

Checklist Electric Lighting

School:.....

Group (names of all pupils):.....

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Taker of the minutes:

Tutor of the group (name, position):.....

Dialogue partner (name, position):.....

Date:



Find out if we light our in an energy-saving way! Ask the caretaker or another suitable person to answer the questions with you. You should solve the arithmetic problems yourselves.

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

1 Lamps as electricity guzzlers

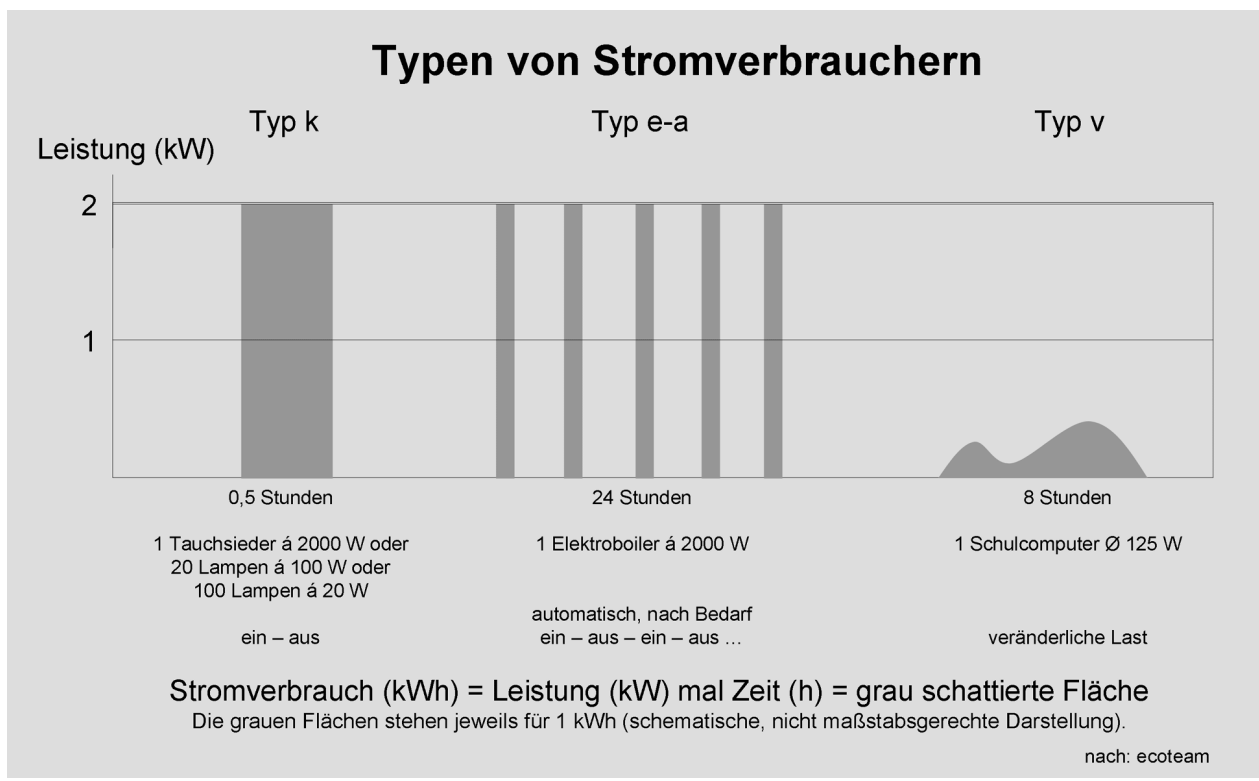
Often the “consumption of electricity“ (electrical work) isn’t easy to determine.

a) Think about the difficulties of determining the consumption of electricity with the help of the illustration.

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- b) Most lamps belong to the simple energy-consumers types k. Why is it still not easy to determine the consumption of electricity for the lighting of the whole school?

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2 Examination of the lamps

Find out how many lamps there are in our school! List all rooms and all lamps! If necessary do more checklists.

