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## RWL Case-Study

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**Name of the country:** Slovenia

Provider: CSOE (Centre for School and Outdoor Education), Centre Lipa  
www.csod.si



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### **Name of the programme?**

Sun, water, wind – theme week

### **Age of the children involved?**

9-11; A programme for students up to the age of 15 is also being developed.

### **Short introduction**

This program introduces students to different ways of producing energy with an emphasis on renewable energy. Students compile a model of a hydro power plant, a sun collector and a wind power plant. They test all three and try to make them work the most efficiently.

### **What is the frame?**

Nature provides a variety of energy sources – it's up to us to choose wisely and sustainably

### **What are the goals of the programme?**


- Learning about different renewable energy sources
- Putting together a model of a solar panel and connecting it with a solar-powered water pump
- Making a water mill from natural materials
- Putting together models of wind and hydro power plants and testing them
- Performing measurements, and finding the best locations for the models and other solutions for the highest level of efficiency
- Taking notes and writing a report
- Learning about advantages and disadvantages of using renewable sources of energy

### **What values are promoted in the programme?**

- respect for nature and care for the state of our planet
- respect for future generations

### **Which competences are promoted that empower learners to shape a sustainable future?**

- enable learners to cooperate, participate and take responsibility – students compile models in small groups and take responsibility for their work
- inspire learners to be curious, reflective and critical thinkers – through testing out settings and locations to find the best ones students think about what to do and get to try out many different possibilities
- allow learners to take ownership of their learning and reflect on what and how they have learned – these are younger students so they reflect on their learning with a help of a facilitator - teacher

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- empower learners to take positive actions that deal with change – students get to discover on their own how to make energy, and they discuss energy issues in a group; both of these help them to be more conscientious about energy use at home and in school
  - Enable learners to become conscious of interconnectedness - you, me and the world around us- students discuss how people are connected to the environment – how we depend on it and also how we affect it.

### **Which of the specific scientific concepts does the programme relate to?**

The programme relates mostly to energy flow. Younger students learn about the fact that energy is not just electricity, but exists in nature as well – and that people can use those natural sources to produce electricity. They learn about how energy transforms from one form to another and the web between people and the world around us. This helps them to understand the influence that our choices have on the natural world.

### **Which ecological problems are involved, if any, and how? (Refer to mindmaps of 9 planetary boundaries)**

Climate change – alternative energy

The theme of the whole week explains and demonstrates usage of renewable energy sources – solar, wind and hydro energy.

### **Transferability: Which different areas of learning are included and how?**

The activities of this programme mostly relate to the man-made environment. Pollution is also included due to energy use and living nature both globally and locally in learners' communities is also included.

### **What educational strategies (learning models, methods, etc.) are used in your programme?**

Demonstration – for giving instructions

Practical work – putting together the models of wind, solar and hydro power plant and of solar panel for heating water

Experimenting – using the models to get the best efficiency

### **How is the programme evaluated? How do you know the programme achieved its educational goals?**

The student evaluation is carried out in form of discussion and the posters that they make at the end of the week. There is also a discussion with teachers.

### **Describe the programme.**

Work is carried out in groups. The number and size of groups depends on the number of participants, weather conditions, the number of teachers, etc.

#### Day 1

- Introduction and discussion on renewable energy sources
- Putting students into groups (usually 2 or 3)
- Making a plan for the week
- Due to the need for using tools, a workshop is carried out where students learn about tools and practice using them; the emphasis is on safety
- All the workshops are introduced; this helps work through the week to run more smoothly.

#### Days 2, 3 and 4

- Working in working groups – Students put together the models and use them. The mentor helps them with suggestions. The main task is to get as high efficiency as possible. To measure this



they take measurements, write down results, compare them and change parameters which might affect the efficiency.

- Solar Panel – Students put it together, connect everything and find the best location for it, and the most efficient angle of the solar panel and the collector, depending on the position of the sun
- Model of hydro power plant – Students become familiar with its components, learn how to connect the electric motor, the power plant and the light bulb. They measure the voltage of the generator.
- When students know how the model of a hydro power plant works, they put it on different locations in the creek, and determine the influence of the creek speed on the efficiency of the power plant. There are two different turbines, so they test the effect of turbines on the efficiency of the power plant.
- Students look for the best location for a wind power plant (no trees, etc.). They set up the model, connect the electric motor and voltmeter, perform measurements and determine the effect of windspeed on the efficiency of the model.
- Students draw a sketch of each model, explain how it functions and describe the equipment needed.
- Determining the pros and con of using renewable energy sources and its usability
- A hike by the local creek; at certain distances they measure altitude and afterwards plot results into a graph.
- They compare a spring and a water pumping station.

