Smart Heat Grid

How does it work?

NODA

INTELLIGENT SYSTEMS

What is Noda Intelligent Systems?

Noda Intelligent Systems was founded in 2005 to develop intelligent systems for energy efficiency and system-wide energy optimisation for both energy companies and property owners. **Noda Intelligent Systems** has a background based in internationally renowned research in computer science. Headquartered in NetPort Science Park in Karlshamn, Sweden, **Noda Intelligent Systems** has business partners and customers around Europe, including energy companies, property owners, automation companies and municipalities. The principal owner is the Swedish Sixth AP Fund.

Noda Intelligent Systems develops and provides **Smart Heat Grid Solutions** to optimise district heating systems, and **Smart Heat Building Solutions** to maximise energy efficiency in buildings. With over 1,000 affiliated buildings **Noda Intelligent Systems** is the leader in its field.

The Quiet Revolution – Changing the way we use energy

District heating is moving from strength to strength! With recent changes in production and technology there's a quiet revolution going on in district heating. And as a result Europe now stands poised to create a sustainable energy infrastructure. Now, energy companies and building companies are working together with district heating to help create a more sustainable society.

In Sweden for example, district heating is a vital part of the energy infrastructure with cutting edge technology available in virtually all major commercial and residential properties throughout the country. Although district heating is a mature and established technology, there are nonetheless elements that could be improved and made more efficient for both customers and district heating suppliers.

An important aspect of this on-going advancement is the continually evolving technology that creates an improved synergy between those who generate energy, and those who use it. This is a way of improving district heating efficiency from a system perspective, which directly leads to both economic and environmental benefits.

District Heating in Partnership

Noda Smart Heat Grid is a platform for linking customers and district heating suppliers. By combining traditional engineering with modern IT technology, Noda technology optimizes production strategies, energy efficiency and reduces emissions throughout the entire energy chain for district heating customers.

The system coordinates substation power output and links this with operational production conditions. Normally, district heating is entirely controlled by demand and energy companies can only affect the supply temperature and pressure holding facilities. **Noda Smart Heat Grid** creates a third level of freedom by enabling the operational control of demand in real-time.

Reduction of Peak Load

Most district heating is supplied by base load power sources that are environmentally friendly, but sometimes production has to be increased to meet demand. Peak load is very often fossil fuel based, which is both expensive and environmentally unfriendly. However, **Noda Smart Heat Grid** reduces or completely avoids the need for peak load.

Balancing Load Profiles

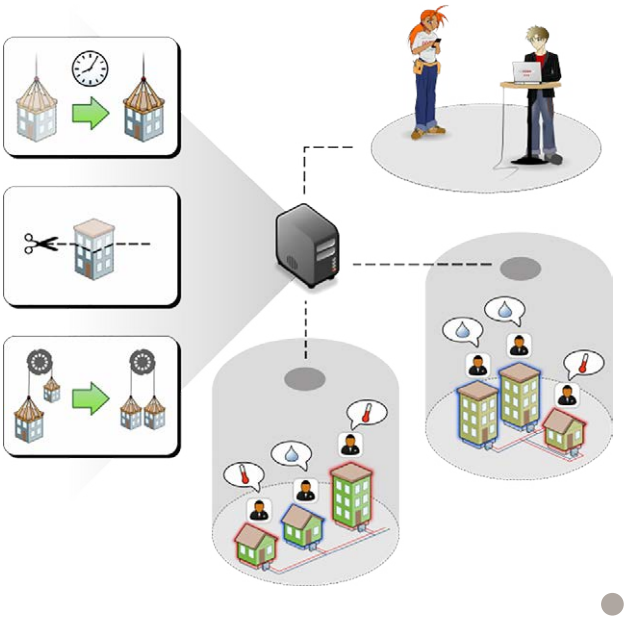
Through the operational controlling of the interaction between production conditions and consumer need we can equalize power demand and lower return temperatures.

Optimised Heat and Power (CHP)

Properties can interact as a virtual hot water tank and match heating requirements with high spot prices.

Platform for Energy Services

Streamline the efficiency of energy use in buildings in order to save money and the environment.



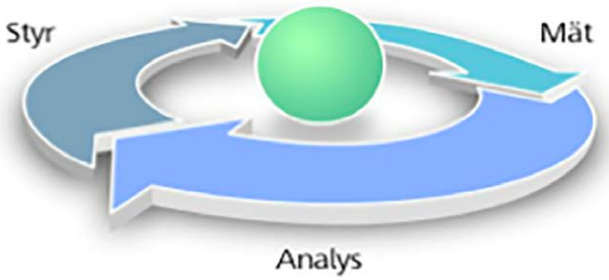
What is an Intelligent System?

