Ladies and Gentlemen,
It is always a moving moment to reach the end of the congress and realize just what a great success it has been. I would like to thank the Andorran organization, the participants, the speakers, the exhibitors; the competitors of snow plow competition, the secretariat-general of the AIPCR, not to mention the Technical Committees of Winter Service, Tunnels and Bridge. I would like to also thank the chairs and co-chairs for presiding over the technical sessions and providing their input to this presentation.

For the technical part of the congress, the choice was to make an early conclusion.

The principal topic of the congress, "To reconcile road safety and durable development with climatic changes and economic crisis" resounds like the report of a need: it is necessary now and it will be necessary more and more to integrate fluctuating parameters to ensure the safety of the users, the fluidity of the traffic and to answer the concerns of durable development.

**Topic 1: Winter viability and climatic change - 3 presentations**
Winter maintenance is directly affected by climate change. In some areas, there is a noticeable general warming affecting snow removal. Moreover, the variations in climate can result in unusually mild or severe winters; both on local and global scales do the weather events deviate from normal. Organizations must respond to these changes

This is the first time that this topic is proposed and only three communications appeared in the program.

However, one can see the concerns related to these problems in many other presentations from other topics.

Let us go first to California where an analysis shows that the foreseeable reduction in snow events related to climatic change should see a reduction in accidents, however, in a smaller proportion than expected because of the accidents caused by rainy events might increase.

Germany proposed a climatological analysis and a simulation of the evolution in three steps until the end of the century (2011-2030, 2031-2050, and 2061-2080) and compared it to the baseline of 1991-2010. They also did projections to estimate the impact on the management of the labor and the changes in needed resources.

Japan proposed an approach to the evolution of the study of accidents according to the evolution of the climate starting from the recent climatology of snow storms and the potential variation over several decades.

These relatively pioneering communications represent a number of interesting methodological cases.
**Topic 2: Cost and benefit of winter viability in a context of constrained budget - 12 presentations**

This is a concern in the short or immediate term, which generated a dozen communications.

The economic crisis affecting many countries requires the adaptation and shrinking of the winter maintenance budgets. It takes a strong economic justification to support the need of winter maintenance with direct and indirect benefits.

Japan and the United Kingdom have posed the question this way.

In the Baltic countries during hard winters we consider a euro invested in VH earn 20 euros to the company

This can be translated as Iceland by a decrease in the level of short-term service and a complete flattening of the organization to optimize it, the idea being less resource back to the original level.

Impacts are training to become more efficient in decision making, they also consider the selection of versatile materials, more fuel efficient equipment, better suited to the situation.

Service levels are reviewed and they sometimes asked users to become true partners, equipping or participating themselves in winter maintenance actions.

Optimization of treatments is part of the range of solutions; to refine strategies, use good products and ultimately spend less, spreading brine is often cited.

It is also necessary to provide the best conditions of roadways; models are emerging and are becoming more efficient.

The question to invest in some hardware arises as the case for road weather stations. A review was made by our German colleagues to get at answers.

The overall balance must obviously take into account accident rates and the associated costs. Korea has conducted an analysis on express roads during winter episodes looking into this. But other factors increase the risk, alcohol, seatbelt use and drivers over 60 years old.

Answers regarding the infrastructure are also available such as the choice of techniques to improve surface friction properties combined with mechanical qualities.

**Topic 3: Extreme events in winter - 13 presentations**

It seems more and more common to face extreme events. During these events the usual organizations are not effective enough.

The concept of extreme event deserves some attention. What constitutes an extreme, harsh, severe, or rare event? A Finnish communication reports on these concepts.
Three difficult winters with heavy snowfall hit the United Kingdom between 2008 and 2011, causing major disruptions in traffic and salt supply. Being faced with adversity can have positive impacts and improve organizations such as the implementation of a crisis management process. This is this feedback that was developed by our British colleagues.

Managing mountain roads and in particular avalanches may lead to the closure of some routes, several examples of management of avalanches have been described and include the case of the E 136 in Norway.

Many countries have been faced in recent years with heavy snowfall that led to the definition of new rules; it is in particular the management of salt supplies that is described in one of the German communications.

The user is often at the forefront and in 2010 one hundred motorists were stuck on the M8 in Scotland. This situation created a new way of organizing traffic information.

Winter is also a source of aggravation for pavement disorders whether surface or structural. Several ways to analyze the situation have been proposed.

Nature is sometimes terrible particularly in conjunction with a volcanic eruption. Argentina presented a case where cleanup was very similar to the difficulties of winter maintenance.

**Topic 4: Management of winter maintenance - 49 presentations**

Many approaches have been developed in the context of this relatively classic theme that are very relevant to the work of the winter maintenance manager.

