8 FEBRUARY 2021

VOLUME 2 ISSUE 20

BİLKENT ENERGY POLICY RESEARCH CENTER NEWSLETTER









A FAST GROWING INDUSTRY: CLEAN TRUCKS AUTOMATION IN OIL AND GAS INDUSTRY

DOCUMENTARY REVIEW: KISS THE GROUND

SYNERGY 8 FEBRUARY 2021 VOLUME 2 ISSUE 20 #50

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ABOUT US







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Director's Message

Dear Bilkent Members and Readers of Synergy,

Today, our team is publishing the 50th issue of our newsletter Synergy in which energy experts, academics, and students from Bilkent and various other universities inform our society about issues related to energy and climate matters. While doing so, our young authors also developed their writing skills and gained a deeper understanding of the world's energy and climate issues.

Bilkent Energy Policy Research Center started its activities in 2015 with the graduate program established to improve the analytical skills of experts working in government institutions. I am happy to return to Bilkent EPRC as the director, and I thank Prof. Dr. Erinç Yeldan for his contribution to this center as its founder.

Since then, many of our students working in different sectors have had the chance to receive a good education with our expert academic team's support. It is wonderful to be able to draw academics and practitioners from around of the world to the center and the graduate program. I would like to take this opportunity to congratulate our students who received their degrees last semester and wish them success in their careers.

In the next academic year, we plan to continue our graduate program with the new curriculum that designed based on the experiences we have gained so far. We are looking to update the curriculum to provide a multi-disciplinary education that will enable people who want to work in energy studies to have globally accepted qualifications.

Apart from our graduate program, we also aim to expand our research studies. We intend to use the strong human capital that our center has established through its former students and academics to provide analytical solutions to Turkey and the world's energy and climate problems. Impactful research, strong teaching and dedicated public service are the core values of Bilkent that EPRC fully shares.

I would like to express my gratitude to all of our readers who motivated us to publish fifty issues and wish good health and ease of mind during these trying times.

Yours faithfully, Refet S. Gürkaynak

Turkey's Post-CoVid-19 Sustainable Growth of Its Economy With Energy Transition

Dr. Değer Saygın

The global economy is facing a new era of turmoil with the impacts of the CoVid-19 pandemic continuing. Countries are implementing new measures to recover their economies and create motives for growth. As for the rest of the world, the design of new strategies that are in line with its national priorities is becoming important for Turkey to continue to grow its economy. A national recovery strategy that takes energy transition and green investments at its core could provide new opportunities for Turkey to limit the potential adverse economic and trade impacts of emerging green deals that favor industrial competitiveness and climate change mitigation and to strengthen its negotiation capacity at international climate discussions.

Transformation of the power system is crucial as it accounts for nearly 40 percent of Turkey's total greenhouse gas emissions. The uptake of low-carbon technologies such as renewable power and energy efficiency has gained momentum in recent years highlighting Turkey's progress in the global headlines. Accelerated deployment of these investments and expanding transition towards electrification could help alleviate the impacts of CoVid-19, thereby ensuring the long-term competitiveness of Turkey's economy.

Studies undertaken by the SHURA Energy Transition Center over the past three years show a viable transformation pathway for Turkey's power system. By 2030, Turkey could supply more than half of its electricity demand from renewables, with a notable 30 percent share from wind and solar energy. The growth in Turkey's electricity demand could be limited to on average 3 percent per year in the coming decade by investing in the energy efficiency of the entire power system value chain from supply to end uses as a continuation of Turkey's ambitious National Energy Efficiency Action Plan. There is a significant electrification



potential for heating and transport sectors integrated with renewable power. For instance, at least 2.5 million electric passenger vehicles and 1 million charging points can be deployed by 2030 with negligible impacts on the costs and operation of the distribution grids. Turkey's potential of around 15-gigawatt distributed renewable energy resources could play a crucial role in supplying the needed electricity. Digitalization, smart grids, and flexibility will ensure smooth management of a more renewable, distributed, and efficient power system. Innovation will need to expand towards new market design, market-based policy mechanisms, and innovative financing tools and business models. Enabling this by 2030 would create an investment opportunity of around US\$12 billion per year on average in the coming decade.

The CoVid-19 period offers a historical opportunity to integrate such a transformative investment pathway to Turkey's economic recovery strategies. The benefits that can be gained from energy transition, such as reducing the current account deficit, increasing value-added,



creation of new employment areas, and reducing the adverse environmental effects of fossil fuel use, are in line with Turkey's overall objectives, which are addressed by relief, recovery, and reform packages. In the design of these strategies, it will be important to set short-term measures that comply with and can enable the pathway towards a long-term transformation of Turkey's energy system.

Transition to a low-carbon pathway can increase economic activity and create new employment whilst reduce greenhouse gas emissions towards Turkey's efforts to contribute to global climate change mitigation. At the same time, the energy transition will reduce the economic impacts of energy imports that have a share of around 70% in total primary supply for nearly two decades. In particular, as a local resource, improving energy efficiency could have a transformative impact that can provide immediate benefits on new employment and creation of technology value-added. Indeed, it takes time to realize the economic and environmental impacts of the energy transition, but, in the short and mediumterm, it will give the urgently needed market signals to investors and financiers for a predictable environment to accelerate investments in low-carbon technologies. Such a pathway will also provide benefits to update Turkey's existing climate plans that build on the country's success of renewable energy and energy efficiency in recent years, and that consider the rapid changes in the costs of low-carbon technologies.

The abundant availability of local renewable energy and energy efficiency resources, the manufacturing and business development capacity, the young workforce, and flexible business practices of Turkey provide the needed advantages to make this transformation possible and reap its benefits to sustainably grow the country's economy in the post-CoVid-19 period.

A Fast Growing Industry: Clean Trucks

Can Arıhan in

With numerous electric and hybrid cars already present on the streets around the world; clean technologies, which can significantly cut emissions, for trucks (in this article, the term "clean trucks" will refer to any eco-friendly truck that does not use the traditional combustion engine) and other heavyduty vehicles seemed to be developing rather slowly. However, this stark difference is set to change.

