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PAYNE COMMENTARY SERIES: **VIEWPOINT**

Future of Energy Security: Shifting System to Meet Climate Targets

by Jamal Saghir
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1. Context

As world leaders prepare for another international Climate change conference later this year in Glasgow (the United Nations Climate Change Conference of the Parties)[1] and they continue to lay down the path of our clean energy future for generations to come, the world needs to shift its energy system to meet its climate targets. Our energy future will depend on going beyond traditional energy concept, sources and approaches and embrace a new energy security concept. In fact, while the energy debate in the last few years has moved, the issues of energy security and energy insecurity remain relevant as we define this new future.

Several geopolitical problems in the last few years affected energy security in many countries. What has been the traditional concept of energy security in the past linked mainly to oil market is changing and we are now considering other energy resources and many new interrelated factors. So, recreating the energy future will now depend on going beyond traditional energy concept, sources, and approaches. Increased use of renewable energy, combined with intensified electrification, could prove decisive for the world to meet key climate goals by 2050.[2]

2. Enhancing Energy Security

For over 40 years, concern over energy security was largely centered on oil supply. Clearly this has changed. Natural gas markets used not to be globally integrated. We were used to thinking of a European gas market, a North American gas market and in many other countries the gas market was local. A global market in oil and natural gas is linking countries, continents, and prices in unprecedented ways. Environmental sustainability is closely bound with the future

[1] https://ukcop26.org
[2] https://www.irena.org/publications/2019/Apr/Global-energy-transformation-A-roadmap-to-2050-2019Editions

pathways of energy development in emerging and development countries and development of all form of green - renewable energies and energy storage are critical for development and prosperity. The parlous state of energy infrastructure in many developing countries and consequently the serious energy supply shortfall and low rates of electricity access in particular in sub Saharan Africa in particular is closely bound with development itself. In fact, energy security and energy access are now including both in the formulation of energy and development economic growth strategies. Clearly in the last 40 years, energy and development has moved from being a peripheral matter to centre stage in the larger relations between nations. It is small wonder that energy and development, including energy security, became important topic when the G7 and G20 countries meet.

Many projections imply increasing interdependence between energy-producing and energy-consuming countries, because a pronounced shift in the geographical sources of incremental oil and natural gas supplies will occur over the next decades, and because growth in energy demand will be increasingly concentrated in developing countries. More than ever in the past, all countries—energy producers and consumers, rich and poor—have a vital common interest in ensuring sustainable supply of the energy needed shift from traditional, to green and renewable sources for a global economy.

Enhancing energy security will require a far-sighted and cooperative approach internationally, and countries should work to build on the value of interdependence, instead of focusing on energy independence and trying to address these concerns on their own which is becoming nowadays more as a trend in several countries then the exception. Long-term measures to increase energy security center on reducing dependence on any one source of imported energy and in particular fossil fuel, increasing the number of suppliers, developing at large renewable energy resources, and reducing overall demand through energy conservation measures. Renewable energy is becoming the cornerstone for energy security in years to come by adding diversity to an overall electricity generation portfolio.

3. Shift in Energy Systems

In the next 25 years, the world needs to transform its energy system severely to reduce its carbon footprint and to address global climate change. In order to achieve this goal, energy demand growth must slow down on a global basis and even decline in some regions. In addition, fuel mix must fundamentally change.

According to the International Energy Agency (IEA) the world has a viable pathway to building a global energy sector with net-zero emissions in 2050, but it is narrow and requires an unprecedented transformation of how energy is produced, transported and used globally.[3] The world has never achieved such a transition before on a global scale. Shift the energy system toward net-zero emissions in 2050 will be close to the industrial revolution two centuries ago.

