MAY 2021

ENERGY

INDUSTRY REVIEW

INDUSTRIAL IOT ERA
Digitalization
of the Energy Sector

AGRIVOLTAIC SYSTEMS
A Promising
Experience

ENERGY TRANSITION
Risk of Having
a Two-speed Europe

Răzvan Copoiu, CEO Signify Romania & South East Europe

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Hopping for A Better Future

Since 1970, every year on April 22, Earth Day marks the anniversary of the birth of the modern environmental movement, as we all hope for a better future.

Today, Earth Day is widely recognized as the largest secular observance in the world, marked by more than a billion people every year as a day of action to change human behaviour and create global, national, and local policy changes.

Currently, our focus is on global warming and a push for clean energy. Clean energy solutions (that come from renewable, zero-emission sources that do not pollute the atmosphere when used, as well as energy saved by energy efficiency measures) gain momentum to make them political and investment priorities.

As United Nations Development Programme (UNDP) puts it, there are five reasons to be optimistic about clean energy in 2021.

First of all, clean energy is a smart investment. Fossil fuels used to be less expensive than cleaner energy, but this is changing. Renewables are becoming more affordable every year, and some options are now cheaper than fossil fuels. The price of solar power has decreased by 89 percent since 2010. It is now cheaper to go solar than to build new coal-fired power plants in most countries, and solar power is now the cheapest electricity in history.

Secondly, there is growing momentum for carbon neutrality. High-emitting economies, such as China, Japan, South Korea, the UK, and the EU have made net-zero commitments. The announcements at or just before the Climate Ambition Summit, together with those expected early next year, mean that countries representing around 65 percent of global CO2 emissions, and around 70 percent of the world's economy, will commit to reaching net zero emissions, or carbon neutrality. President-elect Joe Biden has announced that the United States would seek to re-join the Paris Agreement early in his presidency.

The third factor is that clean energy can power a green recovery that leaves no one behind and is in line with the Paris Agreement. Clean energy is a win-win solution to recover from COVID-19. It can improve healthcare for the world's poorest. Clean energy is also an engine for job creation. The energy transition can create 18 million jobs by 2030, even when accounting for the inevitable losses of fossil fuel jobs.

Then, every year, tens of millions of people get clean energy. Between 2010 and 2018, 411 million people gained access to clean electricity, and an additional 200 million to clean cooking technologies and fuels.

After all, 2021 will be the year of global action for sustainable energy, UNDP claims. In September 2021, for the first time in 40 years, the United Nations will host a High-Level Dialogue on Energy, organized by UN-Energy. The event will be instrumental for countries, businesses, civil society, and international institutions to step up action on sustainable energy.

The question is are we ready to face the challenge? It depends on us to make 2021 the year of global action for sustainable energy.

Lavinia Iancu
Publisher

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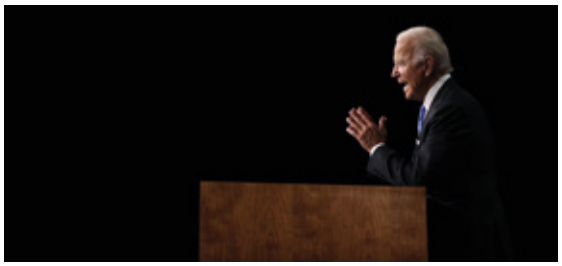

ANALYSIS

Distributie Energie Electrica Romania to Receive EUR 40mln Loan from EBRD

Distributie Energie Electrica Romania (DEER) will receive a loan worth RON equivalent of up to EUR 40 million from European Bank for reconstruction and Development (EBRD). The loan will finance part of the company's capital expenditures programme for 2021-2023.

Starting with January 1st, 2021, the three electricity distribution companies within the Electrica Group merged to become Distributie Energie Electrica Romania SA (DEER). DEER operates 198,988 km of power lines in 18 counties in three geographical areas of the country, representing 40.7% of Romania and serves over 3.8 million users.

DEER is responsible for the distribution of electricity in the following counties: Cluj, Maramures, Satu Mare, Salaj, Bihor, Bistrita-Nasaud, Brasov, Alba, Sibiu, Mures, Harghita, Covasna, Prahova, Buzau, Dambovita, Braila, Galati and Vrancea. At regional level, there are eighteen branches, with headquarters in: Cluj-Napoca, Oradea, Baia Mare, Satu Mare, Bistrita, Zalau, Brasov, Sibiu, Alba Iulia, Targu Mures, Miercurea Ciuc, Sfantu Gheorghe, Ploiesti, Braila, Galati, Buzau, Targoviste and Focsani.

Report on Foreign Direct Investment in Romania

The Academy of Economic Studies (ASE) together with the Foreign Investors Council (FIC) organized, on April 6, an event dedicated to the second edition of the joint study entitled 'Report on Foreign Direct Investment in Romania'. ASE and FIC initiated this analysis dedicated to evaluating the contribution of foreign direct investment to the development of the economy in Romania since 2017, when the first edition of the report was launched.

The latest study conducted jointly by experts from ASE and FIC mainly includes aspects related to foreign investment at the global and regional level, but also at the local level, as well as a case study on the multiplier effects of foreign investment in three industries: energy, telecom and automotive. The objective is to highlight why investments are the basis of a strong, resilient and diversified economy, through which Romania can prosper, given that it is known that foreign direct investment (FDI) is an important source of financing for the economy and the transfer of know-how.

The main conclusion of the report is that it would be an opportunity for Romania to have a more intense presence on international markets, especially during this period, through government agencies for attracting investment and promoting exports.

Romania to Host in 2023 the Solar Decathlon Europe International Competition

EFdeN and Energy Endeavour Foundation (EEF) on April 8 organized a press conference during which they officially announced Bucharest qualification as host city of the event Solar Decathlon Europe 2023 - international competition of solar-powered houses. The Ministry of Energy supported Romania in the competition for the designation of the host city for organizing the Solar Decathlon Europe contest, in 2023.

Until then, Romania will be represented at the 2021 edition of the international competition, which will take place in Germany, in Wuppertal, by the team of NGO EFdeN, with a new project of solar-powered house that will be developed in the following two years. EFdeN is one of the 18 participating teams in 11 countries, i.e.: Romania, Germany, France, Spain, the Netherlands, Thailand, Taiwan, Denmark, Czechia, Sweden, and Hungary.

The group that represents the NGO is the only team in Romania to qualify in three editions of Solar Decathlon: Versailles (2014), Dubai (2018) and Wuppertal (2021). Solar Decathlon is the most important sustainable housing competition in the world and was born in 2011 in the US In 2012, PRISPA team was the first team in Romania to qualify at Solar Decathlon (Madrid edition), and in 2014 the EFdeN team participated in the Versailles edition, with the home that is currently Research Centre for Comfort Conditions.

EU Energy Ministers Meet to Discuss Major Energy Topics

Virgil Popescu, Romania's Energy Minister,

On April 22, under the auspices of the Portuguese Presidency of the Council of the European Union, EU Energy Ministers held an informal video conference to discuss major energy topics. One of the topics addressed at the meeting was the application of European funds to energy efficiency, in particular the 'Renovation Wave Initiative', whose aim is to promote the rehabilitation of buildings in Europe. The Ministers also discussed the integration strategy for the energy system, in particular the role of decentralized energy production and the creation of renewable energy communities.

Energy Ministers exchanged views on the development of renewable energy communities, as well as self-consumption of renewable electricity, establishing the concepts of self-consumers of renewable energy, either individually or jointly, given the provisions of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources. Regarding the building renovation wave in Europe, the discussions focused on prioritizing actions in three areas, namely: renovation of public buildings and social infrastructure; addressing the basic energy needs and buildings with the poorest performance and decarbonizing buildings throughout their lifecycle.

"According to the national long-term renovation strategy, by 2030, an amount of approximately EUR 13 billion will be invested in the renovation of public and private buildings, residential and non-residential, to fulfil the European commitments on renovation rate, reduction of energy consumption and greenhouse gas emissions. This is a major challenge, as it involves not only sources of funding, but also labour force for the construction sector," Virgil Popescu, Romania's Energy Minister, stated.

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Razvan Nicolescu Nominated European Climate Pact Ambassador

The European Commission (DG Clima) nominated Razvan Nicolescu, former Romanian Energy Minister, to be, for a one-year period, one of European Climate Pact Ambassadors.

Razvan Nicolescu established the Association for Clean Energy and Combating Climate Change, a non-governmental organization that aims to help a smart regional transition to a sustainable and environmentally friendly economy.

Razvan Nicolescu was president of the European Agency for the Cooperation of Energy Regulators (ACER) between 2014 and 2016 and Energy Minister in 2014, and in the period 2006-2008 he was Romania's representative at the EU on energy issues. He has made his knowledge and experience available to the European Union, supporting its quest to become a global player in innovation, digitization, and fight against climate change. Razvan Nicolescu also aims to help Romanian companies and local entrepreneurs to transform and benefit from energy transition.

Recently, Razvan Nicolescu was appointed member of the Supervisory Board of OMV Petrom.

EU First Facility for Recycling Car Batteries

With the help of a loan of up to EUR 25 million from the European Bank for Reconstruction and Development (EBRD), Poland will become the site of the first facility in the European Union (EU) for recycling both car batteries and other waste containing metals, in response to the rapid rise of electric vehicles.

The EBRD financing for Elemental Holding S.A. will be part of a wider package raised to finance the construction of the pioneering facility, which will be one of the first in the world to treat spent lithium-ion batteries for electric vehicles and other waste containing metals that are critical for e-mobility.

Elemental Holding S.A. is a Polish company engaged in the collection and recycling of platinum-group metals and electrical waste and has a worldwide presence. The company has operations in Poland, other European countries, the Middle East, and the United States of America. The facility entails the deployment of state-of-the art innovative technology supplemented and co-financed by the Polish National Centre for Research and Development (NCBR) with the support of the European Commission.

Romania Will Join the International Energy Forum

"Romania joins one of the largest and most important energy organizations, with pride and enthusiasm, as proof of our commitment to further developing national and regional energy security, market stability and fulfilling the targets we agreed upon for decarbonization and sustainability. Only by working together can we build a better economic and energy ecosystem," said Energy Minister Virgil Popescu, following a meeting at the Ministry of Energy with Joseph McMonigle, Secretary General of the International Energy Forum (IEF).

"Romania's accession to the IEF and active participation in the global energy dialogue will be a positive contribution to shaping the global energy agenda and strengthening energy security in the common interest of all," said Joseph McMonigle.

Romania's request to join the IEF as full member is expected to be validated at the next meeting of the IEF Executive Board, which meets every six months.

Siemens Mobility Hydrogen and Battery Trains for Romania

Adrian Stoica, CFO Siemens Mobility S.R.L

Siemens Mobility discussed with members of the Ministry of Transportation and NGOs' representatives regarding environmental, technical, and financial aspects of a possible future acquisition of Hydrogen and battery trains for Romania.

The European Green Deal is a plan to make the EU's economy sustainable. One of the key elements of the plan is to roll out cleaner and healthier means of transport, as the transport sector is currently responsible for about 25% of the Union's greenhouse gas emissions. The European Green Deal seeks a 90% reduction in transport emissions by 2050. On the 1st of April 2021, the management of Siemens Mobility Romania - Florian Paul Roettig, CEO Siemens Mobility S.R.L & Adrian Stoica, CFO Siemens Mobility S.R.L, were invited to participate to a public consultation in the presence of members of the Ministry of Transportation regarding the renewal of rolling stock through the National Recovery and Resilience Plan 2021-2026.

In the present, 50% of the European railway network is not electrified and in fact on the Romanian territory there are still operating more than 800 Diesel Locomotives and Diesel trains. But now, Romanian is considering replacing part of it with state-of-the-art Hydrogen and/or electric powered trains. Considering this, Siemens Mobility discussed with the participants of the Ministry of Transportation and NGOs regarding environmental, technical, and financial aspects of such a possible future acquisition.

3M to Reduce Its Plastic Use and Dependence on Virgin Fossil-based Plastic

On Earth Day, 3M is committing to reduce its use of new plastic made from petroleum. By 2025, 3M aims to achieve a new sustainability goal: reduce dependence on virgin fossil-based plastic by 125 million pounds.

To achieve this new goal, 3M is innovating the products and packaging in its Consumer Business Group. Advancements will include use of recycled content and bio-based plastics, and designs to decrease overall plastic use. Scotch-Brite® Greener Clean Non-Scratch Scrubbers, which are made with 75% post-consumer recycled plastic and encased in recyclable packaging made from 100% recycled content, offer a prime example of the improvements 3M is making. 3M is implementing its transition away from new plastic quickly and aims to achieve the 125-million-pound reduction - more than five times the weight of the Eiffel Tower - by the end of 2025.

3M continues to work with its researchers, engineers, and scientists, as well as suppliers, customers, nongovernmental organizations, and community leaders to improve the circularity of 3M products and materials.

Power-to-X Consortium to Produce Renewable Clean Fuels

Alfa Laval - a world leader in heat transfer, centrifugal separation, and fluid handling - becomes a partner in the Swedish company Liquid Wind, which develops electro-fuel facilities to produce renewable clean fuels. Alfa Laval will be part of the Liquid Wind board and contribute with its heat transfer expertise to improve the process efficiency and the overall heat and energy integration of the facilities. The closing date was March 15, 2021.

Liquid Wind is a Power-to-Fuel company which develops and finances commercial-scale eMethanol facilities. Each facility captures and concentrates biogenic carbon dioxide emissions from industry and combines it with hydrogen, made from renewable electricity and water, to produce green methanol. Alfa Laval has acquired a small stake in the company and will join the consortium together with; Carbon Clean, Siemens Energy and Haldor Topsoe. Alfa Laval will be part of the board and contribute to the design of eMethanol facilities where heat exchangers will be installed as key components in the main system, as well as in the process steps of green hydrogen, carbon capture and methanol synthetization.

Blue World Technologies and Alfa Laval Partnership on Carbon-neutral Methanol Fuel Cell System for Shipping

An innovative fuel cell system based on high-temperature proton exchange membrane (HTPEM) technology from Blue World Technologies is being constructed for testing at the Alfa Laval Test & Training Centre in Aalborg, Denmark. The test installation, which will use methanol as fuel, will explore the technology's potential as a source of marine auxiliary power. Funded by Danish EUDP (Energy Technology Development and Demonstration Program), the project is a joint effort between fuel cell maker Blue World Technologies, Alfa Laval, and vessel owners DFDS, Maersk Drilling and Hafnia. The goal of Blue World Technologies and Alfa Laval cooperation is to contribute to the industry's transition towards decarbonatization.

The International Maritime Organization (IMO) targets a 50 percent reduction of vessel-related greenhouse gas emissions by 2050. To meet the long-term target of decarbonization, the industry must shift towards new fuel types and technologies.

The aim of the project is to establish a highly efficient and cost-effective HTPEM fuel cell solution, giving marine vessels a realistic alternative to combustion-based auxiliary power within the near future. The fuel cell test setup will have a power of 200 kW, but the fully developed and modular design should be possible to scale up incrementally to a level of 5 MW.

XING Mobility and Castrol to Develop Immersion Cooling Battery Technology

XING Mobility and Castrol, a wholly owned subsidiary of bp, announced a partnership to further develop XING Mobility's immersion cooling battery technology, utilizing Castrol's advanced thermal management fluid to deliver unprecedented power and safety to the rapidly growing electric vehicle (EV) market.

Since 2015, XING Mobility, the market leader in immersion cooling technology, has continued to advance its EV battery system and powertrain technologies, setting itself apart from competitors by providing automotive-grade EV systems to commercial and industrial vehicle makers worldwide. Its breakthrough Immersio™ Modular Battery Pack technology directly submerges widely available lithium-ion battery cells in non-conductive cooling fluid. Castrol's recently launched product, Castrol ON e-thermal fluid is circulated through XING Mobility's system at a dynamic flow rate to provide superior battery thermal management that enables improved efficiency and is especially designed to meet the highly challenging specifications, conditions and safety demanded by these applications.

Immersion cooling in EVs is now widely considered to be the most effective method of cooling due to its 100% cell-to-coolant contact and improved cell temperature uniformity, which allows battery cells to reach their optimal performance levels while remaining extremely lightweight. The technology delivers market leading energy density and a high level of reliability, in addition to achieving a modular design that allows it to be installed in many vehicle types.

There is no Green Transition Without Natural Gas

According to the European Commission, the green transition needs to happen at a local level, with citizens engaged in climate activism and policy. Amid this intense debate, it is crucial that we continue to focus on what really matters: finding the most effective way to reach our common goal of carbon neutrality by 2050.

The EU Taxonomy remains one the most important legislative exercises shaping the future of the energy sector across the European Union for the next 30 years. The public consultation concluded last December exposed a high degree of polarization among stakeholders. From industry players to invested citizens, they all seemed to expect more from the European Commission draft delegated act.

For the green transition to be successful, we need to effectively use the competitive advantage provided by the availability of certain resources such as natural gas. The role of natural gas as a transition fuel is critical for the sustainable transformation of coal-intensive regions in Central and Eastern Europe, for example. It provides for a viable, accessible, and technologically mature alternative that could lead to significant reduction of greenhouse gas emissions and pave the way for even more ambitious targets such as the introduction of renewable and decarbonized gases, as well as support the deployment of more renewable electricity generation. Additional, through adequate research, development, and demonstration the hydrogen as a fuel of the future produced from natural gas represents the pathway to decarbonisation in the context of European policies for environment, energy, and green transition to sustainable economy.

This approach will ensure an inclusive and just energy transition in some of the most vulnerable communities across the European Union. Failing to safeguard this objective will compromise the reputation of the European green transition as a fair deal for all the Europeans.

"Transition fuels play an essential role, which must be safeguarded to ensure an efficient transformation of the industrial sector and equitable access to financing for all companies committed to decarbonize"

The EU Taxonomy debate should strive to remain fact-based and its implementation realistic. Certain technologies, such as hydrogen, have a clear undisputed potential for the future. However, for now, we lack the adequate production, transport, and storage facilities, and therefore we lack the ability to use renewable and decarbonized gases in the electricity generation sector on a large scale. For instance, the hydrogen economy is far from being an immediate, quickly achievable reality. To require the immediate implementation of strict emission standards when no viable technology is commercially available cannot be qualified as a fact-based, scientific approach. Transition fuels play an essential role that must be safeguarded to ensure an efficient transformation of the industrial sector and equitable access to financing for all companies committed to decarbonize.

Franck Neel *is the President of The Oil and Gas Employers' Federation (FPPG)*

“Setting emission benchmarks of 250g of CO2e per kWh calculated on the economic life cycle of the asset could be a realistic solution only for cogeneration units”

The Technical Expert Group (TEG) provided a clear description of what we should expect from a sustainable economic activity in terms of emission standards. That was indeed the task that the TEG was assigned with. The European Commission should however assume the political responsibility for putting forward a realistic implementation calendar that is scientifically pragmatic, non-ideological and balanced. The implementation calendar should make sure that we meet our common 2050 goal, and that all member countries can contribute to this endeavour while reaping the benefits of the green transformation of the energy sector - irreversibly departing from coal generation with a soft landing toward the 2050 target. Setting emission benchmarks of 250g of CO2e per kWh calculated on the economic life cycle of the asset could be a realistic solution only for cogeneration units but excludes power generation units (condensing units) from the opportunity to decarbonize quickly and sustainably. Also, BREF BAT (Best Available Techniques) reference document for large combustion plants indicates values over 350g of CO2e per KWh.

In our view, imposing a threshold is not appropriate for the transitional activities. The transitional activity threshold should be based on the best performance of technology and signal the decarbonization pathway. Such an approach will ensure a trajectory for meeting the targets and ensure inclusion of activities that contribute to emission reduction, including retrofitting of existing processes. The threshold can be reduced in time, but should not be set too low, too early. Otherwise, suitable technologies that can contribute to the transition or that could be retrofitted will be excluded already at this stage.

“There is no such thing as one-solution-fits-all as there is unfortunately no breakthrough technology”

Central and Eastern Europe will continue to require significant investments in improving the regional energy interconnections, revamping the infrastructure, and replacing the existing generation capacities while attempting to combat the side effects of this transformation, which will be felt by the people living and working in the coal-intensive regions. If the European green transition will come to associate with poverty, destitution, and hopelessness, then such a policy will fail us all - industry leaders, policymakers, social partners, and NGOs - but first, the citizens of the EU.

There is no such thing as one-solution-fits-all as there is unfortunately no breakthrough technology that would allow this. There is also a clear danger in applying a multitude of solutions to address all potential concerns, regardless of how improbable they are. Europe should aim to have a balanced approach that guarantees an orderly and swift transition from highly polluting power generation to mature low-carbon technologies, such as natural gas electricity generation capacities, while ensuring that no European citizens are left behind. A clear, realistic, and scientifically informed roadmap is needed to enhance the sustainability of the sector in the medium- to long-term, to guarantee the attainment of the 2050 carbon-neutrality objective.

The Promise of Carbon Capture and Storage

ExxonMobil believes, and experts agree, that carbon capture and storage (CCS) will need to play a critical role if the United States and other countries are to meet the emissions-reduction goals outlined in the Paris Agreement.

CCS could enable the United States to safely capture and store hundreds of millions of metric tons of carbon dioxide (CO_2) each year that otherwise would be released into the atmosphere. It's one of the few proven technologies with the potential to significantly lower emissions from certain hard-to-decarbonize sectors, such as manufacturing and heavy industry.

The question is: How can CCS be deployed broadly to help reduce U.S. emissions more quickly?

For the past three years, ExxonMobil has been assessing the concept of multi-user CCS "hubs" in industrial areas located near geologic storage sites, such as depleted oil and gas reservoirs. We believe the time is right for a large-scale collaboration in the United States between government at every level, private industry, academia, and local communities to create an "Innovation Zone" approach to dramatically accelerate CCS progress.

And we think Houston is the perfect place for such a concept.

Houston has two features that make it an ideal site for CCS: It has many large industrial emission sources, and it's located near geologic formations in the Gulf of Mexico that could store large amounts of CO_2 safely, securely and permanently. The U.S. Department of Energy estimates that storage capacity along the U.S. Gulf Coast is enough to hold 500 billion metric tons of CO_2 — more than 130 years of the country's total industrial and power generation emissions, based on 2018 data.

ExxonMobil believes the United States could establish a CCS Innovation Zone along the Houston Ship Channel and surrounding industrial areas with the potential to effectively capture all the CO_2 emissions from the petrochemical, manufacturing and power generation facilities located there. The CO_2 would be piped into natural geologic formations thousands of feet under the sea floor.

Big idea, big benefits

It would be a huge project, requiring the collective support of industry and government, with a combined estimated investment of $100 billion or more.

But the benefits could be equally big: early projections indicate that if the appropriate policies were in place, infrastructure could be built in Houston to safely capture and permanently store about 50 million metric tons of CO_2 annually by 2030. By 2040, it could be 100 million metric tons.

This concept could be a game-changer for deployment of CCS, benefitting not just Houston and its ambition to be carbon-neutral by 2050, but the United States as a whole. In addition to having the potential to effectively decarbonize one of the country's largest sources of industrial emissions, the concept could generate tens of thousands of new jobs and protect thousands of existing jobs. Importantly, CCS also promises the potential of significant impact at lower societal costs compared to other emissions reduction technologies, especially for the manufacturing sector.

Lessons learned from this Houston CCS Innovation Zone could be replicated in other areas of the country where there are similar concentrations of industrial facilities located

Joe Blommaert *is President of ExxonMobil Low Carbon Solutions*

near suitable CO2 storage sites, such as in the Midwest or elsewhere along the U.S. Gulf Coast.

A collective effort, built on Houston's history as an energy innovator

As the "Energy Capital of the World", Houston is already the home to all kinds of energy innovation. The Houston area also is home to more than 12,000 ExxonMobil employees, including myself.

ExxonMobil is uniquely positioned to help advance this Houston CCS Innovation Zone concept. We're the global leader in CCS, having cumulatively captured more anthropogenic CO2 around the world than anyone else. We also have extensive reservoir management expertise and decades of proven performance in safely building and operating large-scale projects.

But a concept as ambitious as a Houston CCS Innovation Zone will require a collective effort.

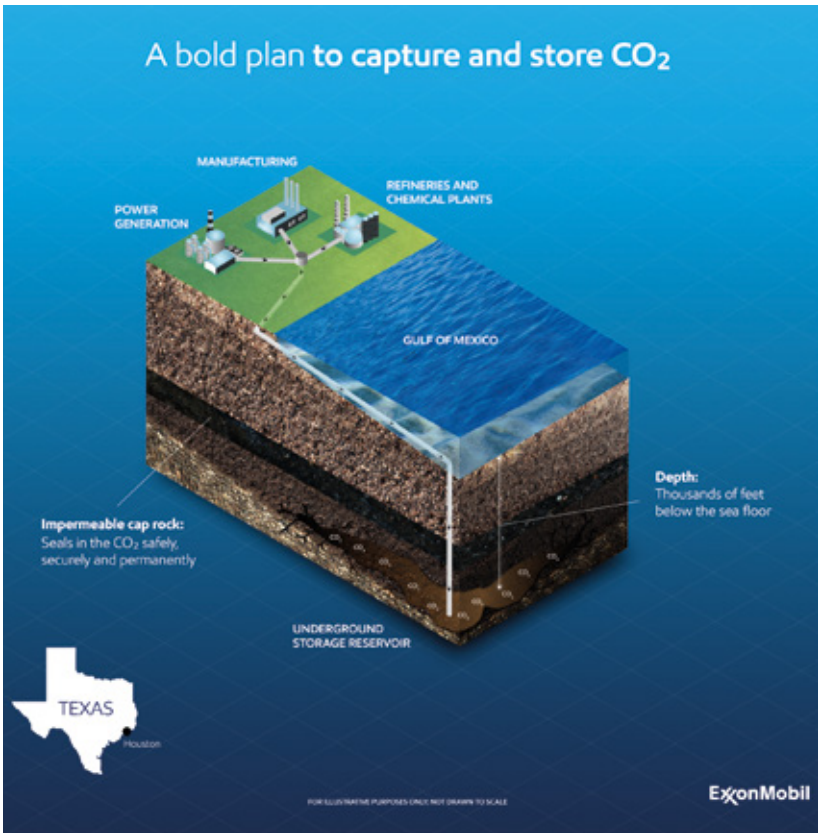
It will need collaboration among federal, state and local officials – the "whole of government" approach the Biden Administration has championed. It will need business support from across industries and community support. It will need government and private-sector funding, as well as enhanced regulatory and legal frameworks that enable investment and innovation. That's why we envision a "zone" approach, similar to other public-private initiatives established to facilitate economic growth or tackle other broad societal challenges.

