The Two Sides of the Coin in the Energy Transition Conflicts

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***Abstract*- To the extent that energy derived from fossil fuels is increasingly difficult to obtain and therefore more expensive, added to the fact that its use is the predominant factor in the intensification of CO2 emissions, energy transition has already acquired a peremptory character at a global level, and with it have also come the conflicts associated with this transition. Although energy transition is an imperative for everyone, what is different is the scope of the transition that must and can be made in each country; this depends not only on their current dependence on fossil fuels, but also on the availability of a) capital, b) technology, and c) the natural resources necessary to transition towards an energy matrix with renewable sources. The analysis suggests that the relationship between these three elements, are one of the main causes in the generation of energy transition conflicts where non-industrialized countries have foreign intervention. Hence, the purpose of this article was to expose some of the challenges and inequities derived from new energy systems by identifying and analyzing the main characteristics of some of the conflicts derived from them.**

Keywords **- Energy transition, Transition conflicts, Energy inequality, Energy Justice.**

I. INTRODUCTION

Energy derived from fossil fuels is increasingly difficult to obtain, and therefore more expensive [1]–[3] and its use is the predominant factor in the increase of CO2 emissions: "Energy accounts for over 80% of the global anthropogenic GHGs, with emissions resulting from the production, transformation, handling and consumption of all kinds of energy commodities" (Akpan & Akpan, 2012: 24); hence, energy transition has acquired a peremptory character at a global level. In the midst of the pressure caused by the scarcity of fossil fuels that still move the world and the increasingly devastating and frequent effects of climate change, the energy transition processes have already begun in most countries, as shown by the Energy Transition Index [5]; but with them have also come the conflicts associated with said transition.

However, to explore the conflicts derived from the energy transition, it is necessary to remember that at the very base of the energy conflicts there is a historical and structural argument; this affirms that while the benefits of accessing fossil energy consumption were enjoyed by the countries that call themselves "developed", the negative impacts of high CO2 emissions, a result of said enjoyment and the main cause of climate change, are being suffered by all countries. Although this question is returned to later, it is important to recognize that no matter how inequitable the distribution of the benefits and harm consequences of fossil fuel consumption has been –and because the climate disasters derived from global warming hit countries indiscriminately, regardless of whether they have been large consumers of fossil fuels or not–, the energy transition is an imperative for everyone.

What is different is the scope of the transition that must and can be made in each country; our analysis indicates that this depends not only on their current dependence on fossil fuels, but also on their availability of: a) capital, b) technology, and c) the natural resources necessary to transition towards an energy matrix with renewable sources. As will be explained, the data analyzed shows that the imperative need to have these three elements seems to be the predominant reason in the conflicts present in the energy transition processes with foreign intervention in a good part of the non-industrialized countries.

Hence, the purpose of this paper is to explore the challenges and inequities derived from new energy systems and whether the energy transition can exacerbate the existing marginalization of vulnerable groups, by identifying and analyzing the characteristics of some of the conflicts derived from this. Therefore, in the first section, one side of the coin was addressed, examining some countries, which although have capital and technology available, also show high levels of fossil energy dependence and lack of the natural resources necessary to move towards renewable energy; in the next section, on the other hand, other group of countries was analyzed that, although do not have capital or technological innovation processes available to them, are less dependent on fossil fuels and have the natural resources necessary for the transition; in the third section, some of the conflicts generated by the energy transition processes that involve these two types of countries were examined, briefly exposing some of the characteristics of the global conflict around the unequal distribution of the benefits and damaging consequences of fossil energy consumption. In the final section, the main conclusions are presented as a closing.

II. ONE SIDE OF THE COIN IN THE ENERGY TRANSITION CONFLICTS

The data show that the distribution of the global consumption of fossil energy sources has large differences that depend on the income of groups of countries, geographical regions or individual countries; hence, this section examines the relationship between fossil energy consumption and the availability of capital, and also access to technology and the natural resources necessary to move

towards a renewable energy matrix in some of the countries that have been high consumers of fossil energy sources, and therefore the most responsible for high CO2 emissions.

At this point, it is important to remember that even if CO2 emissions are the most visible damage from the consumption of fossil fuels, it is not the only one, since there is also air and water pollution, with the consequent problems for the health of all living beings, and the disruption in food production and damage to soil fertility, among several others.

Global fossil fuel consumption data and per capita consumption between 1965 and 2022 show that the highest consumption, without exception, historically corresponds to the High-Income Countries group (Table No. 1).

U.S. and Canada are among the top ten consumers per capita throughout the entire period; Luxembourg, Saudi Arabia and Australia have also been large consumers during these 57 years, although at some point they were surpassed by other countries that removed them from the group.

Table 1 – Top Ten Countries Fossil Fuel Per Capita Consumption (1965-2022)

Rank	1965	1975	1985	1995	2005	2015	2022
1	Luxembourg	Luxembourg	Luxembourg	Singapore	Qatar	Qatar	Singapore
2	United States	United States	Estonia	Luxembourg	United Arab Emirates	Singapore	United Arab Emirates
3	Canada	Canada	United States	United States	Kuwait	Trinidad & Tobago	Trinidad & Tobago
4	Czechia	Netherlands	Canada	Canada	Trinidad & Tobago	United Arab Emirates	Kuwait
5	Saudi Arabia	Czechia	USSR/Russia	Trinidad & Tobago	Singapore	Kuwait	Oman
6	Belgium	Belgium	Czechia	Netherlands	Luxembourg	Saudi Arabia	Saudi Arabia
7	United Kingdom	Australia	Saudi Arabia	Australia	United States	Oman	Canada
8	Germany	Germany	Netherlands	Saudi Arabia	Canada	Canada	United States
9	Australia	USSR	Australia	Belgium	Saudi Arabia	Luxembourg	South Korea
10	Netherlands	United Kingdom	Ukraine	Russia	Australia	United States	Australia

Source: Authors' calculations based on Ritchie et al. (2023)

However, because their high consumption patterns did not change, they returned to the group. On the contrary, Czechia, Belgium, the United Kingdom, Germany, and the Netherlands are among those that, although they still have high incomes, are no longer among the ten largest consumers per capita; the excessive consumption of countries with very small populations such as Luxembourg, Belgium and Germany is also noted, and the current presence (2022) of countries on the Arab peninsula and Southeast Asia is highlighted, among the new highest consumers per capita.

But the analysis also shows that China's per capita consumption in 2022 ranked 31st, well below other countries such as the Netherlands (14th place), Belgium (16th), Malaysia (19th), Japan (20th) or Germany (23), whose population size has no point of comparison. Given that the entire Chinese population has access to electrical energy, its low-ranking in-fossil consumption per capita may be explained by the rapid growth of renewable energy taking place in this country, among other reasons.

In terms of technology and innovation production, the only country among the first thirty-three countries that occupy the best positions in the Global Innovation Index (GII) [7]-which is not part of the High Income Countries is China, in the 11th position. The GII ranking is based on two sub-indices: the Innovation Input Sub-Index, which is calculated with five input pillars which capture elements of the economy that enable and facilitate innovative activities, and the Innovation Output Sub-Index that includes two pillars to capture innovation outputs which are result of innovative activities within the economy. The overall GII score is the average of the Input and Output Sub-Indices on which the GII economy rankings are produced.

