Administrative Procedure for students, teachers, and school staff

ENERGY: WHAT IS IT?

For our society, energy is an indispensable commodity.

Any form of human activity from the simplest to the most complex requires energy. One could give endless examples of its use.

For example, we use energy to light our cities, operate some of the means of transportation such as trains and recently cars, heat and/or cool our homes, store food in the refrigerator, and run our computers, televisions, and smartphones. Most of the devices we use every day run on the energy we supply to them by plugging them into an electrical outlet or plugging in batteries. but energy use does not stop there : most industrial and/or business activities require basically electrical or thermal energy : examples of energy-intensive activities can be the ceramics industry, mechanical engineering, steel (arc furnaces), fine chemicals, etc.

Defining energy is a task mainly assigned to physics.

It manifests itself in many different forms in nature, and we can only see it when it changes from one form to another, thanks to the technologies that humans have developed to use it.

For example, if we look at the light emitted by a light bulb, it is light energy; if we touch it and feel that it is hot, it is heat energy; when we watch a machine move, it is mechanical energy, and so on. The various forms of energy can be usefully converted from one to the other with varying efficiency losses.

ENERGY: WHERE CAN WE FIND IT?

Energy can be found everywhere, but what man is able to use is, at present, only a small part and that is energy from so-called primary sources.

Primary sources are those that we can use as they are and can be referred to as: fossil or non-renewable primary sources : coal, oil, natural gas, nuclear fuels and in renewable sources such as sun, wind, tides, water from lakes and mountain rivers and geothermal.

With appropriate technologies, man has learned how to use them and turn them into secondary energy sources, such as gasoline, which comes from processing crude oil, and electricity, obtained in thermoelectric, hydroelectric, wind, and nuclear power plants.

WE USE TOO MUCH ENERGY

To meet our energy needs worldwide, we consume three times more fossil fuels each year than we can extract. And in the coming years, energy consumption will continue to increase, because the world's population continues to grow, and because people in developing countries will improve their living conditions, and consequently increase their energy consumption.

ENERGY AND FOSSIL FUELS: LOW AVAILABILITY, HIGH POLLUTION

Fossil fuels are available in limited quantities:

Despite the discovery of new deposits and the development of innovative technologies that allow fuels to be extracted at ever greater depths, fossil fuels are bound to run out. At current rates of extraction, we have enough fossil fuels to produce energy for the next 50 to 100 years.

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Fossil fuels pollute the environment:

To produce electricity, fossil fuels are burned in thermal power plants, automobile engines, industrial plants and heating plants, releasing polluting gases into the atmosphere, such as carbon dioxide, nitrogen and sulphur oxides. These gases are mainly responsible for the increase in the greenhouse effect of the planet, which leads to a rise in temperature, and acid rain that damages the environment and our health.

ENERGY – FOSSIL FUELS – ENVIREMENT: WHAT CAN WE DO?

To protect the environment from the pollution caused by the overuse of fossil fuels, and at the same time avert the risk of depleting reservoirs and with them the end of the availability of much of the energy we use today, we must act on several fronts.

* Use of renewable energy: this is certainly the goal to be pursued most using solar, concentrated solar wind and secondary biomass.

* Energy efficiency: great efforts to spread a new culture that is more environmentally aware of the rational use of energy.

Ultimately, we need to reduce waste and increase energy efficiency.

GROWING SMART ENERGY USERS AT SCHOOLS

Building users may play important role in improving energy management in their buildings, when encouraged and motivated properly. By changing their everyday behaviors and practices, e.g. by making sure that all unnecessary lights are off or that rooms are aired properly, they can contribute to significant energy and financial savings. Combining this with organizational changes introduced by building managers (but sometimes also by the users themselves), like rearranging the rooms or modifying the work schedule, these savings can come up to even 15% or even 20% of the initial energy consumption.

All this is especially relevant for **schools,** where there are many "permanent" users, including teachers, pupils and staff. Their combined efforts can bring results that may be difficult to achieve in other types of buildings.

As previously mentioned, **school community** includes different types of users: pupils of different age groups, teachers, principal and non-teaching staff. Some schools are also renting their premises to external customers - like sports clubs or interest circles - in the afternoons and over the weekends. All these people have to be addressed and involved in energy-saving efforts if the school really wants to reduce its energy consumption and improve energy management practices.

Of course, each group has different sources of motivation and capacities to act, which should be taken into consideration when planning communication activities and activation methods. Natural leaders of the **school's energy transition** will be the pupils and the teachers, supported by the janitor, principal and representative of the municipality

Pupils: they spend at school significant part of their day, not only raising knowledge of different subjects but also learning proper everyday behaviors, including taking care of surrounding environment and using its resources reasonably. Adding to that pupils' natural curiosity and willingness to engage in interesting activities and initiatives, they can become real leaders of energy saving efforts. However, this will require

not only raising their energy awareness but also giving them possibilities and tools to act, e.g. by assigning them roles of energy researchers, authors of energy saving measures, implementers and multipliers,

Teachers: they support the pupils in their energy quest, helping to discover how and where energy is used, where does it come from and how it can be saved with simple measures. They can introduce various energy-related topics and tasks both during regular classes (e.g. natural sciences, mathematics, languages, arts) and during additional meetings with pupils (e.g. meetings of school environmental clubs).

