



'S&T International Cooperation Network for Eastern
European and Central Asian Countries-IncoNet EECA' Project
Funded under the EU Seventh Framework Programme

Workshop on 'Sustainable Surface Transport'

Identification of topics of mutual EU – EECA interest in the
field of 'Sustainable Surface Transport' to be considered under FP7
Kyiv, 5-6 October 2009

CONCLUSIONS

The EECA region, situated at the Eastern border of the European Union, includes countries addressed in the European Neighborhood policy, the strategic partnership with the Russian Federation and the Development and Cooperation Instrument. The cooperation between the EU and this unique group of countries is picking up speed based on historical ties and boosted by economic considerations.

The European Union, already acknowledging these complementarities is currently evincing a particular interest in the region and is working actively on an improved EU – EECA relationship through various initiatives and instruments.

Within the spirit of the European Research Area (ERA), innovative and interdisciplinary approaches of mutual EU-EECA interest should be employed to define, prioritize and propose actions to address surface and air transport in the EECA region, and assess its capacity towards sustainability. In addition, the harmonization with EU standards is an urgent need.

The EECA region possesses a strong scientific potential in Transport issues that can contribute significantly to all the objectives of the Thematic Priority "Transport" of the 7th Framework Programme.

At the same time, the EECA region presents a series of specificities that need particular attention since they present a specific mutual interest, in the context of the EU – EECA S&T cooperation in this field. Among these specificities, a group of Experts from EU Member States, Associated countries and from EECA countries highlighted in particular the following:

Title: Sustainability of urban logistics traffic management – measuring the environmental performance

Description

Due to the growing consumer markets in the eastern European countries, the inner city or urban transport flow are constantly increasing. The intensity of traffic flow reduces the capacity of the road network and tends to be a burden to the inner city. Where not possible to avoid these transports, it is necessary to make the transport system sustainable and thus stabilize the traffic flow (e.g. the ability of the system to cope with traffic accidents, car breakdowns, damage to the integrity of the road covering etc.). Especially in dense traffic flows unforeseen incidents can lead to congestion, increased risk of secondary accidents, reduction of traffic safety, loss of time, fuel consumption, and

environmental degradation. The research will measure the vulnerability of the inner city transport systems regarding the impact of unforeseen events and the negative potential of existing bottlenecks to interfere with the unavoidable traffic flows. The possible negative impacts on the performance of the traffic systems and especially the impact to the environment in terms of pollutant emissions, particulate matters, noise etc. will be measured.

Justification

Analyzing the existing methods of reducing the negative impact of traffic on the environment, we can identify the most efficient, capable and expeditious methods of organizing the traffic. Therefore, the investigation of traffic flow behaviour in the "bottlenecks" of the road network and the prediction of the ecological situation in them is very relevant. The study of the effect of operating modes of traffic-light signalization and the delay of traffic flow on the ecological situation in the area of intersection will allow by optimization methods to achieve lower fuel consumption and to reduce the negative impact of traffic on the environment. The result will show the ability of the target region to react flexible to unforeseen events without loss of the necessary performance. Rational organization of traffic will provide an opportunity to spread traffic flows in space and time, and therefore to solve the following problems: a) Economic (fuel economy), b) Environmental (reduced emissions of toxic components of exhaust gases of cars) and c) Social (time saving and safety). The results could be used as benchmarks for best practice in the urban transport management, using the detailed outcomes especially regarding the ecological impacts both in EU and EECA countries.

Title: New modelling method for connecting two or more complex and inherently stable rail transport networks with numerous unstable interfaces in between

Description

The research will be based on modelling transnational passenger and freight rail networks with potential longer period interrupts (i.e. by gauge interchange or other incidents which are outside of the control of rail operators). In a supply chain part, also intermodal transport options will be modelled. The model shall include state-of-the-art modelling and decision taking methods, not yet applied in rail network modelling. The model includes criteria's, like expected CO2 output chosen different means of transport, shortest transport time, and least cost. Optimisation algorithms must be applied at dynamic planning level. The results will serve as basis for static and dynamic planning of rail transport capacity (infrastructure, production means and rolling stock) and for developing appropriate control algorithms for overcoming the instabilities caused.

