LEARNING BOX OF UNPLUGGED ACTIVITIES

Reducing Household Energy Consumption

This unplugged activity helps learners understand how energy is consumed in a typical household and how to reduce it effectively. Participants work with structured information about different appliances, heating/cooling systems, and daily habits — provided directly in this document as reference tables and scenario descriptions. They analyze energy usage, identify inefficient practices, and design simple rules to reduce consumption and costs. The activity connects real-life challenges (high energy prices and seasonal variations) with computational thinking skills.

Target Group

- ☐ Low-skilled adults with low digital competences
- ☐ Low-skilled adults with limited formal education or qualifications
- ☑ Low-skilled adults with low participation in lifelong learning / training opportunities

Learning Objectives

- Understand the main sources of household energy consumption
- Identify inefficient energy usage habits
- Recognize patterns in energy use (daily and seasonal)
- Develop practical strategies to reduce energy consumption
- Apply computational thinking to real-life cost-saving decisions

Competence Areas

a) Innovation Competences

- ☐ Creativity
- ☐ Critical thinking
- ☐ Problem solving

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Theme

Energy efficiency and sustainable living

Duration

75 minutes

Level

Beginner

Computational Thinking Steps Used

- ☑ Decomposition
- ☑ Pattern recognition
- ☐ Abstraction
- ☑ Algorithmic thinking

Methodological Approach

☑ Gamification
☑ Challenge-Based Learning
☑ Collaborative learning
☑ Experiential learning

☐ Communication
☐ Collaboration

b) Information Literacy Competences

☐ Ability to access, understand, and critically analyse information
☐ Interpretation of digital and visual content
☐ Awareness of media influence and biases

c) Life and Career Competences

☑ Flexibility and adaptability
☑ Initiative and autonomy
☑ Sociability and intercultural competence
☑ Productivity
☑ Leadership and responsibility

Learning Outcomes

By the end of the activity, participants will be able to:

- Break down household energy consumption into key categories (heating, cooling, appliances)
- Identify peak consumption periods and usage patterns
- Focus on high-impact areas for energy savings
- Create simple rule-based strategies to reduce energy use
- Make informed decisions to lower household energy costs

Notes

- Appliance Reference Table (see below): Participants use the printed table on the following page listing 12 household appliances with their names, category, typical wattage, and usage frequency. No cards are needed — participants work directly from this table.
- Scenario Descriptions (see below): Three written scenarios are included in this document — a winter weekday, a summer weekend, and a shoulder-season evening — each describing a typical household's energy situation that day. Participants read and analyze these scenarios directly.
- Encourage participants to share personal experiences

Facilitators can adjust difficulty by adding constraints (e.g., limited budget, extreme weather conditions)

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Step 1: Decomposition of Energy Consumption

Participants refer to the Appliance Reference Table below, which lists 12 common household energy uses: electric space heater, air conditioner, refrigerator, washing machine, tumble dryer, dishwasher, electric oven, LED lighting (per room), television, laptop/computer, phone charger, and standby devices. Each entry shows the appliance name, its category, typical power consumption in watts, and whether it is used daily, occasionally, or seasonally.

They are asked to:

- Group energy uses into categories such as heating/cooling, appliances, lighting, and standby consumption
- Identify which appliances or activities are used daily, occasionally, or seasonally
- Estimate which categories consume the most energy and contribute most to the household bill

Facilitator support:

- Ask guiding questions like: “Which devices run all day?”, “Which ones consume the most power?”
- Encourage participants to reflect on their own household habits

This step helps participants break down overall energy consumption into clear and understandable components.

Step 2: Pattern Recognition

Participants read the three Scenario Descriptions below, each depicting a realistic household day: (A) Winter Weekday — cold weather, heating running all day, cooking in the evening, washing machine used once; (B) Summer Weekend — hot weather, air conditioning on, multiple people home all day, frequent appliance use; (C) Autumn Evening — mild weather, no heating or cooling, family home from work/school, TV and cooking appliances in use.

They are asked to:

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- Identify patterns in energy use, such as:
  - Increased heating in winter or cooling in summer
  - Higher electricity use in the evening when people are at home
  - Frequent use of certain appliances at specific times
- Recognize inefficient habits, such as leaving lights on, overusing heating/cooling, or running half-empty appliances
- Discuss how small daily habits contribute to overall energy consumption

Facilitator support:

- Prompt reflection: “When do you use the most energy?”, “Which habits could be changed?”
- Highlight how patterns can help predict and reduce costs

This step helps participants identify trends and understand the causes of high energy consumption.

Step 3: Energy-Saving Strategy (Algorithmic Thinking)

Participants develop a set of simple, rule-based strategies to reduce energy consumption.