And today, one of the biggest challenges is reducing the risks of climate change while continuing to meet people's need for affordable energy and the products they rely on every day.

The role of policy

We applaud President Biden's decision to rejoin the Paris Agreement, a framework ExxonMobil has supported since its inception. We believe CCS should be a key part of the U.S. strategy for meeting its Paris goals and included as part of the administration's upcoming Nationally Determined Contributions (NDC) submission. After all, the International Energy Agency has said, "reaching net-zero (emissions) will be virtually impossible" without CCS.

New policies are needed, however, to spur the investment required to deploy CCS on a pace and scale to meet Paris Agreement goals. Government should establish a durable regulatory and legal environment and implement policies to enable CCS to receive direct investment and incentives similar to those available to other efforts to reduce emissions. Establishing a market price on carbon will play an important part by providing the needed clarity and stability required to drive investment.



Looking ahead

Meeting the goals of the Paris Agreement is a big challenge – requiring new technologies, new policies, and new ways of thinking. A Houston CCS Innovation Zone could be a giant step in the right direction.

In the weeks, months, and years to come, ExxonMobil will continue to engage with the industry, government, academic and community leaders who will be needed to make this concept a reality. I look forward to collaborating with them and helping reduce global CO2 emissions, starting right here in my adopted hometown of Houston.

EVs in 2021 and Beyond

The first axiom would be that electric vehicles will emit minor quantities of carbon dioxide compared to those with internal combustion or hybrids. This obvious truth depends however on a few conditions that are not easy to solve.

Following a research on 'California' case it resulted that electric vehicles clearly represent a niche discovery, but under no circumstance can they replace models with internal combustion engines. The proposal emerged after studies and solutions of specialists reveals that the rephrasing '2050 targets' could be much better to give global markets the time needed to solve physical, chemical and mechanical issues imposed by this niche. As a first conclusion one can say that the reason of supporting electrically powered cars is the reduction of carbon dioxide emissions compared to fuel propulsion that leads to internal combustion. It is known that the difference between the quantity of emissions is, for the moment, 12% of total carbon dioxide emissions. On the other hand, in the global vehicle fleet, the electric ones are, as number, around 1.1%, value supported by those sold lately. Research proves that the minor emissions, talking from a climate point of view, depend on certain conditions.

First of all, this presented comparison must have a common denominator correctly defined from a methodological point of view. For example, the lifecycle of motor vehicles, the so-called 'Life Cycle Assessment', cycle that starts from their manufacturing, then the use in street traffic to the final technical fall and storage as scrap, a usual methodology, of certain complexity, considered difficult to apply, all the listed parameters being subjective.

Secondly, the modality of producing electricity, in fact vehicle's power supply, the production of energy that will be accompanied, without a doubt, by the corresponding carbon dioxide emissions, must be assessed. Taking Germany as an example, a new electric car is rather detrimental, failing to improve certain details, due to the quite unbalanced energy mix favouring coal. Therefore, carbon dioxide emissions for the quantity of electricity necessary for the new car means more carbon dioxide than in the case of a new car with Diesel engine of equal power. Experts such as Hans-Werner Sinn and Christoph Buchai, for example, (within Electric Car Study) have reached the conclusion that "The EU's regulation on fuel consumption will not do anything to protect the climate. It will, however, destroy jobs, sap growth, and increase the public's distrust in the EU's increasingly bureaucracy."

A third factor should also be considered, the type of vehicle as architecture, as well as the average operating time of the vehicle. In general, research of these factors has led to a clear conclusion: for a long operation of electric cars, the sum of emissions is lower than for a traditional car; but for an average operating time of electric vehicles, the sum of emissions will be higher than in the case of series cars with internal combustion. We shouldn't forget that in the case of the 'short-normal' operating time this means reducing the production of brakes, tires etc., obvious sources of emissions. All these parallel approaches rely on technical and engineering parameters, scientific even, on certain theoretical assumptions on the behaviour of consumers, on their preferences and, also, on the modality of using electric vehicles etc. In Italy for example the requirement to lease conventional cars far exceeds that of the purchase, quite rare, of one of the electric cars.

Unfortunately, a change in the trajectory of the difference between classic and electric is nowhere in sight, obviously in favour of the traditional classic car.

Ioan-Corneliu Dinu *is a Scientific Counsellor at Romanian National Committee of the World Energy Council*

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Using our resources and collective experience, we support our customers, at global level, to exceed their business targets. We fulfil this promise by the careful way in which we listen to customer requests and subsequently by delivering the products and services they need.

Our strengths

- A business model underscoring the advantages for customers, such as: predictable/low maintenance costs and increased reliability.
- The large number of customers, proof of increased productivity, optimization of equipment maintenance and repair costs, contributing to obtaining competitive positions in their markets.
- We expand technological innovations whenever possible, with the aim to improve our ability to meet the needs of our customers.
- We are open to new challenges and potential projects, which we will approach with the particularly successful team of Flowserve SIHI.
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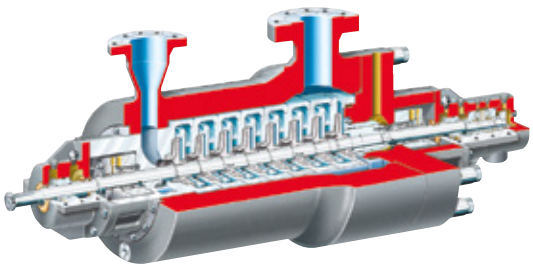


WIK Pump - according to API 610 (BB5) Standard

Letter to the Oil & Gas Community in Romania

As spring has once again set upon us, we should welcome her, as well as the hope, the positive energy, and the endless possibilities that it brings. Before doing so we should first look back and examine where we have been and what has happened so far.

Our industry has gone through an upheaval of unprecedented proportions that has seen us have to take a long honest look at ourselves. When the pandemic began, we saw travel and tourism come to a standstill. Oil prices began plummeting and hundreds of thousands of jobs disappeared, some studies say millions. On April 21, 2020 oil prices went to negative. Many politicians on several continents began preparing our obituaries. We read it in the press, we saw it on TV, and we heard it in interviews. We were punished like no other industry sector ever had been. But as usual reports of out demise were greatly exaggerated.

We took and absorbed the hardest blows and the harshest words from the 'experts' and from the critics and here we are. We are still standing, and we will not go away. The men and women who work in this industry are very special. They are ambitious, hardworking, unrelenting, innovative, perseverant, creative, and like the majority I know with a strong sense of humor.

Modern society was built and developed around oil and gas. The capacity of this concentration of energy, the ease of storage and transportation have made it a major source of energy on a global scale. This goes a long way in explaining its intensive use in many key sectors, including transportation.

I am reminded of the words of the famous Welsh poet Dylan Thomas:

Do not go gentle into
that good night,
Old age should burn and
rave at close of day;
Rage, rage against the
dying of the light.

It is generally agreed that the use of oil and gas as fossil fuels will decrease slightly in the coming years, according to forecasts, making way for new and more sustainable sources of energy. The same studies confirm that oil will remain dominant for decades to come. For example, by 2035 it should supply 80% of the energy needed for transport in Europe according to IEA (International Energy Agency) because demand is growing both in the aviation and maritime sectors.

Our challenges are many and complex. But our industry has risen to the challenges. Affordable energy helps secure life's basic needs: clean water and sanitation; food production and storage; lighting, heating, and cooling; and transportation. Beyond their uses as fuels, oil and natural gas serve as the feedstock for thousands of products like medical devices, cellphones, clothing, building materials and pharmaceuticals. Domestic production, refining and delivery of oil and gas strengthen the Romanian economy, enhance national security, and reduce the trade deficit. As such policy must balance environmental, economic and security concerns.

Andrew M. Costin *is President of the Petroleum Club of Romania and Managing Partner Innov8 Energy*

The oil and gas industry considers climate change a very important issue and is engaging constructively to address this complex global challenge. Romanian policy must recognize the vital role of petroleum products in modern society, and the many benefits that oil and natural gas provide this country and indeed Europe.

The availability of clean burning natural gas is directly impacting the power sector in positive ways - among them, helping to drive down CO2 emissions. This is an inescapable climate point.

In a dynamic, innovation driven industry like oil and gas we should be careful not to adopt prescriptive regulations and prevent technological improvements or shrink opportunities for investments that could deliver environmental benefits and savings to consumers for years to come.

Since 2000 our industry has spent nearly $25 billion developing substitute and less carbon intensive fuels, such as LNG, while also reducing fugitive gas emissions.

Since 2000 our industry has invested more than $3 trillion in capital projects to advance all forms of energy, including alternatives, while reducing the industry's environmental footprint.

The industry is taking a variety of actions and investing in technologies across the value chain that reduce greenhouse gas emissions. Therefore, policies must support the development and use of our abundant oil and natural gas resources and encourage innovation.

The Petroleum Club of Romania will be the lynchpin for all the important players in our industry. As governmental COVID restrictions will ease as they inevitably must, we will continue to organize the technical and social events you have grown to enjoy and expect.

I look forward to seeing you all in the near future.

UNLOCKING ENERGY EFFICIENCY POTENTIAL OF SMART LIGHTING

Interview with Răzvan Copoiu, CEO Signify Romania & South East Europe

by LAVINIA IANCU

Photographs by JUSTIN IANCU

Signify is the world leader in lighting for professionals & consumers, and also in connected lighting for the Internet of Things. Their energy efficient lighting products, systems and services enable the customers to enjoy a superior quality of light, and make people's lives safer and more comfortable, businesses more productive, and cities more livable.
With 2020 sales of EUR 6.5 billion, approximately 38,000 employees and a presence in over 70 countries, Signify is unlocking the extraordinary potential of light for brighter lives and a better world. We spoke about smart lighting, digital transformation, and the power of innovation with Răzvan Copoiu, CEO Signify Romania & South East Europe.

Dear Răzvan Copoiu, in accordance with our conversation topic, please shed light on your career path. Why Signify? And why now?

I have joined the Signify team last August, for the position of CEO for Signify Romania and 10 other countries in the South-Eastern region of Europe. This career transition came naturally, continuing my journey of 22 years professional experience in the field of renewable energy, industrial automation, industrial software, IoT and Cloud-based solutions, promoting and developing the Industry 4.0 further and further.

Working for Signify means being creative and adaptive, and always looking for what future will bring. I am proud to be part of a team who is constantly ahead of the curve, with a culture promoting continuous learning, commitment to diversity and inclusion, an undisputable leader in the lighting business.

What is your core strategy at Signify? What are your current roles and job responsibilities?

As CEO of Signify for the SEE Cluster, my mission is the continuous growth of the business, both strategically and operationally, as well as maintaining the company's position in Romania as a leader in lighting, including IoT and Industry 4.0, and of course, introducing our new innovative solutions to all the 10 markets of the South Eastern Europe.

My personal belief is that, as light becomes a new intelligent language, we will redefine how to use the light, so people could benefit more, in so many new ways, undeveloped so far.

For more than 125 years the company has pioneered breakthroughs in lighting and been the driving force for many innovations. How your innovations contribute to a safer, smarter, more sustainable world?

At Signify, we have a long-term commitment to increase the energy efficiency of our products and reduce energy use in our production facilities.

In September 2020, we became the first lighting company to be carbon neutral in its operations and we shifted to 100% renewable electricity supply, ahead of our target and ahead of the aspirations set out by the Paris Agreement. Moreover, our packaging policy requires for the use of 80% recycled paper, and, by the end of 2021, we aim to 100% eliminate all plastic from our packaging.

Through our digital LED technology, Signify offers light that is up to 80% more energy efficient, compared with conventional technologies, and over 80% of our revenues are coming from sustainable products, systems and services. Another great example of circular economy principles are our 3D printed luminaires, manufactured using recycled polycarbonate and customizable to meet our customers' needs.

91% of total waste was recycled in 2020 and we continue to recycle 100% of our metal and glass waste.

What means intelligent lighting and how does it help the customers to improve efficiency, safety, and optimize operations? What are most important business applications of your Interact IoT platform?

We are talking now about connected lighting. Over the years, Signify has strengthened its position as the industry leader in connected lighting, going further to IoT and cloud-based solutions.

We deliver connected lighting solutions for cities, retail, office buildings, industry facilities, hospitality, sport venues and, least but not last, landmarks.

Signify's Interact IoT platform is designed to handle data collected from the growing number of connected light points, sensor devices and systems. The transition to connected lighting is occurring rapidly. Potential savings for customers based on total cost of ownership are significant. As an example, Interact City enables cities to centrally manage street lighting and adapt intensity depending on weather, traffic movement or organized events, thereby realizing significant energy cost savings on top of the led solutions, if any.

And this is the path to Industry 4.0 and IoT. A

smart building platform is as a collection of verticals: a smart ventilation system vertical, a smart heating system vertical, a smart lighting system vertical. And the real 'smart' is when these verticals work all together connected: they share data and can trigger one another based on sensed conditions or combinations of factors.

Taken as a whole, a well-designed smart building functions like a single unit, which human managers can control from an integrated dashboard accessible on a tablet or other such device. When it comes to what such a smart system can do, the sky's the limit.

In a new era of digital revolution, how do you manage to succeed? What are Signify main assets?

The COVID-19 pandemic has been a testing time for technology as companies scramble to get their workforces up to speed on working remotely.

This is the new way of doing things: tune in to the market, listen, hear what other people are doing, structure what we've learned, then see what we can work with. This is how we keep our finger on the pulse on what is happening in the markets and what customers want.

Signify is a front runner when it comes to digitalizing light. I am so proud when I look at our innovation, and our team, and what we have been doing with, for example, our Interact software portfolio, or with our Philips Hue.

In 2020, in terms of innovation, we have accomplished major milestones that are worth mentioning, such as horticulture LED lighting for sustainable food production in indoor vertical farms, and also unique UV-C disinfection luminaires.

We have expanded our multi-brand smart connected lighting portfolio with numerous product launches for both Philips Hue who continue to consolidate the market leader position, but also the more accessible WiZ who I developing amazingly fast, we have introduced NatureConnect, a special light source for offices, as part of our Human-Centric lighting offer for the good health and wellbeing of the employees, we have released new solar outdoor lighting luminaires, new 3D printed luminaires aligned with the

circular economy, and many others.

We were quite active during pandemic times.

How much does your company invest in R&D? How do you balance investments in your current operations against disruption and innovation with future potential?

We have pioneered many of the key breakthroughs in lighting over the past 130 years. From the dawn of the electric light, we have led the development of the LED industry.

The level of our R&D investment is 4.8% of sales worldwide, and we have 17.750 patents registered until today.

Signify & ex Philips Lighting's LED patents include inventions such as warm dimming, high colour rendering white, tunable white, colour illumination and efficient light mixing and distribution and there were our scientists that developed the first 60W replacement LED light bulb as well as the world's most energy efficient light bulb.

From light recipes that increase the quality and yield of different vegetables, to lights that give fast internet connectivity via Li-Fi, we are constantly innovating.

In 2018 we have invented an alternative to Wifi. Our game-changing technology provides a fast, stable broadband connection through light waves. It is ideal in areas where WiFi cannot be used or where there's poor or no wireless connection.

Also, our horticultural lighting experts have created special 'light recipes' tailored to the unique requirements of particular plants and vegetables. These enable growers to improve quality, taste and yield while saving operating costs.

Signify is leading the industry's expansion to lighting systems in both the professional and consumer markets. Your position as the industry leader in connected lighting makes Signify the lighting company for the Internet of Things (IoT). How do you see the market evolving in this area?

The pandemic proved us that we need global action to improve well-being and achieve sustainability.

In 2021 and beyond, we'll see more connected technologies put to work toward achieving precisely these ends. We'll see this in entertainment and hospitality, where contactless authentication will improve security. We'll see it on manufacturing floors, where enhanced indoor positioning services will make work smoother and cut down on

accidents. We'll see it in agriculture, where soil and atmospheric sensors will render the use of pesticides and fertilizer more targeted, efficient, and resource friendly.

And we see AI bots replacing more and more human activities.

It will be a different future than we dreamed about on the eve of 2020. It will be one in which we are wiser about the potential of IoT tech to help us meet these challenges and change things for the better.

What are the key benefits of using your products and solutions? What is connected lighting and what are the disadvantages of existing lighting system?

We have come a long way since the Edison lamp. The LED brought the energy efficiency at a new level.

The electricity bills are less than half if we replace conventional lights with LED. Moreover, our Interact IoT platform for connected lighting combines the best digital lighting products with cloud-based system management and data services.

Interact can help to get more value from something that you already own – your lighting system.

First by helping you get even better energy-efficient LED luminaires. Even smaller electricity bills.

Next by connecting your lighting system using standard networking and communications technologies.

With better lighting management, diagnoses and maintenance, connected lighting help you lower costs and operate more efficient, no matter if we are talking about a city, office building, retail shop or warehouse.

Please name your top 5 smart objectives to focus on in 2021.

In 2021, our main objective is to help Romania make the transition to a greener, smarter and prosperous future for current and next generations, through our Green Switch program that is corelated with the European Green Deal.

There are around 2 million street lighting poles in Romania. If we add up all these values, we can think of savings up to 700 GWh, leading to energy costs reduced by 75 million euros - only from public lighting sector, and the key to this are the cloud-based, remote-controlled, energy-efficient lighting solutions.

Signify has extended the study not only to the public lighting, but also to Education and Healthcare segments. In all these three sectors, a complete transition to LED would mean for Romania an annual electricity cost reduction of over 150 million euros, which represents over 510,000 tons of CO2 that can be avoided every year, the equivalent of the amount of 23 million fully grown trees can absorb in a year.

We have already developed innovative smart-city public lighting solutions in Romania, in Bucharest and Alba Iulia, which now benefit from Interact's open technology and lighting system.

We have the best know-how, and we will share it.

The second focus of this year is to create awareness in the education sector, by delivering a reference project for schools, as an example of what is really needed for our children to study in the best lighting conditions that will keep them healthy and focused. And if possible, we will extend it to hospitals, helping the patients to get well faster.

Then, we would like to help growing the awareness of our beautiful country, by illuminating Romanian historical and other important buildings with best-in-class architectural lighting.

We have beautiful projects done already, like the well-known Place of Culture from Iasi, Deva Fortress, Medgidia Bridge or Alba Iulia, just to mention few of them, and thanks to Signify lighting solutions the authorities started to understand the benefits which architectural lighting can bring in terms of tourism, community development and city scaping.

The fourth direction worth mentioning is the lighting for sport arenas and stadiums in Romania. Signify changes the rules of the traditional game by introducing sustainable, efficient lighting systems that contribute to design the atmosphere. Just go to Steaua stadium, and you will understand we are talking about the next level of entertainment lighting.

To finalize the priority list, we have reached a less desired topic – the pandemic. Signify can ensure a safe and comfortable environment for their employees with our UV-C Upper-Air luminaires.

Used extensively by scientists for over 40 years, UV-C is a known disinfectant for air, water and surfaces. All bacteria and viruses tested to date (many hundreds over the years, including various coronaviruses) respond to UV-C radiation.

Signify has been at the forefront of UV technology for many years and has a proven track record of developing innovative UV-C products and applications. In laboratory testing, Signify's UV-C light sources neutralized the SARS-CoV-2 virus from the air in less than 10 min.

IEA's assessment of 2020 trends and 2021 forecasts warns of lax electricity demand in all major economies over the year, with the notable exception of China, accompanied by a general plummet in wholesale power prices. What is the future of power?

More than 75% of the EU's greenhouse gas emissions come from energy production and use, so it's clear why the EU must decarbonize

its energy system to reach the Green Deal's climate objectives.

So not just less energy, but also less carbon!

The Green Deal calls for several measures, including linking renewables to the grid, promoting connected technologies, and boosting the energy efficiency of electrical products and devices.

LED and connected lighting offer one of the simplest and most often overlooked paths to reducing greenhouse gas emissions. Not only that, but IoT capabilities built on top of the connected lighting infrastructure can help make the smart future a reality today, spurring job creation and driving prosperity.

Energy efficiency battles climate change by reducing energy usage. Clean energy battles climate change by decarbonizing the energy that is used. Solar and hybrid-solar streetlights from Signify reduce carbon emissions while leveraging the most cost-efficient energy source around: the sun.

What are from your viewpoint the changes needed in this environment we are dealing with today for a clean future?

Energy consumption has been rapidly increasing for several years, in line with rapidly declining natural resources; this has to change.

In order to make the most out of these resources, more companies need to make the switch to a circular economy approach.

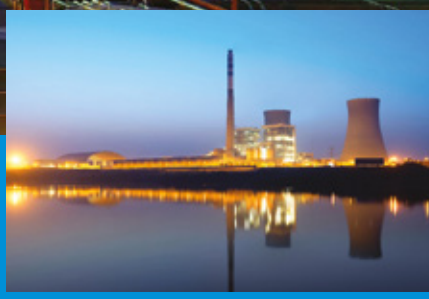
A circular economy uses resources more effectively by creating rather than wasting, using rather than owning, and reusing rather than disposing.

Our company became last year the first lighting company to reach this extraordinary target of carbon neutrality in its operations, and we shifted to 100% renewable electricity supply. Also, our packaging policy is to 100% eliminate all plastic by the end of 2021. And our car fleet policy is now focusing electric vehicles.

So, we have some experience in this. And our products reflect our sustainability strategy. When we relate the circular economy to lighting, products are designed in a fully sustainable way.

When the lighting product comes to the end of its lifetime it can be upgraded and reused, or the materials and parts can be returned for repurposing or recycling.

If we, the industry, manage to understand and apply these principles, we will all enjoy a brighter life, in a better world. ■



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Romania Committed to Contribute to the Achievement of the Decarbonisation Target of the EU

Romania's energy mix is quite balanced with a high share of solid fossil fuels, hydro, natural gas, and nuclear power. Romania has significant resources of natural gas which, can contribute to the security of supply of the country.

The natural gas market features a rather high level of concentration with the two main large producers, i.e., OMV Petrom and SNGN Romgaz, holding together a market share of over 90 % of the natural gas production. As for the market shares of main suppliers, there is a slight differentiation between the free market and the regulated market, the latter featuring a higher level of concentration.

Having a look at the projected trend in the natural gas-fired capacity, we see that the Development and Decarbonisation Plan for CE Oltenia 2020-2030 provides for an additional natural gas-fired capacity of 1400 MW as from 2024. Considering the age of the current natural gas-fired units, it has been estimated that the decrease due to their decommissioning will exceed the increase resulting from the new capacity.

Nevertheless, the gross energy production from natural gas will increase (due to increased efficiency of new capacity and increased utilisation rate of existing ones).

The level of ambition regarding the share of renewable energy was revised compared to the initially proposed share of 27.9% to 30.7%.

The new target was mainly calculated based on the Commission's recommendation to align the national macroeconomic projections to those in the 'Ageing Report: Economic and budgetary projections for the EU-27 Member States (2016-2070)', correlatively decommissioning the coal-based units.

In order to reach the ambition level regarding the share of renewable energy of 30.7% in 2030, Romania will thus develop additional RES capacity of approximately 6.9 GW compared to 2015. To achieve this target, appropriate funding from the EU is needed to invest in the adequacy of electricity grids and flexibility in the production of RES-E. This goal will be achieved by deploying backup gas capacity and storage capacity, and by using smart electricity grid management techniques.

Romania has chosen to adopt a prudent approach to the level of ambition, taking into account the national particularities and the RES investment demand for both replacement of units that have reached the maximum operation period and new ones in order to achieve the targets of the NECP. The replacement of existing conventional power generation capacity with low carbon capacity will also result in the further promotion of renewable resources in the production of energy (e.g., wind or solar energy), including for heating in SACET type district heating systems, energy transit through the National Energy System (NES), and the use of heat pumps at source level, as well as using the energy market mechanisms.

The replacement of the existing power and heat generation capacity will also result in the reduction of own consumption for process purposes, in particular as a result of investments in the refurbishment and development of high-efficiency cogeneration units (including methane gas-fired ones).

Projections for 2030 show an increase of up to 5,255 MW in the wind capacity and of approximately 5,054 MW in the photovoltaic capacity.

Romania plans to make a fair contribution to the achievement of the decarbonisation target of the EU and will follow the best environmental protection practices. The application of the EU ETS scheme and compliance with the annual emissions targets for the non-ETS sectors are the main commitments to achieve the goal. For the sectors covered by the EU-ETS scheme, the overall emissions reduction target of Romania reaches approximately 44% by 2030 compared to 2005. ■

Role of Gas and Existing Gas Infrastructure in Supporting CE- and SE-Europe Towards Climate Neutrality by 2050

Picture source: GAZ-SYSTEM, Poland

GIE publishes an in-depth analysis of the role of gases and the existing gas infrastructure in supporting Central-Eastern- and South-Eastern- Europe towards climate neutrality by 2050. The research covers 10 EU Member States, including Austria, the Czech Republic, Germany, Greece, Hungary, Latvia, Poland, Romania, Slovakia, and Slovenia.

"This analysis shows that one thing is clear: there is no one size fits all solution. If we want to deliver climate neutrality by 2050, the specificities of all EU Member States must be considered when designing Europe's decarbonisation pathways. It will be a mistake if future legislation will ignore this. Only an inclusive and technology-neutral approach will help Europe deliver its 2050 goal. Each Member State will face its own battles and leverage its unique opportunities, but no one should be left behind," Boyana Achovski, Secretary General of GIE, states.

"For example, due to their transit character and historical circumstances, countries in South-Eastern and Central-Eastern Europe have their energy mix strongly based on coal. Therefore, the existing gas infrastructure will play an important role when switching from coal to natural gas to hydrogen. Building on our well-developed infrastructure, the gas assets will gradually accommodate growing shares of renewable and low-carbon molecules, including hydrogen. Today, it already provides increased flexibility in complementing the electricity systems by storing a huge amount of renewable and low-carbon molecules. On top of that, our pipelines, underground storage facilities and LNG terminals can be fit for hydrogen with some retrofitting and repurposing," she explains.

