

MEDIUM AND LONG TERM ENERGY STRATEGY - A KEY ELEMENT FOR ECONOMIC AND SOCIAL DEVELOPMENT

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Abstract

The macroeconomic evolution since the beginning of 2022, worldwide, but also at regional and national level, marks major imbalances, caused by several factors, among which the vulnerability of the energy system as a whole is a major one.

Demand and supply in all forms of energy, both in terms of production and distribution, have unsustainable gaps, which implies the need for public authorities to intervene through the design and implementation of appropriate strategies to address the challenges of the transition in energy resources and, at the same time, to remove the effects of the crisis of the energy system, a crisis that is felt in the vast majority of the states of the world.

Keywords: *energy supply and demand, macroeconomic challenges, global geopolitical environment, types of energy products, energy transition.*

European and global macroeconomic situation at the beginning of 2022.
Vulnerabilities in the energy sector

By the end of 2021, the world's economies showed signs of ending the difficulties created by the lockdown imposed by the need to curb the Covid-19 pandemic, and output and investment returning to levels seen in 2019.

However, the economic and social outlook for the entire globe presents multiple risks: a continuation of the pandemic through various variants, such as Omicron, but also

consistent inflationary expectations in most countries, particularly in Europe; major difficulties in supplying the population with food, as well as with raw materials for all productive activity, which, together with the continued degradation of natural environmental conditions will lead to a slowdown in macroeconomic development and a worsening of the social-cultural climate in most European countries.

On the other hand, the resumption of economic growth, together with disruptions in the supply of goods and services in various areas: energy, supply of raw materials, supply of the population, investments with any time horizon, etc., as well as geopolitical tensions, will have a major impact on the financial balance of global markets.

It will be seen that the impact of the war in Ukraine is just as damaging and far-reaching as the Covid-19 pandemic, affecting both the global supply of goods and services and the demand for them, and hence the standard of living of the population.

The demand shock is caused by consumer and/or investor behaviour in the face of large macroeconomic fluctuations. Thus, household consumption is strongly affected by the income reduction caused by the pandemic containment measures, as well as by people's behaviour in the face of expectations of economic and social fluctuations caused by the current geopolitical conflict, in the sense that they will prefer to keep their savings in view of the macroeconomic financial downturn.

On the supply side, supply is being disrupted primarily by rising energy costs - for example, the price of a barrel of Brent oil, which is the international benchmark, has risen significantly, to almost US\$140, according to information on the bursa.ro website on 8 March 2022 - to levels well above those of 2014, the year of the Crimea crisis.

Supply channels are disorganised for other reasons too. A number of key metals in industry - for example titanium, vanadium, etc. - come mostly from Russia, and as a result of the sanctions that Western countries have imposed on it, businesses in these countries have to find other sources to get them, which is very difficult in such a short time.

An even more dangerous consequence of the current geopolitical conflicts is that food supply routes are being seriously affected by the disruption of international trade, as exports from major agricultural producing countries - Russia, Ukraine - to countries on several continents are interrupted, threatening the very lives of the entire population.

One of the economic sectors that is very strongly affected by the energy crisis is transport - road, rail, sea and air - especially in Europe, as many operators are supplied

from Russia - the sanctions that block it greatly reduce the quantities of fuel that can be accessed. In addition, the very activity itself, and therefore the customers of the operators, decreases as a result of the economic bans. All these negative effects have a substantial impact on transport costs, whose high increase amplifies the negative shock on the whole economic sector.

Theoretically, to balance the economy, public authorities have to choose between letting inflation happen and curbing unemployment, but during the health crisis, government interventions were needed to protect people who were losing their jobs or cutting short their working hours. In order to stimulate a return to the previous pace of development, the lockdown must be lifted, resulting in increased demand, which explains the rise in prices, a factor in addition to higher energy prices.

Several major factors contribute to maintaining an unstable economic environment with high downside risks. Geopolitical tensions are exacerbating raw material and food supply bottlenecks, falling production levels in all countries - developed and developing, including China and European countries - and the cautious behaviour of Middle Eastern oil exporting countries not to increase extraction volumes in order to lower the price per barrel and destabilise Russia.

In order to influence the evolution of inflation, it is necessary to act on the main factors that determine it, the price of energy products being one of them.

Regardless of the type of energy - electricity, heat, water, etc. - or energy products: oil, gas, coal, etc., the average price can be monitored by two types of intervention: consumption and source.

Energy consumption is driven from two directions: on the one hand by the population and economic activities - production, transport, services, etc. - and on the other by environmental policies around the globe, with almost every country striving to reduce pollution in order to achieve climate neutrality.