Janitor: has very important role to play in reducing school's energy consumption, although this role is not always adequately appreciated. Since he (or she) knows everything about the school building and its relevant systems, he can help other users involved in the process, e.g. pupils and teachers, to understand better its technical state and energy situation. He can also implement many energy saving measures, e.g. conducting necessary reparations (like fixing leaking taps and toilets), sealing windows, placing silver foil behind the radiators or rearranging the rooms to make better use of natural light.

Efficent Energy Management

Efficient energy management requires an energy manager or an energy management team that wouldhave adequate skills and capacities to analyse and improve building's energy situation. This is the case in all types of buildings, including schools. However, schools are also unique since one of the main user groups are the pupils, who - despite their young age - should be involved in energy management and optimization processes for the two equally important reasons. Firstly, because they have significant potential to influence school's energy consumption and second, because they are there to learn proper behaviors.

This should be taken into consideration when planning energy management structures at school.

Three basic options are possible, with the third one associated with the highest energy saving potential but also most difficult to implement:

- Appointing energy manager
- Establishing energy team
- Appointing energy manager and energy team

Of these options, the relative one is of particular importance i.e. Establishing energy team.

Establishment of an energy team that would gather representatives of different groups of users and would be responsible for analyzing and improving building's energy situation. *In case of schools*, the team would operate on a bit different term than in case of other types of public buildings as it needs to involve pupils, who are one of the primary group of users.

- Ideally the team should be composed of a group of pupils (from one class or different

classes), few teachers and a janitor, who could show the pupils around the building, explain how it operates and help in implementation of energy saving measures.

- Number of pupils and teachers in the team will depend on the size of the school and organization of the team's work. The team should be big enough to ensure successful implementation of all tasks but not too big to enable regular meetings and efficient communication and collaboration.

  The team's task will be to analyze and discuss energy situation of the school (where, how and how much energy is used, how much does it cost?), come up with an energy saving plan (how energy consumption can be reduced? who should be involved?), implement all planned measures and organize widespread communication campaign addressed to the rest of the school community and aiming to engage them in energy saving efforts. In warmer months, the team can also work on other environmental aspects as water saving or waste management.

- Relevant topics can be introduced both during team meetings and during regular classes, which would allow to raise energy awareness of also other pupils.
- The team should meet at least twice a month to discuss and analyze results of up-to-date activities and plan next steps. Majority of work should be done during school's regular working hours, as this is when it is possible to follow and improve most of the consumption patterns.
- Energy team's work can be organized in annual cycles (analysis-planning-implementation-monitoring) with energy and financial savings calculated and announced after each year.
- It is best if the team is composed of the pupils of different ages. Then, when the older pupils leave school, younger members of the team stay and share their knowledge and experience with the newcomers ensuring continuation of the process.

To keep the team motivated and eager to undertake further energy saving efforts, it is important to give them feedback about the results achieved so far. At least once a year energy and financial savings obtained should be calculated and communicated to the team members and other building users. If the school has smart metering system, such feedbacks should be given more regularly.

Involvement and education of users in school

There are different methods for involving building users in energy management processes and changing their behaviours.
In each case, the process should start with adequate information and education to give context and theoretical background to practical activities.
Preparation - each successful activity starts with careful preparation. It is the same with users' involvement initiatives, which should be based on:

- Decision on the intended outcomes of the process and priorities that we want to achieve.
- Identification of main users' groups and analysis of their characteristics (what do they already know? what motivates them? what changes in behavior and everyday practices they can introduce?).
- Decision on methods and tools for communicating with different groups of users.
- Decision on methods and tools for engaging different groups of users in energy-saving efforts.
- Decision on monitoring and follow-up procedures.
- Development of detailed engagement plan.

Information - all users should be adequately informed about school's efforts to improve its energy management and about the background of these activities (e.g. participation in the TOGETHER project). They should learn what school's objectives are, why it is important to save energy, what benefits can be gained and how they can contribute to the achievement of these goals and benefits. is important is to keep communicating and giving feedback on the actions throughout the process.

Education - information activities should be followed by educational ones. Building users should learn more about energy, the ways it is generated and consumed and possibilities of reducing its consumption. This knowledge transfer should be more extensive in case of pupils than in case of other building users as it should contribute both to the environmental and overall educational objectives.
In case of pupils, the topics discussed should include:

- Forms of energy.
- Generation and distribution of energy.
- Using energy in everyday life and its impact on the environment.
- Greenhouse effect, climate change and climate protection.
- Energy saving, energy efficiency and use of renewable energy sources.

