# ENERGY TRANSITION

## CONTRIBUTIONS FOR COLLECTIVE REFLECTION

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# CONTENTS

# 1

# Is there a single vision for energy transition?

**There are as many views of the energy transition as there are economic, political, ideological, ecological, technological and hegemonic interests.**

Thus, proposals for energy transition have very different objectives. There are political-economic views from neoliberalism, Keynesianism, and anti-capitalism; from ecological perspectives, from the cult of wildlife or eco-efficiency (cult of technology), or from the environmentalism of the poor (Martinez Alier, 2011) – with emphasis on weak, strong or super-strong sustainability (Gudynas, 2004); from large multinational corporations in the oil industry;[1] and from small citizen co-operatives.

Today, different views of energy transition coexist, from those held by representatives of green neoliberalism[2] and large oil industry multinationals,[3] to those of environmental institutions or movements with diverse ideologies,[4] to those of international organisations linked to energy,[5] and of various scientists and diverse unions,[6] to mention just a few.

Analysing and systematising the various energy transition proposals allows us to reflect on the characteristics of an energy transition that is consistent with post-capitalist, social, and environmental justice, and which genuinely confronts extractivism.

This handbook presents a non-exhaustive and non-exclusive classification, with the aim of organising the various proposals in circulation today.

Despite significant differences among them, most proposals for an energy transition share some common bases: accepting the role of human activity, particularly since the industrial era, in climate change and proposing the diversification of the "energy matrix". They also encourage the reduction of fossil fuels and their replacement with other sources – in some cases with renewable and sustainable sources, in others with nuclear power or even with so-called unconventional fossil fuels.

***Discussions on energy transition emerged during the Cold War at the end of the 1970s as a proposal to develop an energy matrix based on renewable resources, in opposition to the development of nuclear energy (Brüggemeier, 2017) (Fornillo, 2018).***

***The term 'just transition' does not refer exclusively to an energy transition but to a broader economic and ecological transformation of which the energy transition is one part. It emerged in the 1970s as a guiding principle of the labour movement under Tony Mazzocchi's leadership in the Oil, Chemical, and Atomic Workers International Union (OCAW).*** The origins of the concept are found both in the environmental and the labour movement. The concept of a 'just transition' appears in the preamble of the 2015 Paris Agreement, which mentions the need to take into account 'the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities' (United Nations Framework Convention on Climate Change, 2015).


In the 21st century, the climate crisis is a central concern driving the energy transition, though some actors also see this as an economic opportunity. Thus, official spaces like the United Nations Framework Convention on Climate Change (UNFCCC) produce proposals and conditions for an energy transition. Having identified greenhouse gas emissions as the main cause of the climate crisis, these entities seek to create mechanisms to reduce emissions, mainly by relying on non-fossil energy sources.

However, reducing the climate crisis to greenhouse gas emissions ignores other matters, both environmental (for example pollution and biodiversity loss) and social (inequalities and rights violations). These important issues are part of the crisis and must be taken into account in the search for solutions. This conceptual reduction is sometimes described as the 'carbonisation of climate' or 'carbon reductionism'. It is associated with an interest in establishing quantitative indicators and market tools that claim to address the crisis. Generally, emissions are expressed in terms of equivalent tonnes of carbon dioxide (because it is the most abundant greenhouse gas in the atmosphere),[7] and decreasing emissions of 'greenhouse gases' becomes the primary indicator of success in the fight against the global climate crisis.

Several groupings of actors are seeking to impose their view of energy transition in this context – some in an authoritarian manner and others in a more fluid and people-centred way that is in constant construction. Two groups are especially apparent. On the one hand, there are the actors who, faced with the climate crisis, see the energy transition as an opportunity to accumulate wealth and strengthen their geopolitical position. They promote weak sustainability mechanisms and view the situation with a corporate and patriarchal gaze. This could be called 'corporate environmentalism' or – following Maristella Svampa, in her essay 'Imegenes del fin' (Images of the End) (2018), – 'the capitalist-technocratic narrative'. This positioning encompasses what we refer to here as a corporate energy transition.

On the other hand, there are those who support strong or super-strong sustainability and pursue an energy transition based on participatory and cooperative social and environmental justice. This could be defined as 'popular' or 'peoples' environmentalism. It is based on an anti-capitalist social and environmental transition narrative (Idem, p. 158, 2018). This perspective leads to what we call a peoples' energy transition.

## THE CORPORATE ENERGY TRANSITION

The corporate energy transition does not come solely from businesses. It is promoted by diverse actors including multinational corporations, states (countries, provinces, regions, municipalities), and institutions and organisations that see this as the only possible path, or the only path able to respond quickly enough to the urgency of the crisis. Those who promote a corporate energy transition focus on a strictly hegemonic techno-economic perspective. Their main objective is to reduce emissions and generate a bit of geopolitical support in the face of growing public concern about climate change, while continuing to expand the accumulation of wealth and power through new extraction areas, and maintaining existing inequalities. In many cases, they promote very controversial and high impact solutions to the climate emergency, such as the use of nuclear energy, unconventional gas and large dams.

In the corporate energy transition, most elements (machinery, projects, regulations, research and development, etc.) are controlled by, or work in favour of, transnational corporations or world powers. Under the guise of increasing efficiency, their 'solutions' often make the systems governing peoples' everyday lives less transparent and accessible, thus limiting the possibility of democratising the use of energy and technology.

Access to, ownership and control of energy sources, materials and necessary technologies play a central role in this framework. Fundamentally, it increases the concentration of the energy systems. Large companies – not only private but in many cases notionally public – hold hegemonic power.

The main actors in the corporate energy transition see renewable energy sources as a way to address the planetary limits which are threatening to undermine the continuation of the industrial and extractivist model of development. They believe that non-fossil energy sources can sustain the current path of unlimited growth (Gonzalez Reyes, 2018).

Energy efficiency also plays a leading role in this vision. Advocates see 'efficiency' as a panacea which can sustain the same level of consumption while reducing energy use. In this way, they avoid the need to question or alter the logic of consumption itself.


The corporate energy transition is hegemonic, authoritarian and patriarchal: it consolidates the power of the powerful, including men, and it is willing to use state-sponsored violence to do so. However, it does sometimes include some democratic characteristics, for example the elimination of taxes on the self-generation of solar energy in Spain and other countries, and plans to ensure access to renewable energy for vulnerable households in New York.[8] However, such elements are not a central part of the corporate energy transition. Instead they are the result of political pressure exerted by social movements.

Thus, the corporate energy transition is based on a trivialised notion of 'sustainable development'. It foresees our society continuing on the path of limitless growth, exchanging fossil resources for renewables and high technology, without modifying the logic of capitalist consumption, without questioning distribution and people's access to energy, and without deepening or expanding citizen participation in decision-making processes. It does not represent a paradigm shift, but illustrates how the capitalist system seeks to capitalise on the energy and climate crisis for a new cycle of accumulation.

Those who promote this vision of energy transition seek to be at its forefront. This is how a representative of the Danish company DONG Energy expresses it:[9]

***'Our ambition is to drive the transition of the energy system and to lead the Green transformation. And to do that isn't just a technological challenge, it's also a human challenge! [...] How do we get the public that we build our windfarms for to accept this change in their landscape? [...] We will be needing people to adopt things which are good for society and good for the environment but don't necessarily have direct visible benefit for the individuals whose behaviour we are asking to change.'***

The resulting socio-environmental conflicts are not questioned, as the approach seeks instead to overcome communities' cultural values and impose the perspective of the companies.

## A PEOPLES' ENERGY TRANSITION

'Popular environmentalism' stands in sharp contrast to this corporate environmentalism. This other perspective recognises the urgent need to collectively build a peoples' energy transition that is counter-hegemonic, based on respect for rights and socio-environmental justice. In the words of researcher Kolya Abramsky (Transnational Institute, 2016):

***'Energy democracy – understood as an abstract vision of a future energy sector – is "a fantasy". The existing balance of power under neoliberal capitalism is profoundly anti-democratic. Thus, any kind of emancipatory energy transition would require a fundamental transformation of the existing geometries of power – and, as such, would demand a concrete and ambitious political strategy for how this kind of transformation might be achieved. Therefore, we might wonder whether the more pressing question is not the precise details of what a future energy utopia might look like but, rather, how we might build collective power and organisation.'***

The material conditions of the planet make the idea of limitless expansion or growth impossible. This reality must be analysed in a context of ecological distribution conflicts: different actors, with different levels of power and different interests, are confronted with resource demands by other actors at a particular ecological moment (Martinez Allier, 2004).

We cannot imagine 'a world where many worlds are possible' without contemplating how to build multiple societies that can achieve happiness with much reduced inputs of energy and materials. This is necessary to create the space for alternatives to flourish. However, envisioning and building these societies involves deep disputes over both power and meaning.

There are a few views that take energy not as an end, but as a means to improve people's quality of life within a rights framework that is coherent with the rights of nature.

***'The conceptualization of energy is cultural. Societies that consider oil as a resource are radically different from those that consider it as the blood of the earth. In this framework, energy is understood as something more than a physical concept, because it is a social, political, economic and cultural element.' (Fernández Durán & González Reyes, 2018) [Own translation]***

A peoples' energy transition aims to construct a 'right to energy' and questions the idea of energy as a commodity. It is based on the idea of de-privatisation, of strengthening the diverse forms of the public sphere, of participation and of democracy. It is based on the imperative need to reduce energy use and, at the same time, to move away from fossil energy sources. It is based on the struggle to eliminate energy poverty, and to decentralise and democratise decision-making processes around energy.

A peoples' energy transition is therefore a process of democratisation, de-privatisation, decentralisation, de-concentration, de-fossilisation, and decolonisation of thought. It is a process for the construction of new social relations, consistent with human rights and with the rights of nature.

# 2

# Why do we need an energy transition?

**Energy transition is already on the agenda of various institutions, governments, movements, corporations, and others. However, different actors have and promote different visions of both the process and the end goal of this transition.**

Embarking on a transition requires agreeing on a baseline assessment, tracing a desirable future, and developing a process, a path, a journey. Understanding the magnitude of the necessary changes and building pathways for these changes also requires a collective process of reflection and construction, democratisation of energy, and an inter- and cross-disciplinary approach in accordance with the complexity of the problems.

Here are just some of the problematic characteristics of the world's energy systems which we must confront in our transition towards a just and sustainable system: (Bertinat, Chemes, & Arelovich, 2014) (Cornell Global Labor Institute, 2012)

- Strong growth in energy extraction and consumption, heavily reliant on fossil and non-renewable fuels.
- Highly concentrated ownership and management of conventional energy resources (in the hands of private entities or held by public entities that function as corporations).
- High levels of conflict regarding access to energy sources.
- Conflicts with people and communities affected by the entire chain of energy exploration, extraction, transformation, and use.
- Serious impacts on biodiversity in both rural and urban areas.
- Substantial increases in greenhouse gas emissions related to the energy sector.
- Conflicts created by large energy infrastructure projects (many of which have been developed with public funds) with impacts on territories, biodiversity, and affected communities.
- Inequitable appropriation of energy and its benefits along the entire value chain.
- A high degree of dependence on fossil-fuel revenues in the economies of the main hydrocarbon producing countries.
- Private appropriation of energy resources and services for profit. The commercialisation of the energy chain in all its stages.
- Energy regulations in many countries that are the result of structural adjustment processes in the 1990s which pushed privatisation and market-based approaches.
- The decline in the efficiency of energy production, meaning that more and more energy is needed to produce one unit of useful energy.
- The absence of spaces for citizen participation in the creation of energy policies and, above all, in decision-making regarding how natural systems and territories are used.

From these summarised observations, we conclude that change is necessary, and that there are central themes that need addressing:

- There is growing evidence[10] that there will be less energy available in the future. The finite nature of fossil resources and the fact that fully using reserves that do exist would trigger catastrophic climate change are a current reality.
- The tremendous inequality and inequity in access to energy for a good life (energy poverty).
- the impacts of the energy system on ecosystems, territories, and peoples.
- Increasing concentration of wealth and power in large energy corporations (Bertinat & Kofman, 2019).
- Continued threats to peoples' ability to meet their basic needs, either from the privatisation of services or from the actions of state corporations

***Some important issues must be highlighted. A peoples' energy transition is not simply a change in the energy matrix, or a decision about which technological options to adopt. Rather, it is centred on discussing and transforming power relations. There are no infinite energy sources or materials. On the contrary, resources are limited, as is the capacity of the biosphere to absorb the impacts of the energy system.***

Thinking about a peoples' energy transition, therefore, requires a radical change in the energy system. The energy system cannot be reduced to the production and consumption of certain physical volumes of energy. The system is a complex interrelationship between public policies, sectoral conflicts, geopolitical alliances, business strategies, technological advances, diversifying production, sectoral demands, oligopolies and oligopsonies, the relationship between energy and distribution of wealth, the relationship between energy and the production matrix, relations with technology, and so on (Bertinat, Chemes, & Arelovich, 2014). This complexity demands a solution which is transformative, democratic, and participatory.

# 3

# What is the relationship between food sovereignty and energy transition?

**Beyond energy sources, discussing energy transition means discussing resources, public policies, sectoral conflicts, geopolitical alliances, the environment, human rights, gender equality, corporate strategies, technology, diversification of production, the relationship between energy and the distribution of wealth, the relationship between energy and production, and food sovereignty, among others.**

To discuss a social-ecological transition we must understand the intricate relationships between many factors, and explore diverse conceptualisations (systemic and counter-systemic), as well as existing aspirations (Bertinat, 2016).

Thus, the idea of 'a peoples' energy transition' is an invitation to understand and explore new relations between rural and urban areas. New relationships can be explored between the city and 'the countryside'; between food production and energy consumption; between food systems, local consumption, food sovereignty, and peasant agroecology,[11] and more.

As stated in Question 1, actors with many different backgrounds and ideologies realise the need to reduce fossil fuel use. However, this has sometimes led to neglecting or obscuring the role of agribusiness and agrofuels as causes of the climate crisis.

Industrial agriculture is not only responsible for the grabbing of land and territories globally,[12] but is also a massive emitter of greenhouse gasses. Growing use of synthetic fertilisers and toxic agrochemicals, heavy machinery required for large monocultures, deforestation, food and agricultural waste, and the high levels of energy consumed in large-scale food distribution and sales (refrigeration, waste, and transportation) mean that agro-industrial food systems are responsible for a large portion of greenhouse gas emissions. The interests of agribusiness corporations, like those of biotechnology and energy industries, are thus fundamentally opposed to those of peasants and the general population (da Silva & Martín, 2016).

A study by the United Nations Food and Agriculture Organization (FAO) shows that, as a whole, the world's industrial food production systems (production, processing and trade) consume 30 percent of all energy produced. Most of the energy consumption (70 percent) occurs once food has left the farm, in transportation, processing, packaging, storage, commercialisation, and preparation (FAO, 2012).


'Higher costs of oil and natural gas, insecurity regarding the limited reserves of these non-renewable resources and the global consensus on the need to reduce greenhouse gas emissions, could hamper global efforts to meet the growing demand for food, unless the agrifood chain is decoupled from fossil fuel use.' At the same time, 'without access to electricity and sustainable energy sources, communities have little chance to achieve food security and no opportunities for securing productive livelihoods that can lift them out of poverty.' (FAO, 2012) Moreover, as asserted by the UN General Assembly in its Declaration on the Rights of Peasants and Other Persons Working in Rural Areas (UNDROP), adopted in December 2018, peasant communities must have guaranteed access to means of production, credit, and markets. Food systems and those who produce food today thus stand in the center of their own transition, their lives and livelihoods potentially threatened by necessary changes to the energy system, even as many of them are traditional keepers of knowledge, wisdom, and practices that are vital for that transformation.

Several social movements, including La Vía Campesina, propose food sovereignty as part of the solution to the climate crisis (La Via Campesina, 2017; 2016), based on family agriculture and peasant agroecology (La Via Campesina 2018a; 2018b). Peasant agriculture, as recognised and practices by these movements, is a way of being, of living, and of producing in rural and suburban areas. It is based on family labour; it uses resources controlled by peasants (land, water, energy, and biodiversity); it has a strong relationship with the environment; it constantly seeks autonomy from capitalist markets; and it focuses on the needs of peasant communities (e.g. improving living conditions and reducing heavy labour) (da Silva & Martín, 2016).


Peasant agriculture and agroecology make use of various technologies. The path towards a peoples' energy transition, among other things, leads to a reflection on, and deconstruction of notions about technology. This can help to put technology into dialogue with other forms of indigenous and traditional knowledge (sometimes described as a 'dialogue of wisdoms'), while recognising the particularity of different cultural, social, and environmental contexts which means that there is no single system or way of living which can be replicated everywhere. A peoples' energy transition must be co-created and co-designed by the rich diversity of actors involved in community/small-scale and agroecological production systems.[13] This includes not just peasant farmers but also small-scale fishers, pastoralists, and indigenous peoples.

From the perspective of a peoples' energy transition, the solution is not to make industrial agriculture more efficient or for it to use renewable energy, but to strengthen, promote, and empower peasant and 'peoples" agriculture. This entails promoting food as a basic human right; agrarian reform; protecting biodiversity and the commons; reorganising the food market; eliminating the globalisation of hunger and poverty; and promoting social peace and democratic control.[14] A peoples' energy transition requires re-directing resources and public policies, including those related to food production and access to land.Joining forces and agendas among social movements of rural and urban workers who defend food sovereignty, family and peasant agroecology, and peoples' energy transition, can contribute to the systemic transformation needed to move towards societies based on environmental and social justice.

