

**Climate Wise Schools and Students
(2024-1-ES01-KA220-SCH-000251082)**

Topic: Renewable Energy (Complied by Turkish partner)



Level: Secondary School / High School Freshman

Time: 40+40 minutes

Objectives: Students will be able to;

To understand what renewable energy is and how it compares to non-renewable energy

To explore the advantages and disadvantages of renewable energy

To develop innovative solutions for renewable energy

To understand how to modify daily lifestyle for eco-friendly purposes

Disciplines: Science and Technology, Social Science, Ecology

Materials: Tablet PC or Smart Board /Notebook

Activities and Practices:

Warm Up Activities:

The teacher asks these questions and make students discuss the difference:

- 1) What is weather?
- 2) What is climate?

After taking the answers and making the difference clear for the students. The teacher asks about climate change issue and students are supposed to tell reasons and results.

Then, teacher takes students' attention to energy. Then, make the students define energy with their own words. Then, the teacher explains the forms of energy. (Heat, Light, Motion, Electrical, Chemical, Gravitational) The sources of energy are asked and students are to answer as renewable and non-renewable energy.

Main Activities:

Students are asked the questions below for critical thinking skills.

- What types of energy do you use in your daily life?
- In the future, do you think you will be using more or less energy than you do now? Why do you think so?

Make students watch the video.

<https://youtu.be/1kUE0BZtTRc?si=UR3NxW-zo0ODPLzt>

Then students are grouped by means of the wheel in the link;

<https://wordwall.net/resource/83500370>

**TASK I**

Students are given their first task:

Students match the renewable energy types by means of the digital tool in the link:

<https://wordwall.net/resource/83501141>



The finishers are given the **Energy Expert Label**

TASK II

Students are given to their second digital. task Group the advantages and disadvantages of renewable energy in the link;

<https://wordwall.net/resource/83502791>



The finishers are given the **Energy Hero Label**

TASK III

Students are asked to place the home appliances into right group regarding their energy consumption.

<https://wordwall.net/resource/83505909>



The finishers are given to **Energy Wise Label**.

TASK IV

Students are supposed to search for available renewable energy use percentage (energy mix /all renewables) and also 2030 target regarding the name of their team. To illustrate, Spain team will search for Spain, Türkiye team will search for Türkiye and so on. However, all groups should identify the country best in renewable energy use. The finishers are given Energy Discoverer Label.

Country /Team	Current situation	2030 Target
Spain		
Türkiye		
Greece		
The Republic of North Macedonia		
Portugal		
Croatia		

TASK V

CRACK THE HIDDEN CODE

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The finishers are given Energy Master Label.

Wrap Up: Teacher summarizes the lesson. All groups will have a right to travel a virtual renewable energy island.

https://www1.eere.energy.gov/apps/water/redi_island/#/large-island/

About the Island: <https://www.nrel.gov/water/redi-island.html>

Assessment: Teacher assess the comprehension of students' orally. And ask them to assess their performance with a self-assessment form.

Assignment: Students are asked to prepare a table showing their energy consumption at their homes. They are aimed to be aware of their daily life usage with this task. This assignment also includes parents help and parents will give the costs of their home consumption. They are asked to crack the hidden code as well. (Annex 1)

Answer Key: I have eco-friendly lifestyle

Players' Journey Onboarding: Warm-Up Activities, Group Selection Wheel

Scaffolding: Task II -Task III

Mastery: – Task IV – Task V (Assignment & Extension)

Gamification Elements: Group work in teams, Cooperation, Rewards (Labels), Fun Elements (Finding the hidden code, digital matching activities, a virtual holiday to an island)

Intercultural Elements: The teachers from each partner will talk about the use of renewable energy in other partners of the project. They will make use of these news items and make them rank the partners regarding their renewable energy use.

