

Lesson plan

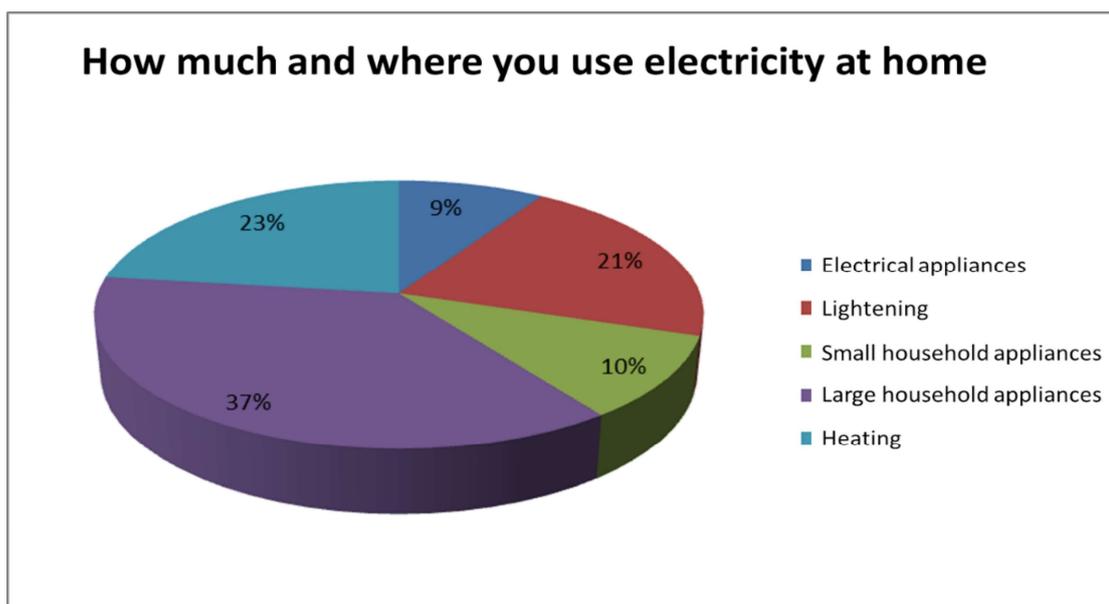
using the STEAM method of teaching.

Topic: Environmental saving measures (e.g. smart thermostats, air thermostats, decoupling, reducing water consumption)

The entire modern economy and people's way of life is based on the use of electricity. It is needed every day and almost everywhere: in the home, in manufacturing, in tourism, in services and industry, in medicine and science. Although electricity is produced in many different ways today, it is not provided to people for free. On the contrary, electricity, like other products, tends to become more expensive. Saving electricity is not only worthwhile in order to reduce household costs, but also to contribute to saving the planet. After all, being resourceful is not only useful but also fashionable.

To reduce the cost of electricity use, it is important to know what you use it for in your home in the first place. Most of the energy is consumed by the most important and commonly used large appliances: the fridge, oven, washing machine, tumble dryer, etc. The heater and air conditioning come second. Lighting, small appliances, and electronics are in third place.

Households use energy for space heating, hot water, general electricity, cooking and cooling.



Energy saving steps in households:

Step I: Starting with the habits that determine energy consumption (behavioral transformation):

1. Working remotely (at least 2-3 days a week if you drive your own car to the workplace). It's good to know that a laptop consumes up to 90% less electricity than a stationary computer.

2. Reducing indoor temperature:

Reduce the temperature by 1 degree (or more, but under hygienic conditions);

Reduce the temperature to 17-18 degrees when you are not at home and at night.

- The temperature in the kitchen can be lowered, as it is usually warm anyway because of the heat from steaming pots, ovens, etc.

3. Use the washing machine efficiently:

- wash with a full load;

- wash in cold water (depending on the situation);

- use the delay function (using the night rate).

