STATE OF NORTH CAROLINA	REQUEST FOR INFORMATION (RFI) 54-NCDOT- Advanced Zero Emission Aircraft	
Department of Transportation	Issue Date: January 25, 2024	
Purchasing	Questions Due: February 15, 2024 at 12:00 PM ET	
Refer <u>ALL</u> Inquiries to : Thomas Busshart	Description:	
tjbusshart@ncdot.gov	Zero Emission Aircraft	
Using Agency Name: NCDOT	Due Date: March 7, 2024 at 12:00 PM ET	

MAILING INSTRUCTIONS: Deliver one **(1) signed original executed** Request for Information (RFI) response along with one redacted confidential copy. Address email and insert RFI number as shown below. It is the responsibility of the Vendor to have the response in this office by the specified time and date of opening. Vendor must return all the pages of this RFI in their response.

Request for Information Schedule:

The table below shows the intended schedule for this RFI. The Contract Lead will make every effort to adhere to this schedule.

Action	Responsibility	Date and Time
Issue Request for Information (RFI)	State	01/25/24
Submit Written Questions via email	Vendors	02/15/24
Provide Responses to Questions	State	02/22/24
Submit RFI Responses email	Vendors	03/07/24

Execution

Vendor	Email	
Street Address	P.O. Box	Zip
City & State	Telephone	
PRINT NAME		
AUTHORIZED SIGNATURE:	Date	

I) Executive Summary

The North Carolina Department of Transportation Division of Aviation invites zero-emissions aircraft Original Equipment Manufacturers (OEMs) and vendors to participate in a Request for Information (RFI) aimed at understanding and exploring the advanced capabilities of electric Zero Emission Vertical or Short Takeoff and Landing (zeVSTOL) technologies. This RFI represents a preliminary step towards potential future collaborations and is an ideal opportunity for OEMs and vendors to influence and inform the direction of North Carolina's aviation strategy. By engaging with NCDOT Aviation at this stage, your insights and innovative technologies will shape our understanding of zeVSTOL capabilities. Your detailed responses will be instrumental in highlighting the unique benefits, operational efficiencies, and potential cost-effectiveness of your zeVSTOL solutions, setting the stage for future partnerships and opportunities within the state's evolving transportation landscape. We look forward to your valuable participation and the opportunity to explore how your leading-edge technology can meet the diverse mission needs of NCDOT Aviation.

NCDOT Aviation utilizes aircraft to serve multiple roles on behalf of the state, such as acquiring aerial photography and spatial information products for transportation projects, transporting government officials on state business, and assisting government agencies with statewide emergency response. NCDOT Aviation currently operates two twin-engine aircraft to support these requirements. The diversity and complexity of these missions indicates the need for another aircraft capable of better serving certain missions at a lower operational cost.

Zero emission aircraft promise greater operational efficiency and lower operating costs than conventional aircraft. There are many zero emission aircraft in development, and some are expected to be available for purchase in the near future. NCDOT Aviation is interested in learning about the capabilities of zero emission conventional takeoff and landing (zeCTOL), zero emission short takeoff and landing (zeSTOL), and zero emission vertical takeoff and landing (zeVTOL) designs. To better understand the requirements, capabilities, and opportunities afforded by zero emission aircraft for state purposes, NCDOT Aviation is issuing this Request for Information (RFI). Vendors are requested to provide information pertinent to the state's interest in the utility and cost-effectiveness of zero emission aircraft to fulfill its mission needs.

II) NCDOT Aviation Program

Section 1: Introduction

NCDOT Aviation has been an active participant in the Federal Aviation Administration's (FAA) Integration Pilot Program (IPP) and the successor BEYOND Program, which is active until October 2024. Both programs have afforded NCDOT Aviation the opportunity to conduct pioneering operations using unmanned aircraft systems (UAS) and to build enduring partnerships with original equipment manufacturers (OEMs)¹, operators, and supporting industries. Through these programs, North Carolina has conducted more UAS operations than all other program participants, including many national first-of-a-kind operations. It is a policy objective of the state to continue to lead the nation in advanced air mobility (AAM) and foster the development of the associated industries and services for the benefit of all North Carolinians.

In pursuit of these objectives, NCDOT Aviation is interested in engaging the next phase of AAM, passengeroccupied zero emission aircraft. NCDOT Aviation seeks to understand the costs, requirements, and capabilities these aircraft offer and how they could support our mission. NCDOT Aviation also seeks to understand and foster the economic and humanitarian benefits made possible by the unique aspects of these aircraft. Building on our success in the BEYOND Program, NCDOT Aviation intends to be an active and involved participant in pioneering the introduction of zero emission aircraft into our aviation system.