Consumer behaviour cannot be changed quickly enough to significantly reduce demand. People can only reduce their consumption by investing in better insulation of their homes, use of energy-efficient vehicles, etc., which means significant costs that can only be covered over time. Moreover, at least in developing countries, where the aim is to raise living standards, this can only be achieved by increasing energy consumption.

In terms of business activity, energy consumption can only be improved both in terms of quantity and carbon dioxide emissions through modern efficiency techniques - clean resource exploration and exploitation, high-tech processing, safe and clean transport infrastructure, highly efficient technology use.

Current energy demand and supply. Forms of energy produced and distributed

The global economic environment is currently facing multiple challenges, which are producing and will imply for a long period of time profound structural and qualitative changes in economic and social life, as well as in the entire geopolitical order that will characterise the 21st century.

As regards the economy, it is experiencing major disruptions in world trade in a wide variety of goods and services, perhaps the most important being energy products, the crisis of which is the cause of rising inflation in almost all countries of the world, especially in Europe, but which is also the main cause of production imbalances in many sectors of activity.

Fossil resources are found where nature has placed them around the globe and are unevenly distributed. According to TotalEnergies' 'Panorama des énergies 2021' Report, ten countries hold more than 86% of the world's oil reserves and ten countries hold almost 80% of its methane gas reserves, while coal is found in large quantities in many parts of the world, which explains why it is difficult to give up its use, especially in the current energy crisis.

	Oil (billion barrels)		Gas (trillion cubic meters)		Coal (billion tons)	
North America	238	13%	16	7%	257	24%
South and Central America	293	16%	8	4%	14	1%
Europe	15	1%	5	2%	135	13%
Africa	126	7%	19	8%	15	1%
Middle East	834	46%	81	36%	1	0%
Eurasia	146	8%	77	34%	191	18%
Asia Pacific	151	8%	22	10%	457	43%
World	1803	100%	228	100%	1070	100%

Source: 2021_Rapport_TotalEnergies_Panorama_Energies

The issues raised by energy differ in several ways. First, there are the types of energy, which can be categorised according to different criteria that present both opportunities and risks for each category.

Thus, energy sources are distinguished according to their origin, in:

- fossil energies: coal and hydrocarbons, respectively oil and gas;
- nuclear energy;
- renewable energies: solar, wind, hydro, biomass and geothermal.

The forms of energy also differ if one takes into account:

- the possibility of storing them. Some energy products are easy to store, *e.g.* solid fossil fuels such as coal, others are almost impossible to store, *e.g.* electricity, the most widely used energy product produced by processing primary resources. Renewable energies, such as solar radiation, wind, streams, etc. cannot be stored.

- The availability of a form of energy varies according to its origin and characteristics. For example, electricity produced in power stations of any kind is always available, while wind energy is only available if there is wind, solar energy only during the day, etc.;

- the cost of energy differs according to how abundant and/or easily available it is (by extraction, such as fossil fuels, by technological processing, such as nuclear energy, and by specific installations in the case of renewable energy);

- the impact on the environment presents significant variations and risks depending on the type of energy. Fossil fuels, which are currently the most widely used energy sources - more than 80% of world consumption - also generate greenhouse gas emissions through their use, especially coal-fired power plants, which pollute the atmosphere much more than other forms of energy.

This prompted global environmental experts to propose at the 2015 Paris Summit (COP21) an Agreement, ratified by representatives of the 197 UN member states participating in the United Nations Framework Convention on Climate Change, committing to take action against climate change. On this occasion, the European Union presented its long-term emissions reduction strategy and its updated climate plans before the end of 2020, reducing CO₂ emissions by at least 55% below 1990 levels by 2030. Progress has been recorded at COP26, the Glasgow Summit in November 2021, but it was noted that more work is still needed to reach the 1.5 degree Celsius global

temperature reduction target. Some European countries, such as Germany, whose strong economy is a major consumer of electricity, have even put this commitment into practice by shutting down coal-fired power plants.

However, at the beginning of 2022, the geopolitical landscape in the world, but especially in Europe, has changed with the Russia-Ukraine war and the tensions created by the sanctions imposed on Russia by the United States and the European Union.

In addition, extraction techniques present some risks, for example in the case of shale oil and gas, the balance of geological strata and the water table can be disturbed.