4

# Where is energy poverty within the energy transition agenda?

**There are approximately 1.2 billion people worldwide who lack access to electricity, and more than 2 billion who cook with biomass, kerosene, or coal in conditions that affect their health (International Energy Agency, 2017). Energy poverty undermines quality of life and deepens inequality. Women are especially affected by energy poverty, given the roles generally assigned to them, as those responsible for reproduction of life and other care work.**

Energy is a tool, not an end in itself. As such, it should be used to improve people's quality of life. Especially in contexts of profound inequality, energy has the capacity to improve the distribution of wealth.

There are varying approaches to energy poverty. In most cases, it is subsumed under energy access policies or discussed only in relation to the cost of access relative to household income.

Discussions at the beginning of the 20th century took place in terms of 'fuel poverty', which can be summarised as the inability of a household to adequately cover its energy needs due to its low income, the cost of energy, and characteristics of its housing (e.g. poor insulation) (Castelao Caruana, Méndez, Rosa, & Wild, 2019).

One of the most common definitions of energy poverty (Boardman's, cited by Rodrigo Durán (2018)) considers a household to be energy poor when it must spend more than 10% of its income to adequately heat the home, or when the total spending on energy is higher than this. Although this definition does not refer to other multidimensional aspects of energy poverty, it is useful for understanding part of the problem.

Researcher García Ochoa (2014) proposes a focus on Absolute Energy Needs,[15] which, following Max-Neef, considers human needs as absolute and unchanging in all times and cultures. Identified 'axiological' needs – protection, affection, subsistence, freedom, identity, creation, leisure, participation, and understanding – have 'satisfiers' in three different modes – having, being, and doing. The specific 'satisfiers' for these needs, however, change through time and differ across cultures.

Ochoa applies this reasoning to energy needs specifically, creating the Basic Energy Needs Satisfaction method,[16] according to which energy poverty is defined as:

'... when the persons who live cannot satisfy their absolute energy needs, which are related to a series comforts and economic goods that are considered essential, in a given time and place, in accordance with social and cultural conventions' (Idem, p.17, 2014) [own translation].

There is also a gender dimension to the strategies that households use to address energy poverty (Castelao Caruana, Méndez, Rosa, & Wild, 2019), thereby contributing to the feminisation of poverty.

Various indicators show that energy poverty affects many aspects of daily life around the world. For example, ten years ago, the Economic Commission for Latin America and the Caribbean (ECLAC) described energy poverty in Latin America with the following characteristics (among others):[17]

- In all the countries analysed [by ECLAC], the poor strata consume less energy than the other social strata (in countries where the difference could be measured, eight times less on average). However, they spend more of their income on energy than do the non-poor strata.
- In many cases, the price per calorie equivalent unit is higher, basically because of difficulty accessing grid services such as natural gas in some of the countries that have natural gas (even taking into account subsidies for liquefied petroleum gas (LPG), this gas was eight times more expensive than natural gas).
- When this is not the case, it is because firewood is used as the basic fuel or because people are illegally connected to the grid and do not pay for the electricity they use.
- In some cases, there is as much as a thirteen-fold difference in the energy spending/income rations between the poorest 20 percent and the richest 20 percent, and many countries do not even have statistics on this aspect
- The level of inequality is very high.
- Greater per capita firewood consumption also generally corresponds to lower levels in the Human Development Index.
- The issue of inequity arises not only as regards access to the various services, their relative cost and the larger proportion of family income to meet energy needs. The issue also concerns households' and communities' access to equipment, which in turn is reflected in the level of energy consumption.

Far from structurally addressing energy access, energy policies have dealt with it in a scattered and unsystematic manner. Access to energy services is not seen as a basic aspect of poverty reduction. (Kozulj et al. 2010).

It is sometimes argued that bringing billions of people out of poverty could lead to an increase in greenhouse gas emissions. Aside from its problematically elitist implications, this idea is based on the incorrect assumption that satisfying peoples' needs is possible only through large-scale industrial production and consumption.

The corporate energy transition model reduces the debate to increasing renewable sources in the energy matrix and ignores energy poverty as an essential part of the discussion. A peoples' energy transition addresses energy poverty as a key aspect of the energy system, respecting scientific knowledge and ancestral wisdom, co-constructing the energy transition towards societies that fully realise both social and environmental justice.

# 5

# Can we create a right to energy?

**Rights emerge from historical, social, and political struggles. Rights – particularly civil and political rights – used to be assigned only to men (and not all men, as some were excluded due to race, class, or other characteristics). As a result of political and social struggle, some countries' rights frameworks today include all men, women, boys and girls. The rights of workers, peasants, traditional communities, and the right to express one's sexual identity may be recognised, among others.**

Rights are not a fact, but a construct, a human invention, in a constant process of construction and reconstruction. Rights are a terrain of and in dispute – fluctuating between their 'regulatory potential' and their 'emancipatory potential'. That is to say, they can serve sometimes to solidify or consolidate existing power relations in society, but at other times can serve to challenge, undermine, or transform these. The living forces of society – political and social movements – are key actors in these struggles, against forces and institutions that tend to preserve the established order. Fundamentally, struggles over rights are struggle about the nature, meaning, and legitimacy of democracy and the rule of law.[18]

The law can be seen to represent the balance of forces at a given moment. When this balance of forces shifts within a democratic system, this generally influences the legal system.

Peoples' need to establish their rights in the legal system within the framework of capitalist society has a direct relationship with the advance of market logic in different spheres of life.[19] In this way, capital's response is the emergence of markets where the satisfaction of rights will become a service, subject precisely to the market logic. This is how water, nature, and energy have become commodities subject to the logic of capital.


Faced with this market logic that considers everything in our surroundings as a good to buy or sell, social movements fight and resist. They use their creativity. And often, they use the recognition of rights as part of their struggles. They shape the content of rights, and the social and political legitimacy that enable their institutionalisation. Rights do not exist solely from legal recognition. They begin to exist from vital needs and fundamental claims by human groups and beings that demand them (Bertinat, Chemes, and Moya, 2012).

In this way, a peoples' energy transition includes advancing the decommodification of energy and removing it from the sphere of capitalist markets, so that it becomes part of a logic of rights. A comprehensive right to energy encompasses not only the right to have energy available to cover basic needs, but also the right to decide about critical dimensions of the energy system. What kind of energy is produced?; for whom and how it is distributed?; how are the rights of communities and workers who are directly related to energy extraction and creation affected? This set of rights is usually called energy sovereignty, understood as peoples' non-State sovereignty. Energy sovereignty is based on the empowerment of communities and workers in relation to their energy future and their vision of society. Energy sovereignty means ensuring that communities and workers have the energy they need to build and sustain thriving, resilient and just socio-ecological systems.

This will require social and technological responses that allow people to break relationships of dependence with energy systems that are controlled by transnational corporate monopolies.

Energy sovereignty requires the recognition of the human right to energy in sufficient quantity and quality for a life with dignity. That amount is not fixed but can be set according to the energy requirements of a sustainable society, the availability of energy, and the physical limits of the planet.

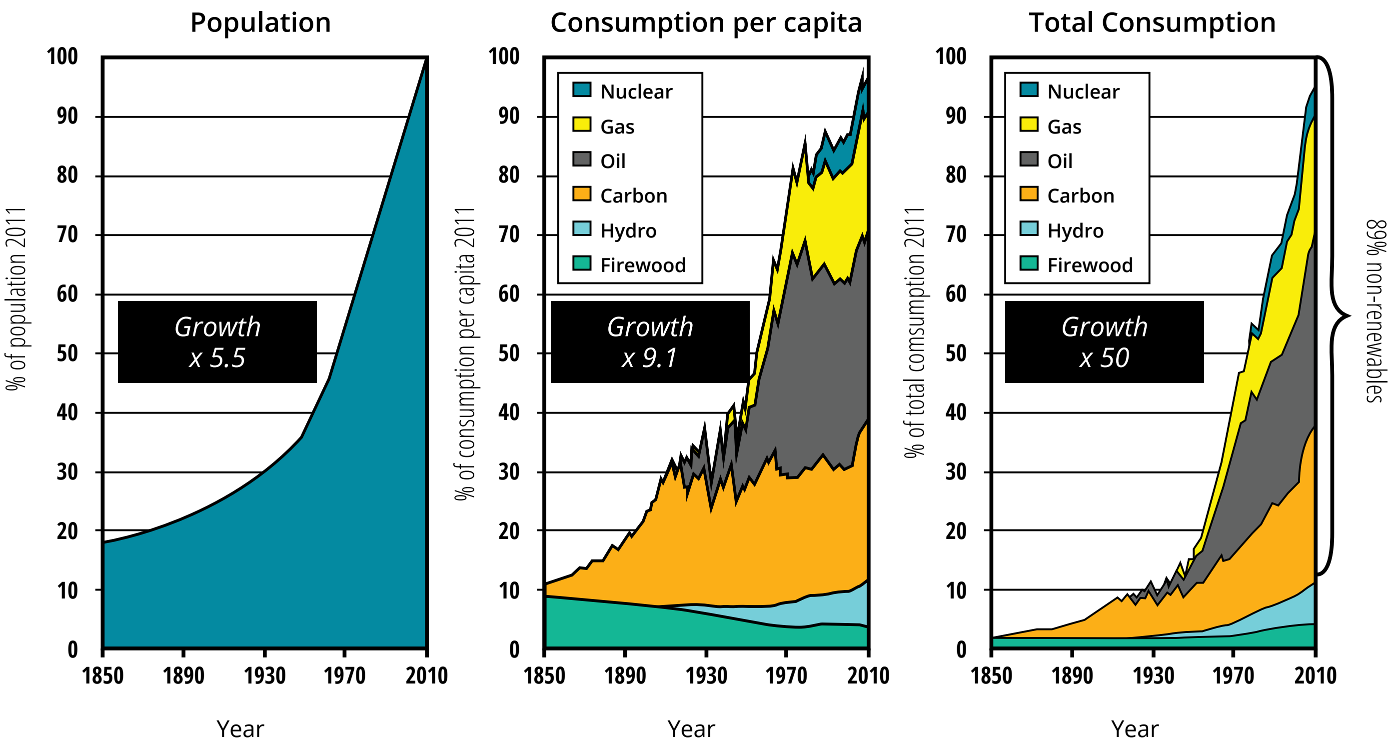
Progress is being made within peoples' movements to agree on and collectively build visions of energy sovereignty, energy rights, energy decommodification and democratisation in the context of building societies based on environmental and social justice.

# 6

# How much energy is available? Is energy unlimited?

**Over the last 160 years – from 1850 to 2010, the global population increased by 5.5 times, meanwhile energy consumption increased almost by 50 times through the use of fossil fuels (Hughes, 2013).**

**Figure 1: World population and energy consumption**




*Source: (Hughes, 2013, p. 4)*

The availability of energy (in terms of both quantity and quality) has created the conditions for material development over the past two centuries. The sources that made this phenomenon possible (coal and, later on, oil and natural gas) are defined by their high energy density, the presence of a lot of energy in a small volume, the ease of transportation and storage, the development of multiple uses, and the high energy return rate especially in the early stages of their exploitation.

The adoption of fossil fuels was not instantaneous; it took decades to displace the previous energy system based on biomass resources, water, and wind (and these energy sources continue to be important in some contexts). Coal was deployed during the 19th century; oil entered around the end of the same century, but became a major energy source only after the First and Second World Wars. During this period, the combustion engine and oil derivatives began replacing coal and the steam engine. However, it was only in the second half of the 20th century that oil became the main source of energy. Natural gas – a fuel that many predict will play a leading role in the fight against climate change (see Question 8) – also made its entrance in this period.

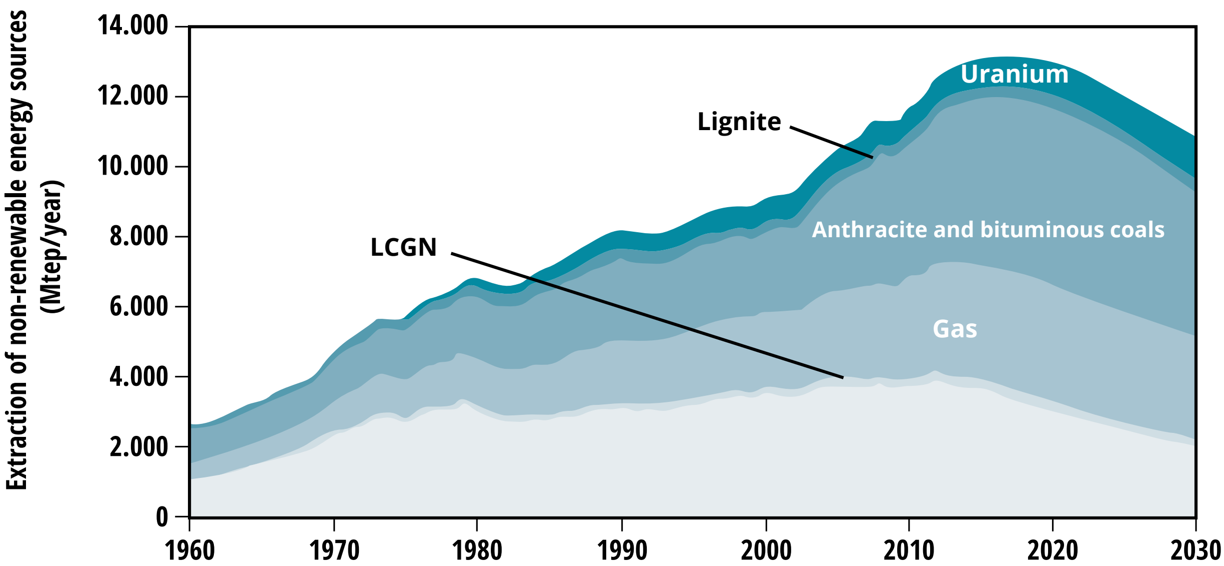
In the middle of the 20th century, Marion King Hubbert, a geologist and geophysicist employed by the oil company Shell, analysed the process of discovery, production, and decline in the extraction of oil (work that later extended to other fossil fuels and many minerals) and argued for a theoretical 'peak' in oil production, after which production must decline. Setting aside the debates raised by the research, most researchers agree that hydrocarbon production will 'peak' at some point. The debate today is focused on when this will occur, if it hasn't already.

Reviewing the existing literature, González Reyes (2018) notes:

'The peak of conventional oil was reached in 2005 (IEA, 2010, 2012, 2015). A corollary of this is that the supply of oil is in the hands of a decreasing number of States, including Saudi Arabia, Russia, and the United States. The peak of all liquid fuels is likely to be before 2024 (Patterson, 2014a, 2016b; Political Economist, 2014; Mediavilla, 2015; Li, 2017). This will be reached in non-OPEC countries first. OPEC exports will end before 2050 (Lahèrrere, 2013). The peak of gas fuels will be reached between 2020 and 2039 (Valero and Valero, 2014; Coyne, 2015; Mediavilla, 2015; Li, 2017). The peak of coal could be shortly after: between 2025 and 2040 (Capellán-Pérez et al., 2014; Political Economist, 2016; Li, 2017)' [own translation].

The following graph shows the possible moments of the extraction peak of uranium and of the various fossil fuels (Fernández Durán & González Reyes, 2018).

**Figure 2: Peak extraction of various fuels**




**Disponibilidad de fuentes energéticas no renovables y proyeción futura (Zittel y col., 2013).**

It is likely that the finite nature of resources will set the limits that will stop the fuel use curve from continuing the exponential growth described in Figure 1.

The following table shows the estimates on the limits of fossil fuel availability compared to the limits of renewable sources (Gonzalez Reyes, 2018).

| | Fecha prevista del cénit | Tasa geológica de declive anual (%) | TRE | Energía primaria (% en 2015) | Potencial teórico máximo (% de 2015 y TW) |
|---|---|---|---|---|---|
| **Líquidos combustibles** | **2015–2024** | | | **31,3** | |
| Petróleo convencional | 2005 | 6-9 | 18-20:1 y bajando | | |
| Petróleo ártico | | | 5-10:1 | | |
| Petróleo aguas profundas | | | 5-10:1 | | |
| Petróleos pesados y bitumen | | | 3:1 | | |
| Petróleo de roca poco porosa | 2022 | >pet. convenc. | <5:1 | | |
| GTL | | | 5:1 | | |
| CTL | | | <5:1 | | |
| Kerógeno | | | 1,5-7:1 | | |
| Agrocarburantes (biodiésel) | | | 1-9:1 | 0,005 | incluido en biomasa |
| Agrocarburantes (bioetanol) | | | 2-5:1 | | |
| **Gas combustible** | **2020–2039** | | | **21,2** | |
| Gas convencional | | 4 | 10-20:1 y bajando | | |
| Gas de roca poco porosa | | >gas convenc. | 2-5:1 | | |
| Clatratos de metano | | | 2-5:1 | | |
| **Carbón** | **2025-2040** | | | **28,6** | |
| Carbón convencional | | ¿1? | 46:1 y bajando | | |
| Gasificación subterránea de carbón | | | <<46:1 | | |
| **Uranio** | **2015** | **6** | **5-14:1 ligada al pet.** | **4,8** | |
| **Renovables** | | | | **14,1** | **26-66 (4,5-12 TW)** |
| Hidroeléctrica | No hay | 0,2-1 | 20-84:1 ligada al pet. | 2,4 | 0,5-1,8 TW |
| Eólica | No hay | No hay | 10-20:1 ligada al pet. | 1,4 | 0,5-2 (+0,5) TW |
| Fotovoltaica | No hay | No hay | 1-10:1 ligada al pet. | | 2-4 TW |
| Termoeléctrica | No hay | No hay | 4-20:1 ligada al pet. | | |
| Geotérmica | No hay | | 9:1 ligada al pet. | | 0,06-0,2 TW |
| Marinas | No hay | No hay | 1:1 ligada al pet. | | 0,06-0,7 TW |
| Biomasa y residuos | No hay | | 10-80:1 | 10,3 | 0,9-3,3 TW |

There is no doubt about the finite nature of non-renewable fossil energy resources. This is broadly consistent with the planetary limits: planetary ecosystems cannot adapt to and survive a continuation of current emissions. However, strong evidence suggests that, even with 'peak fossil fuels' in sight, burning all remaining fuels would most likely spell the end of human life on Earth, taxing ecosystems far beyond their ability to adapt, and pushing the climate far beyond the limit of 2 degrees of global heating identified by the IPCCC and the Paris Climate Agreement.

