

Forum Overview

Unlike other events of similar thematology and orientation the focus of IENE's Vienna Energy Transition Forum was not one sided, as is often the case when the whole discussion ends up being an eulogy on renewables and the need for temperature rise containment to so many degrees.

The Forum's organisers chose a far more difficult path when dealing with the real problems of Climate Change which are global rather than regional and certainly not European, since Europe's contribution to the planet's rising greenhouse gases is rather small (and declining) compared to the rest of the world and Asia's in particular. And besides, as IENE's Executive Director **Costis Stambolis** pointed out in his opening remarks, "Europe has a well worked out plan to mitigate increased greenhouse gases. In addition Europe's role is significant, to say the least, in terms of technology and methodology, and hence its scientific contribution in fighting Climate Change is proportionally much higher compared to other countries".

Stambolis also stressed that IENE, "through this Forum, aspires to broaden the debate on Energy Transition by giving equal weight to energy branches hitherto considered anathema in discussing the contribution of energy in mitigating climate change. In this context we believe that the role of natural gas, nuclear power and that of the oil and gas must be fully re considered in view of the serious merits that each one of them brings in the overall effort for decarbonization".

In the same vein IENE's chairman **Mr. John Chatzivasiliadis** observed that "The energy transformation will be one of the major elements in the 21st century". He went on to add that "Renewables have emerged as a technologically feasible and economically attractive choice that progressively increase their capacity to meet the energy needs of many countries. Decarbonization policies are taking place with fundamental changes in the global energy system, entering into an "energy transition" period. Rapidly growing renewables have started to transform the global energy landscape, while the drive towards further electrification and energy efficiency improvement is gaining traction".

"The global energy transition to sustainable energy sources will continue to accelerate and this energy transformation driven by renewables could bring changes with significant impact. Electricity, driven mainly by renewables, is becoming the main energy carrier in Europe and soon globally, with new areas of applications and increasing demand, almost everything becomes electrified, such as the transport, heating/cooling etc."

"Natural gas is another energy carrier in the energy sector and further expansion of its use and domination worldwide during the 21st century should be expected. Significant amounts of natural gas are used for power generation to substitute coal towards low CO2 emissions, in parallel with high penetration of renewables. Moreover, new uses of LNG in transport and shipping is becoming increasingly important".

“The high penetration of renewables will increase electrification and stimulate cross-border trading in electricity. Variable renewable sources of electricity, such as wind and solar, require storage and flexible and resilient power systems. Especially, a mature electricity storage technology is a basic strategic sector in the energy transition and the future of the European economy, contributing to industrial policy”.

“Large interconnections between countries and regions, both for electricity lines and natural gas pipelines can effectively meet the needs for flexibility and market operation, as well as for security of energy supply, without ignoring their geopolitical implications”.

“A huge amount of investment is needed during the next decades for the development of the future electricity and gas networks with storage for clean energy and more efficient European network and market operation. We are moving to a more interconnected world, and the concept of Supergrid and Global Grid, Gas Hub, is at the beginning, with positive influence in the market and the international cooperation”.

“The transition will generate considerable benefits and opportunities. It is not so much only a technology challenge, but in parallel a regulatory challenge and market reforms, for a plan and new policies”.

Decarbonisation was not so much a constant thread as a steel cable running through IENE’s Vienna Energy Transition Forum in Vienna on June 6 and 7, 2019. From the first day’s opening statement by **Janez Kopac**, Director of the Energy Community in Vienna, to the closing remarks by **John Roberts**, the need to move as swiftly as possible to carbon neutrality was stressed by speaker after speaker.

And it is cost-effective, too. Kopac said prices on the European carbon market are now starting to have a significant impact on investment in new power plants in western Balkans.

Market prices in Western Balkans do not cover the real costs of coal production. Coal subsidies in state budgets were unsustainable and state aid for coal should be ended. But, he indicated, capital costs for renewables in the Energy Community countries needed to be addressed since they were twice as high in Southeastern Europe as in North-western Europe. There was a need for renewables auctions – and for carbon pricing.