Achieving decarbonisation by 2050 requires significant efforts and commitment from all Member States and sectors. The report Decarbonisation in Central-Eastern and South-Eastern Europe: How gas infrastructure can contribute to meet EU's long-term decarbonisation objectives brings forward the decarbonisation potential of the gas infrastructure in that context. It presents multiple pathways in which a future-proof gas infrastructure could ensure resilient security of supply by integrating large volumes of renewable and low-carbon molecules, including natural gas, hydrogen, and biogases.

Report highlights

- By 2030: Switching from coal to gas is expected to be an intermediate step in transitioning to a zero-carbon economy. Coal-based total CO2 production in the ten selected countries equalled 645,9 Mt CO2 in 2018, which is equivalent to the overall emissions generated in France and Spain (656 Mt CO2).
- By 2050: Renewable and low-carbon gases will complement and slowly replace natural gas. These gases will play a major role in the future energy system as they will secure a baseload energy supply in these regions. Renewable gases like green hydrogen will gradually adopt the role of integrating the electricity and gas sectors, providing more flexibility within the entire energy system.
- The existing gas infrastructure supports the integration of renewable electricity in Europe and reduces the need for large investments into electricity grids – on both transmission and distribution levels.
- In the short-term, natural gas can have an immediate and tangible positive effect on the life of EU citizens: air pollution resulting from burning high-emission fuels (including NOx, SOx and fine particles) constitutes a serious health problem in many communities.
- Each country is moving towards decarbonisation in a different way. The common denominator is the shared awareness of the issues at stake, their urgency as well as a strong push for efficiency.

"The main goal of this report is to raise awareness about the current energy landscape and challenges in Central- and South-Eastern European countries and to showcase these aspects with concrete and actual data. In January 2020, we established a working group to exchange views on the decarbonisation in these respective regions and this platform enables us to provide input to various stakeholders - academia, policy makers, industry representatives. The discussions and the work so far enabled us to identify the optimal energy transition pathways for the regions," Piotr Kuś, Sponsor of GIE CH4 Area and GIE board member explains.

"The gas infrastructure plays an essential role in decarbonising the regions, both in the short- and long-term. It provides for the switch from coal to natural gas to hydrogen and it plays a role as an enabler of the energy transition towards low-carbon gases. It brings further benefits via fostering security

of supply and establishing a competitive EU energy system. Using the existing gas infrastructure offers a cost-effective solution for customers, which is crucial when fostering social acceptance and cost efficiency towards the energy transition. The coal-based power and heat plants generation causes a high level of pollution on top of CO2 and causes decrease of air quality standards. In that case, natural gas will play an important role as a solution for challenging fast and cost-effective mitigation of air pollution which is caused by a mixture of solid particles and various gases. Their reduction is of crucial importance as some air pollutants like particulate matter and NOx and SOx are poisonous for the people," he added.

Romania committed to contribute to the achievement of the decarbonisation target of the EU

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About GIE

Gas Infrastructure Europe (GIE) is the association representing the interests of European gas infrastructure operators. GIE members are active in transmission, storage, and regasification via LNG terminals of renewable and low-carbon gases, including natural gas and hydrogen. Gathering around 70 industry entities from 27 European countries, GIE perfectly embodies the multiple transitional decarbonisation pathways of the EU regions. The association's vision is that by 2050, the gas infrastructure will be the backbone of the new innovative energy system, allowing European citizens and industries to benefit from a secure, efficient, and sustainable energy supply.

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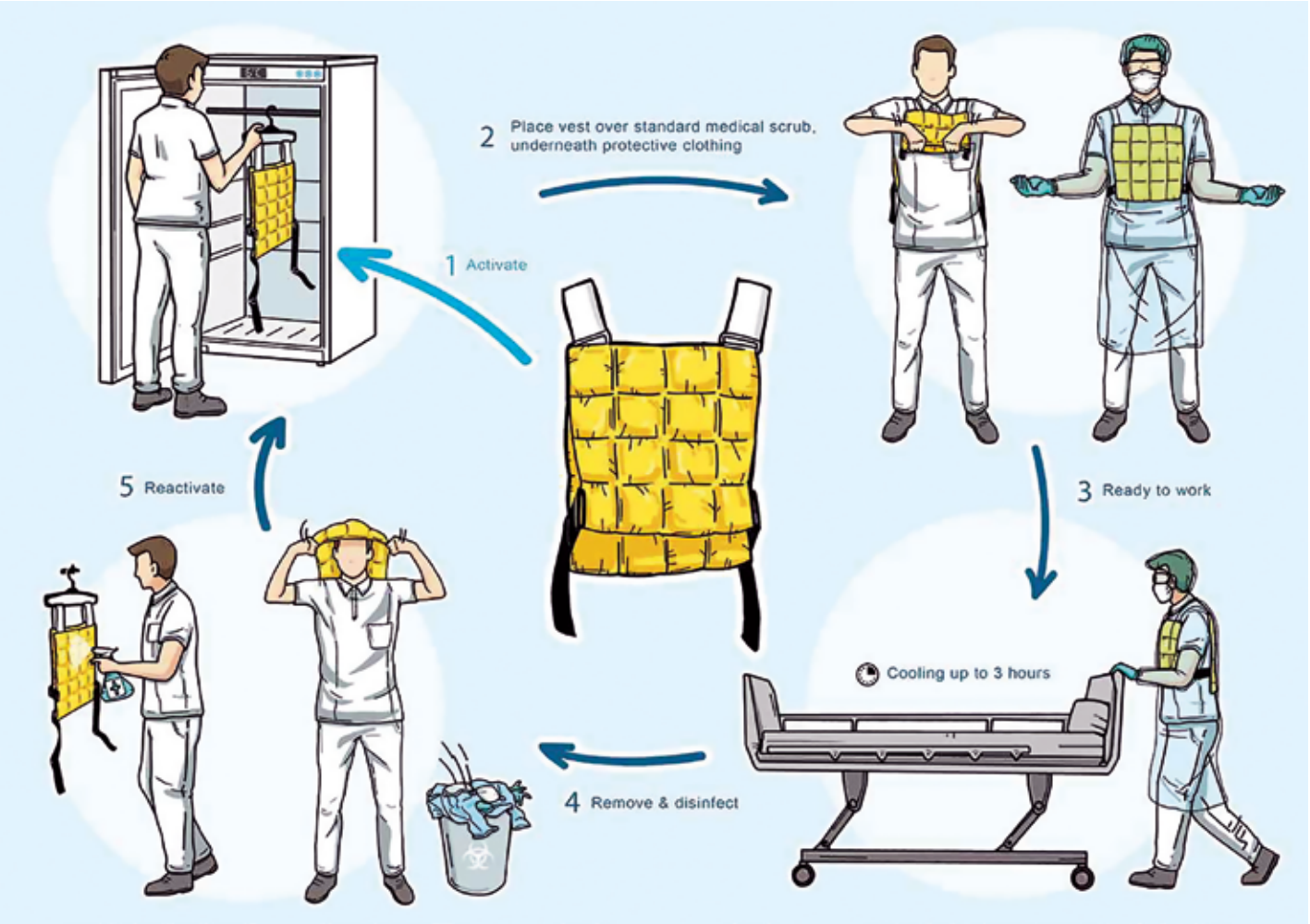
Cooling Vests Proven to Be the Solution Against Heat Strain Perceived by COVID-19 Nurses

In 2020, in the Netherlands a study by the Radboudumc (Radboud University Medical Center) and TNO (The Netherlands Organisation for applied scientific research) was done to see if cooling vests would alleviate heat strain. Something COVID-19 nurses were experiencing during their battle against the uprise of COVID-19 cases. The research paper with the results was published in December 2020 and covered the effects of cooling vests worn by COVID-19 nurses.

Presentation of how the 21°C phase change material (PCM) cooling vest was worn over the standard medical scrub (a) and underneath the personal protective equipment (b)

Like many other industries, nurses wear personal protective equipment (PPE) to safely perform their medical duties. During the COVID-19 outbreak they had to wear even more PPE to protect themselves from the infectious disease outbreak. The high evaporative resistance of PPE materials formed an insulated microclimate around the skin, leading to an impaired dry and evaporative heat loss capacity, and elevation of heat stress levels. The PPE-induced heat strain is associated with increased exertion, thermal discomfort, and displacement beyond the thermoneutral zone whereas sensory displeasure impairs effective decision-making, even in the absence of elevated core temperature.

During the study the effects of wearing a 21°C phase change material cooling vest on perceptual and physiological outcomes were assessed by following seventeen nurses at work, 5 males and 12 females. They all worked at the COVID care department at the Radboudumc and everyone was followed for two days. A day with and a day without wearing a cooling vest. The vests were worn over the regular medical clothing, but under the protective clothing.



Schematic overview of practical recommendations to implement, activate, and use a 21°C phase change material-cooling vest to attenuate perceptual heat strain encountered by nurses during infectious disease outbreaks like the COVID-19 pandemic. (a) Activate the cooling in the refrigerator. Make sure the front and backside of the cooling vest are hanging straight down with some air in between. (b) Wear the activated cooling vest over the standard medical scrub and adjust the fit using the horizontal buckles to ensure the entire cooling vest is contact with the skin surface. Put the personal protective equipment over the cooling vest. (c) Perform regular medical duties with cooling power up to 3 hours. (d) Remove the personal protective equipment and cooling vest and disinfect accordingly. (e) Reactivate the cooling vest by placing it back into the refrigerator (see step 1) after which it can be re-used again

The cooling vest had a temperature of twenty-one degrees and had a weight of 1.2 kg when the nurses put them on at the start of their shift. After three hours, during their break, the vest was replaced by a new one. The vests were prepared and activated by a mobile cooler and disinfected after use, with alcohol.

Less heat stress during a shift

The research showed that the vests did not reduce the core body temperature but did have a positive effect on the nurses. The heartrate went down, and the uncomfortable feeling of the heat went from 90% (without vest) to 20-30% (with vest). Almost all the nurses said that working while wearing the vest was comparable to doing their job without the extra protective PPE. Because of the success of the cooling vests, they now wear them every day at the COVID-19 departments of the Radboudumc.

Energy Efficiency Calculator for Household Energy Consumers in Romania

Household energy consumers now have at their disposal the Energy Efficiency Calculator, a unique tool in the Romanian market, created within the Efficient Romania program, carried out by Energy Policy Group, and sponsored by OMV Petrom. The new online tool helps household consumers calculate in three simple steps the average energy consumption for heating, hot water production and cooking, and also discover the approximate values of savings they could obtain in energy bills by thermal rehabilitation of the house.

The Energy Efficiency Calculator can be used by all household consumers in Romania, irrespective of the geographical area they live in or the type of home (single-family house or flat).

This tool created within the Efficient Romania project is conceived to be easy to use and understand by users. After going through three easy steps - choosing the location, describing the house and type of consumers - the user can see the average values of the annual energy, the estimated related expenses and environmental impact generated by this consumption, respectively the annual quantity of carbon dioxide emissions.

At the same time, the household consumer will find out how heat losses are distributed in the house - through walls, windows, floor, and roof. If the house is not rehabilitated, the Calculator also shows the energy savings that can be obtained after the thermal rehabilitation of the house, as well as how the carbon footprint decreases.

"The Energy Efficiency Calculator was created within the Efficient Romania program as an element of our public awareness campaign on benefits of energy efficiency. It is an intuitive online tool, easy to use, through which any user, after providing several main information about the place of residence and the type of home can immediately obtain some estimated data about energy savings that can be obtained by very simple measures," said Radu Dudau, director of Energy Policy Group and coordinator of the Efficient Romania project.

"Education and access to information, such as that one can obtain through the application launched today, help us adopt a more energy responsible behaviour. Energy efficiency of buildings is a mandatory step to fight climate change, in conditions in which buildings and the construction sector have a share of almost one third in the final energy consumption and about 40% of direct and indirect emissions, at global level. These are measures each one of us can adopt, in our own homes, to contribute to reducing energy consumption," said OMV Petrom CEO Christina Verchere.

For an efficient consumption of energy resources, beyond house rehabilitation, a very important component, often neglected, is that related to consumption habits. Therefore, also within this calculator, users will find useful advice to reduce energy waste.

The new tool can be accessed at calculator.romania-eficienta.ro

"Energy efficiency of buildings is a mandatory step to fight climate change, in conditions in which buildings and the construction sector have a share of almost one third in the final energy consumption and about 40% of direct and indirect emissions, at global level." - **Christina Verchere, CEO, OMV Petrom**

Given that we spend about 90% of our time within buildings, our health and wellbeing are strongly influenced by the quality of the environment. Therefore, beyond savings in energy bills, renovation of buildings - which means not only enveloping, but also upgrading the heating, cooling, ventilation, lighting systems etc. - also brings numerous benefits in terms of occupants' health. Also, measures of increasing the energy performance help reduce the impact of buildings on the environment, given that climate change has become a major threat globally.

About Efficient Romania

Efficient Romania is a private project, of national public interest, carried out by Energy Policy Group (EPG) in partnership with and with financing from OMV Petrom. The project started in the summer of 2019 and consists of carrying out a national program for the promotion of energy efficiency, until 2022. Efficient Romania aims to support achieving Romania's targets for 2030 in terms of reducing carbon emissions and increasing energy efficiency, both through information and education campaigns, and by carrying out concrete major renovation projects in public schools in different regions of the country. ■

Crude Characterization and Process Control by Topnir Technology

To remain competitive and profitable, refiners have to work more and more with opportunity crudes that provide a cheaper feedstock but are more challenging to process. Indeed, Crude quality is changing rapidly leading to the necessity to evaluate Crude oil quality more often. It becomes mandatory now to characterize Crude feeds more frequently and not to rely only on crude assays.

by **Dr. Didier Lambert, Ph.D.**

Based on more than 25 years of experience and expertise, a unique technology addresses this challenge flawlessly. Topnir technology is able to identify and characterize any Crude mixture. In less than one minute, neat crudes ratios are predicted from any crude mixture, as well as all properties such as full distillation curve (TBP), API, TAN, Sulphur, SARA and more. Moreover, the full Crude Assays, integrating distillation cut yields and properties, can be delivered as well.

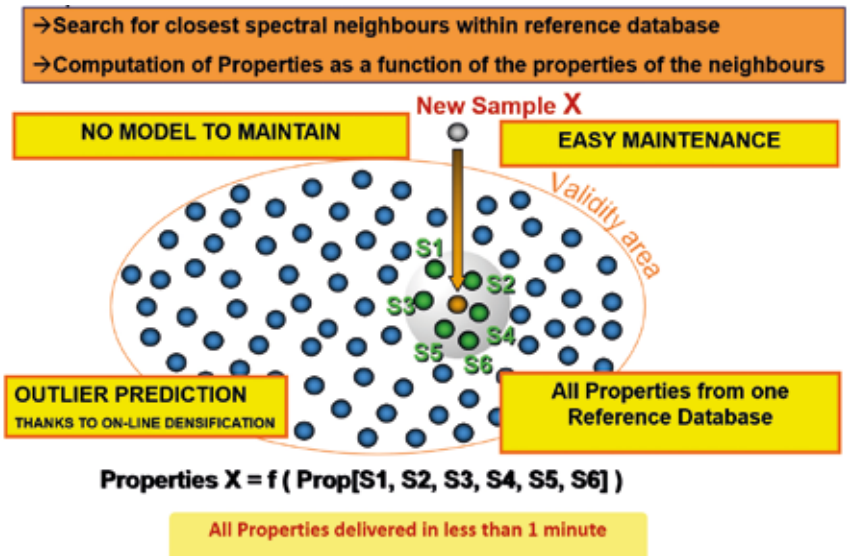
Topnir is a field proven on-line technology used worldwide for more than 25 years.

1. Topology modelling with NIR spectroscopy

The best spectral domain to analyse Crude oil was identified in the Combination Band, lying between 4.000 and 5.000 cm-1, which provides the best information in terms of chemistry, accuracy and robustness.

- The spectrum of any product is directly linked to the physical and chemical properties of this product. It is like a fingerprint of the product, each product has a unique fingerprint, like any human person. Topology modelling is based on

Figure 1 – Spectra matching for prediction of Properties



spectra matching, working through pattern recognition and database densification. It means any spectrum is used as a fingerprint of the sample.

• Thus, this spectrum is positioned in a database and characterized with the closest neighbour spectra. Then the full set of properties of any new sample is predicted from the average of properties of closest spectra (see Figure 1). Indeed, the closest spectra means samples having the closest physical and chemical properties.

Only one single model is used for all the properties, the quality prediction being performed from a reference database. The fact to have one single model for all the properties gives a better robustness and reliability to the prediction.

This approach keeps the inter-correlations between the properties and makes sense in terms of sample chemistry.

These spectra matching approach allows for instance the prediction of the full distillation curve as per ASTM Standards by keeping the continuity of distillation process.

Topology model is not limited with the number of properties as it deals with a single reference database. So, the number of properties can be easily extended if required without impact on modelling effort.

2. Crude Distillation Unit, NIR spectroscopy and Topology model

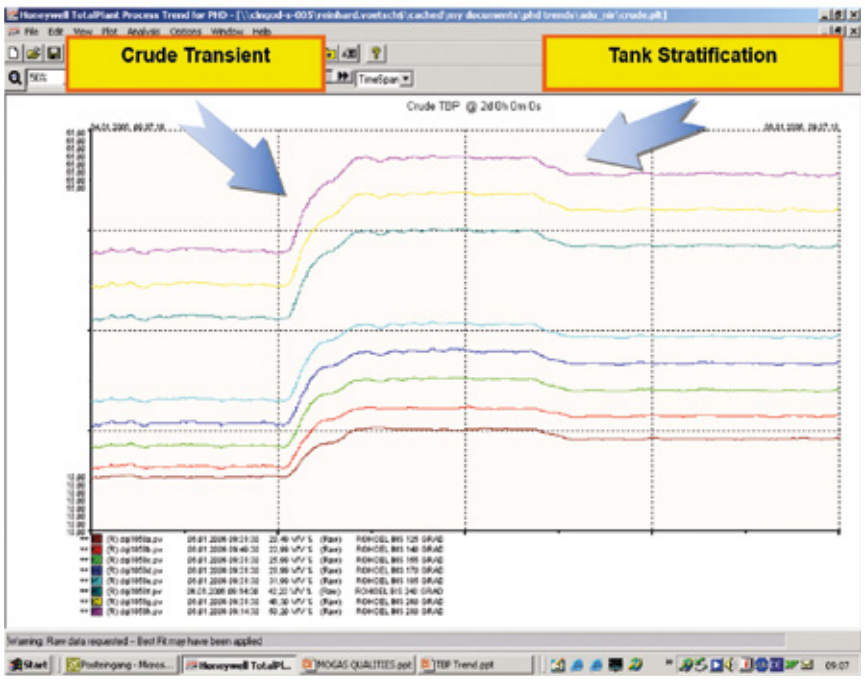
The early applications of Topnir for crude quality have covered:

- Oil production sites with variable quality at well clusters, the objective being to have a crude commercial grade at gathering stations
- Crude Distillation Units (CDU) in refineries with diversified crude slate, the primary objective being to avoid transient throughput reduction during crude swings

The first on-line NIR application was installed at the BP Lavera refinery in 1992, using the topology modelling technique. Typically, about 40 quality determinations at high frequency on crude feed and rundowns were used by the CDU advanced control application.

A screen shot from DCS on TBP on-line prediction is shown hereafter on Figure 2.

Figure 2 – Crude TBP Points monitoring during Crude Transient



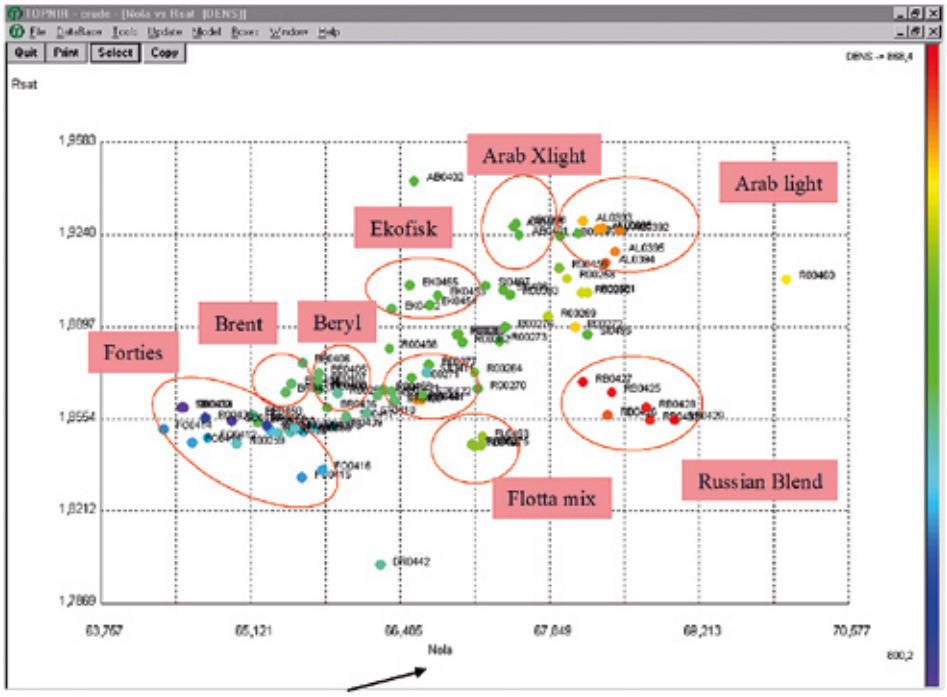
This figure shows the efficiency of Crude feed quality monitoring during a transient between two Crude Oil tanks. Even tank stratification can be detected and quantified as shown by Figure 2 thanks to Topnir. This analysis has no equivalent in terms of on-line system giving the full TBP every minute.

The precision and accuracy of the TBP curve is coherent and in agreement with the relevant ASTM Standards methods.

Another example of the capability of Topology is shown on Figure 3 with a very efficient spectral discrimination between origins of Crude Oils. This achievement is possible because Topology software uses the whole NIR spectra as well as specific proprietary axes to plot the samples.

A typical validation stage display is shown on Figure 4 where all properties predicted by Topnir are compared with Conventional results. All properties match the standard measurements from Conventional analysers perfectly. Thus, critical properties such as TAN, Simdis, Assay Yields, Sulphur, API, density are accurately predicted on-line by Topnir every minute.

Figure 3 – Crude Oil identification and discrimination



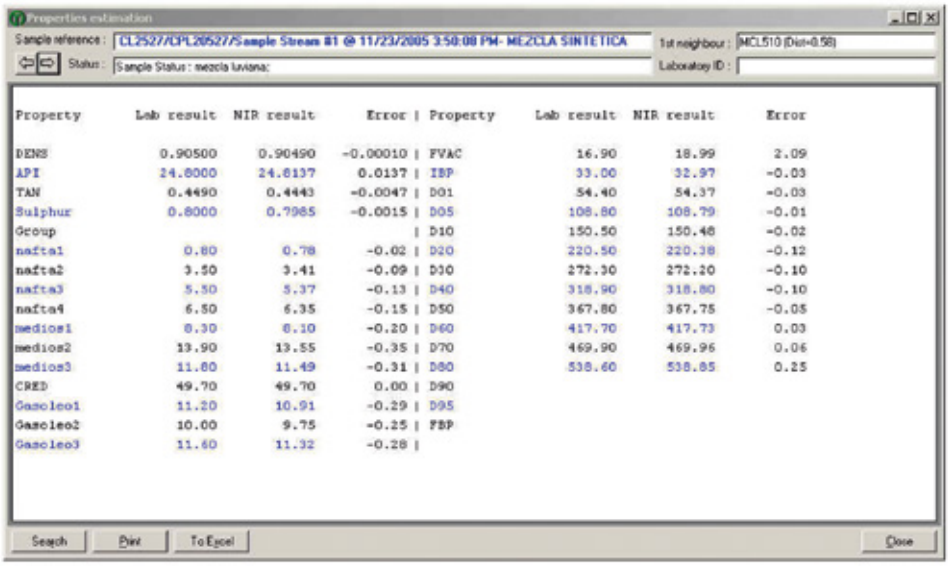


Figure 4 – Crude Oil analysis by Topnir

All the advantages described above allow reliable Advanced Process Control (APC) with effective closed loop control. It can be mentioned:

- Improvements in:
  - Fractionation control, effectively using side streams qualities in real time
  - Cut point control by APC
  - Response to crude mix quality swings, reducing transient products down grading such as Gasoil and Residue
- Yield increase of selected streams without quality impact, in particular Cloud and Freeze Points
- Throughput Increase by better swing procedure, using real time TBP of Crude mix
- Better tuning of LP and Scheduling models

All these advantages can easily capture benefits of several million USD per year.

3. Other Applications of TOPNIR

Several other Topnir applications have emerged in a context of increasing crude slate and logistics complexity.

In particular, crude traders have diversified their supply sources with opportunity crudes (including very heavy, high Sulphur), distressed cargoes, condensates, shale oil and other unconventional crudes. The receipts and storage facilities have generally not been designed to cope with such a diversified crude slate and the crude tank farm can face a severe problem of crude segregation and mitigation of compatibility issues.

Thus, Topnir technology is also applied in Crude receipt and storage, using Topnir fingerprints to check in real time the conformity of Crude oils upon arrival.

Crude blending is used in some refineries to provide adequate feed quality to CDU and to saturate the constraints. In that respect, Topnir spectral blending is a very efficient tool to compute the optimal blend recipes.

Requirement for fast Crude assay prediction is really a challenge for each site. Using Topnir technology enables more up-to-date crude oil assay information and a better prediction of cuts on non-linear properties. Thus, Topnir is able to predict the full Crude Assay, integrating distillation cut yields and properties, only from Crude oil spectra, representing hundreds of properties in less than one minute.

4. Conclusion

Field proven Topnir solutions enable the capture of significant benefits in a Refinery:

- For Planning and scheduling, with a better tuning of linear model for planning and optimization of crude slate as well as a faster crude quality information to scheduling system for better adherence to optimal plan
- For Crude tank farm, with a more efficient crude segregation and crude compatibility management as well as an easy detection of crude tanks stratification
- For CDU, it allows faster crude swings without loss of throughput and with more stable downstream operations

Typical benefits collected from installed basis are within the range of several million USD per year.

