ENERGY EFFICIENCY AND PARTNERSHIP

Energy solutions for the block level – Opportunities in Smart City business environment -seminar 12.9.2019

HELEN

Salmenvaara

DEMAND RESPONSE FOR DISTRICT HEATING AND KIINTEISTÖVAHTI SERVICE

CASE HEKA

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PROJECT DESCRIPTION

- Agreement on cooperation on November 2017
- Collection of data for demand response for district heating analysis initiated on November 2018
- First results on April 2019
- Research is ongoing

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PROJECT DESCRIPTION

OBJECTIVE / RESEARCH QUESTIONS

- What is the demand response potential?
- What is the optimal demand response control sequence for each property in various weather conditions or weather forecast scenarios?
- How do the piloting results correlate with earlier findings?
- What are the differences between
  - targets of various ages
  - targets of various types?

PROJECT DESCRIPTION

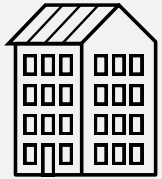
MEANS

- Indoor temperatures are measured with the help of Kiinteistövahti service
- Energy is measured by using new main meters which send data with an accuracy of 2 minutes
- Weather data from the Finnish Meteorological Institute – forecast and measurement data

- Helen determines the demand response commands (a csv file determines the command for each metering point separately)
  - Demand response is only used by reducing power, not by shutting off the heating
  - +/- 1 degree change in indoor temperature is allowed – in reality, the impact has been lower

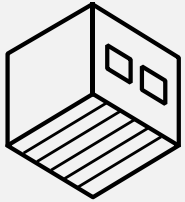
- The collected data has been used to analyse the impact of the demand response command on the other factors and data correlations

PROPERTIES OF HEKA



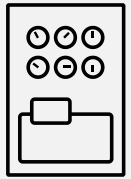
2,300

PROPERTIES



47,500

HOUSING UNITS



700

HEAT DISTRIBUTION CENTRES

EUR 16,000,000

HEATING ENERGY COSTS PER YEAR

EUR 750,000

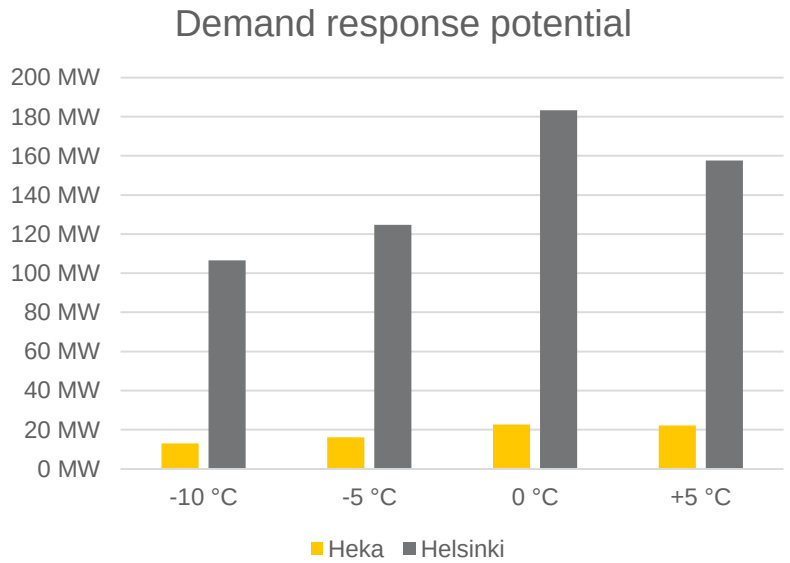
ACCHIEVABLE COST SAVINGS
PER YEAR

DEMAND RESPONSE POTENTIAL IN APARTMENT BLOCKS

- Assumption of fifteen-minute demand response potential
- Result: Demand response potential up to 4 hours

- The demand response potential is as high as 180 Megawatts in Helsinki and it would utilise the energy efficiency of power generation
- However, this utilisability is difficult to implement
- Demand response does not improve the energy efficiency of a property

- The charge and discharge power of the Mustikkamaa cavern heat storage facility is 120 Megawatts



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FURTHER RESEARCH

- Investigation on technical implementation
- Conditions experienced by the residents vs. indoor temperature
- Advantages of continuous control to the properties

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KIINTEISTÖVAHTI SERVICE

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ENERGY EFFICIENCY AND COMFORT OF LIVING

In many apartment blocks, the heating system is unbalanced which causes **uneven conditions**. This is one of the reasons why apartment blocks are often **overheated**. Kiinteistövahti helps to regulate the indoor temperatures to remain at the desired level and also prevents overheating.