Costs were a constant theme, with several speakers tackling such key issues as the cost of renewables and the continuation of subsidies for coal and nuclear. **DI Hubert Fechner**, Chair of the Austrian Photovoltaic Technology Platform, cited a study by Bloomberg that showed that photovoltaics had now become the cheapest form of electricity in all leading economies apart from Japan.

At the other end of the spectrum, **Ms. Milka Mumovic**, the Energy Community’s Electricity and Statistics Expert, argued that the region needed to be weaned off its mistaken belief that coal was cheap. “ ‘Cheap coal’ is not at all cheap; it is very expensive,” she said. She added that in the region covered by the Energy Community’s member states – essentially South-eastern Europe – there was “no real incentive to promote energy efficiency.”

There was optimism, and there was caution. Professor **Reinhard Haas** noted that renewables were the biggest component in EU 28 power supply in 2018, but warned that one should expect stagnation in EU power demand to 2030. Likewise, independent consultant **Charles Ellinas** cautioned that, according to the latest IEA figures, in 2018 the increase in renewables capacity in 2018 actually slowed down, with investment falling marginally, so that it was oil and gas that plugged the gap in increased energy demand. Ellinas cited the IEA's argument that there is a need to double investment in renewables and energy efficiency and that investment in low carbon energy needs to grow 250% by 2030. He cited Britain's leading energy economist, Dieter Helm, in saying that if Europe wants to achieve a level playing field, then it must apply carbon taxes to imports.

One of the most detailed analyses on decarbonisation came from **Dr. Bas Van Ruijven**, Senior Research Scholar for Energy at IIASA in Austria. Dr Van Ruijven put forward four different pathways which varied according to the emphasis on different objectives. "If you only look at removing CO₂, it's a relatively narrow focus," he said. There was a need to weigh various trade-offs, to consider "which environmental problems do you care about apart from climate change and how do they affect your attitude to climate change." However, he added, "reducing energy demand avoids all the environmental issues associated with trade-offs." If the road chosen was full decarbonisation, he argued, initially there would be some increased demand for gas, but not for long as there would also be a need to reduce its use in order to achieve CO₂ targets.

Michael Woltran, Vice President for Gas Innovation and Advocacy at Austria's OMV, considered that gas had a considerable role to play in the energy transition and that it should be considered part of the solution, rather than part of the problem. Woltran noted that the question of gas does not simply refer to natural gas but also covers the potential for biomethane, hydrogen and synthetic methane. Methane pyrolysis offered a way of closing the gap towards carbon neutrality. Nonetheless, he anticipated that in 2030, renewables would supply 100% of Austria's power generation and that in 2050, the transport sector would be able to do without fossil fuels.

Pierre Tardieu, Chief Policy Officer at the Belgian-based WindEurope, noted that in Belgium, wind has the second largest power capacity in the EU. He said that wind already supplies 14% of the EU's electricity demand and it will that it would become the largest source of power generation in the EU by 2027.

Mr. **Tim Yeo**, Chairman, of the New Nuclear Watch Institute (NNWI) in London, strikingly declared: "Time is the resource we running out of," but added that "for the first time in 30 years there is a real sense of urgency." He continued: "Decarbonisation of the power sector must accelerate very quickly." Within the next decade, he said, Europe needed "not just an energy transition but an energy revolution." Yeo added: "We can't wait for CCS (carbon capture and storage) to become viable in five or ten years. The era of coal is over; more and more investors simply refuse to fund new coal projects because they fear being left with stranded assets." The required goal was not just an 80% cut in carbon emissions by 2050 but net zero emissions by 2050. However, achieving this raised the prospect of a power generation shortfall. Yeo naturally urged increased reliance on nuclear power, but he voiced

concern that while renewables would certainly grow, half of their projected growth would actually come at the expense of nuclear.

A second contribution from the nuclear sector came from **Dr. Aliko Van Heek**, Unit Head 3E Analysis Planning and Economic Studies Section, Division of Planning, Information and Knowledge Management Department of Nuclear Energy, International Atomic Energy Agency (IAEA), Vienna. Dr Van Heek called for the large share of fossil fuels in final consumption to be replaced by renewables., and she considered this would happen rapidly. She added: “All low-carbon technologies need to be utilised, optimised to cost and geography.”

