ENERGY GEOPOLITICS AND SPHERES OF INFLUENCE

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Part I.

1. The New Energy Geography

1.1 The New World Order: Energy security and new geostrategic developments

The Cold War period, headed by the United States, promoted a multilateral order, supported by free trade and deeper economic and political integration among countries. This multilateral world included relatively open markets and technology transfer. But the world is experiencing a new era of competition for greater geographic and economic power driven by the shifting centre of gravity of the global economy, from west to the East, the realignment of relationships between countries, rapid technological change, and two new powers China and Russia that after the Ukraine invasión has change the European map after the post cold war. As a consequence, today this multilateral order is being challenged and the world post Cold War have disappeared, energy relationships might become more political and open trade but conditioned by Russia, specially in Europe, and it could give way to friction and great powers will employ energy relations or energy technology to gain influence over each other. In the domestic political competition, new parties to power will come and mainly extreme right or left**.** Many nations are not happy over inequality and this new order threatens to disrupt the global trading regime and has led to intensified economic competition among firms and states.

For the first time since the end of the Cold War, there is a real strategic rivalry among the world's great powers. It was not very smart to trust Putin after 2014, and also not to open the Nord Stream 1 and 2, and it was thanks to the delibérate ingenuity of Mrs Merkel. It was also a colossal mistake for Germany to reduce defence spending as well as the Ukraine renunciation of nuclear weapons. These mistakes favoured the Russian invasion in Ukraine. In Europe, the gas should have been diversified with North Africa, the US, or Saudi Arabia, but, it was not done.

China's rise has created a net of economic and political relationships in all continents. Russia is trying to recover its former prestige and the place from which it had retreated and the Ukraine war it is a good example, but it also could suppose that at the end of the conflict, Russia's position came to be a pariah.

The United States is in a time after chaotic end of Trump's presidency and the fall of Kabul and is renegotiating its existing relationships with allies and adversaries, and alike the Crimean war, look that at these time, with the Ukraine invasión, USA, will lead again the Western world, alike that the Mr Trump policy. On the other hand, new

areas of strategic competition have opened up in resource-rich areas like the Arctic and the emerging economies of Africa, and because the presence of Russia and China alliance, and the US withdrawal from the world leadership at the moment we live in a very fragmented world and Europe is trying to avoid remain isolated in between Asia and US, and will be necessary at the time to create a new pólicy with Russia, even that it looks difficult, except if the power in Russia change.

1.2. The important role of energy in the new era: Energy Spheres of Influence

For several decades, energy security, defined as the ability to secure affordable and reliable supplies of energy, has been widely recognized as a common good promoted by this system. As countries look to expand their spheres of influence, energy can play a role as both a target and a tool of that expansion. The energy world also is changing rapidly, with renewable energy resources like solar and wind, waves and tidal, making up the fastest growing and largest source of new supplies, and global problems like climate change challenging the role of *status quo* fuels. It is because of these reasons that energy will play an important role in this new *disorder* as well as will be affected by these changes.

The until now indisputable super power, the United States is no longer the largest consumer or importer of energy. Instead, it is now the largest producer of oil and natural gas and will be a net exporter of energy. But other global powers, like China and Russia can suppose strong competition for this U.S. strategy. Energy is included prominently in the economic, foreign, and national security strategies of all the three powers but in different ways. And although all three recognized the importance of maintaining affordable and reliable energy supplies for the good of the global economy as well as their own economy, after the Ukraine war, this supposed consensus has blown up and now the influence of energy in the execution of foreign policy at the global and regional level, is an ítem, that could suppose a constant conflict, and not only about prices. European and mainly eastern countries must change the energy supplier and it would change the energy geography that we know until the Ukraine invasión.

Energy is visible, tangible, and often acts as a proxy for influence, because it in fact confers influence. It is the case of China's search for resources that provoked its overseas strategy, commonly known as the *Go Out Policy* with the change of the century. Today, in spite of other commercial and strategic interests, energy is a major component of Chinese investment and trade around the world. For Russia, energy is one of two strategic commodities, along with arms, that enable it to court other

countries; and it is energy that is providing a foundation for its expansion into the Arctic. However it is not clear how much the western sanctions will affect the Russian economy and the future of your energy exportations.

Even for the United States, energy has become part of bilateral relations with allies (NATO, South Korea) and adversaries (Russia, China). One key point in foreign policy objective for the United States has been to prevent any country or group of countries from dominating the fuel energy market. Equally, the USA has controlled nuclear power proliferation since President Eisenhower's "Atoms for Peace" speech. Today's energy landscape has changed: the United States is no longer thinking merely in denial terms; it is examining whether it can dominate energy markets.

The European Union as an important partner in the new world order must analyse the role energy plays in the contemporary competition for influence among the United States, China, and Russia in specific regions of the world; or if any one country or groups of countries might be able to exert preponderant influence over a specific type of energy or fuel; only doing it, can UE appreciate the implications for foreign policy objectives and global energy security. One thing is clear, the EU and specifically the German pólicy to trust in Russian energy dependency has been a big mistake, and Ukraine has suffered the consequences.

1.3. Energy Geopolitical Influence

We can analyse the energy factor into several examples of the contemporary struggle over geo-political spheres of influence. First example is Venezuela. Over the past 15 years of Venezuela's political, economic, and social decline, China and Russia have got much of its oil resources and debt. However after the Ukraine invasion, the US has established some agreement with Caracas to supply oil to the US. This means the United States will need to find some sort of solution with China and Russia over Venezuela and its oil resources. On the other hand some agreement could be reach with European countries, but Venezuela has suspended Shipments to Europe, under oil for debt deals, and is asking Italy's Eni and Spain's Repsol to supply fuel in Exchange for future shipments.(Reuters 12-08-2022)

Another example of geostrategic competition is in the Indo-Pacific. China has tried to expand its sphere of economic and soft power influence through the Belt and Road Initiative (BRI). The United States and its regional allies seek to counter with the Free

and Open Indo-Pacific Strategy. Energy plays a role in both agendas, such as the financing and construction of coal-fired power generation units by China and the efforts by the United States and Japan to create natural gas import facilities throughout the region.

Relationships throughout the Middle East are shifting as well, with Middle Eastern countries increasingly looking to Asia to secure future markets for their oil. Russia, through its partnership with OPEC and energy investments in the Middle East, appears to have close ties with more countries in the región, at least, before the Ukraine invasión. The U.S. presence in the region is long and complicated but it seems that alliances in the region are diversifying and energy is playing a big role even though trade flows throughout the region have been affected by the renewed U.S. sanctions on Iranian oil exports. However after the invasión to Ukraine, could be possible some kind of agreement, of the The Joint Comprehensive Plan of Action (JCPOA), even USA, which permitt to Iran export the oil to european countries. On the other hand we will see the future of the new Russia-OPEC relationship in the new world post war Ukrainian.

Further North, the Arctic's natural resources are abundant and more accessible as the Arctic summers are ice-free for longer periods of time. Russia and China have bet aggressive territorial claims in the Arctic and are seeking to expand commercial and military activity in the region. The oil and gas resources in the region provide economic justifications for a greater and sustained presence in the Arctic.

Finally, energy also provides a tool for investment in Africa on both the supply and demand side of the market. Africa is hungry for energy. Only 24% of sub-Saharan Africans have access to electricity and the energy generation capacity of Africa (excluding South Africa) is only 28 Gigawatts, equal to that of Argentina alone. The irony of Africa's energy poverty is that Africa is actually very rich in energy resources but most of the energy potential on the continent is unexploited. Africa is, currently, the world's most crucial hotspot for renewable energy. Its potential is immense: the continent's solar energy sector could generate up to 11,000 GW of power, with the hydro and wind markets able to add, respectively, 1,750 and 1,300 GW to its energy mix. Overall, Africa could generate up to 24 000 TWh of electricity each year, a quantity which amounts to almost 90% of the global generation, and which would satisfy the internal energy demand by more than 26 times.(RES4AFrica, 15 Julio 22).

However African economies are believed to hold a great deal of promise for future growth in the global economy and a source of energy supply and demand. Regarding resource extraction, several countries in Africa have oil and natural gas resources that have historically attracted attention from international oil and gas companies. Chinese national oil companies have long operated in Africa, a 2015 working paper by the International Energy Agency pointed out that Africa was the top source of overseas equity oil production for Chinese companies. About Africa's energy demand, soft power influence in Africa through the provision of power generation and other basic infrastructure fits into the strategic policy of the U.S., Chinese, and to a lesser extent Russian foreign policy. China's overall Africa strategy has grown in recent years and the United States has made significant investment in the region. It is clear that energy determines the competition for influence and it is a key point, perhaps the most important, of the dynamics in each region. (1)

1. *Energy Spheres of Influence*, Sarah Ladislaw, Nikos Tsafos, CSIS, September 13, 2019.

2. Nord Stream 2. The geopolitical dispute brought to Europe, and the Ukraine invasión.

Opposition to the Nord Stream 2 pipeline was an important point of the foreign policies of both the Obama and Trump administrations, and it was a clear response to Russia's annexation of Crimea and the Kremlin's efforts of using gas as a weapon of coercion in Eastern Europe. The decision by the Biden administration to reverse the policy of its predecessors and stop sanctioning participants in the pipeline project was seen as a capitulation because of pressure from Germany and a gift to Russian President Vladimir Putin. The German Green party, which is now part of the governing coalition, opposes Nord Stream 2, and even more, after the Russian invasion in February 2022. Anyway, after the Russian invasion, Nord Stream 1 and 2 is not more than a monument to the lack of strategic visión, from, both, German as well as EU.

In Poland, former Polish Defense Minister Radek Sikorski likened the pipeline to the Molotov-Ribbentrop Pact, which secretly divided up his country between Germany and the Soviet Union, setting the stage for World War II. A similar thinking existed in Ukraine, and other Central and Eastern Europeans countries and had the conclusion that the Biden administration was prepared to make concessions at the cost of their security. But there is also an anti-Western, pro-Russian opposition in all these countries that

considered that it is a proof of how Washington's security promises cannot be trusted. But this opinión is not only in Europe. Jerusalem and Riyadh, for example, are afraid of facing a surprise similar to the one that Washington just delivered to Warsaw and Kyev. On the other hand the promise that U.S. diplomats will sign in the Vienna negotiations with Iran seems to be much less credible, but after the invasión, US offered a deal to produce more bpd, to remove Iran sanctions (2) Could be that after the invasión US and EU has strongly support to Ukraine, but the US and western countries before of the war it is evident that they looked to other way, regarding the russian policy.

2. *Biden's Surrender to Merkel on Nord Stream 2*; Kiron Skinner and Russell. A. Berman, Foreign Policy, 26-07-2021

2.1. How can the Russian invasion change the geography of energy.

Russia's war against Ukraine will change the landscape of global energy and its geopolitics in deep ways. We have already seen some of these changes. Russia was the world's largest combined exporter of oil and gas, and had energy relationships with more than 24 European nations, as well as China, Japan, South Korea, Vietnam and others. If we include the coal exports in the list, a dozen more countries will be added, even India. Russia has used these energy exports as a political weapon since the Soviet Union. However after invading Ukraine in violation of international law, Russia became a supposed pariah. Its energy customers are not only concerned about sanctions; but also they are rethinking their agreements with Russia, and the big companies like BP, Shell, Exxon Mobil and other abandoning billions of dollars in assets, after decades of investment. In regards to Russia's position with OPEC, and after sanctions forcing Russia into financial isolation, its future is uncertain.

European countries are the most affected of the Russian customers. Vladimir Putin clearly believed his country's exports are too important to sanction and make Russia's energy sector too valuable to attack. However, it was a big mistake, even though it is partly right. Besides the exodus of international oil firms, there has been a withdrawal of investor support for Russia's own energy companies. In any case, Putin's strategy will fail for other reasons as well. Western energy companies leaving will produce, as consequence, Russia's fall in the energy sector of capital and expertise. On the other hand the Ukraine war has sped up Europe's transition from fossil fuels, especially for Russian oil and gas. (3), eventhough during a transition period coal and other fuel products will be used.

3. *War in Ukraine is changing energy geopolitics*, Scot. L. Montgomery, The Conversation, 03, March, 2022

2.2. Replacing Russia Energy: Oil options

Even though in the short term, Russian oil will be difficult to replace for European customers, there are options for oil which we can analyse.

1. To restore the Iran nuclear deal. It is a foreign policy priority for President Biden, which offered Iran relief from economic sanctions in return for limiting its nuclear weapons activities, and would allow Iran to add 1.2 million to 1.5 million barrels of oil per day (bpd) to the global market this year 2022. Not all of this oil would go to Europe, but just half of it could replace up to 30% of Europe's Russian imports, which currently total around 2.4 million barrels per day.

2. Increase U.S. oil production and exports. This is already happening in response to prices over $90 per barrel. But companies have moved cautiously, to avoid overproduction that could provoke a price collapse. The U.S. could rise by 1 million to 1.2 million barrels per day over the next 12 months. Depending how much goes to Europe, this could replace another 30% of Europe's Russian oil.

3. The option for Saudi Arabia to raise output. Until now it never has happened, but war in Ukraine may change things. OPEC, led by the Saudis, has between 3.7 million and 5 million barrels per day of surplus oil production capacity available. In this case 1.5 million barrels per day could go to supply another 40% of Europe's dependence on Russia.

