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« Fossil Fuels : economic stakes and maritime dimensions »

At a time (notwithstanding the global pandemic) when questions of climate urgency are being raised, the future of fossil fuels lies at the heart of contemporary stakes. Over the past twenty years, the economic operations of the global age have become established, multiplying both the volume of goods and the geographic areas involved. The three fossil fuels (oil, gas, and coal) constitute a major share of global energy, in proportions specific to each country due to national resources, energy strategies, and the presence of nuclear and renewable energy. The energy landscape has changed significantly in twenty years under the effects of globalization, periods of crisis and growth, the arrival of shale oil and gas, the environmental mandate, and the energy transition. The economic functioning of oil, gas, and coal (with relatively volatile supply and demand phenomena) feeds a large portion of maritime transport—no less than 40% of international activity, counting raw materials and refined products. With a few available elements, one can attempt to catch a glimpse of the future of these resources, which remain indispensable to an energy-hungry world that is relatively aware of the imperatives to decarbonize its operations.

Oil

Black gold well deserves its name. With 4.4 billion tonnes consumed in 2019, it represents one-third of the world's energy and covers 95% of transport needs. According to the BP Annual Survey 2020, between 2000 and 2019 (representing 20 full years), oil consumption grew by 25%. By comparison, the global population increased by 26% during the same period, and the planetary economy by 72%. This latter growth stems largely from globalization and emerging economies, first and foremost those of China and India, but also Turkey and Southeast Asia. Since the turn of the century, economic shifts have reshaped the geography of global oil consumption. China's share has risen in twenty years from 6% to 14.6%, and India's from 3% to 5.4%. More broadly, non-OECD countries have shifted from one-third (38%) to over half (53.8%) of the total. The oil issue is gently sliding from being a problem of developed countries to the rest of the world. This is one of the major phenomena of globalization: the generalization of energy stakes.

On the American side, its share of global consumption has shrunk (from 25% to 19%) in the same proportion as the US GDP within the global economy. Over twenty years, a reduction in American oil consumption can be observed, but it was slowed down by the massive production of shale oil starting in 2013¹. This new resource generated a 14% increase in US refining capacity, a 25% reduction in oil imports, and even sparked exports, reaching 138 Mt in 2019.

Europe reduced its oil consumption (-12%), but ultimately in a limited manner due to the development of Eastern European countries integrated into the EU. Over the same period, European crude imports actually grew (+15%) to offset the drop in North Sea production (which was cut in half). As the third pole of the developed world, Japan very sharply reduced both its consumption and its imports (-33%).

China has become an energy monster, with its oil demand soaring from 70 to 507 Mt, making up nearly a quarter of global demand. India finds itself in the same situation on a smaller scale, now accounting for 10% of demand. These phenomena are occurring alongside growth in refining capacities (China +74%, India +25%). Europe, which already experienced a reduction in its refining capacity following the 2008 crisis (and will lose more), remains marked by an imbalanced production structure, leading to gasoline exports and diesel imports.

¹ In 2019, shale oil accounted for 63% of US production. The United States reached a production level of 11 million barrels per day, equivalent to Russia and Saudi Arabia.

In geopolitical terms, Middle Eastern oil production is now predominantly directed toward the Far East and South Asia, whereas Africa and Russia supply Europe. The new American production flows in all directions, first and foremost toward Europe. The next major supplier will be Brazil, with its ultra-deepwater resources.

If we add the expansion of refining capacities in the producing nations of the Persian Gulf and Russia, the landscape of petroleum products has fundamentally changed. The deindustrialization of some and the new industrialization of others are reshaping global refining. This new geography alters the demand for oil: a portion of the crude remains within the extraction zones (Persian Gulf, Russia) while the remainder flows toward new refiners (China, India). Consequently, the market for refined products has become more complex, with cross-flows moving in all directions as they stem from all refining zones².

According to BP, global trade in crude oil has progressed by 35% over the past twenty years, whereas trade in refined products has tripled! Maritime trade data evaluated by Clarksons shows a 21% growth for crude oil and a twofold increase for refined products. The same trend applies to LPG derived from oil field operations and refining. The overarching theme is the rising momentum of fuel exchanges within a globalized market. While crude oil traffic will continue to stream toward major refining hubs, the maritime trade of refined products is bound to keep expanding in the future.

In terms of the fleet, the number of tankers dedicated to both crude and refined products has grown by 66%, and the fleet of the largest vessels (VLCCs, ULCCs) has doubled in twenty years. In 2000, 44% of the tanker fleet was controlled by Europeans (EU + Norway), 11.2% by the Japanese, and 11% by Americans. By 2019, despite the weight of Greek shipping, all three blocs lost market shares, notably to the benefit of China (10%) and the maritime hubs of Singapore and Hong Kong. China is pursuing its growth with the ambition of covering its national import market and, eventually, third-party markets driven by its two maritime giants, COSCO and China Merchants.

