Improving Eco-social Literacy Using Spanish Media Coverage of the EU's Clean Energy Strategy

María-Luisa de Lázaro-Torres, Miguel-Ángel Puertas-Aguilar, and Javier Álvarez-Otero

Abstract Sustainable Development Goals represent a collective effort to achieve a better future for the world. Specifically, a clean energy transition requires eco-social literacy to improve in relation to Sustainable Development Goal 7: to ensure access to affordable, reliable, sustainable and modern energy for all. Thus, it seems appropriate to clearly identify the key concepts that everyone should know in order to efficiently make the clean energy transition. The method employed in this study to introduce citizens to the topic has drawn on Spanish press coverage on clean energy over the last two years. MyNews data base, a digital archive of modern printed press in Spain, has provided us with access to 66 different journals to identify 'clean energy key words', and the information obtained has been cross-referenced with BBC web page information, the New York Post, Washington Post and various European Union and International Energy Agency reports, among others. Thus, it has been possible to observe how the European Union's (EU) is leader on environmental, technological, investment and employment actions on clean energy transition. The two key questions to collect main concepts from the press have been: has the socio-economic effort been sufficient? And: what are the main challenges for a clean energy transition? The response has included reference to the latest EU regulations and the relevant emerging debates and controversies. The main themes that the press have addressed included the problem of renewable energy storage, how to obtain energy from what used to be waste (such as poultry manure or brine from the desalination of seawater), how to favour the circular economy, and other experimental initiatives, such as biopropane production and decarbonization in the tertiary sector (tourism

M.-L. de Lázaro-Torres (✉)
Departamento de Geografía, Facultad de Geografía e Historia, UNED, Paseo de la Senda del Rey 7, 28040 Madrid, Spain
e-mail: mllazaro@geo.uned.es

M.-Á. Puertas-Aguilar
International Doctoral School of the UNED (EIDUNED), C/de Bravo Murillo, 38, 28015 Madrid, Spain
e-mail: mpuertas48@alumno.uned.es

J. Álvarez-Otero
Facultad de Educación, UNED, C/Juan del Rosal, 14, 28040 Madrid, Spain
e-mail: j.alvarez.otero@madrid.uned.es

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and transport). This paper also asks whether clean energy can be a good option for decarbonization in the context of growing energy poverty. Taken together, this information made it possible to pin down the main concepts required to train citizens in eco-social literacy and to weigh up its pros and cons in an informed way.

Keywords Geography · SDG7 · Energy transition · Clean energy · Decarbonization

Introduction

The world has an energy deficit. There are areas that still do not have access to modern electricity, affecting 759 million people in 2019; three quarters of whom live in sub-Saharan Africa (United Nations 2021). While the world is moving to adopt clean, renewable energy sources, many people in developing nations still struggle to obtain access to reliable electricity and safe cooking and heating fuels. (https://www.bbc.co.uk/bitesize/guides/zffqjsg/revision/1). This energy deficit, still experienced in many areas of the world, means that energy consumption continues to increase globally.

Sustainable Development Goal 7 (SDG7) advocates access to modern energy for all that is affordable, reliable and sustainable (Table 1).

To achieve SDG7, it is necessary to redouble efforts to accelerate energy efficiency and renewable energy actions, especially in the heating and transport sectors (UN 2021). However, in the EU, the efficiency brought about by technology and energy saving policies designed by governments might reduce consumption, and contribute to the energy transition, i.e. the progressive abandonment of fossil fuels and their replacement by clean energies.

Clean energy technology is becoming a major new area for investment and employment–and a dynamic arena for international collaboration and competition. The term 'clean energy' incorporates different dimensions (International Energy Agency 2021):

(a) In power: generation from renewable sources, nuclear and fossil fuels fitted with carbon capture, utilization and storage (CCUS); battery storage; and electricity grids.
(b) In efficiency: efficiency in buildings, industry and transport (excluding aviation bunkers and domestic navigation).
(c) In end-use applications: direct use of renewables; electric vehicles; electrification in buildings, industry and international marine transport; use of hydrogen and hydrogen-based fuels; CCUS in industry and direct air capture.
(d) In fuel supply: in, for example, low emissions.