#### Day 5

- sorting out notes, writing reports
- making posters, preparing an exhibition and reporting
- conclusion – based on observation and the results, students determine the value of renewable energy sources and sensible energy usage

#### **Included resources / materials / tools.**

Solar panel – do-it-yourself version. It is made in a way which enables students to put it together on their own – they screw sides together, etc.

Dimension of the collector – 100x60x10cm

Materials used:

Water-resistant plywood – frame

Styrodur, 2cm – bottom

Perspex for covering the frame

Refrigerator condenser (waste material from old refrigerators)

Rubber tubes – 2x 150cm

Water reservoir

– Styrodur box with a top with three holes (two for rubber pipes, one for a thermometer

- Water container inside of the box

Solar pond pump

Thermometer

Models of wind and hydro power plants with different turbines, electric motors, wires and voltmeters



Photos



Materials for the solar panel

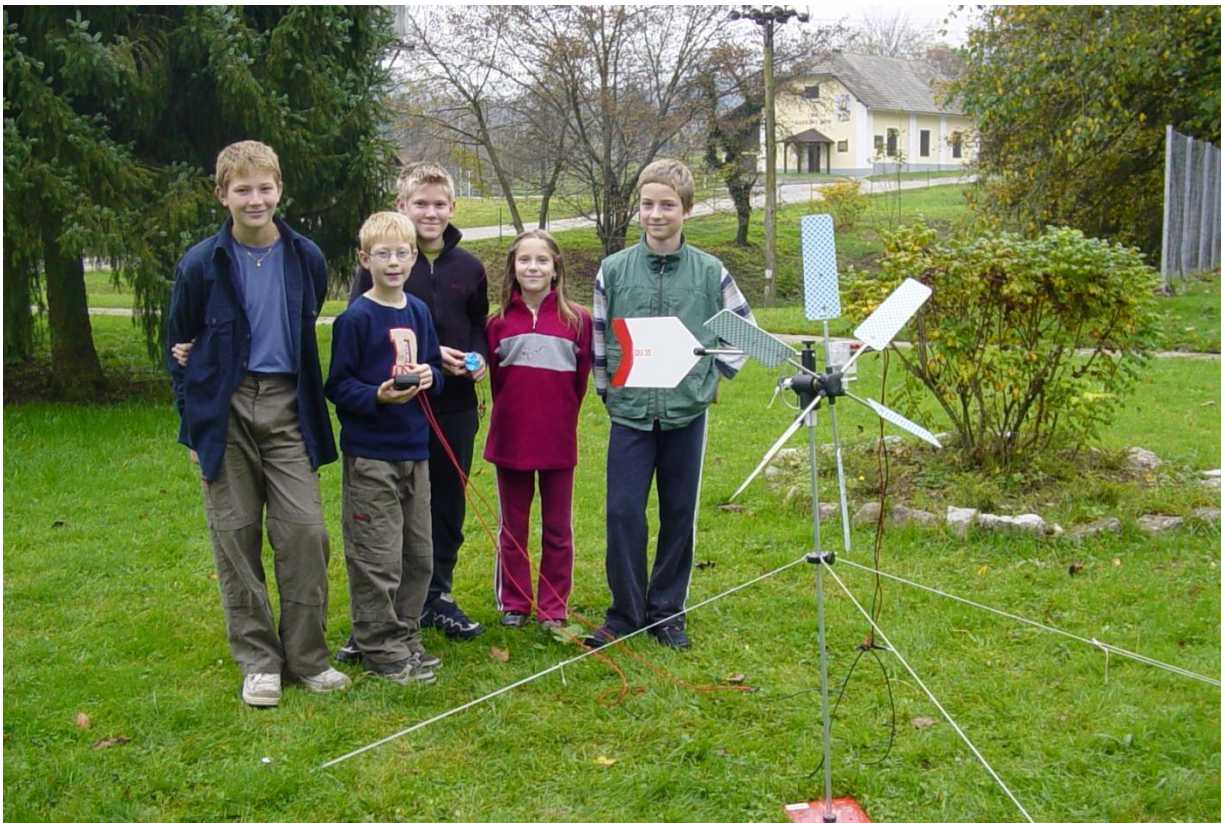


Putting solar panel together





Finished and functional solar panel



Testing the model of wind power plant





Testing the model of hydro power plant



Trying to find the best location for the model of hydro power plant