They should:

- Create clear rules such as:
  - “Use appliances only when fully loaded”
  - “Turn off lights and devices when not in use”
  - “Set heating/cooling to a fixed efficient temperature”
- Organize their ideas into a step-by-step routine, for example:
  1. Check daily energy use habits
  2. Reduce unnecessary usage
  3. Adjust heating/cooling settings
  4. Monitor and review changes

Finally, participants:

- Present their energy-saving plan to the group
- Explain which rules have the biggest impact and why

- Compare different strategies and discuss which are most practical and effective

Facilitator support:

- Encourage realistic solutions: “Can this be applied every day?”
- Introduce challenges (e.g., extreme weather, large household) and ask how strategies adapt

This step helps participants develop structured, practical approaches to reducing energy use and costs.

Facilitator Guidance

Before the activity

Begin by asking participants which household appliances or systems they believe consume the most energy. Encourage discussion about seasonal differences, such as increased heating during winter or air conditioning during summer. Explain that small changes in everyday habits can significantly reduce energy consumption and household expenses.

During the activity

Encourage participants to justify their choices when identifying areas where energy can be saved. Ask questions such as: "Which appliance uses the most energy?", "When is energy consumption highest?", or "Which actions would have the greatest impact?" If necessary, provide practical examples such as using washing machines with full loads or lowering the thermostat by one degree to stimulate discussion.

After the activity

Facilitate a discussion about the strategies developed by each group and encourage participants to identify which recommendations they could realistically apply in their own homes. Highlight that there is no universal solution, as every household has different needs and living conditions.

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Conclude by reinforcing how computational thinking helps people analyze information, identify patterns, prioritize actions, and create practical routines for improving energy efficiency.

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Appliance Reference Table

Use this table in Steps 1 and 2. Each row represents one household energy use. For Step 1, cut out or refer to each row as a separate item to sort into categories. For Step 2, use the "Usage Frequency" and "Season" columns to identify patterns.

Appliance	Category	Typical Watts	Usage Frequency	Season
Electric Space Heater	Heating / Cooling	2,000	Daily (when cold)	Winter
Air Conditioner	Heating / Cooling	1,500	Daily (when hot)	Summer
Refrigerator	Appliances	150	Daily (always on)	All year
Washing Machine	Appliances	2,000	Occasional (2–4× / week)	All year
Tumble Dryer	Appliances	2,500	Occasional	All year
Dishwasher	Appliances	1,200	Daily or occasional	All year
Electric Oven	Appliances	2,000	Daily	All year
LED Lighting (per room)	Lighting	10–15	Daily (evenings)	All year (more in winter)
Television	Electronic Devices	100–200	Daily (evenings)	All year
Laptop / Computer	Electronic Devices	40–65	Daily	All year
Phone Charger	Electronic Devices	5	Daily	All year
Standby Devices (total)	Standby Consumption	50–100	Daily (always on)	All year

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Scenario Descriptions (for Step 2)

Scenario A — Winter Weekday
It is January. The outside temperature is 3°C. The household consists of two adults and one child. Both adults leave for work at 8:00 am and the child goes to school. The electric space heater runs from 6:00 am to 8:00 am (morning warm-up) and again from 5:00 pm to 10:00 pm (evening). The refrigerator runs continuously. The washing machine is used once in the evening with a full load at 40°C. The oven is used for one hour at 6:30 pm to cook dinner. The TV runs from 7:00 pm to 10:00 pm. All lights are on from 6:00 am to 8:00 am and from 5:00 pm to 10:30 pm. Standby devices (router, set-top box, microwave clock) draw power all day.

Scenario B — Summer Weekend
It is July. The outside temperature is 34°C. The entire family is at home all day. The air conditioner runs from 10:00 am to 11:00 pm (13 hours). The refrigerator runs continuously and opens more frequently than usual due to the heat. The washing machine is used twice — once in the morning (half-load, 60°C) and once in the afternoon (full load, 40°C). The tumble dryer is used after the first wash cycle. The dishwasher runs once in the evening. Multiple laptops and phones are charging throughout the day. The TV runs most of the afternoon and evening. Lights are barely needed during daytime but are on in the evenings.

Scenario C — Autumn Evening
It is October. The outside temperature is 14°C. No heating or cooling is needed. The family returns home from work and school at 5:00 pm. From 5:00 pm onwards: lights are on in the kitchen, living room and two bedrooms; the oven is used for 45 minutes to cook dinner; the dishwasher runs after dinner; the TV is on in the living room; two people use laptops for work and studying; two phones are charging. Standby devices continue to run all day. The household forgets to turn off the bathroom and hallway lights overnight.