NIGERIA'S PRESENT ENERGY SITUATION

How can Nigeria attain 216000MW and 330000MW[pic3] electricity delivery capacity by 2037 and 2040 repectively ,with a present total installed capacity of 16,384MW[1](in use and awaiting commissioning)that churns out around 5200MW transmitting 4200-4500MW and delivering 3000Mw to consumers [2] using our inadequate transmission lines with 60%[1] coverage of rural and urban areas. A country of 216m[10] people with the bulk of electricity generated consumed by residential sector[2] and 'her' total annual budget less than required spending forecasts to achieve electricity and energy sustainability(IAEA forecasts projected required electricity use for Nigeria at 119,200MW by 2030(2) and 150,000Mw by 2040 spending between $445B and $600btw 2018 and 2040(IEA) while world bank estimates $100b"12" in 10years from 2021 for business as usual scenario.These costs can be reduced by upto 60% overall by scaling on renewables(14)

An average person in an industrialized nation uses over 200-300kwh of electricity per month whilst Nigerians use an average of 17Kwh per month in rural areas and 39kwh per month for urban dwellers [22] .

rough calc- electricity delivered(3200mw or 3200000kw) x (10hrs) daily use x (365) days /divided by 60% current estimated population(129.6m)

I.e 11,680,000,000kwh or 11,680gwh / 129.6m people=90.1kwh per person per year, off grid not included

In a PWc report in 2016, it was estimated that Nigeria's base annual energy scenario would be in the region of 433kwh(based on 2hrs of tv,24hrs of refrigeration and 1 full dishwasherload) per day per person per year and doable scenario of 982kwh/p/y and perhaps 1818kwh/p/y by 2025 if it grew at 10-12.5% annually with higher utilization factor and major reduction in transmission losses. At time of the report, vietnam's growth rate was 6.5% annually for 15years between 1995 and 2010, leaping from 159kw/h to 1035kw/h[3] and 1471.4kwh in 2014[5] and upto 2000kw/h(60, not many confirmed sources) per person per year in 2020, having realized their(vietnam's) energy needs are fast rising; their government still wants to grow at 10% annually btw 2021 & 2030 which had been the growth rate since 2017 having invested heavily in renewable technologies notably rooftop solar which accounts for up to 10% of total electricity grid supplied[6] NB- Vietnam's population is about one third of Nigerias and may not face some of our peculiar problems

Nigeria's Vision 2020 targeted 32774[2]-35000MW[5] with agreements completed for 26423[2] MW.
NEPA undervalued and unbundled to NBET,PHCN,Discos,TCN ,still comatose after 10years, about the same time it took Egypt with half population of Nigeria, similar landmass with less resources to be on pathway to 100% electrification.They had a clear goal and perhaps government sincerity, Egypts power is mainly backed by fossils and still lagging behind in use of renewable energy ,though much progress is being made.

Nigerians spend up to $14b[8(2020)] on fueling petrol and diesel generators(phcn,disco) facilities inclusive, this is about one third of our average annual budget .It's not news that Nigeria needs well *SERVED* power with purposeful continuous investments in research and development to attain its full industrial potential with its diverse army of human capital.

79% of electricity generated currently in Nigeria are from fossil plants - gas powered thermal plants,diesel renewables take the rest of Nigeria's energy mix 20% hydro and 1% (solar,wind)[1.] ;Fossil prices have skyrocketed in recent months amid Russia's invasion of Ukraine as Nigeria will be required to sell more gas internationally especially to Europe due to Russian trade embargoes and Naira's volatility to the dollar for imported fuel. Vandalism, pockets of insecurities are also a factor. Coal plants are beginning to come on stream with a plan for 10% of projected electricity generation by 2037.

