

Hovåsskolan

A Mellifiq reference project



Air purification and heat recovery in commercial kitchens

**Saving energy at Hovåsskolan, the
technology behind ozone treatment
with high-performance systems**

MELLIFIQ

Hovåsskolan, Gothenburg, Sweden

The city of Gothenburg has opted to build a brand new kitchen and canteen at the Hovåsskolan school as the old one did not meet the requirements. The objective is to reduce energy use by 50 percent compared to the old kitchen.

Saving energy at Hovåsskolan

“Our goal with Hovåsskolan’s new kitchen is to generate as much energy savings as possible based on our very tough energy requirements,” says Johan Gunnebo, energy expert and project manager. If we achieve this the way we intend to, we can create a new standard based on Hovåsskolan’s energy use. This is why we are going all in here.

“At the same time, it is of vital importance that the kitchen staff be completely on board. That they experience that the kitchen works to their satisfaction. We will not reach this objective without their assistance.

Compliance with the tough energy requirements at Hovåsskolan requires, among other things, a well-functioning ventilation system as well as heat recovery

of extract air from the kitchen. The facility management has installed a heat exchanger with very high efficiency (90-95 percent) along with an ozone treatment system.

“The ozone treatment system is here to guarantee the trouble-free operation of the heat exchanger,” says Johan Gunnebo. “There are several methods for cleaning extract air, but in our opinion, ozone treatment is the most practical one, and we are also sure that it works.”

Ventilation system

The ventilation system has both air intake and exhaust with a heat exchanger for heat recovery. The ventilation system is equipped with ozone treatment provided by a central Ozonetech ozone system.

Facts

Name:	Hovåsskolan
Kitchen’s floor area:	265 m ²
Number of portions per day:	640
Number of production days:	230 days per year
Pellet heating:	0.035 kWh per portion (calculated)
Operation and property power:	0,35 kWh per portion (estimated)
Hot water:	0.03 kWh per portion (estimated)

The problem

Measurements in the project Energy Efficient Commercial Kitchens, co-funded by Belok and the Swedish Energy Agency, indicate that Sweden's municipalities could save almost EUR 60,000 daily if they improved the energy efficiency of their commercial kitchens.

Ventilation stands for a large portion of each commercial kitchen's energy use, a figure that can be reduced through heat recovery of extract air. This is also something the Swedish Energy Agency's Procurement Group for Commercial Buildings, Belok, recommends in its commercial kitchen guidebook. But in order to be

able to recover the heat from a commercial kitchen's extract air, we must first break down the grease in the cooking off-gas. Ozone provides an effective way of breaking down pollutants.

The grease creates other problems too. Grease deposits burn intensely and is hard to put out. The continuous breakdown of grease in extract air reduces the fire hazard and makes your property safer. The Hovåsskolan school in Gothenburg has opted for ozone treatment with a system from Ozonetech.



The ozone meets the greasy extract air right at the kitchen hood and treats it immediately.

One of the toughest environmental and energy requirements in the country

The municipality of Gothenburg City has set high objectives for reducing its climate load. Energy use (primary energy) must be reduced by 14 per cent in residential and commercial buildings and 90 % of the carbon dioxide emissions must be eliminated by 2020 compared to 2009.

“We have one of the toughest energy and environmental requirements with regard to buildings – 45 kWh/m², annually including building services”, says Johan Gunnebo, energy expert and project manager at Gothenburg City. “And we also calculate energy use more strictly than required in the Building Regulations of the Swedish National Board of Housing, Building and Planning (BBR). An extremely tough goal!”

“Buildings can comply, but we see a potential for improvements in commercial energy use.” TO REACH

the goals, the City builds as energy-efficient structures as possible and optimizes heating and ventilation on its properties. But energy-efficient construction is not enough. In addition to having Sweden’s toughest energy requirements for buildings, the City is under way with the development of Sweden’s best system for ensuring that the energy targets are met. It is a package of measures that includes, among other things, early operational optimisation and a completely new energy follow-up system.

“We are working on this at the moment and aim to be ready with it by the middle of 2017”, says Johan Gunnebo. “To be sure we are on the right track we need to implement a number of actions including, for example, making continuous measurements. We have great demands on our energy use!”



Griddles are commonly used for preparing food in commercial kitchens.

The solution

“There used to be lots of on/off functions in commercial kitchens before, which made recovery of the hot and greasy extract air impossible,” says Tobias Bodén, CEO at Andersson & Hultmark. But the project at Hovåsskolan has been dominated by a sustainable way of thinking. “This means, among other things, that we have effected energy optimizations in each kitchen hood individually and have installed a high-efficiency rotating heat exchanger for extract air recovery. But heat recovery here required that we clean the extract air at each hood. We solved this challenge using ozone. The ozone meets the greasy extract air right at the source and immediately eliminates it.”