Ms. Liana Gouta, Group Director, Energy Policy and International Affairs, at Greece’s Hellenic Petroleum, considered that primary consumption of oil and gas will keep increasing up to 2040, due to growing demand from developing economies. Renewables were currently the fastest growing source of energy but were only on track to have a 14% share of the energy market in 2040. Gas was also growing fast, becoming the bridging fuel. Ms Gouta also asked some pertinent questions concerning the Energy Transition. Will we still need oil in the next decades? What will the role of liquid fuels be in the future? Will we still need refineries in the future, and what will the refinery of the next decades look like?

Finally, she asked: “Is petroleum technology an ‘old, fading technology’ or does it have a crucial role to play in the transition to a low carbon economy?”

Dr. Michael Losch, Director General for Energy and Mining at the Austrian Federal Ministry for Sustainability and Tourism, noted that while Poland was thinking of building a new nuclear power plant, it was also intending to stick to coal for quite some time. The Germans, Losch said, were serious about phasing out coal, with 25GW of coal-fired plant to be taken off line (or transformed) by 2030 while some 10 GW of nuclear generation would also be taken out. This 35 GW takeout over the next decade was equivalent, he noted, to 3.5 times Austria’s entire electricity consumption. “This is a huge energy transition to which Germany is committed.” he said.

Hydrogen

Losch also focussed on hydrogen. He noted that hydrogen development was being seriously assessed by the IEA and that an advisory report, under preparation during the summer of 2019, would be presented to the next major IEA summit in Japan. With hydrogen, Losch said, “the key word, the watchword, is flexibility. If we want to achieve this energy transition, we need the flexibility to balance power systems.” The most important element concerning hydrogen was its ability to provide storage to cover variable intermittent renewables energy production.

Losch listed three main ways to source flexibility to balance power systems

- Make the power generation fleet and demand more flexible;
- Deploy energy storage;
- Upgrade an improve electricity grids and their operation.

He added: “We can use the gas infrastructure; we can blend in 10 to 20 per cent (of hydrogen) into the gas grid. 10% is no problem. The IEA brought together a lot of people from gas turbines etc., who said we can function very well with 30% hydrogen.”

Losch also argued that “if we integrate the electricity markets with a strong grid across Europe, that means competition” between different energy sources. However, he added: “If you have competition, you need a level playing field.” At present, he argued, renewables face completely unfair competition. For example, the UK’s current development of a new nuclear power station at Hinkley Point was based on a contract which is to last for 35 years. “If a project is only feasible with a subsidy for 35 years a subsidy for which every wind or photovoltaic producer could only dream of...” Coal, too, was still enjoying subsidies. “Basically, we would have a subsidy race; not my idea of a functioning market...”

Instead, an overall programme to integrate renewables was needed.

Nick Butler, Chair of King’s Policy Institute at King’s College in London, completely agreed with Losch, not least on the costs of the Hinkley Point project, which, he said, has a deal from a base price set in 2013 and which was index-linked for 35 years from when it comes on stream, which could be in 2027, or some years later, possibly 2030. The cost, he said, would be £130 (approx. €142) per megawatt hour, “and we will still be paying that index-linked price in 2060.”

Butler had concerns about the attitude of traditional hydrocarbon companies. He said: “Oil and gas companies are investing less than 5% of total capex in energy transition. If they are serious about climate change, that is a figure that will have to increase.” He indicated there was a need to speed up technological development to effect change in the transport sector. Each year, he said, “the number of internal combustion engine vehicles increases by more than number of electric vehicles.” He continued: “Petrochemicals, freight, lorries, airfreight – they are all going strong and, as yet, there are no serious substitutes.” “The first role for the oil and gas industry is to manage their own activity, to produce less emissions, address waste, methane leakage.”

The market for gas would be very competitive, Butler argued, “especially in the electricity sector.” As for traditional energy development, he noted that whereas the development of a new oilfield required a 20% rate of return, new wind farms required an RoR of no more than 7 or 8%. And it was “very difficult for corporations to handle” the kind of electricity business in which there were multiple sources of supply and a very competitive environment. He considered that big companies seeking to enter this market might set up daughter companies which would have their own balance sheets and, no doubt after racking up considerable initial costs, would eventually start to turn a profit. “Daughters need investment, they live at home, they are not cheap, but in the long run they find their own way and leave home,” Butler commented.