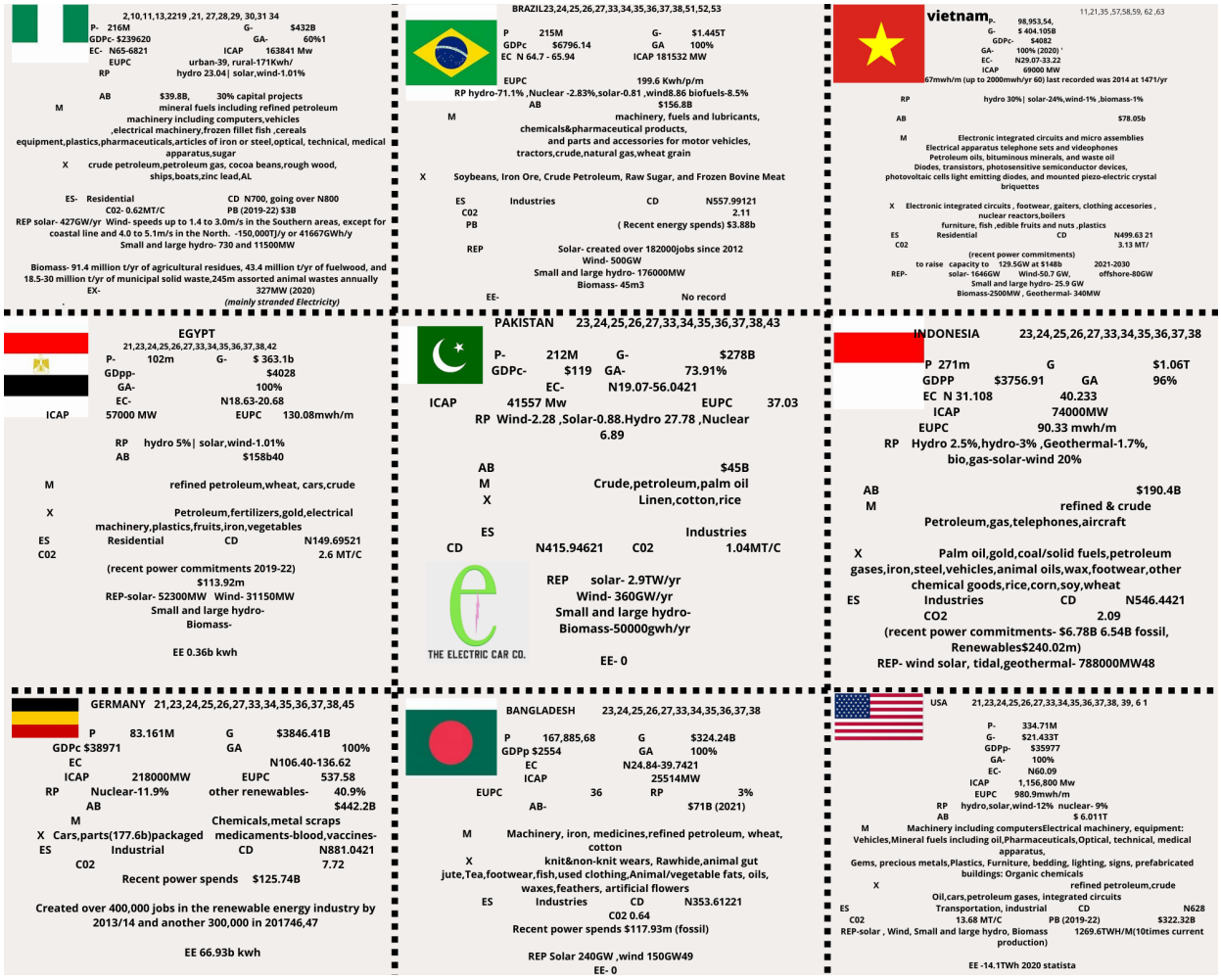
Nigeria spent up to $52.4B on imports with $3.7b on cars and car parts , Top imports were petrol and smartphones in 2021. [20]

Nigeria lost an estimated $1b[2] to blackouts in 2009 and up to $29b in 2021only[9]. Nigeria has spent over $30b in fuel subsidies in 15years[15] 2021-22 not included and N30b monthly on electricity tariffs[18] . Cumulative losses, opportunity costs can best be imagined

Nigeria will spend $3b btw 2021 and 2023[16,17] on i, electricity subsidies which ends june 2022[18] which makes her electricity tariffs now at par with other Nations but no commiserate delivery yet and
ii, increasing energy/electricity transmission to 7000Mw.

Nigeria has quite favorable policies designed by experts in the Energy industry locally and internationally but with persistent problems of :

- funding closure (investors need long term clear cut recovery/windfall profits) ,-- Nigeria's Electricity tariffs had been amongst lowest in the world till recent subsidy phase out
- bureaucracy
- high cost of connecting less accessible rural areas to national grid
- contracting some incompetent technical partners
- widespread vandalism
- low revenue generation from discos partly due to inadequate demand side management,widespread estimated billing -metering is still an issue creating distrust and low bill honoring , only EkDC had done up to 60% annual returns in 10 years[2] before the use of direct debits by NBET at least 3m made in Nigeria meters are to be distributed in 2022 and up to 5m by 2023 - net metering should be considered
- increasing fuel costs are amongst issues faced by our power utilities.
- low policy coordinations and multiple taxations
- disco staff lethargy due to inadequate remuneration compared to collections from urges and inducements .