Justification

At European level the result should be a (first time) model for an arrangement of two or more large networks with disturbances at their interfaces. The large networks could be at national level (i.e. Ukraine vs. East/Southeast Europe, Belarus vs. Central Europe and France vs. Spain), at TEN-network level (TEN-Corridors vs. regional connections) or at regional level with interconnection regions which are causing potentially high friction costs (i.e. Region 1 vs. Region 2). The model can support European rail network planning in general. It also helps with specific bottleneck analysis, if interaction of two large rail networks with high growth potential and numerous disturbing interfaces emerge. This is vital when dynamic regions develop towards a higher share of rail transport for ecological reasons. For participating organisations and states, based on that date, an adaptation of network design to handle higher freight volumes by rails in a more flexible manner could be done based on qualified and quantified results. This date would include the inherent border crossing

problems. For the EECA countries, the financial impact could be determined in terms of rail infrastructure renovation and potential extension, number and capacities of border crossing stations, and erection of rail production facilities (shunting yards, RailCrossDocking stations and container hubs) and logistic centre and efficient intermodal terminal at the right places and the appropriate dimensions.

Title: Sustainable – environmentally friendly and safer asphalt roads using new materials for international transport corridors

Description

There are many techniques and materials which are used in road construction. These are always being improved to be able to have sustainable, safer and environmentally friendly roads together at a reasonable cost. According to the climatic conditions, traffic flow and geographical properties of the countries, the suitable materials and techniques need to be evaluated and chosen. To achieve the complex effect of increasing the durability and energy-efficiency in production and construction it is necessary to assess the above-mentioned effects using the mathematical model of behaviour of road covering taking into account the rheological properties of materials and the influence of the technology and construction on the factors being researched.

Justification

The provision of safety and efficiency of cargo traffic at international transport corridors essentially depends on road covering condition. The practice shows that with heavy duty traffic the damage of the covering happens too fast. It causes gradual deterioration of the covering flatness, the reduction of safety and quality of traffic, the increase of transport expenditures in general and on repairing as well and subsequently traffic jams and ecological deterioration. This is a common problem for the majority of countries and it can be solved using new materials. At the same time new materials can also reduce energy consumption during construction and repair. On the basis of the research documents and instructions for practical use will be drafted.

Title: Rehabilitation strategies for flexible road pavements

Description

A large part of the EECA and EU road networks were constructed between 1960 and 1980 and are now at the end of their expected service life. The financial problems, the inadequate funding of maintenance, the increased performance requirements, the higher demands for reliability and safety and the expected increased load due to climatic change all contribute to the need for research and innovative solutions for the rehabilitation of flexible pavements. There is a need therefore to develop criteria in order to choose from the existing techniques and materials (e.g. HMA, CMA, SWMA, SHMA) for the specific conditions of traffic and climate for required service life and to research the effects of variability in material, traffic, climate, construction quality on reliability in rehabilitation of road pavements.

Justification

The rehabilitation of the road networks in EECA and EU countries has a large financial burden on the road authorities. The research will contribute to a more cost efficient maintenance and the optimisation of durability.

Title: Development of methods and ways of effective use of second generation biofuels in vehicles

Description

The work is aimed at the study of the use of second generation biofuels in vehicles (for instance biogas and biobutanol), the development of methods for evaluating performance of the engine work on alternative fuels under different composition, the identification of effective and ecological characteristics of the vehicle while operating on second generation biofuels, and the formulation of recommendations for the practical use of biofuels in vehicles and draft standards for second generation biofuels.

Justification

Leading EU documents on promoting the use of biofuels or other renewable fuels for transport guide countries to increase the use of alternative fuels (in particular, replacement of 20% of traditional fuels for vehicles to alternative fuels by 2020). These objectives determine the relevance of research and development aimed at diversifying the resource base and the search for effective alternative cleaner fuels. One of the directions allowing, on the one hand, to significantly reduce the amount of harmful substances in exhaust gases of engines, and on the other to reduce consumption of non-renewable hydrocarbon fuels, is to use as a motor fuel second generation biofuels, derived from biomass, and to adapt the engines to run on these fuels. This will be done by using mathematical models of the working process, taking into account the physical and chemical properties of fuels, and conducting experimental research aimed at finding the adjustment parameters, ensuring efficient operation of the engine. In addition, it is important to formulate the requirements for new fuel in the form of a draft standard that defines the basic characteristics of alternative fuels.

