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Energy Transition as a Pillar of Urgent Climate Change

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Abstract This article is intended as an urgent wake-up call to humanity and all its strata that time is running out to take serious and efficient compromising measures. The data from the latest studies shown in this paper leave no room for doubt. A society that demands more and more resources without seeking urgent solutions is a society doomed to failure. The current war between Russia and Ukraine has highlighted the interdependence of many countries on fossil fuels, thereby aggravating the environmental impact that will surely be felt in the coming years.

Keywords Climate change, Energy transition, Temperature, Greenhouse gases, Global warming

1. Objetives

The last United Nations Climate Change Conference held in Glasgow (United Kingdom) seems not to have provided interesting new data on the effective lowering of the greenhouse gas emissions curve. Apparently, and understanding the seriousness of the issue, there is still no real commitment among cities, economies and governments to become more decisively involved in developing processes that transform the different economies [1,21].

There have been several events that have increased society's alarm. The Intergovernmental Panel on Climate Change (IPCC) made a scientific assessment in August 2021 in which it stated that the alterations that had occurred in the planet's climate system were unprecedented and that some would even be irreversible [5,7,13].

On the other hand, the objective of the Paris agreement was that the temperature of the planet would remain well below 2℃ above pre-industrial levels, trying to limit the rise to 1.5℃. Now some experts point out that the most feasible scenario foresees an increase of around 2.5-2.7℃ and this data at the end of the century will depend on the role of society.

To achieve significant and rapid reductions in greenhouse gas emissions, it is necessary to move away from fossil fuels (coal, oil and gas).

The pandemic due to the coronavirus that has ravaged the planet in the last two years has shown that the confinement of the population and the shutdown of many companies led to sharp reductions in emissions for the first time in decades, but this has entailed an enormous social and economic cost [24,25].

An urgent energy transition must be carried out without delay to try to keep the planet's temperature within acceptable control limits, so that without stopping the economy, significant reductions in gas emissions can be achieved [2]. This will require citizens, in general, to commit themselves and become the real protagonists in all actions taken to achieve this objective.

The European Union has undertaken to achieve net zero emissions by 2050, i.e. to generate no more greenhouse gases by that date than can be absorbed by nature itself [3,22].

Achieving net-zero emissions requires an urgent and rapid energy transition with significant changes in the energy, transport, industry and food sectors [4,20]. With this energy transition, it will be possible to try to keep the temperature of the planet within acceptable control limits, so that significant reductions in gas emissions can be achieved without bringing the economy to a halt [9,15,19]. This will require that citizens, in general, commit themselves and become the true protagonists in all the actions carried out to achieve this objective.

2. Method

This section will analyze the evolution of emissions worldwide, the fossil fuels involved and the countries that most affect global warming of the planet with the aim of clearly stating where humanity is heading and the possible measures to be taken urgently [26,29].

If we add up all the pledges to reduce carbon dioxide emissions signed in the Paris Agreement, the world will still have higher temperatures above 3℃ by the time the end of this century arrives [27,28].

In recent years, scientists dedicated to studying climate change have rewritten the definition of what constitutes a "safe" limit to global warming. For decades, researchers on the subject have argued that global temperatures should not rise more than 2℃ by the end of the century if an irreversible impact is to be avoided.