Mainly, government regulations and incentives are leading the truck industry's transformation, which uses combustion engines as its most common technology, to a more environmentally friendly one. Clean Energy Wire notes that the European Union has already adopted rules that legally force newly registered trucks to have 15 percent lower emissions starting with 2025 and 30 percent starting with 2030.

China, the clean truck market leader with a 95 percent share of the global market (Forbes data), is also heavily investing in clean trucks. Clean Energy Wire figures prove how committed China is in transforming its heavy vehicle industry: China has around 400.000 electric buses as opposed to 4.000 in all Europe. Other countries are also slowly speeding up their efforts. For example, BYD, a Chinese firm, has recently signed a deal to supply over one thousand electric buses to Bogota, the Colombian capital.

The future of the clean truck industry is certainly not bound by governmental initiatives. Although the initial buying price for trucks with clean technologies may be higher than the traditional combustion engine trucks, the clean trucks prove to be more economical in the long term. Fuel savings and much lower maintenance costs make these clean trucks more and more competitive. According to Clean Technica, the main reason for the higher buying price of the clean trucks, the high cost of batteries, are getting rapidly cheaper. The astonishing drop of 89 percent in the last ten years in battery costs surely signals that clean trucks will become even more economical in the future.

To take a portion of this rapidly growing industry, both traditional players and newly founded start-ups are competing. For example, Clean Energy Wire quoted Swedish Volkswagen subsidiary Scania's CEO said: "In a few years, we will also introduce electric trucks for long-haulage that are designed for quick charging during the mandatory 45-minute rest periods for drivers." With its new electric truck named Semi, Tesla will certainly be an important player in the market. Pepsi, Walmart, and UPS have already preordered this new Tesla model. GM



is also entering the electric heavyduty vehicle market, and FedEx has already agreed to be its first customer. Similarly, Amazon is set to expand its fleet with 100.000 electric delivery vans from Rivian, founded in 2009. The American online retail giant has also ordered to sign a deal with Mercedes Benz to strengthen its European fleet with 1.800 electric vans.

Such news of clean trucks and other heavy-duty vehicles with clean technologies being sold in large quantities should, of course, be welcomed. Nevertheless, there is still a long way ahead to transform an industry that traditionally has very high CO2 emissions. Despite the development of clean technologies for heavy-duty vehicles, trucks, and buses still take up six percent of the total greenhouse gas output of the European Union. Clean Energy Wire predicts that the transformation of the truck fleets in the European Union will not be so sudden, and it may take around 13 years (10 years in Germany and as high as 22 years in Poland, which has the EU's largest truck fleet).

In the United States, the race to transform 13 million trucks and buses into environmentally friendly ones is on but still in its early stages. According to Forbes, in the United States, there are over 120 projects to produce zeroemission heavy-duty vehicles that can be realized in the following years. Still, the United States is, at least for now, in no position to compete with China, the dominant country in the market. Many Chinese companies, BYD (the world's largest electric vehicle producer according to GreenBiz data) at the top, lead the clean truck production globally. However, it isn't easy to estimate how the rapidly changing market of clean technologies for heavy-duty vehicles will look like in a few years.

Turkey is yet to take major steps in producing clean trucks. It seems that Turkish firms will enter the clean truck market by buying these vehicles from foreign firms, at least for the near future. For instance, Utikad notes that Borusan Logistics, a leading Turkish firm, has already ordered Semi trucks from Tesla.

In summary, we have seen that the clean truck industry is emerging as an important market. Many firms are interested in it, along with the larger market of clean technologies for heavy-duty vehicles. This transformation of combustion engine trucks into low (or even zero) emission vehicles will certainly yield huge benefits for lowering the overall emission levels. However still, this process may take many years if the firms and governments do not take decisive and rapid actions.

Armin Laschet and Climate Action: A Continuation of Merkel? Selin Kumbaraci

Approximately three weeks ago, the German Christian Democratic Union (CDU) held an election to replace their leader Annegret Kramp-Karrenbaur, who herself was Angela Merkel's replacement after Merkel decided to step down from the CDU leadership in 2018. While Kramp-Karrenbaur had resigned last February, following difficulties she faced with establishing her authority within the party, an election to replace her had had to be postponed as a result of the pandemic.

The results of the elections, wherein long-term Merkel loyalist Armin Laschet was elected, has a number of implications for the direction Germany may be heading in with regards to climate and energy policy. While Laschet prides himself on the way in which he will essentially act as a continuation of Merkel and her policies, saying, "It's important to me that we don't choose a rupture with Angela Merkel, but rather continuity," and highlighting how the 16 years of Merkel's chancellorship brought about positive developments for Germany and that such policies should be maintained.

While Laschet has only been elected as the leader of the CDU, not as the Chancellor, he is a strong contender for the role. His main opponent can be seen as Markus Söder, the Minister-President of Bavaria, from the CDU's Bavarian sister party, the Christian Social Union in Bavaria (CSU). Söder, it should be noted, has been portraying himself as an ecologically-oriented conservative and vying for an alliance with the Greens, who are at this point Germany's second-largest party. Such an alliance would deliver a majority of almost 60%.

If Laschet were to emerge victorious from this race for the Chancellor position, it is likely he would not push as strongly for the same green agenda that Söder might. Despite being a strong backer of the transition Germany has in plan to a more hydrogen-based economy—again not diverging from the position established by Merkelhe, nonetheless, brings with him a reputation of being quite pro-industry. This is especially the case with regard to his role in Germany's coal phase-out. Though Laschet has argued for the need for climate action, he has also stressed the importance of achieving a balance so that climate policies, such as climate taxes and rules, do not cripple the economy. His personal background is somewhat telling as well: as the son of a coal miner coming from a coalreliant state, he played a notable role in delaying the date by which Germany plans to phase out coal to 2038.

This phase-out plan stipulates that the mines and utilities impacted by this exit from coal would be compensated for their lost production. Overall, approximately €40 billion has been earmarked for compensation payments, with the four states with lignite mines and coal-fired power



plants being targeted in particular namely, Brandenburg, Saxony, Saxony-Anhalt, and North Rhine-Westphalia.