The possibility of reducing greenhouse gas emissions has been boosted by the drastic decrease in energy consumption during the COVID-19 period, especially in transport. To this end, the EU is creating funds for post-pandemic economic reconstruction with a clear focus on the renewable energy sector (Diario de Noticias, 14/02/2021), such as the Next Generation EU (NGEU) fund. These funds seek to

Table 1 Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all: goals and indicators

Goals and targets (from the 2030 agenda for sustainable development)	Indicators
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity
	7.1.2 Proportion of population with primary reliance on clean fuels and technology
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in total final energy consumption
7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems
7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and landlocked developing countries, in accordance with their respective programmes of support	7.b.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)

Source Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development. E/CN.3/2022/2 (United Nations 2022)

contribute to the shift from decarbonization to clean energy (La Voz de Almería, 9/06/2021), thus promoting the energy transition process. In this context, the reduction of greenhouse gases (carbon dioxide, methane and nitrous oxide, among others) is aimed at slowing climate change.

One way of measuring this achievement is via target 7.2: by 2030, increase substantially the share of renewable energy in the global energy mix. The S&P Global Clean Energy Index since 2007 has aimed to track companies that produce energy from solar, wind, hydro, biomass and other renewable sources, as well as companies that build and provide clean technology to measure the performance of companies in global clean energy-related businesses from both developed and emerging markets (S&P Global Clean Energy Index 2022). This Index comprises around 100 energy groups with environmental and sustainability criteria, which investment funds use to create their investment portfolios. Being part of the Index automatically means more 'upside potential' on the stock market, so any change in the index conditions the companies in the sector, which struggle to achieve certain parameters aimed at improving transparency. The methodology includes market trends and sustainable

investment standards in order to be, and remain, among the companies considered in the Index (Miguel Ángel Patiño, Expansión, 21/10/2021). Thus, many companies within the Index, such as Italian Enel, French Engie and Spanish Iberdrola have experienced unprecedented stock market increases in recent years (Domínguez 2022). This competition to be part of the Index in itself contributes to a further reduction in the carbon footprint.

This Index, in addition to being very high in the middle of the pandemic, became very popular, and led to great interest in social media, especially in Switzerland, Italy, Germany, the UK, Canada, USA and Australia, according to data from Google Trends, as shown in Fig. 1.

The promotion of renewable energy sources is essential in the energy transition, but on the other side to the coin would be asked: Is it possible to only use renewable energy or are other energies labelled as 'clean' also good for decarbonization? Additionally, there is a growing problem of energy poverty emerging in the EU.

Thus, the discourse generated in relation to the energy transition in the press between 2020 and the beginning of 2022 has been the subject of this work, which aims to select the most important concepts that appears on press for eco-social literacy that all citizens should know in detail and the controversy about the clean energy concept. And in addition, how the various alternatives for achieving the energy transition appear in the press media. It deals with how energy-related issues and the ongoing energy transition are communicated in the press.

Together, all this information enabled us to identify the main concepts required to train citizens in eco-social literacy using relevant, detailed and balanced content.

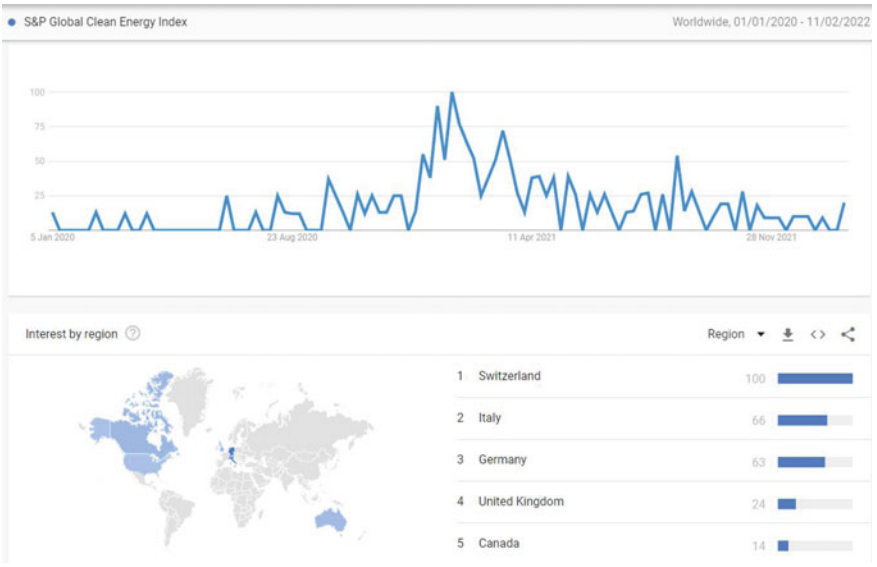

Fig. 1 Popularity of the S&P Global Clean Energy Index in Google search across the world, from 1/01/2020 to 11/02/2022. *Source* Google Trends (https://www.google.com/trends)

To this end, articles in the Spanish press on the increase in clean energy and related policies in the EU have been analysed. This information will be contrasted with various international media and different international reports that specialize in the subject.