Advantages:

- Savings in heating costs
- Optimal and constant conditions for the residents
- Insights on conditions in homes
- Ability to react to issues faster
- Facilitates work of property maintenance staff
- Diminishes environmental impacts of heating

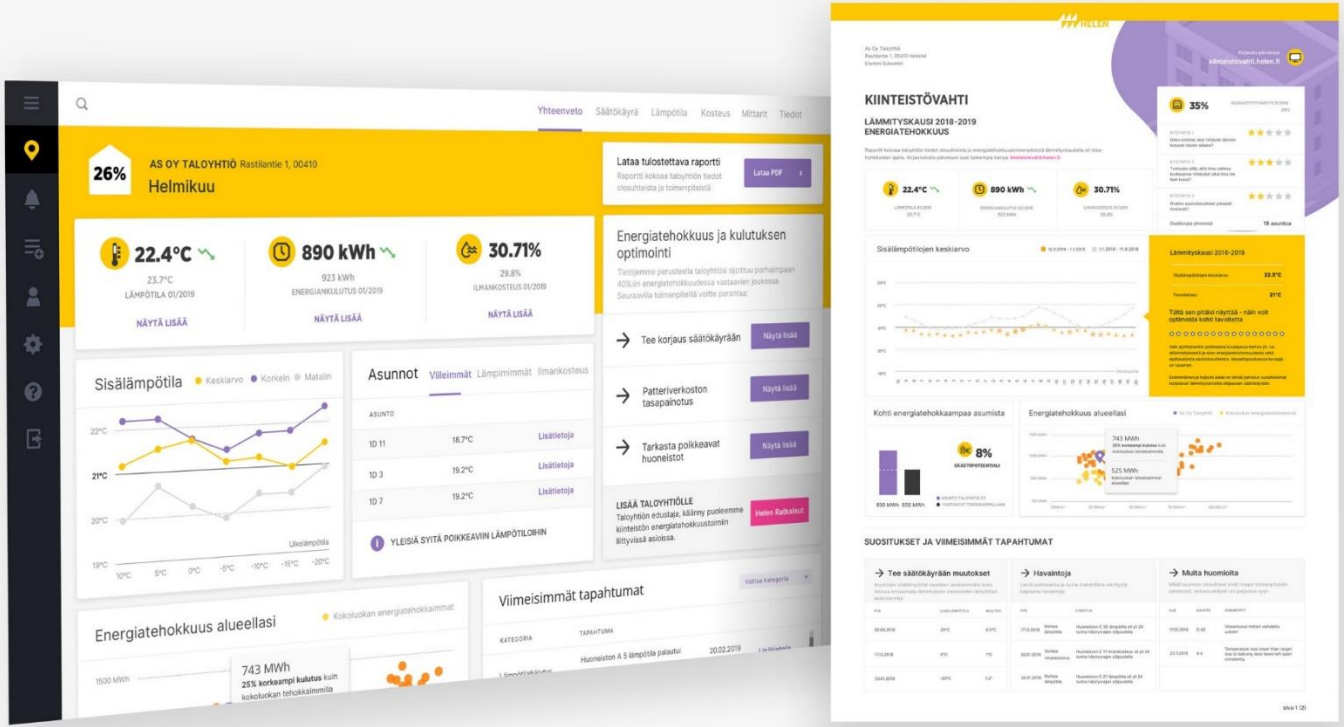
HOW THE SERVICE WORKS

1. Thermometers and moisture meters with a data connection to the service installed in the property.

2. Helen collects, analyses and presents the data gathered automatically from the meters as well as suggests possible further measures.