Hence, just as there is a direct relationship between the availability of capital and the high consumption of fossil fuels –and therefore a high environmental burden– there is also a direct relationship with technological access because the availability of capital facilitates not only production, but also access to cutting-edge technology and innovation.

Among the current proposals that seek to reconcile economic growth with the reduction of the environmental burden, there is one known as 'decoupling' in the specific case of climate change, the objective of decoupling is to maintain economic growth, while reducing CO2 emissions through the implementation of innovative technologies.

However, for Saito (2023), these alternative strategies lead to a dilemma with little chance of being resolved, because, in effect: "the more the economy prospers, the greater the economic activity; this necessarily implies greater consumption of fossil resources and, as a consequence, an increase in the difficulty of reducing CO2 emissions" (pp.59).

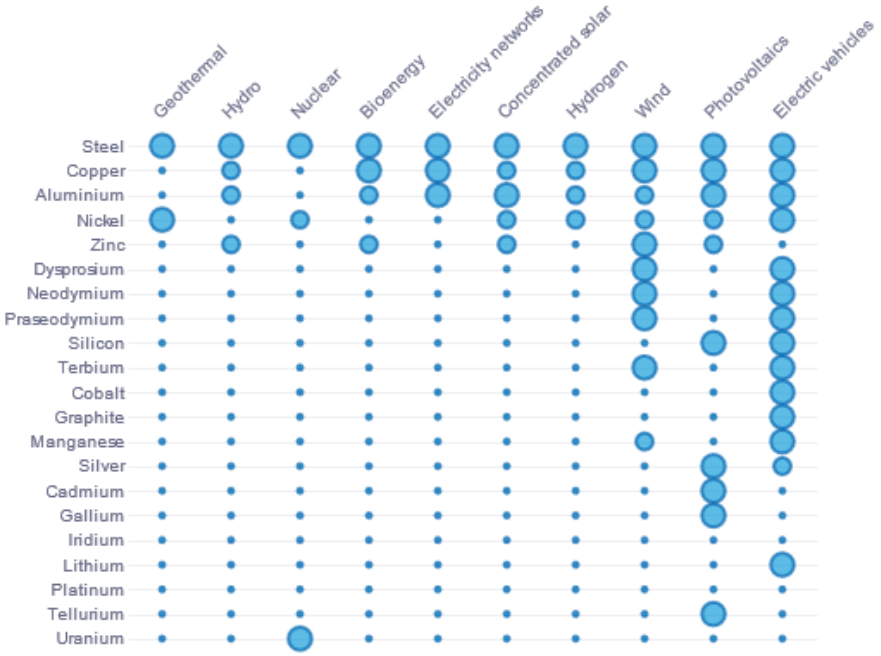
In fact, this is a two-way relationship, since, thanks to the high consumption of fossil energies, rich countries have high incomes and thanks to their high incomes, they can be large consumers of fossil energies.

Furthermore, Saito and other analysts show that currently –and despite the advance in technological innovation – renewable energies are not replacing fossil fuels, but rather end up being additional consumption to satisfy the growing energy demand associated with economic growth; this effect is known as Jevons' paradox, and it states that the greater the efficiency in the use of a resource, the more its demand will grow.

Consequently, instead of technological innovation leading to a lower environmental burden, it fuels economic growth, which leads, as it has done until now, to an increase in energy demand, since technological innovations seem to be inducing greater consumption [9], [10].

Moving on to the availability of the natural resources necessary to decarbonize economies, current technologies require the following 'transition minerals' (Figure 1):

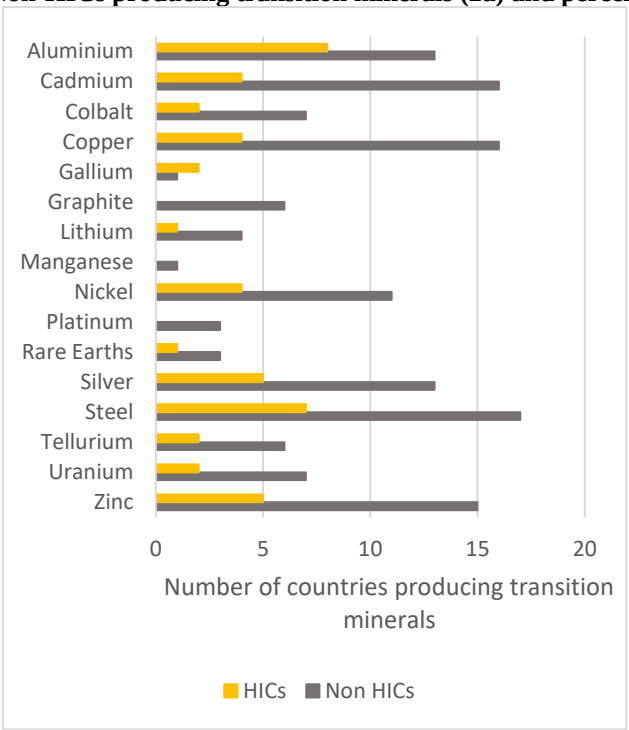
Figure 1 – Critical Transition Materials by Technology Type

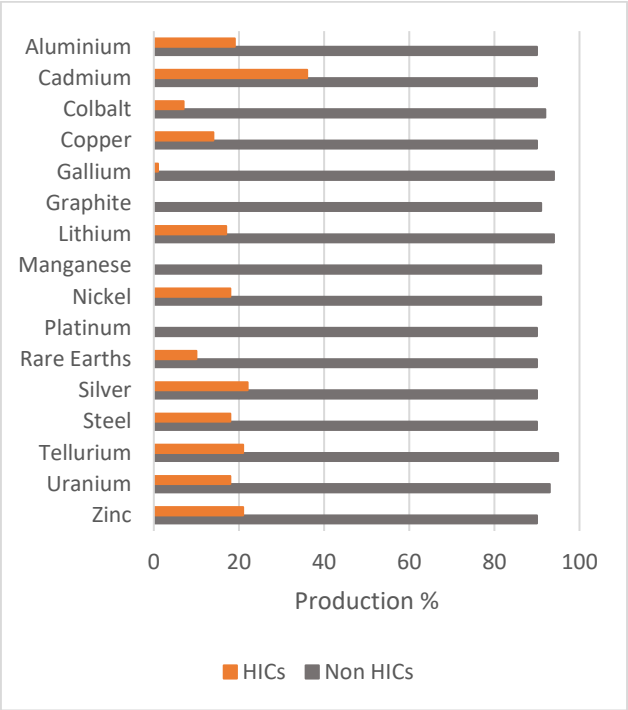


Source: Azevedo et al. (2022)

When reviewing the global mining production of transition minerals and comparing that of High-Income Countries (HIC) with those that are not, some data is obtained that should be highlighted as follows (Figure 2):

Figure 2 – Number of HICs and Non-HICs producing transition minerals (2a) and percentage produced (2b) during 2022





Source: Author's calculations based on BGS - Minerals UK (2023)

Figure 2a shows that the current production of transition minerals originates predominantly from a major number of non-HICs (gray bar) compared to few HICs (yellow bar). In fact, in some cases, such as Graphite or Manganese, the only producers are lower- or middle-income economies.