Topnir on-line applications allowing molecular characterization are becoming essential for future complex crude slates and crude to chemicals plants.

Topnir technology was initially invented and developed by the founders in BP and was subsequently bought out to establish Topnir Systems. With more than 20 years of business experience worldwide alongside every major Oil & Gas Company, their skills and expertise into NIR systems and modelling has led to an extensive and diverse installed base with the delivery of more than 150 applications and 40 patents.

In 1989, Topnir was the first world-wide to implement an online application designed to measure and control octane number for gasoline production, as well as first NIR on-line application worldwide on Ethylene Plant Naphtha feed (1989) and Crude Oil Distillation - CDU (1991).

DR. DIDIER LAMBERT

Dr. Didier Lambert, Ph.D., is the CEO and founder of Topnir Systems Company. He has over 30 years of experience in Refining and Petrochemicals, including International Project Management and Business Development in BP and ABB Group. Dr. Lambert is the inventor of more than 30 patents and the recipient of the 1989 Petroleum Engineer's Award for Octane Number prediction by NIR.

didier.lambert@topnir.com

OMV Petrom to Act as Operator of Neptun Deep Block if ExxonMobil Accepts Romgaz's Offer

If ExxonMobil accepts Romgaz's offer, OMV Petrom will act as operator of the Neptun Deep Block.

OMV Petrom, the largest energy company in South-Eastern Europe, and Romgaz, the largest gas producer and main gas supplier in Romania, cooperates to unlock Black Sea gas resources. These are of the essence for Romania's energy security, for the success of energy transition and to generate economic growth.

"The Black Sea is a unique opportunity for Romania, and we are committed to contributing to its materialization. OMV Petrom has an experience of over 40 years as operator in the Black Sea and also benefits from international capabilities in deep-water operations of OMV group," said OMV Petrom CEO Christina Verchere.

"We are ready to be equal partners to implement this strategic project. If our offer is accepted, OMV Petrom will become operator of the project," mentioned Romgaz CEO Aristotel Jude.

OMV Petrom is the largest energy company in South-Eastern Europe, with an annual Group hydrocarbon production of 53 million boe in 2020. The Group has a refining capacity of 4.5 million tons annually and operates an 860 MW high efficiency power plant. The Group is present on the oil products retail market in Romania and neighbouring countries through 793 filling stations, at the end of 2020, under two brands – OMV and Petrom.

OMV Aktiengesellschaft, one of the largest listed industrial companies in Austria, holds a 51% stake in OMV Petrom. The Romanian state, through the Ministry of Energy, owns a 20.6% stake in OMV Petrom, Fondul Proprietatea has 7% and 21.4% is traded freely on the Bucharest Stock Exchange and on London Stock Exchange.

OMV Petrom is the largest contributor to the state budget, with contributions of around EUR 32 billion in taxes and dividends paid between 2005 and 2020.

Since 2007, OMV Petrom has included corporate responsibility principles into its business strategy. Between 2007- 2020, the company has allocated approximately EUR 72 million to develop communities in Romania, focusing on environmental protection, education, health, and local development.

On July 29th, 2020, OMV Petrom announced its support for the recommendations issued by the Task Force on Climate-related Financial Disclosures (TCFD) regarding risks and opportunities on climate change.

S.N.G.N. ROMGAZ S.A. is the largest gas producer and main gas supplier in Romania. The company is admitted for trading on the Bucharest Stock Exchange (BSE) and on London Stock Exchange (LSE). The main shareholder is the Romanian state, with a 70% stake.

The company has an extensive experience in gas exploration and production, its history starting more than 100 years ago, in 1909. ROMGAZ conducts geological exploration for the discovery of new gas fields, produces gas by exploiting the fields within the company's portfolio, stores gas underground, makes interventions, workovers and special well operations and provides professional services for technological transportation.

As of 2013, Romgaz extended its activity by assimilating the Iernut power plant, thus becoming an electricity producer and supplier. ■

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An Opportunity in the Circular Economy: E-Waste

Electronic waste, also called e-waste, various forms of electric and electronic equipment, is an important point for discussion on the circular economy agenda. In a circular economy, the intention is to produce no waste or pollution. Instead, products, parts, and materials are used, cared for, repaired, reused, and recycled as much as possible.

by **Daniel Lazar**

Electronic devices and electrical equipment, from household appliances to small networks of solar panels or 'smart' phones and other ITC products, bring huge benefits to humanity and provide new opportunities for development. These are valuable tools for society, for increased welfare, extension of education, provision of quality health care services, facilitating trade, as well as addressing challenges generated by climate change. Digitization and ensuring large-scale connectivity are also essential for achieving the 17 sustainable development objectives.

But, on their entire value chain, from the extraction of valuable ores (iron, copper, gold, etc.), included in the composition of electronic products, to their production, transport, retail sale, consumption and elimination from the circuit, there are large quantities of wasted resources, and the system generates many negative effects and a strong ecological footprint. Electronic and electrical equipment disposed of contain potentially harming materials, which pollute the environment and increase health risks for those working in the field of recycling. Every year, approximately 50 million tons of electronic and electrical waste (e-waste) are produced globally, the equivalent in weight of all commercial aircraft ever built.

It should know that, for example, in the EU, less than 40% of total electronic waste is recycled, the rest not being subject to a sorting process. The recycling rate varies from one Member State to the other. According to Eurostat (2020), in 2017 Croatia was the country with the highest rate of e-waste recycling, of 81.3%, at the opposite side being Malta with 20.8%. Romania in 2016 reported a rate of only 25% according to the same sources, ranking on the penultimate place. If nothing more is done compared to what is done at the moment, the quantity of waste at global level will double by 2050, according to the report 'A New Circular Vision for Electronics - WEF, 2019'.

E-waste should be seen as an opportunity. For example, there is 100 times more gold in one ton of mobile phones than in a ton of ore from which gold is extracted. Collection of resources from electronic equipment produces substantially fewer carbon dioxide emissions than mining. Electronic goods in operation and their components are worth more than the materials they contain. Therefore, extending the life of products and the reuse of components brings an even greater economic benefit. There is also a possibility to build a more circular system, in which resources are not extracted, used and thrown away, but capitalized on and reused in ways that create decent and sustainable jobs.

In addition to the directive restricting the use of hazardous substances in electrical and electronic equipment adopted in 2011 and a set of regulations requiring importers to carry out certain general supplier checks, in the context of respect for human rights, the European Commission includes as a priority in the new Circular Economy Action Plan (CEAP) the reduction of electronic and electrical

waste. The proposed plan establishes immediate objectives, such as eco-design, the "right to repair" and improving reusability in general, the introduction of a common charger for mobile phones and other similar devices, and the creation of a reward system to encourage the recycling of electronic products.

The amount of waste electrical and electronic equipment (widely known as WEEE or e-waste) generated every year in the EU is increasing rapidly. It is now one of the fastest growing waste streams.

EU rules on WEEE aim to contribute to sustainable production and consumption. They address environmental and other issues caused by the growing number of discarded electronics in the EU.

Background

Waste from electrical and electronic equipment includes a large range of devices such as computers, fridges and mobile phones at the end of their life.

This type of waste contains a complex mixture of materials, some of which are hazardous. These can cause major environmental and health problems if the discarded devices are not managed properly. In addition, modern electronics contain rare and expensive resources, which can be recycled and re-used if the waste is effectively managed.

Improving the collection, treatment and recycling of electrical and electronic equipment (EEE) at the end of their life can: improve sustainable production and consumption; increase resource efficiency; contribute to the circular economy.

The EU has introduced the WEEE Directive and the RoHS Directive to tackle the issue of the growing amount of WEEE.

Objectives

The WEEE Directive aims to contribute to sustainable production and consumption by:

- Preventing the creation of WEEE as a first priority
- Contributing to the efficient use of resources and the retrieval of secondary raw materials through re-use, recycling and other forms of recovery
- Improving the environmental performance of everyone involved in the life cycle of EEE.
- In order to achieve these objectives, the Directive:
- Requires the separate collection and proper treatment of WEEE and sets targets for their collection as well as for their recovery and recycling
- Helps European countries fight illegal waste exports more effectively by making it harder for exporters to disguise illegal shipments of WEEE
- Reduces the administrative burden by calling for the harmonisation of national EEE registers and of the reporting format

Circular Economy Action Plan

The EU's new circular action plan paves the way for a cleaner and more competitive Europe.

The European Commission adopted the new circular economy action plan (CEAP) in March 2020. It is one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth. The EU's transition to a circular economy will reduce pressure on natural resources and will create sustainable growth and jobs. It is also a prerequisite to achieve the EU's 2050 climate neutrality target and to halt biodiversity loss.

The new action plan announces initiatives along the entire life cycle of products. It targets how products are designed, promotes circular economy processes, encourages sustainable consumption, and aims to ensure that waste is prevented, and the resources used are kept in the EU economy for as long as possible.

It introduces legislative and non-legislative measures targeting areas where action at the EU level brings real added value. ■

Energy Transition vs Risk of Having a Two-speed Europe

With the onset of the industrial revolution, the lifestyle of Western societies was inextricably linked to the presence of readily accessible energy. The model of 'modern' and energy-consuming civilization has spread widely across the globe and continued to gain ground in developing countries. This was possible due to a source of energy provided, mainly, by fossil fuels. History shows that humanity regularly experiences energy crises. The problem is no longer the depletion of conventional gas sources (especially due to discovery of shale gas), but mainly the consequences caused by energy consumption, which affects the environment. The recent explosion of unconventional fossil fuels - oil sands, shale gas, deep offshore drilling - has led to increased risks on the environment, as well as a citizen protest movement. At the beginning of the 21st century, a large-scale energy transition becomes more than necessary. It must be part of the transition to decarbonized economy, essential for climate stabilization. However, fossil fuels dominate the fuel mix. Almost 77% of the energy needs of a European is satisfied by oil, natural gas, and coal. Nuclear power ensures 14% and the rest of 9% is provided from renewable energy sources.

by **Rona Rita David**

In Romania, CO2 emissions from fossil fuels fell by 2% during 2018-2019, due to a reduction by 9% in the energy industry. However, they increased by 6% in the transport sector. In total, CO2 emissions in the country fell by 25% since 2005 and by 58% during 1990-2020. The worst performance is found in the transport sector, where emissions increased by 59% in the last 30 years, period during which the reduction of emissions in industry and energy, constructions and other industrial segments was significant, in the last 15 years, according to EDGAR (Emissions Database for Global Atmospheric Research) report.

Romanians and the European Green Deal

By 2050, Europe should be an emission-free continent. It seems idealistic and maybe it is idealistic because it is a target aimed to mobilize us and in which several practical measures are included. In Romania, the reactions, when it comes to the Green Deal, are like "you ask us to use the cars less, but we don't have highways yet," or "we haven't started Black Sea gas exploitation and now we need to think about the next stage," or "you

mention overconsumption and in fact we face energy poverty."

The reactions are natural, but they cannot cancel the importance of the Green Deal. The main arguments include the fact that European partners and scientists say we have no choice if we want our planet to be habitable for our children, grandchildren, and great-grandchildren. Romania has chosen to be part of the EU knowing very well that it is a group of developed countries. Therefore, we have chosen to sit at the table with these countries and we need to be able to give some answers. In fact, it is a flexible deal, it is not carved in stone, so we still can participate in this European debate. We could find inspiration in the digital sector as a model, to help us take the next step (leapfrog). The Green Deal is a wide hat that also includes measures against excessive use of plastic, promoting biodiversity and measures in the field of transport etc.

Energy transition in a Romania with a 20% share of coal

Cristina Pruna, Deputy Speaker of the Chamber of Deputies, believes that: "The European Green Deal is a topical issue at European level, but also in Romania. When we talk about the European Green Deal we tend to look to the future (towards 2030 or 2050), but things have already started to change. There have been several preliminary steps, such as the Paris Agreement (2015), but also the other targets that have been established at EU level. We therefore realize that things are already taking place. The pandemic context has brought changes in terms of food and environmental impact: we work more from home, we use the cars less."

The Green Deal starts from a reality: between 1990 and 2018, the quantity of greenhouse gases fell by 23%, while the European economy grew by 61%. This proves that there are perspectives and economic growth can be decoupled from the use of fossil fuels. Conclusion: the objective of neutralization of CO2 emissions could be achieved in theory.

"It is important that these ambitious targets do not affect too much the industry and the millions of jobs in the EU and therefore in Romania. There has been a lot of debate on this process of transformation on polluting industries, such as production of fossil fuels (coal) and we look increasingly more at natural gas. Energy transition is essential for reaching the climate goals, but from the national perspective we are trying to find solutions. Romania still has in the electricity production mix a coal share of about 20% on which we depend, especially in situations of low water flow or lack of wind

"The European Green Deal is a topical issue at European level, but also in Romania. When we talk about the European Green Deal we tend to look to the future (towards 2030 or 2050), but things have already started to change. There have been several preliminary steps, such as the Paris Agreement (2015), but also the other targets that have been established at EU level. We therefore realize that things are already taking place. The pandemic context has brought changes in terms of food and environmental impact: we work more from home, we use the cars less."

Cristina Pruna, Deputy Speaker of the Chamber of Deputies

or sun, when renewable energy cannot be produced. On the other hand, reduction, and elimination of this type of energy could have a social impact, especially in Jiu Valley, in Gorj, monoindustrial areas where most jobs depend on this industry. Unfortunately, now we don't have much to put instead, and we should have analyzed how to boost other economic activities. Obviously, there are plans in this regard. We have the Just Transition Fund, but other local measures are also needed. For Romania, natural gas is still a key resource for achieving the energy transition. Romania ranks 2nd in Europe in terms of natural gas production and I believe this potential must be further capitalized, natural gas must still be seen as a transition fuel. We have been talking for years about Black Sea gas resources and unfortunately these investments haven't been started due to a legislation that did not stimulate investors to take this step. Instead, I hope that soon we will amend this law in Parliament (it is a project of the Ruling Coalition), so that resources are exploited. We are still talking about the expansion of smart gas networks. There are European funds of EUR 1bn to implement this project and to move forward with the interconnection of gas infrastructure to the European one. Romania was one of the first countries to fulfill their targets in terms of renewable energy in the final gross energy consumption for 2020," added Cristina Pruna.

Just like Poland, Romania started a process of gradual elimination of coal, and in recent years the country has been importing increasingly more gas. Facing an ever-increasing demand and from desire to expand its gas network, Romania wants to find other sources. This is the moment when Black Sea gas comes back in the spotlight and becomes a practical solution thanks the discovery of a large deposit in the deep waters of Neptun block (2012), estimated between 60 and 80 billion cubic meters.

The private sector will have to participate in supporting energy transition

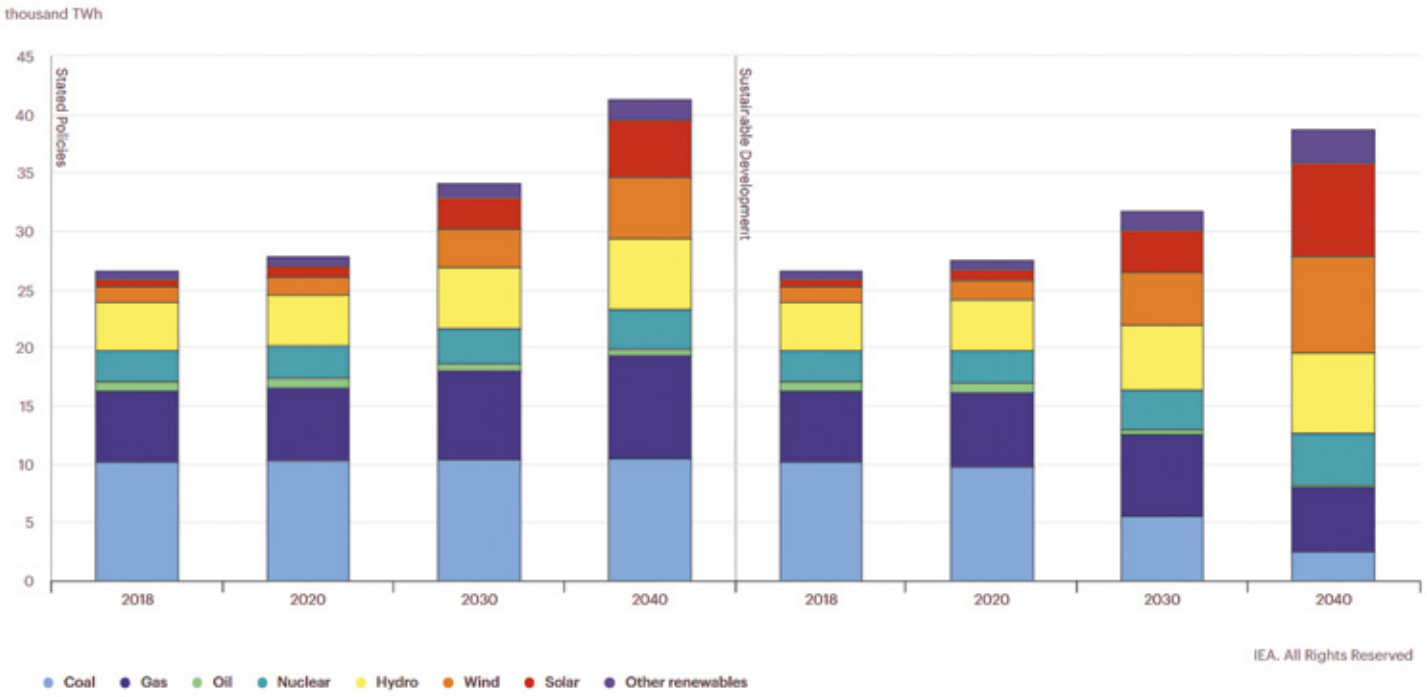
"In the context of Black Sea potential, we are currently considering a law to create the framework for investments in offshore wind power capacities in the Black Sea to be feasible. We are also considering an amendment of the Offshore Law so as to boost new onshore production capacities, wind and solar, by regulating some types of bilateral contracts. It is important to also take steps in terms of energy production from hydrogen. We have a European strategy, launched in 2020, there is also a Hydrogen Alliance that includes Romanian research centers. Moreover, the Ministry of Energy is working on a hydrogen energy strategy. In Romania there is a legislation that allows consumers to become small energy producers to ensure their own consumption and surplus to be sent into the grid. There is a program that subsidizes photovoltaic panels (EUR 4,000) which, unfortunately, is currently blocked at the Environment Fund Administration. It is important to know that this energy transition must be accessible for both consumers and companies and obviously it is essential to make sure that Romania is fully integrated, interconnected and digitized in the European market, so that these costs are not a burden for the entire economy. The good news is that we have multiple European sources of funding: Just Transition Fund, NRRP (National Recovery and Resilience Plan), with EUR 30.5bn, and the Multiannual Financial Framework. It is not enough, so the private sector will also have to support this transition, which involves the creation at legislative level of this framework for private investors to be willing to invest," concludes Cristina Pruna.

Fossil energy still under discussion

Except for the fact that a new obstacle emerges, as the European Union changes direction, although energy security and independence have been privileged in recent years, fight against carbon emissions is the one that takes precedence. With the Green Deal for Europe and the future recovery and resilience plan, fossil fuels, which include natural gas, are banned. The European Investment Bank (EIB), which has granted loans for the Black Sea oil and gas project, has announced that it would no longer finance new gas extraction projects in 2021. The announcement hasn't been made yet by the European Bank for Reconstruction and Development (EBRD), which has also financed such projects. The discussion remains open in Europe in terms of natural gas. Countries like Poland, the Czech Republic and Romania see "energy transition" as the switch from polluting energy to cleaner energy. Officials in Brussels must be persuasive, as we will still need gas, because renewable energy remains intermittent and we need to find more flexible resources, and this is the case of hydrogen or biogas, which can be "cleaner". But investment in these types of gas costs a fortune, which will be felt in the price imposed on consumers.

At least until 2040, coal, oil and natural gas will continue to produce up to 77% of the necessary energy, according to Energy Information Administration (EIA). While countries with solid economies reduce their fuel consumption, not the same is expected for developing countries. Despite this apparent balance, total energy consumption is estimated to grow by almost 30% in the following

Electricity generation by fuel and scenario, 2018-2040



20 years.

Therefore, globally, natural gas will register the biggest growth as primary energy source after renewable energy. According to EIA, use at global level of oil and other liquid fuels will increase from 90 million barrels per day (bpd), the value in 2015, to 104 million bpd in 2030 and 113 million bpd by 2040. Renewable energy being a cleaner source than coal or oil, many states switch their attention to these resources as they will implement national or regional plans to reduce carbon dioxide emissions.

In terms of global coal production, EIA estimates that it will remain constant, at approximately 9 billion tons until 2040, and consumption will probably grow by 0.2% per year until 2025 and then start to fall.

Romania will not give up energy production in thermal power plants and will continue to use coal, but under the conditions and based on decisions of the European Commission transposed into the current legislation. The new EIB investment policy will prevent financing for most projects based of fossil fuels, including those on natural gas, which gives a blow to projects worth billions of dollars in this sector.

One of the conditions imposed by EIB for projects applying for financing is for CO2 emission to be lower than 250 grams for each kilowatt hour of energy produced, which means that it will cease financing for gas-fired power plants, using traditional technologies.

Two years ago, Romania was criticized by the European Commission that it aimed to increase only to 27.9% the share of energy production from renewable resources, by 2030, while it could increase it to 34%. The energy strategy provides that in 2030 the share of production based on fossil fuels will fall from 9% to 11%, but the new financing conditions of EIB lead to an increase in the cost of investments by billions of euros.

The greatest risk, a two-speed Europe

"Although the European Green Deal seems a top-down initiative (from Brussels to the Member States), I think the Green Deal is in equal extent a bottom-up initiative. The initiative will be successful if account is taken of Member States' views, to concretely deliver the fulfillment of the goals undertaken. While several years ago we wanted, primarily, electrification and access to energy and only then were we talking about energy security, today energy production from non-polluting sources becomes extremely important. Romania must adopt a strategy because everyone wants to know where we're heading. There should be a cross-party agreement on the energy strategy. It is the only way to achieve

this goal. If every time a new government restarts everything from scratch, we won't make it too far. Transition will have certain impact: conventional production capacities will have to be removed, which will have to be replaced by something else. We have the experience that proves that Romania can make this transition, which will be gradual (thinking only about the time needed to make the construction of new production capacities such as gas turbines, which take years)," believes Victor Grigorescu, former Energy Minister.

And yet, there are significant obstacles in the way of this energy transition. There is increasing reluctance among population regarding energy measures leading to an increase in electricity prices.

"If we miss the target of achieving a realistic step-by-step transition, returning to the goal will be difficult. If we remove only production capacities creating social problems without putting anything instead or if we outbid the technological advance in certain sectors (e.g., hydrogen), the risk can be of two types: system problems and problems with assuring resources in certain periods, as well as the risk of losing the confidence of citizens in the transition process. For people, the notion of transition will be mistaken for the loss of jobs and for monoindustrial areas remaining in decay and with no future. An opportunity is digitization, which brings an additional service to consumers by democratizing the market. Another risk is posed by the fact that we still have problems with energy poverty, with the sustainability of bill payment. What is even tougher is the direct proportionality between energy poverty and high consumption caused by the lack of resources to purchase, perhaps, quality equipment. Romania has a mix of energy production (gas, nuclear power etc.) that is still balanced, which leads to the implementation of a transition with own resources. We are currently involved in the decarbonization process. Complexul Energetic Oltenia is in full process of negotiation of a decarbonization plan, with the European Commission. The great risk is that, at the end of this transition, we could have a two-speed Europe: that of the West focused on state-of-the-art technologies, and that of the East, without the possibility to access them, so that we are forced to ask ourselves the key question whether the EU represents a common future for Member States. The answer should be undeniably yes," says the former Energy Minister.

From 54,000 to 4,000 miners in the following 30 years

In January this year, Energy Minister Virgil Popescu stated: "Romania supports the European Green Deal, but coal represents now an important part of the Romanian energy mix. To be able to switch from coal to green energy we need a period as transition fuel, which is natural gas, Romania being a gas producer. Romania has joined other 16 states that support the use of natural gas as a transition fuel. For Hunedoara and for Jiu Valley we have a clear program of reorganization of Complexul Energetic Hunedoara. Basically, based on Ordinance 60, the company will be split in two: Midia power plant will go to local authorities and be modernized, meaning that the coal-fired groups will switch to gas, and Paroşeni power plant together with the four mines will form another complex that already fulfills the environmental standards. But in Paroseni too we can go further by using renewable energy by creating a dam and a hydropower plant where a group can switch to gas. From the four mines, two are already in closing procedure and the other two operate normally. We don't have a deadline and we avoided to establish a deadline in Brussels, because I want to move forward step by step and see what the other European states are doing. We cannot say that tomorrow we will shut down coal, because it would endanger the security of the national energy system. But we are determined to implement the European Green Deal, reduce CO2 emissions, and assume the proposed targets. As far as jobs are concerned, it is obvious that they will be affected. In the period of transition to green energy, Romania will use the Just Transition Fund, made available by the European Union to efficiently manage the reforms assumed and to retrain the personnel in areas that will be affected by giving up coal. The personnel will be relocated and retrained. I want to see built in Romania solar panels, photovoltaic cells which we currently import, and this will also generate jobs."

Without investments in recent years

While the Romanian Government is in full process of preparing the budget for its national recovery and resilience plan, NGOs such as Bankwatch, WWF and Greenpeace took a stand against funding for gas extraction projects. The representatives of NGOs believe that there are so much potential renewable energy sources, in offshore Black Sea wind power, for example, but there was almost no investment in recent years, especially in research. Transition means considering funding for research and development, funding for digitization and schools for training professionals in new energy sectors. It is not only a matter of making a transition by building 300 kilometers of pipeline, otherwise we will get stuck in the same model and nothing will change. ■

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A member of Bouygues Construction

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  Basic and precision installation of all components, such as devices, columns, pumps and compressors
- Steel construction
- Installation of cracking and reaction furnaces
- Tank farm construction
- System integration, operating checks and commissioning
- Plant revisions
- Pipeline and bracket corrosion protection
- Insulation
- Scaffolding

Provisional Agreement on the European Climate Law

As one of the key elements of the European Green Deal, the European Climate Law enshrines the EU's commitment to reaching climate neutrality by 2050 and the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. This agreement on the European Climate Law is a key milestone for the von der Leyen Commission, delivering on one of the commitments announced in the President's Political Guidelines in July 2019.