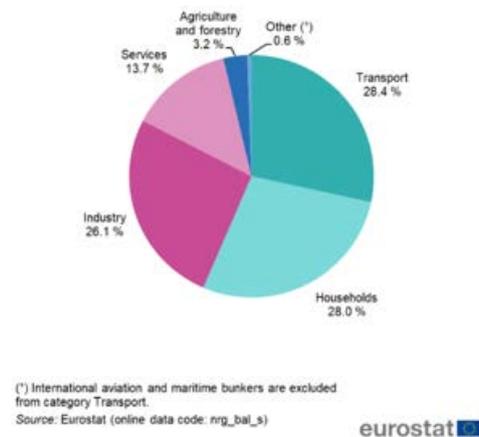
The macroeconomic challenges of the energy transition

The two major issues that are considered crucial for future global development are energy self-sufficiency and meeting energy demand.

The current energy crisis has highlighted even more strongly than in the past the need for any country to be relatively independent in terms of energy and food resources. Of the major developed countries, only the United States can enjoy such autonomy, with oil and shale gas complementing its energy resources. European countries depend to a greater or lesser extent on imports, especially as oil reserves in the North Sea are showing signs of a sharp decline. As for renewable energies, although long-term strategies mention increasing their use, they pose thorny problems because they are inconsistent and require costly investment which, if they do not pay for themselves relatively quickly, risk being technologically outdated.

As for energy demand, it has been growing steadily and at an ever-increasing rate as a result of the considerable increase in the world's population, and also because of the sharp industrial development brought about by technical and technological progress and, by extension, people's standard of living.

Final energy consumption by sector, EU, 2020
(% of total, based on terajoules)



Final consumption in the European Union – 27 countries (from 2020)

- Thousand tons of oil equivalent by sectors -

	2011	2020	2020/2011 (%)	Share in total (%)	
				2011	2020
Total final energy consumption, of which:	933989.94	885764.45	94.84	100	100
- industrial sector	244695.81	231211.89	94.49	26.20	26.10
- transport sector	278927.98	251969.94	90.34	29.86	28.45
- trade and public services	128249.54	121376.49	94.64	13.73	13.70
- households	251827.99	248243.38	98.58	26.96	28.03

Globally, energy consumption has decreased over the last ten years, but there have been important shifts in the energy needs of different sectors. For example, industrial activity has seen a slight decrease in energy demand, mainly due to new, more efficient technologies, and the IT and telecommunications sectors have become more energy efficient through interconnection, although they themselves have become major consumers of electricity.

The transport sector has also reduced its energy demand, although activity has increased considerably in recent years. It has also been observed that the level of greenhouse gas emissions from transport is on a downward trend, mainly due to the strong growth of the electric car fleet, but this is still in its infancy.

Households have, however, consumed more energy than ten years ago, which shows an increase in well-being, but also highlights the need to take action to improve the residential sector in terms of better thermal insulation, leading to lower energy consumption for heating/cooling homes, depending on the season and/or geographical area.

These observations are particularly valid for developed economies, while most developing economies face different problems: the need for much greater industrial and agricultural development, improved living conditions for the population, as well as non-economic problems, all leading to increased energy demand.

Conclusions on the current energy crisis and the need to develop and implement medium and long-term energy strategies

Electricity is the most widely used form of energy both in productive activities and for the needs of the population: lighting, heating, transport, etc. It is produced from several kinds of primary energy products: hydro, solar, wind, fossil fuels, uranium, and the conversion efficiency can differ considerably, depending on factors such as calorific value, plant efficiency, photon conversion efficiency, etc., which explains the variation in costs both during the investment phase and during operation.

Whereas centuries or even decades ago, primary energy products were converted to a considerable extent into mechanical energy for both industrial processing and transport, today electricity consumption has become predominant - for example, in 2018 it was four times higher than in 1974 (2021 TotalEnergies Report, Panorama Energies), which shows the need to analyse the production and distribution of electricity by destination, the two main directions to be addressed in national and international macroeconomic strategy.

In this respect, the sources of electricity generation are highlighted: fossil energies, nuclear energy, renewable energies.

Share of electricity production (%) in 2019

Coal	36.7
Oil	2.8
Natural gas	23.5
Nuclear	10.3
Hydro	16
Geoth./tide/other	0.5
Wind	5.3
Solar	2.6
Biofuels and waste	2.4
Total of electricity production	100

<https://www.iea.org/reports/electricity-information-overview/electricity-production>

Electricity from fossil energy products - coal, oil and natural gas, extracted or fracked, such as oil and shale gas - accounted for about 63% of the world's electricity in 2019. Each of these resources presents opportunities and risks.

Coal-fired power plants are reliable, coal is abundant, costs are among the lowest, but managing CO₂ emissions requires large and unattractive investments.

Oil has been the subject of protracted negotiations between oil-rich countries, and natural gas is the subject of ongoing tensions in Europe, most notably the Russia-Ukraine war.