It is also worth noting that despite HICs reach just over a third of global cadmium production (orange bar in figure 2b) and around a fifth of aluminum, nickel, or zinc production, among others, the number of HICs with their own natural resources involved in such production is much lower in all cases than the number of non-HIC countries (black bar).

Figure 2b shows the number of countries that produce around 90% of each mineral, since usually the remaining 10% is dispersed in a series of countries that produce a minimum amount.

The data presented in this section shows, then, the high scores in production and access to technological innovation of high-income countries, as well as their still high consumption of fossil energy, but while their own natural resources are non-significant when it comes to the minerals currently required for the energy transition.

III. THE OTHER SIDE OF THE COIN IN THE CONFLICTS OF THE ENERGY TRANSITION

This section analyzes the relationship between fossil fuel consumption and capital availability, but in a group of countries with medium or low income, which also show low technological production, although they do have the minerals required for energy transition as part of their own natural resources.

The production of various transition minerals from low- and middle-income countries compared to high-income countries (HIC) can be seen in the following table (No. 2); the classification according to World Bank income is also indicated.

Therefore, the technology of the current energy transition inevitably requires the natural resources of countries with very vulnerable economic and social situations, as well as middle-income countries. It is notable that none of these minerals are produced in large quantities in the HICs, except for Lithium, thanks to the natural resources of Chile and Australia.

Table 2 - Low- and middle-income countries with minerals for energy transition (% of total produced in 2022)

	1st producer	%		%		%		%		%	HIC (%)
Aluminium	China	58	Russian F.	5	India	5	Malaysia	1	Brazil	1	18
Copper	Chile	26	Peru	11	Congo DR	11	China	8	Russian F.	8	38
Cadmium	China	40	Kazakhstan	6	Russian F.	5	Mexico	4			32
Cobalt	Congo D.R.	71	Russian F.	6	Cuba	4	Philippines	2	Papua N.G.	2	7
Gallium	China	94									0
Graphite	China	65	Madagascar	8	Brazil	8	Mozambique	6	Korea D.P.R.	3	0
Lithium	Chile	59	Argentina	18	China	4					76
Manganesium	China	91									0

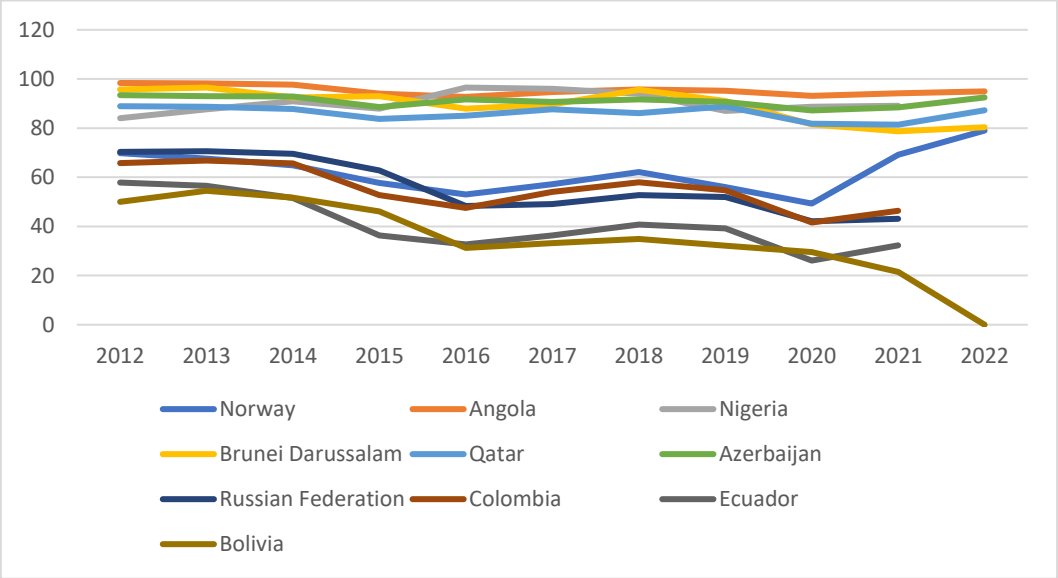
Nickel	Indonesia	42	Philippines	14	Russian F.	7	China	4	Brazil	3	18
Platinum	South Africa	61	Russian F.	23	Zimbabwe	7	China	1			0
Silver	Mexico	23	China	13	Peru	13	Bolivia	7	Russian F.	5	22
Steel	China	54	India	5	Russian F.	4	Turkey	2	Brazil	2	18
Tellurium	China	64	Russian F.	10							21
Uranium	Kazakhstan	46	Namibia	12	Uzbekistan	7	Russian F.	6	Niger	5	18
Zinc	China	35	Peru	11	Mexico	6	India	5	Bolivia	3	20
Rare Earths	China	68	Myanmar	13	India	1					16

Source: Author's calculations based on BGS - Minerals UK (2023) and the World Bank (2023)

(*) Light gray for Low-Income Economies; gray for the Lower-Middle Income Economies; blue for the Upper-Middle Income Economies and light blue for Chile, which is the only one classified as High-Income Economy (HIC) and at the same time the leading producer of some transition minerals, such as copper and lithium.
(**) The missing percentage in each product is dispersed in the minimum production of several other countries.

On the other hand, when examining the consumption/dependence relationship on fossil fuels, which some of the low- and middle-income countries have had in the most recent decade (not so much due to their domestic consumption, as in the case of high-income countries, but for the income obtained from exports), it was found that of the group of countries that have transition minerals, only the Russian Federation and Bolivia show an important dependence on oil exports (Figure 3), but still well below the consumption of the HICs.
As it can be seen, the only three high-income countries that are part of those that mostly derive their income from oil are Norway, Brunei Darussalam, and Qatar. 2020 was the only year during the last decade in which Norway's income from this item was less than 50% of its total export income, as it corresponded to 49%.
It also stands out for being one of the few countries that, instead of reducing its dependence on oil revenues, has increased it, reaching its maximum in 2022, which is explained by the energy crisis caused in Europe by Russia's invasion of Ukraine. On the other hand, the Russian Federation, classified as Upper Middle Income, had its export percentages at 71% in 2013 and 42% in 2020, while those of Bolivia were at 50% in 2012 and 22% in 2021.
Just as it is no surprise that HICs score highest in technological performance, it is also no surprise that low- and middle-income countries rank lower. Focusing on the countries that have transition minerals, the first in the GII ranking is Malaysia, in position 36, followed by Turkey (37), India (40) and the Russian Federation in (47) (Dutta et al. (2022: 21). In fact, the close relationship that may exist between high income and technological performance is validated once again by Chile, which, being the only high-income country in Latin America, is also the first Latin American country in the list, occupying position 50, followed by Brazil (54) and Mexico (58). Among low-income countries, Madagascar is the first country on the list with position 106, followed by Zimbabwe at 107. It is worth remembering that technological developments for the transition, as well as technical innovation, are one of the most usual means that HICs exchange to obtain the natural resources that they do not possess.

