COURSE: CONSUMPTION OF RENEWABLE ENERGY

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THEME:

- ***RENEWABLE ENERGY***,
- *SUSTAINABLE HOUSING*,
- *SUSTAINABLE FOOD SYSTEM*,
- *CIRCULAR ECONOMY:*
  - *DESIGN AND PRODUCTION*,
  - *CONSUMPTION*,
  - *RECOVERY AND WASTE MANAGEMENT*.

MODULE: ***RENEWABLE ENERGY***

SESSION:

LECTURE TOPICS:

1. GENESIS AND TYPES OF THE RENEWABLE ENERGY SOURCES,
2. EUROPEAN, GOVERNMENTAL AND LOCAL AUTHORITIES INSTRUMENTS TO ENCOURAGE HOUSEHOLDS, COMPANIES TO INTRODUCE RENEWABLE ENERGY SOURCES
3. GOOD PRACTICES RELATED TO RENEWABLE ENERGY SOURCES IN EUROPEAN COUNTRIES

TARGET GROUP: SEE MEMBERS, STUDENTS, HE TEACHERS

INTEGRATION INTO CURRICULUM: possible integration into the course: „sustainable production and consumptions“ on Barchelors‘ and Masters‘ degree in the field of Social Economy; the element of the diploma seminar’s subject

LEARNING OUTCOMES: *maximum 5 learning outcomes based on Bloom’s Taxonomy in terms of students´* ***knowledge, comprehension, application, analysis, synthesis***.

- Knowledge: to explain the importance of renewable energy sources in reducing fossil fuel consumption,
- Comprehension: to understand how using renewable energy sources helps reduce air pollution as opposed to using fossil fuels as energy sources,
- Application: to provide the achievable actions taken up governments, enterprises and households to develop renewable energy sources,
- Analysis: to analyse the benefits of taken up renewable energy sources,
- Synthesis: to ditch fossil fuel energy in favour of renewable energy to reduce carbon emissions, become independent of fossil fuels and increase energy security.

LECTURE OBJECTIVES:

The aim of the module is to explain the importance of renewable energy sources for improving the quality of the environment, people's living conditions and socio-economic development.

LECTURE DURATION: 25 LESSONS HOURS (10 HOURS WITH TEACHER & 15 HOURS SELF-LEARNING)

GREEN SKILLS ADDRESSED: (KEEP RELEVANT ONES FROM THE LIST) DESIGN SKILLS, LEADERSHIP

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SKILLS, MANAGEMENT SKILLS, **CITY PLANNING SKILLS, LANDSCAPING SKILLS, ENERGY SKILLS**, **FINANCIAL SKILLS**, PROCUREMENT SKILLS, WASTE MANAGEMENT SKILLS, **COMMUNICATION SKILLS**

SDGS ADDRESSED: GOAL 7: AFFORDABLE AND CLEAN ENERGY, GOAL 12: RESPONSIBLE CONSUMPTION AND PRODUCTION, GOAL 13: CLIMATE ACTION.

LECTURE DEVELOPMENT

BEFORE: *preparation prior to the lesson*

CONSIDER WHAT ENERGY SOURCE YOU USE TO CHARGE YOUR CELL PHONE

INTRO: *ideas for activating the student's background knowledge or ice breaker*:

BASED ON A GROUP DISCUSSION, CONSIDER HOW THE ENERGY THAT POWERS YOUR CELL PHONES IS PRODUCED, AND THEN WHETHER THE PRODUCTION OF THIS ENERGY CONTRIBUTES TO ENVIRONMENTAL POLLUTION. IF SO, IN WHAT WAY.

DURING:

1. **GENESIS AND TYPES OF THE RENEWABLE ENERGY SOURCES**

TIME	**TYPE OF ACTIVITY**	**LEARNING ACTIVITIES**	**(VISUAL) AIDS**
45 minutes	reading	reading scientific materials about history of the use of energy from various sources for human needs /i.e.: (The history of energy https://www.nationalgrid.com/stories/energy-explained/history-of-energy)	hard copy or digital version of materials
20 minutes	writing	list what humans use energy sources for	Paper and pencil/ computer
25 minutes	discussion	discussion in small groups about benefits and costs are associated with the most popular energy sources, i.e. those based on fossil fuels, arrange them according to the following categories: human, environment, economy on flipchart and share with class	Paper and pencil/computer, flipchart
45 minutes	reading	reading scientific materials about importance of renewable energy sources for improvement the quality of environment /i.e.: Petrović-Ranđelović M., Kocić N., Stojanović-Ranđelović B.(2020)	hard copy or digital version of materials
25	writing	find the newest data about using energy from renewable energy sources, taking into account types of renewable energy sources in member states of the European Union, /i.e: (Eurostat, OECD data)	Paper and pencil/ computer
20	discussion	discussion in small groups about the current situation in development of renewable energy sources in EU countries, presentation the result for class	Paper and pencil/computer, flipchart

