HCT (High Capacity Transports) on Road - Swedish steps toward an efficient transport system

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Abstract
In this paper we describe which steps and measures we are taking to be able to introduce HCT in Sweden. We will describe how we in Sweden manage and collaborate on the issue of HCT-cooperation between industrial groups, agencies, universities and government. Which projects we have started and results from some completed projects. This have placed Sweden in the front of high capacity road transport development in Europe. HCT for us in Sweden is vehicles longer than 25.25 m and/or heavier than 60 ton. Today Swedish legislation allow for trucks up to 25.25 meter and with a maximum total weight of 60 tons on most roads. The Swedish HCT program looks for possibilities to go for lengths up to 32.5 meters and weights up to 90 tons.

Keywords: Heavy vehicles, HCT, implementation, PBS, IAP

1. Introduction

The Swedish transport system is under pressure. It competes for public funding with other public areas such as schools, health care, while it is dominated by four major problems – energy usage, climate change, lack of capacity and health & safety for people, animals and goods. In addition there is a lack of knowledge and different views about in which way the various parts of the transport systems should contribute to overcome these problems.

The transport sector is facing a major challenge to reduce fuel consumption and limit environmental impact, both in relation to carbon dioxide emissions and emissions of regulated emissions (NOx, CO, HC and PM). The transport sector is the only sector of society that has not yet succeeded in finding a potent tool to reverse the trend of increasing carbon emissions and energy use. This is especially true for heavy goods transports on roads. Now we think that we in HCT has found one way to contribute to the reversal of this trend. We have very positive results from some test projects which show very strong reduction of energy usage per tonkm goods transported.

The program aims to increase knowledge and create conditions for the introduction of High Capacity Transport (HCT) on a designated part of the Swedish road network. To do this we need to describe problems, agree on common goals, and possible solutions and to test and demonstrate these solutions together. This includes developing new and different vehicles and vehicle combinations designed for higher capacity than the vehicles of today.

HCT helps to fulfill transport policy and industrial benefits by:

- Increasing accessibility by better utilizing the capacity of existing transportation systems.
- Increasing the return of previous infrastructure investments.
- Reducing the need for new infrastructure investments.
- Increasing transport efficiency and productivity, which boosts economic development
- Increasing the competitiveness of the Swedish automotive and transportation industry as well as for exporting industry.
- Reducing energy usage and carbon emissions
- Reducing emissions of regulated emissions (g / ton*km of NOx, CO, HC, PM)
- Increasing safety for heavy transports.

2. Implementation

A multidisciplinary taskforce with representatives from industry, administration and universities have developed a Research and Innovation program and a common roadmap for HCT on roads, thus creating a framework for future actions and deployment. We have set goals and steps we know are crucial for introduction of HCT in Sweden.

Important steps we need to take is.

- Parallel R&D projects in
    - road safety including literature studies, field tests, simulator studies
    - telematics IAP (Intelligent Access Program), OBM (On Board Mass systems)
    - PBS (Performance Based Specifications)
    - Configuration of vehicles
    - Knowledge of conditions and systemic effects of the progressive introduction of HCT
- Reviewing and adapting the infrastructure
- Developing a new regulatory framework

What has made this possible?

- A strong base of common interests.
- Cooperation between industrial groups, agencies, universities, administration and government in Sweden.
- Cooperation with Australia primarily TCA is very important because Sweden is the first country in Europe to test longer vehicles.
- Research funds from different sources.

With these in mind, the prioritized development needs for the period 2013 - 2017 are summarized in the following work packages. Each work package is coordinated by one or more organizations (in parentheses), but several other organizations are participating in the work packages:

2.1 System Effects (Lund University and Trivector AB)

• Knowledge of conditions and systemic effects of a progressive introduction of HCT;

• Access to relevant data.
• Tax and fee issues.
• Competition amongst modes of transport, transfer of goods from rail to road
• National economy
• The market and the potential for different market segments.
• Pressures on environment and climate.

2.2 Traffic Safety (SAFER Research Center):
• Impact on road safety and the need for compensatory measures. SAFER runs the program, which has been funded by the Swedish Transport Administration.

2.3 Infrastructure (Swedish Transport Administration):
• Define and describe the first HCT-road network and its bearing capacity and capability in the appropriate level of detail (including bridges, rest areas, terminals, etc.). It also includes inventory of rest areas, entrances, etc.
Can we define the parts of the network for different kinds of transports and vehicles?
90 tons / 32 m
74 tons / 32 m
74 ton / 25,25 m
60 tons / 32 m

2.4 Demonstrators (Skogforsk - Forestry Research Institute):
• Support stakeholders in their ambition to test HCT.
• Develop a temporary process for HCT condition at future experiments and demonstrations.
• Develop specific, and prioritize, HCT approach in real transport cases on actual roads. Above all required HCT tested in collaboration with more cargo owners and for more product categories.
• A procedure for mandatory data collection from all the demonstrators need to be established.
• Analysis of results from ongoing demonstrators; energy use, return on investment, etc.

