

## **IRWIN**

### **Improved local winter index to assess maintenance needs and adaption costs in climate change scenarios**

a research project of the  
cross-border funded joint research programme  
**“ENR SRO3 - Road Owners Getting to Grips with Climate Change”**

#### **1) Introduction**

“Road Owners Getting to Grips with Climate Change” is a trans-national joint research programme that was initiated by “ERA-NET ROAD – Coordination and Implementation of Road Research in Europe” (ENR), a Coordination Action in the 6th Framework Programme of the EC. The funding partners of this cross-border funded Joint Research Programme are the National Road Administrations (NRA) of Austria, Denmark, Finland, Germany, Ireland, Netherlands, Norway, Poland, Sweden and United Kingdom.

#### **2) Project Description**

Winter indexes are used in Road Climatology to describe the main characteristics of the climate in an area and relate to the amount of maintenance activity needed. Index calculations can show the severity of winter in a specific area by comparing different climate parameters, or compare the climate between different years or seasons. Objective of IRWIN is to develop an improved winter road index using historical observations from the Road Weather Information System (RWIS) networks in Sweden and Finland. Index can be used as an assessment aid in present-day as well as future climate scenarios.

Project starts with summarising the present state-of-the-art of global climate models, emission and climate scenarios, effects of climate change on the road network, winter indexes, and the key factors and calculation methods in constructing those. A database of possible future road condition scenarios is developed using archived historic RWIS-data, and combining those with widely accepted climate change scenarios. Observations from the Swedish and Finnish RWIS stations will be collected from national Road Administrations from as long time span as has been archived with homogeneous contents and quality. Target is to get 10 years of observations of air and surface road temperature, moisture, wind speed, rainfall amount and precipitation type.

In the next step, the raw archived observational data will be processed into regular interval time series. The Finnish and Swedish data will be reformatted to similar data format. Climate downscaling is performed to establish the climate database. The phase-space method to select the historical analogue days matching the future days will be developed.

The second phase will develop and test a winter index technique to evaluate such things as the spatial variations of winter maintenance needs as well as the cost/benefit of various winter maintenance strategies. With the help of the databases and index calculations, other types of weather related events, such as strong winds, heavy precipitation, flooding, freezing and thawing, can be mapped and assessed. With well-defined interfaces, the new system can be easily adapted to other countries outside the project test areas in Sweden and Finland. Possibilities of using road weather data from other countries will be investigated.

### 3) Expected Results

Project IRWIN will develop a new database for possible future road condition scenarios through combination of historic RWIS-data with widely accepted climate change scenarios. These scenarios will extend to 20-30 years into the future. Target is to collect and process into a database high quality RWIS data from three test areas in Sweden and Finland with differing local climate features.

Using the database and widely accepted climate models and scenarios, the new improved winter index will downscale the large-scale climate variations into local road network scale. Winter maintenance needs and cost/benefit analyses can be thus assessed with better spatial resolution in the present and coming climates.

As the RWIS-data traditionally are used for decision making regarding winter maintenance needs, the combination will lead to a straightforward connection with mapping of the present day situation as well as future needs in relation to scenario calculations. Another great advantage with winter index techniques is that the results can be used for other type of activities and situations that are related to climate. An example of such use is the frequency of situations with heavy precipitation that can be used for evaluating road construction risks, or strong wind situations that can be used for construction dimensioning.

Road owners urgently need improved tools to assess the effects of climate change on road networks, as many decisions on investments in the infrastructure may have implications over decades. A change in the impacts may cause a need to change road structures. Improvements of drainage, erosion control and raising the road surface levels may be needed. Other adaptation and proactive measures are control of design criteria and improvement of current roads to assure the service level. Services for road users may need changes as well, in order to deliver appropriate warnings and other valid information through the most efficient channels.

IRWIN index will provide additional support in these complicated decision making situations. Target user groups of project results are the road owners and administrations in ERA-NET countries and the EU. Results will be presented in transport forums, publications and conferences active in 2009 and 2010.

### 4) Project Facts

**Duration:** 01/11/2008 – 31/12/2009

**Budget:** EUR 258.100,-

**Coordinator:** Pirkko Saarikivi, Foreca Consulting Oy, Finland

e-mail: [pirkko.saarikivi@foreca.com](mailto:pirkko.saarikivi@foreca.com), tel: +358 9 6689 6466

**Partners:** Torbjörn Gustavsson, Klimator AB, Sweden

Dave Rayner, Department of Earth Sciences, University of Gothenburg, Sweden