¹ OEM for the purposes of this RFI is intended to represent any company who originally designs, engineers, and manufacturers a specific aircraft such as an Uncrewed Aircraft (UA) or zero emission aircraft.

NCDOT currently maintains a Flight Operations unit that operates and maintains two crewed aircraft: (1) King Air B200, and (2) King Air C90. NCDOT Aviation has five pilot positions with one full-time mechanic to perform passenger and photogrammetry flight services for state agency personnel. Typical missions include passenger transportation for state business, photogrammetry flights for NCDOT projects, and emergency response support. Each airplane is shown in Figure 1. A geospatial representation of where the King Air C90 flies for photogrammetry missions is shown in Figure 2, which highlights the scope of the geographic area covered by this aircraft today.



Figure 1: NCDOT Passenger Plane (King Air B200, Left) and Photogrammetry Plane (King Air C90, Right)



Figure 2: Engineering Flights (Green), Emergency Response Flights (Red), Subaquatic Vegetation Flights (Yellow) Example Data

Section 2: Mission Requirements

Mission A

NCDOT Aviation envisions that a zero emission aircraft would serve primarily short-haul missions in support of its role to conduct photogrammetry operations or transport government officials for state business. The photogrammetry operations require the ability to carry surveillance sensors and at least one sensor operator, in addition to the pilots. The passenger operation would require the ability to carry at least four passengers (*not including the pilots*). Both operations require the ability to fly up to two hundred (200) nautical miles (nm) with a cruise speed of at least 100 knots indicated airspeed (KIAS). Some of these missions require short turnarounds, so NCDOT Aviation is interested in understanding the aircraft's range for a round trip without recharging, as well as the recharging time required for longer trips.

Mission B

A robust coastal transportation system has diverse and unique requirements, including possible cargo, emergency management and passenger air taxi operations to rural and remote areas. This operation would require the ability to fly short missions (<25 miles) between coastal communities. In addition, coastal transportation requires strategic response to emergency missions. Unique features can include airborne endurance for surveillance, hover capability, ability to operate in and out of degraded runways, and ability to operate in low visibility and/or high winds. NCDOT Aviation is interested in understanding the extent to which zero emission aircraft can serve missions with these operational requirements.

Mission C

A third objective of NCDOT Aviation for next-generation zero emission aircraft would be to explore and expand the commercial potential of these aircraft and the associated industries to grow the economy and serve the needs of North Carolinians. There is already considerable interest in the potential of zero emission aircraft to be used to serve healthcare and humanitarian missions, as a component of an intermodal transportation system, to transport high-value cargo, and as an air taxi to access rural and remote communities. Flying pilot programs would enable NCDOT Aviation to gain knowledge about the infrastructure, policies, and regulations needed to foster the most beneficial applications of this industry.

Section 3: Vendor Response Requirements

Responses are requested to include, but are not limited to, the following information as applicable to the respondent's product. Responses may omit some of the following information if it is not known or available at time of submission.

Responses to this RFI will indicate which mission(s), from Section 2, a respondent's product is capable of accomplishing.

I. <u>Company Overview</u>

- Brief history and background of the company [~]
- Previous experience in aircraft manufacturing, especially in the zero emission aircraft domain
 [~]

II. <u>Aircraft Specifications</u>

- Model name and description [~]
- Minimum flight crew [~]
- General aircraft systems description and navigation capability [~]
- Types of operations (Day VFR, Night VFR, Day IFR, Night IFR, Flight into known icing conditions) [~]
- Environmental limitations (as are applicable) [~]

- Noise level (FAR 36 Noise Standards Aircraft Type and Airworthiness Certification) [dBA]
- General aircraft safety features and redundancies [~]
- Motor, Propeller, and Fuel Data
 - 1. Number of motors [~]
 - 2. Individual motor rated horsepower (maximum and continuous) [HP]
 - 3. Total collective motor rated horsepower (maximum and continuous) [HP]
 - 4. Power source [battery, hydrogen fuel cell, hybrid] [~]
 - 5. Power source data:
 - 1. Quantity of fuel (indicated in fuel type capacity and endurance value considering normal operating conditions with and without reserves) [~]
 - 2. Refueling specifications and performance (e.g., refueling method(s), standards, refueling rates supported, process, limitations) [~]