PIC 1

Key

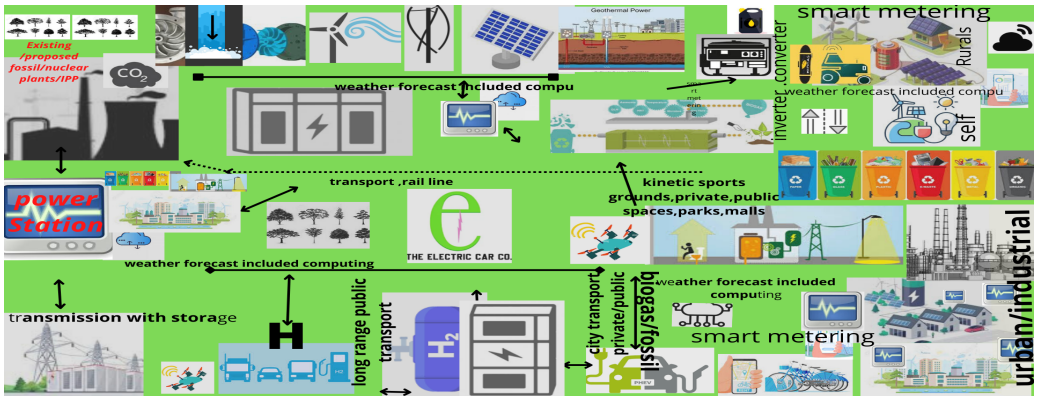
(P)Population in millions (G)GDP($) (GDPc)GDP Per capita($):
(GA)%Access to Grid Electricity: (EC)Cost of Electricity(N) (ICAP)Installed Capacity(MW): (EUPC)Electricity Use Per person Per Month(kwh): (RP)Renewable % in Electricity Mix ,
(AB)Annual Budget ($) (M)Core Imports (X)Core Exports (ES)Sector with most Electricity/Energy Use (CD)Diesel Rates(N) .(C02)C02 Rates (PB)Power Budget (REP)Renewable Potential (EX) electricity exports

It takes an average of $500-$600m to install 200-500mw of fossil[1] deployable within 290days at 960% of per capita income[2]. Renewable energy is deployable within shorter time frames as low as 2-6months for 1kwh-1MWh scale solutions(cost from N128,000)when funding is readily available for either technologies. The latter is expected to drop in price, installation space/size astronomically with huge constant investments and import tariff exemptions.

Nigerian Electricity transmission is 100% owned by the government just as many countries but managed by a private firm. Nigeria does not have the funds to transmit electricity optimally and efficiently while connecting rurals Rurals are perceived to have low purchasing power forgetting they are backbone of Nigeria's agriculture with many locations housing vast mineral deposits eg- lithium ion for production of batteries for Ev's and powerpacks .Bangladesh is mainly agricultural economy[27] so was vietnam before scaling into lighter manufacturing and still earns considerably from produce.

Tecco smart decentralized grids are designed to provide reliable energy powered by renewable hybrid or hybrid renewable-fossil sources/technologies with smart metering and adequate storage(depending on budget and client energy use/needs custom to geographic renewable resource strengths in the safest and most efficient ways; comes with I.T infrastructure creating human capital developments, encourages waste recycling ,generates income ,creating efficient energy PROSUMERS

PIC 2 *smart grid concept*



STIMULATING RENEWABLES

Nigeria requires enormous capital ,motivated and dedicated workforce which can only be provided by the private sector as Nigeria's minimum wage is very poor, The private Sector needs to be encouraged more e.g power agreements in brazil spans 15-30 years which gives ample time to recover investments with profits, unlearning,learning and relearning

Some of Nigeria's policies compel Industries that provide their own power to serve the surrounding communities,

No perceived bottlenecks for individuals that want to produce up to 1MW of electricity although 10-20MW may have been better ,the more the power available to sell/use on and off Grid, the cheaper Energy in Nigeria will become eventually

The Nigerian government with several partners are providing unserved,rural areas with energy from solar or wind farms ;some rural communities currently run on diesel plants which can be hybridized to use biogas from waste and other biomass.