Energy and material availability is nonetheless a main determining factor in the energy transition. While a corporate energy transition tries to escape by betting on more market strategies and continuing a path of unsustainable consumption, a peoples' energy transition posits the need to adapt to existing energy and materials, not only in terms of physical quantities, but taking into account the socio-environmental impacts caused by their use and extraction.

# 7

# Is having energy resources or reserves the same as being able to use them?

**There are technical, environmental, political, and social obstacles, among others, blocking the full exploitation of fossil fuel and uranium reserves. This section will address only one key obstacle: 'Energy Return On Investment (EROI)'.**

EROI is an estimate of how much energy it costs to produce energy. Mathematically, it is the quotient of energy obtained (through a given production method) divided by energy consumed in obtaining that energy:

$$EROI = \frac{Energy\ obtained}{Energy\ consumed}$$

EROI can be understood as a measurement of the energy performance of an energy source. A higher number means that more units of energy are obtained for each unit of energy consumed in energy production – a higher 'net gain' in energy.[20]

It is important to differentiate EROI from efficiency, which usually refers to the end-use of energy, for example, in analysing how much energy is used to heat or cool, or move something.

There are different ways of calculating EROI.[21]

EROI is an indicator which serves to complement calculations on existing fuel reserves. While the precise numbers vary, there is a widespread consensus in the literature that, as we use up energy sources, the EROI of fossil fuels is falling – we have to work harder and harder to access energy from fossil fuels.

In foraging and agricultural societies, the energy available to society had an approximate EROI of 10:1. Although less energy was available in total, the 'pay off' on invested energy was quite high.

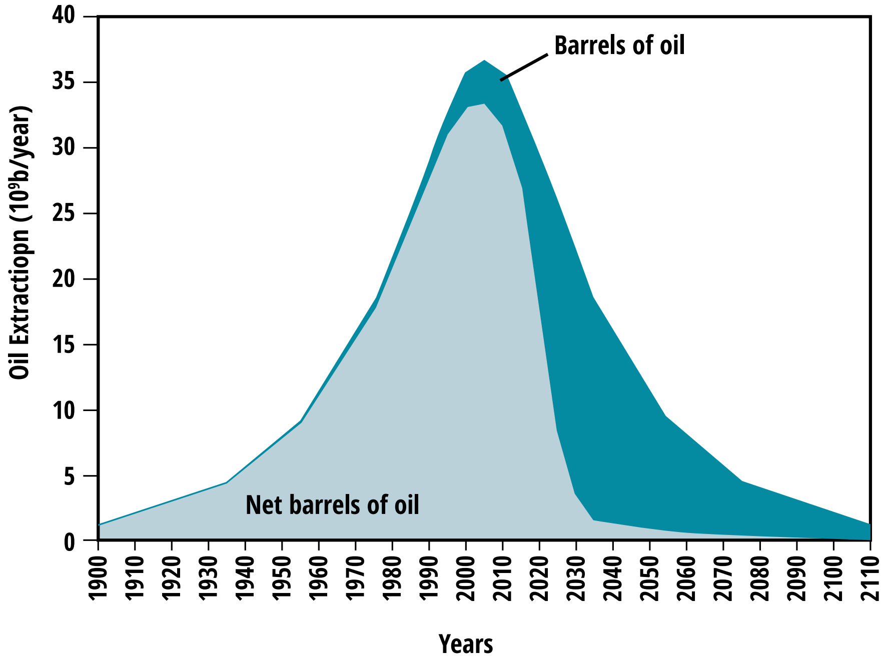
It's likely that the first petroleum obtained had a much higher EROI, close to 100:1; that is to say, with energy equivalent one barrel of oil you could obtain 100 barrels. However, these numbers have been declining since. Thus, on a global scale and on average, the oil EROI in the 1960s was around 45:1, decreasing to 35:1 by the end of the 20th century, and to just 18-20:1 in the first decade of the 21st century. The EROI of coal today is around 46:1. The combined EROI of oil and gas, which was at 23-26:1 in 1992, fell to around 18-19:1 in 2006 (Idem, Vol. 2, p. 105, 2018).

These EROIs are still relatively high in comparison to what is expected for the 21st century. According to French economists Court and Fizaine, oil and gas reached their EROI peaks in the 1930s and 1940s (oil peaking at 50:1 and gas at 150:1). They have been in decline since then. Coal seems to be the only fossil fuel whose EROI has still not reached its maximum, which is expected between 2020 and 2045 (Morassi, 2017).

The same authors suggest a possible relationship between the ongoing decline of oil and gas EROIs and the slowdown in conventional economic growth in recent years. Falling EROIs mean that the general production costs for fossil fuel energy will increase, even when these fuels' market values remain low. It therefore seems impossible that the 20th century's supply and demand of fossil fuels could be sustained in the current century.

EROI's relationship to the known oil reserves can be seen in the following figure, where the net oil barrels are shown light grey, once the barrels needed for extraction in the context of a decreasing EROI are taken into account.

**Oil extraction curve correcting the volumes according to the variation of EROI**




*(Fernández Durán & González Reyes, 2018)*

In sum, it is not possible to recover all of the inventoried resources, due to the high energy cost of doing so. In other words, not all theoretically existing reserves could be used, even if the catastrophic climate consequences of doing so are disregarded (see Question 9).


Many questions emerge regarding social, environmental, and political consequences of this decline: Who will be most affected by these changes? What changes will take place in the power relations that were created, among other things, in relation to energy sources? Is it possible to move towards a decommodified energy model, where the relationship between supply and demand do not determine access and control? What are the environmental consequences of continuing the extraction of increasingly scarce resources?

# 8

# Should unconventional fossil fuels have a role in the energy transition?

**Information about the existence of so-called 'unconventional' oil and gas deposits has been available for a long time. Unconventional fossil fuels are sources of fossil energy other than traditional coal, oil, and gas which are being made (theoretically) available for extraction by new technological developments, or by rising fuel prices which make them profitable to extract despite the high energy, social, and environmental costs of doing so. These deposits can be classified by the method for their extraction (Bertinat et al., 2014).**

- Mining: oil shales and oil sands.
- Wells: tight gas, shale gas / shale oil, extra-heavy petroleum, and coal bed methane.
- Other types of extraction: methane hydrates and marsh gas.

Despite the widespread attention that these new unconventional fossil fuel reserves have recently garnered in various parts of the world, these fuels do not guarantee an infinite extension of the growth paradigm. At best, they will be a supplementary source of high-cost energy, which will mitigate, to some degree, the impacts on energy consumption of the decline of conventional fuels, which are cheaper to produce (see Question 7). It is a mistake to view unconventional fossil fuels as an alternative capable of indefinitely increasing the low-cost energy supply that has sustained economic growth so far (Hughes, 2013).

Although some unconventional fuels can provide short-term income for local economies, these sources in general are characterised by low net energy yields, the need for continuous capital investment, a limited rate of supply, and major socio-environmental conflicts often associated with their extraction.

Certain actors have suggested unconventional fuels as a 'plan b' to allow energy use to continue unabated if conventional fuel supplies falter. But although the reserves of these unconventional resources are apparently very large, their usefulness must be assessed in relation to the total cost of their production and consumption, the socio-environmental conflicts involved in their extraction and supply, and their EROI (see Question 7) or ability to yield net energy.

In 2009, the UK Energy Research Centre (UKERC) presented a report on global oil depletion, which reviewed the models of future oil production developed by various organisations.

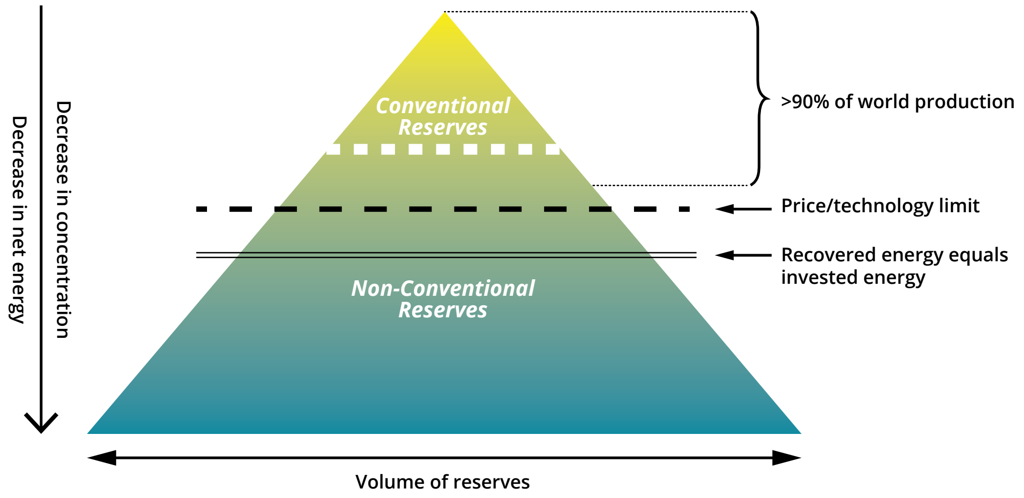
The report concluded that (Sorrell et al., 2009, p.29):

- Based on the current evidence, a peak of conventional oil production before 2030 appears likely and there is a significant risk of a peak before 2020.
- Peak global production of conventional and unconventional petroleum may be reached before 2030 (including conventional oil, natural gas liquids, heavy oils and oil from tar sands).
- The situation of alternative liquid fuels – among them bitumen, liquid fuels made from coal or gas, and agrofuels – was less clear.

The following figure shows a pyramid with the highest quality resources – those that are found in highest concentration, and can be extracted most quickly and at lowest cost – at the apex (Idem, p.44).

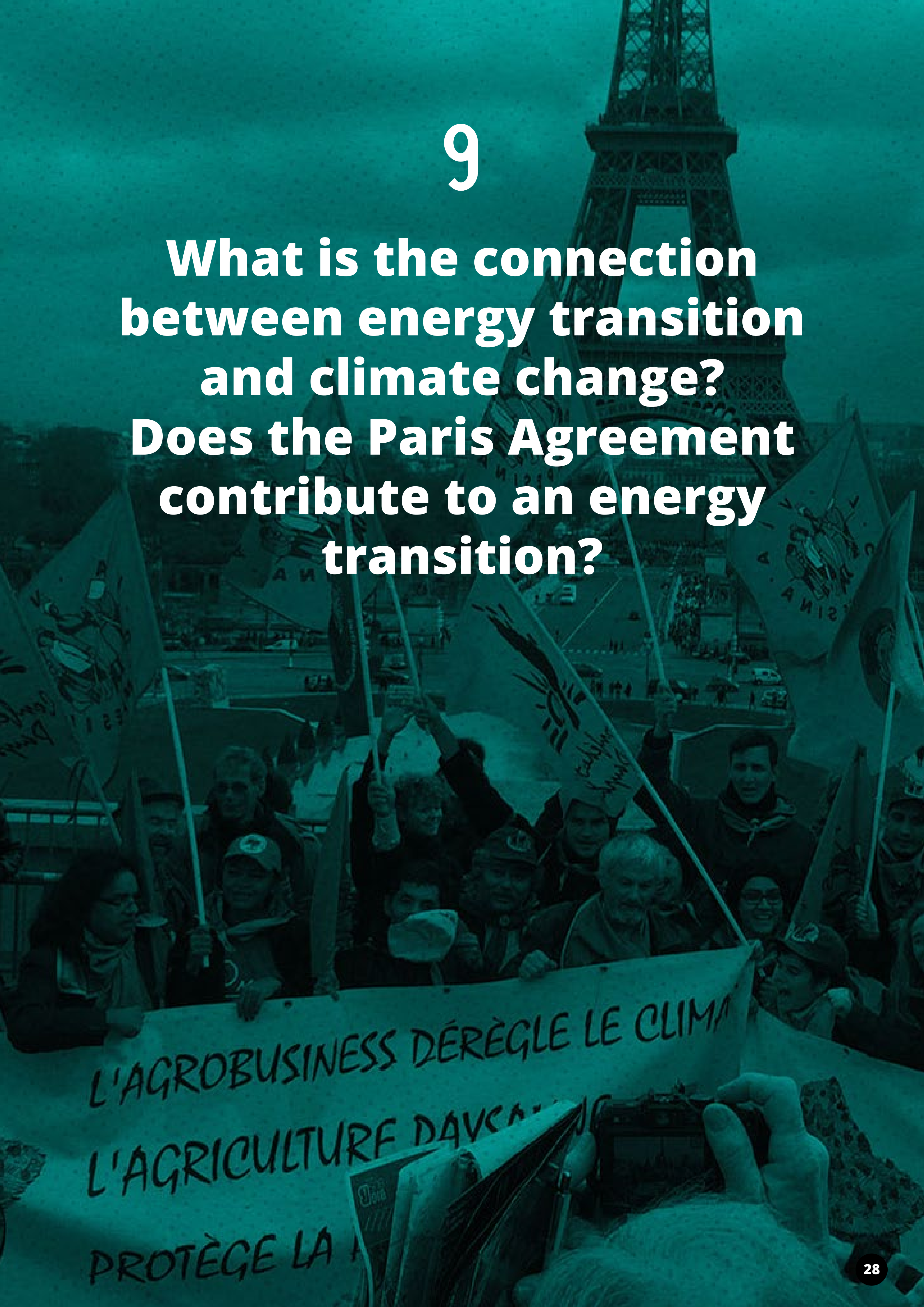
**The pyramid of oil and gas resources vs. the quality of the resources.**

**The graph illustrates the relationship between the volume of conventional and unconventional resources and their quality, as well as the decreasing net energy and increasing cost of extraction towards the bottom of the pyramid.**




Descending towards the base of the pyramid, the quantity of resources increase, but their quality decreases. The first dotted line shows the boundary between abundant 'low-cost' conventional fuels and high-cost unconventional fuels. The next line below shows the limit of production even accepting high costs; that is to say, accepting that price increases will activate certain reserves. The next line shows the breaking point at which the energy needed for extraction is higher than the energy obtained.

It is therefore debatable whether unconventional resources can be considered viable energy sources. In addition to the technical limitations and extraction costs, we must take into account the territories in which these resources are located. In many cases, these are territories inhabited by traditional communities and/or are rich in biodiversity. Accessing these reserves would entail the destruction of territories and the communities that live there, as well as major ecosystem disruption. A peoples' energy transition points towards the decision to leave unconventional fuels in the ground as a necessary step towards abandoning fossil fuels.




# 9

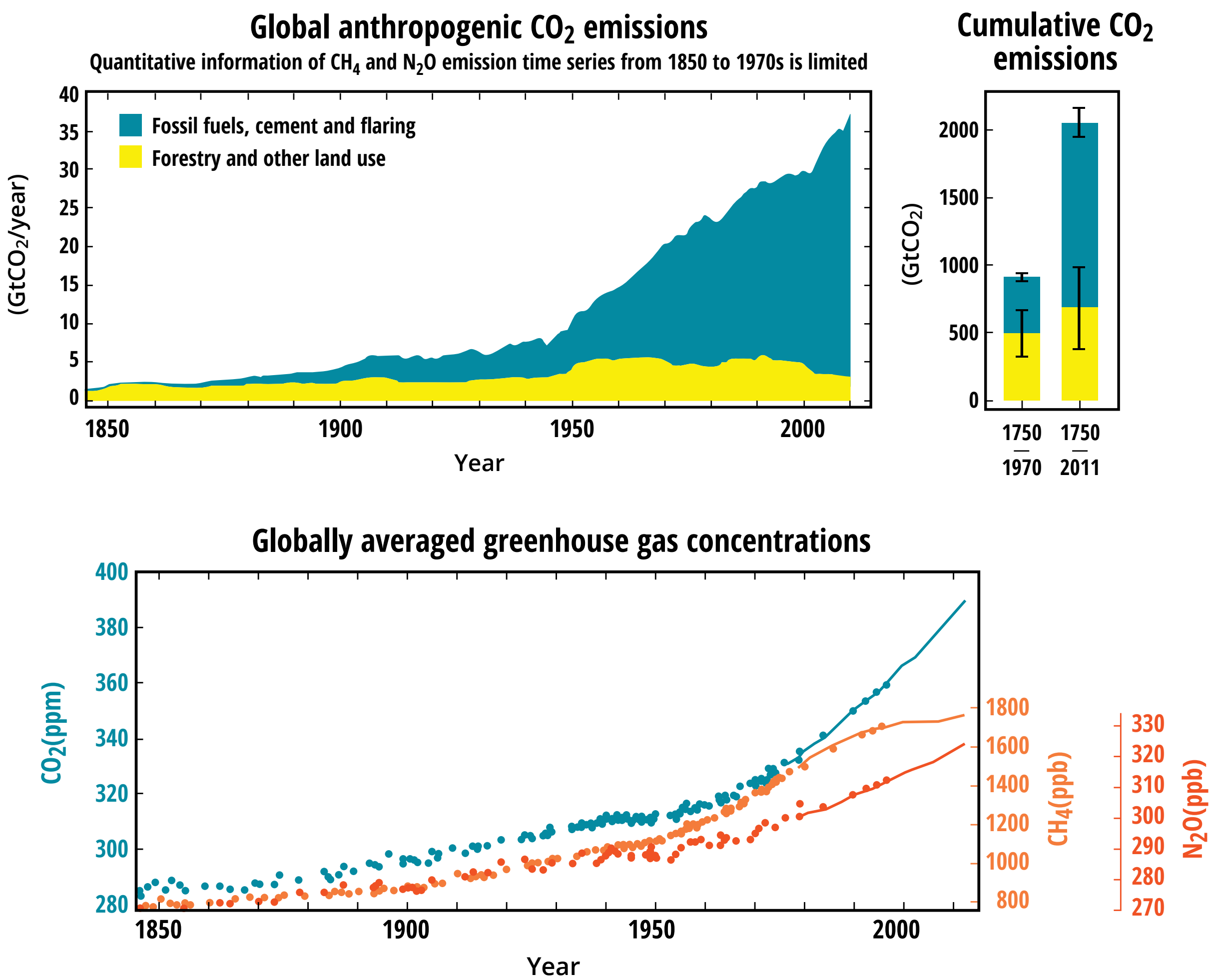
# What is the connection between energy transition and climate change? Does the Paris Agreement contribute to an energy transition?