LNG

In two decades, global gas consumption has grown by 66%, reflecting the strong enthusiasm for this hydrocarbon, even though this growth has not been linear³. Here again, there is a clear divergence between developed nations (+34%) and developing countries (where it doubled), driven as always by the influence of demand from South and Southeast Asia and China. Gas is taking a more and more prominent share in global electricity generation, notably replacing coal. While it does emit CO₂, gas is deemed "cleaner" and benefits from a craze favored by increased product availability via pipelines and, above all, Liquefied Natural Gas (LNG). This is a direct product of the expansion in global liquefaction capacity (export terminals), which has tripled in twenty years. These trains partly dictate the volume of global activity. On the demand side, importing countries are multiplying across all continents, utilizing conventional or Floating Storage and Regasification Units (FSRUs). Many States are equipping themselves with LNG terminals to secure access to this energy or to diversify their gas supply (Baltic, Black Sea, Adriatic).

Consequently, maritime LNG traffic rose from 103 Mt in 2000 to 343 Mt in 2019. Growth among historical consumers varies: the EU by x3.7, Japan by x1.5, and South Korea by x2.8. New consumers now hold significant weight: China (17% of imports), India (7%), Pakistan (2.5%), and Thailand (1.4%). Only one country is missing from the initial import forecasts: indeed, the United States, once expected to become a massive importer, has instead turned into an exporting country (34 Mt in 2019) due to the shale gas boom, with major prospects for future growth.

Moving from a handful of supplying and purchasing nations in 2000, the maritime trade of LNG has expanded year after year to encompass more and more players. Qatar took off as the leading producer, while Australia, Russia, and the United States have overtaken historical producers (Algeria, Nigeria, Malaysia, Indonesia). The highly structured gas market between States has transformed in a few years with the arrival of more buyers and sellers. In 2019, 33% of the LNG market was conducted under short-term and spot contracts (with spot trading alone representing 27%). LNG has thus become a commodity trading market, featuring buying and selling opportunities driven by price differentials between continents. This liberalized market context creates new opportunities for maritime transport. LNG is attracting increasingly attracting private shipowners. Over twenty years, the growth of European control

² This also creates storage challenges in crossroads regions such as the Mediterranean and the Strait of Malacca.

³ The Fukushima disaster triggered strong Japanese demand for nuclear substitution, diverting LNG flows—particularly European ones—toward the archipelago for several years.

(EU, Norway) has intensified within the LNG carrier fleet, driven notably by Greek ambition, although the fleets of producing nations and Japanese companies remain substantial [10].

In geopolitical terms, Middle Eastern LNG exports are currently directed two-thirds toward Asia and one-third toward Europe. Beyond traditional Southeast Asian resources, the Asian appetite for gas relies on Papuan and, above all, Australian resources. Europe, for its part, does not lack suppliers (Russia, United States, Algeria, Qatar, Nigeria).

Coal

The distinct feature of coal is that several of the world's major economies possess it in abundance: Germany, Russia, the United States, Canada, Australia, and China. Traditionally, the main importing nations were European countries, Japan, South Korea, and Taiwan, to meet their electricity and steelmaking requirements.

Over the past twenty years, shifts of various kinds have occurred regarding thermal coal⁴. China has turned to the global market to supplement its extremely high domestic consumption (accounting for 21% of global imports), while India and Southeast Asia have become major importers (30%). South Korea, Taiwan, and Japan remain attached to this energy source (25%). The progressive rejection of coal by Europe explains its now minor share (7.4%), which will undoubtedly shrink even further in the coming years.

In terms of international coal trade evolution, it is worth noting that over twenty years, coking coal has progressed to 272 Mt (+60%), sustained by Chinese and Indian demand. Thermal coal has tripled, reaching 1 billion tonnes. For the time being, coal remains a substantial component of global energy within the globalized world, notwithstanding its environmental harms.

Perspectives

Before addressing the question of outlooks, one must bear in mind the difficulty of any projection. Global crises (economic in 2008, health in 2020) or sectoral shocks (gas in 2011, oil in 2014) have consistently disrupted energy markets. The unpredictable Fukushima catastrophe for gas, as well as the more politico-economic oil wars between Russia and Saudi Arabia, represent two examples of heavy cyclical factors impacting both energy markets and maritime transport. Through these oil wars, it is not only market price levels that are at stake, but also exploration investments, given that various drilling areas are only profitable with high barrel prices (ultra-deepwater offshore, unconventional sources, Arctic zones).

The current Covid-19 crisis serves as a reminder that the future is inherently uncertain. Political events, industrial or natural disasters, as well as health crises, disrupt the established order of things. Conversely, we have truly entered the global age—a world where, despite the diversity of political and economic situations, all planetary States are entangled in economic relations and commercial trade.