Promotion of more energy efficient appliances and policies

Encouragement of renewable energy modular,assemblers, producers and product

Continuous collaborations, research and developments

If Nigeria industrializes ,C02 emission will go up from 0.67 MT[(23)] which is one of the lowest in the world, C02 taxes/green certificates (for industries ,plants) should be introduced to assist in renewables development

New cities should be designed smart and energy efficient

States are beginning to develop their IPP's though mainly fossil, with recent local govt autonomy passed- more funds may be available for municipalities that see the need for self generation ;renewables should be attractive

Efficient mass transport system reduces pollution and total energy used ; Clean Mass transportation should be employed, e.g hydrogen buses for long distances

Investors should continue to be encouraged to deploy renewable technologies by subsidizing it for rurals while urbans pay renewable surcharge on energy supplied from fossil plants< many urbans and some rurals have a form of inverter system which relies on grid power for sustainability ,feed in tariffs should continue to be harmonized

Renewable resources should be harnessed with recourse to host community needs amid best practices eg afforestation should follow deforestation, use of hydropower may cause water shortages , brazil has alarming deforestation figures in the amazon which is against the concept of clean energy , conservation

Subsidies should be used as developmental tools not as palliative or political tools; these are bad for the economy and worse as it is an import based one. It should be applied to harness local industry development, phasing it out in measures corresponding to local capacity developmental set milestones, with a more enlightened and trusting populace,the monies, if used judiciously can be used to achieve greater productivity.

Some renewable installations do not work optimally because of wrong installations, more renewable investments will develop our vast resource of low technical skills

Note ,offshore farms may be expensive as it requires large scale transmission infrastructure, may not be too pleasing to some sites

WHY RENEWABLES

- Renewable resources though maybe erratic but are available abundantly in Nigeria year round
- They are customisable to area /resource
- When used smartly, years of information can be collected to assist in resource predictions and planning
- Renewables used as mini grids costs less with better overall value
- Industrialization, numerous career opportunities and upgrades which may lead to significant increase in standard of living
- Decentralized grids can later be linked to grid transmission lines
- Renewable technologies can be deployed modularly,community-owned or on a large scale which makes them more secure(d,-able)
- It may help Nigeria achieve its electrification goals quicker if done deliberately
- Tackles most waste problems
- Nigerians will become energy prosumers encouraged by feed in tariffs for those connected to National grid (produce, consume ,earn) from their irrespective locations
- Innovations and adoption of low carbon ,energy production processes and factories, many new manufacturing technologies are modular, more energy efficient ,becoming more flexible and easily deployable

- Increase in high paying technical jobs and enhanced skills acquisitions
-
- New jobs
-
- Less bulky, reduced noise and emissions pollution
-
- Flexible, Adaptable
-
- No significant maintenance costs over technology life cycle, some of which last up to 25years compared to fossils
- Renewable,hybrid Smart grids with storage are equipped with predictive technologies to ensure electricity supply at all times
- Ample raw materials, resources for renewable technology production processes

PIC3

Electricity Use Scenario Nigeria 2040 by a Middle Income Household: Rural & Urban

Calculating a typical smart household electricity use including cooling,
clean cooking and ,renewable powered appliances ,1 SME or service industry resident
present efficient energy ratings are used though expected to be much lower in future amidst increased energy use

2 a.cs x 1200w x 12hrs	28800
2 celing fans x 50 x12	1200
2 tvs x 60w x 20 hrs	2400
2 holographic monitors x 30w x 22hrs	1320
2 laptops x 50w x 12hrs	1200
2 power tools x 100wx 2hrs	400
2 KT (gas cooker,oven,water heating,toaster,dryer) x 2000w x 2.5hrs	10000
2 lm washing machine, iron x 2400w x 0.25hrs	1200
12 lightning x 10w x 18hrs	2160
10 phones,gadgets x 5w x 0.5hr	25
6ip cams , other circuits x 1w x24hrs	144
1 electric mobility x 7200w x 2hrs	14400
1 power pack x2000w x2hrs	4000
1 fridge freezer x 1200w x24hrs	28800
2 x personal security-all purpose drone/companion robot/energy pod x 30w x 6hrs	360
	96409wh or 96.409kwh/household/per day

(Nigeria typicaly household of 5 but 4used as population is getting younger)
24.102kwh/p/x360days = 8676.72kwh/p/y or 723.06kwh/p/m (T1)

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other Energy conversions to help you calculate your current energy uses in different spheres
1kg nat. gas = 10.8 to 13.2 J | 1L of petrol = 12.4 J
1kg wood = 5J | 1L kerosene = 12.1J
compressed Hydrogen= 39.5J | 1kg hardcoal = 6.7 to 8J
where 1kwh = 3600000J | 1 food calorie = 4.184J
1000J=1KJ , 1000KJ=1MJ , 1000MJ=1GJ , 1000GJ=1TJ

THE ELECTRIC CAR CO.