4. Currently, Russian oil and petroleum product exports to the U.S. represent about 8% of all the U.S.'s imported oil, and less than 2% of the total U.S. supply. (4) However ending the U.S. sanctions against Venezuela would add to the U.S. oil supply and could lower prices of oil and gasoline. It would also help to revive Venezuela's place in the global oil market. Venezuela's oil output could rise by at least 400,000 barrels per day to a total of 1.2 million barrels if the U.S. ends the embargo. That's a far cry from the late 1990s when the country produced close to four million barrels per day. Since then, the nation's oil industry has suffered because of mismanagement, underinvestment, and the U.S. embargo. (5)

4. *How Much of U.S. Oil Comes from Russia*, NBC News, 09-March.2022

5. *Venezuela could add 400.000 bpd to oil output if U.S. approves licenses*, Reuters, 11-03-2022

However since the fall of 2021, OPEC has been restraining production .This strategy is to keep prices high and not anger Russia. OPEC however, can change its mind, due to Russia's current situation, as a pariah, and also because of the fact that persistent high prices could create demand for alternatives to oil.

2.3. Options for replacing natural gas

Crude oil markets respond quickly and often dramatically to world events, but natural gas markets have tended to be driven by regional factors and have been less connected to the international market. Most crude oil is traded on short-term contracts based on spot prices, and refiners generally purchase crude oil for processing 90 days in advance. However the gas contracts have a longer term period and it is not so easy to contract gas in the short term. (6)

6. Natural Gas market remain regionalized compared with oil markets, Justin Parker, Today in Energy, 29-04-2020

Europe is more dependent on Russia for natural gas than for oil, but options exist too. In 2019, Russian gas deliveries to the European Union and the United Kingdom were about 16 billion cubic feet per day, mostly by pipeline. But Gazprom started cutting supplies, causing an energy crunch in Europe. Even more, before the invasion, Russia tried to pressure the EU into certifying the Nord Stream 2 natural gas export pipeline and to deter energy sanctions. To try to solve the problem, the U.S. sent 60 liquefied natural gas shipments across the Atlantic. Thanks to this initiative, except, in case of a cold snap, Europe now has enough gas in storage without relying heavily on Russia, at least, until the next Winter. However, given its Asian natural gas contracts, the U.S. doesn't have enough export capacity to replace Russia's supply for the moment. But U.S. peak capacity is set to rise to 13.9 billion cubic feet per day in 2022 to 16.3 billion cubic feet per day by 2024. Another option could come from inter-EU countries' connections of electricity, if they are able to redirect power to neighbours with especially high dependence on Russian gas. However, France rejected the named Midcat pipeline, because "it does not respond to the current crisis". It means that France does not share the German and Spanish aspirations to connect the Iberian gas network to the entire continent. This does not seem a good example to demonstrate solidarity in the face of the Russian invasión. (Energypost.eu, 23 August, 2022)

2.4. Other options

Qatar aims to raise its capacity substantially by 2027. New expanded gas reserves in East Africa, Papua New Guinea and the Eastern Mediterranean will create new liquefied natural gas export terminals. No one of these options are good for Russia, which sends 70% of its gas exports to EU countries. Even more, European governments could use tariffs to raise the price. Although China has signed new oil and gas deals with Russia, leaders in Beijing disagree to do the dirty work to Putin's energy plans, and probably China will spread their energy dependence.

2.5. Long-term energy security through decarbonization

The war in Ukraine has provoked support for accelerating the EU's European Green Deal. This big project aims to make Europe climate neutral by 2050, and was approved in 2020, and it included a package of measures known as "*Clean Energy for All Europeans*", that must be executed by law, with a strong emphasis on carbon-free and low-carbon sources.

However it will not be so simple. And so, when in 2022 the EU Parliament agreed to categorise nuclear power as "low-carbon clean energy.", many political parties, mainly the ecologist, and left side, protested. In spite of it, France announced plans to build six to 14 new advanced reactors to improve its energy security and maintain its low emissions status, and in the other side of the world, Japan, announced in August 2022, that will build new generation atomic reactors and extend the life of existing ones.

The EU needs to move forward more aggressively with non carbon sources, including renewable energy, nuclear power and green hydrogen. Decarbonization offers a pathway to energy security and can benefit from Europe's newfound unity in the face of war. (7)

7. *War in Ukraine is changing energy geopolitics*, Scott L. Montgomery, The conversation, 3 th March 2022 14:26 CET

2.6. The economic consequences

While tensions between Russia and Ukraine have been rising for years, the current military action is creating concerns about the potential impact on financial markets and the global economy. Fortunately, however, history shows that while geopolitical crises such as the one between Russia and Ukraine can temporarily roil markets, they don't typically have long-term consequences for investors.

While Russia's economy ranks as the world's 11th largest, according to the International Monetary Fund, at only 1/20th the size of the U.S. and 1/15th the size of China, it is likely not big enough by itself to affect global markets or economic growth, even if it were to suffer significant economic damage as a result of sanctions or other measures taken against it by the U.S. and Europe. Still, because Russia is also the source of 10% of the world's energy, and nearly 50% of the energy consumed in Europe, the conflict does pose risks that could extend beyond the two countries' borders including higher energy prices and increased financial market volatility. The impacts of the conflict are likely to vary depending on geography. Western Europe, particularly Germany, also has no easy alternative source of energy to replace Russian natural gas. Even though Germany has reportedly managed to significantly reduce its reliance on Russian oil and so, while Russian gas accounted for 55% of Germany's consumption in 2021, this has been squashed down to just 9.5% in August 2022. Gas imports from Norway and the Netherlands now make up the brunt of Germany's supply, according to Energy Minister Robert Habeck. (Reuters, 28.08.2022). Higher oil and gas prices could further benefit North American energy companies, whose stocks have been among the best performers over the past year. (8)

8. What Does the Ukraine Crisis Mean for Markets?, 02/18/2022

3. Critical energies, emerging technologies and security implications

3.1. Geopolitical competition over oil and gas

It is accepted in recent decades that oil and gas resources are geopolitically important and a cause of intense worldwide competition. With this point of view the American invasions of Iraq were about oil, as we have already said, African and Latin American countries are involved in competition between China and Western countries by the struggle over oil and other natural resources, as well as the Arctic being a hotspot of territorial rivalry. However, even if it was true during the Cold War period and during the colonial era and the First and Second World Wars, it is not so clear today. In this past period the great power, with the most men (territories), tanks (steel), and diesel (oil) had a good chance of winning. But with the advent of nuclear energy, it is not so clear that access to oil would be as decisive in a military confrontation between great powers.

The end of colonialism means that there would not be more white spots on the map on earth except on the bottom of the sea or in space, to compete over. It means that a transition from fossil fuels to renewable energy should greatly reduce tensions in the international arena, and could be the initial point in the era of peace and goodwill between great-power states. The United States should lose interest in the Middle East, competition between China and Western countries over client states in Africa and Latin America should soften, and oil-fuelled geopolitical hotspots such as the Arctic, the Persian Gulf, and the Caspian and South China Seas should lose some of their importance. However the Crimea crisis and the Ukraine invasión, has shown us that this idilic scenario could not be so simple. (9)

9. *Uncertain past, uncertain future: how assumptions about the past shape energy transition expectations,* Indra Overland; The Oxford Institute for energy studies; February 2021.

3.2. Russia's energy weapon

Some analysts considered that the Russian Federation has used its natural gas resources as a foreign policy tool or even a weapon. It was the case with Ukraine. However, others saw the Rusia use of oil as an example of the modernization, and commercial tendency, regarding the Soviet era. Those who believe that Russia has been using energy as a weapon might expect that with the energy transition, it could be a good chance to disarm Russia, but for those who considered it as a process to forget the soviet old times will not expect to see much change in terms of international security, except the loss of an important source of revenue for Russia.

It has been said that Russia has the "gas weapon". It means that high dependence on Russian natural gas makes nations in East and Southeast Europe think twice before they consider making any move against Moscow. The Kremlin is in a position to punish those daring to oppose it by introducing hard clauses to gas deals or, even worse, cutting off deliveries. However, Russia is not able to sell all the gas that it doesn't send to Germany and so, with energy costs skyrocketing across Europe, Russia is burning vast amounts of natural gas. In a plant located near the border with Finland, Russia would be burning around 11 millions euros of gas per day, which would have been destined for sale in Germany. (10)

10. *Climate change: Russia burns off gas as Europe's energy bills rocket*, **Matt McGrath, bbc,** 26 august 2022).

Friends, on the other hand, get rewarded, as was the case of the "incredible" deal Russian President Putin gave Serbia, that permit Serbia will continue to pay $270 per 1,000 cubic metres of natural gas for six more months. However, we have seen recently that this "gas weapon" does not really exist. On April 26, Gazprom turned off the gas for Bulgaria and Poland after they refused to pay their monthly bill in rubles. But Several weeks later, both countries are doing just fine. However the Russian decision has not provoked any collapse in either economy, and even more the cutoff has

strengthened those countries' resolve. On April 28, hours after gas stopped flowing, Prime Minister Kiril Petkov travelled to Kyiv to discuss with Ukrainian President Volodymyr Zelenskyy what Sofia can do to help.

The Bulgarian trader Bulgargaz has contracted shipments of liquefied natural gas (LNG) that are now entering Bulgaria through the Revithoussa terminal in Greece. Additional volumes are also arriving from Romania, through the Trans-Balkan Pipeline which, until TurkStream started work in 2020-21, served Gazprom. The main thing, however, is that Bulgaria's long-delayed interconnector pipeline with Greece (ICGB) is due to come online on June 30 or even soon. Once it is up and running, Bulgaria will be importing one billion cubic metres (bcm), it means, about one-third of its annual demand, from Azerbaijan, as ICGB connects to the so-called Trans Adriatic Pipeline. LNG will be coming from the terminals in Turkey and, after the end of 2023, from a floating storage and regasification unit (FSRU) next to the northeastern Greek port city of Alexandroupolis. The war in Ukraine has given new chances to new infrastructure projects that will diversify gas deliveries to the Balkans and redraw the supply routes. Even those, it is business as usual, despite the Russian end of imported gas, Bulgaria is not stopping flows from Russia to Serbia and Hungary through TurkStream. Contrary to popular belief, Southeast Europe does not depend on Russian gas, and the main reason is because local countries consume limited volumes: three bcm per year for Bulgaria and Serbia each and six bcm for Greece. Romania, a large market where annual demand stands at 12 bcm, meanwhile, barely takes any Russian gas at all. With the right infrastructural links, Gazprom can be replaced by alternative suppliers. That is why Greece and North Macedonia are thinking of an interconnector pipeline that could also be extended to Kosovo. The same for Bulgaria and Serbia. There are long-standing plans for an offshoot of Trans Adriatic Pipeline (TAP) into the Western Balkans: the Ionian-Adriatic Pipeline that could serve Albania, Montenegro and Bosnia.

More immediately, gas itself can be replaced by electricity, particularly if prices shift in favour of the latter. Thanks to large spare capacity, Bulgaria and Romania both export electricity to the likes of Greece and Turkey, where demand often outpaces supply. Last but not the least, there is the green transition. Investment into renewable energy and energy efficiency, a priority on which the European Union had demonstrated from the very beginning, will shape the future of Southeast Europe.

The question, really, is about the price. In May 2022, during the war, Russian pipeline gas based on long-term contracts and indexed to oil was cheaper than what spot markets – reflecting supply and demand – charge. Diversification away from Russia has a price. However, in the future the balance may change. A slowdown in global economic growth and depressed demand for energy will make gas cheaper, too. Then Balkan countries will be in a much better position in negotiating with Russia. The main point is about politics. That is why the current crisis is also an opportunity to change the situation. What happens in Bulgaria may set an example for others in the region. (11)

11. *Russia's so-called 'gas weapon' is nothing but a myth,* Dimitar Bechev, Aljazeera10 May 202**2**

3.3. The resource competition.

Some opinions considered that countries with natural resources have a malediction, bringing corruption, bad governance, authoritarianism, and domestic and international conflicts. However, some other people argue that the "black legend" is not true and the real problem was that the problems that plagued these resource rich countries were due to climate, culture, religion, colonialism, or something else. Countries such as Angola, Russia, and Saudi Arabia should then have a greater chance to become democratic, reduce corruption, and maintain peace with their neighbours. It means that energy transition should not bring much change in this area. (12)

12. *Uncertain past, uncertain future: how assumptions about the past shape energy transition expectations,* Indra Overland, The Oxford Institutes for Energy Studies, *The geopolitics of energy: out with the old, in with the new?;* February 2021.

3.4. Dependency theory

The central idea of dependency theory is that Western states exploit 'peripheral', poor and non-Western states, exploiting their natural resources and ensuring by political, military, and economic means that they are unable to develop. Dependency theory has not much popularity among people pro-Western views, who see underdevelopment as mainly caused by internal problems such as bad governance, corruption, weak institutions, and authoritarianism. After the collapse of Communism, dependency theory lost much of its popularity. However, many people continue to believe that these countries are poor because they are exploited by rich countries. From this point of view, the transition to green energy and the probably reduced interest in the fossil fuel resources should improve the poverty of these countries, because western countries will have less interest in exploiting them. By contrast, those who do not believe in dependency theory, don't think that energy transition bring a big change.(13)

13. *Uncertain past, uncertain future: how assumptions about the past shape energy transition expectations,* Indra Overland, The Oxford Institutes for Energy Studies, *The geopolitics of energy: out with the old, in with the new?;* February 2021.

