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**GEOPOLITICS OF
ENERGY TRANSITION**

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Abstract

A Current energy policy map is characterized by low oil prices and permanent expansion of renewable energies. From both scenarios, in particular the latter can modify traditional energy dependencies, since it allows the substitution of fossil energy imports. For this replacement to be effective it is necessary that renewable energies –that in current technological and economic analysis are focused essentially in regional markets– also satisfy the energy demand in heating and transport. From the political perspective, it is necessary to have general stable conditions to generate regional cooperation in the energy sector between different countries. In this cooperation, those with networks and energy storage possibilities will have an advantage. Taking into account the growing energy demand, renewable sources will only have an important role in global energy policy in the medium term. In the immediate term, transformations to current dependencies are determined by technological innovations in exploiting fossil energy resources like fracking and gas fluidization for maritime transportation.

Towards a new global energy map?

Oil prices are currently very low, something that German drivers clearly perceive at the gas station. Although there are multiple reasons behind this, a key has been the commercial use of shale oil deposits in the United States, which determined the virtual disappearance –in a very short period– of the U.S. as an energy importer in the global market. An increase of oil prices in the short term is not foreseeable, especially when taking into account the big oil-producing countries' energy policy. With an almost stoic parsimony, Saudi Arabia –the largest crude exporter in the world– rejects all possibility of limiting its exports and crude oil prices could keep going down as new oil sources continue to enter the market. The return of Iranian oil to the energy market, in this regard, is anticipated to generate further tension.

At the same time, industrialized nations like Germany redirect their energy supply towards renewable energies. The increasingly threatening consequences of climate change create the necessary political conditions to promote CO₂-free energy sources. This is an unavoidable shift for most nations, such that are already talks about a global energy change. These new trends impact the geopolitics of energy. In particular, the expansion of renewable energy resources –more independent and local than fossil fuels, which are often imported from far-away and questionable regimes– could end global energy dependencies and redraw the global energy map permanently.

Erosion of oil-exporting countries' foreign policy

A secure energy supply is a requirement for country to develop industries. It is thus only natural that energy policy is fully integrated into the foreign policy of many States. In essence, this policy responds to logical considerations: countries with energy resources like oil, gas, or coal, and the corresponding distribution infrastructure have the power of supply or are subject to the foreign policies of those energy-demanding countries, which have power of demand. Transit countries cannot be ignored either, since they have decision power over the transport of energy resources and thus are an essential part of international energy policy.

To date, Middle Eastern countries, Russia, Norway, and Venezuela have the largest natural oil and gas reserves. Some of these states formed the Organization of the Petroleum Exporting Countries (OPEC) early on, in order to control a substantial part of global energy policy and set an international price for crude by controlling supply. The 1973 Oil crisis was a clear demonstration of its power: as a consequence of the Yom Kippur War, some OPEC countries reduced their supply volume in order to put pressure on the Israel-supporting Western countries. In Germany, oil scarcity led to a drastic increase in gasoline prices and to the introduction of car use restrictions. In a car-loving country such as Germany, a strong and unforgotten annoyance.

After the crisis, prevailing dependencies in energy markets have increasingly shifted. As a first step, the International Energy Agency (IEA) was created by OECD member countries with the primary purpose to warn them about possible sudden crises in oil supply and to develop prevention strategies. Many countries

around the world –including Germany– also began to diversify their energy sector to reduce the unilateral dependence on OPEC countries. As a result, OPEC began to lose influence, although for a long time it has remained a determining player of global energy policy.

Today, OPEC members' influence over international energy policy is diminishing and major emerging countries as China, India, Indonesia, Mexico, and Brazil dominate much of the global energy market. Their power is product of energy supply but even more so of a rapidly growing energy demand. In the oil sector, non-OECD states are the most oil-demanding and at the same time are the most productive countries. Some other emerging countries have aligned around the BRICS group (Brazil, Russia, India, China, and South Africa) in order to pursue their own political goals. Russia has lately been attempting to gain weight in this alliance around energy policy, for example presenting initiatives on the development of a common energy reserve policy.