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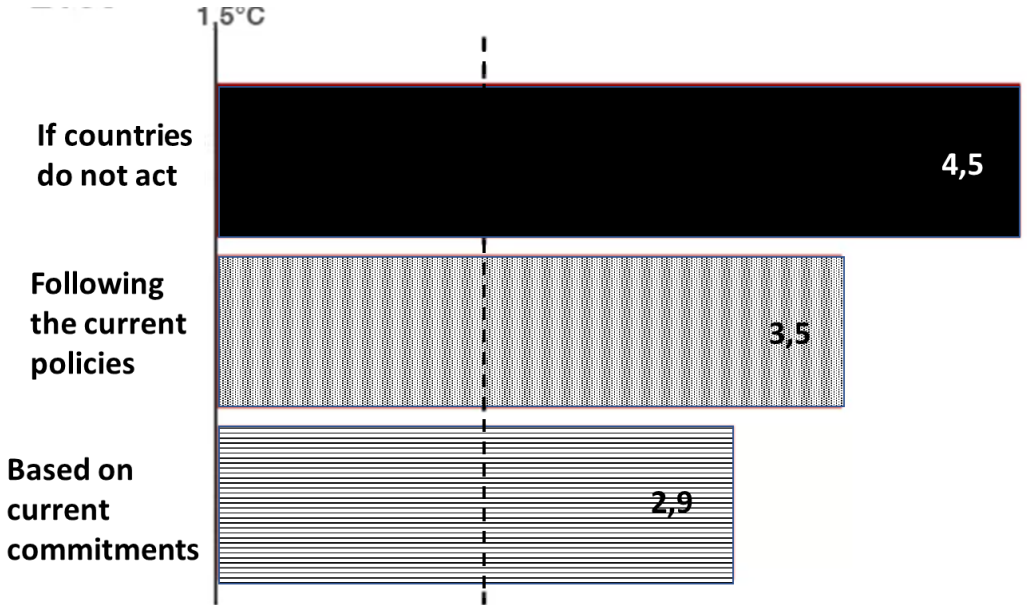

Figure 1. Average warming (℃) projected for the year 2100 (Source: Climate Action Traker)

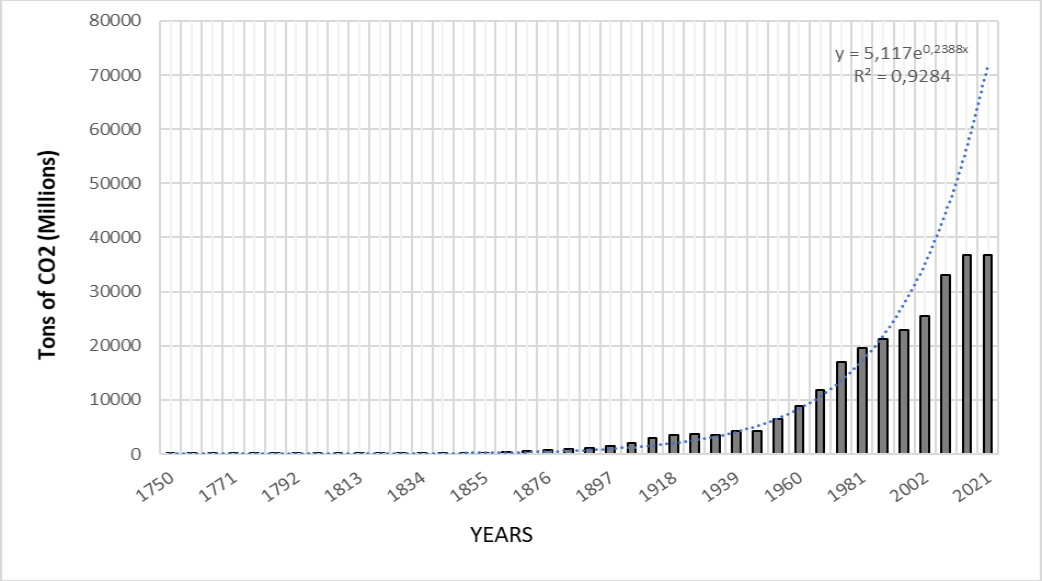

Figure 2. Evolution of global CO2 emissions from fossil fuels

Countries that signed the Paris Agreement pledged to keep temperatures below 2℃ above preindustrialization levels and to continue efforts to limit temperature increase beyond 1.5℃ [16,17].

Many scientists now agree that we really need to keep the temperature increase not below 2℃, but below 1.5℃ as demonstrated at the Glasgow Conference.

Figures collected by the company Global Carbon Project show an exponential increase in CO2 emissions due to fossil fuels since pre-industrial times. In 2020, a total of 34 billion tons of CO2 will be emitted worldwide.

A trend curve has been made with the recorded data of the evolution of emissions as shown in figure 2, obtaining as a fit an exponential curve of equation:

$$y = 5{,}117e^{0{,}2388\,.X}$$

and with a statistic value of R^2=0,9284.

It can also be observed that the adjustment of the trend line in the last years separates from the recorded data, where the trend of emissions appears more constant indicating a retention in the rise of emissions. Analyzing this, it could be thought that something is happening in the world, perhaps with the recent Paris and Glasgow Conferences, a greater concern and a more committed and serious taking of measures among all the countries, and especially in those that contribute more to the pollution of the planet, has been glimpsed.