The issues can be raised both during regular classes and during additional meetings with pupils (i.e. meetings of school environmental clubs, meetings of the energy team).

Capacitation - to change their behaviors and practices building users need both knowledge how to do it and tools enabling them to do it. If there are no thermostatic valves on the radiators (or other ways of regulating the temperature), they will not be able to turn down the heating when it is too warm. If there is only one light switch in the room, they will not be able to optimize artificial light use. Therefore, it is important to implement as many technical improvements as possible to actually enable the users to adopt more sustainable behaviors.

Activation - this is the most difficult step, where people should be encouraged and motivated to use the knowledge and tools that they have to actually change their behaviors and practices

There are some examples of useful tools for changing behaviors that can be applied in schools:

- **Energy saving contest or game** - a competition, where people are getting points for specific tasks or achievements, is always a good method of engaging both younger and older users. It is important to have it well designed, covering longer period of time (e.g. a year), including attractive (and sometimes even challenging) tasks and foreseeing attractive awards and recognition for the winners. A competition is better if there are more schools involved in a common scheme, while a game when a school is working on reducing its energy consumption alone
- **Living lab methodology -** the methodology engages users in common research and exploration activities that should lead to co-creation of innovative solutions for existing problems. With reference to energy, the living lab can work on exploring current energy situation of the building and possible ways of improving it.
- **Monitoring and feedback** - this is the last but very important step. All energy saving measures, including organizational and behavioral ones, should be accompanied by careful and structured monitoring of the real results achieved, both in terms of energy and financial savings.

Change of user behavior

As already mentioned, to change user's behaviors it is important to raise their overall energy awareness, increase capacities to take own action, motivate them to do so and give regular feedback on the results achieved. The users should be also guided in their efforts to save energy, learning what kinds of simple measures they can implement to improve the situation of their building

What no-cost and low-cost energy saving measures can be introduced by the school community?

To achieve savings on electricity the school community should make sure to:

- Turn of unnecessary lights and equipment.
- Turn of all lights and equipment when leaving the room for longer (it can be made easier for them by installing multiple outlet strips with one switch allowing to turn off all devices at the same time).
- Label light switches to enable easy turning on of only part of the lights (sometimes only a part of a large room is in use).
- Rearrange the rooms to use as much daylight as possible.

- Regularly clean the dust from the lamps and the bulbs (a heavy dust coat on light bulb can block up to 50% of light output).
- Use the equipment properly and ensure its proper maintenance.
- Turn off stand-by function of the equipment as it is responsible for up to 11% of the device's total electricity consumption.
- Turn on energy-saving mode, which is incorporated to many types of devices.
- Analyze further, building-specific opportunities for reducing energy consumption (like e.g. reducing light and cooling intensity in beverage machines, using stairs instead of elevator, making tea together to avoid boiling the water every few minutes, etc.).
- Organize a day without electricity (preferably in winter, when it will be more fun. Such day might help the pupils, teachers and other building users to come up with further, maybe even untypical electricity saving ideas).

To achieve savings on heating the school community should make sure to:

- Check and adapt setting of thermostatic valves to make sure that temperatures in respective rooms are appropriate (not too warm and not too cold).
- Close the door after entering/leaving the room to keep warm air inside and colder air on the corridor.
- Remove all heavy curtains and furniture covering the radiators and preventing warm air from spreading around the room.
- Keep radiators clean.
- Air the rooms properly (windows wide open for few minutes and with the radiators closed).
- Don't open windows when mechanical ventilation provides enough fresh air.
- Reporting all malfunctions of the heating system to the janitor and the school principal.
- Tell the janitor when the class leaves for a trip or a study visit so that he could reduce temperatures in the room for this particular day(s).
- Organise warm sweaters & socks day proving that it is possible to feel comfortable in lower temperatures (again joining education with good fun).

To achieve savings on water the school community should make sure to...

- Turn off water taps fully after using them.
- Report any dripping taps or leaking toilets immediately to the janitor and the school principal.
- Use "low-flush" button in the toilet whenever possible.
- Water the plants with rain water.
- Take short showers after sports activities.

SCHOOL'S INSTITUTIONAL ROLE
Send a list of requests to local administrators. Proposals, referring to the neighborhood or the city and signed by a group of children, a class or the teaching staff, can be delivered to the mayor, a city councillor or a local authority. Involve a television station, a local newspaper, a public figure might be meaningful to spread the message more effectively. The goal is to have an ally who becomes a testimonial for energy saving. For example, the local newspaper can dedicate an article to the theme, do a report on the denunciation of waste made by students, the TV a broadcast, the character could post messages on Facebook and Instagram.