Total Energy Use(J or Kwh)= T1 + T2 petrol +T3 (cooking or heating fuel carrier) +.....

Nigeria in 2040

- Population-329,066,611- population pyramid
  (barring any catastrophe)
- 330000 MW(330GW) at 24hrs delivery at 360days a year , 723.06kwh/person/month electricity use peak period on + off grid this can be met conveniently using 1% of total landmass if Nigeria were to use solar only utilizing less than half of its solar potential
- 250 to 658GWh/d distributed battery packs/storages providing more than 2hrs backup during downtimes, emergencies, weather fluctuations and to priority feeders,emergency stations
- Fossil coal @10%[11] hybrids inclusive)- 49% , Nuclear-2% ,Renewables-49%
- private sector.States,Lgs participation,transmission lines inclusive-56% ,FGN-38%, prosumers + small energy resellers- 6% .
- strict controls in electricity transmission to ensure national energy security as private companies will be involved
- high technical, remote manning technologies and IT skills
- new job roles for humans and robots-minimal, with a.i & physical failsafes .
- 24hr electricity supply
- spike in total electricity and energy use by industries over residential between 2025 and 2035
- feed in tariffs should be winding down by 2040, it is better used as a developmental tool
- 100% electricity access . 90-95% connectivity to National grid , 5-10% totally off-grid

- cheaper more efficient renewable technologies,portable utility scale renewable products wholly , mostly produced in Nigeria
- formalization ,integration and upgrade of Nigeria's informal apprenticeship and trade systems
- More exports leading to budget surplus easing forex dependence ,pressure
- Reduction in power investment spend projections by 30-60%
- The Electric Car Company with a 0.1-0.5% market share of renewable electricity and up to 1% in smart mobility, portable cordless tools,apparatus ,equipments ,SME solutions and technical capacity developments .
- To be part of equitable ,customizable and flexible policy formulations ,improvements and effective implementations
- Assist in reducing effects of climate change and deployment of hybrid energy efficient kiosks, buildings, solutions
- Efficient economic cities
- Classics, Mobility hybridizations
- Competitive R&D ,STEM/CS Institutions ,
- Battery, hydrogen,hybrid technology advancements
- 20% of A.G.O powered plants,industries, logistic trucks to be powered by biodiesel/biogas
- 10% of trucks to run on electric/hydrogen technologies
- 50% of new agricultural,construction equipments to run on biodiesel,biogas and 20% on other renewable technologies

CONCLUSION

Renewables will have Nigeria en route to fulfilling its Industrialization-level electricity demand cheaper, cleaner,faster with smart distribution storage which will create diverse jobs ,critical IT infrastructure, local capacity developments ;analysts ,technical experts and upgrades, cloud computing,robotics,innovators, cyber experts,finance ,legal, meteorologists, athletes, environmentalists, biologists etc.

Nigeria also has high fossil deposits which can produce as much needed power,they can also be hybridized with other supply sources, a balanced mix is ideal and hopefully Nigerians will receive fair value,using the Merit order of generation where they get to pay for the cleanest,cheapest energy producers at peak and off peak periods which keep all yet to be decommissioned and planned plants in operation while keeping Nigeria on track to net zero emissions in Nigeria's vision 2050[33] between 2050 and 2060

Nigeria needs to be aggressive as her electricity requirements and total energy use are set to rise and do so astronomically. There's a booming innovative young population, they, like many from the generation before them have been able to effectively '*japa*' for their own personal development and well being, enduring forms of racism.

Equitable energy opportunities will definitely be a plus in reversing such trends

Email teccoafrica@gmail.com with your present electricity use, requests,please include your coordinates ;let us design or integrate, cost your sustainable energy system. You can also send in pictures of any vehicle type you will like to convert to electric power train and a member of team will get back to you

Awotorebo Akinkunle T.
for **The Electric Car Co.**

THE ELECTRIC CAR CO.

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SERVED*- areas covered by National grid electricity*

'Japa' *- Nigerian slang of ' yoruba' origin meaning to run away, but mainly used to denote emigration for greener pastures*

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