Figure 3 - Fuel exports (% of merchandise exports) Selected countries 2012-2022



Source: Authors' calculations based on the World Bank (2023b)

The following section exposes the main characteristics of some of the conflicts caused by the energy transition with foreign participation, validating the fact that capital, technology, and resources are the three main elements that are currently at play.

IV. A STRUCTURAL ENERGY CONFLICT AND SOME CONFLICTS OF THE ENERGY TRANSITION

Before addressing some specific conflicts arising from the energy transition, we return to the historical dispute about the inequitable global distribution of the benefits and damages of the consumption of fossil fuels –and therefore the responsibility of 'developed' countries for global warming–. This revolves around the economic benefits that the group of countries with higher incomes have had, thanks to the consumption of large quantities of fossil fuels, versus those that do not, plus the damage caused by their high CO2 emissions versus those countries with low emissions.

Indeed, consumption statistics by groups of countries according to their economic income show that from 1965 to the present, the largest consumer of fossil fuels has been the High-Income Countries group, which in 1965 consumed 71% of the world total and currently consumes 40%; considering that in 1965 25% of the world's population lived in HICs, while currently only 16% live there, its present consumption equals 47%, thus cannot be said that the its consumption decrease has been notable. This group, also from 1965 to today, is followed by the countries of the Organization for Economic Co-operation and Development (OECD) and the Upper-middle-income countries [15].

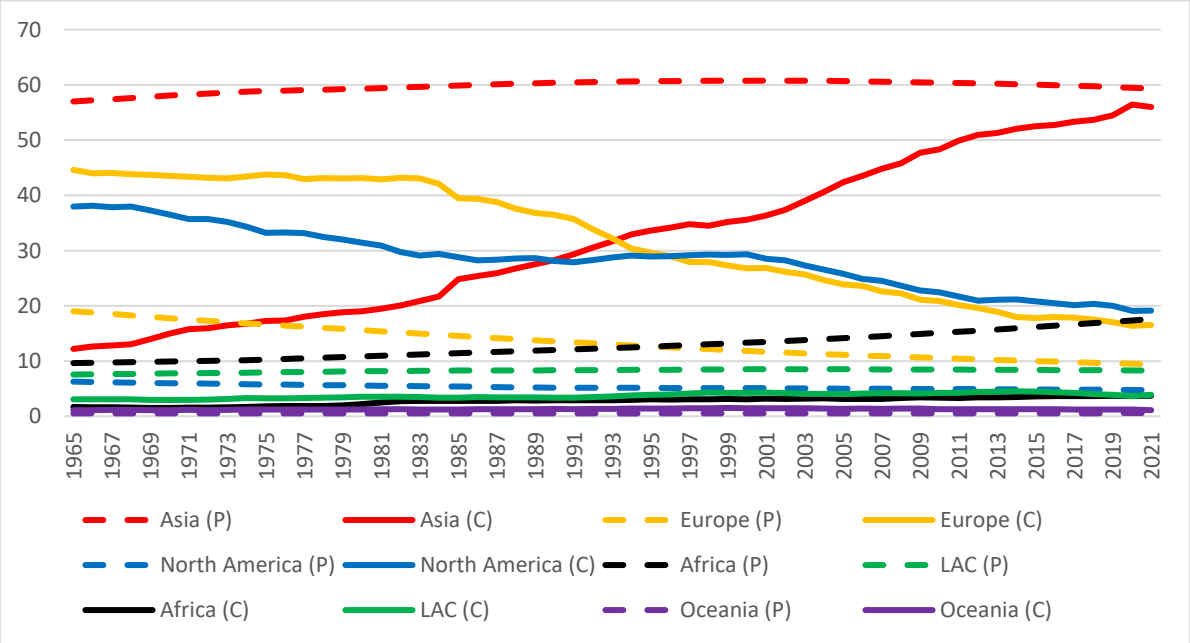
If consumption is analyzed by geographical regions, figure 4 shows that in 1965 Europe was in first place consuming 45% of the total fossil fuels (solid line), although its population was only 19% of the world total (dotted line).

Europe was followed by North America with an even greater contrast (38% consumption, 6% population), while for the remaining continents the relationship is inverse: Asia (12% consumption, 57% population), Latin America and the Caribbean (3% consumption, 8% population), Africa (2% consumption, 10% population) and balanced Oceania, (1% consumption and 1% population).

As this graph shows, this order was maintained for 35 years, until 1990, when Asia took second place in consumption and North America third; their consumption corresponded to Europe 36%, Asia 28%, North America 28%, South and Central America 3%, Africa 3%, and Oceania 1%.

As can also be seen, in 1994 Asia took first place, followed by Europe and North America and two years later, in 1996, consumption in Europe decreased, giving second place to North America; the consumption of fossil fuels with Asia in first place, followed by North America, Europe, South and Central America, Africa and Oceania remains until today, with the exception of 2020, when Africa narrowly surpassed South and Central America.

Figure 4 – Fossil fuel consumption (C) and population (P) by continent (1965 – 2021, % of the global total)

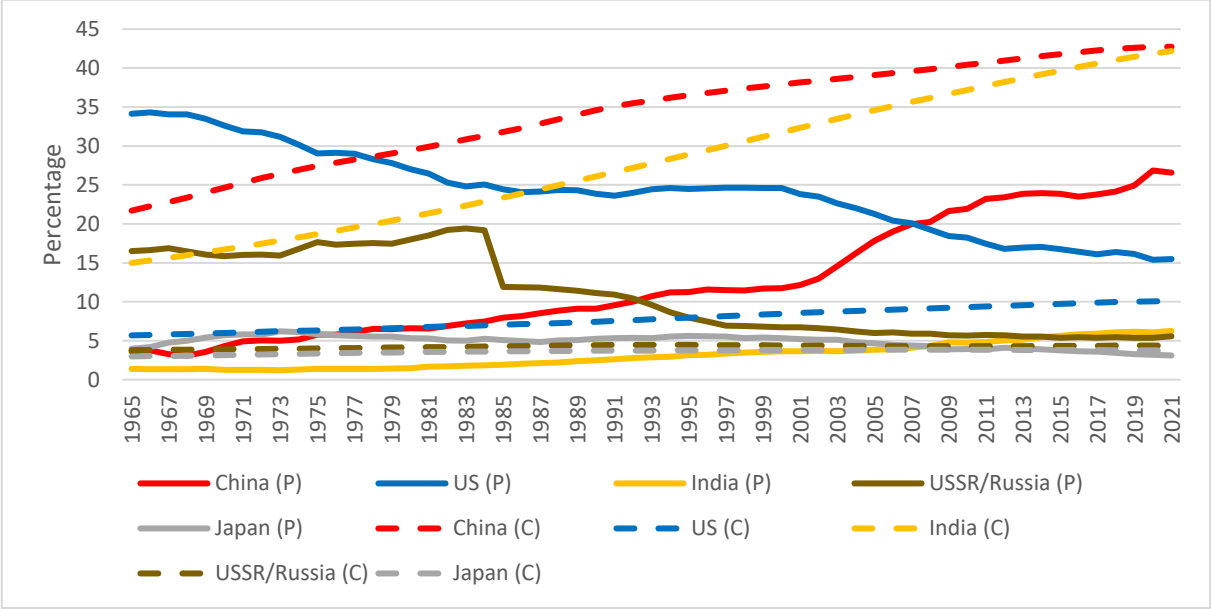


Source: Authors' calculations based on [15]

The proportion of consumption (C) and population (P) corresponds in 2021 to Asia 56% fossil energy consumption, population 59% of the global total, North America 19% consumption, 5% population, Europe 17% consumption, 9% population, South and Central America 4% consumption, 8% population, Africa 4%, 19% population and Oceania 1% consumption and 1% population.