Methodology

This study reviewed all the information related to clean energy from a selection of mass media to determine the current situation and identify the key related concepts that all citizens should know.

The information from the Spanish press was obtained from the MyNews database, from which, after a search for the term 'clean energy', the 95 articles that raised this topic in the context of the EU were selected. This involved examining over 66 different newspapers for a few months in each of the following years: 2020, 2021 and 2022.

This has been contrasted with information available from the BBC in the UK, where the key word searches have been 'clean energy' and 'renewable energy Europe', which refer to the EU. The Washington Post and The New York Post newspapers have also been analysed in a similar way, where the key phrase was: 'clean energy Europe'. These searches yielded the results shown in Table 2.

On this basis, the information was compared with reports from the EU and the International Energy Agency, among others, in order to obtain a global vision of EU policy in relation to clean energy and the most commonly used concepts that we consider to be of interest in terms of citizens' eco-social literacy.

Table 2 Data sources

Source (key words used in the search)	Years	Number of clean energy news articles (EU topic)
Spain's MyNews (clean energy)	2020 (October–December) 2021 (January–December) 2022 (January–February)	97 (32) 197 (33) 129 (30)
BBC (clean energy/renewable energy)	2020–2021–2022	290 (14)
New York Post (clean energy Europe)	October 2020–February 2022	341
Washington Post (clean energy Europe)	October 2020–February 2022	515

Results and Discussion

The energy transition is increasingly important in many European countries (e.g. Austria generates 79% of its energy from renewables, and Denmark generates 78% (La Vanguardia, 25/01/2021). For Spain, the figure is 43.6% in 2020 according to Red Eléctrica Española (REE) (El Economista, 27/05/2021). Germany is split between the Ruhr area's required energy transformation (BBC, 04/01/2020), and the need for all gas stations to also offer charging stations for electric cars (Washington Post, 11/02/2022).

In this research, the importance given in the most developed countries to zero emissions (which is the first step towards achieving SDG indicator 7.2.1: Renewable energy share in the total final energy consumption), stands out. To this end, new EU regulations have been developed, with the accompanying challenges and controversies, for example, in relation to nuclear energy. There are other unresolved problems, such as the storage of renewable energies, obtaining energy from what years ago was waste, such as poultry manure or brine from seawater desalination, among many other initiatives that favour the circular economy. Progress has also been made in the production of biopropane, decarbonization in the tertiary sector, in the hotel and catering industry, and in transport.

Thus, although the promotion of renewable energy sources is presented as the key to the energy transition, some of the social problems, such as growing energy poverty in the EU, will probably increase, for example, with the current war in Ukraine.

Finally, the information obtained will make it possible to detect the concepts identified, in order to train citizens in eco-social literacy.

Steps to Achieve Zero Emissions in the World and the EU Response

The leaders of the Group of Seven (G7)—that is the leaders of the world's most industrialized democracies (Canada, France, Germany, Italy, Japan, the United Kingdom, the United States and a representative from the EU)—for the first time in history have aligned their goals in the fight against climate change and adopted concrete measures to accelerate the transition to clean energy sources. Specifically, they have reached the following agreements: to end direct government aid to thermal power plants that have not adopted anti-pollution measures, as this is the largest source of greenhouse gas emissions in the world; to provide $2 billion to support the work of the so-called Climate Investment Funds, which help developing countries transition to clean energy by providing funds for technology, training and infrastructure; and to launch an Industrial Decarbonization Agenda to speed up innovation, the use of technologies and the harmonization of standards to convert cement and steel production into clean energy sectors (Diario de León, 13/06/2021).