I am delighted that we have reached an agreement on this core element of the European Green Deal. Our political commitment to becoming the first climate neutral continent by 2050 is now also a legal commitment. The Climate Law sets the EU on a green path for a generation. It is our binding pledge to our children and grandchildren," President Ursula von der Leyen stated.

"This is a landmark moment for the EU. We have reached an ambitious agreement to write our climate neutrality target into binding legislation, as a guide to our policies for the next 30 years. The Climate Law will shape the EU's green recovery and ensure a socially just green transition. This agreement also reinforces our global position as a leader in tackling the climate crisis. When world leaders gather on Earth Day, the EU will come to the table with this positive news, which we hope will inspire our international partners. This is a good day for our people and our planet," Executive Vice-President for the European Green Deal, Frans Timmermans, added.

In addition to the 2050 climate neutrality target, this deal strengthens the European framework for climate action by introducing the following elements:

- An ambitious 2030 climate target of at least 55% reduction of net emissions as compared to 1990, with clarity on the contribution of emission reductions and removals
- Recognition of the need to enhance the EU's carbon sink through a more ambitious LULUCF regulation, for which the Commission will make proposals in June 2021
- A process for setting a 2040 climate target, taking into account an indicative greenhouse gas budget for 2030-2050 to be published by the Commission
- A commitment to negative emissions after 2050
- The establishment of European Scientific Advisory Board on Climate Change, that will provide independent scientific advice
- Stronger provisions on adaptation to climate change
- Strong coherence across Union policies with the climate neutrality objective
- A commitment to engage with sectors to prepare sector-specific roadmaps charting the path to climate neutrality in different areas of the economy

Background

The Commission tabled its proposal for a European Climate Law on 4 March 2020. Once this provisional agreement is formally approved by Parliament and Council, the European Climate Law will be published in the Official Journal of the Union and will enter into force. ■

KAESER COMPRESOARE®

Portable Compressor for Industrial Applications (I)

Image: KAESER KOMPRESSOREN SE

The M 27E proved the perfect portable solution for UNIMATIC.

Compressed Air for FFP2 Protective Masks

From the onset of the Coronavirus pandemic, the demand for FFP2 protective masks shot up rapidly. UNIMATIC Automationssysteme GmbH, a successful manufacturer of customised assembly, production, and testing systems from the Bavarian municipality of Grub am Forst, were able to erect the necessary production systems from scratch in next to no time. Their existing compressed air supply, however, could not cope with the sudden increase in demand. Ever fast and flexible, KAESER were on hand to assist. Their unconventional solution? A MOBILAIR M 27E portable compressor with electric drive.

As the saying goes, "Extraordinary situations call for extraordinary measures", and UNIMATIC are great believers in this maxim. In March of 2020, this 40-year-old family business was on the receiving end of a particular challenge, which would require all the considerable collective innovation at their disposal across six sites worldwide.

It was during that month that the government in Germany determined there was a lack of protective medical equipment in the country and requested that German manufacturers plug the gap. Off the back of this call, UNIMATIC received an order to build a new system for producing FFP2 protective masks. As time was of the essence, the company recalled a number of their employees from China, who had valuable prior experience in this field, to assist with the effort.

"The customer ordered first four and then six systems, which we have been building since March," explains Alexander Raps, Managing Director of the company. The tight schedule meant that their task was anything but simple. "We had to be quick, the need was urgent," he continues. "We had to be ready to deliver by the middle of August. This meant that we did not have time to follow our usual method of building the systems, delivering them to the customer and then commissioning them. We would have to operate them directly at our facility instead."

MOBILAIR for industrial applications – flexible bridging solutions

The MOBILAIR M 27E features a near-silent electric drive producing zero emissions. A 32-amp socket with CEE connector is all that is needed is connect this portable powerhouse to the required power supply. This compact unit delivers 2.6 m^3/min at 7 bar. This means that not only is the M 27E ideal for construction sites but can also serve as a fast and flexible bridging solution in the event of compressed air bottlenecks or a breakdown of the existing compressed air station in an industrial setting. Robust construction means that the M 27E boasts the ability to operate at 100% duty cycles in ambient temperatures between -10 and +40 °C. "Also, in our case, the optional hose reel proved worth its weight in gold," comments Ralf Hereth. This feature meant that the lack of compressed air lines posed no problem at all. All that was needed was to plug it in and production was up and running again.

Alexander Raps was extremely impressed by the swift and straightforward assistance they received from their neighbours in Coburg: "A solution was found over the weekend – that really stood out for me, given the size of their company," he enthuses. "We have been working with KAESER for a long time now and are as satisfied with them as we always have been. For me, the capabilities of a company are proven in matters of service, not sales."

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Daniel Barciuc, Head of Digital Industries at Siemens Romania

The Future of Automation in Industry

Siemens is an innovative leader in the fields of industrial automation and digitalization. The company's mission is to support its customers in the discrete and process industries along their digital transformation journey. The company is continuously expanding its Digital Enterprise portfolio to include state-of-the-art technologies and to offer industry-specific end-to-end solutions for industry and companies of all sizes. Daniel Barciuc, Head of Digital Industries at Siemens Romania, talks about the current challenges for manufacturers and the solutions that can support them to remain competitive in the future.

Dear Mr. Daniel Barciuc, after more than 20 years of experience in the field of industrial automation, how do you see the future in this area of activity? What news will the next decade bring?

The business environment is undergoing an unprecedented transformation, influenced by advanced technological discoveries in digitization and data analytics. Technology for platform-based businesses, innovations and the rapid evolution of technology will generate increased competitiveness in business. The biggest impact, for the economy and society, in general, will be generated by robotics, 'big data analysis' and artificial intelligence.

The industrial revolution is defined by the speed of the innovation cycle of each stage, from the emergence of a technology to the next industrial revolution. The cycles of innovation have become shorter and shorter, as a result of digitalization - and we are witnessing, in fact, a rapid succession of digital revolutions under the umbrella of the term Industry 4.0.

The future of automation is represented by the next stage of evolution in the journey towards Industry 4.0, namely the visibility of automation processes in discrete or process industries. An agile company needs information from various areas, which must be analysed through different tools and disciplines, accessible anytime and anywhere, so that management can make decisions based on real data.

In short, the challenge of the new decade will be to create a digital twin of a company. This stage will prepare us for the next phase, the transparency of the processes, which implies the cause-effect analysis, where the technologies responsible for Big Data analysis intervene.

What challenges are manufacturers facing and what are the solutions that will help them stay competitive in the future? What steps should be taken in this regard?

Manufacturing companies need to integrate the IT component in the production area. This requirement comes from the digitization criteria, which require the elimination of IT barriers and the existence of vertically and horizontally connected production systems. Basically, we already notice that there is standardization in digitization, which is a support for manufacturers looking for solutions to remain competitive.

Specifically, the integration of the IT (Information Technology) field with the OT (Operational Technology) is a crucial step in the digitization strategy, represented by the integration of IT applications at the level of production equipment and machines as well as in the product design area.

Approaching these ambitious projects requires digital skills, proper training, in close connection with the strategy of implementing IoT projects.

What impact will digitalization have on the efficiency of production processes, the use of energy resources, the preservation of the environment, while respecting the new regulations imposed globally?

This question describes the digital ecosystem of which a manufacturing company is a part. It is a group of interconnected resources, which functions as a unit, an ecosystem that includes suppliers, manufacturers, customers, transaction partners, applications, and various technologies.

Once we reach an optimal level of transparency of production data, after the creation of the digital twin, we will also be able to optimize and streamline production processes through technologies. These actions have an impact, as the information is shared and all participants in this ecosystem can benefit from it.

This lays the foundations for an integrative management, which takes into account the use

of resources, environmental protection and other standards, regulations and norms that will appear. The digital database created by streamlining production will be crucial in subsequent optimizations of a digital ecosystem.

What role will the human factor play in this equation?

It is very important not to underestimate the role of people in digital development and to focus on developing the digital skills of the workforce. Appropriate qualifications are needed to exploit the potential of digitalization, and companies themselves have a role in this education, through organizational culture, strategy, elements that must be in the priorities at the management level.

We also need to build confidence in the benefits that new technology brings to productivity, and here, adaptability is an essential skill of an employee. Thus, he can focus more on creation and innovation, being freed from repetitive and time-consuming activities.

What are the most important challenges you face as a promoter of digitization in the Industry?

Workforce education is an important challenge in preparing for the digital future, and it has an impact on our own organization, as well as on our clients. A common understanding of the digitization process is needed to avoid risky investments in a rapidly changing technology, and to opt for a coherent, long-term strategy for this journey to innovation called Industry 4.0. ■

A POWERFUL ADDITION

NEW CAT® GC DIESEL GENERATORS

Caterpillar is introducing 31 new models of Cat® GC diesel generator sets, optimized specifically for stationary standby power applications. They are currently available for 50 Hz and 60 Hz applications worldwide*.

*The models currently available range between 33 kVA-400 kVA & 1100 kVA at 50 Hz and 30 ekW-200 ekW at 60 Hz with additional models being released throughout 2021.

NOISE LEVELS

Sound attenuating enclosures meet European Conformity noise legislation levels.

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An optional smart water heater with a timer control and battery charger means these generators are always ready to start. When generator use is planned or known, the timer function can significantly save on running costs, compared to traditional water heaters that run 24/7.

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All Cat GC generators can run for a minimum of eight hours at 75 percent load.

EASY ACCESS

Large doors provide ample access to all serviceable components.

CAT GCCP CONTROL PANELS

Each generator is controlled by the new Cat GCCP control panels, which deliver functionality through an easy-to-use interface.

ENVIRONMENT

Optional 110 percent spill containment for fuel, oil and coolant or dual wall tank base available to help ensure compliance with local environmental standards.

ADDITIONAL PROTECTION

Robust enclosures provide additional protection from the elements in harsh conditions and feature a sloped roof to ensure optimal water run-off.

"The electric power grid landscape continues to change and become more stable, meaning outages are less frequent and shorter in duration, driving increased demand for cost effective, stationary standby generator sets," said Graham Scandrett, Strategy & Business Planning Manager at Caterpillar. "Because these generators are value-engineered, they give customers all the performance, reliability and support Cat products are known for at an even more competitive price."

By value-engineered, Graham means that these Cat GC generators have been designed and fine-tuned to offer only the key features and functionalities that are required and valued by stationary, standby customers.

As a result, they can be offered at an attractive cost.

"These are a great way for Cat customers, electrical contractors and installers to meet site specifications at the most competitive price," explained Graham.

Because they are powered by field-proven Cat C3.3 through C32 engines, these new Cat GC generators are perfect for a range of small- to medium-sized applications and market segments. That includes healthcare, manufacturing, agriculture, infrastructure, utilities, office buildings, commercial buildings, sports arenas and many more. Plus, thanks to a sleeker, streamlined design, these Cat GC models have a smaller footprint to help ensure low installation costs.

Along with an industry-best warranty and product support, Extended Service Coverage and Customer Value Agreements are also available with these models for even further peace of mind. "Whether power is needed eight hours a day or eight hours a year, these generators represent the Cat brand value," added Graham.

Eneria, the Energy Division of Bergerat Monnoyeur – Caterpillar dealer for Romania and the Republic of Moldova is your best partner for all applications involving generator sets or diesel/gas industrial engines.

Aggreko's 43MW CHP Solution Installed at CET Arad Power Plant

Aggreko, the leading global supplier of mobile and modular power, temperature control and energy services, has installed a new Combined Heat and Power (CHP) solution at the CET Arad Power Plant, Romania. The solution will help to increase efficiency and stability at the plant, a key provider of hot water and electricity for the district heating scheme and grid at the regional capital Arad City, for the next four years.

by **Daniel Betts**

Photos: **Aggreko**

Aggreko's skilled team of engineers had to contend with the challenges of sustaining the constant power output and demands of the plant whilst reducing carbon emissions; and simultaneously complying with stringent European Entso-E guidelines on grid compliance. The answer to the challenge was an innovative hybrid thermal and electrical cogeneration system, combining gas generators with batteries to provide important low emission ancillary services.

The complete solution comprised a total of total 43MW of power: 21MW gas generation, with a further 20 MW of thermal energy derived from the plant's operations, supported by an additional 2MW battery capacity. The system has the potential to cut carbon emissions by up to 45% by capturing and using the plant's exhaust gas and gas engine jacket water to generate further thermal energy.

Aggreko deployed a fully flexible system which allows for all or none of the heat to be recovered, therefore being perfectly suited to meet the required mix of thermal and electrical energy throughout seasonal changes and demand spikes. Energy stability across the site is ensured through the integration of battery units, with 2MW of lithium-ion storage supporting the 14 gas generators. Aggreko and CET's contract provides flexible terms to cater to the plant's variable demand, with Aggreko's rental solution also avoiding the need for CAPEX investment across the four-year contract. The best-in-class solution works hand in hand with the existing infrastructure and systems of the plant to meet these modern demands and ensure it operates at maximum efficiency.

The project, working to delivery efficiency increases for the plant whilst decreasing CO2 emissions by up to 45%, aligns with Aggreko's wider net-zero aims and work to assist customers in their energy transitions. The company is committed to a 50% reduction in fossil diesel fuels and local air quality emissions by 2030, as well as achieving net-zero in its own operations by the same year. By 2050, Aggreko will also be a net-zero business across all of the services it provides.

The power plant, operated by CET Arad, has been the main source of energy and heat for nearby Arad city for almost 50 years. It was originally built to provide heat and electricity in the 1970s, and has since developed its offer, with a fall in demand for heat meaning it now works primarily to provide electricity for the Ancillary Services market.

The project complies with local regulations whilst delivering cost-effective heat and power at lower emissions, meaning the plant is able to maintain efficiency whilst lowering carbon footprint, and can respond to changes in demand to the nearest millisecond, ensuring the turbines and ancillary grid facilities on the site are always operating at the most efficient level in both the long-and short-term.

"Across the business, we are seeing increased demand for efficient solutions which work to meet climate and emissions targets, and Aggreko is

committed to helping customers navigate this energy transition. I am thrilled with the trust that CET Arad has put in Aggreko to move forward with our innovative solution combining batteries and combined thermal/gas power generators. At Aggreko, we are committed to helping our customers adapt to the energy transition and this project is an example of the innovative solutions we're deploying to achieve our net-zero ambitions," Nicolas Protais, Managing Director of Aggreko Rental Solutions, Continental Europe said.

"Aggreko's international reputation and innovative approach made them an easy choice for our project, and their CHP solution enabled us to find the optimal balance between electrical and thermal production for updating our operations, allowing the plant to become more efficient and cost-effective. The agreement we reached with Aggreko will provide high quality installations and products at the plant, allowing us to provide heating to the Arad city district, but also expand to serve the wider Romanian and European energy markets," Sorin Daniel Bogosel, General Manager of CET Arad Power Plant, stated.

This project is one of a number of CHP solutions Aggreko has provided to clients to support a diverse range of requirements, including thermal power plants, mining operations, pharmaceutical companies and manufacturing production lines. Aggreko can deliver CHP solutions for both short duration projects as well as providing longer term support as part of its flexible, modular offer.

CHP offers a combined heat and power generation solution that supports ambitions to reduce carbon emissions and improve efficiency without compromising on reliability.

Provide unmatched heat and power while lowering emissions

As part of the local community, CET is to provide hot water and electricity to feed the city district heating scheme and the grid at the regional capital of Arad in Romania.

Its aging combined heat and power (CHP) needed a revision. During this, CET requires a partner to help them provide these vital services for the local community for between three and five years.

To optimise the economics of its CHP solution, the plan is to sell the electric power generated by the plant to the national grid, and deliver important ancillary services, which help to balance the pan-European grid too.

CET needed a flexible contract term with the demand being temporary, and avoiding CAPEX also had to be taken into consideration.

Above all else, CET required a best-in-class CHP package that complied with regulations, while delivering reliable, cost-effective heat and power.

An integrated hybrid solution – batteries and gas power

Aggreko were recommended for the job and their experts had to design and engineer an integrated solution to combine power production with balancing services and CO2 emissions reduction.

Aggreko devised a package that could produce electrical and thermal energy from natural gas, using a customised design.

Aggreko combined its high-efficiency gas generators with a waste-heat recovery system and its battery storage to supply their customer with a CHP solution that fits the requirement for both power and heat output.

Aggreko produced thermal energy by capturing exhaust gas and jacket water from gas engines, enhancing the overall efficiency of the solution and keeping emissions in check.

This fully flexible system allows none, some or all of the heat to be recovered. It means that it is perfectly suited to meet the required mix of electrical and thermal energy, depending on seasonal requirement

Aggreko reinforced the supply from the gas generators with battery storage to provide a hybrid resource that can respond to changes in demand instantly, which kept the frequency stable. This is because its batteries react with millisecond-level precision, which allows the customer to ramp up power to the gas turbines to provide longer-term support – and it means the gas turbines can run at their most efficient level. ■

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EC Investigates, Government Raises Stakes, CE Oltenia Receives Grant of RON 664mln

Romanian Government in mid-April adopted an Emergency Ordinance based on which it granted a state aid for the restructuring of Complexul Energetic (CE) Oltenia. Based on this legislative act, the Ministry of Finance will allocate in the form of grant, at the request of the Ministry of Energy, the amount of RON 664.1mln, as part of the state aid, in order to ensure the resources necessary to grant the state aid. The amount will be covered from revenues resulting from privatization, for the partial purchase of greenhouse gas emission allowances related to 2020 and it comes after another state aid worth EUR 251mln granted to the largest energy producer in Romania.

by **Adrian Stoica**

"We continue the restructuring process at CEO, and the amounts allocated today confirm that we comply with the plan agreed with the European Commission. CEO is an important pillar of the energy system in our country, but we also must successfully implement the restructuring plan to be able to produce clean energy," said Energy Minister Virgil Popescu after adopting this legislative act. Payment of CO2 allowances is part of the Restructuring Plan and failure to pay them leads to compromising the plan and reform in electricity production and the entire process of decarbonization and transition to climate neutrality.

The loan is granted in RON from revenues resulting from privatization recorded in the current account in foreign currency opened with the National Bank of Romania, by way of derogation from the provisions of the Government Emergency Ordinance No. 113/2006 on the establishment of the National Development Fund, approved by Law No. 186/2008.

The interest rate of the loan remains fixed throughout its duration and is 1.25% per year, being equal to the monetary policy interest rate established by the National Bank of Romania and practiced by the Ministry of Finance for loans granted from the liquid assets of State Treasury, in accordance with the provisions of GEO No. 146/2002 on the formation and use of resources by the State Treasury.

This amount is necessary as at the moment CE Oltenia does not have the necessary financial resources to purchase the deficit of greenhouse gas emission allowances, to cover the total quantity of greenhouse gas emissions resulting in 2020 from each plant owned. This is to be able to comply with the obligation to return, as operator of power generation facilities, a number of allowances, according to the provisions of Complexly Government Decision No. 780/2006 establishing the scheme for greenhouse gas emission allowance trading, as amended and supplemented.

In case of failure to comply by April 30, 2021, CE Oltenia will be required to pay a penalty of EUR 100 for each ton of carbon dioxide equivalent emitted for which greenhouse gas emission allowances are not returned.

Price of allowances surges

CEO must purchase about 7.5 million CO2 allowances related to the production of 8.5 TWh last year. A brief calculation shows that at a cost of EUR 4/allowance, CE Oltenia will need EUR 300mln. It had already reached EUR 40, the allowance reaching at the end of March EUR 42, after in the middle of the month it had reached the record of EUR 43/t CO2, amid an increase in electricity, gas prices and rising global stock market.

The European Commission aims to reform this year the system of allocations and trading of emission allowances (EU ETS - the EU emissions trading system), because, since its launch in 2005, it has not contributed according to expectations to the reduction of emissions.

The reform of this system will lead, inter alia, to the reduction of emission allowances in circulation, which will mean an even more accelerated increase in prices.

Support of EUR 2bn

The restructuring plan of CE Oltenia provides for a support of approximately EUR 2 billion (RON 9.93bn), of which EUR 1.33 billion (RON 6.48bn) is public support from the Romanian state, in the form of grants and loans (including the rescue loan of EUR 251 million that CE Oltenia hasn't repaid).

EU state aid rules, more specifically the Commission's Guidelines on rescue and restructuring aid, enable Member States to support companies in difficulty, under certain strict conditions. In particular, aid may be granted for a period of up to six months ('rescue aid'). Beyond this period, the aid must either be reimbursed, or Member States must notify a restructuring plan to the Commission for the aid to be approved ('restructuring aid').

The plan must ensure that the viability of

the company can be restored without further State support, that the company contributes to an adequate level to the costs of its restructuring and that distortions of competition created by the aid are addressed through compensatory measures, including in particular structural measures.

European Commission, in-depth investigation

This isn't the first state aid received by Complexul Energetic Oltenia.

Government granted to CE Oltenia in February 2020 a rescue aid of EUR 251mln, consisting of a temporary input of liquid funds in the form of loan, necessary to save the company, which was in economic and financial difficulty. The aid was authorized by the European Commission the same month, the company having the obligation to submit, within six months, a restructuring plan and repay the aid.

Romania has sent to the European Commission the restructuring plan of the company, for a five-year period. The plan also provides for a state aid for restructuring of EUR 1.326bn, during 2021-2025.

Government says the recently approved aid is part of the restructuring aid notified to the Commission on December 4, 2020. But the European Commission has triggered an in-depth investigation into the state aid that the Romanian state plans to grant to Complexul Energetic Oltenia.

Brussels' doubts

In this stage, the Commission has doubts that the restructuring plan and the aid to support it satisfy the conditions of the Community guidelines. Under these circumstances, the European Commission opened in early February this year an in-depth investigation to assess whether the support measures granted by Romanian authorities to CE Oltenia are compliant with EU state aid rules granted to companies in difficulty. For the time being, the results of this in-depth analysis are awaited, but the authorities in Bucharest are confident in its result.

Despite their optimism, Greenpeace environmental activists are calling for a clear date and a realistic plan to eliminate coal from the energy mix. They claim that the restructuring and decarbonization plan proposed by the complex is not realistic and that the carbon footprint will not be reduced.

What does the restructuring plan provide?

The restructuring and decarbonization plan of CE Oltenia was conceived and structured over a period of five years, during which the company must become viable by streamlining operations and switching to renewable and less polluting resources.

According to the plan, the number of employees would drop to 7,179 in 2025 and 4,419 in 2030, compared to 12,107 in 2020. The complex will continue coal-fired production, but at a rate that will gradually decrease, beyond 2030, which is possible with investments of around RON 2bn.

The restructuring plan provides for gradual closure of production capacities and mining exploitations, as well as the outsourcing of some activities.

Investments in new production units with a total installed capacity of around 2,000 MW are provided.

Projects considered

- Construction of 8 photovoltaic parks in Turceni, Rovinari and Isalnita, with a total installed capacity of around 700 MW
- Rehabilitation/retrofitting and upgrade of Turceni small hydro-power station, with an installed capacity of 10 MW
- Development of new gas-fired capacities with a total installed capacity of around 1,300 MW, in Turceni and Isalnita

Restructuring increases the direct and indirect impact that CEO has in the local economy. The direct impact will be around RON 1.5 billion, through contribution to the state budget, local budget, and environmental fund; the indirect impact will be provided by keeping collaboration with other employers in the region, by ensuring new jobs for local economic operators and by developing new activities within service providers, throughout the performance of these investments and by commissioning the new capacities.

During the transition process, as production capacities are optimized, a cost recalibration will take place, which will lead to an adjustment of staff to the new business model. This is a condition for the approval of the restructuring plan by the European Commission and the intention is to be fulfilled with minimal social impact. For this reason, the adjustment of the number of employees will be obtained mostly naturally, through retirement, as well as through vocational retraining and voluntary redundancy schemes.

Currently, with an available capacity of 3,570 MW, Complexul Energetic Oltenia is the main energy producer in Romania and contributes to ensuring national energy security, mainly in extreme moments of prolonged drought or in winter periods with low temperatures, periods when the contribution brought by coal-fired power plants in the structure of production increased to almost 35%.

Opinions

Bankwatch Romania and ClientEarth, an international not-for-profit organization of environmental law, have called on the European Commission to reject the Billion-Euro state subsidy set to support the restructuring of Romania's incumbent energy company, Complexul Energetic Oltenia.

The two environmental groups warn that using public money to restructure the company constitutes unlawful State aid as the current plan undermines the European Green Deal's objective to decarbonise the energy sector and the EU's 2050 carbon neutrality target. Instead of setting out a coal phase-out date and helping CEO transition to renewable energy production, the aid will enable CEO to continue burning fossil fuels by modernising some of its coal assets and by replacing some of the company's coal capacities with fossil gas plants.

The observations come in response to the Commission's decision to open an investigation into whether the EUR 1.3 billion restructuring aid should be granted by the Romanian government.

ClientEarth State aid lawyer Juliette Delarue said: "The current plan is shockingly contradictory to what the aid should be used for, which is to help CEO transition to an economically viable, forward-facing energy company. Instead, the plan goes against State aid rules by being neither coherent nor far-reaching, encouraging CEO to maintain its status quo and continue promoting fossil fuels. We expect the Commission to notice this and act accordingly."

The groups' observations show that the restructuring aid will also give CEO an unfair competitive advantage, which the company would not be able to obtain under normal market conditions. The aid will be used to pay for EU Emissions Trading System (EU ETS) allowances, which CEO has been unable to afford alone for several years.

The Romanian government has already paid OEC EUR 241 million to cover its EU ETS allowances without waiting for the Commission's approval.

However, if the Commission finds that the pay-outs violate EU law, CEO may be forced to reimburse the full amount paid out to date.

The company's restructuring is the result of years of structural deficit due, in part, to the constant increase of the price of annual ETS allowances. The restructuring aid comes just a year after the Commission approved an EUR 251 million rescue loan granted by the Romanian government to cover CEO's EU ETS allowances due for 2019.

Bankwatch Romania and ClientEarth

submitted a complaint to the Commission last year opposing the rescue aid. The two organizations also warned about a series of Government Decisions, through which the Romanian state illegally transferred over EUR 6 million from the state budget to CEO's accounts for forcing inhabitants from villages in Gorj county from their homes for coal mine expansions.