3.5. Potential of trade and interdependence to promote peace

Many people think that globalization and interdependence between countries promotes peace. Keohane and Nye in their international-relations classic *Power and interdependence* envisaged that growing trade would create multiple 'channels' between countries and to reduce the importance of war in international affairs, making emphasis on economic tools and relations between countries opening the field of opportunities to a more diverse set of actors. This liberal argument was created as a critique of other approaches to international relations, in which military force and physical resources had primacy. With this theory, the transition to a better way to get energy should reduce international tension. As countries become "prosumers", it means that they produce and consume their own energy from domestic renewable resources, they should become less dependent on the hydrocarbon resources and should therefore have less reason to compete over them. From a liberal perspective, a bigger reliance on domestic renewable energy resources should *increase* the risk of international conflict, as prosumer countries will be less dependent on one another and have fewer interlinkages to reduce their bellicosity.

3.6. Energy transición consequences

These points indicate that predictions of the consequences of the energy transition are more uncertain than they appear. To foresee future developments and events is challenging even when one has a model in the past. When this past is open to different interpretations, prediction is even more difficult. It is important to study about how interpretations of the past and present shape our predictions of the future, regarding the geopolitics of the energy transition and beyond. About it, two aspects must be analysed: If regionalization will intensify the rivalry and promote fragmentation or if it will provoke competitive and well-functioning new markets, and as a result, states will control key technologies and value chains (14)

14. *Uncertain past, uncertain future: how assumptions about the past shape energy transition expectations,* Indra Overland, The Oxford Institutes for Energy Studies, *The geopolitics of energy: out with the old, in with the new?;* February 2021: ISSUE 126

3.7. The Way ahead in the energy policy in Europe

A new energy and environmental world order is urgently needed. In Europe, it is time to redesign the energy sector and be clear about the optimal model to meet the classic “trilemma” of the three pillars of energy.

· Security of supply

· Reasonable costs and compatible with economic development

· Minimal environmental impact.

The balance in the energy/environmental "trilemma" is not simple because any movement in any of the three pillars affects the rest, but it is necessary to consider where we want to go. In the complexity of the situation, dogmatism must be avoided, since each circumstance requires great skills of resilience and balanced adaptation. The sector is a living being. To do this, by way of reflection, a series of complex approaches are presented that must be answered. The list of approaches can be endless, but a definition priority and actions that will condition subsequent ones must be established. Some of the questions already have a clear answer and their implementation will take time, but it is important to define well the energy model for the planet, the European one and for each state, its coordination and integration in the whole, and its effect on the economy and its environmental impact.

Security of supply

As for the security of energy supplies, Europe in general and some countries in particular have not based their security on a diversification of the origins of fuels nor on obtaining a portfolio of primary energy that currently endangers supplies, facing interruptions in the logistics chain and with serious effects on the economy.

The approaches are:

The European energy policy must strengthen its unity and coordination or each country may be a particular case.

Dependence on third countries or geographical areas for primary energy supplies should improve diversification in order to guarantee supply

Reasonable costs and compatible with economic development

In economic development, specialisation, relocation of certain manufacturing processes, etc. has led to the need for a series of energy raw materials that are not easy to change in the short or médium term. Transportation, domestic needs, electrical power installations, etc. require primary energy that can not be changed overnight. The effects of the lack of

supply guarantees have an effect on the prices of primary energy (oil, natural gas, coal, nuclear fuel, etc.) with an immediate effect on the economy and on logistics costs, as they have to resort to more efficient producers anyway.

The approaches are:

It is advisable to establish a European fuel purchasing centre, improving purchasing power and sharing non-compliance among member states. And what percentage of the country's consumption should this community purchase each.

It would be convenient to decide if the primary energy mix be established at European level, and the mix of final energies, or the mix of electricity generation, and others.

It is important to decide how to establish equity and fair economic and industrial competition between countries with different degrees of economic development, with different environmental requirements and with different social costs.

European countries must rebalance the different productive sectors: industrial, food, services, etc. in the share of its GDP.

Minimal environmental impact.

And as for the environmental impact, the effects of Greenhouse Gases (GHG) on global warming are a reality, which have led the vast majority of countries to set decarbonization goals that, in the current times with economical crisis and war, could be seriously affected. The greater use of more polluting fuels, and the economical crisis can stop the large investment programs in renewable energy installations as well as the costly processes of capturing and storing CO_2. And we must include in these hándicaps, the investments in research and development of new fuels that respect the environment: Hydrogen, Biofuels, etc, they will be affected in the fulfilment of the established deadlines. Nor should we forget the improvement in energy efficiency in all large consumer sectors: industrial, housing, transport, which require significant investments affected over time by the crisis triggered.

The approaches are:

The closure programs of nuclear power plants that do not emit CO_2 should be reviewed, as well as if it is necessary to promote the use of nuclear energy in new generation reactors.

It is important analyse if can the development of renewable energies, with the economic resources available, maintain the planned rate of investment and if should the renewable energy program go hand in hand with the development of energy storage facilities, as

well as to study what could be the role of intermittent renewable energy backup power generation systems.

The ongoing decarbonization policy also requires the promotion of CO_2 capture and storage plants.

The EU should review if the achievement of the proposed environmental objectives radically prevail or do they require a revision, now or later. (15)

15. *The New Energy Geography*, Conrado Navarro, Eurodefence Spain, August 2022

4. The Future of Energy Security

Several analyses have examined energy and geopolitics in a low-carbon future and one of the major scenarios is of more geopolitical turbulence. In 2014, the G7 created an *Energy Security Initiative* for the promotion of energy security. This action was taken in response to Russian aggression in Crimea, to guarantee energy security to Europe, mainly but also to focus international energy policy efforts toward collective threats to energy security. But after this initiative, no additional multilateral efforts had been made of similar scope and scale. Instead, the Trump administration focused efforts on regional foreign policy strategies such as the Asia Enhancing Development and Growth through Energy (EDGE) strategy, to accelerate the development of energy markets in the Asia-Pacific región, and which is focused too, in relation to European energy security. Some governments saw these strategies as tools created to support the sale of U.S. energy resources, mainly natural gas, in these markets, and even other commodities such as steel and aluminium. On the domestic front, the United States is clearly in a much stronger position regarding its own energy security, because they are self-sufficient in oil and gas supply. However, U.S. energy infrastructure is ageing, vulnerable to cyber-attacks and natural disasters, and as a consequence lacks resilience. A part of the understanding about energy security came from the development of a global oil market where the future of energy security may depend mainly on the security and reliability of the electric power system and the security of information systems. Competition and the fight for influence will be probably the key points of the global energy landscape for the future but that does not mean that shared interests and principles of energy security have disappeared. These are massive technological and geostrategic considerations that the energy security community has not yet evaluated but it must do as soon as possible. (16)

16. *Energy Spheres of Influence*, Sarah Ladislaw, Nikos Tsafos, CSIS, September 13, 2019

5. Security and defence in the Energy and Environmental Area

Energy has always been a strategic input to warfare, but was considered as a task of logistics planners. Security, economic, and environmental factors have recently elevated energy to an strategic level in the military, which will have positive results not only for war-fighting capabilities, and for the civilian energy sector too.

Defence innovation has always led to civilian technological improvements in many areas, mainly in aerospace or nuclear energy, and now also in a similar technological transfer in the domain of energy technology. Defence can lead the way for economic reasons and in more direct military concerns. In this regard in recent decades the US military has suffered an extremely high cost of fuel, and it has implied moving to new approaches much earlier than in civilian contexts where prices and costs are lower. These changes in the defence context can provoke defence innovation in the energy branch.

Efforts focused on improving environmental or energy performance of military activities could induce additional innovations in warfighting capabilities such as reduced logistics requirements or costs, resilient and low-signatureoff-grid power systems, or enterprise cost savings that adversaries are not investing in nor benefiting from. In addition, more fuel-efficient major weapons systems and reduced logistics requirements can potentially partially compensate some Anti-Access and Area Denial (A2/AD) efforts by adversaries. Finally, the recent emphasis on life cycle cost effectiveness and energy savings from installations will both reduce operating costs and enhance the resilience of these installations.

Military and defence innovations are now showing positive developments in the energy and environmental areas. We don't know if the changing nature of energy supply and use in military planning and tactics represents a revolution in military affairs, but we see the potential for a major shift emerging from the military arena and it may even achieve the status of a revolution in military affairs. Until now we observe that there is a separation between experts in civilian energy policy and innovation and their military colleagues about military strategy, planning, and capabilities. We believe that civilian energy technology and policy should consider innovations emerging from the defence sector, and to try to create two-way technology assets. These opportunities for mutually

beneficial exchange have considerable potential to transform the ways both the defence and civilian sectors use and manage energy. (17)

17. *Energy and the military: Convergence of security, economic, and environmental decision-making*, Constantine Samaras, Willian .J. Nutali, Morgan Bazilian, Energy Strategy Reviews 26, November 2019

6. Energy Security Challenges, Risks and Threats

National energy security may be jeopardised if environmentally and economically sustainable supply or delivery are affected. Risks and threats to any European country's energy security are largely the same as those faced by nations that depend on external energy sources. These can be classified by area of influence according to their global impact and must therefore be addressed jointly by the international community if it falls to each State to manage them individually or exclusively nationally. Furthermore, they can be classified as environmental, economic, geostrategic, technical or deliberate depending on their origin or raison d'être.

A second approach is that there are other diverse threats that should be considered, as they can generate new risks or threats or multiply and exacerbate the effects of already identified and known ones. These challenges are essentially dynamic. Next point identifies the main challenges, risks and threats that affect any national energy security. (18)

18. *Spanish National Energy Security Strategy*, 2015

6.1. Energy Security Challenges

6.1.1. Climate change and environmental degradation

Emissions of greenhouse gases are causing global warming, which is having an impact on the climate, biodiversity, oceans and ice masses and, consequently, on the populations of the affected areas. Two-thirds of all these emissions come from the energy sector.

6.1.2. Exponential growth of international demand

One of today's major economic and political challenges is to ensure that the incorporation of China and India into the world economy and their access to energy resources does not start a race between various states to control areas of production and supply flows, in order to prevent possible international friction and conflicts that could upset the world supply balance.

6.1.3. The energy market equation

The availability of energy resources is subject to market mechanisms which must guarantee the competence. The absence of a transparent market is a problem to competitiveness and, what is worse, to security.

6.1.4. Managing reserves appropriately and effectively

The International Energy Agency was established in 1974, following the oil crisis, with the aim of coordinating its member states policies in case of disruptions in the supply of crude oil and petroleum products, both domestic and international. Strategic reserves of hydrocarbons help ensure security of supply in the event of supply disruptions by maintaining the established levels of petroleum products, liquefied gases and natural gas. (19)

19. *Spanish National Energy Security Strategy*, 2015, pp.25-26

6.2. Energy Security Risks and Threats

6.2.1. Economic

• Insufficient upgrading and inappropriate investments in infrastructure

Without an energy infrastructure network, supply cannot be guaranteed. It is necessary to maintain and upgrade it to ensure the appropriate development of interconnections, which will result in a more integrated market where energy is more secure,

• Fraudulent activities in the energy sector

Tax fraud is a matter that can cause budgetary losses. Fraudulent activities will likely affect the competitiveness and functioning of the energy market.

6.2.2. Geostrategic

• Political instability in producer countries

Geopolitical instability in the main producing areas, included domestic conflicts or the presence of terrorist groups, endangers the supply of products, directly in the transportation process or by pushing up hydrocarbon production and procurement costs, which may lead to an escalation of oil and gas prices with direct consequences for the international energy markets.

• Optimising the diversification of energy resources

Diversifying the energy mix and reducing dependence on hydrocarbons are important factors in raising the national energy security limit.

• Threats to countries and supply routes

Although some natural gas is not transported by gas pipelines but by ship in liquid form, the principal threats to fuel transport affect oil, which is mainly transported by sea from

the producer countries, often through strategic passages such as the straits of Hormuz, Malacca and Bad el-Mandeb, as well as the Suez and Panama canals.

• Political conflicts between supplier, consumer and transit countries

The political and coercive use of energy exports, to which a few major energy exporters resort to satisfy their national interests, is emerging as a new threat to energy security as it amounts to a voluntary distortion of markets and constrains the freedom of action of the consumer countries largely dependent on their products.

6.2.3. Technical

• Insufficient energy interconnections

One of the biggest energy problems is the insufficient level of energy interconnections between some countries and the rest of the European Union. In order to mitigate this energy isolation and become fully integrated into the internal energy market, it is necessary to improve the gas and electrical interconnection capacity between the poor connected countries and the rest of the European Union.

