

Harnessing Local Resources for Future Automobile Industry in Nigeria.

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Abstract- In our ever-changing world, renewable energy sources hold the key to a more sustainable development, cheaper and clean energy sources. In automobile industry today, Battery Electric Vehicles (BEVs) are replacing combustion Engines, hence their use result in far less climate pollution than their gas-powered counterparts. Nigeria is blessed with some mineral deposits which can be harnessed in favor of this emerging technology. This paper seeks to examine the Economic benefits of harnessing Nigerian minerals towards this recent innovation in automobile industry.

I. INTRODUCTION

The recent declaration by United Kingdom (UK) to ban petrol and diesel cars in UK city in year 2040 is an eye opener that most developed countries are taking the advancement of renewable energy technology to another level. Hence, the need for Nigeria to rise and key into this global trend.

A battery electric vehicle or all-electric vehicle is a type of electric vehicle that is powered solely by electricity; it uses chemical energy stored in rechargeable battery packs. Battery electric vehicles (BEVs) use electric motors and motor controllers instead of internal combustion engines (ICEs) for propulsion. They derive all power from battery packs and thus have no internal combustion engine, fuel cell, or fuel tank. BEVs include - but are not limited to motorcycles, bicycles, scooters, skateboards, rail cars, watercraft, forklifts, buses, trucks, and cars. (Dan and Katz, 2018).

II. AVAILABILITY OF RAW MATERIALS

Nigeria is blessed with abundant mineral resources; fossil fuels and solid minerals. The most popular being the fossil fuels since these constitute the nation's greatest foreign exchange earner. They have,

therefore, tended to overshadow the solid mineral sector of mining industry. Solid minerals are of many types occurring in many diverse environments in response to many diverse geology and geologic events.

The resources can be grouped under the following category:

- Iron and Iron-alloy metals
- Non-ferrous Industrial metals
- Precious metals
- Metal fuel
- Industrial minerals

One of the important mineral which is useful in the development of modern automobile industry in Nigeria is Galena.

III. GALENA OCCURRENCE IN NIGERIA

Galena is the primary ore mineral of lead. Its discovery dates back to 3000 BC, and its name is derived from the Latin word galena, meaning dross from melted lead (finelib.com 2017). Galena is a lead sulfide mineral with a chemical composition of PbS. It is the world's primary ore of lead and is mined from a large number of deposits in many countries. It is found in igneous and metamorphic rocks in medium- to low-temperature hydrothermal veins. In sedimentary rocks it occurs as veins, breccia cements, isolated grains, and as replacements of limestone and dolostone.

Galena deposits are found in various environments in Nigeria. Galena is found in large deposits mainly in Ishiagu, Ebonyi State, with an estimated reserve of 15 million tonnes (azomining.com, 2017), other states with these deposits includes; Taraba, Kwara, Ogun, Kogi, Ekiti, Plateau, Bauchi and Nasarawa. Galena is mostly found in association with other minerals like fluorite, calcite, spharelite, marcasite, pyrite,

chalcopyrite, siderite, dolomite, quartz, silver minerals and many other hydrothermal minerals.

IV. MINING AND PROCESSING

Galena is the principal source of lead (II) sulphide with a melting point of 1,114 °C and a boiling point of 1,281 °C(Healy, 1999). A process known as smelting is used in extracting Galena from the mineral bearing rock bearing m, Galena is very easy to smelt, the process involves placing the rocks that contain galena on fire and the ashes collected as lead after the fires burns out.

People have taken advantage of this simple smelting for thousands of years. Archaeologists have found lead beads and statues in Turkey that date back to about 6500 BC (Blackburn and Schwendeman, 1997).

V. POTENTIALS OF GALENA FOR FUTURE AUTOMOBILE INDUSTRY IN NIGERIA

Galena is a very vital ore for the electrical and electronic industries because of its principle constituents which Lead and it is also because of this reason that it is mined in Nigeria, Africa and other countries of the world. Galena is a very important mineral because it serves as an ore for most of the world's lead production. It is also a significant ore of silver. Used also in making lead–acid batteries and as a kohl in cosmetics industries.

The number one use of lead today is in the lead-acid batteries that are used to start automobiles. The typical auto battery contains about twenty pounds of lead and must be replaced every four or five years. There are millions of these batteries in Nigeria. Lead-acid batteries are also used as standby power supplies for computer networks, communication facilities, and other critical systems. Lead is also one of the metals used in energy storage systems associated with power generation and hybrid vehicles.