In 2019, the EU adopted a classification system, known as a taxonomy, to determine what is considered sustainable (Díaz 2020). This is a cross-cutting standard for all current and future European sustainable finance regulations. This common European classification of environmentally sustainable economic activities should, in turn, make it possible to determine the degree of sustainability of an investment. Achieving the SDGs in the EU requires channelling capital flows towards sustainable investments. The Taxonomy Regulation was published in the Official Journal of the European Union on 22 June 2020 and entered into force on 12 July 2020—Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088 (Text with EEA relevance). The Taxonomy Regulation establishes six environmental objectives (Art. 9):

- Climate change mitigation
- Climate change adaptation
- The sustainable use and protection of water and marine resources
- The transition to a circular economy
- Pollution prevention and control
- The protection and restoration of biodiversity and ecosystems

At the same time, the European Green Pact has been established, which is a roadmap proposing zero greenhouse gas emissions by 2050 through the use of clean energy (La Rioja, Suplemento Agro 06/10/2020). This contains an action plan with 50 measures, which sought to reach 20% of energy consumption from renewables by 2020, but has achieved 22%. The quota is based on the initial situation of each country, with the Nordic countries starting from a higher level of renewable energy consumption (Sweden, with 49%, has reached 60% and Finland has reached 43.8%). On the other hand, France has fallen far short of this: although if energy from nuclear power plants is considered as green energy, it would reach the figure that corresponds to it (Planeles and Abril 2022). As an intermediate step, CO_2 emissions should be reduced to 40% by 2030 (Diari de Tarragona, 27/01/2022).

One of the energy sources that produces most greenhouse gas emissions is coal, which in the EU accounts for 15% of electricity generation (La Provincia Diario de Las Palmas, EFE, 03/02/2022). Hence, the decarbonization or progressive abandonment of fossil fuels and their substitution by clean energies is one of the main objectives of the energy transition. This energy transition should be based not only on environmental, technological, investment and employment efforts in clean energy, but also on policies and regulations (IRENA 2022). In relation to the latter, a report by the European Court of Auditors states that subsidies for energy produced by fossil fuels represent an obstacle to climate objectives, because they are slowing the energy transition; in fact, there are 15 EU countries that spend more on these subsidies than on clean energy (Esteller 2022).

In the same vein, the EU is collaborating with the "Race to Zero" global campaign launched in June 2020, which was designed for coalitions of companies, cities, regions and investors involved in net zero carbon initiatives, and affects over 20 economic sectors (UN 2021). In fact, the EU is leading the investment drive in

areas such as renewables, heat pumps, electric vehicles, green hydrogen and carbon capture systems (Cepeda 2021). In addition, the European Commission has proposed 10 new European partnerships with the EU and will provide almost 10 billion euros, to which the Member States will have to respond with an equivalent investment. Industry will also participate. This proposal has a double objective: to accelerate the transition to a green, climate-neutral and digital Europe, and to make European industry more resilient and competitive. This is intended to have a positive impact on employment, the environment and society in the long term. This proposal also aims to institutionalize European partnerships to improve the EU's preparedness and response to infectious diseases, develop low-emission aircraft for clean aviation, support the use of renewable bio-based raw materials for energy generation, ensure European leadership in digital technologies and infrastructure and make rail transport more competitive (ESTRATEGIA EMPRESARIAL 01/04/2021).

The Nuclear Energy Issues

The Spanish press regularly refers to the EU's historic energy transition and decarbonization through the renunciation of fossil fuels. Specifically, for Professor Rallo (2022), the problem is that current living standards depend on the availability of cheap energy sources, such that suddenly doing without them could condemn citizens to unimaginable impoverishment. The cost of achieving net zero emissions, according to a Nature study, would be over $10,000 per person per year.

Although the EU is aware that neither gas nor nuclear are climate-neutral or renewable energies, it defends their role as "transition activities" to achieve its goal of a decarbonized economy by 2050 (Diario de la Rioja, Reuters, 03/02/2022) without excessive cost. The Commission insists that nuclear power projects can be considered green if they have received permits before 2045 and are in a country that has a plan—and funds—to safely dispose of radioactive waste by 2050. As for gas, plants that emit less than 270 g of CO per kWh until 2031 or less than 100 g over their entire lifetime (Rodriguez 2022) will be eligible for the green label.

Any decision must be based on scientific evidence at all levels, mainly environmental and socio-economic, in order to minimize negative consequences. Thus, experiments such as those carried out to shorten the life of radioactive waste, for example, the transmutation or bombardment of waste with protons, may be influencing some of these decisions.

Table 3 lists some of the main reflections in the press. It also reflects the unresolved problem of nuclear waste, which experts such as Inés Gallego says is small, as she argues that it is perfectly stored and controlled, both in Spain and in the rest of the world (Rodríguez 2022; Navarro 2022).

Nonetheless the controversy relating to nuclear power plants continues, with countries adopting a variety of positions: Germany has begun to close three nuclear power plants (BBC 31/12/2021) and is maintaining another three; the UK has 16 and will build six more in the coming years; France has 80—although according to

Table 3 Food for thought on nuclear: yes or not?

