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Towards a Sustainable Future through Renewable Energies at Secondary School: An Educational Proposal

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Abstract: A compilation of innovative educational activities to work on concepts related to the production of electrical energy is presented. To approach the real-life secondary education curriculum, they are grouped to be performed during a week denominated Renewable Energy Week: an educational proposal aimed to promote the respect for the environment through the insight on Sustainable Development Goals (SDG) and renewable energy sources. The students would build and perform low-cost experiments so as to deeply understand the essence of energetic transformations, as well as electricity generation. Learning by discovery, collaborative learning and experimentation, are the methodological pillars that characterize Renewable Energy Week, since they have been proven to be efficient methodologies to promote students' learning. Innovative techniques for pupils evaluation are employed, including a rubric, *Socratic* application and a set of sheets regarding experiments. Through this educational proposal, the students are expected to achieve a deep understanding of some key concepts related to electricity and awaken their interest in scientific subjects, making them conscious of the transition to sustainable development that our planet urgently requires. At the same time, this project offers to teachers a series of experiments and innovative activities to work on the SDG in Physics, Chemistry and Technology subjects.

Keywords: low-cost experiments; Sustainable Development Goals (SDG); renewable energy; secondary education; collaborative learning; *Socratic*



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1. Introduction

Current society model leads us to reconsider certain aspects about how we are living. "Education" and "Environment" are two of the main concerns at the present and they are closely tied. There is an international responsibility about promoting, from early stages of education, the awareness related to sustainable development [1]. The goal of living on a sustainable planet strongly depends on the education of future citizens in the values of sustainability and respect for the environment.

In this last decade, those issues has been specified through the establishment of Sustainable Developments Goals (SDG) proposed by the United Nations [2].

SDG are composed by a set of statements intended for all world population, aiming to improve both fields previously mentioned, among others. The SDG number 4 that states: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", and the SDG number 7: "Ensure access to affordable, reliable, sustainable and modern energy for all" are the major driving forces behind this article.

As Martínez-Borrego et al. [3] establish, energy is a key concept of sustainability within environmental education. She concludes that although energy is a wide concept within Spanish curriculum more action is required to promote sustainability at all stages of the education. Thereby, learning how energy generation systems work, their advantages and shortcomings and improvements will likely contribute to create a sustainable society.