Noda Smart Heat Grid is an intelligent system because it has three basic features that make a system intelligent. Firstly it has the capacity to gather input from the environment. This means the system can measure temperatures, pressures and flows as well as dealing with surrounding ambient input such as the weather or production conditions in the district heating network

Secondly, it has the capacity to analyze and evaluate this input. This means **Noda Smart Heat Grid** automatically draws conclusions based on all the surrounding measurements, ambient communication and signals generated by the real world.

And finally, **Noda Smart Heat Grid** has the ability to make decisions and act based on the analysis and evaluation. This means that based on input from the analysis phase, it can control the power output and energy consumption in real time.

Noda Smart Heat Grid merges all three of these steps into an automated and continually updating process based on current conditions of properties, distribution and production. The system analyses and configures all the input data, and then controls the heating system based on the incoming information.



Let it be!

One of the fundamental strengths of **Noda Smart Heat Grid** is its capacity to not only work with existing systems, but to actually make them smarter. District heating substations are connected through a technical platform and coordinated with the operational conditions in both production and distribution.

To make this as easy and cost effective as possible **Noda Intelligent Systems** uses flexible solutions to upgrade the existing systems for communication and data management. Instead of having to install a lot of new hardware, we make use of what is already there. The successful idea has been to utilize cutting edge IT-technology to greatly increase the efficiency of the existing systems.

Everyone knows that building heat storage tanks, replacing distribution pipes in narrow sections or rebuilding entire city areas including new substations is enormously expensive. **Noda Smart Heat Grid** solves the problems that such costly solutions tackle at a fraction of the cost, with a much higher level of practicality.

Win-win

Not only do energy companies benefit from using **Noda Smart Heat Grid**, but building owners also gain several advantages. For example, peak load shedding is when energy companies try to reduce the way electricity is used during times of heavy demand. This basically means the cost of energy is reduced in buildings participating in the system. It might seem strange that energy companies actively try to reduce the amount of energy sold, but the fact is that peak load fuel is normally so expensive that it's not even covered by sales revenues. When you consider the environmental impacts of peak load fuels it's easy to understand why energy companies would prefer to manage peak load energy.

The load control carried out in individual buildings covers a few hours at most each day and never affects the indoor climate. This type of power optimization is made possible because of the thermal inertia of buildings. The strength of the system is in the coordination of multiple properties, creating no noticeable effect in any individual building.

There are several benefits for a building owner to be part of a **Noda Smart Heat Grid**. First and foremost, actual energy savings in individual buildings brought about by operational demand side management. And additionally the system measures and continuously analyzes energy use in buildings, creating a wealth of information and documentation which acts as a huge support in ongoing efforts for greater energy efficiency.

By collaborating within the **Noda Smart Heat Grid** property owners also help to dampen price trends in district heating in the long term, as well as helping to make the technology more environmentally friendly.

References

Noda Smart Heat Grid operates in several places around Sweden as well as actively working with energy companies, automation companies and building owners to create more efficient district heating systems across several European countries. One of the largest plants is operated in collaboration with Karlshamn Energi AB. Karlshamn has one of the largest intelligent district heating networks in the world. **Noda Intelligent Systems** is used by around a hundred of the largest buildings in the network, all continuously collaborating to enhance operational conditions for production and distribution, saving energy for the building owners.

Just north of Karlshamn lies Halda in Svängsta, one of the biggest shopping centres within the Karlshamn district heating system. The premises were originally built to manufacture typewriters, but have now become a development centre with a broad mix of offices, industrial premises and other businesses.

The participating buildings in Karlshamn consist of a broad mix of offices, residential housing and industrial properties. These buildings represent about 50 GWh of a total energy delivery from about 170 GWh over a normal year. Together these buildings are able to manage about 10% of the total heat load, which during colder periods can amount to approximately 60MW.

The district heating network in Karlshamn receives a base load from nearby industrial surplus heat which covers most of its heat demand. However, sometimes different types of peak load are needed, which the **Noda Smart Heat Grid** system now minimizes. A return on investment can be achieved within a few years with **Noda Smart Heat Grid** through the savings from reduced peak load alone.

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