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The Natural Gas & Renewable Energy Alternative

Introduction

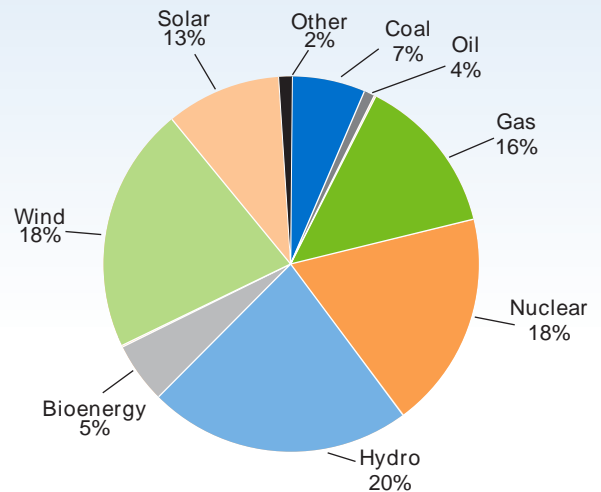
In recent years, there has been increasing awareness regarding the palpable negative impact of climate change on our planet and the need to address it urgently and collectively. The ratification of the COP21 Paris Agreement and its entry into force in November 2016, illustrates this rising global concern and intention to mitigate this impact. Within this context, many solutions have been pondered over and proposed... but the present contribution focuses on a potential alternative that would help reduce CO₂ emissions through the cleaner and more sustainable generation of electricity and would support the increased use of renewable energy sources.

Energy Generation Mix Prospects

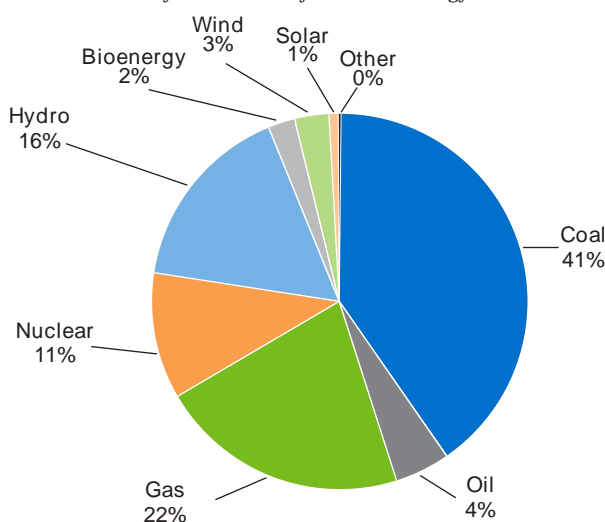
At present and globally, the generation of electricity remains, as shown in the figure below, dominated by the use of fossil fuels, especially coal which accounts for over 40% of the total generation mix (mostly base-load), while wind and solar sources of energy cover (intermittently) only 4% of the electricity produced worldwide.

Under a successful decarbonization scenario (International Energy Agency's 450 Scenario)², by 2040, the combined share of wind and solar energy would increase significantly to reach almost a third of the global energy generation mix. Even for this IEA greenest electricity generation scenario, natural gas would account for a non-negligible 16% of the total mix, as indicated in the following chart.³

Electricity Generation by source of Energy – 2040
 Decarbonization Scenario (450S)



Electricity Generation by source of Energy – 2014¹



Source: International Energy Agency (IEA), 2016

Notwithstanding the fact that scenarios are based on a number of assumptions, international organizations such as the International Energy Agency and the World Energy Council, indicate in their scenario analyses that natural gas would be expected to play an important role in the world's energy balance over the next three decades. At the same time, it is also recognized that the fast emergence and application of new disruptive technologies could alter radically the future energy scene, and leap-frogs the transition to a completely fossil fuel free energy mix. In the meantime, rather than being a transition or bridging fuel, natural gas would likely be part of the solution for a cleaner generation of electricity.

¹ Shares are based on total electricity generated in TWh in 2014.

² This scenario's objective is to limit the average global temperature increase in 2100 to 2 degrees Celsius above pre-industrial levels.

³ It should be noted that the global forecasts do not show the distinct differences between regions or even within regions.

Current Situation

The current thinking on the transition to a cleaner economy, and therefore cleaner generation of electricity, varies widely depending on the group of protagonists and their respective assumptions. At the extremes, there are those who consider that the only solution would be a faster transition to 100% renewables; while others continue to be focused mainly on the use of fossil fuels with cleaner and more efficient generation technologies. Neither of these positions is realistic or likely to rapidly help develop financeable and sustainable solutions to generate electricity.

