



WHITE PAPER

WILL COP 21 HAVE AN IMPACT ON ENERGY SUPPLY?

COP 21, the 2015 United Nations Climate Change Conference, held in Paris in early December last year, represented a significant milestone in terms of action on climate change. The Paris Agreement was a step forward in that it was a global agreement representing the consensus of the 196 parties attending COP 21. However, it will not become legally binding unless 55 countries, whose CO₂ emissions represent more than 55 percent of global CO₂ emissions, sign it prior to April 21, 2017 and also adopt it legally within their own jurisdictions. The agreement calls for zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century and in the adopted version of the Paris Agreement, the parties will also “pursue efforts to” limit the temperature increase to 1.5 °C.

In the run up to the Paris COP meeting, the Global Energy Assessment Council published in 2012 its Global Energy Assessment, Towards a Sustainable Future. This document laid out 10 key findings with regards to the global energy challenge specifically targeting transformation of energy systems to meet a number of goals including reducing CO₂ emissions, radical improvements in energy efficiency, greater use of renewable energy and increased CO₂ capture and storage. It challenged policy makers, and the industry in general, to rise to new levels of achievement in terms of energy strategy, investment and structure.

There are a number of well-known steps or recommendations, which would help to reach these goals:

- Increase share of renewables in generation, but how high can this share be without becoming a threat to network stability?
- Use of power storage technologies to counteract the volatility of renewables, but are they efficient enough for wide scale usage?
- Develop other non-emitting generation technologies, e.g., nuclear, but it is safe enough and politically acceptable?
- Substitute coal generation with gas, but which gas sources are reliable?
- Use emission storage to reduce CO₂ effect of conventional production, but does this make economic sense?

WE INVITED THREE INDUSTRY EXPERTS TO ANSWER THESE AND FURTHER QUESTIONS, WHO KINDLY AGREED TO GIVE US THEIR VIEW. THEY ARE:

- **Mr. Mark Cox**, partner and chief investment officer with the New Energy Fund II, LP.
- **Mr. Alexander Bychov**, who was deputy director general and head of nuclear energy for the IAEA from 2011 to 2015.
- **Dr. Vladimir Feygin**, president of the Institute of Energy and Finance in Moscow.

A key part of the puzzle is in the mix of power generation and how to meet the demands of a growing population for modern conveniences while reducing carbon dioxide output?

The energy mix

A key part of the puzzle is in the mix of power generation and how to meet the demands of a growing population for modern conveniences while reducing carbon dioxide output? Increasingly, renewable sources of power are gaining a significant share of generation in many regions and nations and, in of itself, posing problems in terms of wholesale power price development and grid stability. As individual homes rapidly become distributed generators, both consuming and supplying power from and to the grid, investment is needed in smart technologies to manage and account for such changes. This will in turn require major structural change in the utility and grid industry. Meanwhile, what about power storage? Can power generated at off peak times be stored for delivery at periods of high demand and can power generated when the wind is blowing or the sun shining be stored for later use?

According to Mark Cox, renewable sources of energy are quickly becoming economically viable without subsidies due to the massive decline in the cost of equipment. Green power is already cost effective in major cities and remote areas where traditional power prices are high, he says, quoting a 10 – 12cent/kwh for solar generated power. He also sees a number of potential solutions to the power storage issue, depending upon the local situation, involving kinetic storage technologies and a strong future for capacitor technologies for storage. More traditional storage devices such as batteries are slow to charge, and have limited cycles making them difficult to maintain and expensive. He suggests that “If you put a community under pressure to go green, they can do it now,” especially in an environment where the industry structure is more localized and utilizes the appropriate resources for hydro and kinetic storage.

Nuclear power is another option that might benefit from the Paris Agreement but it too is not without issues. Accidents like the Fukushima event prompted Germany to mothball all its nuclear generation facilities and commit to a non-nuclear future closing all its reactors by 2022. However, Alexander Bychov remains optimistic about the future for nuclear power, citing the high levels of regulation in the industry and improvements in safety as being behind a very low risk of accidents. He points also to the technologies in place to deal with spent fuel, radioactive waste and recycling, which also contribute to a very clean source of energy. He suggests that use of nuclear is a very much a geopolitical decision,

“Nuclear power is a very good option from the point of view of pollution and stability of supply and there is a strong correlation between nuclear power development and life quality in that working with dangerous substances transform’s peoples approach to life.” His optimism is echoed by the International Atomic Energy Agency (IAEA) who see slowly growing use of nuclear facilities for power in the future, beyond 2030, particularly in Asia, Latin America and Africa. On the downside, he sees the complexity and cost of building nuclear power stations and availability of qualified and trained operators will limit expansion of nuclear generation in the short term.

Another favored fuel is natural gas and the replacement of coal-fired generation with gas-fired generation is already a trend in some countries such as the U.K., going so far as to discontinue coal generation altogether. Gas prices are now generally low and relatively stable, but international markets are disconnected according to Vladimir Feygin. He believes that “to reach the goals of the Paris Agreement, coal needs to be replaced with gas for generation,” yet he also sees political obstacles and other challenges along the way such as the opposition to shale gas development outside the U.S., the impact of current pricing levels on the growth of LNG, reliance on Russian gas in the EU and the importance of coal and coal mining to some economies like that of Poland. He also sees a need for more capacity markets to help the workings of regional gas markets like that in Europe.