Alexandru Mustata, Bankwatch Romania's campaign coordinator, said: "Complexul Energetic Oltenia produces over 90% of Romania's coal-fired electricity and is the largest polluter in the country. On top of this, as the economy in Gorj is dependent on CEO's activity, the company's restructuring plan should also support the just transition of the region. In reality, the plan jeopardises economic redevelopment and does not set a coal phase-out date. Instead of endorsing unsustainable investments, the Romanian Government should cut its losses and help CEO and the communities it supports to transition to a more sustainable future."

With the large European financial support granted to climate protection and energy transition during 2021-2027, Complexul Energetic Oltenia could become a viable company if the Romanian authorities would present a plan that shifts the company's activities towards a business model in line with the decarbonisation objectives of the energy sector, as only such one would help restore CEO's viability in a structural manner for the long term.

The European Commission will review the observations submitted by interested parties on the investigation procedure and will then have up to 18 months to take a final decision. In theory, CEO should not receive any of the aid until the Commission has reached a decision. ■

Enel X Romania-NEPI Rockcastle Partnership

25 EV Charging Stations Installed in 12 Cities

Enel X Romania, member of Enel X, the advanced energy services division of the Enel Group, installs 25 charging stations for electric vehicles in 12 cities in Romania, through a partnership with NEPI Rockcastle, the largest retail real estate investor in Romania.

The fast-recharging stations are installed in shopping centers within NEPI Rockcastle's portfolio in Bucharest, Sibiu, Deva, Ramnicu Valcea, Targu-Mures, Drobeta-Turnu Severin, Timisoara, Buzau, Galati, Braila, Targu-Jiu and Satu Mare. They cover a distance of about 1,000 kilometers on the main roads in Romania, connecting cities in the south, center and west of the country. In this way, Enel X continues its plans to develop a network of recharging stations in Romania, encouraging road mobility of customers via electric vehicles.

"We continue the plan to develop the recharging infrastructure for drivers who opt for electric mobility, pressing the accelerator pedal towards energy transition and a sustainable economy. In Romania, we have an ambitious plan this year to expand the chain of charging stations and to encourage sustainable transportation. We are already present from east to west and we intend to connect the northern part of the country with the southern part. Now, through the network created by Enel X in Romania, any driver can cross the country from Timisoara to Constanta at the wheel of an electric vehicle without any concerns," said Mihai Mardale, Head of e-Mobility Enel X Romania.

"One of the strategic directions of NEPI Rockcastle, in the long run, aims to support the green economy in Romania, as well as in the other eight countries where we have shopping centers. Through this project, we are consolidating our position in the field of sustainability and, together with Enel X, we manage to put the most important cities in Romania on the map of sustainable mobility. In our shopping centers, we will provide customers with parking spaces specially designed to allow access to charging stations for electric cars, both in our underground and above-ground parking lots," said Marius Barbu, Asset Director, NEPI Rockcastle.

Through this initiative, NEPI Rockcastle encourages sustainable transportation and aims to minimize the carbon footprint we leave onto the environment. All the sustainability projects of the NEPI Rockcastle Group in the nine countries, including Romania, are communicated under the umbrella #ResponsiblyTogether. 'ResponsiblyTogether' is NEPI Rockcastle's commitment, in the shopping malls in its portfolio, to community development and support; bringing together all their initiatives dedicated to sustainability pillars such as education, community and environmental protection.

The partnership between Enel X and NEPI Rockcastle involves the installation of 11 JuicePump stations and another 14 JuicePole stations, each of the 25 stations allowing the simultaneous recharging of two electric vehicles. With these units, the number of recharging points installed by Enel X Romania throughout the country exceeds 120.

The JuicePump charging stations allow the recharging of two electric vehicles at the same time with a power of 50 kW DC and 22 kW AC, respectively. In direct current, charging up to 80% of the battery level takes about 25 minutes, depending on the car's model and specifications. The JuicePole stations have an available power of 2 x 22 kW AC, each allowing the simultaneous recharging of two electric vehicles and the charging of up to 40% of the battery level in 30 minutes, depending on the car's model and specifications.

Enel X installs in Romania charging infrastructure in shopping centers, supermarkets, restaurants and hotels that want to attract users of electric cars, as well as in public spaces provided by municipalities interested in improving air quality by encouraging electric mobility.

Enel X is Enel's global business division dedicated to the design and development of products and services, focusing on the principles of sustainability and the circular economy to provide people, communities, institutions and companies with solutions that respect the environment and incorporate technological innovation into everyday life. The company is a global leader in the advanced energy solution sector, managing services such as demand response for around 6 GW of total capacity at global level and 116 MW of storage capacity installed worldwide, as well as a leading player in the electric mobility sector, with around 170,000 public and private EV charging points made available around the globe.

Enel X Romania is part of Enel X, the Enel's global business line dedicated to the development of innovative products and digital solutions in sectors where energy is showing the greatest potential for transformation: cities, homes, industries and electric mobility.

In Romania, NEPI Rockcastle has 20 shopping centers in the most important cities in the country: Mega Mall, Promenada Mall, Shopping City Sibiu, Promenada Sibiu, Vulcan Value Center, Iris Titan Shopping Center, Shopping City Timisoara, City Park Mall Constanta, Ploiesti Shopping City, Braila Mall, Shopping City Galati, Shopping City Targu-Jiu, Severin Shopping Center, Shopping City Deva, Shopping City Piatra Neamt, Shopping City Satu Mare, Shopping City Deva, Shopping City Ramnicu Valcea, Shopping City Buzau, Shopping City Targu Mures. ■

First Bond Issue of Electricity Provider Alive Capital Started Trading

More and more companies choose to obtain financing from the Bucharest Stock Exchange (BSE), including companies in the energy sector. The measure is beneficial as long as the companies in question are required to provide data about businesses and investments, transparency being necessary for both shareholders and potential investors.

by **Daniel Lazar**

The latest case is that of the supplier of electricity and integrated services for the energy market Alive Capital, which listed on April 14 its first issuance of corporate bonds on the Bucharest Stock Exchange, on the multilateral trading system (MTS), under ALV23 symbol. The launch of bonds on BSE was marked by the official opening of the trading session by Giacomo Billi (Founder and President of Alive Capital), Mihaela Stoica (CEO of Intercapital Invest) and Catalin Nae Serban (President of Intercapital Invest).

The issuance has a nominal value of RON 10 million and includes 100,000 bonds, with a nominal value of RON 100/bond, with a 3-year maturity and an interest rate of 8% per year, payable half-yearly.

The funds were attracted at the end of 2020 within a private placement with the support of Intercapital Invest, the Authorized Consultant that also supported the admission to trading of the bonds on the stock exchange and will be invested in the area of electricity generation from renewable sources and in the area of technical support of integrated services activities, related to electricity production and sale.

Alive Capital has an experience of almost 9 years in the energy sector. Since its incorporation and until 2020, the company has carried out 'asset management' activities specific to producers of electricity from

renewable sources.

Since 2016, after obtaining the electricity supply license issued by the National Regulatory Authority for Energy (ANRE), Alive Capital has participated in centralized markets for electricity managed by the Romanian Electricity and Gas Market Operator (OPCOM). Since 2019 it was licensed by ANRE as gas supplier, and since the beginning of 2021 it has a license for commercial operation for an electricity production capacity from photovoltaic source.

Electricity in the portfolio of supplier Alive Capital related to 2019 consisted of 55.27% conventional source and 44.73% renewable source. At the end of 2020, Alive Capital managed 477 MW installed in electricity production capacities from renewable sources distributed throughout Romania (photovoltaic, wind, biomass power plants and small hydro-power stations), account for approximately 9.3% of total RES-E capacities in Romania.

The company ended 2020 with a turnover of RON 219.6mln and a net profit of RON 13.7mln.

Company's revenues are generated from three main lines of activities: electricity trade generates 78.5% of revenues, asset management - 13% and electricity supply - 7.5%. Other two new business lines, gas supply and monitoring of renewable-energy power plants generated 0.09% and respectively 0.03% of revenues.

The founder of Alive Energy and Chairman of the Board of Directors is Giacomo Billi, who owns a 99.5% stake in the company, the difference of 0.5% being owned by Alive Energy SRL.

"We are pleased to support through the financing mechanisms of the capital market the development of the renewable energy segment, an important one for the energy market. Renewable energy projects, which involve a large need for capital, are part of the global goal for emission neutrality. The local capital market proves today, through this first issue of Alive Capital bonds, that it has the capacity to support green energy investments. We want to continue to be the connection between developers who can build green energy systems and the capital resources that active investors at BVB have at their disposal. The dynamics in the beginning of this year - eight issues of corporate bonds on MTS and the main market, as well as three government bonds and the six new listed companies - demonstrate the investors interest for new business ideas, as well as the level of financial resources available in the market," Radu Hanga, Chairman of the Board, Bucharest Stock Exchange, said.

"Mankind has begun to realize that economic expansion can only be based on renewable, non-polluting energy, that provides the environment for a sustainable development of our society. The world's states have begun to shut down their electricity generation capacity that are using polluting sources, and coal is the top. Alive Capital's decision to invest in this sector is based on the belief that very soon investments in new renewable energy production capacities will be significant, and the digitization of electricity trading markets is already a reality. The tools offered by the capital market are the ones that will lead to the consolidation of our position in the field of green energy and to the further support of positive economic results, for the benefit of the company and of the investors," Giacomo Billi, Founder and Chairman of the Board of Directors, Alive Capital, highlighted.

"Each Romanian company with ambitious growth intentions and big development plans should consider listing on Bucharest Stock Exchange as a financing alternative. Listing on the stock exchange could be the cherry from the top of the cake of a long-term strategic goal and the beginning of a new stage in the company's life, brought by the listing in the spotlight. Through issuances of shares or bonds listed on the stock exchange, companies benefit from the 'bondholder-shareholders' transfer effect and can win an established group of potential investors. Today's Alive Capital bond issue marks the company's access into the Romanian capital market, and the funds raised will be used for investments in production of electricity from renewable sources.," Mihaela Stoica, CEO, Intercapital Invest, mentioned.

Intercapital Invest is a company with over 20-year experience in the field of capital market, being an Authorized Advisor at the Bucharest Stock Exchange. Its purpose is to support the financing of companies through bond issues or shares and their admission to trading on the Bucharest Stock Exchange markets. In this process, Intercapital Invest promotes the best practices in corporate governance specific to issuers and provides investors with investment opportunities in private placements in bonds and equities.

Alive Capital is a Romanian company founded in 2013, by specialists with decades of experience in electricity business. They started initially with the objective to provide integrated management services for producers of renewable energy sources in Romania.

Since 2016 the company is licensed by the Romanian Energy Regulatory Authority (ANRE) as a supplier and trader for electricity; Alive Capital is now present and fully operational on most important central markets managed by the national platform OPCOM: DAM (Day-Ahead Market), CM-OTC (Centralized market with double continuous negotiation for electricity bilateral contracts), CMBC-EA-flex (Centralized Market for Electricity Bilateral Contracts – Extended Auction Mechanism and products that ensure the flexibility of trading), CMBC-CN (Centralized Market for Electricity Bilateral Contracts – Continuous Negotiation Mechanism).

Today, Alive Capital has become a reference on the Romanian market in terms of high standards and maximum efficiency of the services they offer to renewable sources electricity producers, as well as other customers.

Agrivoltaic Systems, A Promising Experience

The agrivoltaic system is characterized by combined production of photovoltaic power and agricultural crops on the same area. Coexistence of solar panels and crops involves light sharing so that panels placed above part of the crop generate shade and create a kind of microclimate over the growing area. The result: more freshness, so less water requirement for the plants, but also lower losses caused by evaporation.

by **Rona Rita David**

Benefits and risks of agrivoltaic systems

Initially, association of solar panels over agricultural crops aimed at providing a good ratio between the use of arable land and production of photovoltaic power. To compare the performance of association of these two different elements, LER (Land Equivalent Ratio) is used. LER is the unit of measurement and a LER higher than 1 indicates that the combination works better than it would work separately. For example, a LER of 1.3 means that in order to obtain the same production on two separate areas, 30% more area is needed. Cohabitation between agricultural crops and photovoltaic power production would make possible to obtain a LER higher than 1 and, therefore, improve the total production on the equipped area.

In recent years, developers of agrivoltaic solutions have highlighted the benefits for farmers, especially protection against risks and climate disruptions. Another benefit is protection against extreme temperatures (frost or heat wave): in greenhouses with or without temperature control, with or without bleaching; in open field with a reduction in temperature amplitudes due to shading in the event of high temperatures or a greenhouse effect in the event of frost. The system also provides hail protection: in closed greenhouses with roof; in open field with arrangement systems or the deployment of automatic safety nets integrated in the structure. Other advantages include the reduction of water consumption by reducing plant evapotranspiration due to crop shading and increase in agricultural yields. Another benefit is irrigation with solar power.

Even in absence of irrigation needs (in case of very rainy season), solar panels produce energy, therefore opening significant opportunities to power with this energy agricultural equipment, mills, water purifiers and cold storage units, all contributing to rural development and increased revenues. In some cases, solar power can also become a 'remunerative harvest' if farmers are encouraged to reduce the excessive water quantity, opting to sell the energy surplus in the power grid.

Photovoltaic greenhouses, controversies

The main risk of these devices refers to lack of light for plants and decreased agricultural production. Photovoltaic greenhouses have created a lively controversy in the agricultural world. Depending on technical itineraries or the type of crop, agricultural yields in photovoltaic greenhouses can be much reduced. Therefore, crops in photovoltaic greenhouses require an adaptation of cultivation practices, and producers are trying to adapt these tools to farmers' needs. Some photovoltaic greenhouses also suspected of being only pretexts for installing solar power plants on agricultural land. In Japan, to allow them to operate solar panels over crops, the Japanese legislation requires farmers to maintain agricultural production above 80% of what they produced before the panels were installed.

Shaded devices can also bring increased humidity and increased risk of developing diseases or pests. Wind can also be a danger of fall for systems in open field, with solar panels built several meters above ground.

When designing and building an agrivoltaic plant, account should be taken of the agricultural activity and its requirements. Soil compaction and changes in water circulation can degrade the quality of agricultural land. Installation of solar panels should consider the size, width and radius of rotation of agricultural equipment used for crop maintenance, the provision and protection of external cables, and the depth of buried cables, including the presence of personnel, agricultural machinery or animals.

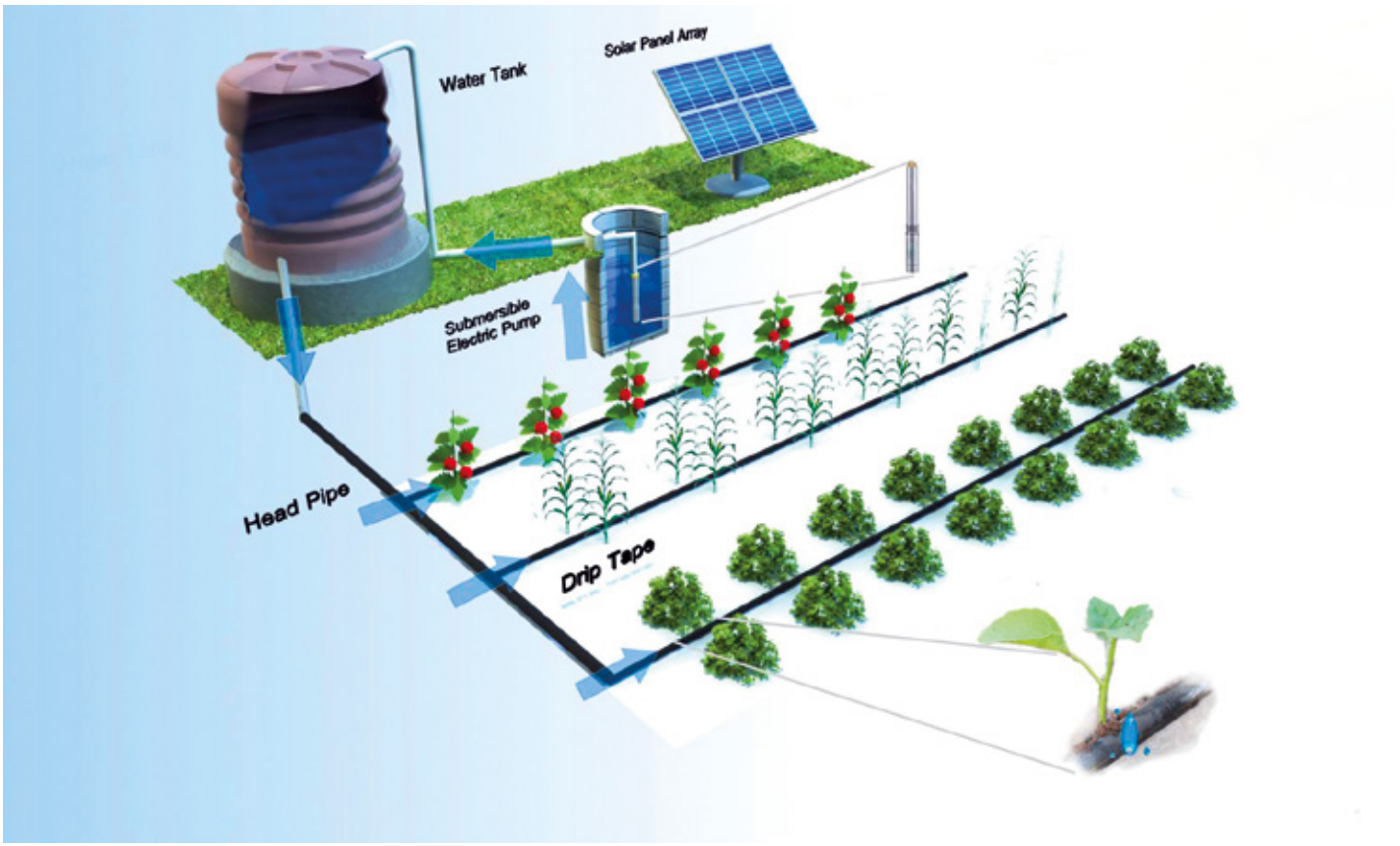
Visual impact on the landscape is also mentioned by the opponents of agrivoltaic systems: solar panels are generally installed several meters above ground and, therefore, are very visible in the landscape.

In case of perennial structures or for long-term commitments (more than five years), the financial power of the photovoltaic company can be a risk the farmer if the photovoltaic producer has committed to disassembly the structure. It should operate the mobile solar panels and if it is no longer able to meet its commitments the farmer can find part of its land immobilized with a system that no longer brings profit or even affects the agricultural production.

Advantages of the use of a solar power irrigation system

The advantages of choosing a solar power irrigation system include:

- Very low operating costs
- Green
- Solar power is absolutely free of charge, as compared to non-renewable energy sources such as gas, diesel or commercial power grid
- No infrastructure is required
- Use of solar power provides the possibility of installing an irrigation system wherever the water source and solar light are located, no matter the availability of the commercial power infrastructure
- Does not require fuels that emit harmful substances (CO2), which can contribute to the additional pollution of the



environment and noise pollution, compared to traditional irrigation systems that use diesel or gasoline
- Accessibility and sustainability
- Solar power is completely renewable and accessible
- Safety
- Duration of operation of solar panels is approximately 25 years
- Time saving

A solar power irrigation system allows an automated activity, without physical involvement of the farmer, who has real-time access to information on soil humidity and air temperature, can switch on and off the irrigation process remotely, due to necessary software and hardware implemented in the project

- Additional income source

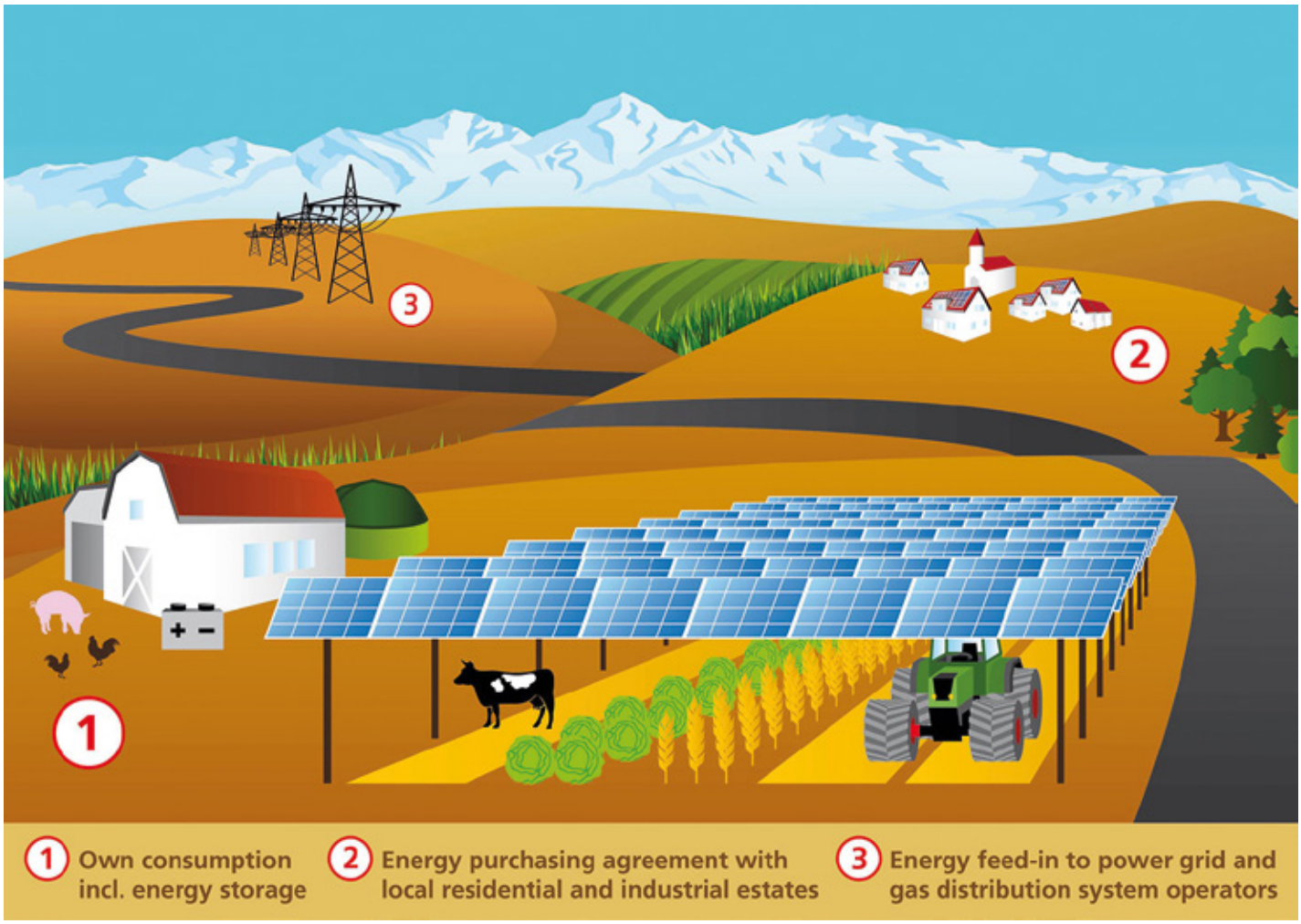
Solar panels produce energy even when irrigation is not necessary, therefore opening up significant opportunities to supply with electricity other agricultural machinery, mills, water purifiers and cooling units, all contributing to rural development and additional income

- Increased value of property

Studies show that properties that have installed solar-powered irrigation systems increase their resale value and become more attractive to buyers.

Although, now, adapted drip irrigation can lead to water saving, the assumption that it will be applied automatically at the level of each farm is an error. Irrigation policy decisions should be made after adequately accounting for water on extended areas, as precipitation, surface water, groundwater, soil humidity and evaporation processes related to various land uses are part of the same hydrological cycle. Modern solar power systems provide useful tools to improve water management, with the electronic control devices able to provide real-time data on storage reservoir levels, pump speed and groundwater level in the drilling area, which could lead to remote adjustment decisions to prevent excessive use. A viable alternative is to set water tariffs in relation to supply and demand calculations determined by satellite and thermal imaging, a technique facilitated even at the level of individual fields by the FAO Open Access Portal for Water Productivity (WaPor).

However, the real benefits of these systems haven't been fully validated, mainly due to the lack of long-term studies on representative surfaces. Developers of agrivoltaic systems conduct few studies on the agronomic performance of their products or do not communicate them. Studies conducted by independent organizations were made mainly on



photovoltaic greenhouses.

A survey by technical experts from 25 countries suggests that while three-quarters of states have government programs and policies to promote small-scale irrigation, less than half have specific regulations that limit groundwater abstraction for such purposes.

As one of the objectives of agrivoltaic systems is to preserve agricultural land, this is all the more reason not to neglect agrivoltaic agricultural production. But constraints on agricultural production vary from one country to another in accordance with the legislation in force or depending on the type of crop and the objectives of the agrivoltaic system.

Configuration of agrivoltaic devices

Regarding the types of configuration of agrivoltaic devices, since 1980, German physicists Goetzberger and Zastrow studied the conditions for optimizing agrivoltaic plants. Therefore, the conditions that continue to serve as reference in the definition of agrivoltaic systems are: orientation of solar panels to the south for fixed panels or east-west for panels that rotate on an axis; sufficient spacing between the solar panels for sufficient light transmission to the ground crops; raising the supporting structure of the solar panels to homogenize the amounts of radiation on the ground.

The basic components of a solar powered irrigation system are:

- Solar panels - take solar radiation and turn it into electricity
- Electric pump - depending on water source (groundwater as well as open water sources, such as nearby rivers and lakes), there are two types of pumps: surface pump - is installed right next to the water source and has as components two pipes, for water absorption and discharge; submersible pump - is installed or immersed in boreholes or deep wells

- Filter - the tool for cleaning water of physical impurities (sand, shells, stones, plant debris)
- Fertigation node - the tool for injecting fertilizers into the water for irrigation
- Reservoir - is an optional component, which may be needed to store water that has been pumped during the day and can be used in a drip irrigation system
- Water supply pipes (main, secondary and drip pipes)

History of agrivoltaic systems and journey around the world in the last 25 years

Proposed in 1981, the agrivoltaic system was massively implemented in Japan since 2004 and ever since it has developed throughout Asia, Europe following. In Austria and then in Italy, agrivoltaic systems appeared in open fields in 2007, and in the period 2009-2011 their implementation followed in France and Germany.