• Perceived risks of nuclear energy generation

Nuclear electric power generation contributes to security of supply and to reducing the emission of green-house gases; however in spite the advantage of energy independence its use provides, the nuclear accidents that have occurred have helped raise the population's awareness of the risks associated with nuclear electric power generation, and have led decisions to be influenced by the huge media impact of these accidents. However in February 2022 European Commision declares nuclear and gas to be green, even that critics are calling the step "greenwashing" and say it could threaten the bloc´s bid to become climate-neutral by 2050

• Serious industrial accidents

The serious industrial accidents that can occur in certain energy infrastructure, owing to technical faults or human error, jeopardise national energy security because they seriously harm both people and the environment, and because they affect the normal functioning of this infrastructure.

6.2.4. Environmental

• Natural disasters

Adverse weather phenomena causing high temperature differences significantly increase energy consumption and can even lead to the total or partial disruption of supply. Natural disasters can also cause significant material damage to energy infrastructure, even jeopardising electricity supply.

6.2.5. Deliberate

• Cyber-threats

Modern societies are characterised by their high connectivity which, despite its countless benefits, also entails greater exposure and vulnerability to cyber-incidents. Cyberspace is used by international terrorism, espionage networks and organised crime as a means of achieving their aims. We are rapidly moving towards a hyperconnected society, which requires a supplementary effort to maintain an appropriate security level in this environment.

• Physical threats to energy infrastructure

One of the main challenges to energy security is deliberate actions aimed at destroying, disturbing and causing malfunctions to energy infrastructure through physical or logical attacks, thereby paralysing certain services that are essential to our community. (20)

20. *Spanish National Energy Security Strategy*, 2015. pp. 29-30

Part II

European Energy Transition

7. European Energy Transition

Transition towards low carbon energy systems is a challenge for the European Union, not only because the Russian invasión of Ukraine, but also because the fragmented national energy markets and in spite of the ambitious “European Green Deal" agenda of Von der Leyen’s Commission, which try to get the EU as a leader in global climate action through decarbonization policies. As we have already said, European legislators under the framework for European Climate Law agreed in April 2021 a reduction of minimum 55% from the EU’s greenhouse gas emissions. However, to reduce GHG emissions needs a regional joint action for transition from fossil fuel economies to renewable energy in order to face the effects of climate change. Energy dependence of European countries was evident after the two Oil Crises of the 1970s and disruptions of Russian gas supplies in 2006, as well as 2009, 2014 and mainly with the Ukraine invasion. And as a consequence the need for a common energy policy has become a priority for the European Union. But until nowadays, the Union has not a common energy policy even of all the harmonisation efforts. The EU imports about 53% of the energy it consumes, which means that it is the largest energy importer in the world. The Union needs an integrated energy market to lead the transition to a low-carbon economy and retain Europe’s leading role in climate change as well as

global investment in renewable energy. However, the transfer of power from the national states to EU institutions has been restricted, mainly due to Member States' reluctance to transfer sovereignty in energy security matters, particularly with regards to its external dimension. (21)

21. *Energy Transition in the European Union: Great Challenges and Opportunities*, Gulfen Cevheribucak, Global Risks insights, 08 Junio 2021

On the other hand the commissioning of a European gas joint purchasing platform, a measure proposed by Spain and France in order to cushion the price rise and strengthen bargaining power against producers such as Russia, has not been yet approved by the EU, even that was garnering growing support among member states, as noted at different summit of European leaders. The Russian invasión has accelerated this movement, but certain countries refuse to cancel the Russian gas imports, and until now, not a last decision has been made about this important point.

What was approved in August 2022 is the E.U "Save gas for a safe winter" that sets out how the EU can tackle potential further disruptions in gas supplies from Russia in a coordinated manner, in view of the upcoming winter seasons. The plan outlines the market situation, the instruments available under existing EU legislation on the security of gas supplies and the measures taken so far. Against the backdrop of tight market conditions and Russia's continued weaponization of gas supplies, it identifies a likely gap between supply and demand in case of a full disruption from Russia. The Plan therefore proposes a voluntary gas demand reduction target of 15% from 1 August 2022 to 31 March 2023. To reach that target, it outlines various measures whereby Member States can encourage the decrease of gas demand and consumption by the public sector, businesses, as well as households. By the end of September 2022, Member States were required to update their existing national emergency plans with their planned demand-reduction measures to meet this target. In August 2022 the EU announced that was preparing to intervene its energy market, to down the power costs in the continent in spite of that Europe is preparing for energy shortages next Winter

22. EU plans to intervene in energy markets as Winter crisis looms, Eva Krukovska, Blomberg, 29-08-2022

8. The clean energy influence: a new European strategic culture

The EU has started the transformation towards a climate neutral economy and will lead global efforts to this end. In order to respond to the IPCC 2021 report and contribute to

stabilising the climate in this century, the EU should by 2050 be among the first to achieve net-zero greenhouse gas emissions and lead the way worldwide. To get it, several actions are necessary for achieving a climate neutral net-zero greenhouse gas emissions:

- Accelerate the clean energy transition, increasing renewable energy production, high energy-efficiency and improved security of supply focusing on diminishing cyber security threats, while ensuring competitive energy prices, all of which will increase the modernisation of E.U. economy.
- Recognise and support the vital role of citizens in the energy transition.
- To impulse carbon-free strategy, connected and automated road-transport mobility; promote multi-modality and low-carbon systems such as rail and waterborne transport; to modify transport charges and taxes to reflect infrastructure and external costs; reduce aviation and shipping emissions using advanced technologies and fuels; invest in modern mobility infrastructure and recognise the role of better urban planning.

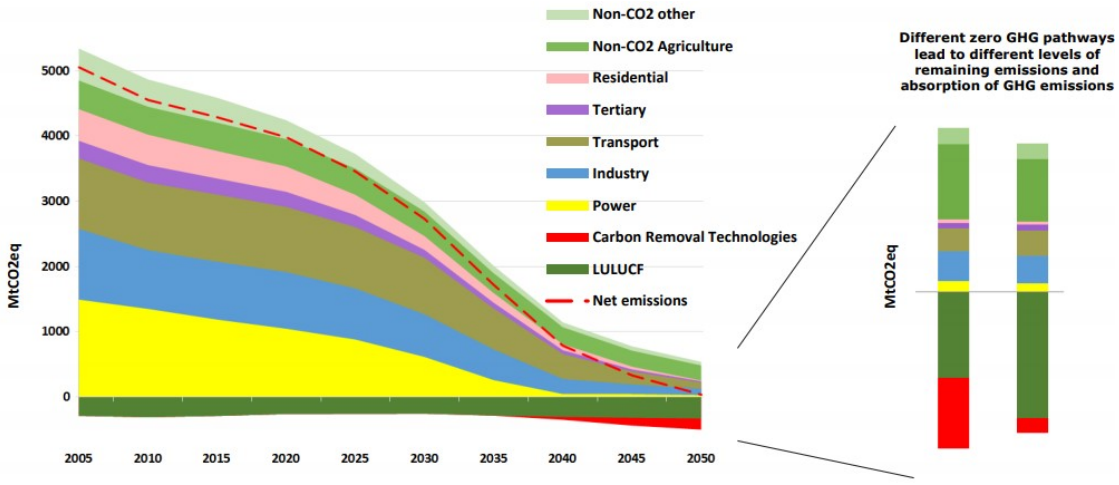

Figure 1. GHG emissions trajectory in a 1.5 C scenario

- To promote the EU's industrial competitiveness through research and innovation towards a digitalised and circular economy to avoid the rise of new material dependencies; start testing new technologies; to check the implications on the EU's terms of trade, in particular for the energy intensive industries and suppliers of low carbon solutions, ensure competitive markets that attracts low carbon industries, and in line with international obligations alleviate competitive pressures that could lead to carbon leakage and unwanted industrial relocation.
- To get a sustainable bio-economy, diversify agriculture, animal farming, aquaculture and forestry production, further increasing productivity while also adapting to climate

change itself, preserve and restore ecosystems, and ensure sustainable use and management of natural land and aquatic and marine resources

- Strengthen infrastructure and make it climate proof. Adapt through smart digital and cyber-secure solutions to the future needs of electricity, gas, heating and other grids allowing for sectoral integration starting at local level and with the main industrial/energy clusters

- Accelerate near-term research, innovation and entrepreneurship in a wide portfolio of zero-carbon solutions, reinforcing the EU's global leadership

- Mobilise and orient sustainable finance and investment and attract support from "patient" capital (i.e. long-term venture capital); invest in green infrastructure and minimise stranded assets as well as fully exploit the potential of the Single Market

- Invest in human capital in the next decade and beyond, equip current and future generations with the best education and training in the necessary skills (including on green and digital technologies) with training systems that quickly react to changing job requirements.

- Align important growth-enhancing and supporting policies, such as competition, labour market, skills, cohesion policy, taxation and other structural policies, with climate action and energy policy.

- Ensure that the transition is socially fair. Coordinate policies at EU level with those of Member States, regional and local governments allowing for a well managed and just transition that leaves no region, no community and no worker and citizen behind;

- Continue the EU's international efforts to bring all other major and emerging economies on board and continue creating a positive momentum to enhance global climate ambition; share knowledge and experience in developing long-term strategies and implementing efficient policies so that collectively the objectives of the Paris Agreement are accomplished. Anticipate and prepare for geopolitical shifts, including migratory pressure, and strengthen bilateral and multilateral partnerships, for instance by providing support to third countries in defining low carbon resilient development through climate mainstreaming and investments. (23)

23. *A Clean Planet for all. A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, Communication from the commission to the european parliament, the european council, the council, the european economic and social committee, the committee of the regions and the european investment bank*, Brussels, 28.11.2018 COM (2018) 773 final

9. The European Green Deal. The rise of a new energy geopolitics in Europe

To achieve the target of decreasing greenhouse gas emissions of at least 55% reduction by 2030, the EU's has created an initiative called the *Next Generation Recovery Fund* that offers the opportunity to reconstruct European economies that are hardly hit by the Covid-19 pandemic. The European Commission strongly encouraged 27 member states to speed up the submission of their recovery and resilience plans detailing their investment projects under the €750 billion recovery fund. Hence, *Next Generation EU fund* is designed to serve the double purpose of sustainability and digital transformation. It may alter the EU members' reluctance to transfer their sovereignty over energy mix preferences and different risk perceptions. Clean energy investments offer great stimulus for the post-Covid economic recovery. Introduction of clean energy technologies combined with energy efficiency policies can increase energy security and self-reliance in the Union. (24)

24. *Energy Transition in the European Union: Great Challenges and Opportunities*, Gulfen Cevheribucak, Global Risks insights, 08 Junio 2021

10. The European Union and low-carbon energy.

Many of the technologies that can help the European Union to achieve a net-zero emissions economy by 2050 are not yet commercially competitive with current fossil-fuel technologies. It is the reason why there is not enough private investment to introduce the new low-carbon alternatives, even though these changes include the benefits of decreasing industry-global costs over time, and the global climate benefits.

As a solution on an annual basis, public subsidies of the EU amounting to the difference between the agreed carbon price and the actual EU carbon price would be provided to investors, depending on the total carbon emissions. As long as EU carbon prices are low, investors would receive larger subsidies to ensure their competitiveness.

Contracts would be auctioned at EU level. This would generate increased competition compared to national auctions, leading to more efficient outcomes and preventing fragmentation of the single market. From about €3 to €6 billion would be provided to the main industrial emitting sectors annually, with the amount reducing as the EU carbon price rises and low-carbon technologies become competitive without subsidy. (25)

25. McWilliams, B. and G. Zachmann (2021) *Commercialisation contracts: European support for low-carbon technology deployment*, *Policy Contribution* 15/2021, Bruegel

11. How Europe can cut natural gas imports from Russia significantly within a year.

The European Union could reduce its imports of Russian natural gas by more than one-third within a year through a combination of measures that would be consistent with the European Green Deal and support energy security and affordability, in accordance with a new IEA analysis. Europe's reliance on imported natural gas from Russia has again been thrown into sharp relief by Russia's invasion of Ukraine. The IEA's *10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas* includes a range of complementary actions that can be taken in the coming months, such as turning more to other suppliers, drawing on other energy sources and accelerating efforts to provide consumers, businesses and industry with the means to use clean and efficient alternatives to natural gas. The proposed measures are fully consistent with the EU's European Green Deal and its Fit for 55 package*, paving the way for further emissions reductions in the years to come.

* Fit for 55 refers to the EU's target of reducing net greenhouse gas emissions by at least 55% by 2030. The proposed package aims to bring EU legislation in line with the 2030 goal.

In 2021, the European Union imported 155 billion cubic metres of natural gas from Russia, accounting for around 45% of EU gas imports and close to 40% of its total gas consumption. Progress towards Europe's net zero ambitions will bring down its use and imports of gas over time, but today's crisis raises the specific question about imports from Russia and what more can be done in the immediate future to bring them down.

Russia's use of its natural gas resources as an economic and political weapon show Europe needs to act quickly to be ready to face considerable uncertainty over Russian gas supplies next Winter. (IEA Executive Director Fatih Birol). The IEA's 10-Point Plan provides practical steps to cut Europe's reliance on Russian gas imports by over a third within a year while supporting the shift to clean energy in a secure and affordable way. Europe needs to rapidly reduce the dominant role of Russia in its energy markets and ramp up the alternatives as quickly as possible.