As the former Minister-President of North Rhine-Westphalia, Germany's biggest coal mining state, it is not surprising that Laschet played a significant part in such negotiations. In fact, he has even he has expressed his support of the phase-out, despite the way in which it is North Rhine-Westphalia that will bear much of the burden of this policy. However, regardless of the support he has voiced, Laschet has also taken a notably industry-friendly position when it comes to the compensation that the owners of such coal plants will receive.

While Laschet can be seen as mainly a continuation of Merkel's policies, some have argued they diverge when it comes to climate action. It is claimed that

Laschet's view of tough climate policies pushing industry away, given higher power prices and stricter regulations, diverges from Merkel's stance of how taking determined action on climate brings long-term economic stability.

As Franziska Brantner, an MP for the German Greens has expressed, "If Laschet carries his course on climate and coal policy in NRW (North Rhine-Westphalia) over to the federal government, things will look bad for climate protection in Germany." This sentiment is particularly telling since, as mentioned above, the Greens appear to be the most likely coalition partner of the CDU/CSU, but if Laschet maintains his current position, it may turn out to be a rocky coalition.

It remains to be seen how well Laschet will perform on the national stage with the upcoming elections in BadenWürttemberg and Rhineland-Palatine to act as early indicators of his political success. Likewise, whether or not a more 'green' conservative, such as Markus Söder, will take Laschet's place as the joint CDU/CSU candidate for Chancellor also seems likely to become clearer with time.

One thing is more evident, though: whoever is to replace her, Merkel's departure creates a leadership vacuum at the EU level that is going to be difficult to fill, at least at the current moment. The loss of the political leadership and direction she has long provided the EU could have negative impacts on how well difficult compromises she played a key role in crafting, such as with the raising of the EU emissions reductions targets, hold up in the absence of such strong leadership.

Automation In Oil and Gas Industry Yazgı Nur Akın

Automation can be defined as tasks controlled by humans that are realized by machines or systems. It is generally known as easy and reliable production management in several industries, like the energy industry, which has a long history in automation implementations. Thanks to the computer sciences' technological developments, it is now more possible to operate and control businesses at every step. When a process started to be planned, automation appears as a very important factor for more controlled and guality production with less workforce.

It will be useful to mention SCADA and PLC, which are prominent to understand automation systems. SCADA (Supervisory Control and Data Acquisition) controls widely distributed facilities from single-center thanks to the computer, mobile phone, tablet, etc. Hence, it is software that helps to monitor the process with devices. It can be used from a single device and control and monitoring with multiple computers and portable devices with network connections. This feature appears as a sine qua non for today's energy world, which deals with many crises. Although SCADA, which is widely used in nuclear, electricity, and natural gas plants, seems to have high initial costs, it is accepted by the authorities that the system pays for itself in a short time. Secondly, PLC (Programmable Logic Controller) comes to the fore in the automation systems. It is known as a "microprocessor" based device that processes the information received from the sensors according to the encoding program and transfers it to the elements.

Automation has four main functions: measuring, comparing, calculating, and correcting. Firstly, it measures to obtain inputs and to turn them into the outputs to actualize the process. Secondly, it compares the values, and then it calculates the current and possible errors. Finally, it provides a correction step for the actions that will be operated. All these functions help the oil and gas companies' projects more appropriately. to operate international O&G companies All prioritize the digitalization of business through full or semi-automation systems. The main reasons for this approach mainly include increasing productivity, quality, and predictability of the business. Besides, embracing automation completely contributes to increasing the value of many jobs in this industry while improving the Health, Safety, and Environment concerns of the companies that face many occupational accidents. Accordingly, it limits the costs for employees that work to control all the processes.

Nevertheless, there are many discussions about industrial controls in O&G and cybersecurity. These mainly include security vulnerabilities that can cause enormous problems in this industry due to the dependency in daily life. This kind of vulnerability is about



the possibility of having a digital system with limited intelligence and capability. Although the possibility of "computer error" is less than human error, it may not determine the power plants' real risks and errors. Furthermore, many O&G companies cannot pay the required costs for the research and development activities to reach fully automated processes, especially since the COVID-19 crisis greatly impacts O&G industry incomes. Even though big O&G companies can meet the requirements and costs, sectoral problems may become more nonnegligible, and so, many companies may have to face high initial costs while their incomes are decreasing due to the oil and gas prices. Moreover, some economists argue that automation is not so logical now because the unit cost of the products or plant equipment is less than automated. Lastly, unemployment is one of the disadvantages of automation due to the less dependency on the workforce.

We live in a period in which the importance of energy as a fundamental resource increases daily due to our consumption habits that change with the developing technology. For this reason, taking the energy under control, creating efficient operating and consumption conditions, and performing all these efficiently become possible with automation. Nowadays, many examples show us that the O&G industry is in a fast transition period toward automation or digitalization with experienced or newly structured software and mechanics technologies. Nevertheless, it can be seen that the industry still needs human labor to reach the targets of the companies. So, the O&G industry can be a "smart" industry with both "smart systems" and "smart labor" if it desires to reduce the risks and increase productivity and predictability.

Documentary Review: Kiss the Ground

Başak Bozoğlu in

Our world is trying to tackle the climate crisis in many different areas; therefore, it is of great importance to attract people's attention and include them in the process. Today I want to highlight a new documentary, "Kiss the Ground," on Netflix. If you are a little bored of watching content that the end of the world is coming, all resources are drain away, and you may love this documentary more with a solutionoriented perspective.

Generally, when climate problems come to mind, it is highlighted the necessity of struggle in many areas such as drought, deterioration of seasonal norms, pollution of the oceans, melting of glaciers, extinction of animal species. Most of the time, people hear the most about the harm of carbon dioxide in the first place in the climate problems and how bad it is, and the need to reduce carbon emission. Of course, reducing carbon emissions with renewable energy solutions and reducing fossil fuels plays a crucial role in this regard. However, "Kiss the Ground" focuses on the carbon dioxide in the soil as a solution.

Carbon dioxide is one of the fundamental elements for both the human body and earth. Sixteen percent of the human body is made up of carbon, and we can live on the earth with the shield of the atmosphere above the earth. Carbon dioxide is necessary for living life, but it should also be under control. The amount of carbon in the air has reached critical levels along with fossil fuels, industries, and vehicles, and we can change this situation on the opposite with renewable energy. But the solution can be more straightforward and under our feet.