Austria

In 2004, Günter Czaloun provided a system of suspended mobile solar panels powered by cables. The first prototype was built in South Tyrol in 2007 on a 0.1 ha area. The panels are more than five meters above the surface. A new system was presented at the Intersolar 2017 conference in Munich. This technology may potentially be less expensive than other open field systems because it requires less steel.

Italy

In 2009 and 2011, vineyards were equipped with an agrivoltaic system with fixed panels. Experiments showed a slight decrease of the yield and late harvests.

In 2009 the Italian company REM TEC developed a dual-axis solar tracking system. In 2011 and 2012, REM TEC built several MW of open field agrivoltaic power plants. These were the first open field agrivoltaic power plants in Europe. The solar panels are installed 5m above ground to operate agricultural machinery. The occupation rate of solar panels is less than 15% so as not to disadvantage crops. These are the first to offer automatic protective net systems, integrated in the support structure. REM TEC also designs mobile solar panel systems installed above an agricultural greenhouse and integrated into the structure of the greenhouse. Controlling the position of the panels would optimize the greenhouse microclimate.

Germany

In 2011 the Fraunhofer Institute ISE launched the concept in Germany under the 'agrivoltaics' name. Developments accelerate with the APV-Resola project started in 2015 and which ended in 2020. A first prototype of 194.4 kWp was to be built in 2016 on a 0.5 ha site belonging to the Hofgemeinschaft Heggelbach cooperative farm in Herdwangen (Baden-Württemberg). Germans estimate that such structures will be profitable without government assistance as of 2022.

Croatia

In 2017 a structure was installed by Work-ing d.o.o. with a 500 kWp open field power plant in Virovitica-Podravina region. The agronomic component of this power plant is supported by the University of Osijek and the Agricultural Engineering School of Slatina. Part of electricity produced is used for the irrigation system and to operate agricultural machinery. At first crops requiring shade will be tested under the device.

Netherlands

In 2019, photovoltaic developer Solarcentury signed an agreement for the construction and maintenance of the largest agrivoltaic park in Europe. The park covers 24 ha of cranberry crops.

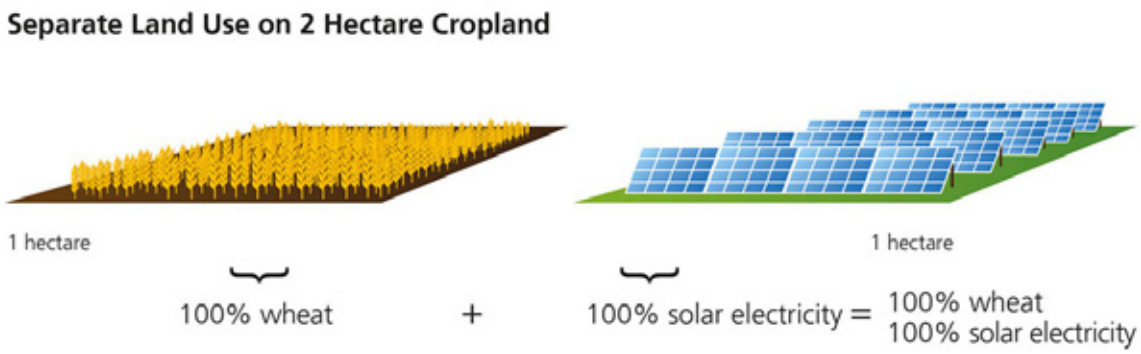
France

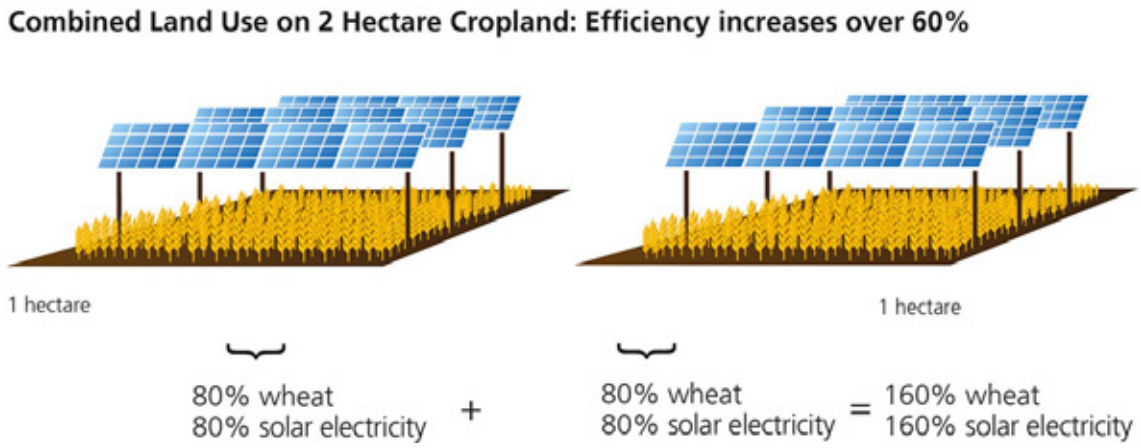
Since the beginning of the 2000s, several companies have implemented photovoltaic greenhouse projects on the French territory. Several types of greenhouses were built, with various architectures and solar panel plans. Designers of photovoltaic greenhouses continue to innovate to improve both agricultural production and electricity production. The Agrinergie concept developed by Akuo Energy (2007) is an illustration of this fact. The first plants consisted of alternation of crops and solar panels. In 2017, Tenergie started building photovoltaic greenhouses with an architecture that diffuses light to reduce the contrasts between light bands and shade bands created by solar panels.

The three-actor system: in this model, the agrivoltaic system, a tool for crop protection, is a partnership between a farmer and a photovoltaic producer. The third actor, independent of the first two, controls the panels, according to the algorithms. The control of the panels is always done with priority for the benefit of power plants and, secondly, for energy production. The priority of agricultural production over energy production is guaranteed by this third actor. However, this model requires success in CRE calls for tenders to obtain a purchase price for energy production.

In Romania, low renewable energy target

Currently, in Romania there is no coherent support system for the installation of new renewable capacities to support reaching the 30% target assumed for 2030, shows the most recent analysis by Bankwatch. The report analyzes the renewable energy sector in Romania, mainly legislative changes, and calls on stability and predictability for sector development. Limiting the support scheme through green certificates to installations commissioned by 2016, without replacing it with other incentives (direct





bilateral contracts or contracts for difference) has led to the stagnation of the installed capacity of renewable energy forms. At the same time, the often-legislative changes, four in seven years, have led to the prejudice of producers and the decrease of investor confidence. Therefore, during 2016-2020 no new renewable energy projects were inaugurated, although in recent years costs with investments in these technologies have fallen. Romania has installed the same renewable energy capacity since 2015: 10,700 MW, of which 4,800 MW are subject to the green certificate scheme.

The analysis also shows that the renewable energy target assumed by Romania for 2030 is lower than that achieved in the period 2007-2020 (from 16.4% to 24%), although European sources of funding available are more consistent, and the cost of installing renewable technologies is lower compared to the previous period. At the same time, the fact that Romania has reached the renewable energy target for 2020 since 2015 shows that our country has a substantial renewable potential that will remain untapped. Another problem identified is the inconsistency of strategic documents. The National Energy and Climate Plan provides for an installed capacity by 3,700 MW higher for wind and solar in 2030, compared to the power transmission grid development plan prepared by Transelectrica.

Eppur si muove (And yet it moves)...

However, there are also innovative projects in Romania, which provide the perspective of good understanding of transformations that we cannot bypass. The University of Agricultural Sciences and Veterinary Medicine (USAMV) in Cluj-Napoca has been involved in testing a technology based on field sensors powered by solar energy.

The project 'Solarvibes – Revolutionizing IoT Scalability in Agriculture' is a cascade grant Internet of Food & Farm 2020 (IoF2020)' for research and innovation, being implemented in the field of 'Arable land', between 01.01.2019 - 30.04.2020, in a consortium

consisting of: Solarvibes Berlin (coordinator of consortium and partner), Institute Fraunhofer for Reliability and Microintegration IZM of Munich (partner), USAMV Cluj-Napoca (partner) and Hungarian Research Institute of Organic Agriculture, Budapest (partner). The total budget is EUR 600,000. 'Internet of Food & Farm 2020 (IoF2020)' is a Horizon 2020 project, Research and Innovation section, IOT-01-2016 axis, applied and coordinated by Wageningen University & Research, in a consortium with over 70 partners from 14 European countries, in the period 2017-2021. This international project aims to accelerate the use of Internet of Things (IoT) technologies in the food industry and European farms.

A group of sensors powered by solar energy is placed on the agrisensor/multisensor equipment, which collects data for the artificial intelligence module. It can develop agro-technical recommendations specific to geo-climatic conditions to achieve optimal levels of yield, by mitigating the risks related to the farmer's decisions regarding the time of sowing, nutrient management or harvesting. USAMV Cluj-Napoca allocates approximately 100 devices to Romanian farmers through its network of partner farms, free of charge in the first year of implementation. A few pilot farms will be chosen in the next period to implement the technology free of charge for a period of one year, after which it will be accessible at subsidized prices to all farmers.

USAMV Cluj-Napoca undertakes innovation and research tasks that lead to implementable results, through which it guarantees the sustainable development of agriculture and food production in Romania. To this end, the university develops professional networks of cooperation with research institutes and farmers, carries out research and information activities and provides technical advice to those interested.

Digital technology will facilitate a more efficient decision-making process, without replacing the need for human intelligence in agriculture, and will facilitate the work, therefore making agriculture more attractive for young people. Moreover, in the future, in agricultural support systems, it is expected to pay special attention to digital technologies to improve the competitive advantage and sustainability of agriculture.

Irrigation systems powered with solar energy

Irrigation systems powered with solar energy are now an affordable and environmentally friendly technology for both large and small farmers in developing countries. But they need to be properly managed and regulated to avoid the risk of using water in an unsustainable manner, reads a new report by F.A.O. - Food and Agriculture Organization of the United Nations. Sudden and constant decrease in the price of photovoltaic panels provides a new boost to use the renewable energy source to increase the irrigation capacity.

Solar-powered irrigation systems provides the possibility to reduce GHG emissions per unit of energy used to pump water by more than 95% compared to the alternatives powered with electricity generated by burning diesel or fossil fuels, according to FAO report.

Assessing the economic viability of a solar-powered irrigation system requires an analysis of a wide range of parameters, such as system size and configuration, water storage capacity and feasibility, well depth, distance to the area to be irrigated and the type of soil to be irrigated.

The so-called 'payback periods' for such investments depend on crop and market conditions, as well as the presence of price incentives from governments. Solar pumps for irrigation could also cause unsustainable extraction of groundwater, as farmers could try to extend the planted areas or move to crops with higher water consumption.

An issue in the field of irrigation currently faced by farmers is the location of the agricultural land in remote areas, without connection to the power grid or connection to the grid may be way too expensive.

In this case, several solutions are available: motor pump (gasoline, diesel); generator for electric pump (gasoline, diesel); route of connection to the commercial electrical network etc.

A solution could be solar energy - combination of photovoltaic systems with surface or submersible pumps to distribute water directly from the source or accumulation in a reservoir. In case of daytime systems (operating without a battery, the system only works during the day) the efficiency can be increased by using the energy accumulator connected to the photovoltaic panels. This option is a smart investment, which although initially seems expensive, is in fact very advantageous in the long run, compared to traditional diesel and gasoline irrigation systems, which are cheaper to purchase, but expensive in operation and dangerous for the environment.

Agrivoltaics - an essential part of the European Green Deal

Agrivoltaics shows a new approach to exploiting Europe's energy potential from offshore renewable sources, in a sustainable and inclusive manner. This is an essential part of the European Green Deal and the EU's recovery package, Next Generation EU, which will help create jobs and boost investment as new clean technologies are implemented across the EU. Strengthening domestic energy production will contribute to affordable energy supply and boost the resilience and security of Europe's energy supply. ■

Romania, One of the First Countries where LafargeHolcim Launches the Green Cement

Romania and Germany launch simultaneously, for the first time at the level of LafargeHolcim group, the ECOPlanet green cement, with CO2 emissions reduced by over 40%. Moreover, Holcim comes with a novelty in the industrial segment, launching a new identity for the bulk cement portfolio. ECOPlanet supplements the portfolio of ECO solutions and products of Holcim Romania, which has recently launched ECOPact - the first range of green concrete in the industry. All these fall within the new business model proposed by Holcim Romania group.

by **Daniel Lazar**

The fact that Romania is one of the first countries where the LafargeHolcim group launches the ECOPlanet green cement honors us. ECOPlanet is a trailblazer for green cement and represents our solution for helping Romania build with care and responsibility to future generations. Together with ECOPact, the first range of green concrete in the industry, ECOPlanet supplements the innovating portfolio of products and solutions of Holcim Romania group and strengthens the commitment we have assumed by launching the new ECONCEPT business model to lead transition to sustainable construction," said Bogdan Dobre, CEO Holcim Romania & Market Head Moldova.

The launch of ECOPlanet green cement and rebranding of the bulk cement portfolio is another important step taken by Holcim Romania group to fulfill the Net-Zero commitment, assumed by LafargeHolcim at global level, which aims to reduce CO2 emissions by 20% by 2030 and neutralize CO2 emissions by 2050.

Holcim Romania has recently announced the launch of a new business model, ECONCEPT, which is based on an integrated offer of ECO products and solutions. At the same time, the company has announced a series of premieres in the building materials industry, such as the ECOPact green concrete and the Holcim Green Label - a system for the transparent evaluation of the climatic performance of its products.

ECOPact Green Concrete - Broad range of green concrete for high-performing, sustainable and circular construction

ECOPact range is the industry's broadest offering of green concrete for high-performing, sustainable

and circular construction. The product is sold at a range of low-carbon levels from 30%-100% lower embedded carbon compared to standard (CEM I) concrete.

The global brand ECOPact aims to make carbon-reduced construction available in all core markets where LafargeHolcim is present. The entry-level product is ECOPact, with 30-50% lower embodied carbon content compared to a mix design with CEM I. ECOPactPRIME has a CO2 reduction level between 50-70%. The product is technically more demanding providing a significantly higher reduction than the general standard available in a given market. ECOPactMAX exploits the technical possibilities to the maximum. This product pushes LafargeHolcim technical expertise to offer top of the line product with a CO2 reduction greater than 70%. ECOPactZERO is a unique or carbon-neutral concrete, achieved through offsetting.

Key features

- Provide higher resistance against the corrosion caused by chlorine penetration and other environmental factors due to high SCM content and positive impact on the overall resistance and durability of concrete in comparison with the alternative
- Reduction in C02 emission by 30-50% with ECOPact, 50-70% with ECOPact Prime, and 70% with ECOPact Max
- Replacement of virgin coarse aggregates as a result of minimum 10% of recycled concrete aggregates content in all mixes on ECOPact Plus line

Profitability

- Significantly reduced maintenance and repair costs of 70-100% less than with market alternative (concrete), 0.85 EUR savings/ m2/year
- Payback in less than 2 years on the additional investment based on Life-365 simulation
- Tax benefits in a selection of countries (i.e., Colombia)

Categories of application

- Building
- House
- Materials reclamation
- Waste valorisation

BIDEN'S INFRASTRUCTURE PLAN AND THE ENERGY IMPLICATIONS

Having introduced his USD 2 trillion infrastructure plan, Joe Biden aims at upgrading the foundational parts of the US economy; He considers it a transformational initiative "that does not tinker around the edges" and that could create the "most resilient, innovative economy in the world." US officials also claim that the plan will accelerate the struggle against climate change by embracing and reinforcing cleaner energy sources but also through a less "energy-hungry infrastructure". It is said that essential parts of the plan target 20,000 miles of repaired/rebuilt roads, upgrades for the most economically significant bridges, the replacement of lead pipes from water supplies and eventually a framework that will create millions of and reinforce American competitiveness in the long run.

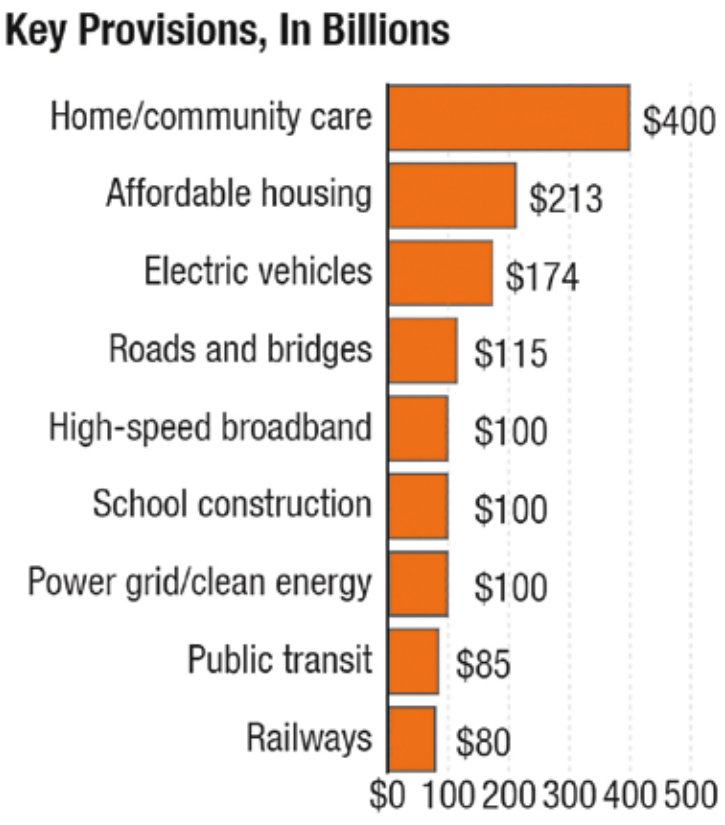
by **Evgenios Zogopoulos**

The cost of the bill is supposed to be supported by increasing corporate taxation over 15 years (something that Wall Street was not very happy to hear, but that's another story) and even more from multinational corporations earning and declaring profits overseas.

Obviously, this is an effort to bring capital back to the United States through reverse/negative incentives. The deployment of the plan will span for over the course of eight years and the tax increases would more than offset that spending in 15 years hopefully bringing a decrease of the US deficit. Biden pledged that, in order to fund the project, he would raise corporate tax rates to 28% from 21%, contradicting a cut signed by Donald Trump.

Joe Biden will also take steps to raise taxes on multinationals, pushing forth taxation of profits earned and declared overseas. Those measures would include a minimum tax rate on global profits and reduce legal loops allowing companies to reduce their American tax liability. Mr. Biden would also add a new minimum tax on the global income of the largest multinationals, and he would enforce it through stricter controls by federal tax agencies. He claimed that these provisions alone could generate more than 1 trillion in tax income for the US.

The president also appealed to a sense of tax fairness said the plan would make America competitive again (mostly meaning against China), proving that a fair capitalistic system is the way to go.



Joe Biden requested bipartisan support in Congress, stating: "Unlike anything we have seen or done since we built the interstate highway system and the space race decades ago" and calling the initiative "the largest American jobs investment since World War II."

Despite the inspiring goals and good motives, the plan obviously offers opportunities for scrutiny, especially the taxation part. Republicans and lobbies defending corporations already criticized the tax hikes, calling them "nonstarters for bipartisan negotiations".

In a nutshell, the USD 2 trillion proposal includes:

- USD 115 billion to upgrade national transportation infrastructure
- USD 100 billion to support the shift to clean energy
- USD 100 billion to expand high-speed broadband connectivity
- USD 100 billion for schools

More specifically regarding the clean energy infrastructure, it is by itself an ambitious comeback to the Paris climate deal (from which Trump withdrew the US) and seems to be one of the most important initiatives ever taken by the US to lower greenhouse gas emissions, competing with China (which has proven to take the matter extremely seriously and with a great rate of effectiveness).

The package includes significant environmental agendas: The New Deal-inspired Climate Conservation as well as catalyzing an irreversible shift from ICE (internal combustion engines) to electric vehicles. Biden will spend billions on rebates and tax incentives to encourage Americans to purchase electric vehicles, and he proposes paying for the transition of thousands of transit and school buses from diesel to electric.

At the same time, he wants incentives for state and local governments to build electric vehicle charging stations to power those new cars and buses. This is arguably great news for EV companies like Tesla and traditional automakers who are now shifting to EVs.

A deeper dive into the specifics of the plan gives us more insight over the different aspects of the bill:

- Infrastructure: Generate thousands of new jobs, supporting the labor unions, and upgrade the infrastructure to support sustainability
- Auto Industry: Bring America to the 21st century and modernize its automobile industry, through promoting the adoption of EVs nation-wide. This will include creating networks of super-chargers across the country and help millions of workers to specialize and

find work within the new US auto industry.

- Transportation: Provide the option of high-quality, zero-emissions public transportation through railroads, green buses, and facilitation of bike usage etc.
- Innovation: Provide brave incentives to stimulate essential clean energy technological breakthroughs (battery storage, emissions technologies, materials, renewable hydrogen, and advanced nuclear tech).
- Energy: Reach the point of 0 carbon emissions by 2035 through cleaner energy production.
- Buildings and housing: Upgrade and 'weatherize' millions of public buildings and private residences through direct state intervention or incentivization for private initiatives. Also, initiate the construction of 1.5 million sustainable homes and housing units.

The US president's pledge to renounce Trump's policies that moved America away from the fight for climate change, is being materialized largely through his bill. Updating and upgrading the country's infrastructure to be more energy-efficient and more resilient towards environmental threats (cyclones, hurricanes, droughts, fires etc.) is one way to do it. On the other hand, investing on research and development will ultimately deliver breakthroughs in cutting-edge clean technology, bringing America back to the front lines of this global race.

The main dual axis around which Joe Biden wants his policies to be deployed is that of cars and electric power plants, which are the main polluting factors to this day. The US administration wasn't to push the use of electric cars, which today make up just 2% of the vehicles in America. More specifically, the plan provides more than 150 billion USD to incentivize manufacturing and purchasing of EVs through tax credits and other incentives to EV manufacturers to keep and scale up production in the United States instead of China. This is a direct invitation to Tesla, among others. The plan includes additional funds for federal procurement programs for all federal agencies to replace their fleets of vehicles with electric ones.

When it comes to the grid modernization, the plan provides almost USD 100 billion to enhance reliability to avoid incidents like those that recently devastated Texas. There are also provisions for installing lines to connect major urban centers with clean energy generating plants. Joe Biden also introduced the 'Clean Electricity Standard', as a mandate imposing that a certain percentage of electricity in the United States be generated by RES and 0 emission sources (like advanced nuclear).

Importance is also being given to federal transit routes, like railways; the California High-Speed Rail Authority (CHSRA) is a prime example of a troubled project that has been stalling for a long time now and could be saved through this bill. The project itself, with projected costs reaching almost USD 100 billion, is now under construction, a 171-mile section between Merced and Bakersfield, has to rely on the state legislature giving green light to the California High-Speed Rail Authority to exploit the USD 4.1 billion in bonds to push for the project's completion. The infrastructure plan mentions specifically Amtrak and expresses the will to connect cities with rail service.

Of course, as we already discussed, this bill and its context do not lack controversy and opposition. Introducing such dramatic shifts in how such an economy works can require expertise in terms of 'change management'. There are such cases that will definitely not make it easy for Joe Biden. For example, during his campaign, Joe Biden opposed hydraulic fracturing (fracking) in the fierce battle with Trump over state of Pennsylvania, which heavily relies on shale natural gas production, which requires the use of fracking. It needs to be mentioned that fracking is one of the most condemned practices of extraction from an environmental standpoint. When they realized that Trump would exploit these comments and claim Pennsylvania, the Biden camp denied that he ever made these comments and eventually he appeared in Pittsburgh and pledged that he would not in fact ban fracking and underlined that natural gas would be part of his administration's energy plans.

The infrastructure project advisory firm ARBO, is very critical stating that: "For a campaign whose slogan was Build Back Better, the fact that the title of its supposed major infrastructure plan makes no mention of either building or infrastructure is telling. The plan essentially has morphed into a jobs plan that has limited spending on true infrastructure. He only mentions of carbon capture and storage come in two very small projects that involve use of the technology for retrofitting large steel, cement, and chemical production facilities in environmental justice communities and as part of a plan to invest in demonstration projects in various areas including utility-scale energy storage, hydrogen, advanced nuclear, rare earth element separations, floating offshore wind, biofuel/bioproducts, quantum computing, and electric vehicles."

They have also been very critical on the fact that the 'EV lobby' seems to gain the lion's share, leaving hydrogen's promising potential in the shadows.

Wrapping up, such an ambitious plan is totally natural and expected to attract much attention and definitely controversy.