**Not long ago, the terms 'energy' and 'climate' began to be intertwined. Initially energy production was linked to environmental problems in general. Since the beginning of the industrial era, the negative impacts of coal on human health and air quality, on top of the impacts of mining, became apparent. In the 20th century other fossil fuels and nuclear energy increasingly became the focus of environmental concerns.**

Since early in the 19th century, there have been warnings about the relationship between the planetary climate and the concentration of certain gases in the atmosphere. At the end of the 19th century, the first warnings were issued regarding the release of certain gases through fossil fuel use and the possible alteration in the composition of the atmosphere and therefore the climate.

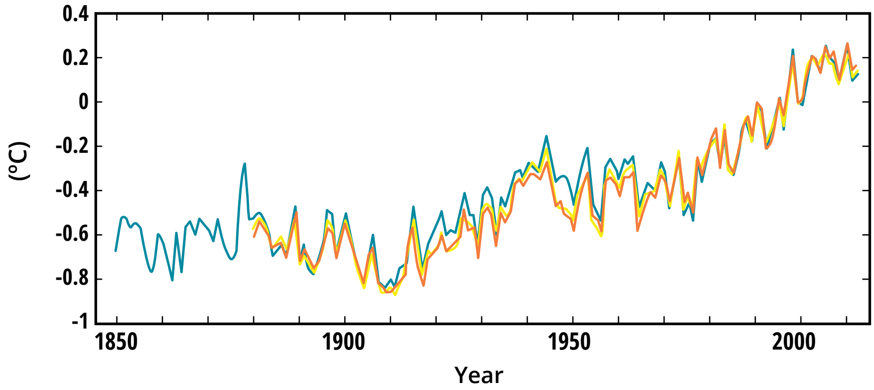
The idea that there is a relationship between the relative proportions of different gases in the atmosphere and the planet's average temperature is widely accepted. There is also consensus that a larger concentration of greenhouse gases is historically associated with higher global average temperatures.

**$CO_2$ Emissions, Greenhouse Gas Concentrations, and Changes to Land and Ocean Surface Temperatures**




*Source: Intergovernmental Panel on Climate Change, 2015.*

**Globally averaged combined land and ocean surface temperature anomaly**




The first figure shows the strong growth of CO2 emissions and main sources including fossil fuel extraction and use. It should be noted that the bulk of these emissions occurred after 1970.

The second figure shows the concentration of greenhouse gases in the atmosphere. Between 1750 and 2017, 2,200 (+/-320) Gt CO2 (gigatons of carbon dioxide) were released into the atmosphere, half of this in the last 40 years. Seventy-eight percent of these emissions correspond to emissions associated with fossil fuels (IPCC, 2015, p. 5).

According to the Intergovernmental Panel on Climate Change (IPCC), the UN body responsible for assessing science related to climate change, to ensure that the average global temperature increase does not exceed 1.5°C above the pre-industrial temperature (with a 66% probability), greenhouse gas emissions should not exceed 420 Gt CO2. The IPCC considers 1.5 degrees to be the threshold below which some of the most serious consequences of climate change can be avoided or managed, taking into account the fact that this global average rates implies much more dramatic local changes, increasingly severe and unpredictable extreme weather events, a significant rise of sea levels, serious impacts on fragile ecosystems and more.

In 2015 at the Paris Climate Conference (COP21) many of the countries of the world signed on to 'the Paris Agreement': a binding agreement setting out a global framework for climate action, aiming to avoid the most dangerous effects of climate change by limiting global warming to 'well below 2 degrees' and implementing measures to limit this to 1.5 degrees (Paris Agreement to the United Nations Framework Convention on Climate Change, 2015). Considering that between 30 and 40 GT CO2 are emitted globally each year, and if current production and consumption patterns are maintained, the emissions quota that would ensure compliance with the Paris Agreement targets would be exhausted in just over a decade (Intergovernmental Panel on Climate Change, 2018).

If the world hopes to accomplish the objective established in the Paris Agreement – to limit average temperature increase to 2 °C – no more than one-third of proved fossil fuel reserves can be consumed by 2050 (IEA, 2012).

As the International Energy Agency (IEA) states, we must leave fossil resources in the ground, even if we know they are available. This objective must be the starting point for any peoples' energy transition process.

Moreover, other energy sources must be evaluated with a perspective that not only prioritises reduction in greenhouse gas emissions during their extraction and use, but also takes into account respect for the workers involved, preservation of territories, and respect for the traditional communities affected.

In this context, although the Paris Agreement recognises the urgency and importance of reducing greenhouse gas emissions in order to keep global temperature rise within the established limits, the mechanisms proposed for this reduction are inadequate. The Paris Agreement abandoned a framework of mandatory goals that had been agreed in the Kyoto Protocol (adopted in 1997, entering into force in 2005) and replaced them instead with voluntary objectives. This was a major setback for global climate change policies.

The Paris Agreement relies on a framework of 'Nationally Determined Contributions' with each signatory country publishing voluntary reduction targets. The Nationally Determined Contributions published by countries do not propose reductions sufficient to achieve the goal of 2 ºC maximum rise in average global temperature. At the same time, many countries' plans rely on untested technologies and dubious market mechanisms in order to reach their already-too-modest reduction targets (Friends of the Earth International, 2021). The implementation and deepening of market mechanisms means that real emissions reductions are not happening, and it leads to increased socio-environmental conflicts in the regions where offset projects are installed.

The idea of resorting to technological solutions with unproven consequences but with very high risks – mainly for the impoverished communities and regions where these 'solutions' would be implemented – constitutes one more distraction from the measures that are needed for a just energy transition.

Reducing fossil fuel use by the amount necessary to reduce the risks of catastrophic climate change is a challenge of monumental proportions. To meet the Paris Agreement objectives even traditionally conservative institutions like the International Renewable Energy Agency (IRENA) propose that by 2050 we should be burning just one quarter as much oil as in 2010 (IRENA, 2019).

All processes for a peoples' energy transition must take up the urgent challenge of abandoning fossil fuels. This must be monitored, taking into account the social consequences for communities that have been affected by, and at the same time have depended upon, extraction for their livelihoods, including workers in the relevant sectors.

10

# What should the main path be if we abandon fossil fuels?

**According to expert Javier A. Prieto (2018), moving towards an energy transition requires three elements: reducing net energy demand, deploying decentralised renewable energies, and improving ecosystem conservation alongside agroecological land management. This process must also take place in a context of democracy and socio-environmental justice.[22]**

Demand reduction may be the most controversial issue, as it entails lifestyles that require less energy use. The necessary reduction in energy demand is of great magnitude. A scenario that is compatible[23] with limiting global temperature rise below 1.5 °C requires a decrease in total energy demand to 32 percent below 2010 levels by 2050. However, the reduction should be twice as large in rich countries, where energy use is higher, in order to account for their higher historical use and to prioritise equitable access to resources for those who have less.

Reduction in demand must be planned democratically, with clear priorities, categories, and pathways for advancement, based on socio-environmental justice and good living. This is incompatible with a 'free market' in energy, which lacks the capacity for self-regulation in order to reduce the volume of energy resources being commercialised.

Instead this will require socially building means and systems for satisfying genuine material and energetic needs, eliminating superfluous consumption. Above all, it urgently requires setting a common goal for reducing energy use, and transforming the notion that increasing energy use is good for the general population.

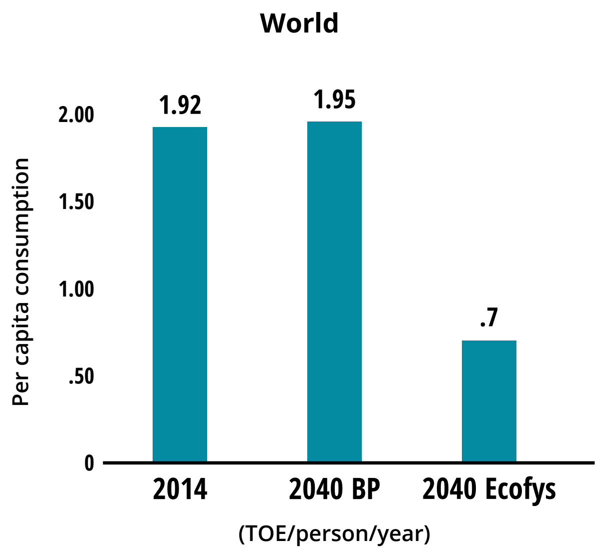
The scenarios described below demonstrate the debate on how we could meet increasing energy demands worldwide as the global population grows and many societies adopt more energy-intensive technologies and lifestyles.


According to BP (British Petroleum, 2018), 13.51 billion tons of oil equivalent (TOE) were consumed in 2017 to meet all global energy needs, which is equivalent to an average annual power of approximately 17.9 terawatts (TW). This means that the worldwide per capita consumption is 1.92 TOE per person per year. Following BP's scenario, based on the continuity of the current (increasing) trend in energy consumption, would mean consumption of 17.86 million TOE in 2040, equivalent to an average annual power of 23.71 TW. This increase in energy demand, met through any existing technology, would put the survival of a large portion of humanity, and other species on the planet, at risk.

We must assess the extent of the changes needed. An alternative scenario, proposed by Ecofys, suggests instead a substantial reduction in demand,[24] meaning that energy consumption in 2040 would be approximately 6.45 billion TOE, equivalent to an average annual demand of 8.56 TW: half of that registered in 2017.

The following table lists per capita energy use in selected countries and worldwide. The accompanying graph shows the worldwide per capita energy use for the BP and Ecofys scenarios.[25]

| Country / region | Per capita consumption 2014 (TOE/person/year) |
|---|---|
| Argentina | 2.01 |
| Australia | 5.32 |
| Belgium | 4.7 |
| Bolivia | 0.78 |
| Brazil | 1.48 |
| Cameroon | 0.34 |
| China | 2.23 |
| Cuba | 1.02 |
| Colombia | 0.71 |
| USA | 6.95 |
| France | 3.65 |
| Ghana | 0.33 |
| Worldwide | 1.92 |




The table and graph give us an idea of the magnitude of the challenge in terms of culture and reduction of consumption. It should be noted that 'per capita data' obscures inequalities in distribution among the population. In the existing system, it is likely that the reduction in demand will differ according to income level and access to energy. This reduction must therefore be accompanied by redistribution policies and guaranteed access to basic energy for the entire population.

Therefore, it is not only a matter of planning a decrease in energy use, but of changing the socio-economic system, which should operate with an undeniably lower amount of available energy.

Changes to the demand side of energy are key to a peoples' energy transition. An effective reduction in energy use is the first option. Energy efficiency measures associated with the various processes of energy transformation are not enough. Undoubtedly, the main path is to change consumption and production patterns worldwide, re-creating new ways of achieving a good life with fewer materials and less energy.

# 11

# Can renewable energy sources solve the problem? Are they enough? Can they be developed?

**We must abandon fossil fuels. Not just because of scarcity and the need to reduce greenhouse gas emissions but also because of the serious socio-territorial conflicts that the fossil fuel economy – large-scale production, agroindustry, and fossil fuel developments – has created.**

The main pathway is to reduce energy demand in the most energy intensive sectors, aiming to eliminate, reduce, transform, and replace fossil fuel sources. This includes a solid integration of renewable energy sources.

Energy sources are grouped here based on two attributes. On one hand, the source's renewable or non-renewable nature. This is a physical characteristic related to the ability of future generations to access these sources, based on its rate of consumption and natural regeneration. Thus, for example, while oil is not renewable, wind and solar are renewable sources. The other attribute is its sustainability or non-sustainability. In this case, the attribute refers not only to the source's physical aspects but also to the ways and processes of tapping into that source. Non-renewable sources, by their nature, are not sustainable. However, not all renewable sources are necessarily sustainable. We must take into account their social, environmental, and eco-system impacts, among others.

There are different ways to approach the technological adaptation necessary to use renewable energy sources. At present, an industrial and hyper-technological model of renewable sources predominates. Relying on highly centralised, capital-intensive technologies, this model can be considered an extension of the fossil fuel economy, sharing its basic approach even if some fuels are replaced with alternatives (Gonzalez Reyes, 2018). This intensive model still relies on fossil fuels, mining, and materials (like manganese, lithium, and 'rare earth metals') that are available in limited quantities.

In contrast to uranium and fossil fuels, the main sources of renewable energy are of immeasurable magnitude. Numerous studies compare, for example, the solar radiation available on Earth to current energy use, indicating that the energy we consume in one year reaches the Earth in just a few moments.[26] Other studies show that the available wind potential is much higher than both present energy use and projected future energy needs.[27]

However, limitations appear when it comes to accessing these primary sources and transforming them for end use.

There are various restrictions that can be generally grouped in two sets: physical and material limitations, and socio-environmental limitations. Both set a cap on the possibility of infinite development for renewable energy use.

## PHYSICAL AND MATERIAL LIMITATIONS

Regardless of the immeasurable nature of primary sources, the infrastructure to convert them for human use requires a large amount of materials. These include some common materials like copper, but also several types that are less abundant or more difficult to access, such as tellurium, cadmium, indium, germanium, arsenic, and gallium, among others. These are all finite materials and many are already in short supply.

The following table lists the materials mentioned, with information about their use and expected peak date, after which production is expected to decline (Gonzalez Reyes, 2018).

| Element | Expected zenith date | Some uses |
|---|---|---|
| Mercury | 1962 | Batteries, medicine. |
| Arsenic | 1971–2015 | Wood preservatives, laser diodes, LEDs, alloys, insecticides, pigments. |
| Tin | 1979–2010 | Cans, glass industry, pigments, fungicides, welding, enamels, batteries. |
| Tellurium | 1984 | Solar panels, electronics, alloys. |
| Lead | 1986/9–2015 | Pigments, wiring coating, plastics additives, insecticides, enamels, magnets. |
| Cadmium | 1989–1996–2010 | Batteries, alloys, televisions, catalysts. |
| Thallium | 1995 | Medicine, optics, electronics. |
| Selenium | 1994 | Medicine, electronics, alloys, solar cells. |
| Zirconium | 1992–2003–2020 | High temperature and corrosion resistant materials, steel, medicine, superconductors. |
| Gold | 1994–2000 | Monetary reserve, electronic components. |
| Silver | 1995–2015 | Monetary reserve, industrial applications (especially electronics). |
| Antimony | 1998 | Conductors, microprocessors, batteries, flame retardants. |
| Zinc | 1999–2015 | Anticorrosive, batteries, pigments, alloys. |
| Gallium | 2002–2040 | Electronics, diodes, lasers, microwaves, solar panels, LEDs, medicine. |
| Wolfram | 2007 | Resistors, electronics, resistant materials. |
| Manganese | 2007–2020 | Stainless steels, pigments. |
| Copper | 2012–2020 | Electrical conductors, electricity production, construction. |
| Lithium | 2015–2040 | Batteries, medicine. |
| Bismuth | 2015–2020 | Medicine, alloys. |
| Nickel | 2017–2025 | Stainless steel, alloys, catalysis. |
| Molybdenum | 2018–2022 | Resistant steels, catalysts in the oil industry, pigments, lubricants, electronics. |
| Niobium | 2022 | Steel, superconductors, lenses. |
| Germanium | 2025 | Fiber optics, electronics, optics, catalysts. |
| Magnesium | 2025 | Medicine, alloy components. |
| Iron | 2030–2040 | The most widely used metal in mass. |
| Cobalt | 2030–2042 | Alloys, magnets, oil industry, electronics, pigment, batteries. |
| Tantalum | 2034 | Mobile telephones, computers, televisions. |
| Vanadium | 2042–2067 | Alloys (especially steel), catalysts, batteries, electronics. |
| Aluminum | 2050 | The second most used metal in mass. |
| Potassium | 2072 | Fertilizers, photoelectric cells, pyrotechnics. |

Many studies discuss the critical state of the materials needed for developing renewable sources.[28] These resources are scarce and have a much lower rate of extraction than what would be needed for mass development of renewable energies to meet current energy demand. They also have important economic and geopolitical implications due to their distribution on the planet. For example, China presently controls some 90% of the global production capacity for rare earth minerals.[29]