European Grids

Butler thought Europe should think big. If China could develop massive grids to bring solar-fuelled energy more than 3,000 kms from Xinjiang to Shanghai, then Europe could develop its

own grid – “a high voltage high quality grid” – to capture wind from the North Sea, hydro for Scandinavia and solar from Southern Europe. It would be a smart grid, it could balance supplies, and help both energy and economic development throughout the continent, rather than concentrating economic development in a golden triangle in northern Europe. Such a grid could also “overcome many of the problems in intermittency.” Moreover, “why should this technology be dominated by the Chinese?” he asked. However, Butler said he was “very doubtful” that Europe had the will to take such action.

George Zazias, in joint paper with **Professor Pantelis Capros**, of the E3 Modelling Laboratory, at stressed the need for decarbonisation of power generation. He argued that carbon neutrality for the EU was feasible by 2050 without excessive costs but warned that this could not be done just by relying on changes in power generation, and improvements in advanced biofuels and increased use of electrical power in transport systems.

Disruptive Changes

Energy savings beyond conventional wisdom - what Professor Capros called ‘disruptive changes’ - were required. These included sharing of vehicles, new energy carriers, new energy distribution systems and equipment. He looked to both hydrogen development and to what he called ‘extreme electrification.’ There was a need to promote and develop GHG-neutral fuels, instead of relying on fossil fuels, while still maintaining current infrastructure. And it was also necessary to consider CO₂ as a commodity; capturing carbon emissions in the air, in combustion, and in biogenic processes and to consider its use for fuels and materials along with sequestration and storage, notably underground.

The circular economy

Both Capros and Zazias noted the need to develop the circular economy, a subject which was at the heart of the presentation made by **Tom Van Ierland**, Head of Unit C1 – Strategy & Economic Assessment, at the European Commission’s Director General for Climate Action. Van Ierland emphasised the need to recycle goods, a key element in the circular economy, which seeks to replace the classic linear ‘make, use, dispose’ economy with an economy that focusses on extending the life of goods in service, and when they are no longer required, recycling them and regenerating elements and materials for further uses.

At present, Van Ierland thought, we might get no further than a 50% reduction in carbon emissions by 2050. “Very quickly, we need to move to a more energy efficient system,” he said. There was a need to approve key technologies in the next 10-15 years, so that they could then be rolled out a widespread commercial basis. He raised the issue of promoting the bio-economy, noting the key role that energy crops could play to avoid unsustainable use of forests, and of the need to maintain the natural carbon sink while preserving ecosystems. There was a need, he said both to reduce emissions and to store emissions. Focussing on decarbonisation could produce economic benefits. Full decoupling of EU GDP growth and emissions by 2050 would be positive for growth, improving GDP by up to 2% a year. And, of course, it would improve people’s health. But all this would require much greater investment. At present, Van Ierland said, the EU invested 2% of its GDP in energy. This would have to

increase to 2.8% a year – an annual increase of around €575 billion – in order to achieve a net zero greenhouse gas economy.

Social concerns

The need to do more on the social side was highlighted by **Mr. Daniel Kroos**, Senior Programme Officer, Energy Security Organization for Security and Cooperation in Europe (OSCE), Vienna. Kroos said that energy transition had to take place without introducing energy instability. Clean energy tech and digital tech would clearly help, he argued, but hinted this would not be enough. Kroos warned: “Beware of the CAVE - Citizens Against Virtually Everything (CAVE) – symptom.”

The social impact of the climate emergency was also highlighted by **John Roberts**, a UK energy security specialist, who said there was a need to contrast the social impact of the emergency and the social impact of the measures required to tackle the emergency. The law of unexpected consequences was worth recalling, Roberts noted. Thus the decision of the Thatcher Government in the mid-1980s to challenge the power of the coal miners in the UK led immediately to a sharp reduction in both the number of working coal mines and, of course, of miners. One logical consequence was a reduction in coal-related carbon emissions. But it was worth noting that there were also correlations between the social damage caused by the mine closures and the way in which a later generation in the affected areas, still distrustful of politicians, voted in 2016 for Britain to leave the European Union.