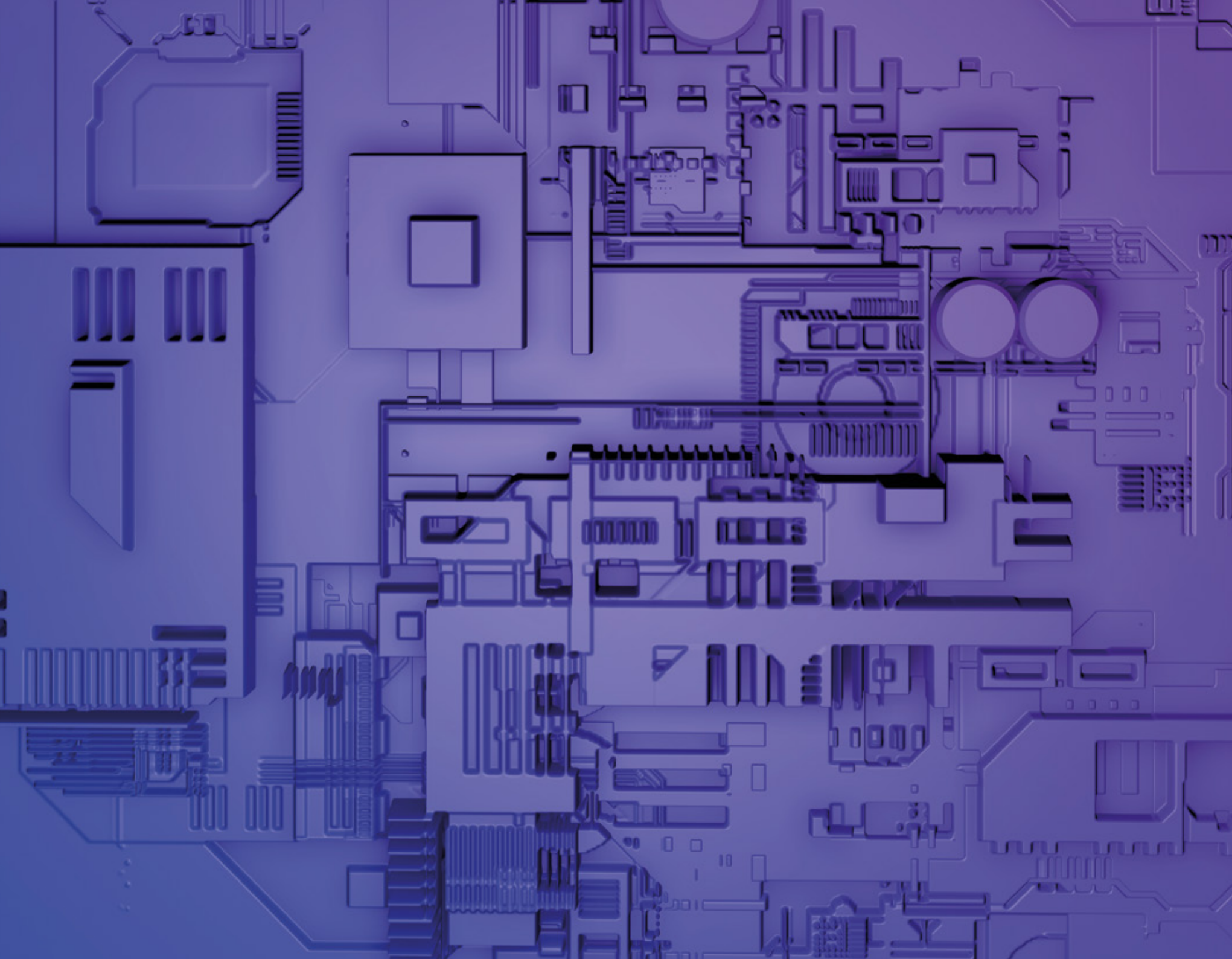
Afterall, it claims that it will change the outlook on America's imprint on the world of tomorrow. Of course, change management will be essential, especially for a country that has been proudly declaring that its environmentally unethical practices have been a landmark and part of its identity.

Banning fossil fuels from the mix might seem necessary for many but definitely not for everyone, especially if they are making money out of it. ■

Digitalization of Energy in the Industrial IoT Era

by Evgenios Zogopoulos

The Industrial Internet of Things (IIoT) represents the potential of a whole new world, where everything is more efficient, measurable, controllable. Industrial Internet of Things applies the Internet of Things framework to manufacturing.



The insights harvested as data by new Internet-connected devices can be used to enhance efficiency, real-time decision making, solution of critical problems, and eventually create new and innovative experiences. Nevertheless, as more and more devices interconnect, companies are facing increased fragmentation and new challenges and in order to harvest and use the power of data they need solutions to deliver interoperable, end-to-end collaboration that bridges the intersections between the Internet and devices, while riding the waves of innovation coming.

This sparked a wave of older companies (like Microsoft, IBM, Intel etc.) and many younger ones (Palantir, Tesla etc.) to find solutions for the above mentioned challenged and turn them into offerings for companies that are willing to harvest the opportunities spawning from IIoT. They are developing IIoT products and solutions (intelligent gateways, electronic platforms to integrate data etc.) to provide fundamental building blocks that streamline integration, lower development costs, and accelerate time to market. Afterall, it all boils down to better and faster decision making. From the device to the data centre, these solutions will include capabilities that support a wide range of vertical integration markets, like industrial control within the energy sector where devices operate in domains with extreme safety requirements.

For energy companies, this might lead to better and wider option phase to accommodate new energy sources, better efficiency of assets, greater reliability, upgraded security and unlocking of new business models and services. While urbanization rises and business models demand greater efficiency, energy companies need to augment capacity while developing new solutions, optimizing management of the existing assets.

When it comes to how we manage the delivery and use of energy and water, or how we run our cities, there's definitely immense space for improvement. Ongoing privatization and involvement of shareholders, stakeholders and regulators have transformed the market into a space of intense competition and struggle for more efficiency. This ever-growing scrutiny from investors, regulators and customers regarding social responsibility and sustainability have placed considerable pressure on utility providers. Naturally, there is also pressure on CAPEX side to renew or totally replace aged energy grids and older power plants removing bottlenecks in both distribution and generation of energy.

On top of that, with the EV leaders transforming transportation, there is a roaring need for charging networks which will burden the grids. Tesla is already expanding their already existing network of supercharges globally. The introduction of smart cities, smart grids and new methods of generating and transporting energy are now being shaped by the IIoT. It enables smart utility services that can be monitored and managed aiming at sustainability.

The transformation of electric grids into smart grids built on digital and IIoT solutions will be a matter of life or death for utility companies and energy providers in the years to come. Smart gids could offer proven solutions to the above-mentioned challenges, but the transition is not easy. It will require extensive assessment of available digital technologies and hardware to find the right combination of security, manageability, reliability, and flexibility.

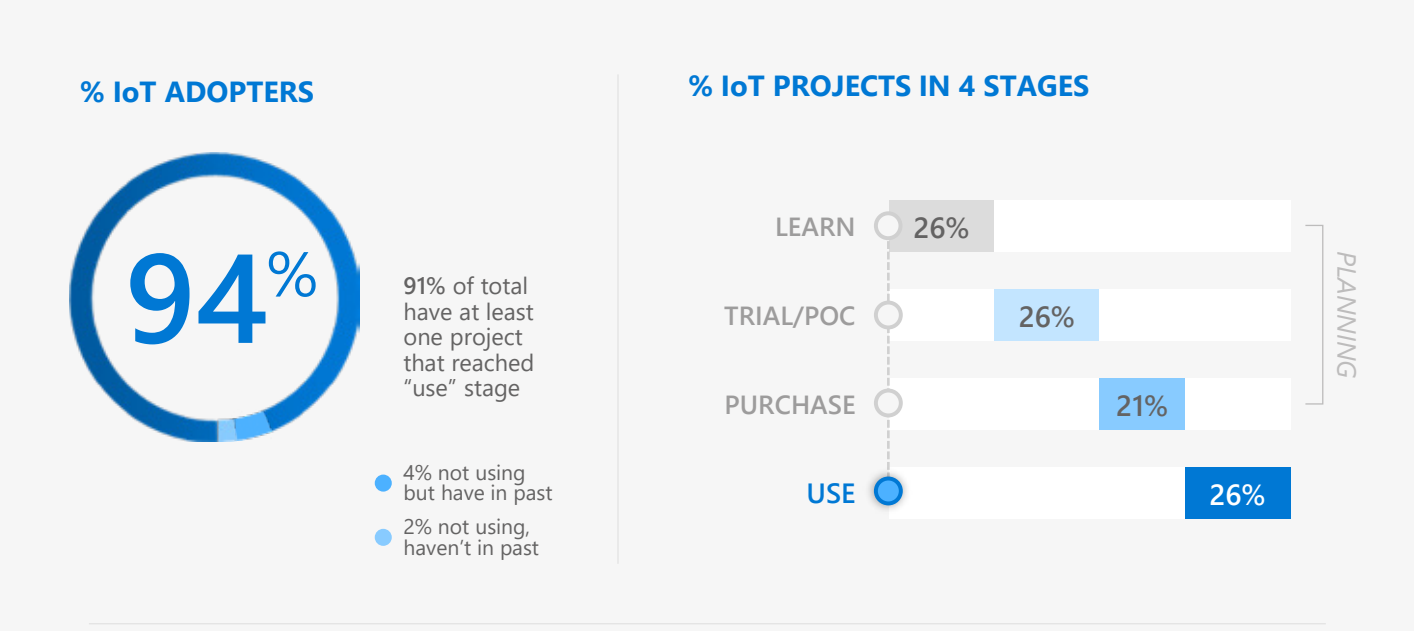
The IIoT energy movement is about integrating connectivity into equipment and devices, connecting those devices to intelligent networks, and using data analytics to extract meaningful and actionable insights from them. An indicative example will be that of energy generation companies embedding IIoT sensors into wind turbine vanes to control their velocity, rotation, and functionality responding in real time to varying wind conditions. The greatest value of smart grid and IIoT solutions is that they help realize the potential of data that exists and harvest it to produce automation, better decision making and ultimately increased efficiency. Some more specific solutions are:

- Reduction of capital expenditure (CAPEX)
- Management of demand
- Increased renewable capacity
- Lower maintenance costs
- Improved regulatory compliance
- Enhanced customer engagement

As discussed above, some of the major players in the IT sector are already moving fast and furiously to transform IIoT into business offering for the energy sector. One of the most prominent for holistic IIoT and tech integrated solutions is Microsoft, a giant among technology companies. As part of the announcement that Microsoft will be carbon negative by 2030, they have identified that the use of energy will be catalytic for human prosperity. Having dedicated more than a billion dollars they have dedicated critical teams to work on how to accelerate the development of carbon reduction and improve removal technologies. The Azure IoT team continues working on tools enabling delivery of new solutions and empowering clients to adopt digitalization. Microsoft's partnership with Vattenfall, one of Europe's largest producers and retailers of electricity and heat, illustrates how they can power new Swedish data centre locations with renewable energy. In their own words, on their website, Microsoft teams outline some of the services in their IoT energy portfolio:

"Grid asset maintenance

Visualize your grid's topology, gather data from grid assets, and define rules to trigger alerts. Then use these insights to predict maintenance and provide more safety oversight. Prevent failures and avoid critical downtime by monitoring the



IoT is embraced among energy organizations – 94% have adopted IoT within their organization, with a quarter of their IoT projects having reached the use phase. Those who adopt IoT most often benefit from improved operational and production efficiency, decreasing the chance for human error along the way.

© Microsoft / IoT Signals.

performance and condition of your equipment.

Energy optimization and load balancing

Balance energy supply and demand to alleviate pressure on the grid and prevent serious power outages. Avoid costly infrastructure upgrades and gain flexibility by using distributed energy resources to drive energy optimization.

E-mobility

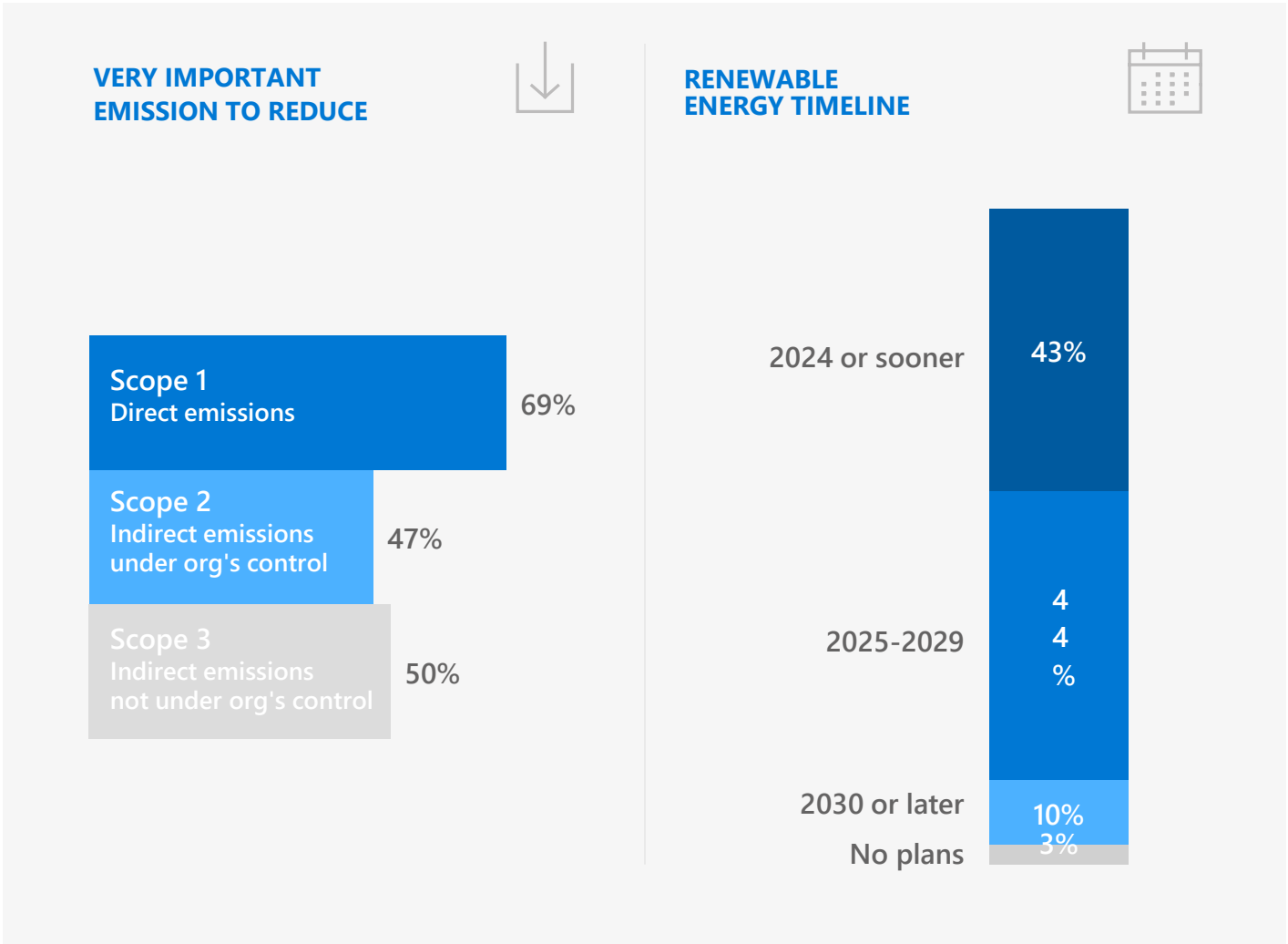
Remotely maintain and service electric vehicle (EV) charging points that support various charging speeds and vehicle types. Make it easier to own and operate electric vehicles by incentivizing ownership and creating new visibility into energy usage.

Emissions monitoring

Monitor emissions in near real-time and make your emissions data more readily available. Work towards sustainability targets and clean energy adoption by enabling greenhouse gas and carbon accounting and reporting."

To transition into an IIoT environment, data harvesting is essential. One of the upcoming leaders for the utilization of AI and Dara is Palantir. Palantir Technologies is a public American software company specializing in big data analytics. Their original clients were US federal agencies (from CIA to NSA and from DoD to DoE) but they have lately expanded their targeted client base to serve agencies of other countries as well as private companies in the financial and healthcare and energy sectors. Their added value is the multi-layered software that takes available data in their platforms and produces visual integrated networks with decision nods, enhancing the user's capacity for effective decision making. Their most prominent platform for private companies is Foundry and according to Palantir it "integrates and transforms petabyte-scale data, from sensors and IoT to third-party sources and internal datasets. The platform maintains complete data lineage and enforces granular access controls to ensure data integrity and security. Once data is integrated, Foundry unlocks actions, simulations, and analysis that connect users across the enterprise."

A surprising very strong player in data and continuous optimization is also Tesla. They have a dedicated energy segment, focusing on solar panels for homes, among other services. Their vision remains to accelerate transition into a world without fossil fuels and their plans remains the



Energy organizations also often use IoT for emissions monitoring and reduction, with one in three companies doing this. Direct emissions (scope 1) are viewed as the most important emission to reduce (69% say it's very important), though indirect emissions, both those under an organization's control and not under an organization's control, are also being prioritized. The majority of the companies focused on emission reduction plan to be carbon net zero by 2030 or sooner.

transformation of energy grids from the ground up.

Their solar panels and solar roofs segment offer the customer to reduce their dependence on the grid; to buy solar energy at the lowest price and have total control of electricity input/output.

Through the solar roofs, along with Tesla Powerwalls (another Tesla energy product), the Tesla cars and eventually the Tesla software the company offers a wholistic approach on how to control their energy print ad potentially redefine their relationship with the grid (through selling harvested solar power back).

Tesla's Virtual Power Plants (VPP) idea is an excellent example of information of Energy, IT and IIoT elements coming together. Distributed computing and IIoT helped Tesla ensure grid resilience and address some of the major engineering problems Tesla engineers faced. Talking about reimagining how a smarter grid would look like, and how to get there, two prominent Tesla engineers, Colin Breck and Percy Link, shared their ideas at a recent conference.

Their approach involves building immense resiliency through open-source technologies. One of the biggest challenges is about renewable energy sources being integrated which complicates the calculation of supply and demand. A degree of control is lost, and generation becomes more difficult to forecast as you cannot just

rely on weather forecasts (for wind or solar). The answer could be better battery technology, a field where also Tesla is a ground-breaking leader. In those cases where wind and solar power is already common, batteries mitigate these challenges. They can store energy efficiently and release it afterwards, covering extra demand. The ideas of Breck and Lick might sound crazy and involve creating giant batteries the size of whole factories and plants, but they also suggested the utilization of smaller home-installed typically used in service of private solar generation or backup power. This is more connected with the bigger Tesla idea of smarted grids. This could revolutionize and maybe displace actual energy generating plants, through the VPPs.

The whole idea relies on distributed energy sources (batteries) would be one example combined with wind and solar energy generators. The advantages of such a decentralized network, connected through software and enhanced though advanced analytics, would be immense with primary elements being cost effectiveness and flexibility. In Tesla's VPP vision, digital twin models represent various Internet of Things (IoT) elements. The digital twin modelling software is based on two essential open-source projects: Kubernetes and Akka. Breck clarified that the combination of Akka and Kubernetes is essential as the first can handle more major failures the second can handle minor (or in need of fine approach).

For example, when a system operator would be concerned about modelling an individual site, Akka would scale this diagnostic probe to thousands of sites. He continued by pinpointing the main challenging point of IoT adoption and talked about the intrinsic uncertainty of any IoT system as something that must be accepted and finally embraced.

Another example is Siemens. In the emerging era of digitalization operating with zero down time is quickly becoming the norm. To minimize risk of unexpected downtime operators must find a way to analyse data output from industrial machinery equipped with IIoT to identify and find solutions to potential problems before they occur. Siemens MindSphere is an open IoT operating system that enables you to securely assimilate and analyse data from products assets and other IIoT machinery.

MindSphere is a scalable industrial end-to-end solution that utilizes powerful industrial applications designed to connect assets and provide actionable insights for maximizing productivity and efficiency across your entire business.

Global IIoT market 2021-2025

The global IIoT market is expected to grow by USD 421.28 bn during 2021-2025 progressing at a CAGR of 33% during the forecast period, according to Reportlinker.com.

Their report on industrial internet of things (IIoT) market provides a holistic analysis, market size and forecast, trends, growth drivers, and challenges, as well as vendor analysis covering around 25 vendors. The study offers an up-to-date analysis regarding the current global market scenario, latest trends and drivers, and the overall market environment. The market is driven by the growth in industrial automation and growing importance of data-driven business outcomes in the industrial sector. In addition, growth in industrial automation is anticipated to boost the growth of the market as well.

The report also identifies the increasing focus on providing end-to-end services as one of the prime reasons driving the industrial internet of things (IIoT) market growth during the next few years.

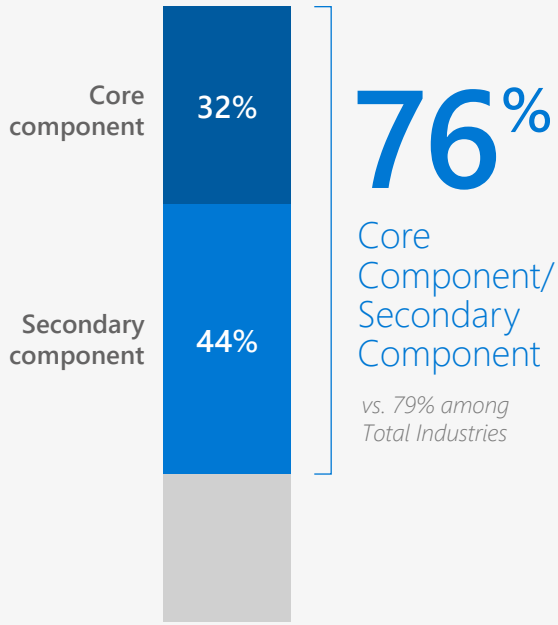
This robust vendor analysis is designed to help clients improve their market position, and in line with this, this report provides a detailed analysis of several leading industrial internet of things (IIoT) market vendors that include ABB Ltd., Cisco Systems Inc., General Electric Co., Honeywell International Inc., Intel Corp., International Business Machines Corp., Robert Bosch GmbH, Rockwell Automation Inc., Siemens AG, and Yokogawa Electric Corp.. Also, the industrial internet of things (IIoT) market analysis report includes information on upcoming trends and challenges that will influence market growth.

The European market potential for IIoT

The European market for Internet of Things (IoT) solutions is growing, shows CBI, the Centre for the Promotion of Imports from developing countries. Germany, the United Kingdom, France, Italy, Spain and the Netherlands are leading European IoT adoption, but Eastern European countries and the Nordics are following closely. Both consumer and business IoT offer opportunities, though specialisation may provide a competitive advantage. The home, health and finance sectors are the front runners in IoT adoption, and the shortage of skilled specialists continues to drive outsourcing.

The COVID-19 pandemic outbreak has affected all European countries. While the Internet of Things networks remained mostly unaffected, investment in IIoT solutions has gone down as new projects were put on hold. However, many companies across Europe are also now seeing the importance of IIoT and increasingly understand the benefits it can offer. In the long run, it is expected that the COVID-19 pandemic will only

USE AND IMPACT OF AI IN IoT SOLUTION



BARRIERS TO AI IMPLEMENTATION

Too complex to scale as we take on more AI projects/unsure about scalability	43%
Lack technical knowledge to see AI projects through	37%
Don't have the human resources necessary to implement and manage	34%
Infrastructure is not far enough along digital transformation plans	34%
Implementing AI would be too complex	32%
No solution available that meets our needs	26%
Don't know enough about how to get started with AI	25%

Most energy decision-makers are developing or implementing an AI strategy, with 76% of them making it a part of their IoT plans. Scalability hurdles persist for those implementing AI within IoT (43%) – even more challenging than lack of knowledge (37%) or having the right human resources (34%).

increase the demand for IIot solutions in Europe.

Research by Vodafone conducted in May 2020, showed 84% of the companies that had begun to adopt IoT technologies found they had a positive impact on their ability to function during the COVID-19 pandemic. The same research indicated that more businesses are turning to IoT to help them grow and adapt in the face of unforeseen events.

According to IDC's Worldwide Internet of Things Spending Guide, in 2019, Europe was responsible for 23% of global IoT spending. This makes Europe the third-largest market after the Asia-Pacific and North American regions, which respectively account for 35.7% and 27.3% of worldwide IoT spending. By 2024, Europe is expected to account for 25% of worldwide IoT spending. North America and Asia-Pacific will have lower annual growth rates of 11% and 13.2% respectively.

Conclusion

We definitely live through interesting times and it seems that the future is much closer than it looked before, mainly thanks to companies dedicating much effort to innovate and crate breakthroughs.

There is a saying about modern problems needing modern solutions, but this does not necessarily apply in this case.

We have an old problem and solutions coming from the future; we just hope that they will soon collide and provide the best possible outcome for the planet and Humanity as a whole. ■

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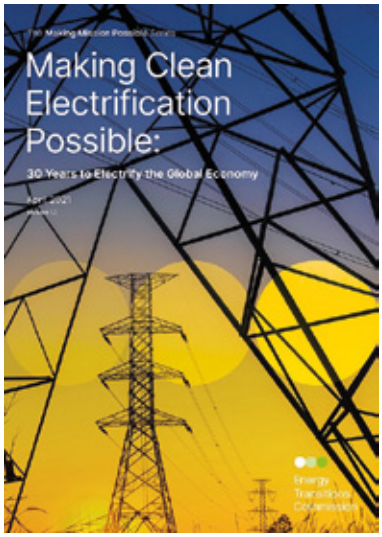
Making Clean Electrification Possible

The report Making Clean Electrification Possible: 30 years to electrify the global economy sets out why it is essential but also feasible and affordable to multiply the size of the global power system by 5, while shifting to renewable-based electricity provision.

The Energy Transitions Commission (ETC), a coalition of more than 45 leaders from global energy producers, energy industries, financial institutions and environmental advocates – including ArcelorMittal, Bank of America, BP, Development Research Center of the State Council of China, EBRD, HSBC, Iberdrola, Ørsted, Shell, Tata Group, Volvo Group and the World Resources Institute among others – released two new reports analysing the feasibility of achieving a net-zero greenhouse gas emissions (GHG) economy by 2050 and the actions required in the next decade to put this target within reach. Clean electrification will be at the heart of this transformation enabled by the rapidly falling costs of renewable energy, with a complementary role for clean hydrogen technology in sectors that are difficult or impossible to electrify.

Net zero by 2050 is possible

The Paris climate accord committed the world to limiting global warming to less than a 2°C increase from pre-industrial levels - and striving for no more than a 1.5°C rise in the planet's average temperature. For this objective to be reached, the world needs to achieve net-zero GHG emissions by around mid-century. The ETC states that achieving a net-zero GHG emissions economy within the next 30 years is technically and economically feasible. A profound transformation of the global energy system is ahead – a net-zero GHG economy will be built on abundant, affordable zero-carbon electricity.



Find the report at www.energy-transitions.org

Electricity could represent up to 70% of final energy demand by 2050, versus 20% today, with total electricity use expected to grow as much as 5 times in the coming decades. Transitioning to clean electricity as the main source of final energy represents the cheapest and most efficient way to decarbonise the economy. The rapidly falling costs of renewables and storage solutions make it possible to achieve the required massive expansion of clean power systems at low cost, according to the reports. However, wind and solar must increase from today's 10% of total electricity generation to about 40% by 2030, and over 75% by 2050. Annual wind and solar installations must therefore grow by 5-7 times by 2030, and more than 10 times by 2050. They must also be accompanied by the parallel deployment of other zero-carbon generation technologies (like hydro and nuclear), flexibility solutions, storage, and power networks to deliver zero-carbon power systems at scale. ■

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