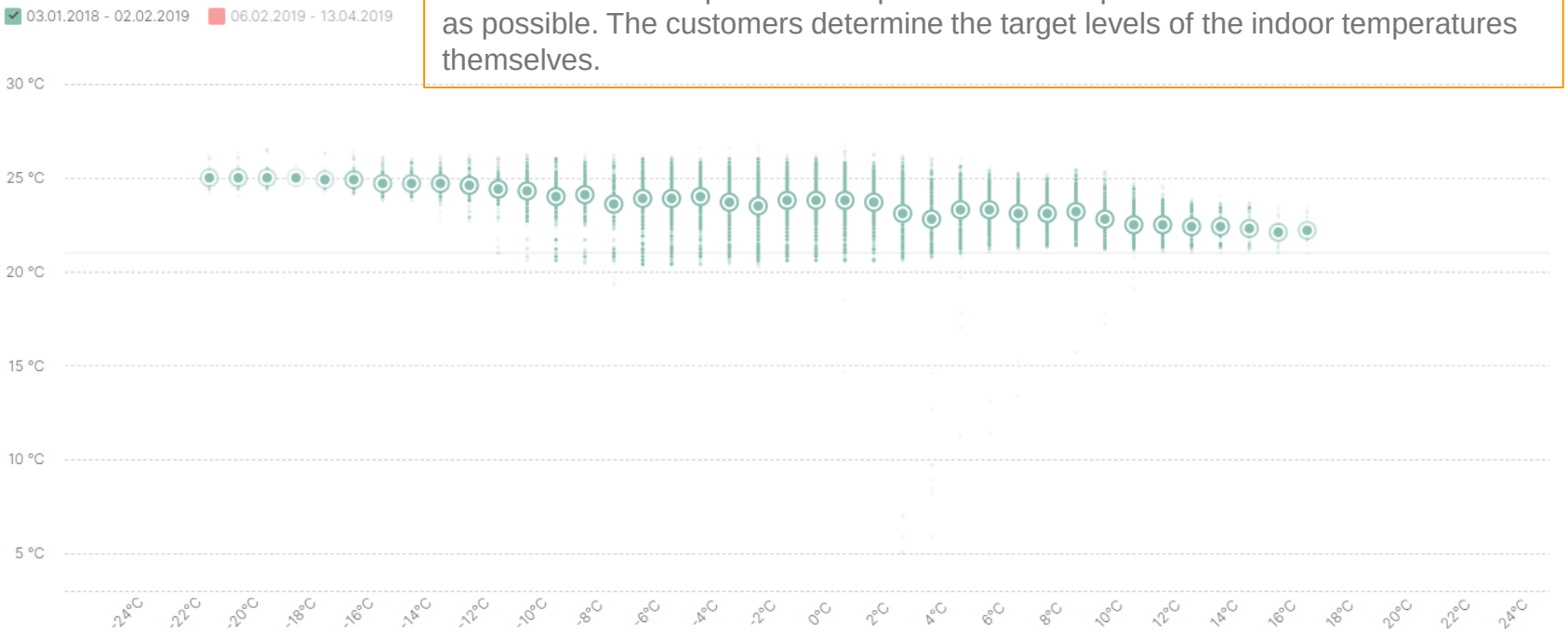
3. Based on the suggestions, the customer carries out energy efficiency measures, monitors the conditions in the property and understand what the issues are.

MONTHLY REPORT



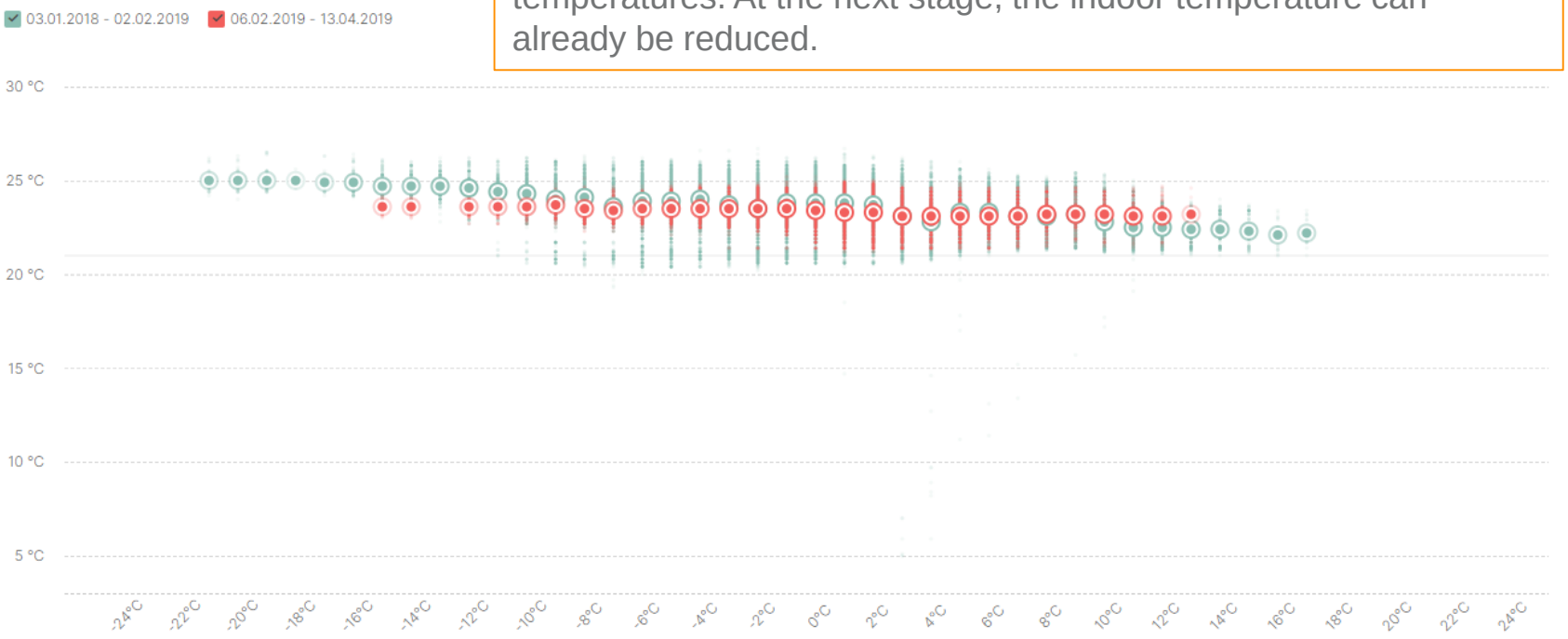
Standard deviation of indoor temperatures