Weight & Balance Data

- 1. Maximum takeoff weight (MTOW) [lbs]
- 2. Maximum landing weight (MLW) [lbs]
- 3. Maximum number of passengers can carry (passenger configuration) [~]
- 4. Maximum baggage weight at maximum passengers [lbs]
- 5. Center of gravity (C.G.) limits (including C.G. envelope chart) [lbs]

Airspeed Data

- 1. Never exceed speed (V_{NE}) [KIAS]
- 2. Maximum structural cruising speed (V_{NO}) [KIAS]
- 3. Cruise speed for best economy [KIAS]
- 4. Cruise speed for best power [KIAS]
- 5. Design maneuvering speed (V_A) at C.G. limits [KIAS]
- 6. Stall speed (V_S) [KIAS]
- 7. Stall speed in landing configuration (V_{SO}) [KIAS]
- 8. Best rate of climb (V_Y) [KIAS]
- 9. Best angle of climb (V_X) [KIAS]
- 10. Takeoff speed (V_R) [KIAS]
- 11. Speeds associated with varying flap settings [KIAS]
- 12. Landing final approach speed (V_{Ldg}) [KIAS]
- 13. Maximum crosswind [KIAS]

Performance Data

- 1. Maximum operating density altitude [ft]
- 2. Motor performance charts (system of motors) [~]
- 3. Takeoff performance charts (CTOL, STOL, and VTOL configurations as are applicable) [~]
- 4. Cruise performance charts (in cruise configuration) [~]
- 5. Landing performance charts (CTOL, STOL, and VTOL configurations as are applicable) [~]
- Ground Movement Data

- 1. Method(s) for which the aircraft can move on or near the surface of an airport, heliport, or vertiport (e.g., powered ground taxi, hover taxi) [~]
- 2. Performance data on ground movement (e.g., turn radius, ground movement speeds, ground movement limitations) [~]
- Cabin Comfort Data
 - 1. Cabin pressurization technologies onboard the aircraft (as are applicable) [~]
 - 2. Flight crew and passenger heating and cooling systems onboard the aircraft (*as are applicable*) [~]
 - 3. Internet connectivity services offered to passengers onboard the aircraft (*as are applicable*) [~]
 - 4. Flight crew and passenger communication onboard the aircraft (as are applicable) [~]
- Emergency Procedures (Describe emergency procedures for the following failure scenarios)
 - 1. Propulsion system fire (including fuel source, covering during start and in flight) [~]
 - 2. Motor failure(s) (*individual and/or collective failure*) [~]
 - 3. Electrical failure(s) [~]
 - 4. Power off landing [~]
 - 5. Stall recovery [~]

III. <u>Projected Certification Date and Availability</u>

- Status in the aircraft certification process with description of remaining steps [~]
- Any certifications and exemptions already obtained or in progress with the FAA [~]
- Projected date of availability for purchase and delivery [year]

IV. Operational Requirements

Refueling infrastructure requirements

- 1. Types of refueling infrastructure (e.g., mobile or stationary equipment, connector requirements, refueling rates and limitations) [~]
- 2. Refueling infrastructure servicing needs (e.g., grid connection requirements, cable or hose requirements) [~]
- 3. Refueling infrastructure firefighting and rescue considerations including how to extinguish aircraft fires [~]

Training requirements for flight and maintenance crews

- 1. Pilot certification requirements with FAA (pilot ratings, aircraft category, category class, and/or aircraft type) [~]
- 2. Maintenance certification requirements with FAA (e.g., A&P mechanics, avionics technicians, inspection authorization mechanics) [~]
- 3. If Vendor provides pilot training (e.g., simulator, ground school, flight training), please describe the expected process, cost, and timeline [~]
- 4. If Vendor provides flight instructor training, please describe the expected process, cost, and timeline [~]
- 5. If Vendor provides maintenance training, please describe the expected process, cost, and timeline [~]

• Aircraft Storage and Parking

1. Aircraft parking tie-downs or other methods to secure the aircraft [~]

- 2. Aircraft downwash and outwash considerations for parking and storage [~]
- 3. Aircraft storage requirements, including facility environmental considerations (e.g., temperatures) [~]
- Specify requirements for continued airworthiness of the aircraft (e.g., inspections, preventive maintenance) [~]

V. <u>Cost Information</u>

Capital Expenditures

- 1. Aircraft acquisition and financing options available (e.g., purchase, lease) [~]
- 2. Estimated cost of the aircraft [\$]
- 3. Estimated useful life of the aircraft [years]
- 4. List of necessary or recommended supporting infrastructure, replacement parts, and backup materials for aircraft operations [~]
- 5. Estimated cost of any supporting infrastructure, such as refueling infrastructure, required to operate the aircraft from at a minimum two airports (include list of necessary infrastructure and purchase model) [\$]

