MITIGATING THE SHORTFALLS OF ENERGY TRANSITION: LEVERAGING ON GREEN MINERAL RESOURCES FOR NATIONAL GAINS

Energy is a crucial input for the development of any nation. Non-renewable energy sources such as coal, oil, and natural gas, with its greenhouse gas emission tendencies contribute about 80% of the world's energy mix. Petroleum use accounts for about a third of the total global carbon emissions[1].Governments around the world are now engaged in efforts to ramp down greenhouse gas emissions from fossil fuels to prevent the worst effects of climate change even as energy is used to spearhead development. The Conference of Parties (COP) of the United Nations Framework Convention on Climate Change met in November 2021 in Glasgow for its 26th annual summit to accelerate progress on reducing carbon emissions and keeping the global temperature rise below 1.5 ℃[2]. Renewable energy technologies were the central theme as the conference ended with several initiatives and agreements aimed at accelerating the inclusion of renewable energy technologies into the world's energy mix.

Ghana relies heavily on fossil fuels for its electricity generation and domestic energy consumption. However, increasing global concerns over climate change has led to technological advances and global policy changes that have now changed the demand landscape for oil and gas. Research suggests that, globally, a third of oil reserves, half of gas reserves and over 80 per cent of current coal reserves should remain unused from 2010 to 2050 in order to meet the target of 2 °C[3]. Just some few years ago, the country seemed set to become the next major producer of oil and gas and international companies were scrambling to win exploration rights in hope of making commercial discoveries. Basins with hydrocarbon deposits in Ghana have only just started to attract development and major oil companies following political pressures are already pulling out and pivoting into the renewable energy markets. Natural gas was identified as a long-term transitional energy source, creating hope for new opportunities for the country. These developments, many thought, would bring significant revenues for governments and a new hope to millions of people and a transformative effect on the country's economy in the long term.

The UK and other G7 nations have announced on separate occasions that there will be no international government support for new fossil fuel projects going forward and the International Energy Agency has recommended that there should be no new O&G fields approved for future development. Development banks such as the World bank and African Development Bank who have traditionally enabled large-scale investments in the sector are also staggering in providing investment or financial guarantee for exploitation of these hydrocarbon resources. Without the support of these funding partners, it would be almost impossible to attract private investment in the sector due to the high upfront costs of exploration, and investment returns requiring many years. The country also has a high cost of borrowing due to the high-interest rates. Hence the only source of capital for a large project is

[1] https://www.nationalgeographic.com/environment/article/fossil-fuels
[2] https://ukcop26.org/cop26-goals/
[3] https://europepmc.org/article/med/25567285

through government support or funding. This starves emerging businesses of capital and discourages diversification considering government's budget constraints.

The World Bank in their 2020 publication, "*Africa's Resource Export Opportunities and the Global Energy Transition*" reiterates that the world's shift towards renewable energy and clean energy technologies will provoke a reduction in global demand for fossil fuel such as oil and natural gas. If this trend continues, it will be almost impossible for the governments and the national oil company (GNPC) to develop the sector on their own especially if the demand for hydrocarbons is significantly reduced in the near future. Ghana is at cross-roads between issues of development with revenues from oil and gas, provision of energy, climate change and sustainability.