Subject	Data	Source
Safety	Safety levels start from the design of the installation to the operating procedures and the training of operating personnel	El Economista (07/01/2022)
Deaths	Nuclear power plants: 0.07 deaths per terawatt-hour (including the Chernobyl disaster resulting from mismanagement, and Fukushima resulting from a tsunami) Wind: 0.04 deaths per terawatt-hour Natural gas: 2.8 deaths per terawatt-hour Coal: 24.6 deaths per terawatt-hour	La Razón (3/01/2022)
Accidents	The probability of a catastrophic accident in a nuclear power plant is in the order of 1 in 1,000,000,000 per year of operation; much lower than the risk in aviation	WASH-1250 Report, El Economista (07/01/2022)
Cleanliness		
Emissions CO2	Regarding CO_2 emissions into the atmosphere: Nuclear power plants: 3 tonnes per gigawatt-hour Wind: 4 tonnes per gigawatt-hour Solar: 5 tonnes per gigawatt-hour Natural gas: 490 tonnes per gigawatt-hour Coal: 820 tonnes per gigawatt-hour	La Razón (3/01/2022)
Waste	Difficulty of management. One plant generates 27 tonnes in a year and a half (Fernando M. Legarda, professor of Nuclear Engineering at the UPV/EHU). Renewable energies also generate waste, for example, windmill blades are chopped up and buried	El Correo (08/01/2022)
Price (average cost)	Wind and solar energy: between 32 and 49 euros MW/h Solar energy has decreased in price by 85% and wind energy by 50% in the last decade Nuclear power: between 61–148 euros MW/h Nuclear energy has experienced an increase in costs	Fernando Valladares and Eloy Sanz, published in the journal Climática Noticias de Gipuzkoa (12/01/2022)

Source Press articles

other sources there are 58 active nuclear reactors (El Periódico 17/01/2022)—which produce 70% of the energy consumed, and at a better price for electricity than in other countries. Outside the EU, China's energy policy stands out, as it has 16 power plants that will be increased in number in the near future (Triper 2022). Nuclear power plants account for 27% of the energy consumed in the EU (De Miguel 2022).

Nuclear energy is supported by France, the Czech Republic, Hungary and Finland, while Germany rejects nuclear energy but is in favour of gas in the transition towards decarbonization (El Segre 09/02/2022). Thus, there are different positions on nuclear power as a clean and green energy. Spain, Ireland, Denmark, the Netherlands, Austria and Luxembourg have expressed their disagreement (Lucio 2022). Some argue that the proposal is intended to provide the nuclear industry with funding that it would not otherwise receive (Rekondo 2022).

On the other hand, the gas crisis in Europe is likely to accelerate the transition to clean energy and the adoption of green hydrogen as a viable alternative to gas and oil, according to the International Renewable Energy Agency (IRENA). The development of green hydrogen, made from water and using renewable electricity, has become a political priority with the aim of achieving emission neutrality by 2050 (Hook 2022). In fact, Siemens Group is already working on hydrogen systems for railways (HOY, Diario de Extremadura, 30/10/2020; Ideal 29/10/2020). It is expected that the International Energy Agency forecasts on the global capacity of electrolysers to produce hydrogen from water will be met, rising from the current 0.2 GW to 3300 GW in 2070, which would represent double the electricity generated today by the whole of China (González 2020). In Spain, the hydrogen energy revolution is being pushed by a large number of companies: Iberdrola, Endesa, Naturgy, Repsol, Cepsa, Enagás, Red Eléctrica, Acciona and Redexis, among many others (Expansión, Patiño, 08/01/2022). The Independent newspaper (15/02/2022) states that Arcelor, Enagás, Fertiberia and DH2 will create the largest renewable hydrogen hub in the world through the HyDeal initiative.

The EU is still 70% dependent on fossil fuels (coal, oil and gas), most of which are imported, such as natural gas from Russia, Norway, Algeria and Qatar. Therefore, increasing local production of solar and wind energy as well as energy storage is essential in the EU. In this context, the EU Energy Commissioner Kadri Simson has said: "We face rising energy prices, not because of climate policy or because renewables are expensive, but because fossil fuel prices are rising when we still don't have enough green and affordable energy for all. We need to accelerate the green transition, not slow it down". However, the fact that the energy crisis and the energy transition have focused on the supply side (i.e. on energy sources, rather than on the demand side by promoting smart, energy-efficient systems), has prevented users from adjusting to fluctuating supply prices, making it difficult to stabilize demand and reduce bills for businesses and households. Coordination of clean energy supply and storage would avoid weather dependence on wind and solar, which is essential in phasing out fossil fuels. Short-term needs can be met by batteries, but storage for long-term needs is still unresolved. In this respect, natural gas or reversible hydropower plants represent possible solutions (Boscardin Ching 2021).