However, today technological innovations are the real factor that is fundamentally eroding the power structures built around energy supply of OPEC and other countries rich in natural resources. New extractive methods like fracking have made unconventional and until now inaccessible gas and oil deposits economically viable. These new methods have allowed the United States, at one point the main fossil fuel importer, to become virtually energy independent. On the other hand, high oil prices in years past have led the industry to turn to alternative energy sources and to find technological solutions for a more efficient use of oil. Efforts towards developing technologies for gas fluidization should also be noted: while oil has a rather well-functioning maritime transport system governed by global supply and demand, so far gas relied mostly on regional pipelines. Though not inexpensive, today gas can be fluidized and transported in ships. Thus, it can compete with oil and help weaken the former's position in energy policy.

"Many countries around the world –including Germany– also began to diversify their energy sector to reduce their unilateral dependence of OPEC countries"

So far, OPEC's reaction has been rather surprising. Instead of cutting crude export, as some members like Algeria, Venezuela, and others have demanded, Saudi Arabia –the largest oil exporter– has preferred not to modify its export volumes¹. The reasoning behind this decision has very different interpretations. Some assume that the country seeks to counteract the newly achieved American energy independence². The Saudi calculation could be that low oil prices erode profit margins of shale oil deposits in the United States. In fact, many of the investments made in unconventional oil deposits in the U.S. are considered unprofitable. There is also information about an alleged agreement between Saudi Arabia and the United States to hurt the Russian economy as an oil exporter as a response to the Ukrainian crisis.

Regional political interests must also be factored in, such as the reappearance of Iran as a regional power in the past months. A low

1 M. Chmaytelli (2015), BloombergBusiness, <www.bloomberg.com/news/articles/2015-09-24/opec-saudi-oil-production-upsets-venezuela-but-cartel-endures> [retrieved on: 10/2/2015].

2 Topf, A. (2014) In: Oilprice.com, <http://oilprice.com/Energy/Oil-Prices/Did-The-Saudis-And-The-US-Collude-In-Dropping-Oil-Prices.html> [2.10.2015].

oil price policy could also lead to an increase in the costs of global policy on climate change, particularly in Western European countries.

In the media, the fall in oil prices has had diverse interpretations: they range from pointing to the negative impact of the oil industry's decline, to the end of the OPEC and on the other end of the spectrum, lower prices are considered a positive evolution aimed that will boost economic growth as a result of cheap energy.

The (geo)economic losers and winners are also clear. Primary beneficiaries are countries with high energy consumption and scarce energy resources of their own. Emerging countries like India, China, Mexico, Brazil, but also Europe, are considered winners due to their high dependency on energy imports. Among the losers are oil supplying countries, since the lower price has a direct negative impact in their national income. It is worth to note that big exporters like Russia, Venezuela, or Nigeria, who finance much of their public spending from revenues from oil exports, now face significant losses.

From a geopolitical perspective, these trends could lead to a loss of political power, as these States often use their abundance of raw materials as a weapon of foreign policy. In this context, latest efforts of countries like Russia to secure fossil fuel deposits –for example in the Arctic region– can only be interpreted as a bet on a future price increase. If this bet will pay off, is yet to see.

Growing political weight of renewable energies

Given the perspective of global catastrophic climate change, new economic realities, and the need for a secure and sustainable energy supply, the number of countries that invest in local renewable energy infrastructure keeps growing. More than 145 countries today have legal frameworks that promote the use of alternative energies and greater energy efficiency.³ Pioneer countries betting on sustainable energy are no longer an exception. Germany, for example, is aiming at an near complete conversion of its energy sector towards renewable energies by 2050. The United States and China have installed significant local capacities in renewable energies. Smaller countries, such as Latin America's Costa Rica, have been the first in the region to announce an ambitious target to transition to 100% renewable energy.

"More than 145 countries have nowadays legal frameworks that promote the use of alternative energies and greater energy efficiency"

At a multilateral level, by the end of this year the new negotiation process under the umbrella of the United Nations (UN) will end in Paris. The goal is to adopt an agreement on climate protection intended to limit global CO₂ emissions. An important resolution has already been put forward: starting in 2020, a global fund of \$100 billion dollars will be invested annually for climate change mitigation and adaptation. Big emerging countries like China,

3 REN21 (2015): Renewables 2015 Global Status Report, Key Findings, p. 7, <[http:// www. ren21. net/status-of-renewables/global-status-report](http://www.ren21.net/status-of-renewables/global-status-report)> [retrieved on: 10/2/2015].