Mitigating the Shortfalls of a Transition

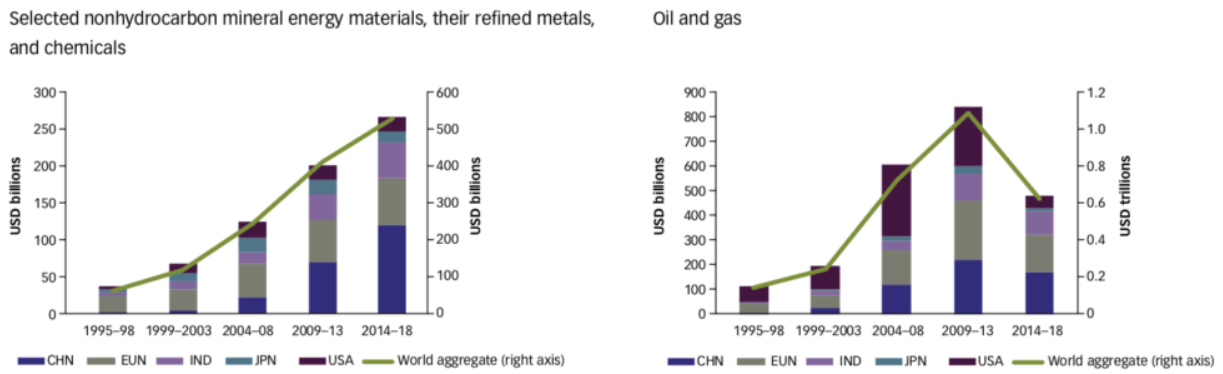
The country may be able to take advantage of the global shift from hydrocarbons to renewable energy. Mineral markets will be a catalyst that will drive mining activities as the world shift towards clean energy systems. Ghana has five of these critical minerals in varying abundance: manganese, bauxite, lithium, iron ore and silica sand. However, the country's limited infrastructure makes developing these resources difficult.

According to research provider BloombergNEF, the transition could require as much as $175 trillion in energy supply and infrastructure investment over the next three decades[4]. Countries pursuing mineral-based industrialization strategies with emphasis on green energy minerals such as lithium, cobalt, iron ore, silica, and bauxite will profit from this global shift. The production of lithium and cobalt is expected to increase by up to 500% by 2050 and the World Bank estimates that over 3 billion tons of minerals and metals will be needed to deploy wind, solar and geothermal power, as well as energy storage, required for achieving a below 2°C future[5]. It is estimated 80% of global lithium demand will come from electric vehicle market by 2030[6]. This will provide opportunities for Ghana to transform and diversify its economy using green energy minerals, but huge investment is required.

Investments in renewable technologies are already taking place in the developed nations such as Germany, France, the United State and China and this will continue to grow decades to come, putting them in a prime position to take advantage as global exporters of sustainable energy technologies.

Figure 1. Sub-Saharan Africa's export structure of mineral energy materials and fossil fuels by main importers, 1995-2018

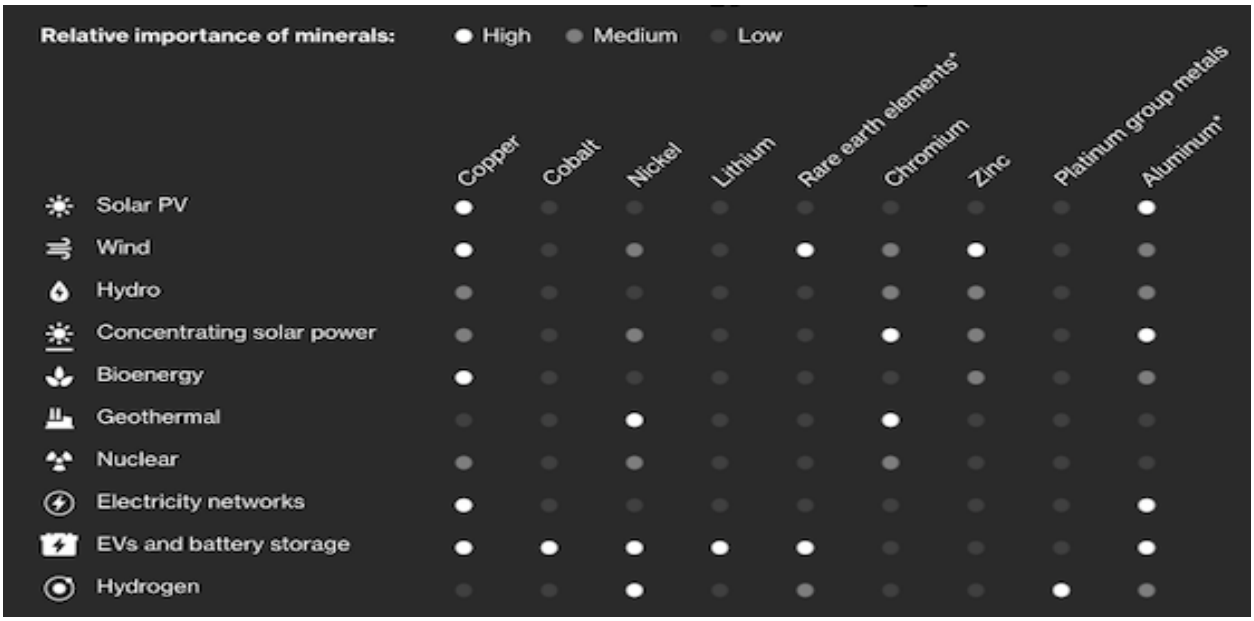
[4] https://www.bloomberg.com/graphics/2021-materials-silver-to-lithium-worth-big-money-in-clean-energy/
[5] https://www.worldbank.org/en/news/press-release/2020/05/11/mineral-production-to-soar-as-demand-for-clean-energy-increases
[6] https://www.reuters.com/business/autos-transportation/global-lithium-ion-battery-capacity-may-rise-five-fold-by-2030-wood-mackenzie-2022-03-22/