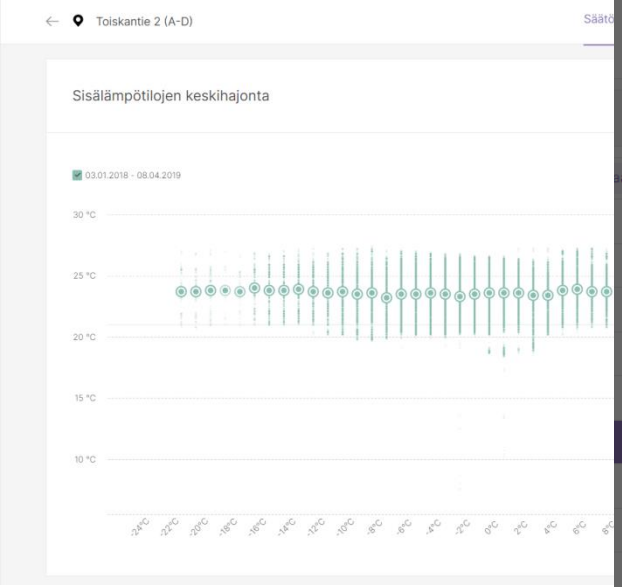
The user interface presents more detailed measurement data on the temperatures and air humidity of the properties.
As for the indoor temperatures, the objective is to maintain as constant conditions in various outdoor temperatures as possible and keep the standard deviation as small as possible. The customers determine the target levels of the indoor temperatures themselves.

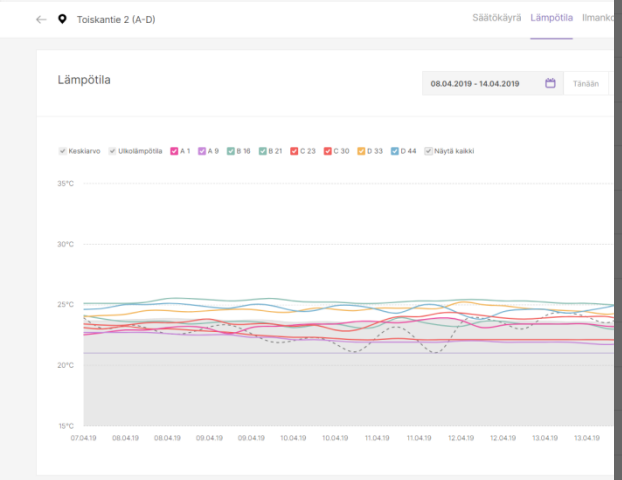


The impact of the measures taken can be shown clearly as graphs in different colours.
In this example, the change has been initiated by regulating the indoor temperatures to be constant in different outdoor temperatures. At the next stage, the indoor temperature can already be reduced.

Standard deviation of indoor temperatures







Kirjaa muutokset säätökäyrään

The service provides clear instructions to property maintenance staff.

Valitse lämpötilojen lukumäärä ja kirjaa säätökäyrään tehdyt muutokset.

