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600MW Solar Farms Early Development Stage Strategy

REPORT

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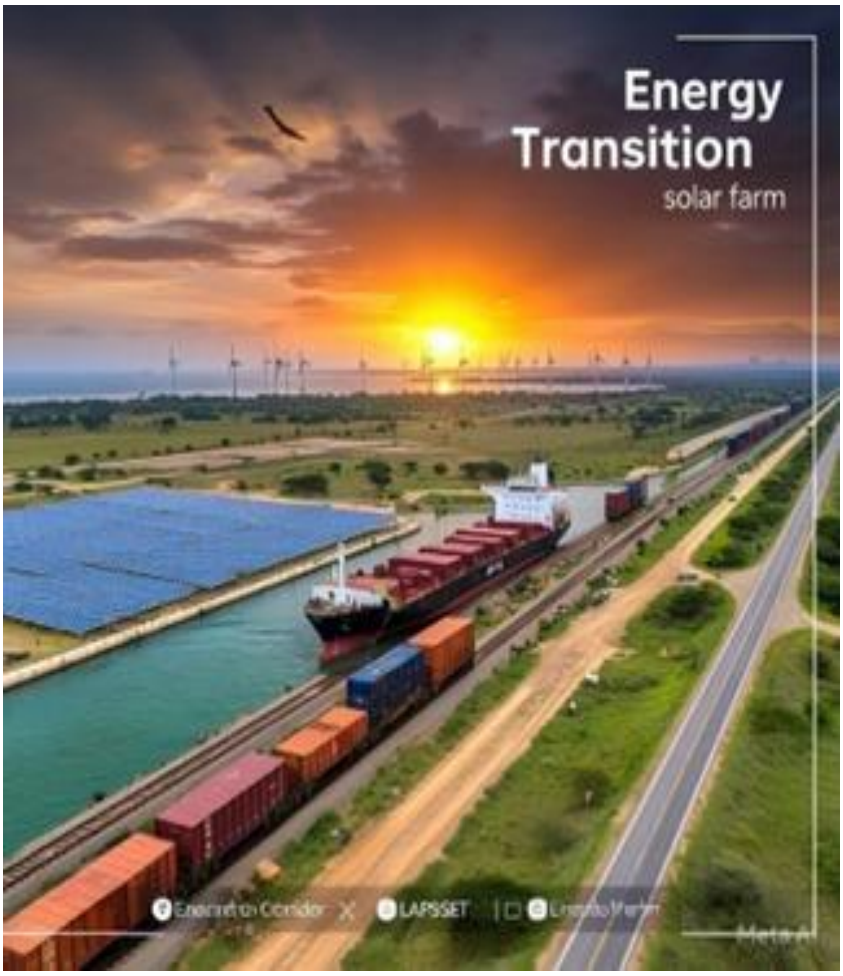
Energy
Transition
solar farm
LAPSSET

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FORWARD


Alan Brewer MSc
Director of PSECC Ltd in the UK

The LAPSSET Corridor: A Key to Kenya's Renewable Energy Future

This is such an exciting project, one that I have been assisting for 2.5 years - The LAMU Port-South Sudan-Ethiopia Transport Corridor (LAPSSET) is a major infrastructure project aimed at connecting Kenya to its neighbouring countries. It presents an opportunity for Kenya to transition to Net ZERO, increase renewable energy and help mitigate climate change.

Kenya's Renewable Energy Potential

The GoK is well prepared to meet Renewable Energy targets and Climate Change Mitigation with Policies and Strategies in place, which are now sufficient to meet the 1.5 Degree C target. Kenya has an abundance of renewable energy resources, including solar, wind, geothermal, biomass, tidal and hydro power. In fact, Kenya is already a leader in geothermal energy, with the Olkaria Geothermal complex being one of the largest in the world, the potential also for Nuclear Energy plants in Kenya.

