts investment, fosters skills development and contributes to the establishment and growth of jobs and businesses of the future.

  The NSW higher education and research sector is home to cutting edge research and expertise underpinning the aviation sector and is a magnet to industry globally. The White Paper and associated regulatory and industry settings should recognise this strength and contain measures to attract R&D investment, partnerships and companies to Australia as well as measures to avoid loss of skills and expertise overseas. These should include targeted measures to:
  - support research translation and commercialisation, including proof of concept (POC) and proof of scale (POS). The level of oversubscription of the Commonwealth EATP program demonstrates significant market demand for drone projects.
  - attract and build SME engagement in R&D, such as through the NSW Small Business & Research Innovation (SBIR) and the Australian Small Business Innovation Research for Defence (SBIRD) programs. The opportunity is illustrated by the Israeli National Drone Initiative designed to capture the benefits of SME engagement in development of countrywide systems and capabilities; and certification in 2022 for the Hermes Starliner UAV to operate in civil airspace.
  - These measures should also be designed to facilitate spill-over benefits, including company interests in test beds accommodating variable natural and built environment conditions and advanced manufacturing opportunities.

- We note the intent to build on but not replicate allied initiatives such as SAF and the Jet-Zero style Council. A whole of ecosystem approach and substantive work will be needed to both secure and ground-truth opportunities identified in the different pieces of work. For example:
  - the feasibility of biofuels will require consistent and verifiable feedstock sources, volumes and content as well as the infrastructure to produce and transport feedstock and products that are sustainable from both an economic and environmental sustainability perspective.
  - Australian regulatory settings need to account for two way traffic implications for international long-haul flights subject to SAF targets set by other jurisdictions – e.g. Finland, France, Brazil, Canada, Indonesia and the USA are implementing SAF mandates of between 1-30% SAF use and increasing over the next decade. Qantas has committed to 60% SAF usage by 2050.

- Climate change is not referred to in the TOR but should be explicitly addressed. Amongst other issues, key dimensions include:
    - Impact on critical infrastructure (ground and in-flight) associated with flooding, high winds, fires and smoke. This may affect placement of ground and communications infrastructure, as well as craft, materials and systems choices.
    - The role of drones and other assets in detection, surveillance and response efforts during and post- critical events e.g. monitoring natural disasters in remote areas, delivery of emergency supplies.

Infrastructure

- There is a need for testing infrastructure for drones and the interface between drones and other craft. This includes defined zones and corridors able to accommodate long-range Beyond Visual Line of Sight (BVLOS) operations, autonomous drones and multiple drones and other craft. Capabilities should include:
    - instrumented corridors with sensor arrays, able to monitor location, movement and capacity to test ground to craft and craft to craft detection, avoidance and communication systems
    - Corridor for live testing and operations. Examples include Project Skyway (165km highway between major regional centres) and the Royal Mail (drone service delivery to remote areas).
- Commonwealth support for establishment of critical testing and demonstration infrastructure as well as seed funding 'sandbox' POC and POS trials should serve to attract other sources of investment to the sector.

Regulatory framework and applications

- Drones are already deployed extensively for a range of purposes in both indoor and outdoor settings including for environmental monitoring, agriculture, building and other asset inspections and maintenance, mining, police and emergency services, water and forestry regulations. Drone capabilities also align with National Reconstruction Fund priorities - transport, defence, renewables and low emissions.

  To fully capitalise on the opportunity offered by the future aviation sector, the regulatory framework must be attractive and enabling to companies and R&D. Therefore, the White Paper process should include testing whether the regulatory framework enables or impedes emerging applications such as autonomous drone operations in metropolitan and well as rural settings, multi-asset autonomous drone operations operating BVLOS to deliver essential services and delivery of heavy infrastructure that would obviate or minimise the need for on-ground road networks.

  From a NSW perspective, enabling autonomous drone use in civilian air space in metropolitan, regional and remote areas have significant economic implications. This includes for example:
    - Costs associated with monitoring and maintaining new and ageing assets including roads, bridges, oil, gas and transmission lines, offshore wind towners and onshore potable water and stormwater infrastructure
    - Capacity to efficiently deliver essential food, medical and other supplies will become increasingly important in the face of drought, bushfire and flooding events and adverse impacts on road and rail infrastructure
    - More sophisticated (manipulative) capabilities in the primary industries sector will have important implications for productivity, off-setting labour shortages and managing biosecurity threats
    - Potential broader positive benefits include skills and training and increasing opportunities for remote management controls in other industries

- In metropolitan areas, emerging electric aviation technologies may play a significant role in lowering costs associated with a range of conventional air transport modes. The current TOR focus primarily on airport implications. However, understanding cost and price point impacts in a range of industries (e.g. long-haul road and rail transport, ports) will have implications for forward investment decisions that the TOR should address.