It is important to analyze the contributions of each of the major pollutants and for this purpose the graph in figure 3 below has been included in the study.

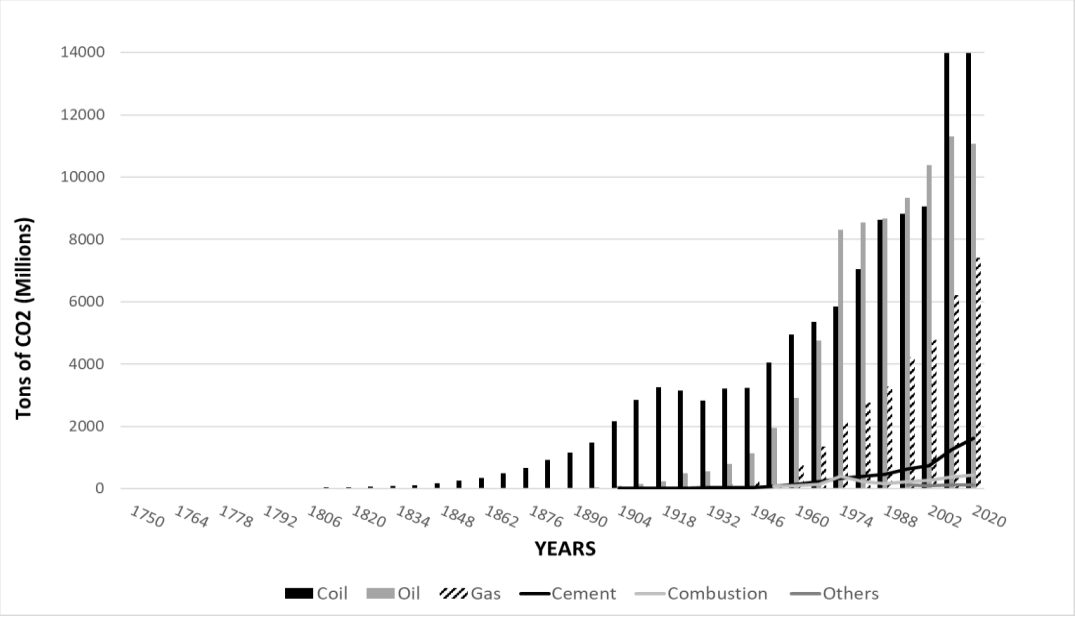

Figure 3. Evolution of global CO2 emissions by fuel type

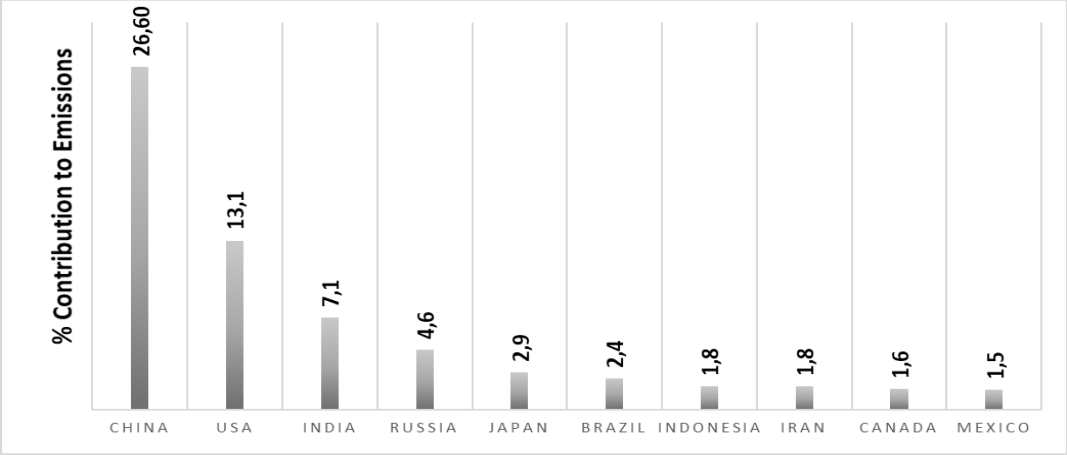

Figure 4. Major greenhouse gas emitters

Thus, coal is the source of emissions that has generated the most in recent years, with China, India and the United States being the countries with the highest figures. There has also been a considerable increase in the demand for gas and an increase, albeit less significant, in cement consumption.