Ongoing Initiatives

Renewable Energy Storage: Lithium Batteries

Rechargeable lithium-ion battery production is key to building a green energy workforce. The batteries enable solar and wind energy to be stored, making it possible to use when the sun goes down and the wind stops blowing. Thus, a European Battery Alliance was established in 2017, which has established sweeping goals for manufacturing, charging infrastructure and electric-car uptake. Europe will have 17 gigafactories by 2030. Europe is also pursuing development of its own lithium mines, to reduce its reliance on imports. And last month, the European Commission said it would spend $3.5 billion to subsidize Tesla, BMW and other companies to produce more batteries in Europe and help cut imports from China (Jeanne Whalen, Washington Post 11/02/2022). In this line, we can cite the Swedish company Northvolt, Europe's leading electric battery company. (Expansión, 12/01/2022; Financial Times).

The Use of Manure from Poultry Farms

The Avienergy project, financed with nearly 600,000 euros from the European Fund for Rural Development (EAFRD) and the Spanish Ministry of Agriculture, Fisheries and Food, promotes the use of the millions of tonnes per year of droppings generated on poultry farms to obtain renewable energy and fertilizers. It is coordinated by Feuga (Fundación Empresa Universidad Gallega) and involves the University of Vigo, the Centro de Edafología y Biología Aplicada del Segura (Cebas-CSIC) and several companies from the Autonomous Communities of Galicia, Castilla y León and Murcia (Narón Demaux Manufacture S.L., Granja José Antonio García Blanco, Avícola El Charcón S.L. and Alimentos del Mediterráneo Sociedad Cooperativa…). The Vigo-based technology centre EnergyLab, a partner in the initiative, is creating small-scale plants on the farms themselves to recover the manure from chicken and turkey-fattening farms, known respectively as pollinaza and pavinaza, and reduce energy dependence on the poultry facility itself. In this way, this initiative differs from others, such as Spain's Coren, which combusts poultry manure with wood pellets, and others from abroad (the UK, Netherlands and USA). The generation of thermal energy is produced in the same way as the burning of a wood pellet, and it is possible to do so with a poultry manure pellet, once it has been dried or mixed with other forest biomass from the area as residual wood. At the conclusion of this preliminary phase at the Ourense farm, combustion tests will be carried out on the biomass produced for the generation of hot air and the conditioning of the warehouses by the Energy Technology Group (GTE) of the University of Vigo, which studies the thermal behaviour of the waste from a physicochemical perspective (i.e. the drying techniques and the different regulations applicable to the combustion of this type of waste). It is also collaborating in the design of a burner adapted to poultry droppings,

as well as in the definition and implementation of flue gas cleaning systems. After the analysis of emissions from the process, the need to implement additional flue gas cleaning systems for regulatory compliance will be assessed. Experts will evaluate the toxicity of the ashes produced by the combustion process of poultry and chicken manure, and their potential use in soils and will develop the agricultural protocol for their use—since the legislation in Spain establishes a maximum of tonnes of nitrogen present in manure per hectare of agricultural land, which forces its storage in areas of high livestock load, generating diffuse emissions—and manage it externally, with the cost that this entails. Furthermore, if this management is not carried out correctly, problems of aquifer contamination, ammonia dispersion and bad odours may arise (Faro de Vigo 21/09/2021).

Along the same lines, but in this case from the use of pig slurry, a fertilizer with high value or biomethane (bio-CNG) is obtained for use as fuel in vehicles or in the heating boilers of municipal facilities, although it can also be distributed through the natural gas network. Thus, the Advisor project has succeeded in transforming livestock waste into methane biofuel for vehicles that can be refuelled in a 'biogas station' at the Guijelo sewage treatment plant. There are currently nine such vehicle refuelling stations in Spain, six of which have been developed by Aqualia (Chiclana de la Frontera, Jerez, Almería, Lérida, Guijuelo and Granada) (González 2021).