Title: Employing state of the art monitoring technologies to develop non-destructive test systems to assess the safety level of rolling stock critical components

Description

Application of high precision on-line monitoring systems requires state of the art technologies for rail transport systems. The aim is to design a real time measurement system to collect data from high speed trains as they travel on the rail track. The collected data should be evaluated to make decisions on the geometry of the track as well as the train itself.

Justification

It is vital to collect data to avoid accidents on the railways from the trains. By collecting proper data, one can always end up with proper maintenance schedules which in turn reduce the life cycle cost of operation. Therefore, it is inevitable to collect reliable data from the train sets as they travel. The results of the research will provide the necessary infrastructure to collect data from the high speed trains.

Title: Heavy Load Rail Wagon with High Volume Container and on-board Facility for Trans-loading

Description

Present rail wagon designs and currently known future developments of container transport rail wagons in Europe show rail standardisation measures, i.e. the UIC profile. The dimensional

restrictions for containers, especially their width and height, are determined by road transport. Hence, when loading containers on a container transport rail wagon, the rail transport capacity in terms of volume per train length is being utilized only to a degree of less than 50%. In terms of loading weight, the relation net to gross for a given train is typically at the level below 1,0. There is a need to determine the highest possible train cross section profile within these given restrictions and to develop a novel rail wagon with integrated easy-to-operate logistics functionality, providing more volume and tonnage per meter of train length, and allowing fast loading and unloading literally without external means in areas with low investment on site. This could be at industrial sidings adjacent to car production sidings, sidings in agricultural production or forestry loading points, and other rural areas which serve as source or drain of containerized high volume or heavy load.

Justification

At present the majority of transports between two distinct areas without the immediate need for road transport per se take place either with single wagon load transport or truck transport. Both transport modes do have their benefits and draw-backs. However, the rail infrastructure is insufficient (below 50%), when containers and rail transport are being applied in a direct rail consignor – consignee relation. The research described aims at enlarging the useable (cross section) capacity as close as possible to 100%. Any increase in capacity utilisation will directly result in cost reduction. An increase in utilisation of approximately 30 to 40% would lead likewise to a transport cost reduction in a similar dimension. In addition, this new way of rail transport has the potential of the most environmentally friendly means of transport for mass goods or similar goods. Comparing the CO₂ level with road transport, a step-reduction of CO₂ emissions per kmto transported may be expected.

The EECA transport demand for exporting agricultural goods over mid and long distances is very large. This fact justifies the development of the new wagons described above. Their new features are not part of the rail system now. The balance will be met with other goods being imported into EECA with comparable volumes. On top, this new wagons could also play an important role for the national rail industries.

The production flow in the forest industry in Nordic countries needs transport of wooden pre- and final products over various distances. One of the proven transport concepts for paper rolls is the “Stora Enso SECU” transport chain from their paper mills in Finland and Sweden to distribution centres in Europe and overseas. It shows how a concept for finished goods transport can be operated as a line with dedicated loading equipment. The proposed research develops this concept further by opening it up for other users as well. Therefore, a big potential for playing a key role in future roadless rail transport can be anticipated.

The specific weight for transporting industrial supply is typically lower than the specific volume/weight of a standardised load unit can bear. A higher volume would help to meet the necessary requirements. This represents one of the objectives of this development, which would support industrial supply strategies in particular.

The transport of air cargo in Europe is presently done to more than 70% by truck based road feeder services. A rail transport process like the one suggested would support strategies of shifting high value goods much easier to rail in comparison to any other solution suggested so far.

Car manufacturing or car assembly plants have theoretically a balanced intake and output volume. This would theoretically provide an excellent chance for rail transport at the plants logistics level. It is suggested to invest into the volumes as well as supply and transport chains associated with and the networks behind. If fitting the demands at both sides, this would allow the operation of both a highly efficient rail based supply and distribution network.