If the consumption of fossil energy is examined by country, the following figure (No. 5) shows the figures of the five largest consumers in the world between 1965 and 2022, including the USSR until its dissolution in 1984 and continuing with the data of Russian Federation since 1985.

Figure 5 – Largest world fossil fuel consuming countries (1965 – 2021, % of the global total)



Source: Authors' calculations based on [15]

The most notable difference between these countries is that while the U.S., the Russian Federation and, to a lesser extent, Japan, have maintained a percentage of fossil fuel consumption well above the percentage of their population over the last 56 years, on the contrary, China and India have population percentages well above their consumption of fossil energy. Another fact to keep in mind is that, while China has steadily increased its per capita primary energy consumption since 1991, India's consumption is barely a little more than a quarter of China's, and has seen frequent setbacks, being the most recent in 2020; this is partly attributable to lack of investment in the energy sector which drives to infrastructure restrictions, and to maintain the use of traditional fuels such as wood, charcoal and organic waste. China and India, and in general countries with lower consumption of fossil fuels, and therefore with lower incomes compared to HICs, are at greater risk from the natural disasters of climate change, especially due to their low capacity to confront them.

In the midst of a debate that is still ongoing, the point of view of the Intergovernmental Panel on Climate Change (IPCC) is that the "Global hotspots of high human vulnerability are found particularly in west, central and east Africa, south Asia, central and south America, small island developing states and the Arctic" (Pörtner et al., 2022:12). To the extent that the regions mentioned by the IPCC include most of the countries that are the lowest emitters of greenhouse gases, the argument is validated that the distribution of the benefits of fossil energy compared to the damages cannot be more inequitable; or as Heidi Hautala, Vice-President of the European Parliament, expressed it: "Injustice and power imbalances between the Global North and countries endowed with mineral resources has long been the unfortunate norm" (BHRRC, 2022: 1).

However, and despite the injustice of this fact, the energy transition is an imperative for everyone; an analysis of the situation is offered regarding the availability of capital, technology and innovation and the necessary natural resources of a series of countries, to kickstart energy transition and achieve it within the necessary period. Returning to the words of H. Hautala, "It is however now clear that the conditions of supply of key minerals for the energy transition must be fairer if we are to scale up renewable energy capacities at the speed required to avoid global climate catastrophe" (BHRRC, 2022: 5).

And although, indeed, moving from a fossil energy matrix to a renewable one undoubtedly offers a wonderful opportunity to balance power relations and exercise greater economic, social and environmental justice at a global level, the current conflicts originated in this transition, for now, do not seem to offer a different panorama.

Lithium in the salt flats of Bolivia, Chile, and Argentina

For example, lithium (or the gold of the future, as it is now known) is one of the minerals that has generated multiple conflicts in Bolivia, ranging from the local to the national level; when reviewing Table 2, it is observed that the HICs do not have the necessary natural resources to be the first producers of any of the transition minerals, with the exception of Chilean and Australian lithium. However, it is important to clarify that Bolivia has the largest reserves of this mineral, above Chile, Argentina, and Australia, but until now its extraction has been low, due to the government decision that the production process be carried out only with the support of the Bolivian state company Yacimientos de Litio Bolivianos (YLB). The purpose was to eliminate Bolivia's dependence on the export of raw materials and to diversify the national economy and industrial development by attracting investment that would allow the transformation of exportable raw materials into exports with added value; in other words, overcoming what is known as "the international division of labor between the Global North and South."

This consists of the fact that, while the Global South supplies the raw materials that the Global North requires to become more industrialized countries every day, the Global South not only has to face the environmental and social impacts resulting from the extractive processes that are required, but also ends up buying the manufactured products that the Global North sells at the prices and under the conditions in which it decides. This dynamic, in addition, of further widening the distance between industrialized countries and those that are not, entails a vicious circle, which was explained by the Dependency Theory; This theory can find its

beginnings in Bodenheimer (1971)[1] which was later expanded and deeply examined by multiple Economic Commission for Latin America (ECLAC) analysts in Latin America and African and Asian theorists [19].

In Bolivia, in 2008, during the government of President Evo Morales, the nationalization of lithium exploitation was promoted through the creation of YLB, as a state and decentralized company, which depends on the Ministry of Energy, hoping for the State to control the entire production chain without intervention by foreign companies. Although Bolivia currently has a laboratory-scale lithium battery plant, and produces lithium chloride, sulfate, hydroxide and carbonate, plus other products that can be derived from the salt flats, it requires the supply of other metals such as nickel, manganese and cobalt, which it does not have [20]. Additionally, during the last ten years in which the State had control of the extraction of this resource, the extraction was done with the traditional method, that is, from evaporation ponds, so they have only managed to produce 600 tons of that mineral [21]. For this reason, the plan by the Evo Morales government to have a battery and electric car industry by 2015 was not fulfilled [22]. However, although previous state exploitation was low, due to lack of capital and the use of outdated technologies, it showed its advantages in the sense that, if not all, then most of the income obtained from lithium stayed in Bolivia.

The current government of President Luis Arce —from the same party as former President Morales—reached alliances with foreign private companies of Chinese and Russian origin to transform lithium production; thus, last June, Bolivia chose between several companies and several countries and the YLB reached an agreement with the Russian mining company Uranium One Group and the Chinese company Citic Guoan to exploit two of its 19 lithium salt flats, including the largest, and with cutting-edge technology, through the installation of two industrial complexes for the production of lithium carbonate with an announced investment of US$1.4 billion. These two join another agreement previously signed with the Chinese consortium Catl Brunp & Cmoc (CBC), so China and Russia, followed by the United Arab Emirates, are now the main markets for Bolivian lithium. Through these new extraction technologies, the Bolivian government aims to export 75,000 tons of lithium carbonate per year in 2025 [23].

Disputes at the national level have not been long in coming, since, according to several entities at the subnational level, including those in the department of Potosí (where some of the salt flats are located), there are no communication channels with the central government and this decision was not sufficiently consulted with the subnational levels and involved communities [24]. And at the local and community level, the conflicts caused by the exploitation of lithium already have a long history in Bolivia, as is the case of the industrial plant in the Uyuni salt flat, in the same department of Potosí. The mobilized civil groups express that, in the midst of the government's interest in generating the necessary infrastructure for lithium production, the proposals of the departmental community organizations have not been taken into account and the due environmental impact evaluation processes have not been carried out, particularly in regards to damage to groundwater sources; the promotion of tourism is also in question with an infrastructure that is not prepared to prevent environmental damage in the salt flats.