SPECIFIC RECOMMENDATIONS AND IDEAS

DI Gottfried Steiner, CEO Central European Gas Hub AG, Austria, naturally stressed the importance of energy exchanges, describing them as “an indispensable part of the present and future energy sector.” He noted the interplay of physical and financial markets, and the way in which competition and markets drove innovation.

Ms. Eva Papadionysiou, Executive Officer at Hellenic Energy Exchange’s Markets Operation Department, looked to the creation of a gas trading platform in Greece with her own Hellenic Energy Exchange naturally playing a major role. She argued that a new business model was needed – and that social issues had also to be taken into account. There was a need for decentralization, for a shift in energy markets from vertically integrated monopolies to small-scale active players, as well as an increasing demand for market integration and cross-border cooperation. Digitalization was required to ensure more efficient coordination between supply and demand. But there was also a need for social acceptance of the measures involved in securing decarbonisation – and a word of advice to entrepreneurs: “fixed cost technologies will prevail in the future.”

Chris Walters, Managing Consultant at the UK’s Gas Strategies, commented: “We’ve already done the easy bit, what’s needed now is real behavioural change.” But, he added, “I don’t think the public is aware that real behavioural change is required.” What’s more, he said, “we need to make changes now to reduce CO2 emissions.” Walters observed that Britain is introducing new regulations that say that new houses will not be connected to gas networks

but will have heat pumps. However, Greece, he noted, is currently extending its gas network. But, he added,

Mr. Olivier Marquette, President, of AES Bulgaria, emphasised the importance of energy storage, noting that, in Hawaii, AES operated the “world’s largest solar and renewables storage system” and that in the Caribbean it operated large scale LNG storage units in the Dominican Republic and Panama.

Dipl.-Ing. Gerd Pollhammer, who heads the Siemens Group’s Smart Infrastructure company, noted that at Linz, in Austria, his company operates the world’s largest hydrogen pilot plant, producing hydrogen from renewables and water. With a 6MW capacity, the plant produces 1,200 cm of H2 per hour. Pollhammer noted that new technologies combined with energy efficiency were changing the way buildings were constructed. A combination of smart users, new building technologies and flexible grids has already resulted in 50% reductions in district heating costs, he said, citing two examples. One was Vienna’s new Aspern district; the other was the Sello Shopping Mall near Helsinki, which aims to be the greenest shopping mall in Europe.

Building Issues

Building issues were a focus for **DI Roger Hackstock**, Managing Director of Austria Solar. The way that both houses and commercial buildings are being heated is changing. Both can now rely 100% on solar power for heating. They don’t need boilers any more, “only solar, hot water-tanks and cooling appliances.” Solar district heating can also be made available for cities. As for other new technologies, Hackstock considered such projects as “the electric car that charges itself,” citing the Solar Highway in Jinan, a \$6.5 million, 1,080-metre stretch of road in China’s Shandong Province that is paved with solar panels and electric battery rechargers.

REGIONAL ISSUES

Russia

Professor Andrey Konoplyanik, Advisor to the Director General of Russia’s Gazprom Export, considered that the EU should forget its dreams about a bright energy future based on renewable electricity, since this would prove too costly. Russia, on the other hand, was in a position to help Europe with gas – and not just by supplying natural gas now or through the provision of hydrogen upstream in the future, but by providing hydrogen downstream. Russia had the technologies that would make methane pyrolysis available. Konoplyanik clearly did not see a major role for renewables as part of the mainstream Russian energy system, but he did consider that distributed energy based on renewables would work for remote regions of Russia with small populations.

Konoplyanik’s presentation mainly focused on the collective efforts of Russia and EU that are needed in gas decarbonization process based on their joint development of H2 production through the process of methane pyrolysis in order to face the challenges of Paris Climate

Agreement (COP21). This is expected to lead to less social costs for EU in terms of decarbonization and will in turn increase social welfare, while it will potentially broaden the market for Russian gas as the source of H₂ production without CO₂ emissions.