Take a classroom that is ordinarily equipped. Now look at a typical lamp, a ceiling light for example, which is equipped with one or two neon tubes.

- a) First you identify the **electric power** of this single lamp. Keep in mind that neon tubes always need so called control gears that also use energy. Normally you find the output data on the devices themselves. If necessary you remove a neon tube and a control gear together with the caretaker or your tutor to read the data. Then calculate the electric power of the whole lamp and all its components.

Now count the **sum of the electric power** of all lamps in the room.

If there are more rooms that are illuminated in the same way (same type and number of lamps), you could transfer the results of the first room to these rooms.

If there are any rooms with other lamps or a different number of lamps examine these as thoroughly as described above.

- b) Calculate the **sum of the electric power** of the entire school.
- c) Then estimate the **running time** of the lighting. First estimate the running time per day and multiply this by the number of operating days per year. For example the lights are used 3 hours per day in the classrooms on 200 days a year: this is a total of 600 operating hours per year. Of course this differs depending of the season, in winter the lights are running longer than in summer.
- d) Multiply the running time (hours per year) by the sum of the electric power (kW); thus you get the **yearly electricity consumption** (kWh per year) for the lighting.

If parts of the school are illuminated at other times than the classrooms (like the gym) do a separate checklist for them and identify the electricity consumption in kWh per year separately (steps a-d, see above).

This also applies to night and emergency lights of the school, for example, the outside lights at the school building usually run 10 hours each night – 365 days a year; which means they are running 3.650 hours a year.

Examination report lighting

In the column "remarks" you can use the following abbreviations:

- (1) lamp cannot be switched on/off separately (for example only *one* switch for the *whole* classroom),
- (2) lamp dirty, (3) no reflectors that direct the light to where it is needed, (4) lamps faulty (doesn't shine or flickers), (5) more lamps than necessary, (6) light of the lamps blinds, (7) light of the lamps insufficient, (8) lamps are running unnecessarily.

a) Room no. / name	Number of lamps	Electric power per lamp (W)	Total electric power (W)	Remarks
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b) Sum (in W)
 Sum (in kW)

c) Running time (estimated value) in hours per day
 Operating days per year
 Running time in hours per year

d) Electricity consumption in kWh per year

e) Ask the caretaker what is already done at our school to keep electricity consumption for lighting as low as possible.

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3 Electric connection power

The more and the stronger the lamps the more energy is used for each running hour.

- a) Choose three of the rooms examined in question 2. Enter the total electric power that you found into the following list. Measure these rooms, write down length and width. Calculate the area and eventually calculate the electric power of a lamp per area (the electric connection power).

Room no. / name	Total electric power (W)	Length (m)	Width (m)	Area (m ²)	Electric power per area (W/m ²)
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- b) Evaluate the electric connection power of the three rooms!

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4 Research

Get information on how one can reduce the consumption of electricity of lighting! Use the internet – for example www.umweltschulen.de/energie/beleuchtung.html – or other information material that are available and ask the tutor of your group.

Write down the results of your research in headwords here and also mention the internet site where you found the information.

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5 Evaluation and presentation

As soon as you've arrived at this point, present your results to your teacher or tutor.

Now start with the evaluation:

- a) Ask the group that did electricity consumption about the annual electricity consumption of our school. Then calculate the percentage of lighting (in %).

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b) Then compare the situation in our school with the possibilities for energy-saving lighting that you have researched.

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Now summarise your findings about electricity consumption of lighting in our school. Justify your assessment in such a way that teachers and pupils understand it!

It is good...

It is not 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 an “energy savings book“, which you hand over to your headmaster or the caretaker and ask him to enter all those kilowatt-hours that are saved in the future. The energy savings book should be clearly laid out and easy to handle and should include short and simple explanations on energy-saving and on how to use the book.

Or design an “energy savings comic“, in which you work on the results of your examinations and suggestions. Here it is not so important to give technical details – rather see that you are striking and humorous in your message!

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Now get ready to present your results!

