Road transport operation and infrastructure planning – case Finland

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There are 78,137 km of public roads and 350,000 km of private roads in Finland [1]. In the road network there are about 19,000 bridges and their value is estimated to be about 17 billion euros. Of the bridges serving the road network, about 4-5% is in need of immediate repair and/or modernisation. According to Statistics Finland, road traffic volume in Finland is estimated to increase by a factor of 1.25 between 2006 and 2030 [2]. The population will continue to increase at least until 2040, whereas also urban sprawl and private car ownership will abound. Consequently, the growth in transport performance is also expected to continue until 2050, despite improvements in logistic efficiency and possible (but uncertain) reductions in transport of raw materials owing to changes in the industrial structure. Thus, we can conclude that there are large planning challenges for the transport network, exacerbated by disparate regional developments and by climate mitigation and adaptation policy guidelines.

Roads and transport systems are vulnerable to climate change impacts. Although a significant share of the weather impacts is already today taken into account in the design, a change in the strength and/or frequency of damaging impacts may cause a need to change road structures [3]. For example, trenches and bridge and culvert structures of smaller roads have not been designed for high precipitation.

Climate change will also have an effect on the routine and periodic maintenance of roads [4]. In order to keep the present level of service, there are needs to changes in the maintenance guidelines policies. Development of warnings to road users and information in drive planning are important ways to mitigate any negative effects of weather and climate.

Climate change may affect demand of road transport services directly, e.g. climate change may alter the supply chains in forest and food industries, or indirectly via transport and environmental policy. The different freight transport modes and the competitiveness will be influenced the most by the mitigation measures and by how equally these measures are allocated globally and especially on the EU-level [5].

Also with respect to adaptation to climate change the competitive position of road transport may change for better or worse, depending on how other modes respond to changing circumstances and risks, on the regulatory and costs effects of explicit adaptation policy, on the interaction with other policies (mitigation, clean air, urban zoning, safety etc. [6]), and on the ability of the road transport sector (incl. its infrastructure and supporting services) to co-operate coherently to find efficient and timely answers.

The expected effects of a changing climate in Nordic countries imply among others a higher frequency of bad road conditions in winter, a higher frequency of more serious wear and tear of infrastructure and equipment, higher risks for large scale impact events (e.g. inundated tunnels), as well as induced behavioral effects possibly entailing maladaptation.

Road transport has many stakeholders with different agendas. Climate change has large variety of direct and indirect impacts on transport sector. It is a challenge to set up design processes where uncertain and increasing information on climate change will be used in decision-making and planning.

In the break-out session on transport we will review a set of stakeholder involvement and decision making issues with the above outline as backdrop.

References:

[1] Marttila, V., Granholm, H., Laanikari, J., Yrjölä, T., Aalto, A., Heikinheimo, P., Honkatukia, J., Järvinen, H., Liski, J., Merivirta, R. & Paunio, M. 2005. Finland's National Strategy for Adaptation to Climate Change. MMM Publication 1a/2005. 276 pp.

[2] Kokkarianen, V:, 2007: Tieliikenteen kuntaennuste 2005 - 2030 Tulevaisuuden näkymiä 1/2007, Tiehallinto, 12-25. (in Finnish)

[3] Seppo Saarelainen & Lasse Makkonen: Adaptation to climate change in the road management; Prestudy. Helsinki 2007. Finnish Road Administration, Finnra reports 4/2007, 53p. ISSN 1457-9871, ISBN 978-951-803-819-4,TIEH 3201029. (in Finnish, abstract in English)

[4] The effect of climate change on the routine and periodic maintenance of roads. Helsinki 2009. Finnish Road Administration, Central Administration. Finnra reports 8/2009, 66 p. + app. 8 p. ISSN 1459-1553, ISBN 978-952-221-172-9, TIEH 3201122-v. (in Finnish, abstract in English)

[5] Salanne, i., Byring, B., Valli, R., Tikkanen, R., Peltonen, P., Haapala, J., Jylhä, K., Tolonen-Kivimäki, O., and Tuomenvirta, H., 2010: Climate Change and Freight Transport. Publications of the Ministry of Transport and Communications 15/2010. 98 pp. (in Finnish, abstract in English)

[6] Perrels. Adriaan, Himanen, Veli, Lee-Gosselin Martin (2008), Building Blocks for Sustainable Transport – Obstacles, Trends, Solutions, Emerald publishers.