Ray Archuleta, a conservation agronomist, claims that if people get the soil right, they can fix a lot of issues. Healthy soil means that healthy plants, healthy animals, healthy water, and a healthy climate. The reason is that soil has the unique ability to sequester carbon dioxide out of the atmosphere. Since the kinder garden, we know that plants convert carbon dioxide to oxygen, but the soil absorbs



carbon dioxide and feeds microorganisms in the soil. Archuleta defends that when people imitate nature, they can use less product in agriculture and also can gain more money with diversity in the product line.

The soil means food at the same time, and food means human health. The quality of the soil also affects the quality of food. Since toxic chemicals used in agriculture to obtain more food production in a shorter time have been used in the soil, the soil loses its natural microorganisms and leads lands to erosion. This toxic chemicals in the soil destroy the food production system. Also, toxic chemicals are passed on to humans through food and causing cancer, birth defects, and attention deficit disorder.

Living plants have a vital role in reversing global warming. If important

ISS the GROUND

steps are taken, they can be a solution to global warming in decades, not centuries. In 2015, Stephane Le Fall, French Minister of Agriculture, offered a proposal for a solution on climate change at United Nations Climate Change Conference. Le Fall claims that people are able to implement an actual answer to struggle against climate change, an answer that could equal the same amount of carbon humanity emits each year. The soil environment can hold more carbon in the atmosphere. The solution will not come up with the one country; the countries whose are the big carbon dioxide emitters should join in the fight against climate change bring a solution from micro-scale to macro scale. This solution's significance is that the scales and measurements show that reducing carbon emission is not enough for the world now.

Electricity cars and renewable energy are significant, and they

should be applied, but they will not alter the tremendous amount of carbon we have put in the atmosphere in the decades. The earth needs to drawdown; once it can be achieved in the twenty years, the earth will start cooling, and it is possible with growing farms and plants in a completely different way than today. Various steps can be implemented to contribute to the solution, such as turning food waste into composting, encouraging people to recycle, implementing agricultural policies, and educating farmers to turn agriculture into its nature.

"Kiss the Ground" shows you one of the vital solutions to overcome the climate crisis in a historical, political, and humanitarian framework. You can see how nature can renew itself with its power and how each individual can contribute to the solution with tiny practices.

Sinking the Kosinj Valley for a Hyrdroelectric Power Plant

Mihael Gubas 🛛 🤖

The media recently announced the start of work on the Senj 2 Hydroelectric Power Plant and the Kosinj Hydropower System, the largest energy project in the country worth 3.4 billion kuna. While otherwise such news would cause at least minimal journalistic analysis, in the midst of a coronavirus epidemic, this one went relatively unnoticed. However, apart from the fan intonation of the article in one daily newspaper, which gives the impression that the residents of Gornji Kosinj and the village of Mlakve have a better future ahead, some important questions were omitted. For example, how the elderly rural population will get used to large backyards and domestic animals, whose properties (as well as archeological finds, cemeteries, churches and schools) will be flooded, get used to living in buildings that are planned to compensate expropriated villagers. However, given that the process of flooding these villages has been going on for years, the number of remaining inhabitants is reduced to a few dozen people.

Josip Pintar from Eko Kosinj explained to Deutsche Welle that "the state of emergency in that area lasts too long and leaves consequences that will be difficult to repair." Adding, of course, since the accumulation is planned there, "people cannot upgrade their properties, they do not have the right to building or use permits." Pintar concludes that there is no water supply there from the infrastructure, "it simply bypassed them and they are slowly moving out. Agriculture is slowing down, there is no tourism, the people are slowly moving out. "

But before going deeper into the story of hydroelectric power plants, it is good to know that up to two thirds of electricity in Croatia is produced from hydroelectric power plants. The share of production from this source varies depending on weather conditions, ie precipitation, so in rainy years production increases, while in drier years it decreases, and these large percentages indicate that the energy hydropower potential in the Republic of Croatia is largely used.

The sociological consequences are not the only problem of this project, the science and expertise behind it also raise many questions. The hydroelectric power plant is planned to be built on karst-type terrain, and a huge concrete curtain is planned in the karst, 60 to 90 meters deep, six kilometers long - with about 75 thousand tons of cement. In such terrain, it is impossible to predict the movement of groundwater through all unexplored failures, so entire construction interventions could ultimately require significantly larger quantities of injected material, moreover, this additional material could be needed so much that the whole project will not be financially viable in a planned way.

Apart from the consequences of the project for nature and society, and its potentially unprofitable financial



constructions, the project documentation does not work either. Another stumbling block is environmental impact studies, which here, as in other examples of potentially problematic energy projects, are a weak point prone to corruption. Not to mention the recent scandal with wind farms, is a very similar example with the already built hydroelectric power plant Lešće, the first built in Croatia after the war. The obligatory environmental impact study for Lešće, as well as the first environmental impact study for the Kosini / Senj 2 project, was made in the 1980s. The first attempts to build a hydroelectric power plant in the Kosinj area began ten years ago based on then thickly outdated studies. Given that in the last ten years, in parallel with scientific progress, the legal provisions on environmental protection have been accelerated and thickened, environmental standards are significantly different today than at the time of the study.

Given the similarities in the projects, it is worth examining the natural and social consequences produced by HPP Lešće, which affect residents living in the vicinity of the rivers Dobra, Mrežnica and Kupa. According to an article on the Energetika portal: "HEP's Hidroelektrana Lešće, in operation since 2010, which was made by a decision of the relevant ministry based on a 20-year-old, unaudited environmental impact study, creates problems for residents along the Dobra River." First of all, everything that environmental activists predicted came true, no matter how excessive it may have sounded at the time. Since no biological, biospeleological and ecological research had been carried out prior to construction, it was not possible to officially assess the actual impact of the dam (a necessary part of any HPP) on the environment.