According to these data, the countries with the highest CO2 emissions from fossil fuels in general (coal, oil and gas (industrial and combustion processes), the gas flaring process and cement manufacture) were China, the United States and India. Spain is among the top 35, a position from which it has dropped with respect to 2019, when it was among the 25.

The countries that emit the largest amounts of greenhouse gases, i.e. those causing global warming are by far China and the U.S. Together they account for 40% of total emissions on the planet, according to data delivered in 2019 by the European Commission and the Dutch Environment Agency.

In addition, methane and nitrous oxide concentrations have risen over the past ten years, according to observations from the World Meteorological Organization's Global Atmosphere Watch network, which has stations in remote Arctic regions, mountainous areas and tropical islands. CO2 has increased by 18.4%, methane by 13% and nitrous oxide by 9%.

It has been proven that the Arctic is warming faster than the rest of the world. In 50 years' time, mankind may regret the lives lost because at the time it preferred to have a functional economy sustained on toxic products.

There are doubts about the commitments made, especially by countries dependent on fossil fuels.

With the new technological era, digital is becoming more sustainable in virtually every sector. It is time to think about 'green algorithms', however, it could also happen that digital could take us away from nature [6].

In a largely capitalist world, more and more companies are joining the cause of reducing emissions, and they are doing

so more and more sincerely. The private sector is taking a more responsible role in all strategies. Not only do companies see it as important to be part of the fight against climate change, but their presence in major meetings and groups fighting the problem of global warming is increasingly valued [10,11]. Companies must do their part, but the whole economy must also participate [18,23]. More convergence is needed between the public and private sectors to facilitate the decarbonization of the most challenging industries, such as cement, steel and aviation. Businesses need a step change and this requires large-scale incentives. More ambitious targets must be set, developing industrial policies in sectors of the future that will make money in the post-fossil economy [30].

3. Discussion

The energy transition is an issue that cannot be solved simply and quickly. Public policy could be pushed forward in a decisive way, e.g. a planned renewable energy deployment strategy.

The shortage of materials, the slowdown in the internationalisation of the economy, the oil and gas crisis and the future water crisis must force governments to accelerate the commitment to renewable energies in part. This is an aspect of general public interest and critical for the future development of society, the economy and people, and therefore we, the citizens, expect and must demand more from our governments.But in the development of renewables, not everything goes. We must not relax our economic, environmental and social demands on renewable energy developments if we are to avoid making the same mistakes of the past.

Renewable energy is essential to lower energy prices, many installations are required to meet climate targets, there is not enough time to go through the ordeal of processing for more than three years, and some citizens are rejecting wind and photovoltaic projects in their villages... What to do?

There is no simple solution, and we all have a lot to do. We are moving into a new world, which requires imagination, leadership and commitment from those with public responsibility.

It requires solidarity and professionalism from private companies to know that, like any project, renewable installations are implanted in an environment and must be environmentally and socially compatible, and the population must assume that, for us to have clean and affordable energy, there need to be many more renewable installations in the fields, in elevations, on roofs, on building façades...

The United Nations has set the decade from 2021 to 2030 as the decade of action, which calls for accelerating sustainable solutions to the world's biggest challenges. Neither countries, nor the people who live in them as citizens, can miss the opportunity to contribute to a great leap forward in human history. Let us put our work and our energy at the service of the new social model, let us make the energy transition a path where no one is left behind, and let us make sustainable development a reality.

Alongside renewable energies, other technological developments are driving the energy transition. Increasing energy efficiency is another basic tool to achieve environmental goals in the most efficient (i.e. least cost) way. The uneven development of renewable technologies, which are more advanced in electricity generation, together with the increased efficiency of electrical energy, is driving an increase in the use of electricity as final energy, a process referred to as the "electrification of the economy". Finally, sustainability must guide this whole process, not only in terms of the energy system itself, but also in all its social ramifications, seeking to ensure that the welfare generated is inclusive and sustainable. Finally, it should not be forgotten that the energy transition is part of a series of mutually influencing social transformation processes. This paper points out that the main processes impacting the energy transition are the circular economy, Industry 4.0, the collaborative economy, demographics and urbanisation. As they are not motivated by the same causes and do not share the same agenda, these processes impact each other both positively and negatively. The search for synergies between them, such as greater efficiency in the use of materials and production processes derived from the application of the circular economy or the optimisation of generation assets thanks to Industry 4.0, will be key in the future of the energy transition and in the generation of sustainable competitive advantages in the different value chains. The scale of the transformation that the energy transition will bring about will create multiple windows and niches of opportunity from economic, environmental and social points of view. It will also lead to the need to adapt and modify production processes in many sectors that will be adversely affected by the transition and to put in place measures to mitigate the impact of the changes on certain economic sectors and segments of society.