Renewable Energy and Climate Change Mitigation

Renewable energy can play a crucial role in mitigating climate change in Kenya by; Reducing greenhouse gas emissions; Renewable energy sources like solar, wind, and geothermal power do not emit greenhouse gases, making them a cleaner alternative to fossil fuels. Increasing energy access; Renewable energy can provide energy access to remote and off-grid communities, reducing their reliance on diesel generators and other polluting sources. Supporting sustainable agriculture; Renewable energy can power irrigation systems, reducing the need for diesel-powered pumps and promoting sustainable agriculture practices. Enhancing energy security; Renewable energy can reduce Kenya's dependence on imported fossil fuels, improving energy security and reducing the impact of price volatility. This 600MW of Solar Farms will be a valuable assist to LAPSSET Corridor. COP28 indicated the importance of Adaption and to "Transition" into a Net Zero economy. The planned investment resources are equivalent to half of Kenya's GDP (core investment). In fact, conservative feasibility statistics show that the project will inject between 2% to 3% of GDP into the economy. The LAPSSET Corridor Project will make a tremendous contribution into Kenya's economic growth, with projections ranging between 8% and 10% of GDP. The project components are spread over a large part of Kenya and will open up the northern parts of the country and relieve strain on the Mombasa Port.

LAPSSET Corridor and Renewable Energy Opportunities

The LAPSSET Corridor presents several opportunities for renewable energy development in this "Early Stage Strategy": Solar energy: The corridor passes through regions with high solar irradiance, making it ideal for solar power generation. This report indicates the Strategy for the initial 600MW of Renewable Energy required to provide power for operational requirements. Wind energy; The corridor also passes through areas with high wind speeds, making it suitable for wind power generation in later phases. Geothermal energy; The corridor is close to the East African Rift System, which is home to significant geothermal resources. Hydro power; The corridor passes through regions with significant hydro power potential, particularly in the Lake Turkana region, a point to note is the effect of Climate Change on rainfall levels. Tidal power; Mombasa has a 4m tidal range suitable for a Tidal Power Lagoon project. Nuclear; The is the potential for two Small Modular Reactors totalling 940MW over time.

Challenges and Opportunities

While the LAPSSET Corridor presents opportunities for renewable energy development, there are also challenges to be addressed such as the Environmental Impacts and Social - Community support;

Infrastructure development; The corridor requires significant investment in infrastructure, including transmission lines and distribution networks, many of which have already been established with the new sub-stations at LAMU and Isiolo. Policy and regulatory framework; A supportive policy and regulatory framework has already been established by the GoK to attract investment in renewable energy. Community engagement; Local communities must be engaged and involved in the planning and development of renewable energy projects. Financing; Access to financing is critical for the development of renewable energy projects and we have designed the LAPSSET.ESG-Smartboard platform to produce monthly ESG reports and Quarterly EMS report to enable further investment.

The LAPSSET Corridor indeed presents a unique opportunity for Kenya to transition to renewable energy and mitigate climate change. By further harnessing the country's abundant renewable energy resources, Kenya can reduce its greenhouse gas emissions, increase energy access, and promote sustainable development. Addressing the challenges and seizing the opportunities presented by the LAPSSET Corridor can help Kenya achieve its climate change mitigation goals and create a sustainable future for generations to come. The GoK will have 30% shareholding and Afri-Fund Capital 35% in each energy project.

We are proposing two 300MW Solar Farms in this early stage, one at LAMU Port the other at Isiolo. LAMU Port Solar Farm will provide the GoK with USD 6.79 Million in year one & Total Government revenue share over twenty years of USD 98.4 Million, similarly Isiolo Solar Farm will provide in year one USD7.5 Million and over twenty years USD103.03 Million.

Total GoK revenue over twenty years for both Solar Farms will be USD 201.46 Million.

Total Afri-Fund Capital revenue over twenty years for both Solar Farms will be USD 235 Million

EXECUTIVE SUMMARY

The boldness of LAPSSET Corridor requires a bold approach to Climate Change Mitigation and Renewable Energy in Kenya. The GoK have this bold approach in place with all the Policies and Strategies to make this happen to ensure wealth creation, 1.5 Net ZERO target being met, hundreds of jobs created for Kenyan's and the Energy Transition. The LAPSSET Corridor Renewable Energy requirements are 15GW Generation capacity and will follow recommendations in the Government's Vision 2030 programme, Medium and Long-term plan for 2015 – 2020 and 2015 – 2035 Long-Term proposals.