4. Use your fridge efficiently:

- do not leave the door open and wipe the rubber seals on the door;

- regularly clean the heatsink on the back of the fridge.

- It is also important to pay attention to where the fridge is placed. If you put the fridge near a window with direct sunlight, a radiator, or another heat source on the side, it may be a top-end economy model, but it will still consume a lot of electricity.

periodically defrost the fridge;

- set the temperature higher according to the food storage conditions.

5. Efficient use of air conditioning. In summer, many people install cooling systems to avoid the sun streaming through their windows. Air conditioning accounts for around 17% of a household's average annual electricity consumption. And on hotter days, maybe even more. Adjust air cooling systems according to the ratio of outdoor to indoor temperatures. Modern technology makes it possible to do this. The air conditioner will only cool the air when the corresponding air parameters change.

6. Properly ventilate your home:

- Ventilate as needed;

Do not leave windows and doors open for long periods of time during the cold season;

- Use the cooker hood only when cooking.



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7. Scheduling energy consumption for night time or weekend (for those with a dual time zone electricity plan). Replacing conventional light bulbs with LED bulbs can save up to 80 percent of electricity. Lighting with LED bulbs is three times more efficient than with fluorescent bulbs and up to 12 times more efficient than incandescent bulbs.

8. Switch off unused household appliances.

9. Boil water in a kettle according to individual requirements, but no more.

10. Use the dishwasher more effectively: - use the eco mode; - load the dishwasher fully; use the delay function.

11. Smarter cooking uses energy more wisely.

Step II: review energy consumption:

1. Assess household energy consumption:

- Assess energy consumption;
- Identify the most energy-consuming appliances in the home and assess opportunities to reduce costs;
- Ask the energy supplier if they offer free or low-cost home and utility inspections or advice on energy saving.

2. Identify the areas where the home's energy or engineering systems use the most energy.

3. Use the mobile app(s) to monitor your household's energy consumption.

4. Targeted lighting can save up to 40% of electricity in your home. What is target lighting? If you like to read, watch TV, or knit in the evening, put a light on where you are most often. You'll have a cozy little island for your hobbies or work without having to have the main light in the room. In homes where you don't need constant lighting, but don't want to flick switches every time, you can install touch-sensitive luminaires. For example in the yard. Electricity won't be wasted and you won't have to worry every time about leaving a light on in the yard overnight.

Step III: reducing consumption (fixing up what's messy or worn out)



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The building loses heat through all its parts, only the magnitude of the loss varies. About 35% of the heat is lost through the walls, 37% through the windows, 15% through the roof and 13% through the basement slab.

1. Reducing heat loss:

- removing leaks (in windows, windowsills, doors);

2. Ensuring that heating appliances work as efficiently as possible:

- keep heating appliances (radiators) clear of furniture or other objects;

- remove dust from heating surfaces;

- choose the right length of window curtains.

3. Maintaining the heating and hot water system of the house:

- Regularly wash and clean the inside of the system;

- Comply with the requirements for the maintenance and operation of the system;

- Air out radiators on time.

4. Use more natural daylight.

5. Neglect of appliances can lead to higher energy bills: a clogged kettle and iron, a dirty cooker and oven, and a full vacuum cleaner will all try to run at full capacity and thus use more energy.

STEP IV: install small and medium improvements

1. Modernization of heating stations.

2. Replacement of a boiler with a more efficient boiler or heat pump.

3. Setting up a solar photovoltaic power plant.

4. Installing solar thermal collectors.

5. Improvements to the heating and hot water system of the house:

- upgrading or adding insulation to the heating and hot water pipes;

- installing and adjusting thermostats;

- installing an insulating cover (reflector) behind the heating appliance. In private homes or apartment blocks where the heating system has been upgraded, thermostats are an excellent way to reduce heating costs.

They can be installed on each radiator and allow you to regulate their temperature individually. So different rooms can be kept at different temperatures, heating the one you are in the most, and leaving the minimum



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settings if you leave the house.