Valitse lämpötilojen lukumäärä

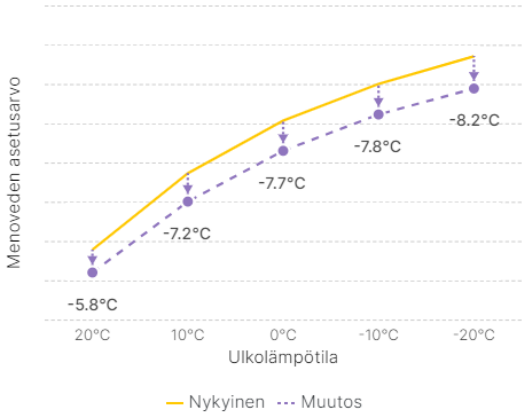
5 lämpötilaa

- 3 lämpötilaa
- ✓ 5 lämpötilaa
- 10 lämpötilaa

		uositus (°C)	
		-5.8	
10	-7.2	-7.2	
0	-7.7	-7.7	
-10	-7.8	-7.8	
-20	-8.2	-8.2	

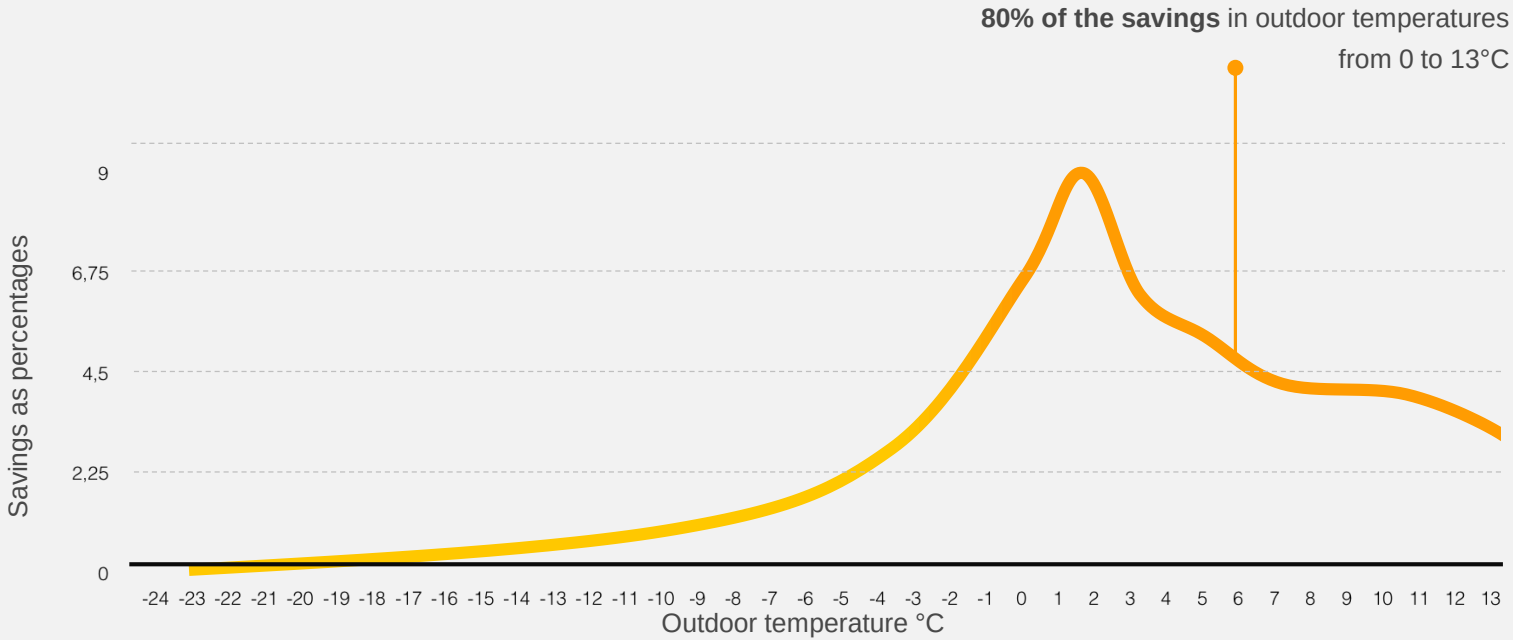
Lisää lämpötila

Muutosten vaikutus säätökäyrään



Tallenna muutokset

HEATING ENERGY SAVINGS APPROX. 5%



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