Renewable sources of energy are quickly becoming economically viable without subsidies due to the massive decline in the cost of equipment.

MR MARK COX,

PARTNER AND CHIEF INVESTMENT OFFICER
WITH THE NEW ENERGY FUND II, LP.

What about emissions?

On the other side of the coin is steps taken to reduce CO₂ emissions utilizing cap and trade schemes such as the EU’s Emissions Trading System (ETS) mechanism or to capture and store carbon emission through sequestration or other methods. If CO₂ could be stripped from emissions from fossil fuel generation or at the point of end use, could the goals of the Paris Agreement be met? Mark Cox does not think so unless carbon can be taken out in solid form as opposed to a gas. He points to the difficulties in storing CO₂ as a gas in finite storage locations as well as the fact that “CCS projects are not being completed and running into a variety of issues.” He sees a regional perspective to this issue as well in that locations with easy access to old coalmines and

workings might work better for CO₂ storage than others, but in the end, he believes the biggest impact will be in moving to renewable sources of energy. Vladimir Feygin agrees saying that “The ETS trading scheme does not work as there are simply too many allowances available,” and he believes that the goals on climate mitigation can only be realized if “quite additional significant cost is added to coal to help diminish its use.” He suggests that it will need either ecological taxes or an effective trading mechanism to obtain significant movement.

The replacement of coal-fired generation with gas-fired generation is already a trend in some countries such as the U.K., going so far as to discontinue coal generation altogether

The impact of Paris on energy

The three experts broadly agreed that the Paris Agreement will have an impact but disagreed as to how significant the impact will be. Mark Cox was quick to point out that the Paris Agreement is voluntary and non-binding and as such, he sees it having limited impact although he is encouraged by the trend the agreement suggests. Alexander Bychov is optimistic about the impact of Paris on the future of nuclear energy and sees it having a steady and slowly growing share of the overall generation mix particularly in areas like China, Asia and Africa while acknowledging the longer-term nature of planning and construction and the limited supply of expertise and trained operators. Vladimir Feygin believes that Paris is likely to have a significant impact on the gas/coal mix; increasing use of gas-fired generation. All three see the impact of Paris as promoting the use of renewables of course.

Our overall conclusion from speaking with the three experts was that we can derive some clear statements for many of our questions but still questions remain mainly because of uncertainty in political decisions. Here is our summary:

- The industry needs to eliminate the dirtiest generation fossil fuels particularly coal and that a move to gas is foreseen. However, there will likely be political issues in certain countries such as Poland or Germany where the coal industry is important.
- The future price of gas is also a consideration. Will the link between gas and oil prices break down and be replaced by hub-based pricing? How will future gas prices hinder or encourage the development of LNG? How will net importers of gas, like the EU, secure a reliable supply?

- Nuclear energy will remain a small part of the generation mix and is likely to slowly grow in the future.
- Continued deployment of renewable generation from wind, tide, sun and hydro and continued investment in improving efficiencies and reducing the cost of these forms of generation. Despite that, there are likely practical upper limits on renewables without economic and flexible storage and impacts on grid stability.
- Carbon dioxide storage is not the long-term solution as CO₂ is a gas and it is difficult to guarantee no leakage while storage facilities are finite.
- Will CO₂ allowance cap and trade schemes be effective to drive down emissions on both the generation and usage sides of the business? Currently, the EU ETS is seen to be failing so is there the political will to make it effective?
- Continued investment and subsidies are needed to drive technology efficiencies. What kind of technologies will eventually prove to be the way forward on renewables and power storage? Power storage remains an unsolved issue.
- Finally perhaps, the fuel mix will dictate the price of power and also impact subsidies. This depends on many unanswered questions at this point.

In the final analysis, all three experts also suggest that the future of energy strategy will be more localized as a result of political and economic factors as well as what makes sense in terms of the resources that are available. As Mark Cox points out, a green future is available now and one only needs to look at Germany to see compelling evidence of that, where renewable energy generation is reaching 50 percent and more. There remain many issues and challenges but the Paris Agreement can be a catalyst to help unravel these.

About FIS

FIS is a global leader in financial services technology, with a focus on retail and institutional banking, payments, asset and wealth management, risk and compliance, consulting and outsourcing solutions. Through the depth and breadth of our solutions portfolio, global capabilities and domain expertise, FIS serves more than 20,000 clients in over 130 countries. Headquartered in Jacksonville, Florida, FIS employs more than 55,000 people worldwide and holds leadership positions in payment processing, financial software and banking solutions. Providing software, services and outsourcing of the technology that empowers the financial world, FIS is a Fortune 500 company and is a member of Standard & Poor's 500® Index. For more information about FIS, visit www.fisglobal.com

 www.fisglobal.com

 twitter.com/fisglobal

 getinfo@fisglobal.com

 linkedin.com/company/fisglobal

©2016 FIS

FIS and the FIS logo are trademarks or registered trademarks of FIS or its subsidiaries in the U.S. and/or other countries. Other parties' marks are the property of their respective owners.