Portugal: <https://www.euronews.com/green/2024/05/10/renewables-are-meeting-95-of-portugals-electricity-needs-how-did-it-become-a-european-lead>

North Macedonia: <https://osfwb.org/sunny-schools-initiative-in-north-macedonia-municipality-of-skopje-stip-and-berovo/>

Greece: <https://balkangreenenergynews.com/greece-breaks-records-in-renewables-energy-efficiency-in-2023/>

Türkiye: <https://www.mfa.gov.tr/turkeys-energy-strategy.en.mfa>

<https://www.iea.org/countries/turkiye>

<https://www.sysenerji.net/12-ISPARTA---ULUBORLU-GUNES-ENERJISI-SANTRALI-PROJESI-1-7-MWp.html>

<http://www.dinar.gov.tr/dinarda-temiz-enerji-res>

Spain: <https://www.reuters.com/business/energy/renewables-produce-almost-60-spains-electricity-2024-07-02/>

<https://www.rystadenergy.com/news/spain-s-renewable-power-generation-to-top-50-in-2023-surpassing-european-neighbor>

Croatia: <https://balkangreenenergynews.com/renewable-sources-surpass-fossil-fuels-in-croatias-electricity-mix/>

Extension for Differentiation (Especially for High School Students):

- The eager students can be asked to how much they can save in one month by use of 3 hours per day if they change 10 incandescent lamps with a consumption of 80W/lamp with the light bulbs of their home 5W/lamp consumption led ones. Each LED lamp costs 5 €, If the cost of the energy is 0,2 €/kWh, how much can we save for per year? After how many months do you start saving money regarding the cost of led bulbs?
- Students can be asked to make a solar cooker model. They are supposed to search and make a porotype /model solar cooker of their own.
- Students can be asked to make a renewable energy sources /plants poster.

Discussion:

- Do you agree that renewable energy is limitless?
- Is renewable energy totally clean energy? (No, because carbon is released to produce these instruments)
- Can renewable energy take the place of fossil fuels or other energy resources? Why? Why not?
- What renewable energy is the best? Why do you think so?
- What is the oldest renewable energy? Explain with your reasons. (Answer: Wind)

Answer Key:

Consumption of the incandescent lamps: $10 \text{ lamps} \times 80\text{W} \times 3\text{h/day} \times 365\text{d/year} = 788.400 \text{ Wh} = 876 \text{ kWh}$

Consumption of the LED lamps: $12 \text{ lamps} \times 5\text{W} \times 3\text{h/day} \times 365\text{d/year} = 54.750 \text{ Wh} = 54,7 \text{ kWh}$

Energy saved per year: $788,4 - 65,7 = 821,3 \text{ kWh}$

Cost of the energy saved: $821,3 \times 0,14 = 164,26\text{€/year}$

Cost of the LED lamps: $10 \times 4\text{€} = 50\text{€}$

The LED lamps have to be used at least: $50/164,26 = 0,3 \text{ years} = 3,6 \text{ months}$

After, 3,6 months you start saving money as you used less energy .

ANNEX 1: ASSIGNMENT FOR RENEWABLE ENERGY GAMIFIED SESSION

	Monthly Consumption / Payment	Yearly Consumption / Payment
Electricity		
Heating (Natural gas etc)		
Water		
Other		
Total		

- How you can reduce your consumption by means of renewable energy practices for homes?
- Which home appliances use the electricity most? How can you reduce it?

LABELS



**Energy
Expert Label**

Energy Hero Label



Energy Master Label



Energy Wise Label



Energy Discoverer Label

REFERENCES

- <https://www.eia.gov/energyexplained/what-is-energy/laws-of-energy.php>
- <https://goldenmateenergy.com/blogs/goldenmate-blog/whats-your-daily-electricity-usage-understanding-average-kwh>
- <https://entegresolar.com/blog-detay-Yenilenebilir-Enerji-Nedir-11>
- <https://karbonsuzgelecek.com/yenilenebilir-enerji/karbonsuz-gelecek-101-yenilenebilir-enerji-nedir>
- https://fbe.bingol.edu.tr/programlar_/yenilenebilir-enerji-sistemleri/