The main results at the societal level are presented below from two different approaches: i) inequality, ii) impacts by social groups and vulnerable households.

In terms of inequality, lower income households have higher expenditures in proportional terms on electricity and heating, so improving energy efficiency allows them to improve their consumption and therefore lower inequality. However, this higher positive effect on inequality is offset by the also improved efficiency of private transport, which is consumed in higher proportion by middle-income households.

Impact on social groups: the main effect on households is caused by improvements in energy efficiency. Thus, household groups with higher proportional energy expenditures are more favoured. This is the case for single people without children. This group of households is made up of young people who spend a large part of their income on private transport. Thus, the strong improvement in the energy efficiency of the transport sector makes it easier for this group of households to increase their consumption to a greater extent. Single-parent families and retired families

deserve special mention, as they tend to be vulnerable households. These households are characterised by the fact that they spend a large part of their total consumption on electricity and heating. Thus, improving energy efficiency means that these groups are more favoured in the Target Scenario. Since the improvement in energy efficiency is driven by the improvement in transport, these households, although favoured by the Target Scenario, do not reach the impact found for single households without children.

The effect of energy efficiency by household type is also evident when households are distributed according to the age of the main breadwinner. As is the case for retired households living alone, older households spend a large part of their income on electricity and heating, so energy efficiency improvements allow them to spend more of their income on other consumption. As was previously the case for the group of single people living alone, this positive effect is more pronounced for younger households, as they benefit more from the significant improvement in the energy efficiency of transport. The impact of the energy transition is particularly relevant for those social groups that are more energy dependent. This is the case for groups of households living in rural areas. These households spend a significant proportion of their income on heating as they tend to live in colder areas. In turn, they also spend a significant proportion of their income on private transport, a major expense in rural areas for which they have little substitution capacity. Thus, improved energy efficiency means that households in rural areas benefit the most if we analyse the impact on households according to their level of urbanity.

Social opportunities of the energy transition

Alongside the economic and energy-environmental opportunities, there is a set of social opportunities linked to the profound transformation processes that are being set in motion within the energy transition process and the other processes of transformation of society mentioned in previous sections. Assessing these opportunities from an economic point of view is complicated by the difficulty of identifying quantifiable indicators.

Energy poverty. One possible consequence of changing the energy mix is an increase in energy costs, at least in the short to medium term. If, in a 100% renewable scenario, the marginal cost of electricity generation is close to zero for many market periods (e.g. hours or days), then investments will be made to achieve the transformation of the energy mix (in production, transmission, distribution, digitalisation, etc.). On the other hand, changes in energy and environmental taxes aimed at generating economic signals that encourage changes in investment, production and consumption decisions and individual preferences will lead to price increases. Energy products and other services, which may particularly affect households with low disposable incomes. The energy transition opens up the possibility, for example through the introduction of new energy and environmental taxes (carbon tax, green certification, etc.), of additional funding to create support programmes for populations most vulnerable to energy poverty and social exclusion..

Empowering energy consumers. The energy transition will dramatically change the role of energy consumers in the entire energy system. Develop distributed energy sources and smarter and more flexible energy grids. The total cost of energy supply includes not only the cost of energy in the wholesale market, but also an additional set of costs associated with activities such as transmission, storage, distribution and sale of energy Energy, and other costs not directly related to energy supply (taxes, subsidies, other fees, etc.). A possible increase in energy supply costs may be associated with an increase in fixed costs associated with the consumption of investments, both in production (reflected in wholesale energy market prices) and in regulated activities (reflected in access costs). This will favour the emergence of new players and the development of new economic models around the flexible management of installations and asset portfolios [18]. In particular, opportunities open up for aggregators, account managers and marketers in the dynamic management of asset portfolios, production, storage and consumption devices, as well as in the context of the configuration of new assets (self-liquidating configurations, micro-grids, etc.). The development of intermittent renewable production and active demand-side management systems will promote the creation of resilient national energy and energy markets, essential for the proper functioning of electricity systems. Transmission and distribution system. In addition to helping to improve the overall management of energy production, consumption and storage, the participation of the different actors involved in the system will be further enhanced.

