

SUMMARY.

The dissertation focuses on urban transport issues in the context of climate change and the need to reduce greenhouse gas emissions. The introduction and development of the thesis covers the relevant contexts that form the basis for the formulation of project objectives. The author analyses the impact of transport on greenhouse gas emissions, highlighting the need to achieve zero harmful gas emissions by 2050, and promotes clean and efficient public transport as a means of achieving this goal. Subsequent sections of the paper discuss the history of trams, the evolution of cities and the problems associated with them. The author also looks at the process of urbanisation, the migration of people to cities and their impact on urban structure. He also analyses the strategies of cities for improving the quality of life, such as promoting public transport and investing in cycling infrastructure.

The paper goes on to discuss various aspects of mobility in modern cities, emphasising the importance of sustainable mobility and the use of environmentally friendly modes of transport. The author also examines aspects of accessibility and modernisation of public transport, especially trams, in line with the objectives of sustainability and providing easy access to transport for all social groups. Examples of practices from France that take into account the needs of people with reduced mobility in the planning of transport infrastructure are also cited. The author encourages reflection on the choice of mode of transport, suggesting that the development of public transport and cycling can contribute to improving the quality of life in cities, minimising the negative impact on the environment.

In the next section, the author focuses on the needs of older people in the context of urban public transport. The ageing population poses challenges for cities to provide safe, accessible and easily understandable means of transport for this age group. The main issues include safety, accessibility, communication, universal design and a free transport policy for seniors.

Chapter 6 discusses the problem of transport exclusion in Poland, particularly in rural areas where there is a lack of access to public transport. It presents changes in Poland's railway network and examples of successful railway reactivation projects.

The author then discusses a new type of vehicle propulsion - fuel cells that produce hydrogen. He describes various examples of hydrogen-powered vehicles that are already in use or being tested in various countries, including Poland. The author reflects on the possibility of introducing this type of propulsion into urban public transport and highlights the advantages of this technology.

Chapter 8 introduces the practical part of the work, where the key design principles of the light rail vehicle are presented. It describes the design, the hydrogen-based propulsion system and the possibility of adapting the interior of the vehicle to meet different line needs. The design incorporates universal design principles and compliance with rail vehicle standards.

The design of the light rail vehicle is based on innovative solutions in public transport, with the possibility of a market introduction within 3-5 years. It emphasises a harmonious integration into the urban environment, maintaining a subtle styling. Promotes the environmental aspect through the use of recycled materials and kinetic energy recovery technology. It introduces bi-directionality, seats with variable geometry, and provides comfort for passengers, including those with disabilities. The control cabin has been designed with the comfort of motorists in mind.

Work on the interior design of the light rail vehicle included an analysis of the technical documentation of existing trams and a review of photographs and elements present in the interiors of similar vehicles. Based on the guidelines for space for people with reduced mobility, two interior layout options were developed, taking into account the needs of passengers travelling on shorter and longer routes. The design also took into account the regulations for interior fittings, especially the disabled-friendly space. The final interior design is characterised by functionality, ergonomics and adaptation to different travel scenarios, ensuring passenger comfort and safety.

The design of the interior of a light rail vehicle included an analysis of the interiors of both classic urban trams and light rail vehicles intended for both urban and suburban areas. Based on these observations and our own experience, two model scenarios for the interior layout were created. The first option focuses on the urban character, providing open spaces for rapid passenger exchange, as well as comfortable seating for short-distance travellers. The layout also takes into account spaces for people with reduced mobility. Variant two focuses on the comfort of longer-haul travellers, offering comfortable seating and space for people with reduced mobility, with additional amenities such as USB sockets and grab handles for standing passengers. The final interior design is characterised by flexibility, functionality and consideration of the needs of different groups of travellers.

The design of the control cabin completes the overall work on the vehicle. The author concentrated mainly on designing the appearance of the elements inside the cab, without overlooking the social aspects. Using the existing layout of a similar vehicle, he designed a driver-friendly workplace, taking ergonomics and functionality into account. The interior of the cab was divided into working and social areas. The design includes an adjustable driver's seat, a control panel with screens and buttons, and safety features such as a fire extinguisher, first aid kit and defibrillator. The social aspect is made visible by the presence of a space for outer garments, a fridge, a place for a cup or an umbrella. The aim of the project was to create a space that improves comfort and hygiene for the motorist.