

# **Unsettled Issues Regarding the Use of eVTOL Aircraft during Natural Disasters**

**Johnny Doo**

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**Johnny Doo**

*International Vehicle Research Inc.*

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Printed in USA

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**EPR2022001**

**ISSN 2640-3536**

**e-ISSN 2640-3544**

**ISBN 978-1-4686-0422-1**

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## About the Editor



**Mr. Johnny T. Doo** is President of International Vehicle Research Inc., focusing on innovative flight vehicle and electric vertical takeoff and landing (eVTOL) technologies and unmanned aerial vehicle (UAV) and wing-in-ground vehicle development and applications.

He is Lead of the National Aeronautics and Space Administration (NASA) Transformative Vertical Flight Working Group on Public Services, teaming with over 100 industry leaders and experts to develop the roadmap and use cases for disaster relief, humanitarian aid, search and rescue, police and firefighting, medical transport, and military eVTOL applications. He also supports aviation industry growth by providing strategic consulting, including business planning, product development, and market strategy to selected global clients.

He has over 30 years of experience in manned and unmanned aviation products, with many years of executive-level responsibilities in aviation product development, program management, and supply chain development, as well as marketing and business development. His technical and program experiences range from high-performance piston aircraft, personal and business jets, and regional aircraft to new-generation aircraft engines and

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He was Executive Vice President of Advanced Technology, Executive Vice President of Marketing and Business Development, and Senior Vice President of Engineering and Product Integrity at Continental Motors Group. He not only managed the product line expansion of the Avgas and Jet-A diesel aviation engines but also developed multiple new market segments, achieving significant growth of the global original equipment manufacturer customer base and sales revenue. He was also the president of a flight training subsidiary with an innovative training model and was responsible for the maintenance, repair, and overhaul business unit, quadrupling business growth over three years.

Prior to Continental Motors, he was Vice President at Diamond Aircraft in Canada, with full responsibility for the new-generation personal jet program. He built a new program team from the ground up and led the successful development of the all-composite, single-engine personal jet in three years. At the same time, he established the design, test, and certification capabilities, negotiated with all the key suppliers, and managed the new supply chain to support the development and production operations. His hands-on experiences with the high-performance business jet at Sino Swearingen Aircraft, regional aircraft at Fairchild Aircraft, and new-generation piston aircraft at Mooney Aircraft formed a broad spectrum of technical and project management knowledge base.

He has a bachelor's degree in Mechanical Engineering from Chung Yuan Christian University and a master's degree in Aerospace Engineering from the University of Colorado. He is the author of two SAE EDGE™ Research Reports, "Unsettled Issues Concerning the Opportunities and Challenges of eVTOL Applications during a Global Pandemic" and "Unsettled Issues Concerning eVTOL for Rapid-Response, On-Demand Firefighting." He is the co-author of the book *WIG Craft and Ekranoplan—Ground Effect Craft Technology* and is the GoFly Master Lecturer on "eVTOL for Public Services—Design and Applications."

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# Unsettled Issues Regarding the Use of eVTOL Aircraft during Natural Disasters

## Abstract

Recent advancements of electric vertical takeoff and landing (eVTOL) aircraft have generated significant interest within and beyond the traditional aviation industry, and many new and novel applications have been identified and are under development. One promising application is rapid response during natural disasters, which can complement current capabilities to help save lives and enhance post-disaster recoveries. With the global increase of occurrences and scale of natural disasters, and the varying and dynamic operations facing rescue and recovery teams, eVTOL can offer timely, on-demand, and potentially cost-effective aerial mobility components to the overall solution. Rapid response to natural disasters could translate into the preservation of life, effective rescue, and timely care for injured persons. These eVTOL aircraft may not currently have the capacity of larger aerial transportation and logistics assets, but for targeted missions, they can be effective in pre- and post-disaster response.

Some challenges need to be addressed before identified capabilities and benefits can be realized at scale. These include mission-specific eVTOL vehicle development, detect-and-avoid capabilities in complex and challenging operating environments, autonomous and remote operations, charging system compatibility and availability, operator and controller training, and dynamic airspace management, as well as vehicle/fleet logistics and support. Acceptance from stakeholder agencies, field commanders, first responders, relief teams, and the public is also critical for the successful implementation of these new capabilities. The purpose of this report is to identify the benefits and challenges of integrating eVTOL aircraft into natural disaster response operations.

NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. These reports are not intended to resolve the challenges they identify or close any topic to further scrutiny.

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ISSN 2640-3536