IEA estimates that by 2050, the energy world looks completely different. Global energy demand is around 8% smaller than today, but it serves an economy more than twice as big and a population with 2 billion more people. Almost 90% of electricity generation will come from renewable sources, with wind and solar PV together accounting for almost 70%. Solar will be the world's single largest source of total energy supply. Fossil fuels will fall from almost four-

[3] https://www.iea.org/news/pathway-to-critical-and-formidable-goal-of-net-zero-emissions-by-2050-is-narrow-but-brings-huge-benefits-according-to-iea-special-report

fifths of total energy supply today to around one-fifth. Unprecedented jump in spending on low carbon technologies would also be required — around $5tn in energy investments per year by 2030, up from around $2tn today.

4. Geopolitical Implications

Many countries rely on the sale of fossil fuels for their GDP and for state income. Two main countries Saudi Arabia and Russia are crucial in the transition. Saudi Arabia, for its part, has begun to assess what is likely a shift away from fossil fuel consumption over the next 20 years - but has not yet done much to act on this. Russia has not. How these two countries deal with that change will likely have substantial implications for the stability and security of their regions and for the shift in energy systems worldwide.

In addition, China is increasingly looking toward securing its future energy needs withsustainable alternatives. In accordance with the 2016 Paris Agreement China committed to make non-fossil fuel energy 20 percent of its energy supply by 2030 and to peak CO2 emissions by 2030. Chinese President Xi Jinping expanded on that commitment in a speech to the United Nations in September of 2020 when he announced that China aims to achieve carbon neutrality by 2060. [4]China is one of the world's largest investor in clean energy. Between 2013 and 2018, the country's investments in renewables grew from $53.3 billion to an impressive peak of $ 84 billion in 2019.[5]

5. Energy Security and Poverty Nexus

Access to electricity is a long-term investment and a necessary input for economic transformation that lays the foundation for sustainable development. The energy security and poverty nexus are a particularly serious issue for development. Economic activity and economic growth that is necessary for job creation and raising incomes in developing countries depends on adequate, affordable and reliable supplies of energy. Rapid progress in electrification requires that governments rethink their strategies for the sector being conscious of key trends that may affect electrification rollout. Five main issues are worth highlighting.

First, supply and generation are hardly adequate today:

- In 1973 about 75% of oil was consumed in the OECD countries.[6] Currently the OECD countries account for around 50% of world oil consumption.[7] More than two-thirds of the growth in world energy consumption in the coming years will come from developing countries.
- Only 43 percent of the population in Africa had access to electricity in 2016, far less than any other developing region. More than 600 million people in Africa live without electricity, including more than 80 percent of those residing in rural areas. Only two countries in the region, Mauritius and Seychelles, have near universal electricity coverage.
- Electric power consumption in Africa is extremely low compared with other developing regions .[8]

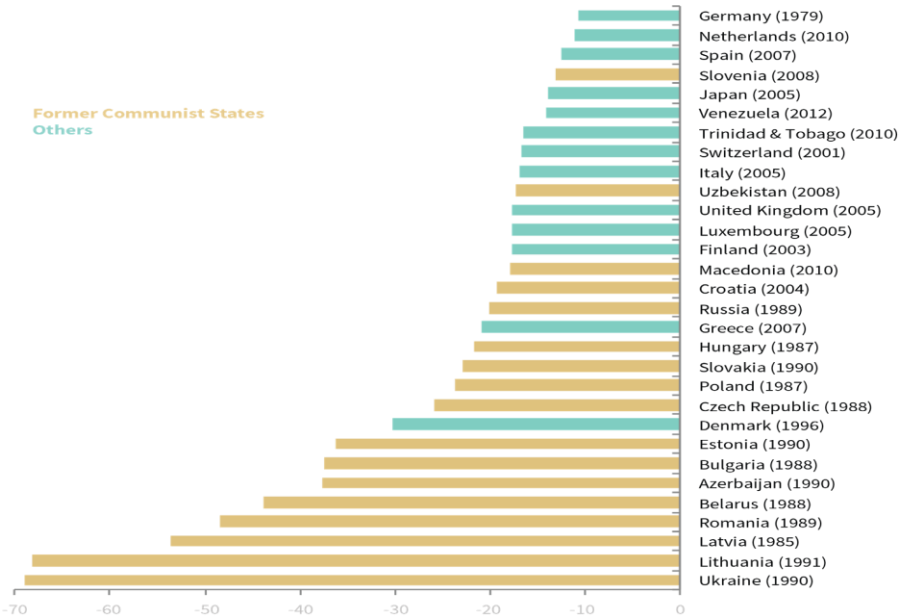
[4] https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1817098.shtml
[5] https://chinapower.csis.org/energy-footprint/
[6] https://www.oecd.org/futures/17738498.pdf
[7] https://www.oecd.org/economy/outlook/34080955.pdf
[8] Blimpo, Moussa P., and Malcolm Cosgrove-Davies. 2019. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact*. Africa Development Forum series. Washington, DC: World Bank.