HPP Lešće produces relatively little electricity. Within a year of the power plant's commissioning, the soil and nearby roads were eroded, the stability of bridges was endangered, the surrounding lands were flooded, and a water wave was frequent, killing fish, bathers and fishermen. In the strategic guidelines of the city of Karlovac 2012-2017. it is stated that the construction of the hydroelectric power plant Lešće, in addition to the devastation that occurred upstream, in order to create an accumulation lake, also caused changes in natural conditions downstream. The power plant changed the migration route of fish, endangered flood defense systems, changed groundwater regimes, conditioned reducing the use of agricultural land and changing the temperature regime of Dobra and Mrežnica. The consequences are so numerous that a working group for damage reduction and remediation has been established.

The consequences of HPP Lešće caused so much revolt of the surrounding population and environmental associations that Zelena akcija and partners managed to win the second environmental impact study for the construction of HPP Kosinj / Senj 2, which this year received a positive assessment from the court in Rijeka and the Ministry of Environment. spatial planning and the power plant can be built. Despite the green light of the institutions, Green Action has filed a lawsuit against this study because, although new, it was conducted flawedly and written vaguely.

Željka Leljak Gracin, coordinator of the program "Environmental Rights" in the Green Action says that the Green Action before the Administrative Court in Rijeka in 2018 filed a lawsuit against the Decision of the Ministry of Environment and Energy which assessed the intervention in the environment - Kosinj hydropower system as acceptable for Environment." According to Gracin, only one hearing was held in the case (December 12, 2019), which lasted extremely short, and eight days later a verdict was passed rejecting our lawsuit. "

Just before the "lockdown", continues Leljak-Gracin, a verdict was delivered to us and we filed an appeal with the High Administrative Court on March 13, 2020. So far, we have not received a decision from the High Administrative Court, but it is not surprising because such decisions are not made overnight. Theoretically, therefore, there is still a possibility that the High Administrative Court will accept our appeal and annul the first instance verdict. That would mean (at least temporarily) stopping this project. " The fact is, she points out, that "regardless of the fact that the decision on environmental acceptability is still in court, the investor has the green light to implement the project because, according to our regulations, a lawsuit to the administrative court does not suspend the decision. However, the investor continues the realization at his own risk, ie if by any chance the solution is annulled, he cannot continue because then the location and other obtained permits fall into the water. We'll see if that happens. "

Leljak-Gracin believes that the expropriation of residents in the villages around HES Kosinj will continue for years, because according to information available to Zelena akcija, the process has not even begun: "Residents of this area this is another pressure, which they have been exposed to for almost 40 years. it is precisely the sad disregard that all levels of government show towards them. The last news I read was that a building would be built for them in Perušić, and I don't know how they intend to settle their agricultural land and other things, because this is not just about housing needed for the population, but about a total change in the way of life they know. " Gracin concludes the statement for the Bulletin with the question: "how come relocation has not taken place for so many years and how is it that old ideas are constantly recycled, in addition to his knowledge available to us today about better and more sustainable energy sources? There are more hydropower plants in the world being removed than planned, built, but we obviously value concrete much more than nature."

However, hydropower plants in the Balkans are still being built obsessively. They are the cheapest way to statistically





increase the energy obtained from the so-called. renewable energy sources. As climate change worsens, the laws and funding of international institutions are increasingly linked to the energy thus obtained. Since the construction of HPPs, a technology we already have in our countries, it does not require any additional investment in know-how, or education of workers, or procurement of raw materials that we are not rich in this area, HPPs with a cheap and almost negligent way to meet Europe and similar provisions.

Hydropower plants belong to the RES by political decision, since despite the renewable water, they still destroy habitats in the areas where they are being built. The most radical example of the extent to which the careless construction of HPPs affects the environment is the American Colorado River, which has almost disappeared due to the exploitation of its flows, so today the otherwise rich state of California is threatened with devastation due to water shortages and frequent power outages. In order to warn that HPPs are not a green resource, Zelena Akcija also published a brochure "Protection and proper management of rivers and hydropower plants" which concludes that hydropower is renewable, but not sustainable (green) and clean way of producing electricity. and mitigating the impact of climate change.

Sustainability assumes that there is no further destruction or major damage to important river ecosystems and biodiversity, and hydropower and dams have a huge and irreparable impact on the environment, nature and society. According to the Green Action, but also many other environmental activists, Croatia does not need new dams with accumulation lakes and new hydroelectric power plants. "Especially not before comprehensive energy efficiency measures are introduced and losses in the distribution network are reduced and the potential for renewable energy sources (sun and wind) is exploited."

Everything we do as a civilization in nature cannot but harm the environment and the living organisms that live in it, so before any major project we should definitely make an environmental impact study, which is not "commissioned" by the ruling elite just to justify short-term financial interests.

Can Europe Lead In Climate Change? Barış Sanlı



Europe can transform the world for better or worse. Climate change and consumer rights can be one of these transformation areas. Still, we never know whether Europe can lead to climate change. It looks as if there are lots of publicity, publications but no solid action. There are incremental solutions, but nothing like the world needs in its energy transformation.

In terms of market size, Europe is big. The import and export markets amplify its influence even further. But it is also a technocratic citadel. More rules, more strategy plans, more commitments are always widely available. Sometimes it looks like a printing house than a governing entity. When you look to the world as a whole, Europe's efforts and rank in clean energy technologies are not synchronous. The big clean utilities, if I may say so, owe all their greatness to EU subsidies. Not even one of them has an innovative technology that the world knows. Balance sheets and innovation capacities are not matched.

Recently, hydrogen strategy has also faced European treatment. First, they pledged for only green hydrogen, and then they published an ambitious hydrogen strategy with blue hydrogen. The interesting thing is the missing references to the EU's hydrogenrelated strategies during the 2000s.





Now German carmakers are against hydrogen. German state minister does not think hydrogen will be part of residential heating. Then what is the point of having an ambitious hydrogen strategy? A simple hydrogen strategy may do the job.

Comparing the EU and US is just a cheap trick. It is not geographies that matter in energy transitions. The volume of published documents also doesn't guarantee success. Rationality is essential, just like Tesla. Tesla's secret strategy is straightforward. "Aim the high-end market with premium, as you scale and earn a profit, move to the lower end of the market." This became a much better strategy than all the other technocratic designs.