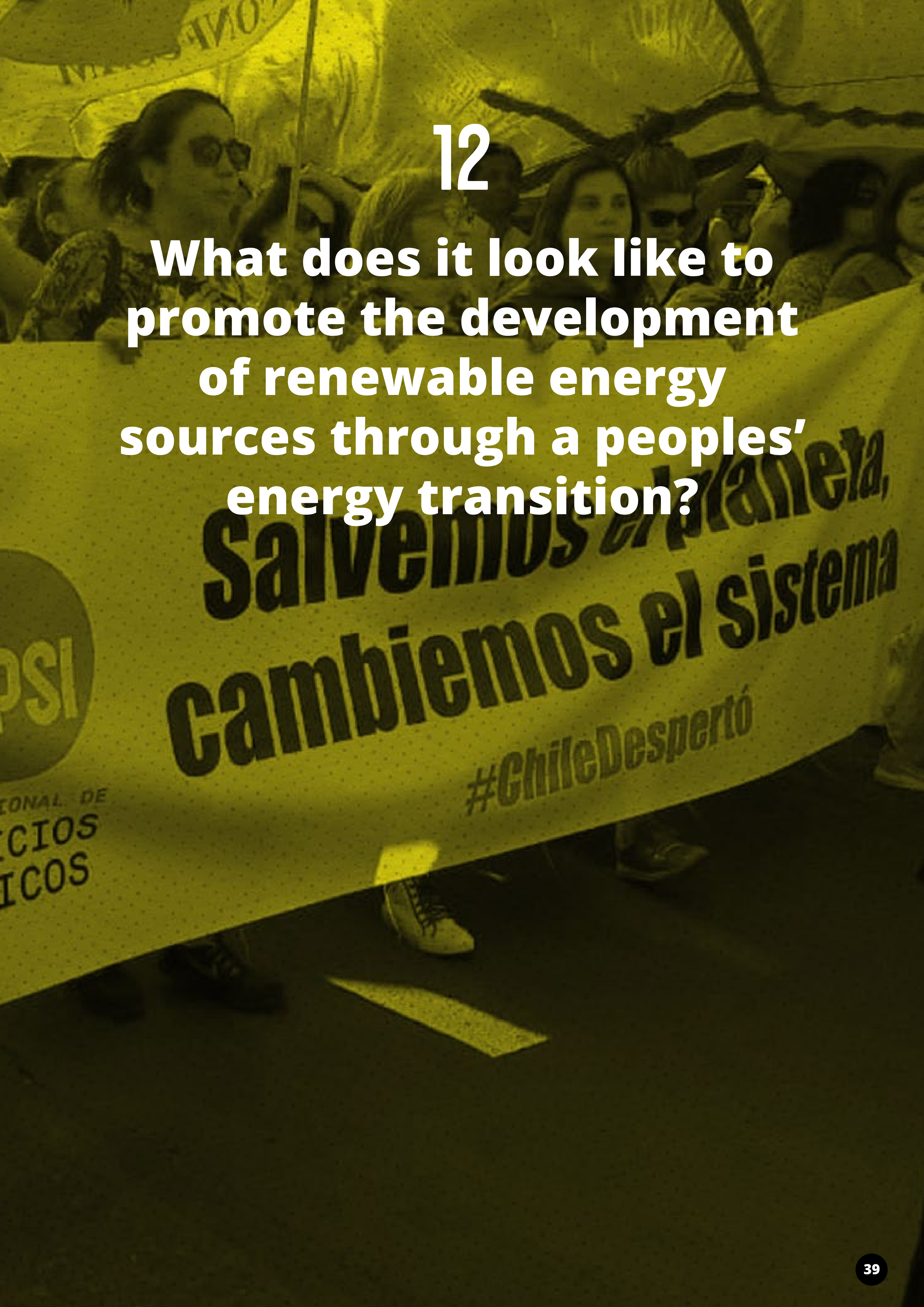
Infrastructure to extract these minerals cannot be developed overnight. Installing the current fossil fuel infrastructure took more than half a century. In this case, as González Reyes (2018) warns, we face a different challenge, since it is not a question of increasing consumption, but of decreasing it.

## SOCIO-ENVIRONMENTAL LIMITATIONS

There are also serious socio-environmental limitations to expansion of renewable technologies under the current models. On the one hand, most of the materials involved are extracted through mining, in some cases in the seabed, and extracting them is even more costly and environmentally damaging than mining for 'traditional' minerals and fuel sources. Increasing this type of mining would cause contamination of air, water, sea and subsoil sources, which in turn would give rise to socio-environmental conflicts in the territories (inland and coastal). These conflicts may be linked to displacement, land/ocean grabbing, and refusal to recognise the rights of workers, as well communities' rights to their land and territories. Beyond the need for certain materials, decisions regarding extraction must be made by the communities in the territories where the materials are found.

Similarly, the development of wind or solar farms that require large quantities of land or ocean space create more pressure on access, use, and control of land and water territories, creating a larger impact on the communities that live there.

From the perspective of a peoples' energy transition, this demonstrates the need for a deeper transformation. The necessary changes will include an overhaul of the ways in which energy is used and controlled in the context of sustainable production, distribution and consumption, with social and environmental considerations at the core.




# 12

# What does it look like to promote the development of renewable energy sources through a peoples' energy transition?

**Over the last two decades, Latin America and the Caribbean (LAC) has slowly started to develop renewable energies. Governments have passed a series of laws and regulations to promote renewable energy (primarily electricity). In many cases, however, regulations have not been adhered to, and new laws have been passed to reach the same objectives.**

Countries have used auction processes to encourage the development of new renewable energy sources.[30] Brazil was the first to embrace this model in 2006, followed by other countries. Among the region's 42 countries, 12 currently use auctions: Argentina, Belize, Brazil, Chile, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Panama, Peru, and Uruguay (REN21, 2017).

REN21, a research and advocacy organisation working on renewables, notes that the region is at the forefront globally in the use of auctions for renewable energy procurement and that these auctions have resulted in the lowest prices in the world (REN21, 2017).

Energy auctions are based on competition, where the main criteria is the price of energy. This logic creates a structural bias in favour of large corporations (REN21, 2017). It also leads to a concentration of projects in places with greater availability or access to natural heritage (for example, sun and wind), in order to reduce costs, rather than in places where energy is urgently needed. Thus, the corporate extractivist logic is reproduced in this use of renewable energy sources.

This system undermines the democratic potential of renewable energy sources that is associated with distributed generation, local use, and participatory decision-making. Renewable energy resources can be harnessed in different locations, so – more than profitability – decisions should be based on use, management, and control of territories by communities; and on the potential to generate energy for people, guaranteeing local jobs that comply with workers' rights and dignified living conditions.

In other words, the energy auctions in LAC promote a corporate energy transition. If policies are to support a peoples' energy transition, states must be clear about why they are initiating an energy transition: Is it to increase the potential of renewable energy or to attract investment? Is it to seek economic growth for local companies, or to increase the profits of multinational energy corporations? Is it to distribute power among citizens, or to concentrate power in corporations?

The case of renewable energies in Uruguay is a particularly significant example. It is often cited as an example of 'high penetration of renewables in the electricity sector.' The effort to transition Uruguay's electrical generation to renewables began in 2008, and, within 10 years, fossil fuels had been almost entirely replaced with wind, solar, biofuels, and hydroelectric power.

This transformation was achieved, among other tools, through a State policy that led to investing 15 percent of the gross domestic product (GDP) in this area, concluding contracts with companies that built (and retain ownership of) some 35 wind farms around the country. This jump, labelled a 'revolution' by the international press 'positioned Uruguay as a success story in the world of transition towards clean energy' and classified it as the first Latin American country with a higher proportion of electricity generated from renewable sources [than from fossil sources] (Ortega, 2017)[own translation].

However, while it diversified the energy matrix, this transformation also brought other elements including increases in electricity prices, as well as the entry of private actors into the previously entirely public national energy sector.

A diversity of mechanisms are needed at various scales to effectively support the incorporation of renewable energies. This should include mechanisms which aren't oriented only towards commercial economic benefits but that recognise and support other dimensions of generation schemes such as a social purpose, activating local policies, creating new enterprises, covering vulnerable sectors, or ensuring gender equity in fees and payments.

Participatory renewable energy projects or renewable production and consumption cooperatives can be an option to realise several different benefits. According to REN21 (2017), citizen participatory renewable energy projects have two important potential benefits:

- Citizens and communities in the region where the project is located own the production of sustainable energy, participate in it, or control it; and most of the direct benefits of the project are distributed locally.
- Citizen participatory projects increase social acceptance[31] and maximise the positive socio-economic impacts of the renewable energy projects, in addition to minimising potential adverse social and environmental impacts (REN21, 2017).

There are few experiences of cooperative or participatory renewable energy projects (REN21, 2017) in Latin America and the Caribbean. This suggests the role that corporate and extractivist ideologies have played in shaping renewable energy policies in the region.

Participatory projects require a public policy framework that is more democratic, since they may not result in low energy prices – in market terms – and are not based on competition. On the contrary, they move towards the decommodification of energy and value other factors, such as local labour, etc. Therefore, they may require subsidies, and deeper transformations of how energy systems are valued and understood. Fundamentally, the decision to support socially and environmentally responsible democratic renewables is a political decision about priorities in public spending, keeping in mind the fact that the ratio between fossil and renewable energy sources in 2014 was 4:1 (REN21, 2017).

In Europe and elsewhere, there are important examples of community and participatory energy projects, for example in Spain and Germany.[32] Although not all of the technologies[33] are directly transferrable between different socio-cultural contexts, exchanges of experiences can support the development of participatory energy projects in other parts of the world where such initiatives are not yet common.

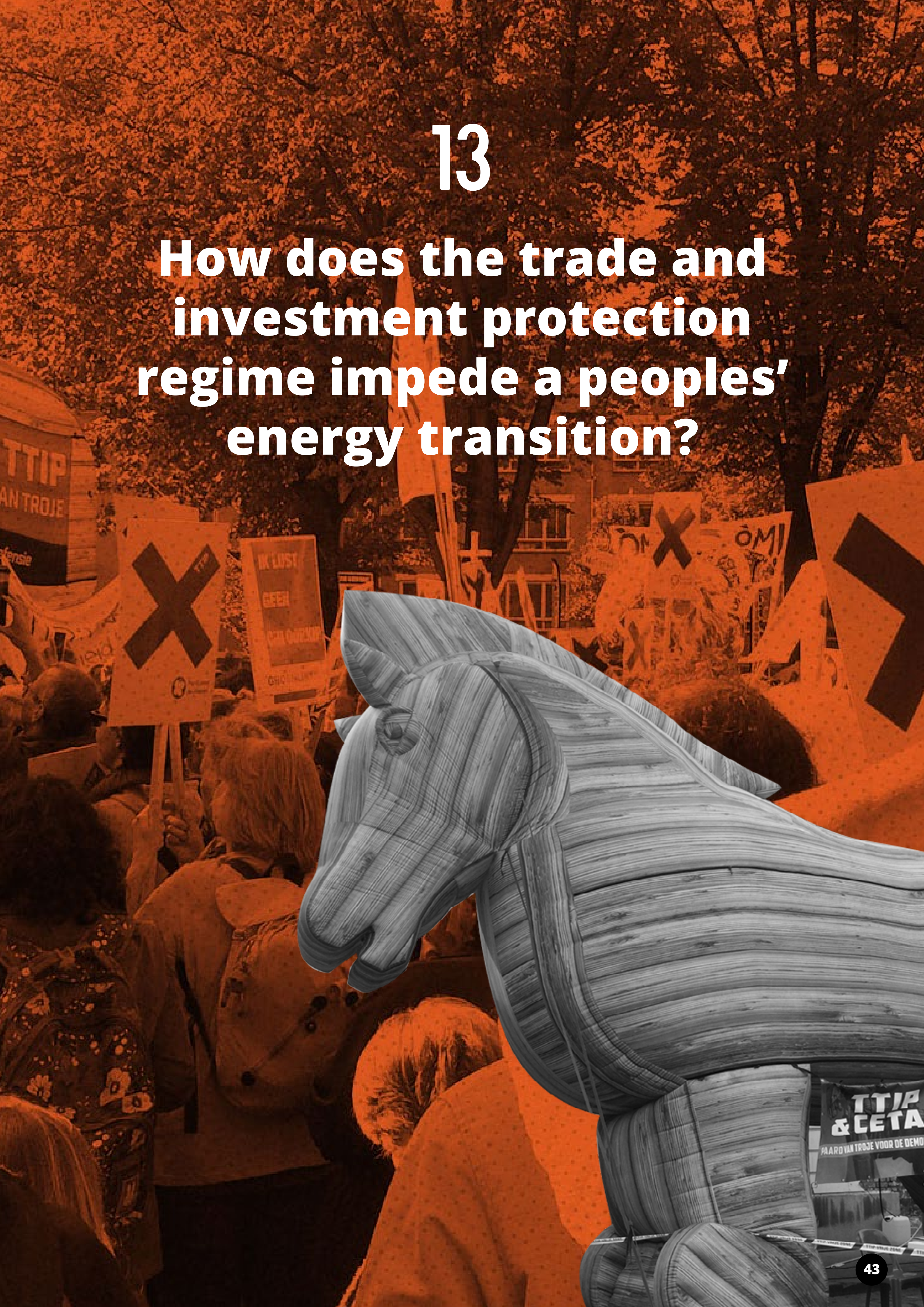
Through re-investment of benefits into the local economy, participatory and citizen projects have been shown to create additional positive impacts on employment and local incomes, which can be as much as 10 times higher than those of projects that do not involve citizens (Okkonen & Olli, 2016).

A people's energy transition must forge a new path towards public and democratic energy systems, in which the nationalisation (or re-nationalisation) and/or municipalisation of public services –in this case, energy – with rights-based criteria can play a key role.

Around the world municipalities have recovered public services. As of 2017, 835 cases of re-municipalisation of public services (in seven sectors: water, waste, education, local administration, health, transportation, and energy) have been documented in 1,600 cities in 45 countries. Especially in Latin America (primarily Argentina, Bolivia, Venezuela, Colombia, and Ecuador), energy systems have been a key target for the recovery of public services (Kishimoto & Petitjean, 2017) showing the feasibility and importance of this transformation which can help to lay the groundwork for a peoples' energy transition.[34]

# 13

# How does the trade and investment protection regime impede a peoples' energy transition?



**The trade and investment protection regime can affect the prospects of moving towards a peoples' energy transition.**

The volume of goods traded internationally is responsible for a large portion of global energy demand. In many cases, this trade entails the transport of raw materials for manufacturing and later consumption with each stage taking place in different parts of the globe. This ineffeciency drives increasing energy consumption. At the same time, raw materials are generally products derived from mining or agro-industry, which reproduce the same model of extraction and distribution based on unlimited energy use. The trade and investment regime aims to drive the continued (and unsustainable) growth of international trade.

Free Trade Agreements (FTAs) and Bilateral Investment Treaties (BITs) are key instruments of this regime, ensuring its continuity and expansion. IFTAs and BITs are agreements between countries or blocks of countries that give trade and investment protection mechanisms the status of binding international treaties. These agreements give broad rights to transnational corporations when they invest in other countries, protecting existing and future investments as well as anticipated earnings. The definition of 'investment' they employ goes far beyond tangible goods and includes stocks, debt bonds, financial and speculative investments, and intellectual property rights, among others.


Investor-State Dispute Settlement (ISDS) is one of the mechanisms that protects the rights granted to investors in these agreements, ensuring country's compliance. ISDS allows investors to sue states in international arbitration institutions when they believe their rights or profits have been negatively affected by government policies or other factors. There are nearly 1,000 cases worldwide where investors have sued states in international arbitration courts challenging 'any action by a nation state that could affect an investment: from laws and regulations from parliaments; to measures by governments and their agencies; and even court decisions, no matter whether they are taken at the local, regional, or national level.' (Eberhardt, Olivet, & Steinfort, 2019). Many of the claims relate to measures taken to stop projects in the energy sector that would have negative impacts on territories and their communities.

The investment protection regime is very controversial, among other reasons because:

- It is biased in favour of investors. Investors are the only ones allowed to lodge claims, and the majority of decisions rule in their favour.[35]
- Arbitrators have a potential conflict of interest. Arbitration courts are made up of three arbitrators – private lawyers generally specialised in trade, who are paid honoraria per case, without adequate assurance of independence or impartiality, and who have an interest in the maintaining the continuity of the system and therefore often adopt pro-investor interpretations.[36]
- States incur high costs, even when they 'win'. The claims are in the billions, and arbitrators have sentenced States to pay sums of up to $50 billion.[37] Legal costs for States average $4.9 million in payments to arbitrators and lawyers, and they are always paid (Eberhardt, Olivet, & Steinfort, 2019).

- This creates a parallel legal system that can inhibit States from regulating for the public interest in order to avoid multi-million-dollar costs from investor claims. This also undermines democratically legitimate local and regional policy decisions.

So far an estimated 263 claims have been filed under this mechanism in the energy sector alone.[38] More than half of these have been filed under the Energy Charter Treaty (ECT), which was signed in 1994 and protects investments in the energy sector. The ECT has fifty member countries in Western and Eastern Europe and Asia. It was developed in order to ensure access to energy resources within the former socialist bloc during the economic transition period.


Today this treaty is expanding into Asia, Africa, and Latin America. Along with other trade and investment protection treaties, the ECT threatens the possibilities of moving towards a peoples' energy transition. It does so in three main ways.

## 1.

First, the trade and investment protection regime (including the ECT) can discourage governments from promoting policies that support the energy transition. This is known as a 'regulatory chilling effect'. Today, threats of costly lawsuits against governments occur (even) more often than the lawsuits themselves. Behind the scenes, energy companies openly admit – as representatives of the US oil giant Chevron once said – that 'the mere existence of ISDS is important as it acts as a deterrent' for decisions they do not like.[39]

Among recent examples of a lawsuit threat intended to dissuade governments from enacting measures regarding fossil fuel use is the case of the German company Uniper. In September 2019, Uniper threatened to sue the Dutch government if the Senate adopted a law imposing a moratorium on the burning of coal for energy production starting in 2030, as part of its energy transition strategy.[40] Around the world these types of lawsuits – real or threatened – create an added obstacle for countries to pursue policies supporting a peoples' energy transition.