Electricity from nuclear power plants accounts for about 10% of the total and is based on the fission of the nucleus of a uranium-235 atom. On the planet, uranium is found in large but diffuse quantities in seawater, which is too expensive to collect, and concentrated in a few locations in Australia, Kazakhstan, Russia, Canada, Niger, Namibia and South Africa. Although nuclear power is carbon neutral, it is used sparingly because of fears of accidents such as Chernobyl in 1986 in the former Soviet Union and Fukushima in 2011 in Japan. Some incidents occurred before and after these accidents and were well managed by the people in charge of the respective plants, but the fear of recurrence has been retained in the public mind.

However, in the current international macroeconomic situation, in a pertinent vision of the feasible directions to take in long-term energy strategies, the use of nuclear energy cannot be ignored.

This is why public authorities, especially those in developed economies, are proposing the creation of new nuclear power plants, with the recent solution being smaller plants - known as Small Modular Nuclear Reactors ((SMNR), World Energy Outlook, International Energy Agency (IEA) 2021) - which are simpler to monitor and therefore represent lower and more manageable risks.

For example, France, which bases a large part of its energy resources on nuclear power, has planned to increase the use of this type of energy in its 2050 energy strategy, as has the United States, which is increasing the construction of SMNRs and also supports the spread of this type of resource in allied countries such as Romania.

Among renewable energy sources, hydropower has a special place, but its share of the world total is only 16%. Although it is completely clean, it requires large investments

- dams, reservoirs, relocations, etc. - which can only be made with public financial effort, but are valuable assets for the countries where they have been built.

Wind electricity is a carbon-free energy source and produces only about 5% of total electricity, because it is conditioned by a number of factors: investment costs, relatively low profitability, dependence on wind, etc.

Solar electricity, with a share of just over 2% of the total, is cost-effective in geographical areas below the 40th parallel, i.e. in tropical areas, and is linked to the possibility of capturing solar radiation. In northern and temperate areas, the cost of investment does not justify their use, especially as climatic variations have become increasingly marked.

Following the Paris Agreement of 2015, the European Commission has developed and commented on the "Strategic vision for a carbon-neutral economy in 2050", in which it proposes the adoption of a legislative package for all Member States of the European Union, which will combine short-term actions with those aimed at achieving long-term objectives for the development of the energy sector and its impact on the whole economic and social life in the European countries and at international level.

In order to achieve this goal, European specialists have made a series of proposals ("Relever le défi énergétique et climatique en Europe: les propositions de cinq think tanks", 2018, Terra Nova, Institut Jacques Delors, I4CE, Iddri) concerning public policies and the involvement of the private sector in the implementation of the green economy in the national strategies of the Member States of the European Union. First of all, medium- and long-term carbon dioxide emission reduction targets had to be defined, with 2050 as the distant horizon. This definition, initially presented in 2018, has now been considerably complicated by the Covid-19 pandemic and, even more intensely, by the Russia-Ukraine war, which has heightened already existing trade tensions between the West - the United States of America, the European Union, etc. - and countries in the East, including Russia, China, India, Iran, etc.

Moreover, the actions envisaged must respect the rights of the population, firstly in terms of access to energy products and, secondly, in terms of the supply of goods and services that go hand in hand with a civilised life in 21st century conditions, a supply that can be greatly distorted by imbalances between supply and demand on the international energy market.

In any case, the actions that will follow the realisation of climate investments need to be linked to financial policies and regulations, both in the public system and in the private sector - banking and capital markets - in order to make available the necessary funds, usually large sums, to cover the costs of building and maintaining low or zero carbon energy assets.

Given the complexity of the field in terms of technological progress, the energy transition can only be carried out with the necessary resources, both material and financial, as well as human, an adequate qualification of the latter, together with a sufficient number of specialists being an essential condition for the success of the action.

In the European Union, the financing of environmental policies included in national and/or Community development strategies will have to involve to a large extent the funds that are set up at EU level for vocational training - Erasmus+ and Erasmus PRO - and for research and innovation, which will have to be massively supported, and therefore financed, all the more so since it has been noted that the EU is lagging behind the USA and China, which is adversely affecting the competitiveness of European economies.

Also in relation to climate objectives, public policies will have to pay special attention to trade relations with third countries, as carbon dioxide emissions may be attributable not only to domestic products but also to imported ones. This will be done by regulating the "carbon tax at the border" and by adopting a set of measures to fight so-called environmental dumping - for example by imposing a low-carbon emission certificate on all companies, both domestic and foreign, exporting to the country concerned - all compatible with World Trade Organisation rules.

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