Lithium-ion batteries and hybrid cars are the results of R&D done by US oil companies. The shock of the oil crisis pushed oil companies to inventions. But the Carter administration was thinking that synthetic fuels were a much better option. It was "the obvious solution" for years. Despite higher budgetary allocation, the thing didn't work. In the long run, the state's plans failed, but oil companies' inventions paved the way.



Maybe innovation and especially disruptive innovation is not an outcome of a technocratic state. The innovation is the result of an entrepreneurial entity, and you may call it to state. Just as the world needs more innovation to deal with climate crises, the EU is not an entrepreneurial state. Worse, it is turning into another lobbying network. Do you think that the handmade European electrolyzers can decrease the cost of producing hydrogen? No way. This perspective will strengthen Chinese manufacturers' position in Europe further, but not the European technology base.

Europe can create the scale for energy transitions. Already high prices

can support this. The technology base in Europe is good but not a bonus for the energy transition. First and foremost, European companies do not believe in the energy transition. The leaders are not pushing these companies hard enough. There are no disruptive technology ecosystems. But plenty of ambitious targets.

My lesson from this story is to simplify the problem. Start with a simple progressive lean strategy, support more private-sector R&D, a specific fund for disruptive technology candidates, fewer rules, less technocracy, more sandboxing, less ambition but more frequent action.

The world has not come out of any crisis with more ambition, rules, and strategies. Creativity is the key. Innovation should be part of our lives, the whole of government so that we all can search for solutions. The highlevel design for energy transition is not working, and it merely serves to fund lobbying companies to their likings. The emissions are not going down. The disruptive technologies are late. We have to move from a technocratic state to an innovative state.

Enerji Analiz Ali Barışcan Kaya in & Ekin Yüksel in

/ ENERJİ ANALİZ

The necessities of the age that we are in have brought along many different business and training methods. In this case, it has become very important to follow the continuous change and development that occurs with the effect of digitalization. Enerji Analiz aims to respond mainly to these requirements in social media accounts and training simulation.

The basic concepts shared from Enerji Analiz YouTube channel are explained; Daily bulletins containing power plantbased daily generation data, relevant day-ahead market and balancing power market data, and up-to-date news explain the fundamental concepts and latest developments. In addition, videos are prepared by coming together with people who have experience in energy and other related sectors. In this way, instead of providing only technical information on the mentioned issues, the comments, inferences, and experiences of the competent people are also conveyed to the relevant people. In particular, academic studies are tried to be highlighted on energy efficiency, storage, hydrogen, and climate change.

On the training simulation side, it enables individuals to learn the dynamics and functioning of the sector during the recruitment and orientation stages in the human resources processes of companies in the energy sector. At the same time, it is aimed to place the most suitable candidate in the right position by measuring their adaptability, competence, and motivation.



Considering the new generation training that we have experienced with the pandemic, the simulation can be applied not only in the recruitment and training process but also at the university level before. With a few weekends of seminars, students will come together online to experiment with simulation, thereby learning the basic concepts of the energy market while also realizing whether they are interested in this industry.

In the content of the simulation, users will be able to experience the technical characteristics, operating principles, basic needs for generating electricity, and external factors affecting their production in this platform as in real life. The technical specifications of the power plants will include their installed power, unit energy generation costs, availability times, and capacity factors. Due to the different operating principles of hydroelectric, thermal, and renewable energy-oriented power plants, users should be able to understand the working principles and efficiency of these power plants. They will be able to offer the hourly generation amounts and prices of the power plants in the markets within the scope of the electricity trade. In this way, a price can be determined at times of supply and demand. Financial analysis and tables will be presented to users for each of these returns. The simulation will serve as a webbased software platform. Each user/team will have an account.

Because there are no direct energy production and trading models and simulations in Turkey's software market, our new software-based simulation model will be the first in the energy and education sectors. In the international arena, although there is no platform with exactly the same functions of the simulation to be developed, it will also be an original and new product on an international scale. Nowadays, since there are presentation-based processes where the users try to learn the production and trade of electricity only by listening to the instructors in classroom trainings, they can only learn the types and features of the power plants in these training processes. Today, within the scope of business management simulation, there are simulation platforms of Capsim and Iosim companies. Periodic trainings are organized on these platforms. However, no information is given about energy specific to users.

The simulation, which is expected to bring the anticipated solutions to the aforementioned problems, is planned to be tested with volunteer participants and turned into entrepreneurship after taking its final form according to the feedbacks.

Romania: Energy in the Carpathians Atahan Tümer in

As a country with large energy reserves, Romania attracts attention and an exciting country in the European continent. When we consider the Balkans region, Romania is in a different position than other countries in terms of energy. Romania, which has a different role and is less dependent on foreign energy, is certainly worth studying.

Although the reserves of countries in Europe such as Norway and Great Britain are much larger, Romania stands out in this regard both with the energy-friendly policies implemented in recent years and with the discoveries made in the Black Sea. According to Deloitte's report in recent years, every billion-dollar investment made in energy contributes 3 billion dollars to the Romanian economy. This reveals the importance of energy in the Romanian economy. Studying Romania will help us better understand the energy needs of the European continent.

The first thing we need to examine may be why Romania, which does not fit the definition of a green country, unlike other examples, has turned to green policies. One of the most important things that push Romania to an energyfriendly policy is that oil production in the country, which started in the 1850s, will soon end. The government, whose reserves are significantly reduced, is therefore turning to alternative energy sources.

At the same time, they want to reduce their energy consumption by turning to projects such as isolating old buildings. When saving is applied, very beneficial results can be obtained almost always. At this point, it is vital to understand the importance of saving not only when our reserves are running out but when reserves are at their highest level.

Another primary reason behind energy-friendly policies is a foreign dependency on energy. Although Romania provides a significant part of its energy needs from its own energy resources, it cannot meet all its needs on its own.



This situation leaves Romania dependent on countries like Russia, especially in products such as oil. Russia's regional aggressiveness and its aggression in Ukraine in recent years reduce the trust in Russia. However, we should not forget that Russia wants to have a say in energy in the Black Sea, especially after the annexation of Crimea. Considering that Romania also has energy activities in the Black Sea, we can understand why it is disturbed by this situation.