Energy from Brine from Seawater Desalination

Sacyr Agua and the Life Hyreward project obtain clean and renewable energy through a combination of reverse osmosis and reverse electrodialysis or RED (Reverse Electrodialysis) from brine from water desalination. In this way, up to 20% of the energy used in the reverse osmosis process of seawater is recovered by using the osmotic gradient between the high-salinity feed stream and the wastewater treated as a low-salinity stream to generate electricity (El Economista 04/01/2022).

The Production of Biopropane, or Renewable Propane

This is based on the fact that it is chemically identical to conventional propane, so that a complete switch from one product to the other does not require any adjustments to existing installations, and it is also possible to mix the two products. Biopropane is produced from a mixture of food industry waste and vegetable oils with a lower environmental impact (emission reductions can be up to 80%), as it is completely organic in origin. It is the only propane gas that complies with the European Renewable Energy Directive (RED). As it is liquefied at high pressure, it is easy to store and transport, making it accessible in rural areas not connected to the natural gas network. In this way, the energy transition is global and inclusive, as it can also contribute to the progress and development of rural areas (El Economista 15/06/2021).

Decarbonization in the Tertiary Sector: Hotels and Transport

Meliá hotels—which use renewable energy sources in 100% of their hotel facilities in Spain, France, Italy, Germany and the United Kingdom—are the most sustainable hotel company in Spain and Europe and the second in the world behind Hilton, according to S&P Global (Expansión 02/02/2022).

In air transport, Iberia is partnering with Cepsa to promote renewable energy (El País 25/01/2022). In rail transport, we can highlight the FCH2RAIL proposal selected by the European Commission's agency dedicated to promoting the development of hydrogen and fuel cells, which is technically led by the Basque group CAF, for the development of a hydrogen-powered train prototype. This involves Spanish, Belgian, German and Portuguese companies (CAF, DLR, Renfe, Toyota Motor Europe, Adif, IP, CNH2 and Faiveley Stemmann Technik). The project is expected to last around four years and has a budget of more than 14 million euros, of which around 70% will come from European funds. The prototype will be based on a three-car Renfe commuter train (Cao 2020). Mobility of the future is based on four trends: electrified, shared, connected and autonomous (El Economista 30/10/2020).

Amazon is preparing to power its logistics network in Spain with solar energy, which is expected to provide 302,000 MWh of clean energy per year, the equivalent of the average consumption of 30,000 homes, in Seville and Zaragoza, complemented by wind energy in six facilities to be set up in Europe, starting with Sweden and Ireland (El Economista 19/11/2020 and 11/12/2020).

In the field of micromobility, the solar pavement of the company Solum consists of a conventional module that is a photovoltaic panel to which a series of materials are added that are capable of transforming the module into pavement, which is what provides clean energy for micromobility (scooters, bicycles and mopeds) without aesthetically affecting the urban environment and constituting an autonomous charging station that is not dependent on the electricity grid. Supported by several companies (Telefónica, Capital Energy, Naturgy and Iberdrola), they have installed projects in Seville, Valencia and Madrid. They also plan to set up projects in other Spanish cities, such as Barcelona, (now underway), Malaga, Valencia, Bilbao… and in Holland, France and Italy (EMPRENDEDORES 26/11/2021).

Promoting Renewable Energy Sources

Renewable energies are resources that do not run out in nature, do not pollute and are environmentally friendly. In terms of their origin or source, they are wind, solar, biomass, hydro, geothermal and tidal energy. The media are currently focused on those that have seen the greatest development in recent years, which are mainly wind and solar energy. There is also mention of offshore wind with different anchoring systems for floating wind turbines, on which Basque engineering companies such as Saitec are working, and the Flow offshore wind project, among many others (Legasa 2022).

Renewable energy sale and purchase contracts, mostly linked to photovoltaic energy, are very active in 2019, accounting for 2.6 GW in Europe (Díaz 2020). Ibiza has multiplied the number of photovoltaic installations tenfold in three years (Última hora 26/01/2022).

Renewable parks generate a large number of jobs during their construction, but not for their maintenance (El Periódico, 11/01/2022). 'Self-created renewable energy resources' also appear to be growing with initiatives such as the installation of solar panels on state schools (Información 21/01/2021) or on the roofs of people's own houses.

Thus, energy dependence seems to be shifting its centre of gravity from dependence on fossil fuels to metals such as lithium or copper, rare earth elements, batteries, electrolyzers to produce hydrogen, wind turbines or solar panels. All of these have components that are not homogeneously distributed, which will continue to lead to geopolitical problems (Bermúdez 2022).