Circular economy and collaborative economy. Emphasising energy transitions on the need to increase the efficiency and sustainability of energy consumption will create opportunities associated with new ways of producing and consuming goods and services. The development of the circular economy and various forms of cooperative economy, if efficient, will lead to an optimal use of resources and thus increase energy efficiency and reduce related greenhouse gas emissions in all production sectors. And in all links of the electricity supply chain. From the perspective of creating business and employment, opportunities will open up in areas related to recycling, recycling, reuse and product refurbishment, e.g. operations that reduce the net consumption of materials and energy, improve knowledge and optimise production, logistics and consumption processes, will result in greater efficiency [23].

Competitiveness of cities. One area where the energy transition will present opportunities for society lies in its impact on the competitiveness of cities, as drivers of economic and social activity at the local level Local government and the driver of change towards a sustainable energy system. A city's potential competitiveness is its ability to attract, compete, own, control and transform resources, compete, capture and control markets and create value faster, more efficiently and effectively. More efficient and sustainable than other cities, in the process of

development, competition and cooperation. Factors that determine the competitiveness of a city include variables such as the quality of firms, local factors that can generate competitive advantages, local demand, economic structure and internal institutions (agglomerations and relationships within cities), global connectivity (e.g. with cities or territories), and legal and institutional environments (software) and physical environments (local infrastructure and environmental conditions, e.g. g, air quality). In this sense, the energy transition will boost the development of cities' competitiveness in two ways. On the one hand, it will revive their economy by developing new activities and businesses. On the other hand, improving the physical, institutional and legal environment will create greater attractiveness and social cohesión [14].

Competitiveness of the rural environment. In parallel to increasing urban competitiveness, the energy transition must serve to boost local economies in rural areas. Although, as has been pointed out, the current global trend is towards an increase in the urban population, it is necessary to guarantee the competitiveness of the rural world in order to combat depopulation, diversify the economy and strengthen social cohesion. The development of renewable energies in rural environments, for example, is associated with benefits linked to new sources of taxation (e.g, From a sustainability point of view, there are theoretical and empirical arguments on the positive environmental impact of population density and size of population settlements on variables such as energy consumption or CO2e emissions per capita of local human and business capital and empowerment of local communities and increased access to energy at a more affordable price (OECD, 2010). Passively, the energy transition also provides opportunities for rural areas through increased land demand for renewable technologies. While the closure of large facilities, such as power plants, significantly affects the counties in which they are located, offshore renewable generation can provide business opportunities in a wider number of counties. Similarly, the use of this distributed generation for self-consumption can reduce energy costs at the local level, which can generate competitive niches compared to urban environments. Finally, it should be noted that the growth of distributed renewable generation can encourage further development of local infrastructure, such as transport and telecommunications, necessary for the deployment and management of these facilities. Actively, the need for production from renewable sources can also increase the added value of certain sectors. One example is the production of biogas in its different variants, notably agriculture, livestock and waste management (wastewater landfills). Another activity that can be promoted along similar lines is forestry, both in terms of forest care and exploitation.

New sustainable mobility. The drastic change in the fuel mix for passenger and freight transport in order to reduce GHG emissions and the restrictions on mobility resulting from legislation and air quality regulations will lead to new mobility models, characterised by greater sustainability. These new models will involve in-depth discussions on the organisation of mobility in different geographical areas (last mile, urban environment, peri-urban environment, rural environment), on the design and use of public space in cities and their surroundings, or on logistical models for product distribution. These new models should effectively and efficiently integrate processes such as the progressive penetration of new energies (new automotive fuels), the planning of infrastructure for recharging automotive fuels, the development of intermodality and the relationship between different modes of transport (e.g. bicycles and other modes of individual transport, small vehicles, collective transport networks (such as buses, trams and trains, etc.). Among other benefits for society, new mobility will allow for a better structuring of territories from a social point of view, offering new opportunities and services in the most disadvantaged geographical areas and segments of the population (12). It will also improve air quality in cities and make better use of land, resulting in improved living conditions and the attractiveness of urban environments.