2.5 Vehicles and vehicle combinations (Volvo AB / Scania AB)
• A number of "blueprints" of typical vehicle assembly in the appropriate size and with a delivery profile for appropriate goods.
• Matrix for different combinations related to different industries, commodities and transportation needs.
Volume transports 60-70 tons (general cargo, etc.)
Medium heavy transports 70-80 tons (general cargo, pallet goods, forest transport, containers, etc.)
Heavy transports 80-90 tons (ore and timber haulage)

2.6 Access and Monitoring (Lund University)
• Implement IAP pilot with TCA, Transtech Driven, SwedishTransport Adminstration, Swedish Transport Agency, Sweco, Volvo AB and Scania AB.

• Develop systems for compliance monitoring and sanctions for rule violations (IAP)
• Develop IAP certification, Develop IAP 2.0, Develop Driver Assistance
• Development of new services and access conditions (eg OBM)
• The relationship with the transport exemptions for abnormal transports.
• Relationship with other IT systems in Europe (Tachograph)

2.7 Performance Based Standards / PBS (VTI Research Institute):
• Develop a Swedish PBS system with levels of properties, certification and permanent authorization process of vehicle combinations. A horizontal project for this with representatives from VTI, the Swedish Transport Administration, Swedish Transport Agency, Volvo AB, Scania, and Chalmers.

2.8 Logistics (Northern Lead / CTH)
• Develop logistical HCT systems (including intermodal) for different types of goods primarily for forestry transportation, ore transport, part loads and containers.
• Develop solutions for HCT Last Mile Access.
• What needs to change in the terminal structure of the cargo owners, forwarders, and carriers to take advantage of the potential of HCT, the relation to ports, rail and combined terminals?
• Work Package delivers among other things draft demonstrators.

2.9 A comprehensive regulatory framework (Swedish Transport Agency)
• Most of the work package focuses on proposals for institutional changes and new regulations. These need to be compiled and coordinated into a single proposal for regulatory reform.

2.10 International cooperation and communication (Closer arena for transport efficiency)
• HCT is very much an international phenomenon, where Swedish experience can benefit other players and Sweden has a lot to learn from other countries.
• As HCT exposed more frequently the need for communication increases. A communication plan that considers the different stakeholder groups has to established and executed. We learned from Australia that stakeholder management is the most important key success factor.

2.11 Follow up research (to be taken on)
• HCT program is part of a process that will hopefully lead to an innovation with new benefits - HCT on Swedish roads. How this process unfolds, what obstacles it faces, and how these are overcome can be a knowledgebase for other processes of change. The follow up researcher can also act as a sounding board and support negotiations during the program.

3. Methods

The program develops and uses several methods to achieve desired results. This means that several scientific and practical skills will interact within the program.

• Follow and analyze the international development (including literature studies).
• Surveys and interviews.
• Modelling and statistical analysis.
• Technology and logistics development.
• Future studies and forecasting
• Demonstration and verification of technologies, logistics and marketing solutions.
• Implementation methods.

4. Organization and management

A multidisciplinary group with representatives from Closer, Swedish Transport Administration, Chalmers, Schenker, Vinnova, Swedish Transport Agency, the Forestry Research Institute, University of Lund, Volvo AB and Scania AB has set up the program and a road map for future measures. The program is thus a part of Closer, an arena for transport efficiency at Lindholmens Science Park in Gothenburg. Linked to this group by a MoU with the Swedish Transport Administration is also Transport Certification Australia (TCA). TCA is furthermore an operational partner within the IAP demonstration project (WP 2.6 above) that started 2012.

The main goal for the group is to generate projects, qualify and prioritize them and help find funding for them. Competences and skills in the program group match what is identified as critical for the development of an independent and innovative R & D - industry, government, universities, and innovation and entrepreneurship. New players and stakeholders that will strengthen this competency profile are welcomed to the program group.

The group is led by a chairman from the Swedish Transport Administration, a vice chairman from the industrial partners, and an operational program leader whose mission is to lead and develop the program in the projects and subprojects to content, management and finance. The host operates with Closer as base.
A more loose reference group is built around stakeholders and players in adjacent projects, which are already in progress or started.

5. Funding

Each project or activity within the program must find its own funding, primarily through project stakeholders in-kind contributions in the form of own personnel and money. The main external financers are: Vinnova (Innovation Agency), the Swedish Transport Administration, the Strategic Vehicle Research and Innovation Program (FFI), the automotive and transport industry, and universities through their strategic research money.

The operational activities during the period 2011-2013 to its greatest part funded by the Swedish Transport administration R & I programs together with industrial partners In-Kind funding. A rough estimation of the total funding (including industrial In-Kind) from 2009 up to summer 2014 is well over 15 million Euros.

6. Results

Up to summer of 2014 around 50 new vehicles or vehicle combinations have been tested and demonstrated in around 20 different projects. Most of them within forestry and mining applications, but some projects concerning steel coils and general cargo applications have also been carried out. Energy usage for these combinations has decreased with between 8 and 28 % per tonkm (depending on type of application). There are many applications suggested for new demonstrators. The knowledge of conditions for and effects of HCT in Sweden is gradually increasing. The purpose of the HCT-program was to develop knowledge, vehicles and a regulator system for decision on implementation by 2017. But the encouraging results have led to a governmental task for Swedish Transport Administration and Swedish Transport Agency, to as a first step prepare for implementation of 74 ton/25.25 meter combinations on suitable parts of the Swedish road network, as fast as possible. You can read and hear more about different projects mentioned in this paper in other papers that will be presented at the HVTT-conference.

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