The key actions recommended in the IEA's 10-Point Plan could reduce the European Union's imports of Russian gas by more than 50 billion cubic metres, or over one-third, within a year, the IEA estimates. This takes into account the need for additional refilling

of European gas storage facilities in 2022. Many of the actions recommended in the plan, are key elements of the IEA's *Roadmap to Net Zero by 2050*.

The IEA analysis notes that other solutions could be available to the EU if it wishes or needs to reduce reliance on Russian gas even more quickly, but with significant inconveniences, such as increasing use of Europe's coal-fired fleet or by using alternative fuels, such as oil, within existing gas-fired power plants. But these alternatives to gas use are not aligned with the European Green Deal, and they are not included in the 10-Point Plan.

Reducing reliance on Russian gas will not be simple for the EU, requiring a concerted and sustained policy effort across multiple sectors, alongside strong international dialogue on energy markets and security. Strengthened international collaboration with alternative pipeline and LNG exporters, and with other major gas importers and consumers, will be critical. Clear communication between governments, industry and consumers is also an essential element for successful implementation. These are the 10 point plan measures (26):

1. Do not sign any new gas supply contracts with Russia.

Impact: Enables greater diversification of supply this year and beyond

2. Replace Russian supplies with gas from alternative sources

Impact: Increases non-Russian gas supply by around 30 billion cubic metres within a year

3. Introduce minimum gas storage obligations

Impact: Enhances resilience of the gas system by next winter

4. Accelerate the deployment of new wind and solar projects

Impact: Reduces gas use by 6 billion cubic metres within a year

5. Maximise power generation from bioenergy and nuclear

Impact: Reduces gas use by 13 billion cubic metres within a year

6. Enact short-term tax measures on windfall profits to shelter vulnerable electricity consumers from high prices

Impact: Cuts energy bills even when gas prices remain high

7. Speed up the replacement of gas boilers with heat pumps

Impact: Reduces gas use by an additional 2 billion cubic metres within a year

8. Accelerate energy efficiency improvements in buildings and industry

Impact: Reduces gas use by close to 2 billion cubic metres within a year

9. Encourage a temporary thermostat reduction of 1 °C by consumers

Impact: Reduces gas use by some 10 billion cubic metres within a year

10. Step up efforts to diversify and decarbonise sources of power system flexibility

Impact: Loosens the strong links between gas supply and Europe's electricity security

26. *A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas. IEA, Fuel Report*, March 03.March. 2022

The Ukrainian war generated a new LNG boom. Infrastructure investments will reach 42 billion in 2024. It means 200 times more than in 2020, when only 2,000 million were invested in LNG due to the pandemic. However, they will fall from that date as governments phase out fossil fuels. However large LNG producers squeeze European energy companies to the maximum and make them pay up to 10 times more for gas. And the fact is that it is no longer just a problem for Russia, which has reduced the supply of gas to half of Europe, but other large producers are also taking advantage of this situation. However it is not too easy in the short term not to depend on Russian gas. Moscow now spends 89% more money than a year ago for exporting hydrocarbons in the European Union (EU), despite selling 15% less fuel. The community block currently spends about 13,916 million euros per month to buy coal, oil and gas from Moscow, compared to the 7,330 million monthly average it paid a year ago. (Eurostat, serie. March-June.2022). But Germany´s gas storage facilities are filling up faster than expected, and hopes that can avoid a severe gas shortage this Winter, (German Economy Minister Robert Habeck, Reuter, 28, August, 2022). He expects to reach 85% storage capacity in September.

11.1. European options to spend the future without Russian Gas

The EU has enough gas to make it until the summer 2022 on the back of record-high LNG imports: However, in order to survive the winter, Europe would need to refill its storages to the very brim as the EU would likely face one of the following three scenarios:

1. No Russian imports: The EU would have no choice but to slash its annual demand for gas by 10-15%.

2. Limited Russian imports: Gazprom would earn a lot of money and maintain control over the EU's gas supply, while Europe would still suffer from a highly volatile gas market.

3. Average Russian imports: Russian exports to the EU market closely resemble 2021, which we consider roughly equal to Gazprom's long-term contractual obligations. It would allow storages to be easily replenished and lead to lower prices.

In brief, EU can survive the next winter without Russian gas; however, Europe will need to:

- Ensure that as much gas as possible is brought to the EU
- Public intervention will be needed to ensure sufficient imports and prevent private companies from outbidding each other.
- Fairly distribute the gas across country storages.
- Pay back to companies the monetary difference in case prices end up below €70/MWh next winter, thus providing an incentive for companies to buy and store gas.

27. Preparing for the first Winter without russian gas, Brueghel, Georg Zachman et al, 28-02-2022

12. Sustainable Energy in the Defence and Security.

12.1. Best practices.

Over the past years, country members have been creating devising ways to reduce the energy consumption of their armed forces. Rising fuel costs, the logistical challenge of supplying large quantities of fuel during operations, and the risks to the soldiers protecting fuel convoys have sparked national and multinational initiatives to explore alternative energy supplies and energy-saving technologies and minimise environmental footprint. It will facilitate sharing lessons learned, best practices and nationally-developed “green” technologies.

12.2. Logistics.

The Single Fuel Policy concerns the capability of using Jet fuel as the battlefield fuel for ground vehicles and for land-based military aircraft.

A strategy research project completed in April 1996 at the US Army War College identified some possible problems with the SFC and gave several recommendations. Two of the more significant recommendations were:

- The fuel pumps on all new equipment must be compatible with JP8. All future military equipment must be designed to use JP8 as the primary fuel source. Both of these recommendations are as relevant today as they were in 1996.
- DOD Directive 4140.25 requires that acceptable operational performance be achieved with both kerosene-based turbine fuels and diesel fuels. However, one fuel type must predominate over the other, and, since compression-ignition engines are essentially designed and manufactured for diesel fuel consumption, the predominant fuel naturally would be diesel. An engine's fuel pump must be JP8 compatible in all types of operating conditions, not just in environments with cold to moderate temperatures. (The Reality of the Single-Fuel Concept, Maurice E. Le Pera, Global Security. Org, April 2005).

Deployed Force Infrastructure has been developed and its logistics implications will need to be considered by the Logistics Committee. The Vision on Future Fuels will be revised by any branch of the European Defence Agency (EDA). (28)

28. *The Policy on Power Generation for Deployed Force Infrastructure* is available at: www.natolibguides.info under "NATO Documents"

12.3. Armaments.

CSDP will be involved in addressing maritime pollution, waste management, energy efficiency and power generation, as well as looking into dual use green technologies in support of consequence management operations, and will consider the "green" aspects of capabilities whenever possible and appropriate.

12.4. Smart Energy.

CSDP will define a comprehensive report on countries' strategies, projects and requirements for multinational capabilities. It will include recommendations for strategies, standardisation and multinational activities similar as included in the Nato Smart Defence, a cooperative way of generating modern defence capabilities, in a more cost-efficient, effective and coherent manner.

12.5. Environmental protection.

There is a global agreement that climate change is the cause of tensions within and between states over water, food, overcrowding, migration pressures and the growing risk of disease. Environmental stresses have become especially acute in some of the world's poorest and most unstable countries. The Sahel and Horn of Africa are a clear example of it. The environmental security risks in these regions are evident and pose challenges to the security of the EU mainly for two reasons: the need for humanitarian relief and deployment of military resources, and uncontrolled migration, which would perturb the relationships between Member States and to create a refugee crisis. To try to foresee these threats, it is necessary to understand not only the impacts of environmental challenges but also how these crises can influence social, political, institutional and economic factors.

However even though the EU has developed many climate security commitments and made undoubted progress in implementing some elements of them, it has not been reflected in the CSDP which is not at the same level of implication. In this regard CSDP will work in the Military Principles and Policies for Environmental Protection, during

the preparation and execution of military activities, as Nato already does. (Nato Green Defence Framework. Approved by the North Atlantic Council in February 2014).

It is clear that it is not expected that CSDP will be a key element of climate security strategy, but it is also clear that the military there would be an important tool to intervéne in these crises and to use its resources. A good example of it, it is the Spanish Emergency Military Unit (UME), created in 2005 and that until date, have proved to be one of the best tool, if not the best, for all the environmental crisis that have happened in Spain or abroad, from vulcan eruptions, to earthquakes, or floodings and fires.

A different approach to environmental challenges for CSDP it is the need to improve its intelligence branch to better understand when, where and to what extent environmental stress can create additional challenges for the CSDP, as for instance:

- Where, when and to what extent is it likely to create new threats, risks and opportunities in countries or regions where CSDP missions and operations do not yet operate, but they may need to be deployed in the future because of the combination of climate stress and existing vulnerabilities.
- Where is it likely to create new challenges for existing CSDP missions that may require adjustments to the mandate, geographic scope, operational plan or activities, for instance around managing resource conflicts, environmental crime and movement of nomads across borders. (29)

29. *Preparing the CSDP for the new security environment created by climate change*, Chistophe Meyer et al, Carnegie Europe, Jun 2021. pp. 27-28.

13. Life Cycle Assessment

Life cycle cost analysis (LCCA) can provide a valuable input to major decisions such as those involved in acquiring new defence systems. It implies an analysis of the cost-of ownership, made up of acquisition costs, through-life costs such as maintenance and operational costs, potential system upgrades or refits, and the costs of system retirement and disposal, is clearly essential if we are to assess the cost-effectiveness of new or existing systems.

30. *Life-Cycle Cost/Capability Analysis for Defence Systems*; Graham Clark, Paul Piperias and Richard Traill; AMRL, Defence Science and Technology Organisation Department of Defence 506 Lorimer Street PORT MELBOURNE VIC 3207

Part III

Climate Change

14. Climate change, a national energy security issue.

The 9th of August 2021 the Intergovernmental Panel on Climate Change (IPCC), a scientific body convened by the United Nations, released a major new report concluding that the world cannot avoid some devastating impacts of climate change, but that there is still a narrow window to keep the devastation from getting even worse. The Main takeaways from the 6IPCC report are as follows:

- Human influence has unequivocally warmed the planet.
- Climate science is getting better and more precise.
- We are locked into 30 years of worsening climate impacts no matter what the world does.
- Climate changes are happening rapidly.
- There is still a window in which humans can alter the climate path.

We will try to brief the climate changes in Europe

14.1 Most significant climate change effects for Europe

Floods

- Large areas have been affected by flooding in Europe. 1500 flood events between 1980 and 2013, with more than half of these since 2000 (EEA 2017). Direct economic losses over EUR 150 billion.
- Damages from climate extremes to critical infrastructures in the energy, transport, industrial and social sectors in the EU made up €3.4 billion in 2015, but are projected to triple by 2025 and grow 10 times by 2050.
- The European Union Solidarity Fund (EUSF) was created in 2002 (after Elbe and Danube floods) to provide funds to help recover from natural disasters.
- By 2030 exceptional flood events like the 2013 central European flood or the past 2021 summer flood in Germany would occur each year regularly if no further action follows (Jongman et al 2016).
- More intense floods (coastal areas, central and eastern Europe). Droughts and floods can occur simultaneously.
- Increases in annual precipitation in northern Europe and decreases in southern Europe.

Heatwaves and droughts

- The average annual temperature over European land areas increased by 1.45 to 1.59 °C in 2006–2015 relative to the pre-industrial period, exceeding the pace of global warming (EEA 2017).
- More intense droughts (southern Europe + eastern Europe). Most warming is expected over eastern Europe in winter and over western and southern Europe in summer.
- In mountainous areas warming to exceed the average continental trend.
- More volatility: intensity of daily precipitation projected to grow even in the areas with less average rainfall > flood (coastal areas and rivers)

Wildfires

- Increasing spread of wildfires. Once a phenomenon in the Mediterranean, now also appearing in Sweden and Germany

Sea Level Rising

- Rising sea-levels (coastal areas). Extreme weather events getting the `new normal`
- Thawing permafrost (northern Europe).
- Scientists find global sea level rise to double (66cm) by 2100

However: Highlighted a few of the extreme weather events the world witnessed in the last years and observed that there is a contradiction between the growing awareness of the urgency to act against climate change and rising emission levels at the same time.

Solutions:

Clock is ticking to get climate change under control, but adaptation is also vital. As a consequence a fundamental revision of the previous growth model: transition to (net) zero carbon economy. This means a restructuring of the entire economy. For the EU: twice as much GHG cuts needed between 2030 and 2050, than between 1990 and 2020 Main message after COP21: the world (and Europe) is far away from the 2ºC pathway: the emission gap is HUGE. (31)

31. Draft IPCC report (2018): 1.5C warming by mid 2040-s, 50,6% of EU final energy consumption (2015) is from fossil fuel (16.1% coal) and 13% from renewables Energy (+residential) and transport sectors are main emitters

15. Environmental impacts of CSDP missions and operations

15.1. Climate Change Challenges CSDP operational capabilities both directly and indirectly:

Direct impacts

Extreme temperatures, changes in precipitation, sea –level rise, drought and flooding

Indirect impacts

Famine and disease, mass migration, humanitarian emergencies, conflicts and instability.

