Snow heap becomes cooling facility in Sundsvall

The snow that falls on streets and squares has to be removed, and snow heaps are often an inconvenience for municipalities. But the snow heaps can also be of benefit. In Sundsvall, Västernorrland County Council now makes use of the cold in snow to save energy.

Increasing amounts of energy are used to produce cooling, and the need is likely to increase with future climate change. The production of cooling is nevertheless a use of energy that is often ignored in discussions on energy issues.

At Sundsvall County Hospital, Västernorrland County Council has transformed three problems into an energy solution, by utilising the cold contained in the snow removed from streets and squares. The solution makes it possible to reduce electricity use to a great extent while polluted street snow is treated before the meltwater is released and before refrigerants with an adverse environmental impact are phased out. The project is a good example of how a “waste” such as snow can be put to use as an energy source and how the cold contained in snow can replace cooling machines. The project was in progress from 1997 and 2008 and has now been made permanent. The project received support from the climate investment programme Klimp during the period 2005–2008.

POSITIVE ENVIRONMENTAL AND ECONOMIC IMPACTS

• Following expansion to a capacity of 70,000 m³, the facility can cope with controlled treatment of a further 30,000 m³ of polluted street snow.
• Emissions of the greenhouse gas HFC-134a have decreased by around 70 tonnes of CO₂ equivalents per year.
• Use of electricity for cooling has decreased by a further 400 MWh per year, which is 90% lower than with conventional cooling machines.
• Carbon dioxide emissions have decreased by 290 tonnes per year.
IMPLEMENTATION

A basin has been created alongside Sundsvall County Hospital that today has the capacity to accommodate up to 70,000 m$^3$ of snow that has been removed from roads and car parks around the hospital and from parts of the city of Sundsvall. With the aid of a heat exchanger, pumps and a system of pipes, the cold in the snow’s meltwater is used to cool the hospital on warm days. Further snow can be produced using snow guns, and when the spring sun becomes intense the mounds of snow are covered with insulating layer of woodchips. This facility has sharply reduced the need for cooling machines in the hospital. This does not just reduce electricity costs but also noise and the risk of leakage of environmentally harmful refrigerants. The snow cooling facility also makes it possible to collect the pollutants contained in the collected snow.

After a running-in and trial phase, good cost-effectiveness has been achieved with the facility. Cooling outputs, quantities of cooling and operating costs are measured continuously, and the facility has attracted interest from elsewhere, resulting in a close media watch and a large number of study visits.

POTENTIAL AND FUTURE BENEFIT

There is a great global need for energy to cool buildings, including in countries in the temperate regions during the summer months. Energy-saving technical system solutions based on naturally available nearby sources of refrigeration, such as seasonally stored snow, offer great potential in many countries.

WHY BEST PRACTICE

The fact that the snow cooling facility in Sundsvall is efficient and cost-effective as well as being an innovative combination of existing techniques means that the solution can serve as a model for similar projects. The project was a unique demonstration project with its large scale and will yield important experience of how the cold contained in snow can be put to use. The technique has been transferred to a similar facility in Japan. The facility has surpassed expectations with regard to energy and environmental aspects. Among other things, it was been possible to largely eliminate refrigerants, and electricity consumption has decreased by more than 90 percent.

Active work has been undertaken in the project to search continuously for new solutions. The facility has been adapted, reconstructed and enhanced throughout the project to make it as efficient and cost-effective as possible.

FOR FURTHER INFORMATION

Contact:
Jan Lindberg,
County Council Staff Unit Property,
Västernorrland County Council,
+46 (0)611-800 00, jan.lindberg1@lvn.se

Contractors/providers:
PEAB built the original facility.
Skanska carried out the conversion and extension work during the project period.

FACTS

Klimp Västernorrland County Council 2004
Action 5
Environmental investment: SEK 14.5m
Grant: SEK 5.1m

For further information on Best Practice:
www.naturvardsverket.se/mir
www.swedishepa.se/bestpractice

The project on the Internet:
www.lvn.se/miljo