Climatology is a concern because winters fluctuate significantly. A winter index enables comparisons between winters and Lithuania has proposed work on this subject.

Management of winter maintenance also is concerned with the societal aspects addressing the concerns of sustainable development. For over twenty years Sapporo has given a prominent place to the user and citizens and has created a culture of winter to engage with the public and provide a cost effective and sustainable service.

For its part, the Finnish Road Administration who employs many service providers, developed a real time monitoring system where the public, in particular, can view the information on the Internet.

To manage winter maintenance also requires management of the inventory of deicing materials. The German Federal Research Institute has developed a model to do just such a thing from road weather stations and weather forecasts. France presented a guide on managing changes of material stocks.
Intuitively we think the quality of the tires will play a fundamental role in winter mobility, however, there is little literature on the subject. This motivated a Norwegian team to set up an experiment with heavy vehicles showing that the hardness of rubber and size sculptures were prevailing.

Pedestrians and cyclists are among the concerns of managers, management of sidewalks and bike paths has been discussed in this topic, and Quebec City has made many efforts in this direction.

It seems obvious, but is it really, what the effect of traffic has on the transformation of the snow and ice. Denmark has implemented an experiment that uses a ride simulating traffic to quantify this effect.

Models of varying complexity emerge, they incorporate many data, the history of treatments, traffic, weather data and they are used to make forecasts on surface quality, treatment strategies, etc.

Treatment strategies have been widely developed with presentations on the inclusion of the residual salinity, the use of sensors to support strategies or the choice of the most effective chemical application rates.

Sometimes an accident can lead to define new rules and reorganize information to users. Norway has tested the implementation of such an approach by providing information on speed, wind direction, visibility and enrollment in crossing a pass.

Winter maintenance requires skills and knowledge validation, Norwegian and Swedish governments have put in place procedures for the qualification of personnel as part of a European regulatory framework.

**Topic 5: Operational Approaches, Equipment and Products for the Winter Conditions - 47 presentations**

To qualify the products is always topical; it is a question of determining the performances and harmlessness with respect to the environment starting from studies of laboratory and full-scale tests. France and Lithuania worked on this subject.

More and more interventions are done preventively mostly with brine to reduce the quantities of chemicals and at the same time to enforce traffic safety.

This means they must be spread on the road homogeneously a few grams from a vehicle traveling more up to fifty miles per hour, a difficult exercise.

This motivated the European standardization work. Denmark has trials in exclusive right of way. France has developed tools (Odémie) and methods to control the transverse and longitudinal dispersion.

But it is also the judgment of the operator that can generate drifts, Germany conducted tests to analyze the differential that may exist to enjoy a road weather situation. Efforts to achieve in terms of training are emphasized.
The idea to use coatings with anti-icing properties exists for a long time and did not find a true result. Research continues: Japan, Germany and Andorra and many other countries continue to explore these avenues.

The environment is a major concern, France presented a study on systems to filter chlorides in the basins, and there are also studies on the understanding of how ions migrate into the soil.

Some alternative methods are considered; geothermal energy is utilized as part of snow melting systems. Japanese presentation discussed this along with direct heating of pavements. Germany gave a detailed presentation on the implementation of heating systems of interest and their limits.

The acquisition of data is important. One will note sensors developed in Japan and Spain to measure the residual salinity from driving truck. Many approaches using sensors have been developed to facilitate decision making in real time or to characterize routes or situations (thermal mapping).

A presentation gave a progress report on the uses of data from vehicles, which is a project of Technical Committee 2.4. This contracted with the presentation from Croatia that described data from weather stations being transmitted to vehicles.

**Topic 6: The road user in winter conditions - 10 presentations**

Having information on driving conditions and traffic is essential for the user. Japan presented a dedicated website called "Drive Traffic".

The United States led a review of the formatting of the information to be transmitted to users by changeable message signs. This has resulted in the creation of a guide for operators regarding messages, formats content, frequency of use, etc.

The combination of heavy vehicles, slope and snow often leads to difficulties, however, there is little objective evidence to describe each of these components. Norway conducted a study that shows it is possible to combine different types of silhouettes crossing capabilities.

Victims of accidents on icy or snowy conditions may undertake legal action to seek the manager's responsibility for failing to perform normal maintenance. A French communication gives a progress report on this issue.

To reduce the number of victims on the roads is a major objective in winter and the perception of the road environment can be modified. A UK paper presents the factors that directly influence driver behavior and how best to communicate with road users with restricted publicity budgets.

A paper from Quebec looked at how to cater for cyclists in severe winter weather and despite everything; it is good cycling in Montreal during the winter.

Conclusions:

Thank you all for your attention, I'll turn to my colleagues tunnel and bridge committees.