In this regard the CSDP´s role in climate change is twofold:

Environmental Protection: To reduce the environmental impact of military activities

Environmental security: To be able to respond to the security challenges emanating from the environment

15.2. Operational impacts of climate change: Air Operations

• Climate change threatens to push the limits of our ability to cope with regular atmospheric variability during air operations

• See also climate/environmental factors temperature, humidity, air pressure, icing, dust/ sand,… (NATO STANAG 4370, AECTP-230)

• Climate change will perturb in some way following Operations or systems:

- Optical Reconnaissance
- Weapons Systems
- Communications Systems

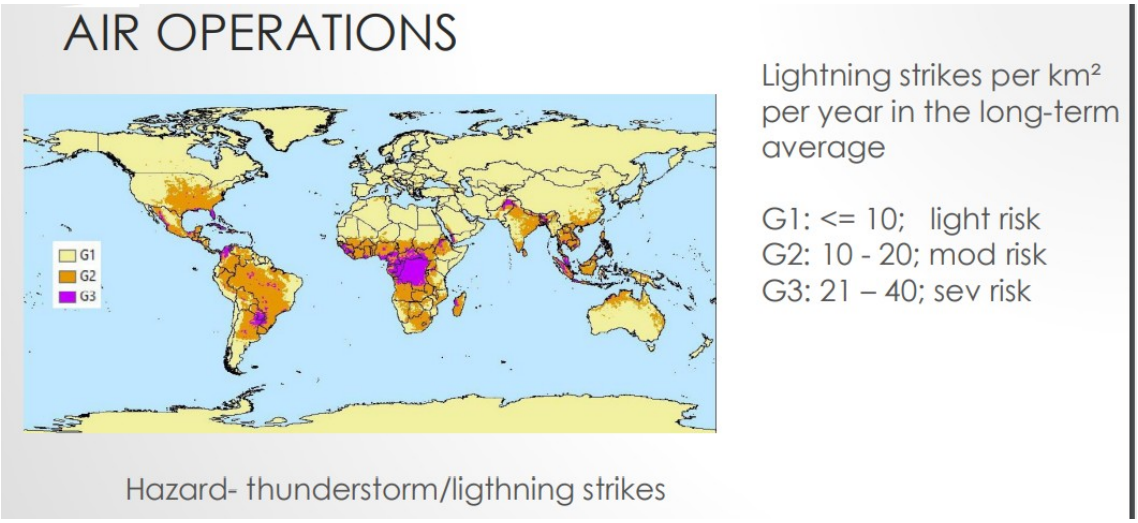

Fig.2. AIR OPERATIONS Lightning strikes per km² per year in the long-term average G1: <= 10; light risk G2: 10 - 20; mod risk G3: 21 – 40; sev risk Hazard- thunderstorm/lightning strikes

The systems may have sufficient tolerance thresholds to manage, but may not be optimised for peak performance under extreme climatic conditions (i.a. air transport and aircraft limitations due to turbulence)

Logistical Challenges:

- Station times
- Icing/de-icing requirements

- Supply routes to Airfields (e.g. fuel)

15.3. Operational impacts of climate change: Land Operations

15.4. Operational impacts of climate change: Maritime Operations

15.5. Operational impacts of climate change: Space Operations

15.6. Climate change in the operational theatre

15.7. Geographic Hotspots

15.8. Existential Risk Management

15.3. Operational impacts of climate change: Land Operations

Personnel:

- Generally only equipped to certain latitudes and temperature extremes
- These limits can be stretched, but not for too long or too often
- Increasingly extreme conditions will present challenges to personnel when extended to new, key areas of operation (e.g. desertification in Middle East and North Africa (MENA))

Equipment:

- Extreme conditions cause faster 'wear and tear' of equipment (weapons, vehicles etc.) – e.g. increased weapon 'jamming' in Afghanistan's arid environment,
- Operating bases (FOBs/Command Posts) do not operate as efficiently in climate extremes (computing temp. requirements, air conditioning/ heating systems etc.),
- Engineering efforts can be compromised by climate extremes.

Logistical Capability:

- Logistical supply chains require predictable climate/environment patterns
- Operational supply routes may become inhibited by flooding, snow/ice, and storms. In addition, humanitarian emergencies and instability due to climate change can impact logistical capability.

15.4. Operational impacts of climate change: Maritime Operations

• Climate change could obliged us to close naval bases mainly beyond 2050 and specially in Indo-Pacific región.

• Ice retreat in the Arctic presents a significant challenge to NATO's maritime operations:

- Increased navigability due to reduced ice cover will open up new trade routes and competition for resources

- Arctic border countries comprise NATO nations (Canada, Norway, Denmark/ Greenland)… and Russia
- Vast geographic expanse and sparse shorelines will likely put added pressure on maritime resources, where land & air capabilities are diminished due to the nature of the environment
- The combination of extreme cold, ice obstacles, high seas, remoteness (e.g. GPS precision) and the potential presence of adversaries, challenge NATO's maritime capabilities in the region

• Gulf of Aden:

- Increased salinity in the Gulf of Aden has caused turbines on several UK Frigates to fail
- Increased instability (drought, desertification, famine) correlates with increased piracy

• Flooding:

- Maritime forces commonly responsible for humanitarian emergencies and flood relief in flood-prone areas such as Bangladesh and small island nations

15.5. Operational impacts of climate change: Space Operations

• Launch facilities are typically close to shorelines and marginally above sea-level, thus at risk from sea-level rise associated with climate change

• Unpredictable and/or erratic winds in the upper and lower levels of the atmosphere

- associated with alterations to wind patterns

– could influence launch trajectories for satellites and missiles,

• If unpredictable atmospheric wind patterns are observed in a given area over the long-term, the viability of space operations in the region could be challenged.

15.6. Climate change in the operational theatre

• Military Facilities and deployed Forward Operating Bases and HQs in theatre are increasingly confronted with the hazards presented by climate change

• Climate change impacts are already dramatic and visible

Example…

- Arctic training has been challenged by thawing permafrost in areas used to train troops in air drops and parachute drills,
- A lakebed used as an emergency runway at Edwards Air Force Base was inundated with floods that did not dry out for 8 months,

- A recent Pentagon report has found that >50% of US Military Bases, including operational bases abroad, are at grave risk from flooding, extreme temperatures, wind, drought and wildfire. All of these are directly attributable to climate change.

• It is increasingly necessary for climate projections to be incorporated into the Radio Electronic Protection (REP) and Geographic and information Systems (GIS) products

- Map overlays for 10, 20 and 30 year projection periods for support of allied operations in areas of interest

15.7. Geographic Hotspots

• There has been a recent trend among climate change & security users to produce spatial vulnerability assessments and geographic "hotspot" maps.

• The aim has been to draw attention to areas at specific and significant risk from climate change, with the objective to mitigate the risks of:

- Humanitarian Crises
- Armed Conflict
- Food & Water Scarcity
- Reduced Crop Yield + Agricultural Degradation

• Hotspot mapping aims to incorporate various factors in assessing risk:

- High exposure to climate change
- High sensitivity to climate change due to a range of factors
- Low adaptive capacity to climate change and climate-related risks

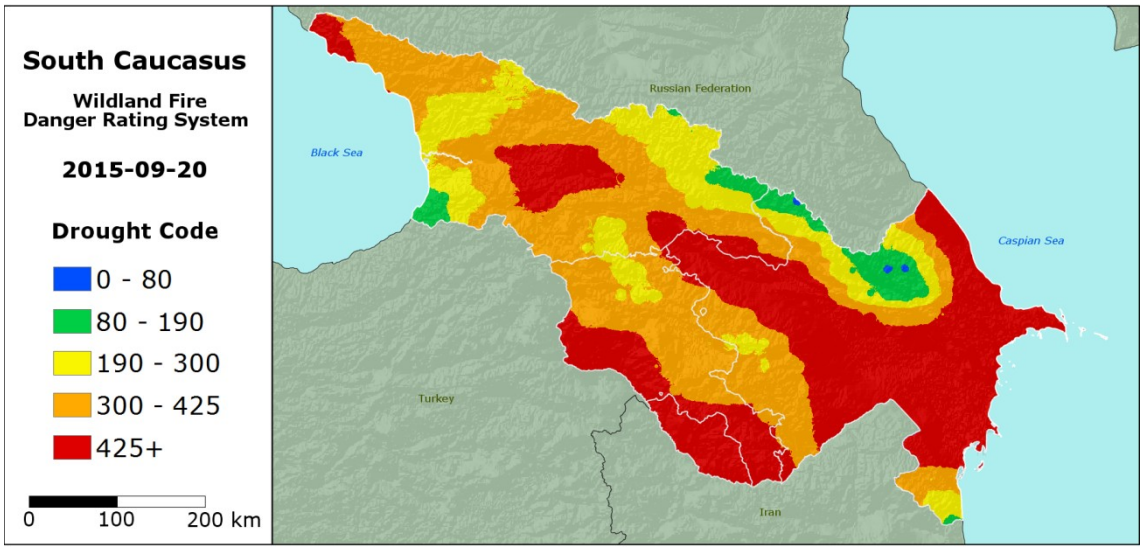

Fig.3. Example of a first product of the Fire Danger Rating System for the South Caucasus: Drought Code of 20 September 2009. Images: Courtesy OSCE

15.8. Existential Risk Management

• To monitor actual observations (Earth Observation, climate) combined with scenarios (esp. IPCC).

• To study the option of upcoming *tipping points** and the worst case scenarios

and so to develop a concept for adaptation of military capability packages concerning upcoming extreme conditions and hazards, integration of climate change scenarios in combination with the military planning process of operations. The way ahead in this field, will be:

a. Big data & artificial intelligence datacubes:analysis-ready spatio-temporal data, rasdaman (raster data manager: actionable n-D datacubes)

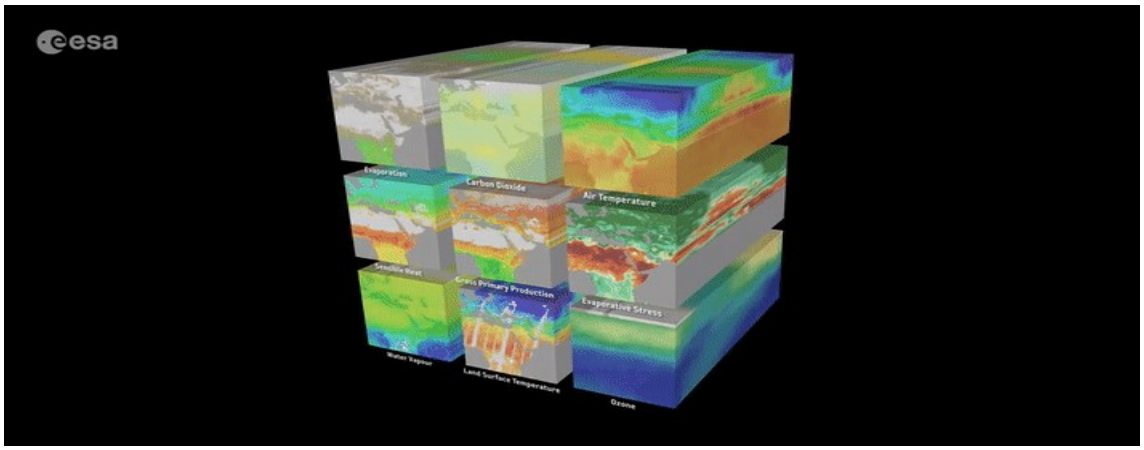

Fig.4. Euro Data Cube Facility service: the ultimate EO resource for researchers and value-adders(European Space Agency)

b. Integration in a Geographical Information Service (GIS)

A computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. By relating seemingly unrelated data, GIS can help individuals and organisations better understand spatial patterns and relationships.

Fig 5.