Romania is also involved in nuclear energy production. There are two nuclear energy reactors, and these reactors meet a significant part of the country's energy needs. Romania started using nuclear energy in 1993 by opening the first nuclear power plant. Since 1993, many plans have been made for new reactors in this area, but these plans have often been canceled. The reasons behind this can be listed as the dangers of nuclear energy and the high cost. At this point, it is quite



possible to say that Romania will turn to this field in the coming years. We can see the rising nuclear trend in the world, especially in developing countries, also in Romania. Romania hopes to make greater use of nuclear energy by installing power plants around the country's major rivers. The United States also supports Romania's development in nuclear energy. So much so that he even provided financial aid to the researchers whose purpose is to establish new nuclear power plants. The US and Romania aim to reduce carbon dioxide emissions by increasing the use of nuclear energy.

Romania's relations with Turkey in the field of energy emerges as a subject worthy of study. Romania welcomes recent discoveries made in Turkey in the Black Sea. This is because Romania is pleased to draw attention to the Black Sea in the energy market. Turkey has made significant discoveries, and it was of great benefit in attracting attention to the Black Sea. Romania can also play an essential role in the energy projects led by Turkey.

They may help Turkey to reach the European market. It is well known that Azerbaijan and Turkey have many different projects that aim to reach new markets to market the energy resources Azerbaijan has. It is unknown what the next years will show, but as long as attention is drawn to the Black Sea, it seems so likely that the two countries will have closer relations and enter into some partnerships in the field of energy.

Hydrogen: From Gray to Green Onur Uyanusta

Hydrogen is the new solar nowadays. The claims about its practicality and cost-efficiency are quite bold. The plans built upon those claims do attract many investors also. The investments concerning the hydrogen-related energy infrastructure and systems are expected to rise dramatically. According to the IHS Markit, \$44 billion will be invested in green and blue hydrogen projects in five key European countries: France, Germany, Italy, Portugal, and Spain by 2030. The coloring of the hydrogen and its features will be the focus of this article.

Hydrogen is indeed a good option for making the world more decarbonized in the following years, especially for the heating emissions. Those emissions consist of about 40% of energyrelated carbon dioxide emissions of the total global carbon emissions. And renewable energy production is unlikely to help that piece of emission since most of it comes from fossil fuel consumption. That is where the "Green Hydrogen," the most famous color of which psyches many environmentalists and government bodies, comes into the stage. They do believe that the green hydrogen will enable them to reduce heating-related emissions, which is really hard to reduce directly. There are other ways to reduce emissions, of course, like crediting and selling them, but those are all indirect solutions, which is the best that the policymakers can provide. When science makes its move and zero-emission fuels are on stage, the potential carbon crediting portfolio will go down. It's not a year's transformation but decades.

Before we explain the coloring, let's give a sneak peek at the code green. Green hydrogen can simply be defined as the hydrogen produced with green energy. Suppose that you have a windmill operating with a significant capacity factor and want to produce green hydrogen. Simply buy an electrolysis device from a manufacturer, find a water source, zap it with your wind electricity, and voila! You have successfully produced green hydrogen. Burn it in your boiler and heat up your home with zero-emission. The problem is solved for heating emission prevention in the most island mode level.

However, when it comes to the question of this concept's price, the potential investors' faces drop instantly. Because it is quite pricey (about €2.5-5.5/kg) and their rate of returns is not that welcoming. Still, it is on a constant downslide, and many are hopeful about the pricing in the future. The upcoming carbon taxation mechanisms seem to help since taxations become more expensive than the production prices of hydrogen. For near ambitions, the hydrogen still stands out as viable heating and heat-intensive business' fuel, but the color is changing with viability. Now, let's take a look at those colors:



Code Gray:

Gray hydrogen is made using fossil fuels like oil and coal, which emit CO2 into the air as they combust. The CO2 is released into the air, and because of that, it is coded as grey. This accounts for roughly 90% of the hydrogen produced in the world today. The median price of gray hydrogen is roughly €1.5/kg at the time being.

Code Blue:

Blue hydrogen is the hydrogen made from natural gas. When natural gas becomes hydrogen and CO2 either by a Steam Methane Reforming (SMR) process or Auto Thermal Reforming (ATR), CO2 is released as a byproduct. Then it is captured and then stored, unlike the gray one. As the greenhouse gasses are captured, this mitigates the environmental impacts on the atmosphere. The capturing is done through a process called Carbon Capture Usage and Storage (CCUS). This technology is still being developed, and the installation prices are constantly dropping. The median price of blue hydrogen is roughly $\leq 2/kg$ at the time being.

Code Green:

Green hydrogen is hydrogen produced by splitting water by electrolysis, as we did in the primary schools. This electrochemical process produces only hydrogen and oxygen. We can use the hydrogen and vent the oxygen to the atmosphere with no negative impact, unlike gray or blue hydrogen.

To achieve the electrolysis, we need electrical power. If the brightest color of green is wanted, electricity must come from zero-emissions also. This leads us to renewable energy sources, such as wind or solar. This obligation makes the green hydrogen more expensive too. Thanks to the falling prices in renewables, it also reflects into green hydrogen because the electricity prices directly affect the progress of the green hydrogen. The median price of green hydrogen is roughly $\leq 4/kg$ at the time being.

As we examined the colors of the hydrogen in the most basic ways, the question stands still. Which road will the policymakers of the world take for the world? There seem to be enough resources in the world in money, accumulated mostly in developed countries, to make this green transition real. They released a lot of carbon into our atmosphere in the last age in order to make themselves industrialized and developed. It is an excellent time to pay their debts to nature in money to make their development right.

Prof. Dr. Nejat Veziroğlu's Hydrogen Torch

Hasan Gürsel 🛽 🛄

Energy Transition

In the Whitepaper published by the Global Future Council on Energy Transition of World Economic Forum The Speed of the Energy Transition: Gradual or Rapid Change? (2019) two narratives were pointed out as being gradual and rapid. Nowadays, there are many possible technological advancements to shape our energy future, such as battery technologies (liquid metal batteries, solid-state batteries), nuclear technologies (ITER, molten salt mini reactors), electrification (interconnected systems, smart grids), and hydrogen. There is an ongoing race among those research efforts (a race with no losers), which will most surely help us attain a carbon neutral future. Nevertheless, if the know-how of the O&G sector is to be utilized, hydrogen might be one step ahead.

