

Activity Title: Pedal Power - Charging While Cycling

Total Time: 3-8 hours.

Student Age: 12-18 years.

Application Area: Global Warming, coding, water and healthy food.

Key Words: Recycling, DIY, environment, water, food, application, coding.

Materials/Materials:

- 4x general rectifier diode
- Buck converter
- Bicycle + dynamo
- Usb type A female plug
- Wire

Theme:

- Water and healthy Food
- Renewable Energy
- Environmental Pollution
- Global Warming

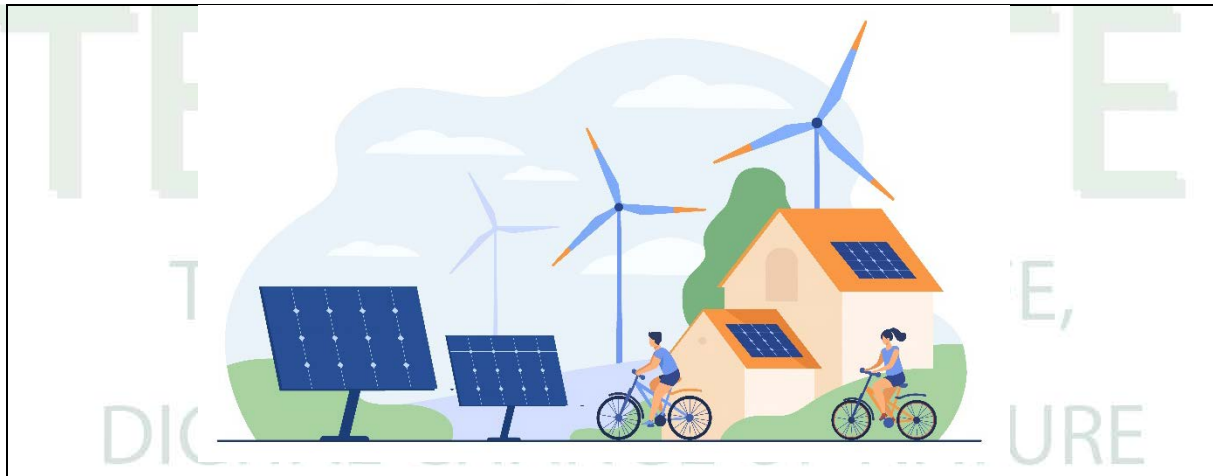
Considerations:

- Take safety precautions when using electronic devices
- Pay attention to the suitability of the dynamos used
- Act in accordance with the learning approach by living by doing (DIY)

Introduction:

We can contribute to renewable energy production both by being healthy and by exercising. For example, we can charge our phone and simple electrical devices while cycling. By pedaling, we can convert our kinetic energy into electrical energy. In this way, we can turn on your bicycle lights or charge your power bank while you are doing sports on the one hand and on the other. For example, a student who lives 15 km from his school can charge his mobile phones or simple devices by converting the kinetic energy obtained by pedaling while cycling from home to school into electrical energy. At the same time, it can store the energy it

receives. Thus, it can contribute to the problem of global warming and the environment (Picture 1).



Picture 1. Renewable energy production

Aim of The Activity:

In general, students learn about energy conversion and electricity generation, soldering, measuring with caliper, 3D printing and design, Designs and makes the model with using electronic information. He/she gains awareness about the transformation of energies into each other and the dissemination of environmentally friendly projects and contribute to the problem of global warming on a large scale by gaining environmental awareness.



Activity Process:

Preparation Phase:

Students learn designs a pedal-powered USB charger that stores the energy he collects by converting energy thanks to the moving pedals in a dynamo fixed on the bicycle. With this device, students can charge simple electronic devices and power bank. Students gain awareness about environmental awareness, energy transformation, global warming issues with the model they have made. Before start activity.

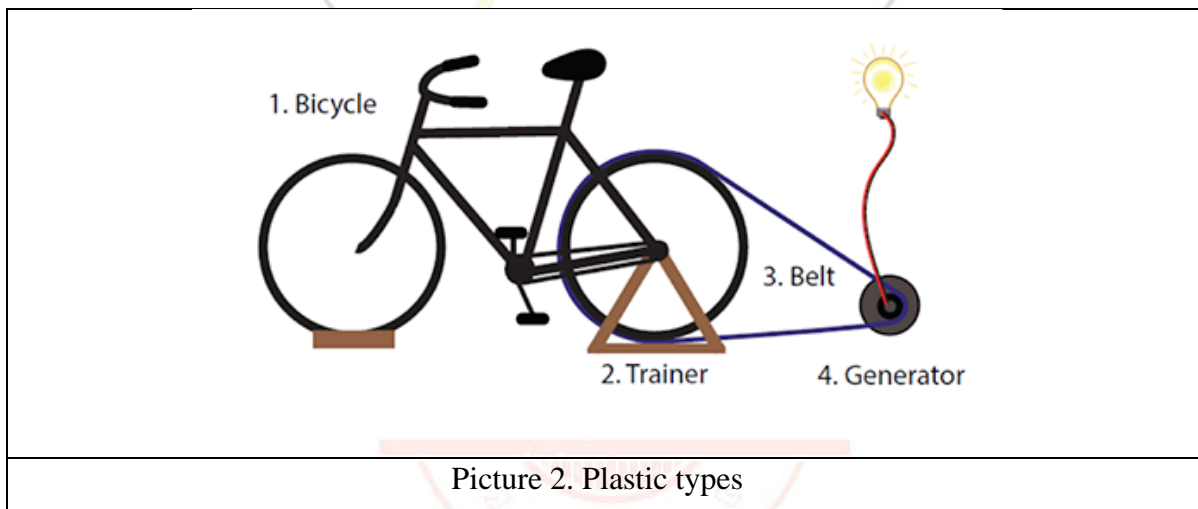
- Student groups are formed in according to the designed model.
- Task sharing is made within each group.
- The necessary materials are provided by the relevant groups.
- Watch the video: <https://www.youtube.com/watch?v=kVAZIDFMRXY>

Design Steps:

1. A pedal-powered USB charger that can be used to charge a simple power bank is designed and made.

It is investigated what types of dynamos are available for common bicycles and collects the necessary electronic parts to create the charger (Circuit example can be found here)

2. The charger is created.
3. A case/holder for the electronic device is designed and a system for fixing it to the bike is made (Createfuture, 2022; Semper, 2022).



4. It measures how much power is generated while cycling for 30 minutes.

- It is calculated how much power the entire class will generate if it travels (for example) 25 km per day for a month. Then this is multiplied for the whole country, and so on.

Example of outputs:

At the end of the study, these outputs will be obtained (Picture 3).



Picture 3: Outputs

Assessment:

Students develop the model, test it. The developed design is exhibited at the school. Peer review is done, the design is reviewed again according to the feedback. Assessment is made by the teacher through the application development rubric.

Goals	Must be improved (1)	Medium (2)	Good (3)	Very good (4)
Cooperation				
Joining discussion				
Creating designing steps				
Usage of designing				
Sustainability of designing				
Total				

Links:

Createfuture. (2022). *The Bicycle Generator*.

<https://contest.techbriefs.com/2014/entries/machinery-automation-robotics/4676>

Semper. (2022). *Bicycle Generator*. <https://www.youtube.com/watch?v=kVAZIDFMRXY>