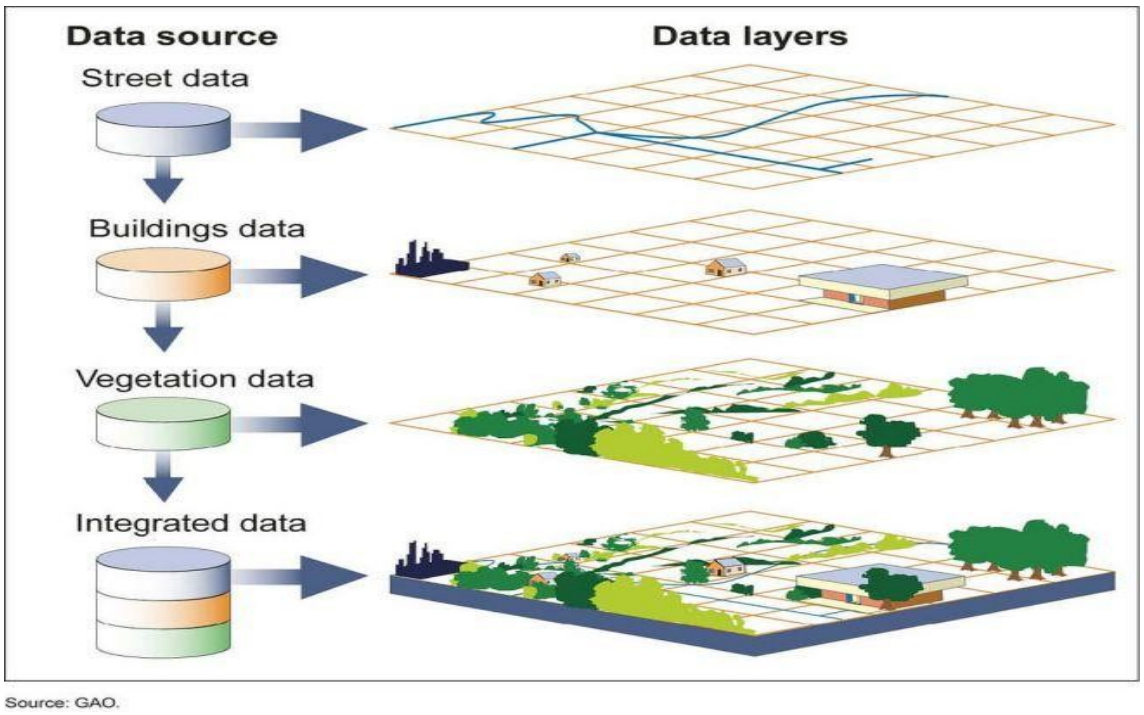

Fig. 5. Geographic Information Data System,

* A tipping point in the climate system is a limit that, when exceeded, can lead to large changes in the state of the system, the IPCC AR5 defines a tipping point as an irreversible change in the climate system.(32)

32. *Climate Change and impact on military operations: Status quo, Integration of Scenarios and Operational Planning Process*; Lt. Col Rene Heise, DEU, AF SHAPE/J3/SPOPS/ACO CMO The Climate –Security Nexus: Implications for Military Personnel, 24-10-2019, EUROMIL

16. Climate and defence nexus

Climate is a security issue, but there is no security solution to the problem. As the involvement of the security and military community is crucial, a whole of government and whole of society approach is needed. Challenges posed by the sea-level rise, for instance, in many parts of the world which are affecting water and food security, energy security as well as contributing to a loss of habitat. Taken together, it constitutes an existential threat to mankind which will destabilise regional and international

security. In sum, retrained and retooled military forces are needed, and climate change effects need to be integrated into military strategic planning.

Climate change can affect the traditional work of military personnel in several ways:
-The very nature of the work might change (i.e. response to natural disasters, protection of critical infrastructure such as water and food supplies, etc.)
-The circumstances of the work might change (i.e. extreme heat, wider spreading of diseases, etc.)
-The nature of conflicts might change (i.e. more globalised, impact of human displacement and migration flows, conflict over land, water, and other resources, etc.)
- The equipment of soldiers might change (i.e. wearable devices producing and requiring energy, etc. (33)

33. The Climate-Security Nexus: Implications for Military Personnel, EUROMIL, October 24, 2019

17. Defence will be an active partner in meeting ambitions and targets

Energy efficiency of the military is becoming an increasingly important issue. Military camps can reduce their energy and water supply dependence, while comprehensive studies are initiated in order to foresee the impact of climate change on the resilience of European military bases in the continent and abroad. An example of a key instrument used for both national and international policy is the Observatory on Climate and Defence, created in 2016 by the French MoD, which conducts studies ordered by all interested departments, thus developing awareness and ownership within the defence community. Climate change cooperation, joint action and climate diplomacy can be good entry points for facilitating good neighbourly relations and strengthening trust. Addressing climate change at regional level is critical as it links the efforts undertaken at the global and national levels. The already quoted Spanish Military Emergency Unit, could be a good example

18. The Impact of Russia's Invasion of Ukraine on Climate Change Policy

Russia's unprovoked invasion of Ukraine has perturbed the markets and geopolitics of energy, driving oil and gas prices to their highest levels in nearly a decade and forcing many countries to reconsider their energy supplies. But even as Russia's bombs rain down on Ukraine, its oil and gas continues to flow to Western nations that have condemned the invasion, even that, every day, less countries receive both, gas and russian oil.

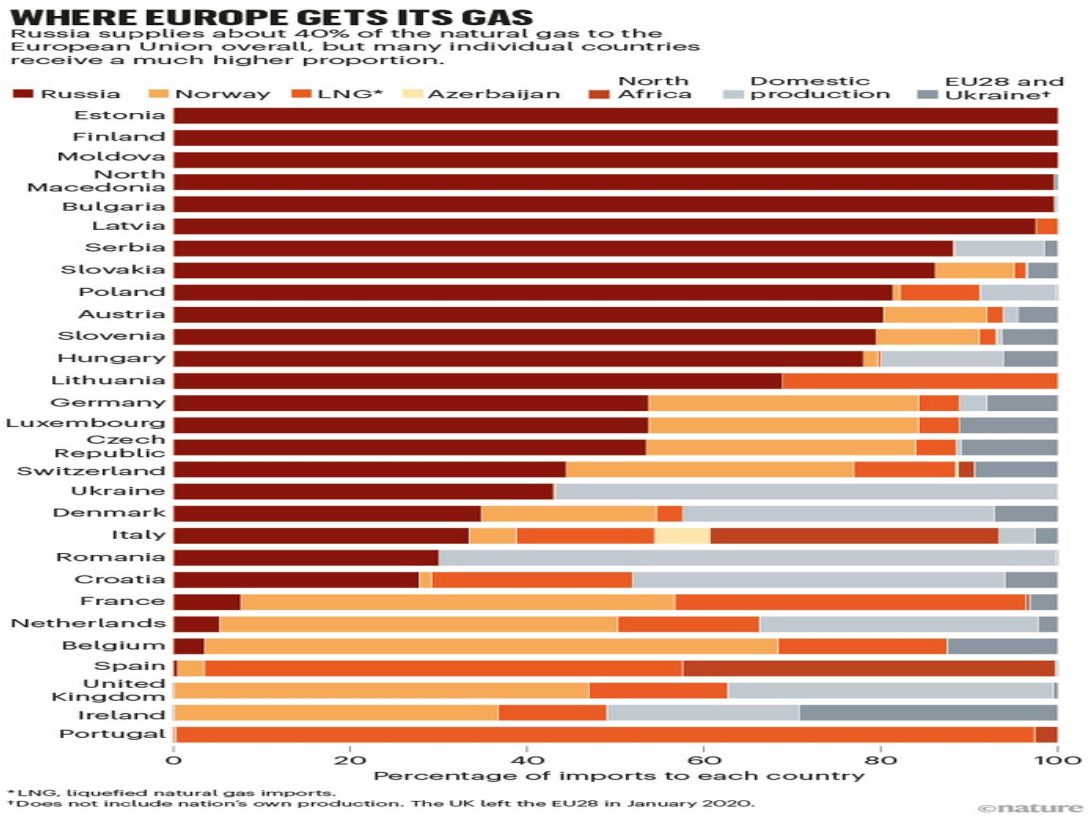

Fig. 6. Sources: Bruegel/European Network of Transmission System Operators for Gas/Eurostat/UK Government/Government of Ukraine

In the longer term, the German government is proposing to increase the share of renewable energy sources in the power sector from around 40% today to 100% by 2035, 5 years earlier than planned. A sustained period of high energy prices could also drive significant investments in energy efficiency, an area that has enormous potential but has attracted less attention than renewables.

Renewable energy is the only way of energy independence since no sovereign state owns the sun. Moreover, as innovation moves down the cost of technology to convert solar and wind power to electricity, renewable energy will become less and less expensive. Battery technology, essential due to the intermittent nature of solar and wind power, is also improving. Motor vehicle batteries are becoming lighter while extending their range between charges. (34)

34. The Impact of Russia's Invasion of Ukraine on Climate Change Policy, Steve Cohen , Columbia Climate School, March, 7,2022.

A study from Stanford University says that the world can go to 100% renewable energy and recover its investment in just 6 years. The study recommends that the world switch

to 100% renewable energy before 2035, and certainly no later than 2050. The team's goal is for 80% of the planet to make the transition by 2030. Although it may seem unattainable, some countries are already making progress. Iceland runs on almost 100% renewable electricity, as do Albania and Paraguay. And even Brazil, with its large population and uneven environmental record, gets about 80% of its electricity from renewable sources. So, ultimately, these goals are not out of the question as long as more governments join them.(35)

35. Low-cost solutions to global warming, air pollution, and energy insecurity for 145 countries, Mark. Z. Jacobson et al, Energy & Environmental Science, The Royal Society of Chemistry 2022.

Although the war in Ukraine will probably speed up Europe's move away from fossil fuels, it could slow the clean energy transition, and boost greenhouse-gas emissions in other parts of the world. Southeast Asia, in particular, could turn back towards coal if Europe effectively corners the international market for liquefied natural gas. And then there's Russia itself, which accounted for nearly 5% of global emissions in 2020 and is unlikely to move forward with decarbonization in the absence of international political and economic engagement. (36)

36. What the war in Ukraine means for energy, climate and food, Jeff Tollefson, Nature, 05 April, 2022

The EU plan, called REPowerEU, calls for eliminating the need for Russian fossil fuels over time, replacing them with hydrogen, biomethane, as well as wind and solar energy. It also calls for efficiency measures, such as turning down thermostats by 1 degree Celsius. The plan, as we have seen, in point 11 of this work, foresees lowering total natural gas consumption across the EU by nearly one-third before the decade ends. Some experts considered that Germany is a country that's going to be much further along their climate decarbonization path five, ten years from now than they would have been had this crisis not happened. But, it is not so simple. Most Russian natural gas travels to Europe via pipelines, but importing gas from elsewhere requires special facilities. To ship natural gas, it must be purified, super-chilled until it becomes a liquid, and pumped into refrigerated tankers at what are called export terminals. Once at their destination, an import terminal is required to regasify the cargo. (37)

37. How the war in Ukraine could speed up Europe's climate plans, Laura Benshoff, NPR, April 5, 2022.

18.1. Storage, electrification and green hydrogen

Storage, electrification and green hydrogen are some of the keys to the energy future of the European Union (EU). Increasing the rate of electrification is fundamental and, precisely, renewables are going to contribute to electrifying the system. In addition, the

role played by storage systems must also be taken into account, given that renewable resources, such as the sun or the wind, are intermittent, so storage will cover that variability. Europe will need a total of 187GW of energy storage by 2030 and 600GW by 2050 to meet its renewable energy targets, according to the European Association of Energy Storage (EASE). Of the 187 GW, 65GW will be pumped hydro energy storage (mostly already existing today), 67GW of battery storage and other short duration solutions, and 55GW of energy storage from longer-duration batteries and other energy storage solutions. The organisation said that storage uptake on the continent is lagging behind renewable energy resources and that the EU risks being unable to integrate new renewable energy resources. Deployment needs to ramp up to 14GW a year to hit the 2030 goal. (38)

38. Europe needs 600GW of energy storage by 2050, says trade body EASE, Cameron Murray, Energy Storage news, 20-June, 2022

However REPower EU, the policy strategy which largely targets the end of dependence on Russia for fuels, even that recognises the importance of electricity storage and will encourage its development, does not go into specifics in the way that it does for say, solar PV or hydrogen. EASE and other groups have made an urgent call for the inclusion of energy storage in the RePower EU plan. Energy storage, whether electrochemical, mechanical or thermal, has been absent from discussions to date and is not covered in detail. Why is this so important ? The commission is calling for more renewables, but we know that the grid cannot flow (due to congestion). The only way to make this happen is to have a massive rollout of storage devices to avert curtailing. Without this we will not meet the target for renewables, and we will not manage to wean ourselves off imported gas. You can create a market product saying, “If you store wind energy to avoid curtailing it, we will pay you per megawatt-hour you store and make available” and give it a business case. In contrast, hydrogen plays a big role in the RePower EU plan, which calls for a target of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports by 2030. The EU appears to recognise that hydrogen will be best used to replace natural gas, coal and oil in industrial sectors and for transportation. (39)

39. Europe needs a massive rollout of energy storage, A.Colthorpe, Energy storage, 19. May 2022

18.2. Four ways the war could affect climate change actions

Some experts are not so optimistic, regarding the fact that the russian´s invasión could bring a fast transition to the EU zero emissions policy. On the contrary, they considered

that this war could provoke not only a delay as well as very pernicious effects on the climate change measures.

1. Fossil fuels, and not renewable energy, could replace Russian energy.

The German government cleared plans to reactivate decommissioned coal-fired power plants. Austria is about to reopen a plant that has been shut since 2020, and France said it is “reserving the option” to do the same this winter, while the Netherlands has lifted a cap on the amount of energy that can be produced by coal-fired facilities. Over in Britain, the government is looking at the possibility of delaying the closure of some coal-based plants. (Here’s how Russia’s invasion of Ukraine is fueling a comeback for coal, Levitan &Kuman, Grid, July 2022). Despite the ambitions of the taxonomy, European countries are willing to prioritise energy security in the short term. However, in the longer term, we hope that renewable energy and storage will become the basic element of the European energy system. Also and as a consequence of Russian´s invasión in July 2022 the European Parliament has not opposed the Commission´s taxonomy delegated act, which includes, under certain conditions, some activities related to nuclear energy and gas in the list of environmentally sustainable economic activities which is called EU-taxonomy. The inclusión of such activities is limited in time and must meet specific requirements

2. Countries will rethink their priorities.

As politicians fix their attention to the invasion, investment in climate mitigation could reduce, in favour of a greater military spending. And militaries are highly energy-intensive, the Pentagon’s greenhouse gas emissions in 2017 exceeded those of entire industrialised countries, such as Sweden, Denmark and Portugal. It is something like: “If war wins, climate action loses”, and increased defence expenditure will accelerate energy and non renewable material consumption as well as emissions, diverting scarce resources away from climate action.