Bolivia is characterized by having a majority indigenous population that is very active in citizen mobilization processes; among the processes related to energy production in which it has been involved, the 2003-2005 “Gas War” stands out, which led to a national crisis and the dismissal of two presidents of the republic [25]. Although there is scattered information on several conflicts around environmental injustice in Bolivia, 40 of them are documented in the Environmental Justice Atlas [26] and three more in the Transition Minerals Trackers [17], of which 14 revolve around the exploitation of transition minerals by foreign companies. These minerals are lithium, copper, silver, nickel, manganese, and zinc, while the foreign companies involved in the most recent conflicts are Newmont Mining Corporation and Coeur Mining Inc. from the U.S.; Sumitomo Corporation of Japan; Korea Resources Corporation (KORES) and Posco Engineering & Construction of Korea; CITIC Group of China; UT Freiberg of Germany; Trafigura Beheer B.V. of the Netherlands and Panamerican Silver Corporation of Canada. And the conflicts have arisen mainly for environmental reasons such as atmospheric, soil and surface and underground water pollution, especially due to waste overflows and spills of toxic substances and poor waste management, although there have also been social conflicts due to lack of job security. Similar conflicts regarding lithium production are also documented in Chile, Argentina, and Zimbabwe, even though the latter is a minor producer.

Cobalt, the fuel of civil war in Congo

Other conflicts that stand out are those surrounding cobalt production in the Democratic Republic of the Congo (DRC), where the Mutanda mine is located, which is currently the largest in the world. Unfortunately, the plundering of its natural resources is part of the history of this country, having been the private territory of King Leopold II of Belgium from the end of the 19th century to the beginning of the 20th, a period in which a series of atrocities and abuses have been documented that ended in a genocide. Since the DRC has the largest reserves of cobalt, in addition to important deposits of copper, gold, diamonds, uranium, tin, tantalum, tungsten and coltan among others, traces of this violent origin associated with the exploitation of its minerals and expressed in a high political instability, are still present today. Authors such as Kaldor (2012); Münkler (2005); Collier & Hoeffler (2004), among others, present the perspective that one of the characteristics of the “new wars” is that political objectives are diluted, while economic objectives predominate. Other analysts resort, however, to what is known as “the resource curse”: it “refers to the paradox that countries endowed with raw materials tend to have lower GDP per capita and worse development outcomes than countries with fewer natural resources” (Badeeb et al., 2017: 4; Henri, 2019).

The DRC was also the scene of another of the paradoxes that are part of the current economic system: the Dodd-Frank Act (Public Law 111–203—July 21, 2010), known colloquially in the DRC as the 'Obama Law', achieved thanks to an intense campaign by environmental and human rights activists and Democratic and Republican legislators, urged US companies to monitor their supply chain, so that 'conflict minerals' were not accepted; the desired result was to significantly reduce the income that the militias (illegal armed groups and irregular groups) obtained from the commercialization of a series of minerals and, therefore, weaken them to

[1] In fact, Dependency Theory is still so current that Bodenheimer's article was republished in 2016, https://www.tandfonline.com/doi/abs/10.1080/10714839.1970.11724302

reduce the armed conflict. However, there was a perverse effect that led to the opposite result, since many artisan miners –who worked in deplorable conditions and who derived their income from the production of raw minerals sold by the militias– lost their source of income and found no other way forwards than to join the militias to make a living. The growth of the militia army brought in turn the intensification of the conflict, massive forced displacements, and added not only corruption in government certification processes for minerals as conflict-free [32], [33], but also the strategies to "launder" them.

Hence, and unlike the conflicts around lithium in Bolivia, Chile and Argentina, the struggles over cobalt and other minerals in the DRC have grown to an international scale since some of the neighboring countries such as Rwanda and Uganda have become involved to launder those conflict minerals; the hundreds of Rwandan armed groups established in eastern Congo buy them from illegal mines and transfer them to this country; this led to for example, that without having large reserves of Coltan, Rwanda appeared as the largest producer of this mineral [34].

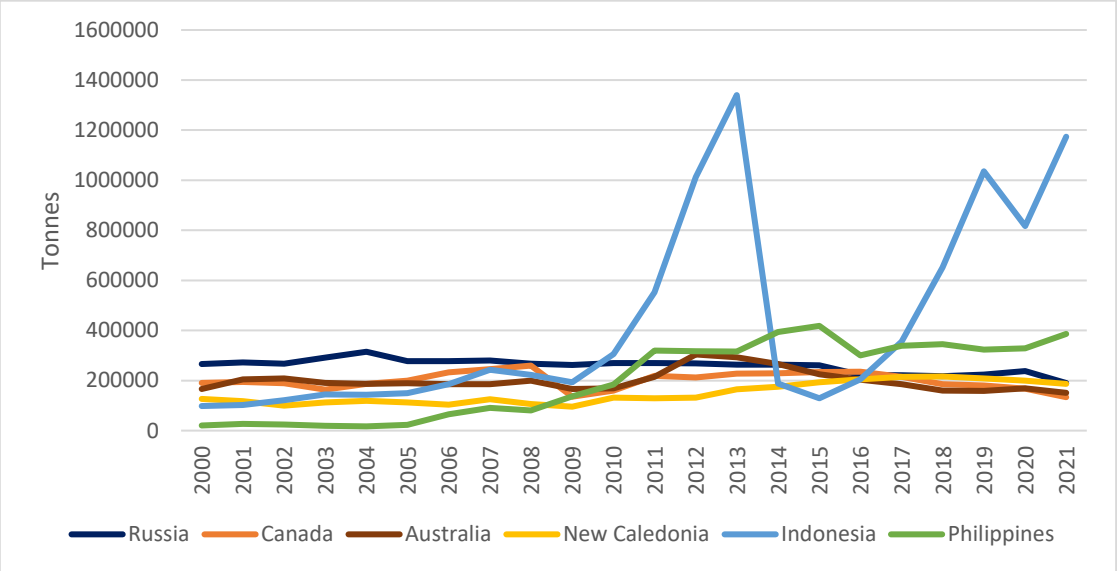
Additionally, other reasons for conflict regarding cobalt production in the DRC are water and soil contamination, negative effects on the traditional work of the population, and insufficient prior consultation processes. Labor conflicts have also been documented due to unjustified dismissals, accidents, and deaths due to lack of adequate workplace safety measures, as well as tax evasion and complaints of corruption. The companies most involved in these conflicts are, in order, Glencore Holdings Pty Limited (Switzerland), Tenke Fungurume Mining (which is an association between the Chinese group CMOC and Gecamines that is owned by the Congolese state), Ivanhoe Mines (Canada), Crystal River Global Group (U.S.), Zijin Mining Group (China), Shalina Resources Ltd. (United Arab Emirates) and Eurasian Resources Group (Luxembourg) [17]. Mining activity in the DRC has also been involved in multiple allegations of child labor.

Is Indonesia the rebellious child of Southeast Asia thanks to its nickel?

In another region of the world, this time in Southeast Asia, which is a region of great mineral wealth, nickel production by Indonesia has very recently become another reason for not a deadly conflict, but a conflict of international trade. Figures surrounding nickel production among the largest producers have shown significant changes over the last 20 years (Figure 6) and Indonesia's behavior is particularly curious.