6. Replace inefficient light bulbs with more efficient ones.

7. Install motion sensors to control lighting. In homes where you don't need constant lighting, but don't want to flip switches every time, you can install touch-sensitive luminaires. For example in the yard. Electricity won't be wasted and you won't have to worry every time if you've left a light on in the yard overnight.

8. Use of lower capacity hot water appliances.

9. Installation of plain or insulated blinds.

10. When purchasing new household appliances, choose appliances with the highest possible energy efficiency rating.

STEP V: upgrade and substantially improve efficiency

1. Renovation/modernization of apartment buildings:

- building insulation;
- ensuring airtightness;
- installing a ventilation system with a thermal break;
- upgrading inefficient heating and hot water supply systems;
- glazing balconies and loggias.

2. Modernization of individual housing units:

- airtightness;
- external insulation of the building;
- internal insulation of walls;
- installation of a second external door.

Reducing water consumption

Do you know that 97.5% of the world's water comes from seas and oceans? Unfortunately, their water is not drinkable. Springs and groundwater reserves are only a small percentage of the planet's total water supply. It is because of that tiny amount of water that we humans still live.

Fresh water is not just for life support. We bathe in it, wash our clothes, and use it in industry. Domestic use is particularly high. Unfortunately, drinking water supplies are not unlimited.

By 2050, the world is predicted to face severe freshwater shortages. In countries where groundwater reserves are slightly higher, it can become a source of income as well as survival. This does not mean that these countries cannot save water. On the contrary, if we do not save, we will waste this potential instead of leaving it for future generations.

The average Lithuanian consumes around 70 liters of centralized cold drinking water per day (2023 data). We could significantly reduce this number.

How to save water wisely?

- When brushing your teeth, turn off the water.

The average person brushes their teeth for 3 minutes. Do you know how much water comes out of the tap at that time? Eighteen liters. Based on the daily drinking water allowance, this is enough for 9 people to



drink. So while you are brushing your teeth, turn off the water. It could save someone's life.

- Shower treatments should not last for hours.

We use between 6 and 45 liters of fresh water per minute when taking a shower. Want to reduce your water bills? Consider buying a shower head that mixes air and water, or a water stream regulator.

- Fix a dripping tap.

It is estimated that a dripping tap can waste up to 15 liters of drinking water per day. That's 5 500 liters per year. In the event of severe water shortages, this would be enough to save a family of 4 people. Acoustic detection of water leakage points is a common method used in practice. It is a very long-established and, on the one hand, very simple and quite reliable method. New technological developments have made it possible to install acoustic sensors directly on water mains in wells.

- Use rainwater storage tanks.

Rainwater storage tanks are a great way to save money by using rainwater for gardening, vegetable gardening, or outdoor work. Install them and use this free resource to water your flowers, wash your car or clean your windows. This will save around 5,000 liters of fresh water per year.

- Use a watering can.

The irrigation hoses can consume 1 000 liters of drinking water per hour. It is therefore much more environmentally friendly to choose watering cans. In addition, mulch and irrigation are best done in the early morning or late evening to reduce evaporation and save water reserves.

- A jug of water in the fridge.

Fill a jug with tap water and put it in the fridge. If you make a refreshing drink in advance, you will thank yourself later. When you're thirsty, you can pour yourself a glass of cold water and enjoy. You can add mint, lemon slices, or ice cubes. It's a much more pleasant way to refresh yourself than standing by an unturned tap waiting for the cold water to finally start running.

- Invest in water saving.

Time to update your household items? This could be the perfect opportunity to take the first step towards greener living. Replace your old tap with a new, water-saving one. Choose water-efficient showers, toilets, washing machines and dishwashers: you'll be doing a favor for the environment and your pocket.

- The second life of dishwashing water.