3. Military conflict diminishes cooperation.

The goal of global decarbonization can be achieved only if countries work together. But with the conflict, the cooperation will be reduced. And even more, Russia, as one of the world’s largest producers of fossil fuels, is vital to the international effort to eliminate greenhouse gas emissions, and in the current circumstances, it will be difficult to reduce emissions according to Climate Action Tracker.

4. The western countries have a lack of political agreement.

While the Biden administration has made ambitious promises to transition the country to net-zero emissions by 2050, his climate legislation has been held up for months by members of his own party, and the crisis in Ukraine has done nothing to move that particular needle. In the Biden State of the Union address, he made glancing mention of the issue, but did not articulate the long-term opportunity for the U.S. to lead the world in breaking free of the geopolitical nightmare that is oil dependency. In France and other european countries, some left parties refuse to come back to the nuclear energy as EU recommended to avoid import, russian energy and other countries as Hungary doesn't accept to renounce to the Russian gas, and France refuses the Medcat Spanish gas connection to Germany (40)

40. What the Ukraine War Means for the Future of Climate Change, Spencer Bokat-Lindell, NYT, March 16, 2022

19. Final Remarks

19.1. Global Geostrategic Situation

For the first time since the end of the Cold War, there is a real strategic rivalry among the world's great powers. The EU and specifically the German pólicy trust in Russian energy dependency has been a big mistake, and Ukraine has suffered the consequences. It was also a colossal mistake for Germany to reduce defence spending as well as the Ukraine renunciation of nuclear weapons. All these facts were causes that favoured the Russian invasion in Ukraine.

Because of the presence of the Russia and China alliance, at the moment we live in a very fragmented world. Europe is trying to avoid remaining isolated in between Asia and the US, at the time that, after the Ukraine war, will it be necessary to create a new pólicy with Russia, even if it looks difficult, except if the power in Russia changes.

The economy has changed on very few occasions: WWI, WWII, the Yom Kippur war, and the oil crisis. We are now in one of these inflexion points.

19.2. The new energy geography

It is accepted in recent decades that oil and gas resources are geopolitically important and a cause of intense worldwide competition. However, even though it was true during

the Cold War period and during the colonial era and the First and Second World Wars, with the advent of nuclear and renewable energy, it is not so clear that access to oil would be as decisive in a military confrontation between great powers.

The end of colonialism means that there would not be more white spots on the map on earth except on the bottom of the sea or in space, to compete over. The oil and gas resources in the Arctic provide economic justifications for a greater and sustained presence in the area.

As countries look to expand their spheres of influence, energy can play a role as both a target and a tool of that expansion. The energy world also is changing with renewable energy and global problems like climate change challenging the role of *status quo* fuels. For these reasons energy will play an important role in this new *disorder* as well as will be affected by these changes.

Energy is a key factor in the economic, foreign, and national security strategies of all the three current worldwide powers. And although all three had a tacit consensus of maintaining affordable and reliable energy supplies, after the Ukraine war, this consensus has blown up, and now the energy in the execution of foreign policy at the global and regional level, could suppose a constant conflict, and not only about prices.

We will see if the Russian "gas-weapon" is just a myth. The eastern european countries have survived when Russia cut the gas pipelines. However Europe can not avoid the rest of the world not buying Russian gas. So Russia is in some ways invulnerable, and even though some sectors as military or avionic will be affected more than others, the sanctions do not change the politics, as we saw in the China or Iran cases.

In Europe, the gas should have been diversified with North Africa, the US, or Saudi Arabia, but it was not done. After the Ukraine war, the eastern european countries and some others, must change the energy supplier and it would change the energy geography that we know until the Ukraine invasión. So, the United States is no longer thinking merely in denial terms; it is examining whether it can dominate energy markets.

However the global energy transformation due mainly, but not only, by renewables will have significant geopolitical implications, and it will reshape relations between states and provoke structural changes in economies and society. The world that will emerge from this energy transition will be very different from the one built on the base of fossil fuels.

Power will become more decentralised and diffused. The influence of some states, such as China, will grow because they have invested heavily in renewable technologies. By contrast, states that rely heavily on fossil fuel exports and do not adapt to the energy transition will face risks and lose influence. The supply of energy will no longer be the domain of a small number of states, since the majority of countries will have the potential to achieve energy independence, enhancing their development and security.

The transition will generate considerable benefits and it will strengthen the energy security and energy independence of most countries; promote prosperity and job creation; improve food and water security; and enhance quality. Some states will be able to remove technologies based on fossil fuels. A transition from fossil fuels to renewable energy should reduce tensions in the international arena, and could be the initial point in the era of peace and goodwill between great-power states. The number of energy-related conflicts is likely to fall. Even the Crimea crisis and the Ukraine invasion, has shown us that this idyllic scenario could not be so simple. It will be impossible if regionalization intensifies the rivalry and promotes fragmentation.

At the same time, the energy transformation will generate new challenges. Fossil fuel-exporting countries may face instability if they do not reinvent themselves for a new energy age; a rapid shift away from fossil fuels could create a financial shock with significant consequences for the global economy; and risks may emerge with regard to cybersecurity and new dependencies on certain minerals.

About Energy security, the future will depend much more on the security and reliability of the electric power system and the security of information systems. There are many technological and geostrategic considerations that the energy security community has not coherently addressed but it must do so sooner rather than later

19.3. European Energy Transition

In spite of Member States' reluctance to transfer sovereignty in energy security matters, the Union needs an integrated energy market to lead the transition to low-carbon economy and retain Europe's leading role in climate change as well as global investment in renewable energy.

Many of the technologies that can help the European Union to achieve a net-zero emissions economy by 2050 are not yet commercially competitive with current fossil-fuel technologies, because there is not enough private investment to introduce the new low-carbon alternatives. UE must try to help with funds to the private investments to solve this important gap. From 1990 to 2019, the weight of fossils has gone only from 90 to 89%, in terms of primary energy, which illustrates clearly that the energy transitions is slow, and with the Ukraine invasion, it will be difficult to improve.

The EU Green Deal, covers three main areas: energy savings, diversification of supply and an accelerated transition to renewables. Storage, electrification and green hydrogen are some of the keys to the energy future of the EU. Increasing the rate of electrification is fundamental and, precisely, renewables are going to contribute to electrifying the system. In addition, the role played by storage systems must also be taken into account, given that renewable resources, such as the sun or the wind, are intermittent, so storage will cover that variability

The IEA's *10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas* includes a range of complementary actions to use clean and efficient alternatives to natural gas. The proposed measures are fully consistent with the EU's European Green Deal and its Fit for 55 package*, paving the way for further emissions reductions in the years to come.

* Fit for 55 refers to the EU's target of reducing net greenhouse gas emissions by at least 55% by 2030. The proposed package aims to bring EU legislation in line with the 2030 goal.

19.4. Security and defence in the Energy and Environmental Area

Energy has always been a strategic input to warfare, but was considered as a task of logistics planners. Security, economic, and environmental factors have recently elevated energy to a strategic level in the military.

Efforts focused on to get resilient and low-signature off-grid power systems or more fuel-efficient major weapons systems can potentially partially compensate some Anti-Access and Area Denial (A2/AD) efforts by adversaries. The recent emphasis on life cycle cost effectiveness and energy savings from installations will both reduce operating costs and enhance the resilience of these installations.

19.5. Sustainable Energy in the Defence and Security.

Over the past years, country members have been creating devising ways to reduce the energy consumption of their armed forces. Rising fuel costs or the logistical challenge of supplying large quantities of fuel during operations, have sparked national and multinational initiatives to explore alternative energy supplies and energy-saving technologies and minimise environmental footprint.

19.6. Security and Environmental Stresses.

There is a global agreement that climate change is the cause of tensions within and between states over water, food, overcrowding, migration pressures and the growing risk of disease. Environmental stresses have become especially acute in some of the world's poorest and most unstable countries. The Sahel and Horn of Africa are a clear example of it. The environmental security risks in these regions pose challenges to the security of the EU mainly for two reasons: the need for humanitarian relief and deployment of military resources, and uncontrolled migration, which would perturb the relationships between Member States and create a refugee crisis.

19.7. Climate Change

The August 2021 Intergovernmental Panel on Climate Change (IPCC), released a major new report concluding that the world cannot avoid some devastating impacts of climate change, but that there is still a narrow window to keep the devastation from getting even worse.

However, highlighting a few of the extreme weather events the world witnessed in the last years we can observe that there is a contradiction between the growing awareness of the urgency to act against climate change and rising emission levels at the same time.

For the EU: twice as much GHG cuts needed between 2030 and 2050, than between 1990 and 2020. Main message after COP21: the world (and Europe) is far away from the 2ºC pathway: the emission gap is HUGE.

The invasión of Ukraine by the Russian army has created a situation in Europe with global repercussions, affecting the energy model and global commitments related to climate change, and so, some countries have activated plans to reopen decommissioned coal-fired power plants as well as nuclear plants

19. 8. Climate change and defence nexus

Climate is a security issue, but there is no security solution to the problema, a whole of government and of society approach is needed. Challenges posed by the sea-level rise in many parts of the world are affecting water and food security, energy security and to a loss of habitat. It constitutes an existential threat to mankind which will destabilise regional and international security. On the other hand climate change will impact in CSDP missions and operations in the five domains

20. The way ahead

It is time to redesign the energy sector and be clear about the optimal model to meet the classic "trilemma" of the three pillars of energy: Security of supply, Reasonable costs compatible with economic development, and Minimal environmental impact.

Security of supply.

Europe in general and some countries in particular have not based their security on a diversification of the origins of fuels with serious effects on the economy. The approaches are:

- The European energy policy must strengthen its unity and coordination or each country may be a particular case.
- Dependence on third countries or geographical areas for primary energy supplies should improve diversification in order to guarantee supply

Reasonable costs and compatible with economic development

The effects of the lack of supply guarantees have an effect on the prices of primary energy (oil, natural gas, coal, nuclear fuel, etc.) with an immediate effect on the economy and on logistics costs. The approaches are:

- It is recommended to establish an European fuel purchasing centre, improving purchasing power and sharing non-compliance among member states

- It would be convenient to decide if the primary energy mix be established at European level, the mix of final energies, or the mix of electricity generation, and others.
- It is important to decide how to establish equity and fair economic and industrial competition between countries with different degrees of economic development, with different environmental requirements and with different social costs.
- European countries must rebalance the different productive sectors: industrial, food, services, etc. in the share of its GDP.

Minimal environmental impact.

The effects of Greenhouse Gases (GHG) have led the majority of countries to set decarbonization goals that, in the current times with the Russian invasion, could be seriously affected, and can stop the investment programs in renewable energy installations as well as the costly processes of capturing and storing CO_2. And we must include in these hándicaps, the investments in research of new fuels that respect the environment: Hydrogen, Biofuels, etc. Nor should we forget the improvement in energy efficiency in consumer sectors: industrial, housing, transport, which require significant investments affected over time by the crisis triggered. The approaches are:

- The closure programs of nuclear power plants that do not emit CO_2 should be reviewed, as well as if it is necessary to promote the use of nuclear energy in new generation reactors.
- It is important analyse if can the development of renewable energies, with the economic crisis, maintain the planned rate of investment and if should the renewable energy program go hand in hand with the development of energy storage facilities, as well as to study what could be the role of intermittent renewable energy backup power generation systems.
- The ongoing decarbonization policy also requires the promotion of CO_2 capture and storage plants.
- The EU should review if the achievement of the proposed environmental objectives radically prevail or if they require a revision, now or later.

Energy Security Challenges

- A part of the understanding about energy security came from the development of a global market where the future of energy security may depend mainly on the reliability of the electric power system and the security of information systems.

Security and defence in the Energy area and environmental and Climate change

- In the area of logistics, the Single Fuel Policy promotes the use of a single fuel for all.
- We believe that civilian energy technology should consider innovations emerging from the defence sector, and try to create two-way technology assets.
- CSDP will be involved in addressing maritime pollution, waste management, energy efficiency and power generation. Also will include recommendations similar as included in the Nato Smart Defence.
- Climate is a security issue, but there is no security solution to the problem. As the involvement of the security and military community is crucial, a whole of government and whole of society approach is needed.
- Challenges posed by the sea-level rise, in many parts of the world which is affecting water and food security, energy security as well as contributing to a loss of habitat.It means that retrained and retooled military forces are needed, and climate change effects need to be integrated into military strategic planning.
- Environmental stresses have become especially acute in some of the world's poorest and most unstable countries, mainly Moghreb, Sahel and Horn of Africa. In this regard CSDP will work in the Military Principles and Policies for Environmental Protection, during the preparation and execution of military activities, as Nato already does.
- Climate change effects need to be integrated into military strategic planning and can affect the nature of the work, the circumstances, the nature of the conflicts, (more globalised, migration flows), and the equipment of soldiers, as well as the working conditions of the five military domains.