Indonesia and Australia had the largest nickel reserves, each with 21 million metric tons in 2021 [35], although as seen in figure 6, production for the industry by Indonesia in recent years has exceeded by far that of the other countries that possess this energy transition mineral.

Figure 6 – Top-five nickel producers (2000 – 2021)



Source: Author's calculations based on BGS - Minerals UK (2023)

On the one hand, the particular behavior of Indonesian nickel production is explained because since the last government administration, and currently with President Joko Widodo, this country proposed as a state policy to overcome the already mentioned usual dynamic of the "division international labor between the countries of the Global North and South". On the other hand, when President Widodo banned the export of raw nickel in 2014 as part of his nationalist economic management, China saw both an opportunity and a necessity: an opportunity, because this measure –which can be understood as an Indonesian strategy to pressure foreign investment– dovetailed neatly with the implementation of the Belt and Road Initiative (launched at Kazakhstan in September 2013) and also with the launch of the 21st Century Maritime Silk Road (MSR) during President Xi Jinping's speech at the Indonesian Parliament in Jakarta (October, 2013); and a need, because thanks to a series of bilateral negotiations that led to said investment, several industrial plants were built, including the Indonesia Morowali Industrial Park (IMIP), through which China secured several privileges when acquiring the nickel necessary to its industrial processes and its energy transition.

This industrial complex (misnamed "park") is located on more than 2000 hectares in the central part of the island of Sulawesi and it is made up of a series of factories and companies whose owners invest through the production and trading of nickel as the main product, and also stainless steel and carbon steel; supporting industries range from coal-fired power plants (providing 1.26W domestically powered, 0.64GW from other sources and planning to expand to 2.9GW), drinking water facilities, cutting-edge

technology, eleven smelters where manganese, silicon are processed, chromium, lime, high pressure acid leachates (HPAL), and coke factories, to a multitude of roads, houses for Chinese workers, an executive hotel, a port and an airport, its own telecommunications network, as well as a security system. Among the technology, the use of High-Pressure Acid Leach (HPAL) to extract nickel and cobalt from laterite ore bodies stands out, which derives into the production of battery-grade nickel and other materials. It also brought electrification to nearby towns, schools, hospitals, and mosques, not to mention employment, although the number of workers in IMIP is uncertain, it is estimated to be between 34 thousand and 67 thousand employees (official data), which includes 5 thousand Chinese workers, and migrants from all over Indonesia, but mainly from Morowali. "According to a former senior executive of Tsingshan, IMIP 'contributed to both, local and national development (…) the local government revenue increased by 100 times' as a result of the park. He also mentioned the increase of skilled labor and the passing of workmanship across family generations as a positive effect that contributed to the establishment of a local working class. IMIP received various incentives from the Indonesian government (…) included the facilitation of licenses and tax reductions, but the park still managed to increase the national government's tax revenues by paying export duties" (Tritto, 2023: 14).

The largest investor to date is the Chinese Development Bank, with an investment of US$ 1.2 billion, and among the other investors are the ASEAN Investment Cooperation Fund, the Export-Import Bank of China, the Industrial and Commercial Bank of China, the Bank of China, the Shanghai Decent Investment Group, the International Finance Corporation (IFC a branch of the World Bank holding 24% of PT Sulawesi Mining), Indonesian and Chinese firms, and businessmen from other countries such as Australia, Japan and Korea, which in total have invested around of US$ 9.5 billion. Its owners are the Shanghai Decent Investment Group (49.7%), the PT Sulawesi Mining Investment (25%) and PT Bintang Delapan Investment (25.3%); but since Tsinghan Holding Group is the owner of Shanghai Decent and also the largest shareholder of PT Sulawesi Mining, this group owns 75% of the complex [37].

Amid the current close relationship between China and Indonesia, history cannot be ignored, nor with it, the difficult acrobatics that Indonesia has done to preserve a margin of independence in relation to other countries: for example, Scot Marciel, a former U.S. ambassador to both Indonesia and the Association of Southeast Asian Nations (ASEAN) expressed: *"*Indonesia has always been, since independence, very nonaligned (…) The shadow of history looms large in the region, and Indonesia's relations with the United States have always been a bit difficult. [The two had a] love-and-hate relationship throughout the '50s, when the U.S. tried to prevent Indonesia from leaning too close to communist countries. [President] Sukarno told the U.S. to go to hell with its aid, because of domestic politics. Indonesia entered into a near-alliance with China [before] becoming anti-China and closer to the United States" (Chivvis, 2023: 2). In fact, Indonesia broke off relations with China for almost 23 years, between 1967 and 1990, when it accepted that it was more useful to have an active role in foreign policy matters in its region. And ASEAN itself is another of the strategies "to prevent attempts to deprive them of their freedom and sovereignty (…) [so] Adam Malik (Minister of the Presidium of Political Affairs and Minister of Foreign Affairs of Indonesia) described Indonesia's vision of a Southeast Asia developing into a region which can stand on its own feet, strong enough to defend itself against any negative influence from outside the region" (Flores & Abad, 2023: 4).

Although the current agreements with China have been obtained thanks to delicate negotiations, there are conflicts of various kinds: labor, due to complaints of poor safety conditions within the complex and insufficient work staff, very long shifts, lack of vacations, difficulties in understanding Chinese workers, which have been resolved through language classes, and the dismissal of union leaders. Difficulties with illegal Chinese workers were also documented (resolved by expediting visa procedures and waiving certain visa costs), as well as job trafficking by illicit intermediaries who charge high sums to interested Indonesian citizens, in addition to fraud in identity documents, given priority for the natives of Morowali. Among the cultural conflicts were work schedules that did not respect the prayer practices of Indonesian workers, a problem that appears to have been resolved, but also preferential working conditions for Chinese workers, as well as longer stay times for Chinese workers than expected, which strengthens a long-standing anti-Chinese sentiment that still remains in Indonesia; additionally, all the difficulties that the sudden growth of a local population brings, without the authorities being properly prepared.

Among the most important environmental problems are atmospheric pollution, flooding, high CO2 emissions, landscape degradation, deforestation, loss of cultivated area and degradation of seawater quality, affecting the livelihoods of agricultural and fishing populations. of the area [40]. Sea pollution and coal-fired power plants are two of the most visible conflicts currently: the elimination of tailings and other industrial processes is done by dumping toxic waste into the sea, which is located in what is known as the coral triangle area. Additionally, the technology used to manage said waste (Deep-Sea Tailings Disposal – DSTD) also has severe environmental impacts.

However, for now, Indonesia has achieved its goal of getting over the international division of labor and is playing an increasingly important role as the Morowali industrial complex continues to expand and input production plants for the EV industry located in other regions, for example, in North Maluku and Halmahera, jointly currently supplying the inputs to the factories that produce 40% of the EVs globally [36]. But, for the same reason, the future trade of nickel with other countries reaches a certain level of uncertainty and hence the European Union and U.S. filed a lawsuit against Indonesia in the World Trade Organization (WTO) after the nickel ban, in which the WTO validated the EU's claims.

Furthermore, it is paradoxical that the largest percentage of electrical energy to produce transition minerals comes from coal-fired plants, and that 'green investments' in Indonesia are used to expand these plants and supply the growing market for batteries for electric vehicles (EV); this has generated not only major health problems among the surrounding population, and a whole series of resistance movements, but also heated environmental questions before investing entities. These environmental impacts have also brought commercial consequences, among others, that the Tesla EV factory in 2021 decided to invest in New Caledonia instead and avoid calling into question its 'green and clean' brand.