## 2.

Secondly, the regime protects corporate mineral and fossil fuel extraction and production projects, both current and future. If a government decides to close extraction projects for obtaining gas, coal, oil, and other minerals used in energy production, they could be held accountable by foreign investors for lost profits, under the ECT and other FTAs or BITs. A government may act out of concern for the climate crisis, or in response to social pressure due to the socio-environmental conflicts created by these projects. One example of this is the 2013 claim filed by the oil and gas company Lone Pine against Canada under the North American Free Trade Agreement (signed between Mexico, United States, and Canada). The company is demanding $110 million in compensation for the Quebec government's decision (taken as a result of social pressure) to introduce a moratorium on hydraulic fracturing (fracking). As of 2021, the case is still pending.[41]

Cases can also revolve around projects which have not yet begun. For instance UK-based Rockhopper Exploration has launched a claim against Italy under the ECT. This claim was filed in response to the government's refusal to grant Rockhopper a concession for oil drilling in the Ombrina Mare platform, a field located in the Adriatic Sea. The government's action was also the result of opposition from the local community to the project. Rockhopper is claiming up to $350 million in damages – more than seven times the money that the company allegedly spent during project exploration.[42]

### 3.

Third and finally, treaties and agreements lock in subsidies for energy companies. Subsidies for oil, coal, and gas production in the G20 countries alone was estimated at $70 billion per year on average in 2013 and 2014.[43] The most obvious subsidies take the form of tax exemptions and direct funding, but they can also include other types of support like providing resources such as land and water at below-market prices. These supports promote what a report from the International Institute for Sustainable Development (IISD) calls ‘zombie energy’ projects, which would not be viable without subsidies (Eberhardt, Olivet, & Steinfort, 2019).

Under the ECT and other investment protection agreements allow corporations to sue states if existing subsidy programmes are reduced. Various corporations filed at least 45 claims against the Spanish State due to cuts in subsidies for renewable energy, adding up to an estimated €8 billion (Kucharz, Bárcena, Botella, & Martínez, 2019). While the decision of the Spanish State is questionable from an energy transition perspective, it is important to note that the only companies that benefit from this system are those that promote a corporate energy transition. Cooperatives and other initiatives towards a peoples’ energy transition are doubly affected: first by the State’s decision to cut subsidies, and then by the burden placed on the public budget by legal fees and multimillion-euro compensation claims.

***Those who defend a corporate energy transition, or are against any energy transition, have a powerful weapon at their disposal to ensure that the established order is maintained. Defending and promoting a peoples’ energy transition therefore demands opposition to agreements and tools that entrench the causes of the current environmental and climate crisis.***

# 14

# Do local initiatives present an opportunity? Do they have limits?

**In response to the systemic socio-environmental crisis, social movements and organisations around the world have been building diverse alternatives to the development paradigm. In relation to the energy sector and the energy transition, there are movements, organisations, and experiences aiming to transform energy policies, although these are not always very visible.**

Most of these share a common element: rejection of the exclusive, concentrated, fossil energy system. Attempts to transform energy policies and build local and community control are appearing around the world, in both the global North and the global South, with different characteristics.

There are multiple initiatives in Latin America, including movements against dams like the Movement of Peoples Affected by Dams (MAB for its acronym in Spanish), which is present in different ways in many countries in the region and includes, in some localities, development of community energy alternatives. MAB includes Ríos Vivos in Colombia, labour cooperatives to develop micro-dams in several countries, and the peasant movement that – for example – has used the MST and MAB renewable energy schools in Brazil as spaces to collectively construct a peoples' energy transition. The development of decision-making spaces around water and energy, and the experiences of energy cooperatives as an alternative to the corporate energy system, contain a multitude of unequal, complex, and still marginal experiences. But with all these contradictions, they are also the seed of a new energy system.

In the Global North, the Transition Towns (TT) and the Post Carbon Cities (PCC) movements prioritise energy transition and promote the creation of decentralised and sustainable economies. These movements are flourishing in the UK and the US, both of which have already passed their peak fossil fuel production. The movements not only propose a transition away from fossil fuels and towards renewable sources, but also attempt to transform the ownership and management of the electricity system. This entails moving away from the model of a few private companies that control electricity generation and distribution, based on large plants, to a decentralised, democratic, efficient, and sustainable model. Attempts to replicate these experiences in Latin America and the Caribbean have been hampered by elitist methods that impose onerous formal training requirements.[44]


Many experiences of re-municipalisation of public services in the North and the South are also linked to the construction of a peoples' energy transition.

For Latin America, it is important to reflect on the synergies that these experiences (from the North and the South) can bring to the development of local citizen initiatives that takes place through a process of exchange and collective construction with working-class sectors in the countryside. While today more than half the world's population lives in cities, more than 66 percent of the population is expected to be urban by 2050. The urbanisation rate in Latin American is even higher: while it was less than 60 percent in 1970, the proportion grew to around 80 percent in 2010, and it is expected to close to 90 percent by 2025 (UN Habitat, 2012).

The structures of energy generation, transmission and distribution – whether in the electricity sector or in other sectors – are deeply concentrated. Physical infrastructure – plants, transformation centres, etc., are intensely concentration, but so to is ownership (whether public or private). Fundamentally decisions relating to different factors – ranging from the infrastructure development, regulations, costs and prices, etc. are highly centralised. De-privatising is not enough; we must also de-concentrate and decentralise.

Experiences such as citizen energy, transition cities, consumer and production cooperatives, peasant movements' self-production of energy, local cooperatives' development of small dams, and distributed energy generation, all point to an essential factor: the ability to take ownership of energy policies. This means fighting for them within the context of national States, and building citizen spaces that encourage another energy model that is renewable, participatory, inclusive, emancipatory, and that takes into account both planetary limits and existing inequality.

These holistic proposals – those not limited to energy sources but instead involving a power struggle over decision-making and the direction of change – have a common denominator: they are local, and often rural, proposals.

However, proposals for creating space for debates about energy policies in municipal arenas are also noteworthy. Conceived as open spaces, made up of social, trade union, and educational actors along with local governments, such proposals enable citizens to take ownership and control over energy policies.

By understanding energy's physical aspects as well as its social, environmental and political consequences, these instruments can create conditions for addressing energy policies in new ways. These aim at satisfying needs, guaranteeing access to energy, transforming the locals, decentralising energy sources, and involving society in the debate on this issue.

In Latin America there are particularly informative examples which can offer insights in other contexts. At the same time local examples around the world have real limitations, demonstrating the challenges of energy generation, distribution, and consumption. Regional and national coordination and cooperation is essential to construct participatory and democratic alternatives to build peoples' power around energy matters. Integrating struggles not only nationally but also regionally in order to contest the present decision-making power in energy systems is a particular challenge.[45]

At the national level and in the hands of 'experts' reveals a worrisome lack of debate regarding the development of these policies. Debates are too often restricted to elite sectors in government and a few consultancies, which are exposed to intense lobbying by corporate interests. Deepening democratisation and centralisation in energy policies is both necessary and possible.

# 15

# Will jobs be lost? Will there be less employment?

**These questions are central in the energy transition. Workers (both men and women), in alliance with other organised social movements, must be the ones to promote, develop and control a peoples' energy transition. Workers' organisations including unions are especially critical.**

The impact of the energy transition on jobs and workers' rights is a major concern for workers, unions, and federations of all kinds. They express these concerns in the debate regarding the so-called 'just transition'.[46]

Studies have explored the energy transition's potential impacts on employment, especially in those sectors most directly linked to energy. Many suggest that the net impact on jobs could be positive, with new jobs created through the transition. However the majority of available data refers to so-called developed countries. The development of alternatives is still scarce in other countries, although developments in China are significant.

Globally, it has been estimated that there are over eight million jobs could be created in renewable energy, as shown in the table below.

**Estimated Direct and Indirect Jobs in Renewable Energy Worldwide, by Industry**

| | World | China | Brazil | United States | India | Japan | Bangla-desh | European Union | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Germany | France | Rest of UE |
| | THOUSAND JOBS | | | | | | | | | |
| Solar PV | 2,772 | 1,652 | 4 | 194 | 103 | 377 | 127 | 38 | 21 | 84 |
| Liquid biofuels | 1,678 | 71 | 821 | 277 | 35 | 3 | | 23 | 35 | 47 |
| Wind power | 1,081 | 507 | 41 | 88 | 48 | 5 | 0,1 | 149 | 20 | 162 |
| Solar heating / cooling | 939 | 743 | 41 | 10 | 75 | 0.7 | | 10 | 6 | 19 |
| Solid biomass | 822 | 241 | | 152 | 58 | | | 49 | 48 | 214 |
| Biogas | 382 | 209 | | | 85 | | 9 | 48 | 4 | 14 |
| Hydropower (small-scale) | 204 | 100 | 12 | 8 | 12 | | 5 | 12 | 4 | 31 |
| Geothermal energy | 160 | | | 35 | | 2 | | 17 | 31 | 55 |
| CSP | 14 | | | 4 | | | | 0.7 | | 5 |
| **Total** | **8,079** | **3,523** | **918** | **769** | **416** | **388** | **141** | **355** | **170** | **644** |

*Source: (REN 21, 2016)*

However, the data requires a more exhaustive analysis: in relation to socio-environmental impacts and conflicts linked to the proposed sources; about the corporate approach to energy; and about the working conditions in these emerging sectors which, in many cases, cannot be described as decent work. We must overcome the tendency to transition towards 'clean energy and dirty jobs', which was created by the corporate energy transition.

There are, however, some positive examples such as Germany, where the growth of employment in renewable energy was more than twice that of all other sectors combined (Heinrich Böll Foundation, 2017).[47] According to a study commissioned by the Federal Ministry for Economic Affairs and Energy, the net impact on employment will continue be moderately positive, with a net annual increase of 18,000 jobs up to 2020, compared to a scenario without the development of renewable energy.

In Spain, an initiative some years ago by the trade union Comisiones Obreras, through the Trade Union Institute of Labour, Environment and Health (ISTAS for its acronym in Spanish), created the Centre for Renewable Energy and Employment, which monitors the development of jobs in the field of renewable energy. This initiative analyses not only the number of jobs that could be created, but also their characteristics and qualities. It also analyses associated sectors including renewable energy generation, adaptation of electric networks, development of 'sustainable mobility', renovation and restoration of buildings, and tasks associated with energy efficiency in production, among others.[48]

Jacobson at al. (2015) assess the possibility implementing 100% renewable energy in the US by 2050. They analyse, state by state, the new jobs that would be created, and those that would be lost in the process. They posit that the necessary infrastructure for this change would be developed over 40 years, and more than 3.9 million new construction jobs would be created – in addition to 1.9 million jobs in operations and maintenance. At the same time, some 3.8 million current jobs in the energy sector would be lost. The study concludes that the proposed transition would create a surplus of more than 2 million jobs. However, the creation of jobs is not enough: hiring, working and unionisation conditions in new jobs must respond workers' demands for fundamental labour rights and the guarantee of a dignified life. This requires the participation of social and trade union movements in the discussion on the conditions for this transition. This is especially urgent in light of the current offensive of regressive labour reforms and the environmental and social consequences of resource extraction and energy generation.

The following table presents Jacobson's analysis.

| Jobs lost in the transition | | Jobs created in the transition | |
|---|---|---|---|
| Oil and gas extraction/production | 806,300 | On-shore wind | 655,927 |
| Refinery | 73,900 | Off-shore wind | 312,368 |
| Operating coal and gas electric plants | 259,400 | Wave | 10,814 |
| Coal mining | 89,700 | Geo-thermal | 37,103 |
| Uranium extraction/production | 1,160 | Hydro-electric | 4,319 |
| Operating nuclear energy plants | 58,870 | Tidal | 3,529 |
| Oil and coal transport | 2,448,300 | Solar | 2,323,800 |
| Other | 171,500 | High concentration solar thermal | 363,640 |
| | | Solar thermal | 469,008 |
| | | Residential solar roofs | 375,963 |
| | | Commercial and governmental solar roofs | 274,733 |
| **TOTAL** | **3,909,130** | | **4,831,204** |

The energy transition also involves the development of new infrastructure. For previous technological changes, such as the insertion of oil and gas into the energy matrix, this process lasted decades. Because of the urgency of the climate crisis, and the fact that this transition has not yet even started, it will need to be much faster.

Further, the change needed goes beyond the sectors directly associated with energy generation. As stated in other questions throughout this handbook, if the current trend continues, energy use in 2040 must be reduced to one-third of its present rate. This means not only that many sectors in industrial production must improve their energy efficiency, but also that the volume of production must be drastically reduced. As we saw, however, this does not mean that jobs and employment will necessarily decrease.

Many sectors must reduce their activity. For example, in a post-carbon economy, minerals could be obtained through recycling and not through mining. We may use fewer trucks, cars, and airplanes, and more electric trains. Plastic use will be reduced to levels similar to 1985.[49] These changes entail big challenges in relation to labour, forcing us to think not only about employment but also about work in a wider sense, including unpaid work and work in the home. In dialogue with the trade union movement, we must question concepts such as industrialisation, technologies, employment, work and needs, in order to move towards socially and environmentally sustainable societies.

The working-class sectors that lead the peoples' energy transition must develop answers to these questions, taking into account the need to move towards a less material and energy-intensive economy. This will be an economy that does not reduce all work to employment and in which, for example, reproductive work, traditionally performed mainly by women, is recognised. Proposals such as a universal basic income could be considered to achieve this. A peoples' energy transition does not depend only on good plans or policies, but especially on the possibility of transforming power relations.

# 16

# Are agrofuels an alternative?

**Agrofuels – fuels derived from agricultural products including soy beans, sugar cane, oil palm, and corn, among others – began to be exploited on an industrial scale in the late 20th century, partially in response to concerns about declining availability (and rising costs) of fossil fuels, and often justified by reference to the environmental costs of burning fossil fuels.**

This 'boom' in agrofuel affected several regions of the Global South. The expansion at the beginning of the 21st century coincided with a global increase in the price of oil. Europe and the United States played a key role in promoting the expansion of agrofuel production by setting targets for renewable energy use, and use of renewable fuels for transport.

This initial push for agrofuels evoked an image of abundance that allowed politicians, industry, the World Bank, the United Nations, and even the Inter-governmental Panel on Climate Change to present these fuels as a key part of the transition away from an oil-based economy.[50] This promotion of agrofuels triggered an unprecedented transformation of the food system.

Agrofuels have been presented as an answer to global warming on the basis of the fact that, rather than releasing fossil carbon into the atmosphere, their burning releases carbon which was only recently absorbed from the atmosphere by the growing plants. Proponents have thus tried to argue that no new greenhouse gasses are released into the atmosphere. This is false for many reasons, but mainly because agrofuel production is itself associated with extensive fossil fuel use and emissions (from tractors to chemical fertiliser production), and with a model of production that is highly concentrated and profoundly energy inefficient (Kossman & GRAIN, 2007).

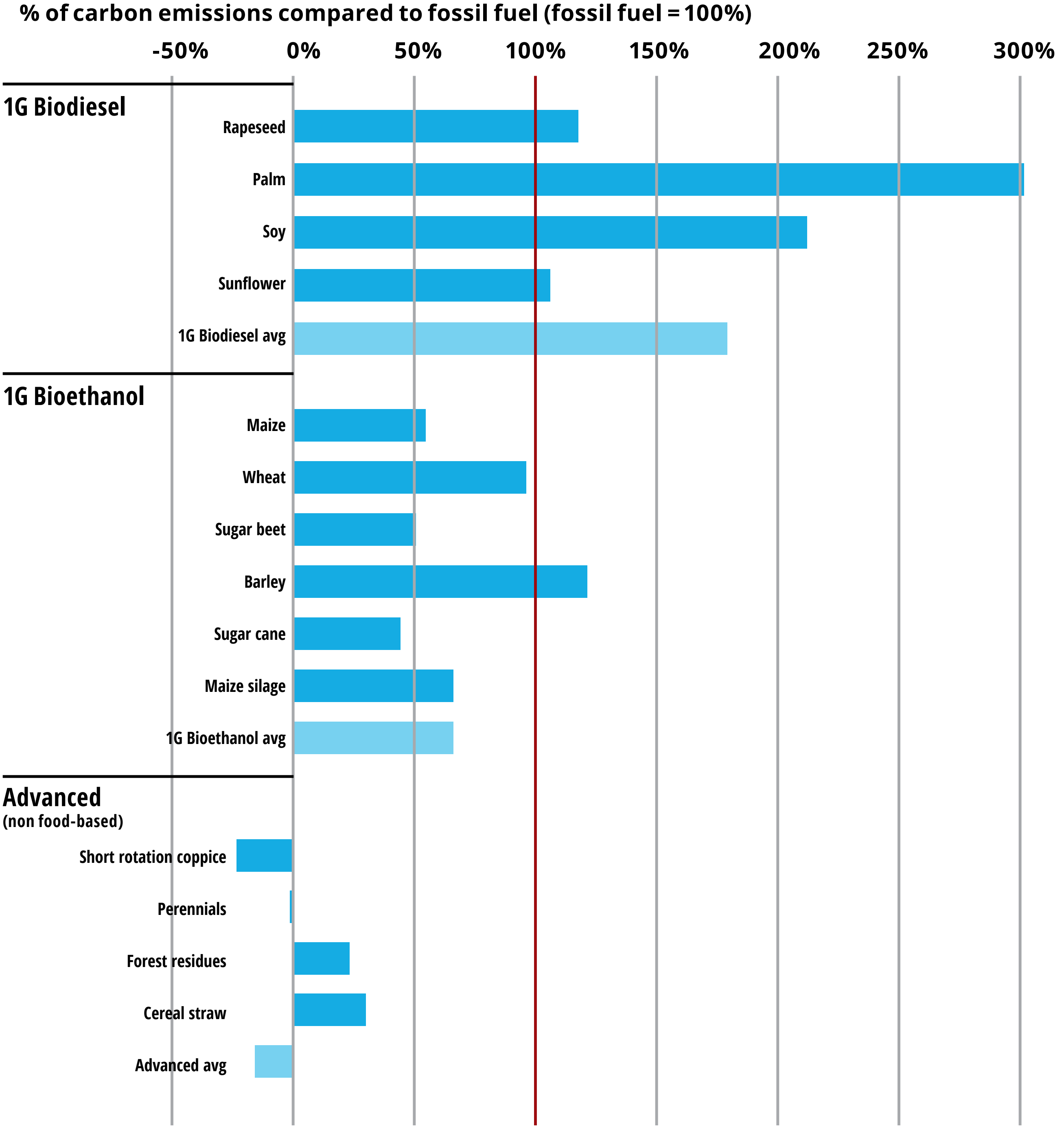
Agrofuels do not contribute to mitigating global warming. They also displace food crops; promote concentration and grabbing of land, water, and natural heritage; displace peasants, and increase corporate control of energy and agricultural systems.

