**Theory (Station 4 and 5):
Why is it important to save heat? (Maximilian)**

CO2-Emissions by heating

Since nobody wans to freeze, we have to heat. However, this pollutes the climate, because the combustion of fossil fuels follows in CO2-Emissions. There are differences with which energy source (district heating, gas or oil) is heated and with which efficiency it works.

Nowadays schools are heated by mostly gas or oil powering heating boilers. Some schools are even using wood. This is also the most eco-friendly way of heating, because during the growth of a tree, it´s saving CO2. These heating boilers are easy to use too. Normally the boiler is taking the chopped wood automatically, so there is no need for a person who´s  throwing  wood chips into the boiler.

For conventional heating systems, district heating is the best option for climate protection. Here, heat and electricity are generated with high effiency by burning fuels (mostly gas), this also leads into a low loss of heat (so-called „waste heat“). This is a big advantage in comparison to casual power plants, since the waste heat could be used as district heat. The next best option is a modern condensing boiler. In the gas contained energy is used there the most productive.

Principally, you shouldn`t turn off radiators at night, because if you do so, it will becold in the morning and the heating radiators will have to use more energy to make it warmer. Instead of doing this, you could just reduce the heat a little bit in the night (20 degrees day – 16 degrees night). This is called „night setback“. This ist he job oft he heating control. The times set there should be aligned with the timetable, so that the rooms are only fully heated when used.

1. Through the introduction of „class energy comissioners“ (or however you wanna call them):

They are responsible for the ventilation, heating, lighting and for ensuring an efficient energy supply.

1. By choosing the right room temperature:

The temperature in an usual classroom should be around 20 degrees. If you set 3 at the thermostat , it will be the same temperature.

If only the janitor has the permission for the thermostatic ventile, please say if it´s too cold or hot in your classroom.

In hallways a temperature of 12-15 degrees is enough. You can check the temperatures with thermometer.

1. Through proper ventilation. The magic word is „shock-ventilation“:
* Turn all thermostatic ventiles down
* All windows and doors wide open
* Ventilate till all the air has been exchanged
* Close the doors and windows
* Turn the thermostatic ventile back up (3)

If the ventiles aren`t usable, put on a styrofoam cap or something else that prevents air from touching the ventile. For a high efficiency radiators should be free accessible and should not be blocked by any furniture.

1. In order to prevent heat to be absorbed by walls and being reflected back into the room, you should put behind the radiator something to reflect the heat (aluminium foil).
2. Are the seals on the window already broken?
3. Ist the main entrance door closing properly?

1. Heat is used for heating the insides of a building, boiling water and for various processes.
2. In general, schools are using heating boilers powered by gas or oil, or district heating.

In order to generate one kilowatt-hour of heat, you have to burn two kilowatt-hours worth of burning fuel (efficiency: 50%-100%). Losses occur in the form of waste heat.

1. The heat is distributed by a closed pipe system, in which hot water is circulating.

In the boiler, heating water is heated, it is pumped by the heating pumps to the radiators, where it cools down by giving off the heat to the room, and then flows cooled back to the boiler, where the cycle starts again.

1. 1 kilowatt hour of energy is in a champagne glass, or  0.1 liter of oil or around 200 grams of wood.
2. With one kilowatt-hour of heating energy, you can…
3. heat a house (heating capacity 20kW) for 3 minutes in a cold winter month.
4. heat a huge school for a few seconds
5. One kilowatt-hour of heating energy (gas or oil) coasts 5-7 cents.

1. The door should be closed, even if nobody`s using the classroom.
2. Lowering the exterior blinds overnight during the heating season. The blinds and the air layer enclosed between them and the wall form an additional insulation.
3. Let the janitor explain the regulation of your heating system and discuss with him about eco-friendly saving options. (There are almost always some, even if your janitor is already good.) Good keywords are the thermal insulation oft he valves, the night reduction, the step switching oft he pumps, the operating times oft he hot water circulation or the so-called „heating curve“.
4. If the school also includes a sports hall or gym, where it is showered, some oft he warm water can be generated by a solarheating system installed on the roof. The sun provides the heat for free.

By theway: Around 80% of heating energy is consumed in the coldest five months (November-March). If you are especially vigliant during this time,you can take it easy for the rest of the year.