On the other hand, although the strategy of banning exports of raw nickel seems to have had good results, Indonesia must not forget its perverse effect: because the miners could not sell their product to the variety of regular customers and were left in the hands of Chinese buyers, the latter used the opportunity to impose low prices. Nor should it be forgotten that extractive processes, in addition

to the problems already mentioned, have other consequences: for example, the dizzying pace of nickel extraction means the same pace in the decline of its reserves.
The academic bibliography, and also the documentary and press review, shows that there are environmental, social, labor, economic, cultural, etc. conflicts, around virtually all of what today are considered energy transition minerals, which are present throughout the world. Among them, those of zinc stand out, in Kazakhstan, Peru, Namibia, Mexico, Serbia, and Guatemala, among others, and which as an indicative figure (and not a statistical representation) comprise 13% of the 533 environmental conflicts that the Mineral Global Tracker system has documented; also those of steel, heightened presently due to the invasion of Ukraine, and also affecting Turkey and India; those of gallium and germanium, whose recent restriction on export by China, heralds another international conflict, in the best of diplomatic and commercial cases; those of manganese in South Africa, Gabon, Ghana, Mexico, Guyana, among others; around the production of cadmium, in Kazakhstan, India, Poland, Bulgaria, Peru, among other countries, and so on.

V. CONCLUSIONS

Our analysis shows that the energy transition depends not only on each country's current dependence on fossil fuels, but also on their availability of capital, technology, and the natural resources necessary to transition to renewable sources; also, it seems to confirm that the relationship between these three elements is predominant in the generation of conflicts in non-industrialized countries with foreign intervention that already occur throughout the world.
The cases analyzed here, and those documented globally, also seem to show that, to overcome the international division of labor, that is, to avoid the export of raw materials and instead take on as much of their processing as possible to become part of the value chain, requires delicate geopolitical and economic alliances, which will hopefully have a prosperous future for all parties.
While Indonesia, for now, seems to have achieved this goal, Bolivia, which also achieved it initially by producing EVs, still has a way to go. Those countries that have the necessary natural resources but do not have the capital, so they are largely forced to sell their resources as raw materials, in the worst case, or to negotiate and ally with capitalist partners, in the best of cases, in their attempts to add to the benefits provided by the value chain.
On the other hand, it is worrying that all the energy transition proposals signed by various countries globally involve economic growth as one of their objectives, which can be considered a contradiction. Our patterns of production, distribution, and consumption –which in a vicious circle feed on economic growth and at the same time reinforce it– have led to a civilizational crisis of a diverse nature (environmental, food-related, societal, and energy-related to mention just some of its dimensions), global warming being the most evident negative impact of this polycrisis. Although the need to transition energetically is one of the civilizational transformations that has reached the level of consensus, if we want to act decisively against climate change, the just energy transition also implies questioning the ways in which human society is organized: “This is so because the intimate relationship between energy and development on the one hand, and carbon and growth on the other, remain tightly coupled” (Newell & Mulvaney, 2013: 1).
We refer to civilizational transformations because to the extent that energy, like water, are vital elements for humanity, a change in the sources that provide our current energy demand will affect many activities in daily life. So, just as it happened when we went from whale oil to kerosene and from firewood to coal, this transition will not be a minor change. On the contrary, if we also take advantage of it to make a fair transition, we will give ourselves the opportunity to balance the relations of power that exist between some countries, some human groups and between human beings and nature.
Since this paper is about analyzing the challenges and inequities derived from new energy systems, and for comparative purposes with fossil fuels, it is not possible to forget the emblematic case of Iraq, which is a country that has derived the majority of its income from oil, even reaching the situation that 100% of its income corresponded to this item in 2016 (as of this year its data has not been reported which is why it is not included in figure 3): “Before the 2003 invasion, Iraq’s domestic oil industry was fully nationalized and closed to Western oil companies”[42]. Twenty years have passed since the US military invasion called 'Iraqi Freedom' and finally, in 2007, it was recognized that “Of course it’s about oil; we can’t really deny that,” said General John Abizaid, former head of U.S. Central Command and Military Operations in Iraq, in 2007 [42] along with other statements such as those of the former Federal Reserve chairman, Alan Greenspan, or those of the former senator and former Defense Secretary, Chuck Hagel.
For the peace of humanity, it would be highly desirable that wars and conflicts derived from the control of energy resources were sporadic, but unfortunately the opposite seems to be the case: “Iraq, Syria, Nigeria, South Sudan, Ukraine, the East and South China Seas: wherever you look, the world is aflame with new or intensifying conflicts. At first glance, these upheavals appear to be independent events, driven by their own unique and idiosyncratic circumstances. But look more closely and they share several key characteristics – notably, a witch’s brew of ethnic, religious, and national antagonisms that have been stirred to the boiling point by a fixation on energy” (Klare, 2015: 1). As he also explains, Ukraine, for example, is not itself a significant energy producer, however, it is a major transit route for Europe to obtain the Russian natural gas; the fact that Ukraine signed an agreement with EU to integrate the EU energy rules into its national energy system, eliminating the deals between the Ukrainian elites and Russian Corporation Gazprom, is one of the basis of the present war.
One of the international conflicts (for now diplomatic and commercial) that the energy transition is making more evident every day is a great shift in power relations at a global level, due to the supremacy that China is demonstrating in matters that were previously the dominion of the United States; this is the case of investments related to energy generation projects, installed capacity in renewable energies, progress in the production and sale of hybrid vehicles and EVs globally, the production of semiconductors and microchips, and alliances for the production of inputs for the energy transition worldwide, to mention just a few related to the production of electrical energy. In fact, with the intervention of several structural and conjunctural factors, it is possible to affirm that, of the cases analyzed here, both Indonesia and Bolivia opted for China, and not for the U.S., after a series of considerations of an economic, historical and political nature; this leaves the question of how smooth this transition of global power would be [44]–[46].

For there to be climate justice, all its component elements, including the energy transition, must revolve around the notions of equity and justice; the just energy transition refers not only to those who still do not have access or reliable access to electrical energy, but also to ecological and social responsibility with populations whose ways of life still depend on fossil fuels, and with extraction processes, production, distribution and consumption for the energy transition. They also depend on maintaining the energy security that certain populations already have and, in addition, refers to the type of relationships that have been established between the regions that have the capital and technology to transition vs. the regions that do not have the these two factors, but with the natural resources necessary to put said technology into operation: "Coping with the problems of energy insecurity, energy poverty and climate change will require new sources of finance, novel technologies and substantial reforms to institutions and policy-making processes" [41].

If the inequitable and immoral dynamics that have existed until now continue, both in the production and consumption of energy with fossil sources and renewable sources, the energy transition will undoubtedly exacerbate the existing marginalization of vulnerable countries and groups; to avoid this, it is necessary to recognize and, furthermore, to act decisively on the structural conflicts that until now have not allowed an equitable distribution of the benefits offered by nature's resources, including respect for nature itself.

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