

Checklist Heat Energy and Heating System

School:

Group (names of all pupils):

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Taker of the minutes:

Tutor of the group:

Dialogue partner:

Date:



Find out how our school is heated! Ask the caretaker or another suitable person to answer the questions with you. You should do the arithmetic problems yourselves. To answer questions 1-3 you should visit the boiler room, if possible.

Answer the questions in sequence! Be considerate when walking through the school! If possible take pictures that are in line with your topic!

1 Survey heating system

Find out how our heating system works and draw a sketch with the plan of our school, possibly on a new sheet! Mark the single heating circuits in different colours.

a) How is heat generated?

b) Where is the heating boiler located?.....

c) How does the heat get from the boiler to the classrooms?.....

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d) What is a heating circuit?.....

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e) Which buildings or parts of buildings are connected to the heating?

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f) Which building or parts of buildings do have an independent heating circuit?

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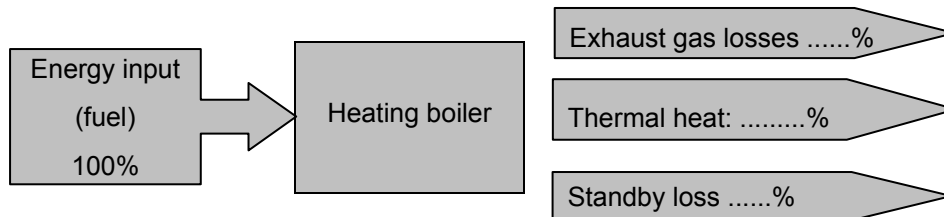
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2 Heating boiler

The heating boiler is the most important part of the heating system. Examine it carefully.

- a) How old is the heating boiler (year of construction)?.....
- b) Make (manufacturer/model).....
- c) Type (for example low temperature boiler, condensing boiler).....
- d) Nominal heat output (in kW).....
- e) Boiler efficiency (%)

Do an energy balance (if possible with your tutor) for the heating boiler according to the following schema:



3 Heating control

The heating system has to work differently in winter than in summer and on a school day differently than on a holiday. Find out how that is controlled automatically.

- a) Have someone explain to you the following terms, and write down the explanations:

Heating control

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Outgoing temperature

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Return temperature

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Heating curve.....

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- b) How does the heating control ensure that each room is heated at the right temperature at just the right moment?

Which time programme is set at the computer of the heating system?

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Which temperatures should be reached in the rooms at what time?
(Please, also take into account nights, weekends and holidays!)

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How is the room temperature regulated (thermostatic valve, room sensor)?

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What is the indicator for the outgoing temperature (for example the outside temperature)?

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How big is the difference between outgoing and return temperature?

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Who is responsible for the updating of the time programme?

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How often is an update done?

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If there is anything else about the control of the heating you can get your hands on, write it down here or take a new sheet.

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4 Responsibility

Ask who is responsible for heating at your school!

- a) Who runs the heating system?
- b) Who handles the heating?
- c) Who decides when and which rooms are heated?
- d) Who installs and maintains the heating system?
- e) Who decides on capital investments?

5 Heat energy

Now summarise your information about heat energy.

- a) What energy source is used for the school?.....
 - b) Which energy meters are used, where are they located and what do they measure?
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Climate detectives: checklist heat energy and heating system p. 4

c) How much heat energy do we consume each year and how much does it cost?
Attention: First write down how the consumption is determined (for example litres of heating oil, cubic metres of gas or kilowatt hours of long-distance heating):

Write down the exact invoicing period (1) and consumption (2) in the following table. If the consumption wasn't taken in kWh, calculate it with the conversion factors mentioned below (3). Enter the cost (4). Calculate the CO₂-emissions (5). Enquire the size of the area that is heated (6). Calculate the consumption per area (7). Enquire how many persons (pupils, Lehrer,...) there are at your school (8). Calculate the consumption per person (9).

	Last year	Two years ago	Three years ago
(1) Period	.....	.....	.....
(2) Consumption	.....	.....	.....
(3) Consumption in kWh	..... kWh	..... kWh	..... kWh
(4) Cost € € €
(5) CO ₂ -emissions	..... kg	..... kg	..... kg
(6) Area heated	..... m ²	..... m ²	..... m ²
(7) Consumption per area	..... kWh/m ²	..... kWh/m ²	..... kWh/m ²
(8) Number of persons	.....	.....	.....
(9) Consumption per person	..... kWh/pers	..... kWh/pers	..... kWh/pers

Conversion heat energy into kWh: heating oil: 10 kWh/l; domestic gas: 10-13 kWh/m³ (please take theexact value from the bill of the energy provider!); liquid gas: 13 kWh/kg; charcoal: 7 kWh/kg; browncoal briquettes: 5,5 kWh/kg; woodchips: 3,2 kWh/kg; wood pellets: 4,9 kWh/kg

CO₂-emissions by heat energy consumption: domestic gas: 0,25 kg/kWh; liquid gas: 0,28 kg/kWh; heating oil: 0,32 kg/kWh; black coal: 0,4 kg/kWh; brown coal: 0,48 kg/kWh; long-distance heating: 0,07-0,15 kg/kWh; woodchips: 0,03 kg/kWh; wood pellets: 0,038 kg/kWh; electricity: 0,616 kg/kWh

d) Were there any changes in the school in the last few years that might have influenced heat energy consumption (particularly different numbers of pupils, other hours when the building was used, any renovations or clean-up operations at the building or the heating system)?

6 Internet research

a) What is a "low energy house"? What is a "passive house"? How much heat energy per area do these kinds of houses need? Use wikipedia for example for this.....

b) How high is the heat energy consumption per area in other schools? Here you could use www.umweltschulen.de/energie/k_heizung.html. Can how can you explain these values?.....

c) Which energy sources are particularly environmentally friendly? Why?

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d) How can heat energy be saved? Use www.umweltschulen.de/energie/sparsamheizen.html for example.

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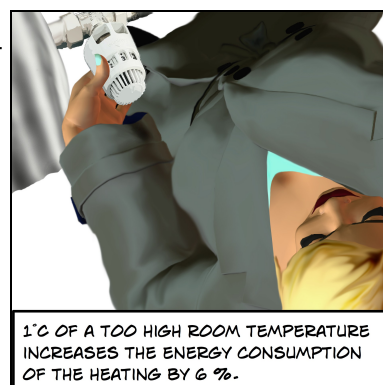
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7 Evaluation and presentation

Please, compare your notes with the group that works on room temperatures and compare your results of question 3 with their measuring results.

If there is a group that is dealing with the school building ask them about their findings.

Now try to evaluate your results: What is good – what is less good about our heating system? Justify your assessment in such a way that teachers and pupils can understand it!



It is good...

It is less good...

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Discuss what we could do better! Justify your suggestions!

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Think about how you would like to present your results to other pupils and teachers!

Design a flyer, with the group for room temperatures for example, in which you publish the best energy-saving tips for your fellow students, teachers and parents or develop a quiz on the topic of heat energy. You can also prepare a paper; think carefully about whom you want to address and what you want to achieve.

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Now get ready to present your results!