In some deposits galena contains about 1–2% silver, a by-product that far outweighs the main lead ore in revenue. Some mines had the potential to produce more revenue from the silver content of their galena than from the lead content. The small amount of silver has a huge impact on revenue because the price of

silver is much higher, therefore silver is more valuable than an equal weight of lead.

VI. THE PROJECTION OF BATTERY ELECTRIC VEHICLES

- Growth Forecast

The electrification of personal mobility is picking up speed in a way that even its most ardent proponents might not have dreamt of just a few years ago. In many countries, government mandates will accelerate change. But even without new policies or regulations, half of global passenger-vehicle sales in 2035 will be electric as illustrated in figure 1 (about.bnef.com, 2022)

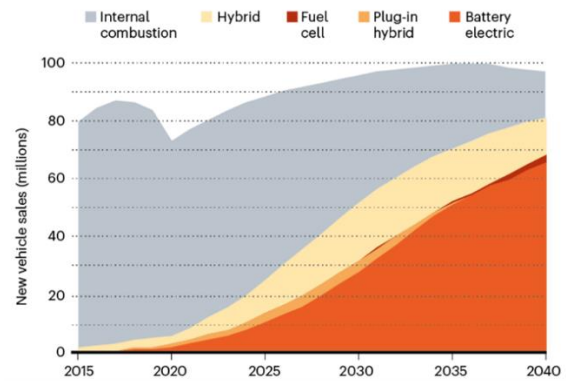


Fig 1. Growth forecasts of electric vehicle sales

This massive industrial conversion marks a “shift from a fuel-intensive to a material-intensive energy system”, declared the International Energy Agency (IEA). In the coming decades, hundreds of millions of vehicles will hit the roads, carrying massive batteries inside them, each of those batteries will contain tens of kilograms of materials that have yet to be mined (IEA, 2021).

BEVs sales are surging due to a combination of policy support, improvements in battery technology, more charging infrastructure and new compelling models from automakers. Electrification is also spreading to new segments of road transport, setting the stage for huge changes ahead.

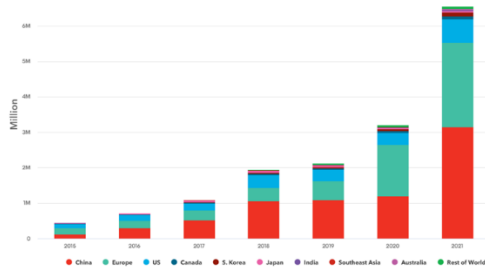


Fig 2 Global passenger EV sales by market

- **Public Charging Stations**

More and more charging points are being built, but each country will have its own optimal mix of home, workplace and public chargers.

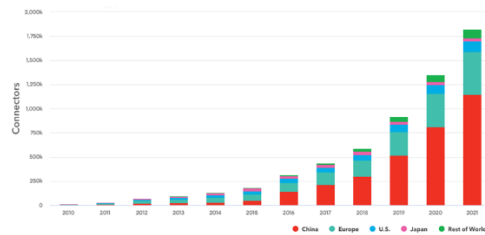


Fig 3: Cumulative global public charging connectors

Economic Benefits of Harnessing Local Resources for BEVs

Energy/Cost Saving: Not using gasoline or diesel also means that battery electric cars are significantly cheaper to fuel than conventional vehicles. Exact comparisons depend on the vehicle model and fuel prices, but driving a BEV can save drivers up to 50% money used for gasoline in conventional vehicle.

Development of other sectors:

Deploying BEVs in Nigeria will reduce emphasis on oil and gas centered economy and open window for other economic activities, in areas of exploitation, processing and manufacturing industries. For instance, Nigeria is blessed with Galena deposit in commercial quantities.

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Provision of Job Opportunities: Nigus Enfinity, an indigenous firm, says it will introduce electric vehicles into the Nigerian automobile market and that its local assembly plant for electric vehicles will be ready in 2020 (Nipc,2017), if that is done a lot of Job opportunity will be created for Nigerians. Just like the GSM provided skilled and unskilled work for numerous Nigerians.

CONCLUSION

It is estimated that by 2030, a quarter of new cars worldwide will be electric or hybrid vehicle, therefore Nigeria needs to look inward to be at the fore of the automotive revolution or risk becoming waste bin for banned vehicles from other countries. It is equally important for us to protect vehicles consumers, the climate, and our environment from the growing costs and risks of our oil. Embracing the modern revolution in automobile and BEVs will not only lead to technological innovations, reduction in pollution/GHG emission, exploitation of solid minerals, but also will provide job opportunities for the skilled and unskilled, which will help to revive not only the Nigerian economy but the global economy.

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