Foreword

Author: *Carsten Thomas**

Transportation Systems - Approaches to SDGs

Megatrends are fundamental changes over an extended period that affect the whole of society. Some of the key megatrends are in direct contradiction to each other, such as population growth, urbanization and megacities on the one hand, and climate change and resource scarcity on the other. Such conflicting megatrends are a huge challenge for society. The global demand for transport is expected to more than double by 2050, while transportation accounts for a very large share of greenhouse gas emissions (e.g., 22.3% in the EU). Examples like this illustrate that sustainable growth can only be achieved if megatrends are holistically understood and if the associated challenges are mastered.

In 2012, the United Nations Conference on Sustainable Development in Rio de Janeiro adopted the Sustainable Development Goals (SDGs). This set of universal goals describes the objectives that must be met in order to master the urgent environmental, political and economic challenges facing the world. They serve as a universal framework to enable countries to better target and monitor progress across all three dimensions — social, environmental and economic — of sustainable development in a coordinated and holistic way. In the years since 2012, the SDGs have been steadily growing in importance, with 193 nations in the world having now endorsed this policy framework.

The transport domain contributes directly to several SDG targets, including road safety (target 3.6), energy efficiency (target 7.3), sustainable infrastructure (target 9.1), urban access (target 11.2) and fossil fuel subsidies (target 12.c). All organizational stakeholders in the transport domain, including railway sector governments and municipalities, infrastructure providers, operators, rolling stock manufacturers and subsystem suppliers, are urged to improve the domain such that the SDGs can be progressively implemented.

The railway sector plays a key role in this context. Railway transport for both passengers and freight is considerably safer and more energy-efficient than road transport with its much higher traffic densities, and is already largely independent of fossil fuels. Clearly, a strong shift from road-bound transport towards railway transport would serve the SDG objectives very well. However, although such a shift has been discussed for many years, it has not yet happened. In the EU in 2017, road transport was used for 80% of all passenger kilometers and 51.7% of all (freight) ton kilometers, compared with only 8.3% and 11.6%, respectively, for railway transport[1]. What is required to change this picture?

To date, road-bound transport is considered more flexible and individualized than railway transport. On roads, freight can be delivered directly door-to-door, and passengers have many choices to individualize their journey, such as starting time, route, breaks and detours. Sometimes this flexibility may be only a perceived advantage, rather than a real one. Nevertheless, in many cases, individualization and flexibility make road transport more attractive and economical than railway transport. Therefore, the railway sector must find ways to provide the same flexibility and individualization to its customers to be able to attract transport demand. This likely requires major changes to today's railway transport system. Railway transport needs to connect seamlessly with other transport modes, train scheduling densities should be improved by orders of magnitude, and freight transport must be made attractive for small volumes through routing flexibility and coverage of the last mile to the sender or receiver. In addition to such conceptual and systemic changes, further improvements are required in terms of energy efficiency, automation, maintenance optimization and other areas, to decrease the life-cycle cost and make railway transport more attractive.

Under its corporate mission, Mitsubishi Electric is continually striving to improve its technologies and services, thereby helping to achieve the objectives of the SDGs. This special issue focuses on specific challenges that Mitsubishi Electric faces as a major global subsystem manufacturer in the railway sector, and concrete examples of contributions that Mitsubishi Electric is making in its mission to support implementation of the SDGs.

[1] https://www.eea.europa.eu/data-and-maps/indicators/passenger-and-freight-transport- demand/assessment-1

**Professor, HTW Berlin, University of Applied Sciences*