Interestingly, the renewable energy industry (solar and wind) recognizes the need for a pragmatic approach involving natural gas to reach a realistically achievable cleaner generation solution while increasing the use of renewable energy. This potential natural gas and renewable energy partnership is not only recognized by the renewables industry, but also by investors. In one of their latest research reports, BlackRock, one of the world's largest equity investors in renewables, states the following: "we see gas as a key component of the global energy mix for years to come..."⁴

Opportunities and Challenges

A partnership between non-hydro renewable energy sources (solar and wind) and natural gas could include hybrid schemes combining two technologies, such as solar and gas-fired units, integrated in one power plant (e.g. the hybrid gas-solar plants commissioned in the early 2010s in Algeria, Egypt and Morocco). It could also consist of a systems integrated approach optimizing output from separate renewables and gas-fired generation systems.⁵

One of the key benefits of a partnership between natural gas and renewable energy sources is the fact that natural gas is the cleanest back-up fossil fuel to use in the generation of electricity to address the intermittency or variability constraints associated with wind and solar generation. This would obviously change whenever a commercially viable and implementable energy storage solution is achieved. In addition, under a low gas price environment, a combined natural gas and renewables generation alternative would provide a cost-effective electricity output and would help increase the use of renewables. In liberalized electricity markets, the mixed dispatch of gas-based electricity supplies and renewable energy could reduce price volatility.⁶

However, achieving the benefits of such synergies varies from one region of the world to another. For example, in Europe's currently depressed and uncertain gas markets, relatively lower cost coal (combined with low – real or shadow – price of carbon) in some countries seems to be better positioned than natural gas for a partnership with renewables in the absence of an adequate consistent carbon pricing or carbon taxation policy.

In developing economies endowed with natural gas resources, the synergies are potentially achievable. But in several countries, especially in Asia and some parts of Africa, coal-fired generation remains the most cost competitive generation option. Combinations of new clean and highly efficient coal technologies with renewables could also achieve under some scenarios the same total levels of CO₂ emissions as natural gas, but with less back-up flexibility.⁷ In order for gas to

remain the fuel of choice, the oil and gas industry will have to also address the issues of methane leakages and associated gas flaring. It should be noted, however, that a lot of efforts have already been made in reducing gas flaring, but it is an on-going process and many more efforts need to be deployed.⁸

Furthermore, when considering the costs of different generation technologies, the issue of climate change mitigation has to be reconciled with the sensitive aspects of energy price affordability and poverty alleviation in low income developing economies.


Therefore, one of the major challenges that a natural gas and renewables partnership faces is the relatively low cost and abundant supplies of coal in a number of countries and the lack of a coherent and effective carbon price or carbon tax policy, in both developed and developing economies. Even in markets where coal is not considered a threat, achieving the full potential of such an energy partnership would require, among other things:

- Adequate market structure, design, and regulation (levels of complexity of such measures and adjustments will depend on the country's energy market maturity);
- Adequate access to energy infrastructure for both renewables and natural gas;
- Internalizing avoided costs of variability or intermittency; and
- Addressing CO₂ emission issue and carbon pricing (some energy companies and countries have already introduced their own internal carbon pricing policy – shadow pricing – in all their capital investment allocations).

Conclusions

Following the recent Marrakesh COP22 conference, which focused its agenda on the implementation of the Paris Agreement and its challenges, it is worth reiterating once more the importance of realistic and implementable approaches. Polarized options to generate electricity based on one type of energy only, whether it is renewable sources, cleaner hydrocarbons, or cleaner generation technologies, would affect the process of sustainable decarbonization of the power sector, especially in developing economies (countries that are likely to suffer the most from the increasing negative climate change impact).

Capturing the benefits of a successful natural gas and renewable energy partnership would not be easy and would present multi-layered commercial, technical, regulatory and policy challenges, especially in the absence of a serious and effective carbon pricing policy. It will also depend on the structure and maturity levels of the considered energy markets.

The combined natural gas and renewables proposition to produce cleaner electricity should not be ignored or looked at with suspicion through the prism of a hydrocarbon industry promoting one of its products. The stakes involved are much higher than just this simplistic view as more and more stakeholders are putting forward initiatives to mitigate the global damaging impact of climatic changes. Least-cost, fundable and implementable cleaner alternatives to generate electricity would certainly allow for a faster growth of the renewables' share of the electricity output mix en-route to the successful decarbonization of the power sector. 

⁴ "Adapting Portfolios to Climate Change – Implications and Strategies for All Investors", BlackRock Investment Institute, September 2016.

⁵ See for the US case "Opportunities for Synergy between Natural Gas and Renewable Energy in the Electric Power and Transportation Sectors", National Renewable Energy Laboratory (NREL) and Joint Institute for Strategic Energy Analysis (JISEA), December 2012.

⁶ "The Renewable Energy Policy Paradox", KAPSARC discussion paper, September 2016.

⁷ "The Asian Flight Into Coal – A one way street away from LNG", Sylvie Cornot-Gandolphe, SCG Consulting, Oxford, October 2016.

⁸ See the World Bank-led "Zero Routine Flaring by 2030", <http://www.worldbank.org/en/programs/zero-routine-flaring-by-2030>