Those who promote a corporate energy transition look to agrofuels to replace the versatility of liquid fuels used in transport. This initiative comes from a strong alliance between oil, auto, and chemical companies.

Looking at its potential for climate change mitigation, the analysis has changed in recent years, since it now takes into account the impact on land use change in different regions.[51] The European Union, for example, amended its renewable energy directive to reduce the targets for agrofuel use by 2030.

The following figure shows that only a few ethanol alternatives and some new technologies have lower greenhouse gas (GHG) emissions than fossil fuels. However, these measurements do not take into account the energy used in production, nor the other impacts of agrofuel production.

# Biofuel emissions vs. fossil fuel emissions




*Source: Globiom and Transport and Environment, p. 8, 2016.*

Diesel produced from vegetable oils – which presently represents approximately 70 percent of the biofuel market in the European Union – generates, on average, 80 percent more emissions than the fossil diesel it replaces.[52] Even after regulatory reforms to reduce biodiesel targets, the increase in emissions resulting from EU support for biodiesel is comparable to the emissions of 12 million additional cars.

The analysis presented here only looks at GHG emissions, which have been the main argument for promoting and financing agrofuels projects. It does not examine the impacts of agrofuel production on land use, food production, and land concentration, among other negative effects.[53]

in the context of Latin America, the Economic Commission for Latin America and the Caribbean (ECLAC) warned that:

***'Latin America has the potential to satisfy a large portion of the world demand for ethanol and biodiesel. However, biofuel production con lead to an expansion of the agricultural frontier, which creates a serious challenge for the agriculture sector and possibly for the environment in the region's countries (...) The increase in energy crops can create serious changes in the agrarian structure. The most significant expected structural changes are higher concentration of production and tenancy, and the emergence of new types of actors and norms. There would also be significant changes in economic structures, mainly due to the creation of economies of scale, and pressure on ecosystems and natural resources would increase.'***

ECLAC also asserted that this would lead to an increase in food prices and a transfer of resources from consumers to producers.

At a global and regional level, the transport sector's demand for fuel is so high that substituting fossil fuels with vegetable-based fuels would require using vast areas of land that are presently inhabited mostly by traditional peasant, Indigenous, or Afro-descendent communities.

A peoples' energy transition centres the discussion on the forms and needs for transport, more than on which energy sources can satisfy current uses.

17

# Are there feminist perspectives on the energy transition?

**Feminist perspectives have enriched the collective analysis of the climate crisis and peoples' energy transition by exposing the roles that the capitalist system has assigned to women, and women's power in driving transformation.**

The exploitation of 'productive' work – paid work to produce goods and services for consumption – is widely recognised. However, there is a tendency to ignore the appropriation of reproductive and care work – the often-unpaid work which keeps individuals, families, communities and ecosystems functioning. This type of work plays a fundamental role in both the economy and society and, beyond that, in sustaining life itself. Care work is overwhelmingly assigned to women and particularly working-class women (this is known as the sexual division of labour). Control over women's bodies and work, as an expression of patriarchy, is a mechanism to maintain the system of production and consumption that has ultimately led to the climate crisis.

Furthermore, water, energy, land, and biodiversity are common resources necessary for sustaining life. Women are nearly always the first to suffer from their scarcity or destruction, and in many contexts around the world they have therefore taken the lead in defending them.

A peoples' energy transition must be built on the recognition of women as political subjects, from a feminist economic perspective, which places the sustainability of life at the centre. From this perspective, we can only build the transition by starting from the struggles in defence of territories, including the experiences of those who challenge corporate extractive energy and agro-industrial projects and who, at the same time, advance the creation of sustainable proposals based on equality.

Defending or constructing commons and recognising energy as a common good is part of a feminist proposal for the energy transition, which identifies the commons as a basis for the sustainability of life. Its construction, starting with strengthening communities and integrating collective subjects and practices, is one way of removing energy from the sphere of the market and harnessing it to ensure decent living conditions for everyone, with criteria based on solidarity, justice, and sustainability.


In relation to work, a peoples' energy transition must address not only 'productive' jobs – including those related to the different energy sources – but also other kinds of work. It must broaden its reach and incorporate a vision of work that guarantees the reproduction of life and access to the energy needed for this reproduction.

As mentioned in Question 3, guaranteeing food sovereignty and agroecology are crucial in a peoples' energy transition. Women are at the centre of this work, protecting biological diversity, building a feminist agenda, expanding alternatives to toxic agrochemicals and agribusiness, and undertaking much of the work on the ground to build alternatives in practice.[54]

***A peoples' energy transition will be feminist, or it will not take place. '***

# 18

# How do institutions in the energy sector view the transition?

**Many institutions are working on energy scenarios for the future.**

This includes those associated with governments, corporations, groupings of countries like the Organization for Economic Cooperation and Development (OECD), multilateral agencies like the World Bank and the Inter-American Development Bank (IADB), and agencies like the Inter-governmental Panel on Climate Change, linked to the UN Framework Convention on Climate Change. Social and labour organisations are also trying to build alternative scenarios.

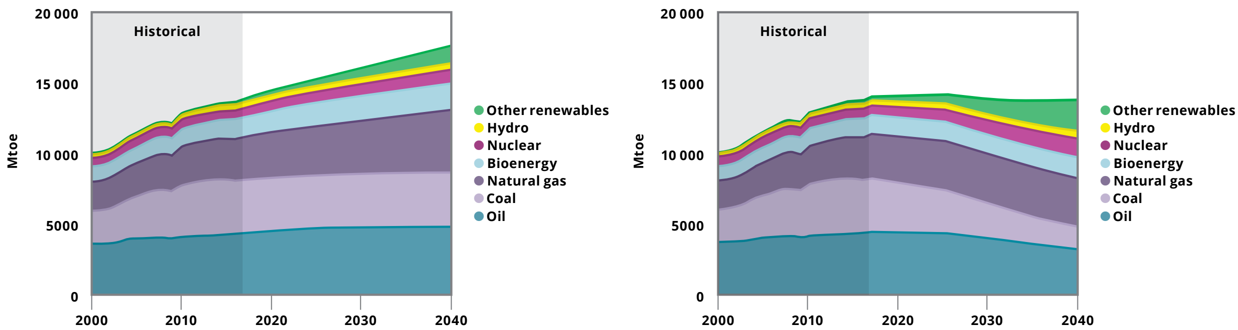
Generally, institutional analyses tend to be restricted almost exclusively to one aspect of the transition: the change in the energy matrix; that is, the change in sources. Other aspects, like eliminating energy inequalities, ecosystem impacts, or the mechanisms and conditions need to ensure that the transition does not lead to bigger social, environmental, or labour conflicts, are not taken into account.

Some scenarios developed by relevant institutions are described here by way of example.

# INTERNATIONAL ENERGY AGENCY (IEA)

The International Energy Agency (IEA) was created by OECD countries in the 1970s to challenge power in the energy sector in response to the Organization of the Petroleum Exporting Countries (OPEC). Thus, the so-called developed countries created a space where they could defend their geopolitical interests in the field of energy. The scenarios designed by IEA have changed over time and show certain contradictions, for example, by positing the need to leave two-thirds of fossil reserves underground, while presenting policy scenarios that argue that demand for fossils will continue to rise.

Currently, IEA proposes two types of scenarios for the future: the New Policies Scenario (NPS) and the Sustainable Development Scenario (SDS). The latter is relatively new and is the first to visualise a plateau in energy use and the reduction of greenhouse gas emissions. However, the response times envisioned would not be adequate to ensure that a temperature increase of 1.5°C is not exceeded and, moreover, the scenario is assigned a near-zero probability of occurrence.



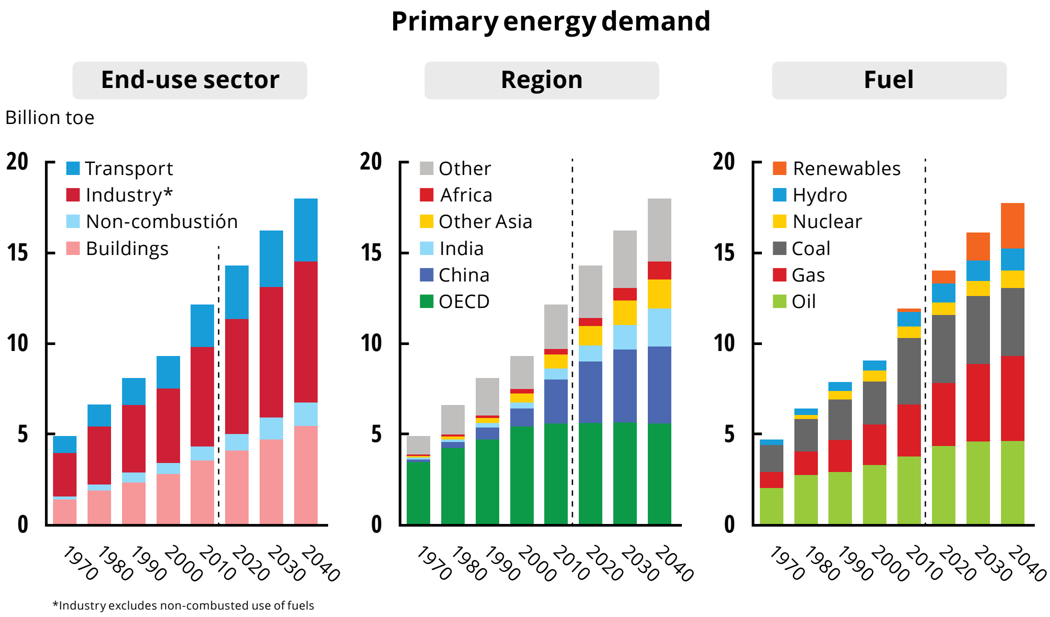

*Source: IEA/World Energy Outlook 2018*

Along with other actors, IEA asserts that transforming the energy reality will require strong governmental action. However, it does not clarify what type of actions are required, or what the implications would be.

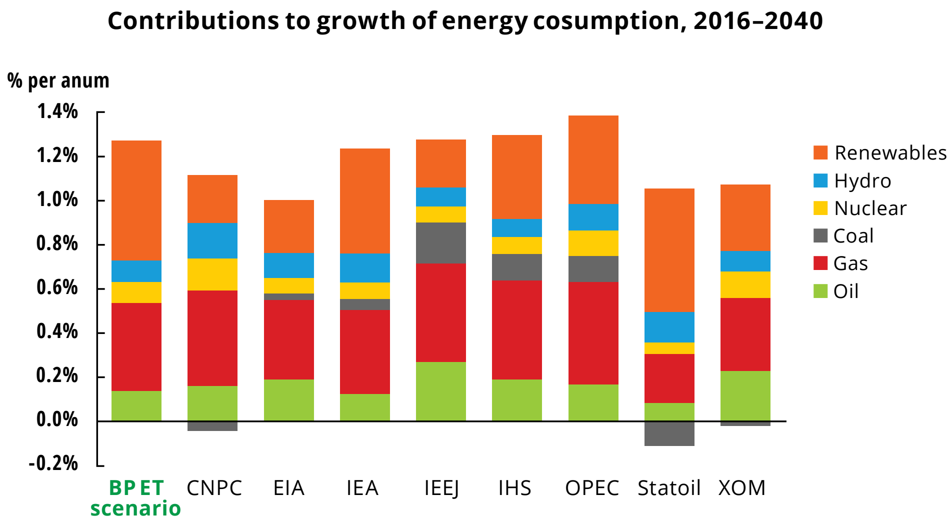
## BRITISH PETROLEUM (BP)

British Petroleum (BP) is one of the largest oil companies in the world. It regularly makes relevant information and long-term analyses available to the public.

The BP Energy Outlook 2017 asserts that global energy demand will grow by around 30 percent by 2035. It predicts that – although the energy matrix will change – oil, gas, and coal will continue to be the main sources of energy. Although it estimates that the growth rate of greenhouse gas emissions will be reduced, these emissions will continue to increase. This growth far exceeds IEA's (conservative) scenario of 450 ppm, which is consistent with the objectives of the Paris Agreement. BP contemplates two scenarios of fast and very fast change, with low probabilities of advancement.




*(British Petroleum, 2018)*




Technical note: for ease of comparison outlooks have been rebased to a common set of data taken from the BP Statistical Review. The IEA case shown is the New Policies Scenario, for IHS it is Rivalry Scenario and Statoil it is the Reform Scenario. The OPEC, EIA and IEEJ cases are each publication's reference case.

55

## INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA)

The International Renewable Energy Agency (IRENA) is one of the institutions that proposes scenarios with the greatest changes. As an alternative to the scenarios that project a continuation of present existing trends, and therefore expect a 40 percent increase in primary energy use by 2050, IRENA proposes a scenario called 'REmap', in which primary energy would be slightly lower than in 2015 and two-thirds of it would be generated with renewable energies (IRENA, 2018).

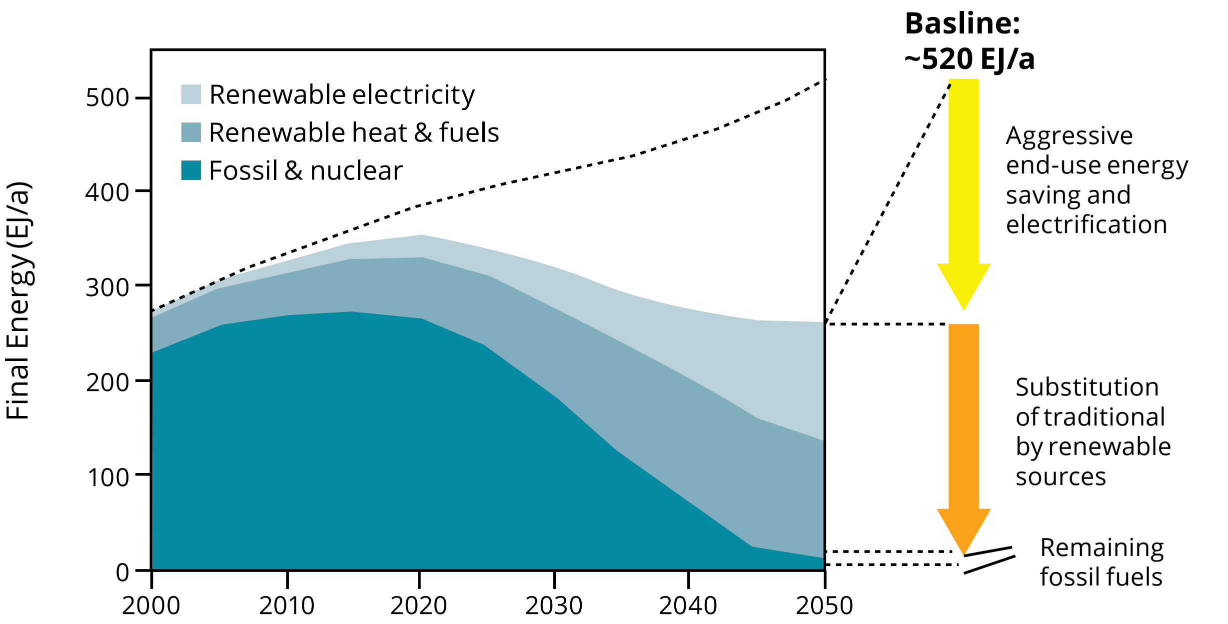
| | 2010 | TODAY (2017/2018) | REMAP CASE 2030 | REMAP CASE 2040 | REMAP CASE 2050 | ON/OFF TRACK | IMPLICATIONS |
|---|---|---|---|---|---|---|---|
| **TOTAL FOSSIL FUEL DEMAND** | | | | | | | |
| **Oil demand** | 87 min barrels/day | 87 min barrels/day | 87 min barrels/day | 87 min barrels/day | 87 min barrels/day | Off track | Increase liquid biofuels and electrification in the transport sector. Support pilot projects for bio-refineries and synthetic feedstock use of petrochemicals in industry. |
| **Natural gas demand** | 3307 BCM/year | 3752 BCM/year | 4000 BCM/year | 3400 BCM/year | 2250 BCM/year | Off track | Push renewable hydrogen, solid biomass and electrification in the buildings and industry sectors on top of strong energy efficiency measures. |
| **Coal demand** | 4963 Mtce/year | 5357 Mtce/year | 3190 Mtce/year | 2000 Mtce/year | 713 Mtce/year | Off track | Stop building new coal power plants and accelerate the retirement of existent coal power facilities. Need for new carbon-free iron making processes. |
| **Total fossil fuel reduction relative to today** | | | -20% | -41% | -64% | Off track | End subsidies for fossil fuels. Support training programmes to retrain displaced workers from fossil fuel industries. |
| **ENERGY-RELATED $CO_2$ EMISSIONS** | | | | | | | |
| **Total $CO_2$ reduction relative to today** | | | -27% | -48% | -71% | Off track | Correct market distortions and price the external costs of $CO_2$. Avoid fossil fuel infrastructure standing by avoiding unnecessary investment in new production and distribution. |
| **Emissions per capita** | 4.3t $CO_2$ per capita | 4.3t $CO_2$ per capita | 2.9t $CO_2$ per capita | 2.0t $CO_2$ per capita | 1.1t $CO_2$ per capita | Off track | |

## ECOFYS

At the international level, there are a number of institutions that have developed possible scenarios, not only for increasing renewable energy use, but also for reducing net energy use. Here, we find the work of many universities, and in particular, the scenarios designed by the specialised consultancy Ecofys.