- In the 1980s, the richest 10% of the population in OECD countries earned 7 times more than the poorest 10%. They now earn nearly ten times more. When you include property and other forms of wealth, the situation is even worse: in 2012, the richest 10% controlled half of all total household wealth and the wealthiest 1% held 18%, compared to only 3% for the poorest 40%.[9]
- Rich countries have developed more than 70 percent of their economically viable hydroelectric potential. For developing countries overall, the corresponding figure is around 20 percent, and for Africa it is 15 percent. [10]

Second, despite continuously rising incomes, energy use has peaked in many countries. Looking at the top 30 countries sorted by their percentage decline in energy use, showed in the chart, the decline in energy consumption relative to the peak was significan - ranging from almost 70 percent in Ukraine to 11 percent in Germany.[11] While there is no assurance that countries will reduce energy consumption at the pace required to deal with climate change, the case of the United Kingdom is worth mentioning: big gains in energy efficiency are possible over a short time and at a time when both the economy and population expand, and these changes can be amplified by a changing energy system that relies more on renewable energy. Between 2001 and 2017, the United Kingdom reduced its energy use by 20 percent[12]

Countries With Sharpest Decreases in Energy Use

Percent decline between peak energy use (shown in parenthesis) and 2017



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https://olc.worldbank.org/system/files/Electricity%20Access%20in%20Sub-Saharan%20Africa%20-%20Overview.pdf

[9] Keeley, B, (2015). Income inequality: The Gap Between Rich and Poor. OECD. Paris
https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/0115391e.pdf
[10] https://www.hydropower.org/region-profiles/africa
[11] https://www.csis.org/analysis/must-energy-transition-be-slow-not-necessarily
[12] https://www.csis.org/analysis/must-energy-transition-be-slow-not-necessarily

Source: BP Statistical Review of World Energy, June 2018

Third, energy supply is hardly affordable for the poorest net-oil importing countries even now at low oil prices. Poor people in developing countries spend up to a quarter of their cash income on energy.[13]

Fourth, energy supply in many developing countries is unreliable. Unscheduled power outages are commonplace in many African countries, parts of India, Indonesia, Lebanon and other countries. Unreliable electricity severely constrains business and hurts the competitiveness of firms. For example, production losses caused by power outages reach 6 and 8 percent of sales of firms in many poor Sub Saharan countries. It should not come as a surprise that many firms have their own generators, despite the fact that the cost of privately supplied power is two to three times as high as that from public grids. As a consequence of unreliable grid supply, the percentage of firms with their own generators is very high in developing countries.

Fifth, recent technological advances in off-grid solutions to strategically promote productive uses, especially in rural areas should be harnessed .and accelerated. This objective can be achieved through the adoption of cost-effective solar solutions that can provide sufficient capacity and reliability to support income-generating activities such as off-season farming, value-added agro-processing, and promoting other small businesses [14]

The bottom line is clear: energy insecurity constrains economic growth and poverty reduction in developing countries. We can put it another way – developing countries need more energy to climb out of poverty and to set themselves on stronger economic growth paths. This brings the issue of sustainability in increasing energy supply and use. The big question is whether it is possible to expand supplies and access to energy in ways that enable the needs of the present to be met without compromising the ability of future generations to meet their own needs. In other words, how this energy be provided in a clean and sustainable basis that leaves an environmental footprint—both at the local, regional and global levels?

