



# Implementing Sustainable Freight Technology Transfer Systems

Tyler Reeb, Ph.D.

California State University Long Beach

Tyler.Reeb@csulb.edu

## Project Objective

The purpose of this white paper is to provide a gap analysis and assessment of best practices in sustainable freight technology transfer to assist stakeholders across the California supply chain to better address freight and logistics challenges in an era of increasing zero-emission regulations. This white paper and the corresponding research represent an implication-based assessment of the current state of sustainable freight technology transfer and outlines initial implications of a still nascent area of research.

## Problem Statement

State Departments of Transportation seek to implement efficient, resilient, and sustainable freight infrastructure planning projects which require public sector agencies to gain knowledge of best practices from key stakeholders in industry, education, and government in the California supply chain. Without an efficient, seamlessly coordinated, and widely supported way to share information across the public, private, and governmental stakeholders in the California supply chain, stakeholders within the freight industry are exposed to increased vulnerability and missed opportunities for improvement.

## Research Methodology

Sustainable freight technology transfer is an emerging area of study which developed out of the under-researched topic of freight technology transfer. Technology transfer became a subject of study within the context of supply chains in the United States after the 1980s and has continued to gain in use and application.<sup>1</sup> The working definition for sustainable freight technology transfer in this white paper is as a process by which tacit knowledge, technical equipment, capital goods, know-how of existing technology, and any industry-specific knowledge or skills are communicated from one organizational setting to another in pursuit of environmental sustainability, economic gain, and the mitigation of future adaptation costs. The use of sustainable technology increases production and/or transportation efficiency which then leads to a diminished consumption of natural resources.<sup>2</sup>

As this white paper represents an implications-based assessment of sustainable freight technology transfer activities, the researchers worked with a small group of subject matter specialists across governmental, public, and private stakeholders in the California supply chain. To gain insights into the current state, barriers, and gaps of sustainable freight technology transfer in the California supply chain,

---

<sup>1</sup> Blohmke, "Technology Complexity, Technology Transfer Mechanisms and Sustainable Development"; Bozeman, "Technology Transfer and Public Policy: A Review of Research and Theory"; Hirt et al., "GUIDE FOR IMPLEMENTING TECHNOLOGY TRASFER."

<sup>2</sup> Karakosta, Doukas, and Psarras, "Technology Transfer through Climate Change"; Blohmke, "Technology Complexity, Technology Transfer Mechanisms and Sustainable Development"; Bozeman, "Technology Transfer and Public Policy: A Review of Research and Theory"; Hirt et al., "GUIDE FOR IMPLEMENTING TECHNOLOGY TRASFER"; Fernandes et al., "Green Growth versus Economic Growth."

researchers conducted a series of pre-survey interviews, collected survey responses, and conducted focus group meetings.

### Results

The results indicate that there is a need for increased institutional prioritization for intentional and direct sustainable freight technology transfer. Key aspects thereof are (1) the establishment of synchronized baseline knowledge and (2) a prioritization to learn key synthesizing technology tools. Additionally, a conscious effort to focus on sustainable technology transfer activities across all freight sectors, including rail and air cargo, could greatly improve efficiency and collaboration across the California supply chain. Introducing common definitions at least within specific freight sectors and at least baseline knowledge thereof could greatly reduce uncertainties and ease regulatory oversight.

In terms of introducing and incorporating new sustainable technology tools, coordination between private industry, public sector, and governmental organizations is necessary to develop a right of way for emerging sustainable technology companies. This could reduce turnover in business and technology applications. Additional communication and coordination are needed to discuss legal barriers, including jurisdictional concerns, and the need to address uncertainty and apprehension. Finally, a broader effort to provide funding within various stages of technology readiness levels, such as for demonstration and feasibility studies, would mitigate and possibly alleviate the financial and competitive pressures for freight operators. Sustainable freight technology transfer is a nascent area of research but shows tremendous potential and positive opportunities. This implications-based assessment outlines some of these opportunities and serves as a baseline of research into an exciting discipline.