Considering our options:
researching sustainable transportation

by Dr. Barry E. Prentice, Director, Transport Institute

As the reach of a global society has increasingly touched on the social, economic and environmental dynamics of the world's urban centres and most remote areas, the place of transportation in everyday life has expanded. Whether in the context of transferring goods and services between locales, stimulating economic growth through consumption and employment, or linking individuals to one another, the transportation sector is key to the vitality of municipal and communal life. More recently, the transportation sector has been associated with matters of climate change, environmental preservation, and sustainability.

Capturing the issue of sustainability in a brief definition is not an easy task. It is an area of concern that reveals multi-faceted debates, and one that impacts a broad number of parties. As a leading research and educational facility, the past (and current) work of Transport Institute staff/faculty has included studies that reflect both the complexity and necessity of questioning the relationship between transportation and sustainability.

For over 30 years, the University of Manitoba's Transport Institute has provided insightful analyses and in-depth commentaries on the impact of the transportation activities in Canada and around the globe. The Institute's mandate to advance economic growth, competitiveness and international trade through transportation and supply chain management research has included a focus on sustainable transportation.

Along with the advance of a graduate program in Supply Chain Management, the Transport Institute recently received a $1 million donation from CN to create an endowed Chair in Sustainable Transport, Logistics and Supply Chain Management. These initiatives are expected to foster a high quality of research. Other areas in which the Transport Institute has a focus on sustainable transportation include the potential of hydrogen technologies, airships as a means of servicing remote areas, green transport corridors and climate change, and alternative urban transit designs.

In 2002, the Transport Institute produced a study that examined the implications of hydrogen technologies for Manitoba's transportation sector. Through a summary of the technological/commercial status of the global fuel cell industry, and the impact that the industry could have in Manitoba, the report shows that the evolution of hydrogen fuel cell technology presents economic and environmental opportunities for Manitoba. As a fledgling industry that may contribute to a sustainable transportation system, the Transport Institute has continued to support research on hydrogen technologies. In early 2005, the Institute partnered with a number of sponsors to bring a Hydrogen Hybrid Internal Combustion Engine (H2-ICE) bus to Winnipeg. Powered by hydrogen instead of gasoline, the H2-ICE bus does not emit carbon dioxide when burning fuel, making it environmentally friendly (see sidebar).

One aspect to consider when discussing

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the relationship between sustainability, transportation, and municipalities is the matter of access. Many of Manitoba's northern communities lack sufficient, regular access to social, economic, and health resources. In the summer of 2005, the Transport Institute will hold its third annual *Airships to the Arctic Symposium*. Spawned by a research interest of the Transport Institute's Director, **Dr. Barry Prentice**, past symposiums have explored the potential of developing airship-related technologies as an alternative resource for servicing remote communities. The benefits of these vessels are of particular relevance to a province like Manitoba that has a geographically imbalanced population, and limited land-based, all-weather infrastructure between its northern communities.

The Transport Institute has also investigated the relationship between Manitoba's strategic location in the geography of NAFTA and the concept of green corridors. As a network that links the economies and communities of Canada, the US and Mexico, the Mid-Continent Trade Corridor directly impacts the flow of North American trade and economic development in communities with close proximity to the network. As a joint initiative between the Government of Canada and the City of Winnipeg, the *Green Corridors Project* investigated the environmental ramifications of international trade corridors, focusing specifically on the Mid-Continent Trade Corridor.

From a transportation standpoint, two occurrences have placed a great stress on the quality of municipal infrastructure: the increasing movement of rural populations to higher density locations, and the reliance on personal vehicles as primary modes of transportation. With limited economic capacities to invest in road maintenance and public transit systems, municipalities often find themselves caught between a rock and a hard-place. Representatives of the Transport Institute have played a vital role in discussions concerning the need to create sustainable urban infrastructure programs and transit systems. The Institute was directly involved with the City of Winnipeg's WinSmart initiative and continues to have a stake in that project.

Also, last year, the City of Winnipeg voted on a proposal to develop a Rapid Transit system, the first branch of which would connect the U of M to the downtown area. Although this proposal was voted down, the City has recently formed a Rapid Transit Task Force in charge of devising the most appropriate transit-development strategy for the City of Winnipeg. Dr. Prentice, was appointed to the Task Force, drawing on his (and the Institute's) expertise in the field of transportation research. Although these initiatives are both based out of Winnipeg, they have the potential to contribute to a broader enhancement of municipal/urban transportation systems throughout the province.

Manitoba is at a crossroad. Social and economic developments are not only reasonable platforms regarding Manitoba's municipalities, but also essential dynamics for an efficient, effective, and sustainable future within and between those communities. Manitoba has the potential to build on a stable, talented population base, its abundance of natural resources, its growing presence in the fields of science and medical research, and its continued leadership in Canadian agriculture. The province is also home to a broad range of transportation industries that have been central to the history of Manitoba's municipalities. Dynamic aviation and bus manufacturing industries, agricultural and natural resource transport services, and a diverse trucking industry represent a few of the major contributors to Manitoba's economy, the viability of its communities and its connections to a global society. Helping these industries grow and flourish will have direct and indirect benefits for the social, economic, and environmental condition of the province's municipal areas. As an internationally recognized research and education facility, the creative, effective work of the Transport Institute has, and will continue to support a sustainable role and place for transportation in the future of Manitoba's municipalities.

Hydrogen bus demonstration

Manitoba's unique cold-weather environment has provided a unique setting to test a hydrogen transit bus. Winnipeg is the first Canadian site for this ambitious demonstration. Energy, Science and Technology Minister **Dave Chomiak** sees this as both an opportunity for international business partnerships, but also the "beginnings of a strong economic future in manufacturing advanced-technology buses."

The bus used locally produced hydrogen fuel and was serviced and supported by Red River College staff. The compressed hydrogen gas was produced with a mobile refueling system using clean Manitoba electricity and was refueled using a Winnipeg-based dispenser. The bus body was built in Manitoba and shipped to San Diego where the engine and drive systems were installed. The engine was modified to burn pure hydrogen gas, powering an electric generator that powers motors at the drive wheels.

The $1.4 million hydrogen hybrid internal combustion engine (H2-ICE) bus is undergoing the cold-weather demonstration with the funding support and in-kind contributions totaling more than $600,000 from the Government of Canada, Province of Manitoba, Vehicle Technology Centre, Winnipeg Transit, ISE Corporation, Kraus Global and Stuart Energy. Other partners include New Flyer Industries, the City of Winnipeg Transit Department, the University of Manitoba Transport Institute, and SunLine Transit Agency.