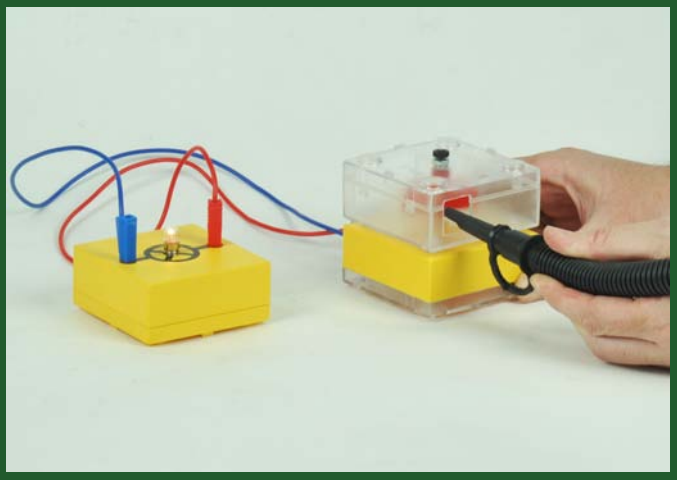
Student Experiments

Manual

ALTERNATIVE ENERGY-CONVERSION

P9160-4W



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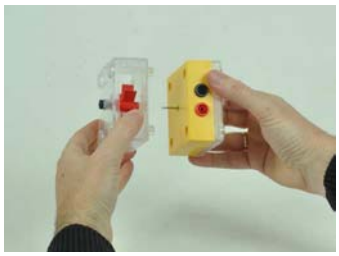
PRINCIPLE OF THERMAL POWER PLANTS

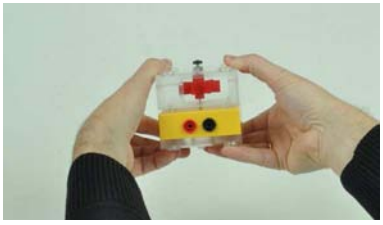
AES 5.1

You might know coal-fired power stations, gas- or oil-fired power plants. Such power plants are known as kaloric power plants or thermal power plants. But where does the electrical energy comes from in these kaloric power plants?

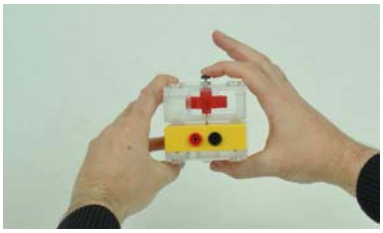
Experiment:



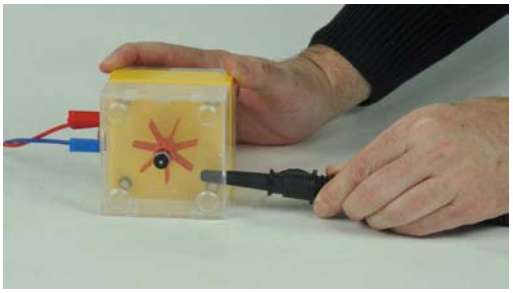
- Place the turbine in housing on the engine/generator brick
- Insert the metal shaft of the engine/generator in the turbine axis



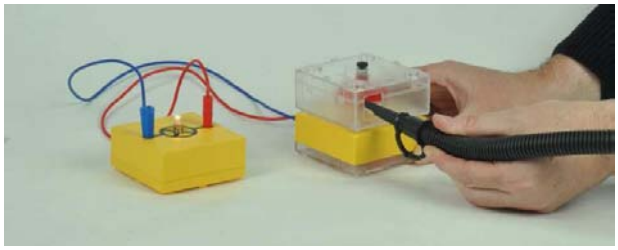
- The 4 plastic bolts of the turbine housing have to stick in the opening of the engine/generator-brick. Stick both bricks together.
- Press the turbine with the black push button on the generator axis



- Check the smooth running of the turbine with your finger
- Screw the lamp 1.5V into the socket of the brick
- Connect both bricks with cables (red and blue, 75cm)



- Place the air pump on the ground next to the table
- Connect the flexible hose with the "pressure"-side of air pump
- Adjust the nozzle of the pressure hose to the turbine housing and onto the center of the "blade surfaces"



- Hold the turbine housing
- An other student assists by pumping

Result:
The air pressure drives the turbine, the lamp starts to glow.

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Physical explanation of the energy conversion:
Mechanical energy (rotation of the turbine) is converted into electrical energy (generator). This electrical energy is then converted into light- and heat-energy (lamp).

Cross-reference to practise:

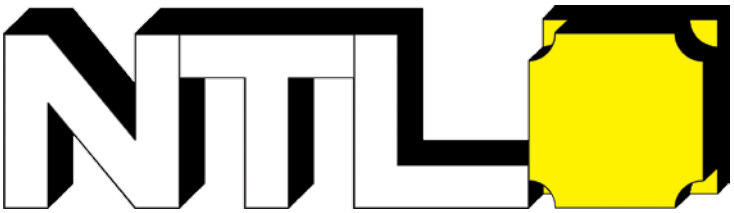
In a thermal power plant water gets heatened-up in a container through burning fuel. This causes the water to evaporate, high pressure occurs in the container. The hot steam escapes from this high pressure through a nozzle and drives the turbine.

Try to describe a thermal power station (operated by coal, gas or oil) schematically. Draw the vapor pressure nozzle and a turbine too.

Advice:
As the operation of the turbine through hot gas steam is difficult to manage in a laboratory experiment (also this would be very dangerous because of the high temperatures, we illustrate the principle by using an air pump.

Additional explanation of nuclear power plants:

Even in nuclear power plants a liquid gets heatened-up. This heat-energy gets then converted by a turbine into electrical energy. The difference to "conventional" thermal power plants can be found in the combustion process.



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