Summary

There are economic, legislative and social reasons for increasing sustainability in the transport sector. Reducing energy consumption per ton/km reduces operating costs per km. Reducing energy consumption per ton/km reduces emissions per ton/km necessary to adhere to ever increasing emission legislation. Society will no longer accept the consequences of unsustainable practices. Companies who operate in ways considered to be pollutant or harmful to the environment, even if within legal limits, risk loss of business due to the stigma attached to polluters. On the other hand companies who consciously make an effort to practice sustainable business can benefit from the marketing value of "being green".

Overland transport systems, (Road, Rail, Conveyor), compete as well as complement each other in the same market. In all modalities technical advances are increasing efficiency and decreasing energy consumption. Road systems comprised mostly of truck and trailer combinations are under pressure from legislation to reduce emissions. Catalizers, NOx removal systems, engine efficiency advances and rolling and air resistance reductions are being augmented by hybrid drives, alternative power sources and IT implementation. Tentative steps are being taken to adapt road infrastructure and vehicle size legislation to allow more sustainable options on the roads. Rail is also benefiting from advances in technology. Electrical power generation is coming under increased public scrutiny as a result of which more "green" electricity is being produced to power homes as well as industry and rail networks. Regenerative systems, improved locomotive engine technology and mostly dedicated infrastructure for freight rail are increasing fuel efficiency in the sector. Research into all aspects of conveyor technology, from rubber compounds to electric motors to idler design, are helping to increase conveyor technologies energy efficiency.

Methods are available to quantify the sustainability of a transport method or modality. Calculations of the total energy use per ton/km, emissions and Transport Loss Factor (TLF) can give insight into the comparative sustainability of a system for a given task. However, little account is taken of the flexibility of a system in these calculations. The TLF in particular allows for in depth study and comparison of modalities for a given situation but can not take into account the complexity of a transport infrastructure in a constant state of flux. Though the location large distribution centers such as ports and large transport consumers such as factories and power plants tend to remain static a large part of the freight transported over roads is distributed to a very wide and ever changing number of destinations. While it can be calculated that rail and conveyor technology is more efficient than trucks for a given transport problem the possibility of a change in the amount of freight or source and destination of the freight can lead to a seemingly less energy efficient choice being made.

Most quantification methods do not take into account the sustainability of the infrastructure. The cost in equipment, material and energy to construct a dedicated infrastructure for, for example, rail freight

must be taken into account when comparing to other options. The road network already exists and therefore costs comparatively little increasing the overall sustainability of a road based solution when compared to rail. Legislative changes allowing for more effective use of the road (Multi-trailer trucks or "road trains") could then be compared to the total rail option to find the most fuel efficient system.

The search for the most sustainable method of transport should not be limited to the application or expansion of old technologies. Building a more sustainable option next to an existing system is not the answer, current technologies must be improved or replaced entirely and a dedicated partnership between industry and government should be encouraged if we are to truly create a sustainable transport sector.