Simply put, when poorly managed *energy* development and utilization damages the *environment*, it is usually the *poor* who suffer most. They are often poor in the first place because they are already live-in fragile environments. They are poor in the second place because they lack access to clean modern and green energy forms.

How can we simultaneously address, on the one hand, the increased pressure on our environment caused largely by energy use, and, on the other hand, meet the rising demand for energy on the part of the developing world?

One thing is certain: the answer cannot lie in a futile effort to only restrict energy consumption. It does include getting people, their homes, farms, and factories the energy they need, but with a smaller environmental footprint and much higher energy efficiency.

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[13]https://documents1.worldbank.org/curated/en/544511468313734634/pdf/374810Energy0WorkingNotes1401PUBLIC1.pdf

[14] Blimpo, Moussa P., and Malcolm Cosgrove-Davies. 2019. *Electricity Access in Sub-Saharan Africa: Uptake, Reliability, and Complementary Factors for Economic Impact*. Africa Development Forum series. Washington, DC: World Bank. doi:10.1596/978-1-4648-1361-0. License: Creative Commons Attribution CC BY 3.0 IGO. https://olc.worldbank.org/system/files/Electricity%20Access%20in%20Sub-Saharan%20Africa%20-%20Overview.pdf

Increasing energy supply and use and decreasing the environmental footprint therefore presents a *double challenge*. If that challenge can be successfully met, the result will be a *double dividend*: improved clean energy supply that can help reduce *poverty* and an improved atmospheric environment that should, in the long term, lead to a more stable climate with benefits particularly for the poor.

Therefore, when we think of energy security in the context of development, we also must think of ensuring sustainability of energy supply, shifting system to meet climate targets and use in an accelerated fashion substantive clean, green and renewable sources of energy. The aim is to accelerate and increase significantly investment in renewable energies so that developing countries can meet energy demands for growth and poverty reduction in an environmentally sustainable way.

In important cases, energy technology "leapfrogging" toward clean energies is necessary. Leapfrogging means "vaulting over" and if energy development, environmental improvement and poverty reduction goals are to be reached simultaneously, it may be necessary to "vault over" inferior, less efficient, more expensive or more polluting technologies and move directly to more advanced ones. Sometimes, it is easier to deploy these technologies in developing countries, especially the fast-growing ones, because of the size of their markets. An example is the need to invest more and deploy energy storage.

According to the World Bank, developing countries will need to double their electrical power output to meet rising demand and that by 2035, these nations will represent 80 percent of the total growth in both energy production and consumption.[15] To meet these needs while also adhering to global emissions reductions targets, a substantial portion of this new generation capacity will have to come from renewable sources.

But development of renewable energies without substantial investing in energy storage at an early stage is critical. Energy storage technology is vital in the expansion of renewable energy in remote and rural areas that lack grid infrastructure or reliable electricity supplies. By dramatically expanding the capacity to store energy, these technologies will help countries meet their renewable energy targets, support the demand for clean energy, and help increasing access to electricity.

Energy storage facilitates access to clean energy all over the world. Storage acts as a buffer to stabilize intermittency of renewable energies. It is an essential tool for enabling the effective integration of renewable energy and unlocking the benefits of clean, renewable, resilient energy supply. However, the development of advanced energy storage systems has been concentrated in selected markets, primarily in regions with highly developed economies. It should be mainstreamed and largely deployed at higher speed in developing countries.

6. Conclusion

Creating our future energy world would require to be bold and support implementation of transformational and large renewable and storage electricity projects. We should tap the vast resource potential for clean energy in all continents as a priority. Past global energy shifts have

[15] https://www.esmap.org/node/57868

taken a long time. However, the challenge we face is historically unprecedented and will require historically unprecedented commitment and good will, substantive investments and action.

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