Improved human capital. New knowledge will be required in virtually all sectors of activity on how to effectively carry out the energy transition process. This will create opportunities to invest in improving human capital and social capital, developing new skills and abilities and integrating training and knowledge aspects related to other technological and economic trends (e.g. digitalisation, ICT, information management and big data analysis). In addition, the development of a society that is more educated and sensitive to the social uses driven by the energy transition (e.g. consumption management and the circular economy) is a factor that will have a particular impact on the success of the energy transition. This in turn will foster the competitiveness of territories at local, regional and national level.

Humanity has several sustainability problems, not only the depletion of certain sources of energy and materials: climate change, which is a consequence of the waste we are releasing into the biosphere; pollution from plastics and heavy metals; poor air quality; soil degradation... They all have a common origin: an accelerated economic system that leads us to an infinite and exponentially rapid growth on a finite planet and makes us crash against the biophysical limits of the world we live in. We are altering the biosphere and its ability to sustain us, and that can lead to self-destruction. Forty-nine years ago, a report commissioned by the Club of Rome called The Limits to Growth was published, which looked at whether growth patterns could be sustained indefinitely. In all the scenarios proposed - business as usual, stabilisation, etc. - it was observed that sooner or later, in the 21st century, a limit would be reached where growth could no longer be sustained. All the studies that have been done show that efficiency is useful, but it is not infinite.

A new energy order has begun to take shape in the world. Oil is not going to disappear, but its omnipotent power will be diluted as the technological revolution now sweeping the energy sector touches more and more areas until the Paris

Agreement becomes a reality. With the transition underway, fossil fuel producing countries need to start diversifying their economies now [22].

It is very important to be aware of the risks involved in continuing to invest in fossil fuel technologies because it may expose both companies and countries to unnecessary economic and financial risks in the future. What is the fate of hundreds of millions of workers and people living in countries whose economies depend on fossil energy exports? Oil and gas companies also need to diversify their asset portfolios so that the transition does not affect their future profitability or their workers. Even in these directly affected sectors, it is possible to seize the opportunities of the energy transition and leave no one behind, but to do so it is necessary to start as soon as possible.

Oil and gas companies are beginning to see that they themselves have to make a transition in their business models [15]. The Paris Agreement will prevail, so it is important that they start diversifying their business. Likewise, countries should do the same, especially those whose economies are heavily dependent on oil.

There are other countries such as Angola, Nigeria, Russia and Norway, among others, with a significant percentage of their income coming from oil exports. If they do not adequately diversify their economies, they may find themselves in a compromised situation in the future. This will not happen overnight, but it will eventually affect them. There is no time to lose. Not on climate change, not on the diversification of these economies.

What about the financial risks of investing in fuels like oil and gas? This is something that is not much talked about. But there is data from the International Energy Agency that says that in order to comply with the Paris Agreement, only one third of proven fossil fuel reserves should be used. What happens is that a part of these reserves are already included in the accounts of companies and do not show their real value because they could become what is known as a stranded asset. A study by Carbon Tracker estimates that 90% of all stranded assets, which together amount to around $1.6 trillion, are concentrated in the oil and gas industry [10].

Kenneth Boulding said that humanity has to move from the model of the green cowboy prairie, which never ended and where everything seemed to be at our disposal, to the Spaceship Earth model, where you have grown up a lot and have finite resources. There are 7.9 billion of us and we have to learn to manage waste, recycle it and close the cycles, because we are on an isolated spaceship in the middle of the cosmos. The economic system we have has been built up over the two centuries of expansion since the first industrial revolution. But now the material bases that have allowed expansion are coming to an end, both because of the inputs that are needed (energy and material raw materials) and because of the waste that is generated and causes environmental problems that threaten our very existence, such as climate change. We have to accept that the expansionary phase is over. I often say that capitalism is just another phase in the historical evolution of humanity. We don't have to destroy it, but to overcome it, to mature. If we insist on continuing to grow in a situation where this is impossible, we will collapse.