Washing dishes, washing clothes and bathing accounts for around 50% of daily water use. This creates "gray water". It is so called because of its grayish color. Using this water would save many liters of water. We can store baths and sink water in 5-liter containers. You can then use it to water your plants or to flush the toilet (of course, it is important to choose. After all, you won't be washing water with detergent or dishwashing liquid impurities on your plants).

- Wastewater - the water produced during the production process - can be treated and used to water gardens, flowers and lawns. We have cooling towers that need a lot of water (untreated to remove bacteria and other pollutants), so if we could use this water, we could save a lot of water.



- Other water-saving initiatives include rooftop rainwater harvesting systems and natural freshwater ponds in the surrounding settlements, which are maintained to return water to the ground.
- One of the biggest water savings in the future will be the replacement of clean water with recycled water through the use of "clean in place" (CIP) equipment. It's a simple change that will save even more water in the future.

Why is it important to save water?

Did you know that New York City uses 30% less water today than it did in 1979, even though it has 1 million more people? This dramatic change has come about because Americans have taken simple cost-saving measures. It probably goes without saying that saving money means spending less and living more beautifully with nature.

- **Reduce energy consumption.**

Wastewater treatment is an energy-intensive process. Heating water is also energy intensive. Saving water saves both energy and money.

- Reduce your costs.



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Water costs money. Reducing its cost will help you spend more money on leisure activities. After all, it's much nicer to spend money on travel or gifts than on water bills, right? Keep track of how much water you use. If you want to get serious about saving water, start counting how much you use each day. You can do this by monitoring your meters. Or, when you get your bill, calculate the amount of water you use by dividing the cubic metres by the number of days and the number of people living in the house.

Literature: <https://www.ena.lt/uploads/PDF-EVE/Energijos-taupymo-gaires.pdf>
Praktiška namų, minčių ir pinigų tvarkymo knyga. Rasa Banelič'. Tera Publika. Kaunas. 2022

Lesson 1

Students watch a video with material about saving water at home and counts the exercises

Exercise 1

4 liters of water flow out of the tap per minute. If a person brushes his teeth for 2 minutes in the morning and in the evening, how much water does he waste?

$$4 \times 4 = 16 \text{ (l)}$$

Exercise 2

If there are 4 people in the family. How much water will they use? How many liters of water would a family of 4 use per month?

$$4 \times 16 = 64 \text{ (l)} \quad 64 \times 30 = 1920 \text{ (l)}$$

Exercise 3

1 glass of water would be enough to clean your teeth. 1 person would use 0.5 l of water per day. How many liters of water will he use per month?

$$30 \times 0,5 = 15 \text{ (l)}$$

Exercise 4

If there are 4 persons in the family. How many liters of water would they save per day?

$$4 \times 0,5 = 2 \text{ (l)}$$

Exercise 5

How many liters of water would a family of 4 use?

$$4 \times 15 = 60 \text{ (l)}$$



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Exercise 6

How many liters of water would a family of 4 save?

$$1920 - 60 = 1860 \text{ (l)}$$

[Gamtos išteklių taupymas www.ismaniejrobotai.lt](http://www.ismaniejrobotai.lt) 1-4 klasei .Dirba ir planšetėse - YouTube

https://www.youtube.com/watch?v=-bvZCdMecEo&ab_channel=greentreks (Clean Water: A Long Journey from the Source to Our Tap



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https://www.youtube.com/watch?v=O-MkOgDQllo&ab_channel=MediaLab

<https://create.kahoot.it/share/energy/5ee53b9f-0f71-47d1-a781-4f69291a5aa7>

Science

Lesson 2.

https://www.youtube.com/watch?v=h4RmNNve3lc&ab_channel=DavidSmith

1. Work in groups. Data collection on electricity saving in school spaces during breaks.
2. Work in groups. Systematization of data in a table and representation in a diagram.
3. Work in groups. Presentation of data to classmates.

Art

Construct an economical house from waste.



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