Operational Expenditures

- 1. Estimated average maintenance cost per flight hour [\$/flight hour]
- 2. Estimated battery service life [years]
- 3. Estimated motor service life and hours for MRO requirements [years]
- 4. Estimated cost of battery replacement (cost of battery) [\$]
- 5. Estimated cost of motor(s) overhaul (cost of motor(s)) [\$]

Other Financial Information

- 1. Provide any information available on aircraft insurance and preferred partnerships [~]
- 2. Describe any maintenance partnerships or applicable service options for the aircraft [~]

VI. <u>References</u>

Provide references of any current operators or customers using your aircraft or other products [~]

Late responses will not be accepted. NCDOT is not responsible for and will not reimburse any costs incurred in the preparation or submission of information in response to this RFI. This is strictly an RFI, and this request does not bind NCDOT to solicit bids or proposals in the future. In addition, submission of information pursuant to this RFI does not give any respondent any advantage in any solicitation if NCDOT elects to solicit bids/proposals in the future. No confidential information should be submitted in response to this RFI.

VII. Optional Presentation

Upon receipt and review of the responses, NCDOT may opt to invite select respondents for a presentation and product demonstration. Please indicate in your response whether your organization would be interested in providing a demonstration or presentation of this nature. Presentations would be expected to include a high-level overview of the product, a discussion of the respondent's experience and competency with implementation of their solution, a discussion about the approach taken in previous implementations, and an opportunity for questions and answers.

VIII. RFI Procedures

Schedule

Responses to this RFI must be received by the date, time, and the location specified on the cover sheet. Respondents may be contacted for clarifications or additional information regarding their response to this RFI.

All Respondents should be aware that your Response will be open to all interested parties and therefore any content presented will be publicly available unless marked confidential and determined to be confidential. Mark all pages confidential that is determined to be confidential. *(See Section 6)*

Clarification Questions

Questions will be accepted until date and time as specified on the cover sheet of this RFI. All questions must be submitted in writing to <u>tibusshart@ncdot.gov</u> Questions should be limited to the overall scope of the RFI. An addendum containing any general clarification questions and their answers will be issued.

Response

The state recognizes that considerable effort will be required in preparing a response to this RFI. **However**, **please note this is a request for information only and not a request for goods or services. No award will result from this RFI**. Furthermore, NCDOT is not legally bound to issue a Request for Proposal (RFP) for goods or services but may elect to do so. Respondents submitting to this RFI will not be precluded from submitting a response to an RFP if NCDOT issues one in the future. The Respondent must bear all costs associated with the compilation and submission of a Response to this RFI.

Multiple Responses

Multiple responses will be accepted from a single vendor provided that each response is comprehensive, meets all of the state's requirements, and is truly unique. Please place in separate envelopes and clearly mark responses as "Response #1, Response #2, etc.

Content and Format

The state expects concise, detailed, point-by-point responses to each of the RFI response items of this RFI. The State is not interested in brochures or "boilerplate" responses. Any issues or exceptions to NCDOT's desired functional requirements should also be identified and explained.

Where appropriate, the response should also include diagrams to clarify components of the response. The response should also specify all services that would be required by the proposed solution.

Format and Copies

Each response should be submitted in the form of one electronic copy. Electronic responses delivered via email should be in Portable Document Format (PDF).

Proprietary Information

Trade secrets or similar proprietary data which the Respondent does not wish disclosed to persons other than personnel involved with this RFI will be kept confidential to the extent permitted by 01 NCAC 05B.1501 and N.C.G.S. § 132-1.3 if identified as follows: Each page shall be identified in boldface at the top and bottom as "CONFIDENTIAL". Any section of the RFI that is to remain confidential shall also be marked in boldface on the title page of that section. Cost information may not be deemed confidential. In spite of what is labeled as confidential, the determination as to whether or not it is shall be determined by North Carolina law.

http://www.ncga.state.nc.us/enactedlegislation/statutes/html/bysection/chapter_132/gs_132-1.3.html

RFI Conditions

The state will not be bound by any RFI procedure qualifications or any additional conditions included by a Respondent in a response.

Communication

All communication regarding this RFI is to be addressed to the contact person identified on the RFI Cover sheet, page one (1). Thomas Busshart <u>tibusshart@ncdot.gov</u>

Vendor Information

- Name of company
- Contact person and title/position
- Address, telephone number and email address
- Overview of your product. Brief history of the company (length of time in business) including a listing of government agencies that have successfully implemented the company's services.