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ALMIA Educativa as an educational strategy towards an effective energy transition of a rural village

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TOPIC: TEACHING INNOVATION AND DIGITAL EDUCATION TOOLS

1. Introduction

The 2030 Agenda for Sustainable Development [1] was adopted in 2015 by the United Nations (UN) and its member states with the main objective of providing a path to protect the planet from degradation and to people prosperity and world peace. A total of 17 Sustainable Development Goals (SDGs) are included in the agenda, with specific targets and actions to achieve this ambitious overarching goal. In Sustainable Development the person is key for policies and efforts to improve conditions in each social context. The three key aspects to consider are: (i) the promotion of remote human and socially equitable development for all humanity based on inclusion, (ii) the guidance of economic development at the service of human development, and finally, (iii) the promotion of responsible use of the planet's natural resources [2].

The fast growth of population in large urban areas is expected to generate or aggravate many problems related to citizen insecurity, energy and water supply, excessive production and over-consumption, waste generation, etc. At the same time, access to affordable, reliable, sustainable, and modern energy for all people living in rural areas must be ensured. Education is a fundamental tool to build sustainable societies actively involving all citizens in the sustainable development.

The objective of this paper is to describe the ALMIA project as a strategic plan for the transformation of a small village called Almatret (Catalonia, Spain) towards sustainable development as a net positive energy and sustainable village, aligned with the implementation of the 17 SDGs. This paper focuses on ALMIA Educativa as an educational strategy to make the energy transition effective in the rural village.

2. Contextualization and description of the experience

Almatret is a village with a surface area of 56.83 km² and around 300 inhabitants, located in Catalonia, in the northeast part of Spain (Figure 1) [3]. Although coal mining was the main activity in Almatret during the 19th century, when Almatret had a population of about 2000 inhabitants, nowadays this activity was completely replaced by agriculture and livestock industry, mainly pork industry. Instead, other energy sources are growing in importance, such as wind and photovoltaic energy.



Figure 1. Location of Almatret (Spain).

ALMIA is a very ambitious project aimed at transforming the village into a reference center for the experimentation and dissemination of knowledge related to energy, and especially to renewable energy sources. Due to its geographical location, as well as all the landscape and cultural heritage, Almatret aims to become a reference that combines the experience of ecotourism with education in sustainable development. Four main areas of action – education, renewable energy, research and development, and tourism – are integrated to address the main socio-economic and environmental challenges of the village.

3. Results and discussion

Within the action area related to education, called ALMIA Educativa, a strategic pedagogical plan was deployed to promote the empowerment of the community to make inhabitants protagonists of the energy transition of their community. The commitment to open innovation pulls citizens as participants in the advances in research in energy systems as well as the proposal of the Energy Interpretation Center (EIC) and the ALMIA museum.

The objectives of EIC are, among others:

- (i) To promote education in renewable energy and energy efficiency.
- (ii) To contribute to formal and non-formal participatory scientific education and open to all public.
- (iii) To preserve and value the scientific, industrial, and technological heritage and its integration with the territory.
- (iv) To disseminate, communicate, and enhance the research and innovation activity in the field of renewable energies.
- (v) To investigate energy efficiency technology solutions in a participatory way.
- (vi) To act as a benchmark for social cohesion, integration, and sustainability for the municipality of Almatret.

This interpretation center is based on the inclusion of contextualization elements of the existing active energy facilities such as the wind farm and photovoltaic solar installation, as well as the recovery of the territory heritage. It will also have a museum area with exhibition, educational, and research programs that allow the carrying out of education, communication, and heritage preservation activities. The creation of a research program for the generation of integrated

solutions for renewable energy and energy efficiency and the possible application of these solutions in the municipality will allow the transfer of knowledge in this area and the participation of citizens in the innovation process. The technological facilities that currently exist in Almatret are the best starting point for the visitor to find inspiration in the curiosity for science and technology, in formulating questions about the impact on their past and present life, thus stimulating reflection and knowledge. EIC, in short, is an open and public space dedicated to scientific and technical knowledge, based on rigor, credibility, accessibility, and understandability.

The pedagogical paradigm that frames the ALMIA proposal focuses on the empowerment of citizens [4,5] as active actors of the project, generating a committed implication and running with responsibility. This citizen empowerment begins with the generation of a promoter group that helps to start this community process. The promoting group is made up of specialists and experts in the field (teachers and researchers) as well as technicians from the local administration. This promoter group will guide the community diagnosis phase, prioritizing the intervention strategies, planning the actions that will be put into practice to finally evaluate the process and the impact. It is very important that the inhabitants of Almatret know about the project and are involved in all phases of development. The promoter group encourages this participation, but at the same time it must establish a network of entities and organizations that help to disseminate, implement, and consolidate the project. ALMIA is planted from its socio-educational aspect as an example of community development with the involvement of citizens. At present, educational activities for schoolchildren have already been generated, educational material has been generated and different practical workshops have been piloted. All this begins an educational and scientific tourism [6] oriented to the interpretation of the different sources of energy that exist in the municipality.

Different activities were carried out so far, such as: training workshops for non-university students, visits and specific routes through the municipality, dissemination and outreach sessions for the inhabitants of the municipality, seminars for lecturers of different educational stages, and specific training on scientific communication for undergraduate students (Figure 2). Moreover, one of the projects implemented at the University of Lleida within the framework of ALMIA, focusing on training of undergraduate students towards scientific communication to the society, received in 2020 the Jaume Vicens Vives award for teaching quality in collective mode (awarded by the Generalitat de Catalunya).



Figure 2. Activities organized within the framework of ALMIA: (a) workshop for lecturers, (b) activities for secondary school students, and (c) Vicens Vives award.

For the Almatret municipality, the correlation between ALMIA Educativa and the SDG #4 (Sustainable Development Goal #4) is important. This SDG aims at considering education as an

integral element of sustainable development. ALMIA Educativa has generated, and is generating, educational and training activities for and in favor of sustainable development. The first results are the high interest risen within the local schools to participate (while in 2021 four schools participated in ALMIA Educativa, in 2022 more than 15 schools have applied to participate). A recently published paper [7] shows the relation between ALMIA and the United Nations SDGs.

First results from the museum part of the ALMIA project is the addition of value to the scientific and technological dimension. Inhabitants will contribute to the creation of a local inventory of heritage resources (natural and cultural, tangible and intangible). Other additions to consider are:

- To contribute to a formal and non-formal science education that is both participatory and open to the public.
- To preserve and value the scientific, industrial, and technological heritage and its integration with the territory. It would try to revalue the heritage of the municipality of Almatret.
- To disseminate, communicate, and value research and innovation activity in renewable energy matters.
- To investigate energy efficiency technology solutions in a participatory way.
- To act as a benchmark for social cohesion, integration, and sustainability for the municipality of Almatret.

4. Conclusions

This study deals with the transformation process of a small rural village towards a sustainable development, aimed at the activation of the local economy and mitigation of the negative effects of rural depopulation. To achieve this objective, ALMIA project was launched to contribute to the improvement of people standard of life in line with SDGs included in the 2030 Agenda.

ALMIA promotes networking, not only with surrounding municipalities and institutions, but also with scientific experts from the University of Lleida. This networking helps to share information, resources, processes, consolidates the commitment between actors, etc., increasing the chances of success. All this arises from the distributed leadership exercised by the municipal council in decision making and in the development of the work, which provides greater flexibility and agility in all processes and much more efficient results.

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