The LAPSSET corridor is identified as a link between LAMU, Kenya's Northeastern province, Ethiopia and Southern Sudan. The project involves the development of a new transport corridor from the new port at LAMU through Garissa, Isiolo, Mararal, Lodwar, and Lokichogio to branch at Isiolo to Ethiopia and Southern Sudan. Projects within the corridor identified in Vision 2030 comprise: a new road network, railway line, oil refinery at Lamu, oil pipeline, Lamu Airport and free port at LAMU (Manda Bay) in addition to resort cities at the coast and in Isiolo and Turkana. The LAMU County Spatial Plan (CSP) - The draft plan does refer to the LAPSSET project, identifying the different elements of the project such as the Lamu port, the corridor (for railway, pipeline etc.), oil refinery, resort city, international airport, and port city. The CSP identifies that the Lamu Port City will reach a population of 1.25 million by 2050.

The Integrated LAMU Metropolitan Area Structure Plan – The County Government of LAMU is in the process of preparing this plan, and draft was published in 2016. The plan sets out a detailed land use zoning plan for the port, industrial area and new metropolis and we hope the 300MW site for the Solar Farm will be agreed to. There is a requirement for 600MW of Renewable Energy for this Early-Stage Strategy development programme. The new Port of LAMU is an already existing deep-water port at the Indian Ocean, currently operating 3 berths, built and financed by Government of Kenya and CCCC. The area is known for excellent irradiation (fixed mounting 1.683 kWh / kWp vs. tracked mounting 2.190 kWh / kWp). Option1: Prelim. Location LAMU Port Solar farm 320 hectares, Distance to Substation 7 km and Option2: Prelim. Location LAMU, 320 hectares, Distance to Substation 10 km, Soil condition: suitable for simple ramming (assumption). This 600MW early-stage proposal is one where Solar Farms are chosen as the "Least Cost Option" and fastest to build.

One of the EPC selected is China Urban-Rural Holding Group Co. Ltd, parent company CCCC - This EPC company has the ability to install 3MW per day so for a 300MW solar farm it could be possible to do this in 100 day, our realistic time period is within 200 to 300 days, which is a very fast delivery.

If necessary, the design of the solar farms may include a few hours of BESS (Battery Energy Storage System), which would incur an additional cost to be accounted for in the project funding.

Award of offers will be based on a blend of the "Least Cost option", components, warranties for components and services, collateral and implementation schedule. Whereas the benchmark EPC pricing for our Solar Farm system is currently around USD410,000 / MWp or appx. $123 million each in addition connections costs and reserves making each solar farm cost of USD485,000MWp totaling USD145.5 million appx for each solar farm, grand total for the two solar farms of USD291 million, IRR 17.83% and electricity sold @ USD0.05 KWh. In total the Free Cash Flow operational profit is USD328 Million over twenty years after all loan is repaid and costs taken out. Year one Free cash flow is USD 22.635 Million, GoK receives USD6.79 Million & Total Government revenue share over 20 years is USD 98.4 Million

Our electricity cost of USD 41MWp is in line with the "Least Cost Option" for LAPSSET Corridor and GoK / LCDA requirements.

Total GoK revenue over twenty years for both Solar Farms will be USD 201.43 Million.

Electricity production amounts PER YEAR:

Lamu 300 MWp x 2,190 kWh / kWp = 657,000 MWh and

Isiolo 300 MWp x 2,259 kWh / kWp = 677,700 MWh.

There will be additional earning revenues from green Carbon Credit certificates free market.

The additional revenue from Carbon Credits is important and the approximate Value of Carbon Credits for all of LAPSSET Corridor from 15.177 GW of Renewable Energy requirements will be*:*

- *At $20 per credit: 75,138,732 × $20 = $1,502,774,640 i.e. ($1.50 Billion per year)*
- *At $50 per credit: 75,138,732 × $50 = $3,756,936,600 i.e. ($3.77 Billion per year)*

For the two 300MW solar farms totaling 600MW then the Carbon Credits would be:

Net savings would be:

- *Compared to coal: 714,000 tons - 42,000 tons = approximately 672,000 tons of CO_2 equivalent saved per year.*
- *Compared to natural gas: 336,000 tons - 42,000 tons = approximately 294,000 tons of CO_2 equivalent saved per year.*

Estimating Potential Revenue:

Let's use a range of potential carbon credit prices to estimate the annual revenue:

- *Low Price: $5 per carbon credit*
- *Mid Price: $15 per carbon credit*
- *High Price: $30 per carbon credit (for high-quality credits in a favorable market)*

Revenue Estimates (Compared to Coal):

