

<b>ACTIVITY 7</b>	Paper circuit
<b>The aim of the activity</b>	The workshop intends to offer a simple introduction to the basic concepts of energy and electric current and to understand the functioning of simple electric circuits.
<b>Places where the event can be held</b>	Hydroelectric energy museum
<b>Age group for the activity</b>	6-11

<b>B. IN THE OUT-OF-SCHOOL LEARNING ENVIRONMENT</b>	
<b>Educational tools</b>	Sheet with printed circuit diagrams, paper circuit roll, flat batteries, clips, led lights, pencils.
<b>Method, technique and strategies</b>	Practical activity, participatory lesson
<b>PRACTICE</b>	Build some simple electrical circuit
<b>Introduction of the activity</b>	The first part of the workshop consists of a short participatory lesson in which the key concepts are exposed: what is meant by electric current, the difference between conductive and insulating materials, what is an electric circuit, etc., also showing some examples and referring to the difference between electric current and static electricity.
<b>Development of the activity</b>	<p>Initially we start with a historical introduction to the invention that allowed the study of electricity: the Volta's battery. The pupils, all together or divided into groups, listen to the story of the birth of the battery and try to build a "homemade" battery. To build a battery you need a few easily available materials:</p> <ul style="list-style-type: none"> <li>• copper coins;</li> <li>• aluminium foil disks;</li> <li>• sponge disks;</li> <li>• lemon juice;</li> <li>• a LED.</li> </ul> <p>A coin, a sponge disk and an aluminium disk are stacked. Repeat the process a dozen times. Finally, by connecting the LED to the ends of the battery, it will light up.</p> <p>Then the class is divided into small groups (2-3 students each). Each group is given a kit containing the necessary material:</p> <ul style="list-style-type: none"> <li>• A paper circuit roll;</li> <li>• The sheets with printed circuit diagrams;</li> <li>• Flat batteries;</li> </ul>

	<ul style="list-style-type: none"> <li>• Clip;</li> <li>• Some led lights;</li> <li>• Colored pencils.</li> </ul> <p>There are 4 circuit diagrams available and they are of increasing difficulty level. The operator invites the students to take the first circuit diagram. This first circuit is carried out simultaneously with the operator, who takes care to check that the students have understood how the paper circuit works. When everyone has completed the first circuit, you can move on to the second, slightly more complex one. Also in this case the operator shows how to do it and accompanies the students in the construction.</p> <p><b>Additional activities</b> If you have enough time available, you can also introduce the phenomena of magnetism, leading students to notice the close link between electric and magnetic phenomena. At the Museum of Hydroelectric Energy we also have a model of a hydroelectric plant: it is possible to show it to see how energy is actually produced and therefore show how to exploit the connection between electricity and magnetism. Alternatively, a simple dynamo or homemade alternator can be shown.</p>
<p><b>Evaluation of the activity</b></p>	<p>The last 2/3 circuits can be done by the students on their own, and it can be seen as a challenge to make all the circuits.</p> <p><b>Alternative</b> If the class is sufficiently reactive and shows a certain awareness of the subject, instead of giving prearranged circuits to make, it is possible to unleash the pupils' imagination by proposing that they think of a circuit to make and the related figure to light, which can be complicated and varied as desired (it can turn on many bulbs, or have multiple switches, or particular intersections).</p>

C. AFTER OUT OF SCHOOL LEARNING ACTIVITY	
Educational tools	Nothing in particular
Method, technique and strategies	Participatory lesson, collective discussion
PRACTICE	Debriefing
Introduction of the activity	Recall the concepts learned.

<b>Development of the activity</b>	After the workshop the pupils can share their ideas with their classmates and teacher can propose a collective reflection in which reviewing the concepts learned.
<b>Evaluation of the activity</b>	For older students it is possible to propose a quiz with open-ended questions to verify the acquisition of knowledge and evaluate the effectiveness of the activity