4. Results

The above analysis shows that mankind must urgently take the most appropriate measures to reduce the amount of polluting emissions produced mainly by coal and diesel.

The main polluting countries are China and the USA as shown in the graph in Figure 4, with emission contributions of 26.6% and 13.1%. These are data that cannot be assumed any longer. Serious and efficient commitments must be made to lower these figures.

Cement production is starting to increase in a very worrying way. Its main problem appears in construction and in the recycling of waste materials from construction and demolition sites. More renewable and environmentally friendly materials should be used. This is an invitation to a re-architectural design in most of the projects.

The temperature increase of the planet should not exceed 1.5℃ due to the problems that could cause higher temperatures that have been identified above. At present, this limit is being exceeded, almost doubling its value, threatening the environment and endangering the survival of flora and fauna, including human beings.

The main environmental impacts that could be caused on the planet would be: melting of the poles and sea level rise, changes in ecosystems, massive migrations, ocean acidification, extinction of species (including humans) and the appearance of extreme weather phenomena.

As a result of the melting of the poles and global warming, the IPCC predicts that the average ocean level will rise by about 82 cm by 2100 if greenhouse gas emissions are not reduced. This increase would have a strong impact on many coastal areas of the world.

Climate change would also have an impact on agriculture and fisheries, which directly affects food security. Some populations would be forced to migrate in order to survive, leading to the emergence of climate refugees. All this would cause tensions over available natural resources, including water, and reinforce inequalities between humans, especially in developing countries.

The oceans are carbon sinks, i.e. they absorb carbon dioxide (CO2) from the atmosphere and store it. However, the accumulation of carbon dioxide in the oceans would change their composition and the oceans would acidify. This acidification phenomenon would directly threaten the capacity of the oceans to absorb carbon dioxide, and would lead to deaths and diseases of marine flora and fauna.

5. Conclusions

So far, and very generally, scientific warnings about global warming have been ignored, and world economic development has been fueled by the consumption of fossil

fuels, i.e. natural gas, oil and coal as the most important in the release of carbon dioxide that overheats the planet when they are burned to generate energy [12,14].

After several decades of warning, the world finds itself subjected to 'eco-anxiety' understood as frustration with the warnings issued and the disproportionate consumption of fossil fuels.

The last Glasgow summit ended with results that could be improved, but humanity has already agreed on what must be done quickly, there is no time to lose. The goal has been made clear: no more than a 1.5℃ rise in global temperature for the next two decades.

However, the current war between the Russian Federation and Ukraine has accelerated the rise in energy prices where the high costs of fossil fuels are generating major tensions around the world.

The way out in the medium term would be to disengage from the use of these fuels by using renewable energies, mainly solar and wind, as they are clean energies that do not emit gases to produce electricity. Many people are more concerned about the damage to biodiversity caused by solar energy and, above all, wind energy. They are very alarmed about the landscape impacts and the damage that could be caused to rural tourism. There are groups that reject the macro-projects of this type of energy installations because they are promoted by large investment funds and electricity companies.

There is no need to convince of the future use of solar and wind energy because they are already more profitable, there is no need to convince of the use of electric cars because batteries are becoming cheaper, but there is still a long way to go.

The Climate Change Law states that by 2030, just around the corner, 74% of the electricity consumed must be produced by renewables.

The need to reduce emissions does not exclude the use of fossil fuels, but requires a significant change of direction; business as usual is not consistent with decreasing emissions in energy systems globally. Energy efficiency and renewables are often positioned as the only solutions to meet climate targets in the energy system, but they are not sufficient. It will be essential to include an expansion of the use of carbon sequestration and this technology is expected to result in emissions reductions of 16% per year by 2050. This is supported by the Fifth Assessment Synthesis Report of the Intergovernmental Panel on Climate Change, which estimates that limiting emissions from the power sector without carbon sequestration would increase the cost of climate change mitigation by 138%.

UN Member States that are still heavily dependent on fossil fuels will be able to participate in global initiatives aimed at reducing the impact of climate change, rather than simply contributing to the problem. The technology has been tested on a large scale in Canada, Norway and the United States of America, and today there are about 40 projects in various stages of development around the world. Near-term efforts in carbon sequestration are essential to improve efficiency, reduce costs and better map storage options in order to make the technology available for large-scale deployment from 2025.

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