

Eco-Melter application in Lahti centre last winter.



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City of Lahti selects environmentally friendly solution for de-icing

A YEAR AGO, LAHTI REPLACED CHLORIDE-BASED DE-ICING AGENTS WITH BIODEGRADABLE ECO-MELTER IN THE CITY CENTRE. EXPERIENCES HAVE BEEN GOOD.

The City of Lahti has formed market-based area-contracts for street maintenance. The contract covering the city centre was signed in 2015 as project management contract. Changing the de-icing agent in the middle of the contract period in the way that the client

truly gets value for money, indicates that the contract form works well. The annual procurement value for street maintenance is 1.7 million euros from the TYL V2, the Joint Venture that provides such services. Before the change, chemical de-icing agents were purchased for about 25,000 euros during the entire winter season. Af-

ter the change, the material costs rose to 250,000 euros per season.

ENVIRONMENTALLY FRIENDLY ALTERNATIVE WAS PLANNED FOR A LONG TIME

Changing over to a more environmental-

ly friendly de-icing agent was debated for many years within the City of Lahti. Change came about during the preparation of the city's strategy in 2017, with "Lahti – a bold green city" providing the necessary impetus. Section 17 of the Environmental Protection Act is clear about the protection of groundwater areas. No substances are permitted into a place, where groundwater that is used as a water supply, may be deteriorated. On the other hand, the Act on street maintenance [Act no. 669 of 1978] obligates that streets must be maintained in a condition that is required for their use. One aspect of the act concerns anti-skid treatment, which in certain conditions requires chemical agents. Therefore, those responsible for street maintenance have had to balance between two pieces of legislation.

Water has always been an important element to the city of Lahti. The Salpausselkä Ridge that runs under Lahti contains a groundwater reservoir used as drinking water by the residents. The groundwater is also used for industrial products both for the domestic market and for exports, and the waterways are an important recreational element in the Päijät-Häme region. The City of Lahti wants to adopt measures that improve water quality.

PLENTY OF RESEARCH INFORMATION ABOUT CHLORIDES AND FORMATS AVAILABLE

When Lahti began using Eco-Melter, it meant replacing chloride-based de-icing agents with a biodegradable alternative. When Lahti seriously began to consider giving up chloride-based materials, they began by studying the relevant literature, as in any research project. The use of chlorides had been studied widely, but to our surprise so had the use of formates. According to studies, chloride is not biodegradable. Once it gets into the soil and subsequently into the groundwater, the quality of groundwater will deteriorate. The groundwater taste will change as its chloride content increases. Its corrosive effect will increase, while its alkalinity and pH will decrease. Water containing chloride that gets into open water is detrimental as it changes the water ecosystem. However, the effects are the opposite to formate. They biodegrade quickly in nature, their biological oxygen consumption is the lowest in comparison to other de-icing agents, and

their use has not been found to have any adverse effects on vegetation.

The price of formates, which is almost ten-fold compared to chlorides, results from the raw material costs and specific manufacturing process. Chlorides are available in the soil, and the amount of resources required to process them is low. Using formates instead of chlorides has economic benefits, but the value of these is difficult to measure or assess in the short term. Having less chlorides in the water, damage to water pipes is reduced. Expensive groundwater protection measures do not have to be built for winter service. Formates are also expected to cause less corrosion than road salt on vehicles and engineering structures.

The chloride concentrations in the groundwater have been monitored for a long time in the centre of Lahti. The latest chloride reading was already 112 mg/l. The target set in the urban service area is to reduce this figure to less than 25 mg/l. To reach it, it has been decided that chloride-based de-icing agents will no longer be used in the city centre.

WINTER MAINTENANCE WAS EXCELLENT DESPITE CHANGE OF DE-ICING AGENT

Formate-based Eco-Melter products were introduced quickly in autumn 2017. This was announced to the public. It was a surprise that a range of problems in the winter season were attributed to the new material, such as making vehicles dirty and causing more damage to permanent markings than normally. Vehicles becoming dirty nevertheless occurred well beyond the Lahti city centre. There is prior research data that when using too soft bitumen, formate can in certain conditions reduce adhesion between bitumen and aggregate. It is nevertheless likely that the reason for cars becoming dirty can be attributed to surfacing work performed during the wet autumn, while the problems with permanent markings were due to the marking processes, not the de-icing agents.

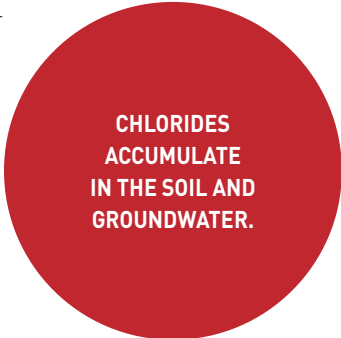
Eco-Melter products are used in the

centre of Lahti for de-icing in the form of liquid and pre-wetted granules. Street dust control and the binding of dust on unpaved roads is done with Eco-Binder, which is Eco-Melter's sister product. Changing the materials has not required any new machinery or equipment, and no problems have been experienced with the new material. The winter season of 2017-2018 was a true challenge for use of these materials. Snowfalls played a major role: the street manager cannot remember a winter during his 10 years of experience when the entire contract area had to be de-iced 30 times. Despite this, winter maintenance was very successful although the de-icing agent was changed. The recipe for success consisted of enthusiastic experts in work planning, excellent support from the material suppliers, and reliable employees in the field. Eco-Melter is used in pretty much the same way as road salt. The only difference is that the granular material requires sufficient wetting before use. This can be done either naturally by using the moisture on the street surface or by pre-wetting it with an Eco-Melter solution.

SURPRISING POSITIVE ADDITIONAL EFFECTS

It became clear already during the first season that the material had surprising positive additional effects. After the material had been applied the streets dried faster and amount of dirt was reduced. Hard snowpack did not occur in practice throughout the winter, and any early creation of such was kept under control by light mechanical means using blades attached to vehicles. The granule size of Eco-Melter is larger than a salt granule, meaning it remains longer on the street surface and therefore has a longer effect than salt. There were situations in which areas treated with Eco-Melter did not have to be re-treated, although re-treatment was necessary where salt was used.

Lahti – a bold green city – will continue to use formates in the city centre and expand their use to all groundwater areas. •



**CHLORIDES
ACCUMULATE
IN THE SOIL AND
GROUNDWATER.**