The Other Side of the Coin: Energy Poverty

Energy prices in the UK, Europe and Asia have hit record highs in recent weeks triggering inflation concerns (Josephs 2021). Thus, energy poverty is emerging and initiatives such as the Alliance for Electrification, formed by some of the main associations related to energy in Europe (AVERE-the European Association for Electromobility, European Heat Pump Association, Eurelectric, European Climate Foundation, European Copper Institute, EuropeOn, The European Association of Electrical Contractors, Renewables Grid Initiative, smartEnsmart Energy Europe, SolarPower Europe and WindEurope), have sent a letter to both, the Vice-President of the European Commission, Frans Timmermans, and to the Commissioner for Energy, Kadri Simson, to directly support the most vulnerable households, especially those suffering from energy poverty. In this case, on a temporary and limited basis, the EU is allowing price intervention, with the possibility of structurally reducing taxes and levies on electricity bills and fully implementing the provisions of the Clean Energy Package to guarantee flexible consumption for all. These associations claim that electricity price rises have led national policy makers to react on a whim and intervene in the functioning of the market. This response to short-term price volatility undermines the EU emissions trading system, distorts the internal electricity market and derails the energy transition (El Economista 23/09/2021 Rubén Esteller).

EU legislation related to the electricity market is not being fully implemented in Spain, especially in the area of demand flexibility, which excludes the benefits of adapting consumption to these fluctuations.

This situation has prompted EU employers to call for an accelerated transition to clean energy to protect against fossil fuel price volatility. The EU Green Deal and the ambition of climate neutrality clearly point in this direction.

Eco-social Literacy: The Main Concepts for a Clean Energy Future

As previously mentioned, there are important concepts related to clean energy that all citizens should know. Some of these concepts come from media learning resources, while others are from information in the media itself.

The BBC Learning English web page offers key language terms related to energy (https://www.bbc.co.uk/learningenglish/english/features/lingohack/ep-211124) and highlights words such as renewable, clean fuel, plant, grid and fossil fuel, defining them as follows:

> renewable—something that does not degrade and can be used again and again.
> clean fuel—energy used for heat and power which is made using renewable sources.
>
> plant—a factory that produces energy or a particular product.
>
> grid—a system of wires and cables through which electricity is distributed.
>
> fossil fuel—organic matter which is burnt for energy

At the end of their list, the BBC adds a key question: what is used to produce green hydrogen?—in order to also introduce the idea of green hydrogen technologies.

However, this list of concepts is insufficient, as has been seen in the text. There are other concepts that are also important, such as renewable energies, clean energy, energy poverty, biopropane, circular economy, decarbonization and, of course, the units used for energy measures. In addition, there is a catalogue of colours related to the electricity's origin: green, if it is generated with renewables; blue, if it is generated with gas; and grey, if it is generated with hydrocarbons.

Conclusions

The method of using the press to bring citizens closer to the discourse generated in the media in relation to the energy transition and to identify the concepts used in it has been useful, as it contains different explanations of these concepts. The energy transition needs all citizens collaboration and it is important to know all details about it, and a better understanding of different countries and politicians positions that the press is explaining.

After the data collection, we can affirm that the EU is ahead of the intermediate target figures agreed in the European Green Pact and well ahead of other countries in the world, on which it depends energetically, although it remains to be seen whether it will be possible to reach zero emissions by 2050.

This energy transition, which can be described as accelerated in the EU, is based not only on the desire to curb climate change by reducing greenhouse gas emissions,

which accounted for more than 75% of emissions (European Green Deal 2022), but also on the need to protect against the volatility of fossil fuel prices.

It can easily be seen that energy generated by renewables is now competitive in the EU with all other forms of conventional generation. "If you push clean energy, energy efficiency, solar electric cars and other solutions, you don't need to use fossil fuels anymore, you simply switch to clean energy sources" (https://www.bbc.com/news/business-58901566).

However, many challenges remain in relation to technology, such as energy storage; and in governance, for example, improving efficiency and savings in demand and in the investments necessary for a satisfactory European energy transformation. It is still unclear, however, if the socio-economic effort made will be sufficient. We agree with Martín-Roda (2021) that it seems difficult, for the time being, to be able to produce all the energy demanded from clean and renewable energies, due to the mismatch between production periods and effective electricity demand. This leaves open the debate as to whether nuclear energy and gas will be necessary in the European energy transition, to which the armed conflict in Ukraine adds uncertainty.

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