India, Mexico, and Brazil have integrated the use of renewable energies in their national strategies for a secure energy supply, redefining energy security away from the concept of mere availability of fossil energy sources. More recently, the G7 decided to support decarbonization policy and promote global conditions that will furthermore support the expansion of renewable energies. All of this will continue to induce shifts in energy dependencies of the past. Countries with the possibility of using renewable energies can thus begin to reduce fossil fuel imports.

As with fossil fuels in the past, to encourage renewable energies many countries use instruments such as subsidies, tax incentives, or price fixing mechanisms like feed-in tariffs. This way clean energy is gaining geo-economic relevance in international energy policy. An example of this are the recent trade disputes between the US and the EU with China about Chinese photovoltaic products. The United States imposed punitive tariffs on these products and the EU a minimum import price, in addition to quantitative restrictions.⁴ The disputes arise out of a context of extremely cheap production of photovoltaic products in China, which considerably affects many U.S. and European, mostly German, producers.

Situation and framework conditions

Nowadays, renewable energies can be used in multiple ways. Energy from the sun, for example, can be collected almost everywhere in the world thanks to technologies like Concentrated Solar Power (CSP) or photovoltaic panels (PV). Differences in sunlight intensity make for more or less suitable locations for producing solar energy. California in the United States, Mexico, the Sahara region, the Middle East, Central Asia, and Australia are considered particularly suitable locations. Coastal and marine regions with relatively strong and steady winds offer natural advantages for wind power generation. Highly efficient wind turbines allow for onshore and offshore wind farms, the North Sea being a good location for this in Europe.

Biomass is another important source of renewable energy, since it can be implemented essentially everywhere where there is agriculture and forestry. Unlike wind energy, biomass can also be used for transport and heating. Products like ethanol –extracted from wheat and soy in Brazil and the United States at a very large scale– as a gasoline substitute have a big economic relevance, along with wood, still widely used in developing countries for heating and cooking.

Hydropower is yet another source of renewable energy, an example of this being the Itaipú power plant, a joint venture between Paraguay and Brazil. Large hydropower plants like the Grand Inga dam in the Democratic Republic of the Congo, which will provide energy for South Africa, demonstrate that this resource is far from being exhausted. Another important renewable resource in many countries is geothermal energy.

Almost as important as geographical availability of renewable energies are the country's economic and political conditions. Since solar and wind energies are mostly transformed

⁴ In the EU, decision on the introduction of commercial trade measures was preceded by a very controversial debate. The German government for example spoke in favor of unrestricted free trade and against restrictions.

into electricity, an efficient use of this sources entails the correspondent technology so that the electricity obtained can be also used in transport and heating. Furthermore, the use of renewable energies is more decentralized, meaning that the energy can be obtained from many different sources spread out over a large area. This requires grids that take electricity from producer to consumer. In addition to this, electricity consumers can increasingly be producers ("prosumers") to the extent that households with photovoltaic systems not only meet their own energy need but also produce energy to be injected into the grid. As renewable sources are generally intermittent, they bring with them the need for durable energy storage. For energy-intensive industries, this constitutes a special challenge due to the high (but rapidly decreasing) cost.

Besides the need for adequate technical conditions, renewable energy requires knowledge and research institutions to further develop existing technologies. Another key is a suitable economic framework that provides stability for financing of large-scale facilities such as wind farms. Another aspect which is often forgotten is the need to ensure the required mineral resources to allow the expansion of renewable energy capacity⁵. Large wind parks require metals like iron and copper. The magnets contained in wind turbines are made of rare earth metals, a topic that has been much debated in the media. Solar technologies such as photovoltaic equipment depend on silver, gallium, indium, and tellurium. Lithium is required for storage technologies. Many of these raw materials are scarce, expensive, and only present in politically unstable regions. Therefore, among the conditions that allow the use of renewable energies is a functional international market or strong cooperation for the supply of raw materials with aims at generating the corresponding capacities.

