

METEOROLOGICAL TECHNOLOGIES HELP IMPROVE WINTER ROAD MAINTENANCE

Integration of latest meteorological technologies into the winter road maintenance processes generates significant costs savings along with the improvement safety, security and winter road conditions.



Innovative meteorological technologies were used for the measurement and analyses of weather conditions in Slovakia's capital city Bratislava. The technological solution was designed and developed by the Slovakia based company BARANI. The city of Bratislava was able to reduce its winter maintenance costs by 63% in comparison with the previous winter seasons thanks to the use of these cutting edge technologies and process optimization based on professional meteorological services provided by the BARANI company and resulted in a better services delivered to the public.

High density weather network

The uniqueness and innovative approach of the provided solution lies in its concept and technologies used. It consists of an automated weather station - AWS, data transfer, cloud based data storage and analytical and predictive software. The AWS is a professional measurement device, such as those commonly used by national meteorological institutions. The wind, temperature, humidity measurement precision standards are in accordance to the World Meteorological Organization's - WMO guidelines for professional instruments. For example, the temperature measurement accuracy is within 0.1°C. The uniqueness of the AWS is its construction - a unibody, compact, all-in-one device with a plug & play standard, which requires significantly less installation, operation & maintenance efforts (costs) compared to similar devices. The system is operated wirelessly and powered by solar panels. The data is also transferred wirelessly via an automated interface to cloud based analytical software which manages data collection and data analysis (including weather forecast models) in real time. Data collection is plug and play and starts automatically immediately after single or multiple weather station installation without requiring operator intervention. The AWS is also equipped with other high tech sensors such as optical rain sensor, sky monitoring and cloud coverage analysis (analyzed through an artificial intelligence system) and camera based area monitoring.

The solution is ideal for setting up a dense meteorological network ideally suited for urban (or densely populated) areas such as Bratislava. The system allows multiple station management and big data collection & analysis.

Local public administration office saved up to 72% on year-on-year costs

Every year, public administrations of central and northern parts of Europe spend considerable amount of funds on winter road maintenance. In Slovakia the costs are shared by different public entities. One of them partnered with a private company to build a dense network of stations allowing precise professional weather data collection and analysis which streamlined the road maintenance process.

Slovakia has a large footprint in the global meteorological technology industry. There are a number of companies producing professional meteorological devices and services. One of the very innovative ones is BARANI, with its patented meteorological sensors and solutions.

Jan Hrcka, head of Bratislava's public district Karlova Ves, explains: „The progressive approach of the public administration office and the company BARANI helped open new approaches towards the winter maintenance process. The use of new affordable technologies and software, previously available only to professional national weather services, was of a great help. “

Utilizing BARANI's meteorological solution, the public district was able to leverage from the most accurate and up to date information on local weather conditions. The result was almost unbelievable. In comparison with the previous winter season, the savings reached almost three-quarter of the previous year's costs and far below the long term average.

Higher density of measurements was a big advantage not only for by the pilot project in Karlova Ves. The weather stations covered a relatively small but geographically diverse area with difficult with complex local weather patterns. Despite the close proximity of the stations, differences in weather conditions were quite intense sometimes. For example, the air temperature difference between two weather stations was at one point almost 8 degrees centigrade. These large differences happen in extreme weather events and not only in air temperatures but also in wind speeds and precipitation and result large damages to properties or create significant danger to the population. The precise knowledge of live weather conditions helps to manage risk and enables more effective damage control resulting in large cost savings not only during the winter period.

The winter season 2015/16

A year to year comparison of the costs and benefits of BARANI meteorological services was performed including their impact on road maintenance operations which included thorough evaluation of the winter season accomplishments as compared to previous years. It is clear that the 2015/16 winter season was very similar to the previous years' winters and even colder in some aspects. The average air and soil temperature was lower than for the winter from two years ago. The average snow depth was also 9cm higher, even if it did not reach one tenth of the snow height achieved in season 2014/15. But the number of ice days (air temperature below 0°C for 24 hours) was higher by 5 days than in season 2014/15.

Another weather evaluation for winter season 2015/16 was provided by the Slovakia's most famous meteorologist Peter Jur ovi : "This year's winter season may have seemed to be unusually warm, but not everything is as it looks like. Public, institutions and media should not fall under the illusion that global warming brings less snow and cold days in winter. The truth is that it brings a rise of extreme weather conditions, which appear locally and fast. Therefore, forecasting and analyzing weather for small areas should be strengthened. Better forecast in the future can be provided only with the help of precise and dense local measurements, ideally from each street. “

Figure of chosen average values measured at SHMI Bratislava - Koliba station in the winter maintenance time period (November to April) (Data source: SYNOP reports of international WMO data exchange and finance records of Karlova Ves district)

The future of local meteorology in the context to the climate change

It is not surprising that modern technologies are more and more finding their way into daily use. Their use in various sectors, including meteorology, is an emerging trend. Innovative companies have the potential utilize these trends, which can aid local governments and many other sectors impacted by weather and climate change which include agriculture, energy, transport, tourism, as well as aid and disaster relief.

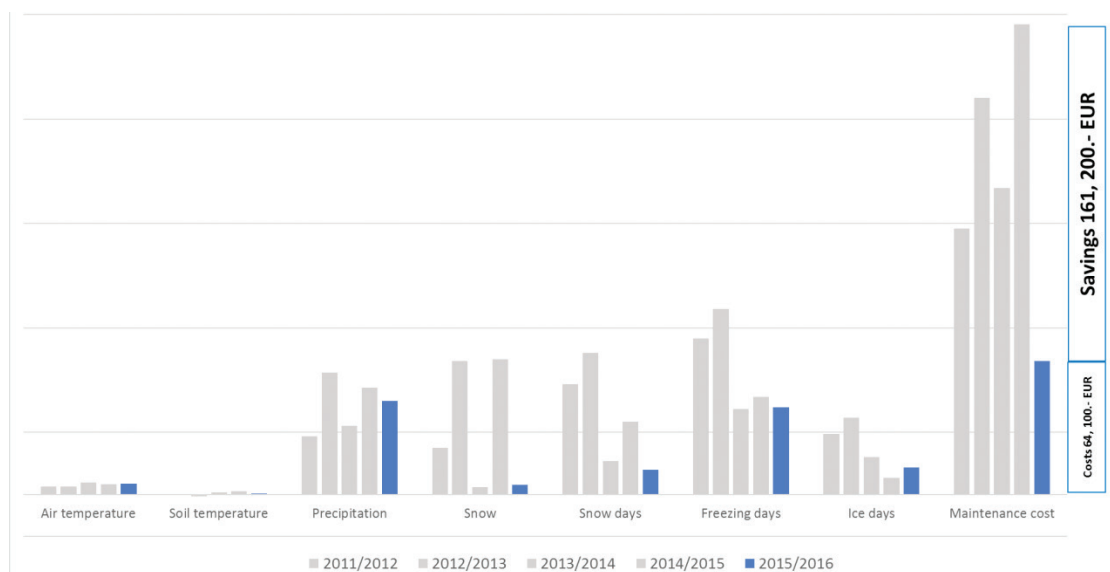


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