The question of the future of fossil fuels remains nonetheless. Demographic projections point to a global population rising from 7.8 to 8.6 billion inhabitants during this decade, representing an annual growth of 1%. Current models generally project 2% to 3% of annual growth for the global economy. The obvious conclusion is that the world will become increasingly energy-hungry, driven notably by the maturity of the Chinese economy and the continued emergence of India, Turkey, Indonesia, Brazil, Russia, Egypt, and others.

For crude oil, projections (such as McKinsey Energy Insights) point to a decadal growth of around 5% (0,5% per year), amounting to an additional hundred million tonnes. Broadly speaking, a drop in global oil demand for transport is not on the horizon for this decade. The overarching trend, however, points to a reduction in flows toward the United States and Europe, and a shift further toward India and especially China. For the latter, following the continuity of its current momentum, it is expected to enter a phase of maturity during the second half of the decade.

In 2018, DNV GL established a maritime projection for 2040, from which an outlook for the new decade can be extracted. Accordingly, crude oil shipping is expected to grow by 1% per year, and refined products shipping by 3% per year. The growth of the tanker fleet is projected to follow trade trends; the number of crude tankers should reach a plateau before declining. This phenomenon will not affect

⁴ India has become the leading importer of coking coal (23%), while China and Europe each account for 15%, and Japan, Taiwan, and South Korea represent one-third.

petroleum product tankers, which will maintain momentum alongside growing flows. The size of refined product tankers could increase to cover less regional and more global markets.

For LNG, a short-term outlook to 2025 (from Wood Mackenzie and Bloomberg) projects a 3.5% annual growth rate to reach 400 Mt. The most dynamic markets will once again be China (+33%) and India (which is set to double). The other importing nations are expected to be the remaining countries in South Asia, Southeast Asia, and even the littoral States of the Persian Gulf (UAE, Kuwait, Bahrain). Growth in European demand will be limited, rising from 100 to 110 Mt in 2025 and 120 Mt in 2030. Beyond that, according to Shell, demand should hover around 580 Mt by 2030, with an acceleration in demand during the second half of the decade⁵. Within twenty years, LNG is expected to account for 80% of global gas trade, compared to 38% today.

China will quickly become the world's leading importer, ahead of Japan. The market will then be supplied by production growth from the United States, Russia, Qatar, and Mozambique. Perhaps one day Iran will also contribute, since Tehran owns the other portion of the massive gas field in the Persian Gulf.

For the time being, in 2020 and beyond the current crisis, the notion of an overly rapid acceleration of supply relative to demand is emerging (as highlighted by Wells Fargo). The growth of the LNG carrier fleet would then be too fast. Qatar has contracted with Chinese and, above all, South Korean shipbuilders for the delivery of around one hundred vessels for the decade. The free market has attracted shipowners, notably Greeks (about ten shipowners), who have bet on steady growth. A capacity crisis in the LNG fleet cannot be ruled out.

The French case

In 2018, French refineries imported 56.6 Mt of crude oil. French refining supplies the domestic market and exported 18.4 Mt of refined products. In return, 40 Mt are imported to cover national requirements—a phenomenon amplified by the contraction of French refining and the dieselization of the vehicle fleet. Gas imports amounted to 10 Mt via LNG and 28 Mt via pipelines. Coal accounted for 13 Mt, supplying both the steel industry (Dunkirk, Fos) and thermal power plants (St. Nazaire, Le Havre).

For coal, a distinction must be made between types and uses. Coking coal will follow the slow but steady growth of the steel industry during the decade, with a stabilization period after 2025. In fact, this model depends notably on Chinese maturity and the stability of historical steel consumers.

For thermal coal, the decade will remain stable before a decline toward the end, leaving coal still around one billion tonnes in ten years. The outlook points to a reduction in European and then Chinese demand. Coal consumption will depend on Beijing's policy and environmental choices. Northeast Asia will remain steady, while India, its neighbors, and Southeast Asia will be the major import hubs. Electricity demand in large Asian nations is bound to rise, involving trade-offs between gas and coal. For the latter, there is no shortage of suppliers: neighboring Indonesia and Australia, more distant Russia (via its Pacific ports), and South Africa. Colombian and American exports will, a priori, be maintained toward Europe.

All of these projections are theoretical and take into account the economic evolution of the world's major blocs relative to the unique characteristics of each within the globalized world (Europe, United States, Japan, South Korea, China, India, Russia, Brazil, Indonesia, etc.). The current crisis remains uncertain—undoubtedly a short crisis that can be easily overcome—but in the short term, it will cause severe disruptions.

To synthesize, oil trade will remain stable due to the mutations in global refining, which favors cross-flows of refined products in all directions. LNG is poised for steady growth, as it stands as the transition energy source while waiting for renewable energies to reach full capacity. Coal, despite being burdened by its flaws, will remain an indispensable energy source throughout this decade.

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⁵ A demand for LNG as a marine fuel is expected to develop, reaching around 50 Mt by 2030.