Regional cooperation in renewable energy

Existing conditions in different regions allow for widespread adoption of renewable energies. Germany is not necessarily an ideal location for their development, but still, the country is installing them increasingly. Financial, technical, and political conditions allow Germany to do so and thus reduce fossil fuel imports. However, the use of local renewable energies is not necessarily a cost benefit for all countries. From a supra-regional analysis, it can be observed that some comparative cost advantages can lead to a concentration of weaknesses and strengths in the use of renewable energies. This concentration has created new energy-producing strongholds, leading to corresponding changes in the relationships with consumers. However, unlike in fossil fuels, relationships in the solar and wind energy areas are concentrated in commercializing electricity, which is generally bounded at the regional level by storage limitations, since long distance transportation leads to significant energy losses.

From a geopolitical perspective, this situation offers advantages for countries that can cooperate in setting up grids with other countries in the region and at the same time can offer good locations for renewable energy, or are close to countries with those conditions. In the internal relations of a regional cooperation, control over

5 M. De Ridder (2013): The Geopolitics of Mineral Ressources for Renewable Energy Technologies, The Hague Centre for Strategic Studies, <<http://www.hcss.nl/reports/the-geopolitics-of-mineral-resources-for-renewable-energy-technologies/127>> [retrieved on: 10/2/2015].

energy grids and storage capacities will decide who will become a player in energy policy. Countries with this control can become the new energy transit states. In this regard, the European Union deliberately promotes the expansion of their grids. One goal is to distribute the energy generated in the North Sea wind parks between the adjacent countries. Norway, a country with good economic links with the EU, also has the capacity to store energy in its dams, which is of great interest for the European Union. Germany could also become a significant European transit country, given the construction of new transmission lines planned in the framework of a new policy for the sector. In this sense, the EU could soon become a strong region in terms of renewable energies.

Nevertheless, cooperation at an international level does not always work. The Desertec project is an example of failure in supra-regional cooperation. This initiative aimed at giving European financial and technical assistance to select states in North Africa, so they could develop the ability to exploit local wind and solar renewable energies to then be exported to Europe. However, the project failed after several big European companies that initially sponsored the idea abandoned the project. There are various reasons behind this: on one hand, many companies withdrew due to high operational costs. On the other hand, in recent years the region experienced a progressive deterioration in political stability as a consequence of the Arab spring. The lesson learned is that regional cooperation for renewable energy grids requires stable political frameworks like those in the EU.

Energy (geo)politics between fossil and renewable energy sources

Renewable energy expansion can modify energy dependencies between current producers, consumers, and transit countries. It is not to expect that the current fall in oil prices lead to a reversal in this trend, since so far the decline in prices has not had an impact on investments in renewable energy. This is due to the fact that these energies at the moment are used essentially in the electricity sector, where oil is rarely used. Also, technology advances in renewable energies –like photovoltaic systems– has also led to a drastic drop in global prices. It should be noted that planning times for wind or solar installations are calculated in cycles of between 20 and 30 years. Therefore, decisions adopted react less sensitively to cyclical changes that could affect the general context, while investments in the oil sector generally have a planning horizon of one to three years due to high volatility.

Under these conditions it cannot be expected that a drop in oil prices will translate into negative competition in the medium-term for renewable energies. Taking into account geopolitical patterns, it is important to note that the progress in renewable energies should primarily generate new regional cooperation.

"Technology in renewable energies –like photovoltaic systems– is also affected by a drastic drop in global prices"

Multilateral alliances relevant for the European Union could create the necessary political conditions to reduce dependency on fossil fuels. A similar evolution could be expected in other regions in the world. Considering the intensity of solar incidence in California and Mexico, new forms of interconnected energy policy could arise. In North Africa, renewable energies continue

to progress, even without European support. Asia wants to use solar energy from the Chinese and Mongolian desert under the Gobitecs project. One of the goals of large hydropower plants as those being constructed in the Democratic Republic of Congo is precisely energy export.

Regional cooperation for promoting renewable energies can significantly contribute to a gradual replacement of fossil fuels, even globally. To what extent current energy relationships as a whole may change, will mainly depend on the growth of global demand to dull the substitution effect. At presents, developments such as the exploitation of oil shale and shale gas deposits will continue to impact and change current dependencies. Moreover, another major obstacle remains: the limitation of renewable energies to the electricity sector.



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