Romania

Romania suffers from uncertainty regarding its energy strategy, said **Eugenia Gusilov**, Director of the Romania Energy Center in Bucharest. Romania is still looking to traditional fuels, not just oil and gas but coal and nuclear, with China investing in the latter pair. There is little understanding of the energy transition; it is not really a subject of interest. And yet there are substantial areas suffering from poor air quality, so the interest should be there. There is modest support for renewables “but it’s not courageous enough,” said Ms. Gusilov. The current energy programme tended to look backwards, not forwards. And as for coal, well, “phasing out coal is not patriotic,” she said.

Bulgaria

Bulgaria is working towards decentralized electricity generation and improved regional connections, said **Mr. Kaloyan Staykov**, Senior Economist at Bulgaria’s Institute for Market Economics. Its goal is to maintain and improve grid operations, including interconnectivity.

But Bulgaria has the lowest GDP per capita in the EU, which means it has limited resources. It also has to tackle the problem that energy costs are not covered by energy tariffs, causing a further financial burden. As a result, Staykov argued, “stakeholders are exhausted and distrust future reforms” while “politicians have been maintaining a half-hearted approach” and “future investments are under question.”

Greece

Mr. Anastasios Tosios, Commercial Director, for Greece’s EDA Attica in Greece, said that Greece was relying on natural gas in its drive for decarbonisation and that in the last three years increased use of natural gas had increased the value of the gas distribution network by 50%. He anticipated that the country’s gas network would see around €2bn in fresh investment in the decade 2020-2030 and that new CNG and small-scale LNG infrastructure would enter service.

As for renewables, **Mr. Costis Stambolis**, IENE’s Executive Director, noted that on Kastellorizo, the most remote island of the Dodecanese, the installation of renewable energy coupled with battery storage was aimed at making the island 90% self-sufficient in energy. At present, he noted, Kastellorizon relied primarily on diesel-generated electricity costing, on average, five times as much as elsewhere in Greece,

Turkey

Turkey has for some time had a problem in that it has produced targets for energy production, rather than actual plans to achieve these targets. However, an Action Plan is now being prepared, said **Dr. Yurdakul Yigitguden**, Independent Energy Consultant and Former Co-

coordinator of OSCE Economic and Environment Activities. The government is working on the plan with stakeholders and there is a particular focus on energy storage. The plan will also cover improved energy efficiency in buildings. In renewables, it looks to continue the development of geothermal, wind and solar power, as well as biomass. But the prime focus in renewables is further development of Turkey's massive hydro-electric potential with the aim of achieving full utilisation of this resource to produce no less than 140 terawatt hours a year. This would require some 40,000 MW in capacity; in 2018 capacity totalled 28,291 MW.

Iran

Iran has plenty of gas, but what will it do with it.? That was the core question posed by **Bijan Khahejpour**, Managing Partner of the EUNEP consultancy in Vienna. By 2025, Iran is projected to be producing no less than 360 bcm a year, equivalent to roughly three-quarters of the EU's entire gas consumption. But its focus is on gas as a substitute for oil on the domestic market, so that it can sell more oil abroad. Inasmuch as it is looking to export gas, beyond such current markets as Turkey, Iraq and prospectively Oman, it is looking to India. Europe comes third, behind new markets at home and in India, both because of its increasing alignment with Russia and because of international sanctions. Iran wants to upgrade its technology and focus on petrochemicals. It would like to develop LNG, hampered by sanctions and the unwillingness of prospective partners to engage in joint ventures, it lacks LNG technology. Iran appreciates energy efficiency, arguing that it is cheaper to save a barrel of oil than to produce one.

Conclusion

If there was a conclusion, perhaps it was that despite all the ways in which Europe – collectively or as individual nations – is capable of tackling the issues of the energy transition, it is still unlikely to do so in a sufficiently forceful manner to help the world attain the Paris target of limiting CO2 emissions to a 1.5 to 2.0 degree increase by 2050.

And it's not just a challenge for governments. It is, especially, a challenge for the corporate energy giants that have built their companies on fossil fuels.

Nick Butler phrased it like this: "Climate risks are still growing and will continue to rise over the next five years. Two degrees is now inevitable and unavoidable. It's not about supply, there's plenty; it's not about demand. It's about trust. NGOs have switched their focus from governments to companies. But companies are not used to being in the sort of focus they are now. So they have to regain trust. They have to show they are working for change and putting money into research."

And, of course, they then have to implement the results of that research.