“If we had instead opted to transport the extract air through the ducts to a central treatment installation, the grease would stick to the inside of the duct, generating a greater fire hazard and higher maintenance costs. By scrubbing the extract air at the kitchen hoods, it is also possible to give the ducts a lower fire classification which then makes it possible to lower the material classification and amount of insulation due to the lower fire risk.

“Ventilation in our new kitchen works in a completely different way compared to the old one. It does not heat so much and it is so quiet! And we feel confident that it’s working. We don’t need to give it a thought or worry that it would just pack in one day. And on top of it, we save energy. It is a win-win situation for everyone!”

Jessica Bäckström, Head Chef at Hovåsskolan, Gothenburg



Jessica Bäckström, Head Chef, Hovåsskolan, Gothenburg

Evaluation

To reduce energy use in commercial kitchens, the Swedish Energy Agency's Procurement Group for Commercial Buildings, Belok, recommends heat recovery of extract air. This, combined with demand-controlled ventilation, makes it possible to strongly reduce the kitchen's energy needs. Hovåsskolan has installed a heat exchanger that recovers 90 to 95 per cent of the thermal energy in the extract air.

Cooking fumes contain grease and odors that accompany the extract air into the extract duct. Without air treatment, the grease is collected in the ducts and on the thin blades of the heat exchanger. To ensure trouble-free operation and high efficiency of the heat exchanger, it is necessary to clean the extract air from grease. Ozone treatment is an efficient and reliable method that is particularly

suitable for tough commercial kitchen environments. All components are located outside the ventilation system, and it is only the ozone that is injected into the dirty air stream. The design minimises the need for maintenance and cleaning.

The task of the ozone is to break down pollutants in the cooking fumes. Ozone is produced by an ozone generator and is then injected into the closed extract duct. When it "collides" with the pollutant, the ozone breaks down the grease in the air, immediately scrubbing it. Translated in chemical terms, this is an oxidation process that results in the generation of water vapors and carbon dioxide as residual products. The thermal energy in the purified extract air can now be recovered in a heat exchanger and fed to the cold supply air.



The ozone detector cuts the production of ozone if a fault occurs.

Clean ducts prevent fire

Grease has just as much energy as diesel oil; it burns easily and is difficult to put out. Preventing fire is therefore an additional important reason for installing ozone treatment. Cleaning the extract ducts from grease reduces both the fire hazard and the need for chimney-sweeping.

Safe use

The ozone is guided in behind the grease filter in the duct and then sucked away by the ventilation. Extract air is only cleaned when the ventilation is operational. A pressure switch on the extract duct detects the negative pressure created when the fan is working, which makes it possible for the ozone treatment to start. If there is no negative pressure, the system will not start.

The ozone treatment is therefore only carried in the closed duct system, and there is never any ozone in the kitchen. We also recommend the installation of an ozone sensor to detect if there is any ozone in the kitchen air. If an error occurs, the ozone production turns off automatically.

The Swedish Work Environment Authority has developed hygienic limit values for ozone in indoor air or, in other words, acceptable average levels. The limit value for eight hours in a workplace is 0.1 ppm* (AFS 2015:7).

About Mellifiq

Mellifiq is a multi-awarded environmental service company group, that has since the early nineties evolved into a world leading system and solution provider with multiple groundbreaking applications for industrial, municipal, and real estate clients. We supply cutting-edge technologies to manage the most sophisticated air, water, and energy challenges.

Mellifiq offers a complete range of air and water treatment technologies and solutions across multiple industries such as processing industry, energy sector, food and beverage, pharmaceutical, wastewater treatment and commercial real estate.

Mellifiq offers strong and renowned brands, such as Ozonotech, Nodora and Water Maid, and world-class engineering services combined an excellent track record of more than 40 years of innovation. We help our clients achieve the most efficient and sustainable solutions while creating the maximum value for their businesses.

With several business units across Europe, Mellifiq is headquartered in Stockholm where research and development, production, QA and certification all take place. Our unique technology and our extensive expertise have made us the Center of Excellence for the world's most complex projects, and a global player with installations on all six continents.

Everyday millions of people rely on our solutions for ventilation, disinfection, sanitation, and odor control. We are committed to raising the bar for the concept of clean and the industry standard for engineering, technical services and general contracting.

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