The scenarios are based on the 'energy triad' concept: 1) electrification and end use savings in the first phase; 2) increasing the use of renewable sources; and 3) covering the remaining uses with fossil fuels, which would be reduced to a minimum. In this way, they developed a scenario based on nearly 100 percent renewable energy.

**Evolution of energy supply in the Earth Scenario, showing the key developments.**




*Source: (ECOFYS, 2011)*

There is a permanent debate over future scenarios, since the variables, contexts, and possibilities considered are based on the interests of the different institutions. Some studies predict the possibility of both a reduction in energy consumption and an almost-total shift to renewable energy sources. However, these analyses focus on the technical possibilities related to energy availability and use, without considering social and environmental implications. Developing scenarios, especially those that are national and multidisciplinary, is a significant challenge for proponents of a peoples' energy transition.

# 19

# Can a peoples' energy transition take place without democratisation?

**Trade Unions for Energy Democracy (TUED) asserts that a transition to a truly sustainable energy system can only occur if there is a decisive shift in power away from large profit–driven corporations towards ordinary citizens and communities. (Worker Institute at Cornell, 2012).**

The current energy system is controlled by global actors linked to large economic interests and lobbies associated with various power groups. It is a highly opaque, non-transparent system.

In the current context, democracies have been distorted and weakened by the extreme concentration of media, political and judicial power, and wealth. In the opinion of political theorist Timothy Mitchell (2011), the imperialist imposition of the Western ideal of liberal democracy on the rest of the world is explained by the fact that democracy has been understood as a pre-designed set of principles and structures that can be exported to all countries, regardless of their historical and geographic context (Transnational Institute, 2016).

Within a peoples' energy transition, however, democracy is understood as self-government of people who decide their individual and collective future. In this framing, 'democracy is not a state of government, but a continuous and multidimensional process that seeks to democratise unequal power relations through political action, improved freedoms, justice, and the capacity for individual and collective self-determination' (Grupo de Trabajo Global Más Allá del Desarrollo, 2019) [Own translation].

In this sense, energy democratisation also advances the possibility of transforming various other systems and dimensions of domination. Advancing a process of energy democratisation entails, at least, addressing the following areas (Bertinat, Tansición energética justa. Pensando la democratización energética, 2016):

Understanding what we want to change, why, and in what direction. This entails a collective social construction of a holistic diagnosis of the reality of the energy system, starting with the system's capacity to satisfy society's needs within the limits imposed by nature.

Building popular information systems that can dispute the corporate lobby's biased data, which are shaped by strong corporate interests. This information should be gathered in the context of popular education processes. This includes not only the building of 'technical' knowledge, but also all types of knowledge, beyond the traditional Western and scientific lens, as discussed by Boaventura de Sousa Santos in his thesis about epistemology from the South (2014).

Resisting the imposition of the international free trade and investment protection regime, which limits energy democracy through instruments like the Trade in Services Agreement (TISA), the Energy Charter Treaty (ECT), among others.[56]

A peoples' energy transition will not occur by spontaneous generation; it will be the result of disputes, which means developing strategies to build power through alliances.

Energy democratisation is a continuous process within communities, movements, societies, and states (Grupo de Trabajo Global Más Allá del Desarrollo, 2019).

Energy democratisation requires the development of decision-making spaces, processes, and participation mechanisms; new forms that, based on the recognition of political rights, resist institutionalisation by the various levels of the State.

An energy democratisation process challenges conventional Western liberal visions and supports the deployment of new forms and processes that can articulate across levels: democracy from below as well as building consensus and alliances between the various spaces, to strengthen the struggle in national or regional spaces.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LAS TRABAJADORAS Y LOS TRABAJADORES
SOMOS LA FUERZA
QUE MUEVE CHILE
NÃO DEVEMOS
SOMOS OS POVOS, OS CREDORES
CSA
TUCA
PODER.
POPULAR.
YA
CSA
TUCA
CONFEDERACIÓN SINDICAL DE
TRABAJADORES/AS DE LAS AMÉRICAS


FUERZA CAMPESINA
CAMPESINOS
2019

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# GLOSSARY

### Decentralisation:

Here, decentralisation relates to distributed generation. Decentralisation involves proposing and implementing public policies regarding local and regional (renewable) energy production, promoting projects that bring generation closer to consumers as well as local socio-productive, socio-economic, and socio-technical initiatives. These types of projects can foster higher social participation and energy democratisation.

### Democratisation:

Democratisation seeks to create spaces for active citizen participation in energy-related decision-making. It aims to balance the power relationships in the energy sector, to ensure free and unbiased access to information, and to be counter-hegemonic in the face of large transnational energy companies.

### De-concentration:

The energy sector in Latin America is highly concentrated in the hands of a few, who control the capital with a logic of monopoly, whether they are private or State companies. Here, we discuss the need to implement public policies that do not concentrate power in the same actors who strictly seek profits and geopolitical positioning. The dynamics of decentralisation, democratisation, and de-commodification are key elements in the de-concentration of energy.

### Decommodification:

Understanding that energy enables the satisfaction of basic needs and offers a higher quality of life, we must see energy as a right and not as a commodity. There are other ways of relating to energy, and energy democratisation is one tool that can contribute to this process.

### De-fossilisation:

De-fossilisation refers to the imperative need to reduce fossil fuel consumption in the energy matrix. This entails replacing fossil fuels while at the same time changing the logic of production and consumption. As is regularly stated here, de-fossilisation must take place within the context of a peoples' energy transition.

### Distributed Generation:

Although each country's regulation includes a technical definition of this concept, distributed generation refers to mechanisms for generating energy in small and medium plants. These can be managed and implemented in homes, small and medium enterprises, or public buildings. Medium plants can generate enough energy to cover the needs of companies or municipalities, and can include energy co-operatives. One of the features of distributed generation is that it brings energy generation closer to the centers of consumption.

### Energy Matrix:

An energy matrix – or the energy balance of a country, a region, or the world – is a way of organising information related to energy. This is usually presented as a table or a flow chart that shows the amounts of the different primary and secondary energy sources, the types of transformation, and the sectors that consume the energy.

An energy balance enables us to assess the sector and, taking the country's economic situation into account, to quantify the potential for exporting energy and the degree of dependence. It also allows us to evaluate the environmental impacts of energy-related activities. For example, the energy balance shows the amount of oil that a region consumes, and which sectors are involved in this consumption.

There are various methodologies for calculating the energy balance; each country or region uses a specific method to develop its energy balance.

### Energy Sustainability:

Published studies by the Economic Commission for Latin America and the Caribbean include one of the first mentions. Generally, renewable energy is a feature of an energy source, while energy sustainability relates to the use of energy sources. Thus, labeling an energy source as renewable does not necessarily mean it is also sustainable. The authors' perspective on this matter is based on conceptual and political constructions developed by environmental organisations and on the Latin American vision of political ecology, in dialogue with Eduardo Gudynas' concept of strong and super-strong sustainability.

### Non-renewable Energy Sources:

Non-renewable energy sources are consumed more quickly than they are produced naturally, so they will be depleted within a certain period of time. Uranium and fossil fuels are the most commonly used non-renewable energy sources.

### Renewable Energy Sources:

An energy source is labelled renewable when it is obtained from natural sources that are virtually inexhaustible, because they are capable of regenerating themselves through natural means. Renewable energy sources include low-power hydroelectric, wind, solar, geothermal, tidal, wave, and residual biomass.

### Unconventional Fossil Fuels

These are fossil fuels extracted using unconventional methods. They can be classified by their extraction method:

Mining: oil shales and oil sands.

Wells: tight gas, shale gas / shale oil, extra-heavy oils, and coal bed methane.

Other types of extraction: methane hydrates and marsh gas.

# NOTES

1 https://elperiodicodelaenergia.com/los-tres-grandes-ejes-de-la-transicion-energetica-de-la-petrolera-bp/

2 http://www.losverdes.org.ar/tag/transicion-energetica/

3 http://www.retruco.com.ar/la-transicion-energetica-solo-matriz-fosil-o-popularizacion-del-poder/

At the January 2019 World Economic Forum meeting in Davos, BP's CEO Bob Dudley said, 'I think it's time for us to tell our story a little bit differently, let people know we are engaged in this big energy transition and we have a big core business.'

4 https://www.foeeurope.org/just-transition, https://www.tierra.org/paso-9-asegurar-una-transicion-energetica-justa-y-equitativa/

5 http://www.olade.org/noticias/guatemala-se-desarrollo-la-iv-conferencia-la-transicion-energetica-america-latina-caribe/

6 http://www.unter.org.ar/node/15222 http://csa-csi.org/MultiItem.asp?pageid=11647

7 https://br.boell.org/pt-br/2016/11/01/metrica-do-carbono-abstracoes-globais-e-epistemicidio-ecologico

8 https://elperiodicodelaenergia.com/nueva-york-proporcionara-energia-solar-comunitaria-gratis-a-10-000-hogares-vulnerables/?fbclid=IwAR3qOVwUFZ3_Ce_z4dD19JnTP6kfEENtq3eJHM9AQ4jyBRpaVPBdPkCyAw8

9 https://blog.antropologia2-0.com/en/energy-transition-needs-anthropologists/

10 See Questions 6, 7, and 12.

11 According to La Vía Campesina, "agroecology is a technological approach subordinate to deep political objectives and, therefore, the practice of agroecology needs to be: collective, organic to the movement, supportive, and adjusted to material and political conditions." [own translation] https://viacampesina.org/es/para-la-via-campesina-la-agroecologia-es-un-enfoque-tecnologico-subordinado-a-objetivos-politicos-profundos/

12 See: The Global Land Grab: A Primer. https://www.tni.org/es/publicacion/el-acaparamiento-global-de-tierras?content_language=en

13 Thomas – along with colleagues in 'De las tecnologías apropiadas a las tecnologías sociales' (2009) and in other papers – gives an account of how artefacts that 'work' in the laboratory or in other geographies or socio-cultural realities, do not give the same results when transferred to new spaces.

14 La Vía Campesina, in 'Soberanía Alimentaria: Un futuro sin hambre' (Vía Campesina, 1996).

15 Based on the Unsatisfied Basic Needs method and the contributions of Amartya Sen.

16 Proposed by García Ochoa based on some aspects of this conceptualisation.

17 Kozulj, R., Altomonte, H., Mercado, L., Acquatella, J., Guedez, P., & Silvestri, L. (2010). Contribution to energy services to the Millennium Development Goals and to poverty alleviation in Latin America and the Caribbean, ECLAC-UNDP-Club de Madrid, Santiago.

18 Boaventura de Sousa Santos further develops this idea: 'law has both a regulatory or even repressive potential, and an emancipatory potential, the latter being much greater than the model of normal change has ever postulated; the way law's potential, whether towards regulation or emancipation, has nothing to do with the autonomy or self-reflexiveness of the law, but rather with the political mobilization of competing social forces.' (De Sousa Santos, 2009)

19 Karl Polanyi explains this market-driven process as a 'great transformation', which occurs when the capitalist mode of production becomes the dominant mode of production, causing the shift from a society with a market to a market society. That is, that the workforce, land, and money, converted into merchandise, were integrated into the market mechanism and thus subordinated the substance of society to its laws. (Aguirrezábal y Arelovich, 2011).

20 For example, if EROI is 10:1, this means that I invest or spend one unit of energy and I obtain 10 units in return.

21 This is relevant because there are many debates about what should be considered as energy consumed or invested. There have been many warnings that EORI calculations are generally over-estimated (in other words, that they give higher values than is actually the case).

22 For further discussion on the principles of "just transition" see https://www.tni.org/en/justtransition

23 See Question 20.

24 See Question 20.

25 Original table and graph using the World Bank's database, https://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC

26 https://landartgenerator.org/infographics.html. This shows the necessary surface of photovoltaic panels to supply the world's energy consumption in different years.

27 https://landartgenerator.org/infographics.html

28 Relevant information can be found in 'Metal Stocks in Society, Scientific Synthesis' (UNEP, 2010) or in 'Critical Materials for the Transition to a 100% Sustainable Energy Future' (WWF, 2014).

Honty (2014) presents a clear systematisation of the best available information about many of these materials, including, for example, the so-called rare earths – dysprosium, terbium, europium, neodymium and yttrium, which are critical in the short term, as well as others in an almost critical situation.

29 https://www.ft.com/content/3cbd2893-ee4b-47b7-a4e5-2cd1b95b5a31

30 In addition to the auctions, progress has been made in the implementation of net balance mechanisms in, for example, Brazil, Argentina and Costa Rica.

31 The authors of this study believe that "inclusion" should be used instead of "acceptance".

32 The publication 'Building the European Energy Transition from a Decentralized and Participatory Perspective' (Siegner, 2014) describes several experiences of implementation.

33 A technological instrument is understood as a public policy, a promotion program, or a community organisation. It does not refer to strictly material devices (photovoltaic panel, windmill, etc.).

34 As discussed by Kishimoto and Petitjean (2017) in their publication 'Reclaiming Public Services: How cities and citizens are turning back privatisation.' Transnational Institute (TNI): https://www.tni.org/en/publication/reclaiming-public-services]

35 'Looking at the totality of decisions on the merits (i.e. where a tribunal determined whether the challenged measure breached any of the IIA's substantive obligations), about 60 per cent were decided in favour of the investor and the remainder in favour of the State.' (United Nations. UNCTAD, 2019).

36 See more information here: (Eberhardt & Olivet, Profiting from injustice: How law firms, arbitrators and financiers are fuelling an investment arbitration boom, 2012).

37 This represents three claims against Russia, known as the Yukos case.

38 https://investmentpolicy.unctad.org/investment-dispute-settlement

39 European Commission internal report of a 29 April 2014 meeting with Chevron. Obtained through a request for documents under the EU access to information regulation. https://www.asktheeu.org/en/request/1643/response/8101/attach/4/Documents%2038%2045.zip?cookie_passthrough=1

40 https://www.telegraaf.nl/financieel/1134267479/claim-om-kolenverbod-voor-staat

41 https://investmentpolicy.unctad.org/investment-dispute-settlement/cases/547/lone-pine-v-canada and https://waronwant.org/sites/default/files/ISDS-file-Lone-Pine.pdf https://www.international.gc.ca/trade-agreements-accords-commerciaux/topics-domaines/disp-diff/lone.aspx?lang=eng

42 https://10isdsstories.org/cases/case9/

43 https://www.iisd.org/library/zombie-energy-climate-benefits-ending-subsidies-fossil-fuel-production

44 We agree with the constructive criticisms of these movements made by researcher Roberto Bermejo in his study 'Ciudades poscarbono y transición energética' (2013).

45 (3er Conferencia Regional de Energía, Ambiente y Trabajo, 2018) http://www.csa-csi.org/NormalMultiItem.asp?pageid=12399

46 For further discussion on "just transition" see https://www.tni.org/en/justtransition

47 In 2015, there were 330,000 jobs in the renewable energy sector, twice as many as in 2004. It is noteworthy that in the following years, Germany saw a decrease in jobs in renewables due to the decline in manufacturing of photovoltaic panels, which, at this time, is monopolised by China (Agora Energiewende, 2017).

48 'Estudio sobre el empleo asociado al impulso de las energías renovables en España 2010' (ISTAS, 2010).

49 Antonio García Olivares (2016)

50 In the words of Eric Holt-Giménez (2007).

51 See Globiom and Transport and Environment. Globiom Report. Transport and Environment (2016)

52 Satisfying the European Union's goal of 5% biofuel use in 2020 using only soybean would entail cultivating more than 70 million hectares with this oilseed in Latin America (Urías Urías, Meza Ramos, & Mendoza Guerrero, 2014).

53 Palm oil production is one of the main drivers of rainforest destruction and peatland drainage in Southeast Asia and, increasingly, in South America.

54 http://www.marchamundialdasmulheres.org.br/wp-content/uploads/2015/11/POSICIONAMIENTO_MMM_COP21_ES.pdf

55 CNPC: China National Petroleum Corporation, EIA: US Energy Information Administration, IEA: International Energy Agency, IEEJ: Institute of Energy Economics Japan, IHS: IHS Markit Rivalry, OPEC: Organization of the Petroleum Exporting Countries, Statoil, XOM: ExxonMobil

56 Among other things, these instruments give large corporations the right to sue governments for measures that capital considers could limit profits or threaten private property, such as a moratorium on fossil fuel extraction or the decision to revert privatisation of a service (See Question 15). TISA's provision on technology neutrality would limit the ability of States to differentiate between high and low carbon energy sources (Transnational Institute, 2016).

The Transnational Institute (TNI) is an international research and advocacy institute committed to building a just, democratic and sustainable planet. For more than 40 years, TNI has served as a unique nexus between social movements, engaged scholars and policy makers.

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