Questions	Gradual Transition	Rapid Transition			
Possible?	Paris Agreement is too ambitious and just not realistic given the inertia of the energy sector	Renewables are enough to meet the increase in demand and will do so with the right policies			
Peak?	Peak for fossil fuels is decades away	The peak will be seen in 2020s			
Tech?	Advancement is slower than projected, also, solar and wind are not enough for the goals	W&S are already cheaper for electricity and this will spread to other areas like transportation too			
EM?	Emerging Markets would like the follow the path developed countries once took	A model for the EM to follow will develop and they will have a leapfrog in energy evolution			
(China?India?)					
Finance ?	Current sunk investment will not be following a change unless profitable	They will see change as an opportunity and act as a whole denying the capital if not sustainable			
Resistance?	Some countries will resist this change	4/5 of countries are fossil importers, they won't			
Parties	Exxon, OPEC, WEC, EIA, IEA (New Policies Scenario) and BP (Evolving Transition Scenario)	IEA (Sustainable Development Scenario), IRENA (REMap), IPCC (less than 2° scenarios), BP (Rapid Transition Scenario), IIASA (Low Energy Demand Scenario), and Shell (Sky Scenario) Primary Scenarios of BloombergNEF, DNV GL, Mckinsey			

Summarized from The Global Future Council on Energy. (2019, October). The Speed of the Energy Transition: Gradual or Rapid Change?

Hydrogen

Hydrogen, of course, is not an energy source but rather solely a carrier. Based on the primary source of energy used to produce it, hydrogen is semi-scientifically color-coded. The most used production method, for the time being, is methane reforming; however, commercial electrolyzer technologies are on their way. The main aim is to be able to use hydrogen as a storage medium for renewables for the times when the wind is not blowing and the sun is not shining, especially on the



long winter nights. Moreover, it could enable the greening of the sectors like energy-intensive industries, heating/cooling of residencies, and transportation. Most importantly, the utilization of hydrogen as fuel (especially blue hydrogen) could help to transition the O&G giants who seem to be aware of the situation.

"ExxonMobil is working to develop breakthrough solutions in areas such as carbon capture, biofuels, hydrogen, and energyefficient process technology." ExxonMobil Sustainability Report (2020)

"We are pursuing emerging markets for carbon-neutral hydrogen production: the first by combining carbon capture and storage (CCS) with hydrogen production using natural gas as a feedstock" Schlumberger Limited Global Stewardship Report (2019)

"We are investing in new technologies, products, and services that advance our industry in cleaner energy, from carbon capture and storage to hydrogen-fueled turbines that will help the industry continue to innovate toward a net-zero future." Baker Hughes Report on Corporate Responsibility (2019)

Shell, Total, BP are all in the same boat, and even Saudi Arabia has announced a hydrogen strategy. China and Europe are backing up hydrogen R&D, and at the World Economic Forum event last week, John Kerry has stated that the US will also be funding hydrogen development. One way to produce blue hydrogen could be through carbon-neutral power plants and electrolysis.

Carbon Free Natural Gas Power Plants (?)

Among the alternatives of low/no carbon PPs, one of the most promising applications is the Allam Cycle, which is a semiclosed loop of Brayton Cycle using CO2 as its working fluid, in the end resulting in zero emissions. A 50 MW test PP has shown promising results, and a commercial 300 MW is on the way. Ice Blue Hydrogen (?)

Comparison Indicators	IG	CC*	N	SCC *	Recompression sCO ₂ Brayton Cycle	Allam Cycle
	With CC *	Without CC *	With CC*	Without CC *	Without CC	
Thermal Efficiency (%)	38.6	44.2	47.7	53.8 ***	52.1	59.8
Carbon Capture (%)	90.1	0	90.7	0	0	100
Carbon Footprint (gCO2/kWh)	109.7	968	39	373	385.3	0 **
Cycle		Brayton +	Rankine		Brayton	Brayton

Table 6. Carbon footprint comparison of various power cycles

*: IGCC—Integrated Gasification Combined Cycle. NGCC—Natural Gas Combined Cycle. CC—Carbon Capture (Post Combustion). **: Under the assumption that piped CO₂ is utilized for enhanced oil recovery (EOR) or chemical feedstock and there are no leaks to the environment. ***: New General Electric HA class turbines have an efficiency of greater than 62%. However, the cost of post combustion capture is expensive.

(Fernandes, D., Wang, S., Xu, Q., Buss, R., & Chen, D. (2019). Process and Carbon Footprint Analyses of the Allam Cycle Power Plant Integrated with an Air Separation Unit. *Clean Technologies*, 1(1), 325–340. https://doi.org/10.3390/cleantechnol1010022)

Research is also being carried out in the USA and mainly China for the exploitation of untapped hydrate reserves of methane clathrates to produce natural gas. A recent paper Wang et al. (2020) of Chinese Petroleum University has investigated insitu hydrogen production from those resources and claimed the process to be profitable. However, there is not much work in the literature for the time being to dive deep into the integration of hydrate exploitation with hydrogen production. Since both technologies have been developed for a long time now, a combination of two could be the wild card to reshape the whole energy sector. If the electrolyzers also join the picture, we could be looking at a life cycle of methane production used to generate electricity with no/low carbon emissions to produce hydrogen at centralized stations to be distributed via pipelines.

A True Hydrogen Romantic

Prof. Dr. Nejat Veziroğlu is a name familiar to most that are in energy chambers. As the most renowned international leader of hydrogen energy, his life and part of his pioneering work has become a part of the high school curriculum in Turkey. Being an advisor to the United Nations, he had helped to establish The International Centre for Hydrogen Energy Technologies of the United Nations Industrial Development Organization (UNIDO-ICHET) in Istanbul, which later closed due to lack of funding (yet is planned to open back in Beijing soon). Currently, at the age of 97, may he live long and rejoice many more happy birthdays. Carrying the torch lit by him "National Hydrogen Association" Youtube Channel is a good place to go for anyone interested in recent developments and a better understanding.



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