

A climate neutral palace

In 2006, SFV installed a new district heating unit at the world cultural site, Drottningholm Palace, located outside Stockholm. 23 buildings in the Drottningholm Palace area are now heated by biofuel. The result has been an environmental saving with 90 percent less carbon dioxide emissions and a reduction in heating costs by around SEK 1.5 million annually.

An unusual project in a unique cultural landmark

The National Property Board Sweden manages Drottningholm Palace and adjoining land and buildings on Lovön, west of Stockholm. The majority of the buildings are, just like the palace, government landmarks. In addition, Drottningholm is listed on the Unesco world heritage list of the world's most valuable cultural heritage buildings. All the buildings in the palace area, together with the park, make up a well-preserved Swedish palace environment from the 1600s and 1700s. Drottningholm is a major tourist attraction with over a half million visitors every year. Naturally, this places very special conditions on property management.

"Managing an object like Drottningholm is incredibly exciting and fun, but not always simple," says SFV's property manager, Rolf Karlsson. "The most unique thing about the conversion to biofuel here is the sensitive palace environment and all the accompanying restrictions. In the autumn it looked like certain areas of the palace park were being exposed to serious mole attacks when we were installing the heating conduits," says Rolf with a laugh.

"We made sure we did it during a period when there are not so many visitors here. Today, there are hardly any signs of the digging work visible.

The goal is to completely stop using fuel oil

Heating old buildings costs a great deal of money. Heating an 8,000 square metres palace from the 1600s costs a fortune; and that does not include all the other buildings in the palace area. The largest environmental impact and cost is due to the oil burners. Previously, it took 260 cubic metres of fuel oil annually just to heat the palace. There were also two seawater heat pumps that SFV installed as early as 1986 as a complement. These are still in operation and are integrated with the new district heating system. Energy from the water of Lake Mälaren is limited since it only provides power during the summer months when the water temperature is higher. In addition, the pumps are run by electricity. Today, oil burners only marginally support biofuel burners. The energy from fuel oil constitutes only three percent of the total energy use.

"It is our goal to completely stop using oil," says Rolf Karlsson. "Three percent is not much, but zero is even less. Right now we are looking into possibilities to use bio-oil instead, for example, colza oil. I hope that it can be done. It would feel incredibly good to be totally non-dependent on fossil fuels," says Rolf enthusiastically.

Economising on resources

It is not justifiable to heat all the buildings in the palace area. Many of them remain cold during the winter months, for example, Kina slot (Chinese pavilion). However, certain maintenance heat is required so that the buildings are not damaged. Actually, not all the rooms in the palace are heated during the winter.

“Naturally, the royal family is warm and comfy in their apartments, but the palace has many rooms that are not shown daily. SFV checks the heat in all rooms and halls according to a thoroughly calculated schedule that is governed by showings, etc. So if you come to the palace unannounced in the winter, put on your hat and gloves! That’s what people have done since the palace was built at the end of the 1600s.

The King is engaged in environmental issues

King Carl Gustav has been sincerely committed to nature and environment issues for some time. For example, he is chairman of the Swedish organization of the World Wide Fund for Nature, WWF, since 1988. The King has also been active in the long-term project work of converting to biofuel at Drottningholm.

“It was especially fun that we received the final decision to carry out the conversion just before the King’s 60th birthday since the King was really involved in this,” says Rolf Karlsson.

Climate neutral with biofuel

Biofuel is the catchall phrase for those fuels that come from the plant kingdom, for example, bark, sawdust, wood chips, wood pellets and energy crops. The biofuel burner at Drottningholm is fired today with wood pellets, but is equipped to be able to handle energy crops. The company, Lantmännen, delivers a truckload of pellets every week.

“Naturally, the transport of the pellets has an environmental impact,” says Rolf Karlsson. “Over the long-term, perhaps this can be changed. One of the reasons that we equipped the district heating unit for bio-crops was so that we could utilize local producers. The farmers out here on the islands of Lake Mälaren could provide us with energy crops. That would benefit local producers and avoid long transports of pellets. But there are many viewpoints about how positive it is to burn up grain to heat a palace when a large parts of the earth’s population is starving... we’ll have to see, in any case we are prepared and have the possibility to heat with other biofuels in the future,” says Rolf.

The advantage with biofuels is that they come from renewable energy sources and are available in Sweden. Biofuel is considered climate neutral; in other words, it does not contribute to the greenhouse effect. A living tree absorbs just as much carbon dioxide as is formed from the combustion of biofuel from one tree. With effective flue-gas purification, emissions are minimized and the ash that builds up during combustion can be restored to the forest and give nutrition back to nature. The energy system is life-cycle adapted.

The district heating facility runs like a clock

The district heating facility is placed near the greenhouse in the royal garden beside the palace park. Two silos and a loading dock have been built here in one of the garden's carriage houses. The only thing that people see that deviates from the surrounding environment is the chimney, which is also rather discreet. It does not emit a lot of smoke and also emits no odour, which means that the flue-gas purifier is effective and functions as it should.

"I am very satisfied with the conversion so far," says Rolf. "We have not had any conversion or running-in problems with the new boiler. She purrs like a kitten and everything has worked according to plan."

The biofuel burner is the latest model and looks more like something you would see at a hospital rather than something you'd see in a boiler room. Everything is computerised and high-tech. Here, it is quiet, clean and attractive. The boiler is approximately 900 kilowatts, which is sufficient to provide the 23 buildings that are currently connected to the district heating unit with 90 percent of their heating needs. The heated water is transported from the boiler room near the royal garden to properties through heating conduits that are placed below ground in the area. The properties that are connected to the district heating unit include the palace and adjacent buildings, several buildings on lower Drottningholmsmalmen, buildings near the royal garden, and the Swedish Board of Fisheries' freshwater laboratory down by Mälaren beach.

The red ochre carriage house with loading dock for biofuels blends in well with the garden environment of Drottningholm's royal gardens.

Several of the radiators in the palace are elegantly hidden behind gilt twin doors in the Blue Hall.