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2. **EUROPEAN, GOVERNMENTAL AND LOCAL AUTHORITIES INSTRUMENTS TO ENCOURAGE HOUSEHOLDS, COMPANIES TO INTRODUCE RENEWABLE ENERGY SOURCES**

TIME	TYPE OF ACTIVITY	LEARNING ACTIVITIES	(VISUAL) AIDS
45 minutes	reading	reading materials about the European Union engagement in the development of the renewable energy sources in member states /i.e. (Renewable energy https://energy.ec.europa.eu/topics/renewable-energy_en)	hard copy or digital version of materials
45 minutes	writing	Write the most well-known government, local government support instruments for the development of renewable energy sources in your country and the entities to which they are dedicated	Paper and pencil/computer,
45 minutes	discussion	discussion in small groups about what social, economic and environmental barriers may be associated with investments in renewable energy sources in local level, analysis on the flipchart	Paper and pencil/computer, flipchart

3. GOOD PRACTICES RELATED TO RENEWABLE ENERGY SOURCES IN EUROPEAN COUNTRIES

TIME	TYPE OF ACTIVITY	LEARNING ACTIVITIES	(VISUAL) AIDS
45 minutes	reading	reading materials about innovative projects implemented in different countries of the world related to renewable energy sources /i.e. (M.B. Galagher (2019)	hard copy or digital version of materials
25 minutes	writing	what the issue of investment in modern technological solutions related to	Paper and pencil/computer,

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		renewable energy sources is dependent	
65 minutes	discussion	discussion about local authorities, social communities, enterprises, social enterprises, and other subjects, that are taking steps to develop renewable energy sources based on case studies prepared in advance, then answer the questions: - whether the analyzed examples can be incorporated in all local conditions - What support would be required for social enterprises to invest in renewable energy sources	Paper and pencil/computer, flipchart
15 hours	homework	See below	Paper and pencil/computer,

BEYOND:

Homework: Prepare materials on the history of the development of investments related to renewable energy sources in your country, indicate what kind of renewable energy sources are the most popular and what this is due to, indicate what entities are investing in such solutions, and then find information on the most innovative projects that are being implemented.

Assessment: A written report after the assignment will be reviewed by the course leader.

Recommended additional materials: *any website or video material that can be provided as additional material, categorize them (website, video, podcast, etc. and include a description of the material, e.g. TED Talk about creative thinking and turning harmful pollution into something useful:*

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1. **Webpages**:

Statistics of renewable energy sources
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics

Renewable energy
https://energy.ec.europa.eu/topics/renewable-energy_en

Types of renewable energy sources
https://www.edfenergy.com/for-home/energywise/renewable-energy-sources

Renewable energy explained
https://www.eia.gov/energyexplained/renewable-sources/

What is renewable energy?
https://www.un.org/en/climatechange/what-is-renewable-energy

The history of energy
https://www.nationalgrid.com/stories/energy-explained/history-of-energy

How have the world's energy sources changed over the last two centuries?
https://ourworldindata.org/global-energy-200-years

The Multiple Benefits of Energy Efficiency and Renewable Energy
https://www.epa.gov/sites/default/files/2018-07/documents/mbg_1_multiplebenefits.pdf

The 200-year history of mankind's energy transitions
https://www.weforum.org/agenda/2022/04/visualizing-the-history-of-energy-transitions/

M.B. Galagher (2019). The race to develop renewable energy technologies
Mechanical engineers rush to develop energy conversion and storage technologies from renewable sources such as wind, wave, solar, and thermal, https://news.mit.edu/2019/race-develop-renewable-energy-technologies-1218.

2. **Scientific papers (on-line available):**

Ellabban O., Abu-Rub H., Blaabjerg F. (2014). *Renewable energy resources: Current status, future prospects and their enabling technology*. Renewable and Sustainable Energy Reviews, No. 39, pp. 748-764.

Majida L. H., Majidb H. H., Husseinc H. Fawzi (2018). *Analysis of Renewable Energy Sources, Aspects of Sustainability and Attempts of Climate Change*. American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS), Volume 43, No 1, pp 22-32.

Marks-Bielska R., Bielski S., Pik K., Kurowska K. (2020). *The Importance of Renewable Energy Sources in Poland's Energy Mix*. Energies.

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Petrović-Ranđelović M., Kocić N., Stojanović-Ranđelović B. (2020). *The importance of renewable energy sources for sustainable development*.Economics of sustainable development, Vol. 4, july-december 2020, № 2, pp.5-14.

Sørensen B. (1991). A history of renewable energy technology. *Energy Policy* Volume 19, Issue 1, January–February 1991, pp. 8-12.

Turkenburg W.C, World Energy Assessment: Energy and the Challenge of Sustainability. Chapter 7: Renewable Energy Technologies

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