Source: World Bank, *Africa's Resource Export Opportunities and the Global Energy Transition 2020*

According to Bloomberg, solar panels with 1 gigawatt (GW) power capacity need about 18.5 tons of silver, 3,380 tons of polysilicon and 10,252 tons of aluminium. The number of materials required for a wind turbine and its associated infrastructure for a power capacity of one gigawatt will be 387 tons of aluminium, 2,866 tons of copper and 154,352 tons of steel. Lithium-ion battery with a storage capacity of 1 gigawatt-hour (GWh) of energy will require 729 tons of lithium, 1,202 tons of aluminium and 1,731 tons of copper. Cumulatively, these technologies will require millions of tons of materials annually to manufacture.

Figure. 2 Critical Mineral Needs Across New Energy Technologies



Source: International Energy agency (Accessed through Bloomberg.com)
Ghana for that matter should not focus only on being a hub for providing raw materials for these technologies but can play an active role in technology export. The sectoral change that Ghana

should pursue is the shift away from mining raw materials for export, towards manufacturing of equipment and technologies to be able to optimize the gains from these resources.
The leaders must find a cross-functional solution which answers simultaneously to socioeconomic and environmental challenges. This involves driving growth in the energy supply chain as well as industrialization with the adoption of a balanced mix that harnesses all energy resources in a cost optimal and sustainable manner. Energy policymakers who work in isolation risk creating energy policy that slows energy-access gains, decelerates economic growth, and mitigates one environmental impact while provoking another[7]. Therefore, broad stakeholder engagement is important. Energy access stakeholders must come together to design a transition customized to the Ghana contexts taking into consideration the green mineral resources the country can leverage on. Ghanaian leaders must liaise with other African leaders to harness these green resources and leverage on the ACFTA to trade and develop these transition technologies from within.

RECOMMENDATIONS

In the light of the above points, the ensuing recommendations are proffered to inform policy action on leveraging available green resources in the nation's energy transition. It is recommended that:

1. The country has to select some key metals that will play a role in the energy transition and define those as key metals that could enhance the country's economic and manufacturing capabilities. Ghana does not have any official list of metals it considers critical to its transition drive.
2. Development in our green minerals should be geared towards creating value added product that places Ghana at strategic point on the global renewable technology market by investment in infrastructure that would be critical to the course.
3. There is the need for policy guidelines taking into consideration the global context of renewable energy technologies. Energy access stakeholders must come together to design a roadmap customized to specific country contexts.
4. Government must set up an institutional mechanism that would ensure fair representation of relevant stakeholders to lead in the implementation.
5. There should be yearly independent review of progress to determine

6. Ghana can seize the opportunity and use the potential windfall to invest in downstream capacity, skill development and strengthening regulatory regimes and ensure local content participation in the green minerals industry to internalize the revenues accruing to individuals and organization.

CONCLUSION

[7] https://www.un.org/sites/un2.un.org/files/2021-twg_2-062321.pdf

In the short and medium term, fossil may remain an enduring source of fuel and government revenues. Nonetheless Ghana should anticipate in the long run, a permanent decline in fossils fuel demand as the global energy transition develops.