- *Low: 672,000 credits x $5/credit = $3,360,000 per year*
- *Mid: 672,000 credits x $15/credit = $10,080,000 per year*
- *High: 672,000 credits x $30/credit = $20,160,000 per year*

Revenue Estimates (Compared to Natural Gas):

- *Low: 294,000 credits x $5/credit = $1,470,000 per year*
- *Mid: 294,000 credits x $15/credit = $4,410,000 per year*
- *High: 294,000 credits x $30/credit = $8,820,000 per year*

For 600MW of Solar Farms CO2 savings are:

- *425,700 tons CO_2/year (if displacing Kenya's grid).*
- *993,300 tons CO_2/year (if replacing diesel generation).*

The 600MW of Renewable Energy will be the first of 15GW in the Climate Change Mitigation programme for LAPSSET Corridor.

Solar farms harness sunlight to generate electricity, providing a clean and renewable energy source. This reduces dependence on fossil fuels, which are major contributors to greenhouse gas emissions responsible for climate change. Solar energy production is associated with minimal greenhouse gas emissions compared to conventional fossil fuel-based power generation. The use of solar power helps decrease the overall carbon footprint, mitigating the impacts of climate change.

Solar Farms' Potential Impact

Two 300MW solar farms would significantly contribute to Kenya's renewable energy capacity.

Potential impact:

1. ***Renewable Energy Contribution**: The combined 600MW capacity would account for approximately 10-15% of Kenya's current electricity generation capacity. This increase in renewable energy would help reduce the country's dependence on fossil fuels.*
2. ***CO_2 Emissions Reduction**: Assuming an average capacity factor of 25% for solar farms in Kenya, the two farms would generate around 1.334 TWh of electricity per year. This would translate to a reduction of approximately 900,000 tons of CO_2 equivalent emissions per year, considering Kenya's current energy mix.*
3. ***Air Pollution Mitigation**: Solar farms produce clean energy, reducing the need for fossil fuels and subsequently decreasing air pollutants like particulate matter, sulphur dioxide, and nitrogen oxides. This would lead to improved air quality, especially in urban areas.*
4. ***Economic Benefits**: The development and operation of solar farms would create hundreds of jobs, stimulate local economies, and attract investments in the renewable energy sector.*
5. ***Grid Resiliency**: The addition of solar farms would increase the diversity of Kenya's energy mix, enhancing grid resilience and reducing the country's vulnerability to fossil fuel price fluctuations.*

Challenges and Limitations

While the impact of two 300MW solar farms, LAMU & Isiolo would be positive, there are challenges and limitations to consider:

1. ***Intermittency**: Solar energy is intermittent, which can create grid stability issues. Kenya would need to invest in grid infrastructure upgrades and energy storage solutions to ensure a stable energy supply.*
2. ***Land Use and Environmental Concerns**: Large-scale solar farms require significant land areas, which can lead to conflicts over land use, especially in areas with high conservation value.*
3. ***Policy and Regulatory Framework**: The success of solar farms in Kenya depends on a supportive policy and regulatory environment, including incentives for renewable energy development and grid integration.*

The development of two 300MW solar farms in Kenya would contribute significantly to the country's transition to a cleaner energy mix, reducing greenhouse gas emissions and air pollution. While there are challenges to address, the benefits of solar energy can help Kenya move towards a more sustainable energy future.

The Kenya Energy Strategy is to bring the entire land mass traversed by the LAPSSET Corridor into active economic activities will provide the country with ample and multiple revenue generating activities, create employment and contribute to economic growth. Solar Farms can assist that goal.

The President signed a framework agreement for collaboration on the development of sustainable green industries in Kenya with an investor to produce 30 GW of green hydrogen in Kenya. There exists opportunities in Kenya to produce 20 GW of wind-power, 10 GW of geothermal electricity and being at the equator, considerable amounts of solar energy.

Kenya is well known for its abundant geothermal and Hydroelectricity energy. However, it also has enormous potential for solar and wind exploitation. That is why the government aims to have 600 MW of solar power generation capacity installed by 2030, up from less than 100 MW currently installed (South Africa's largest solar project alone is almost 100 MW). It is expected that this number will increase with to 5,000MW with many projects in the pipeline.

Infrastructure Development requires early energy from these two solar farms at LAMU and Isiolo

1. ***Lamu Port**: Electricity for port operations, lighting, and security.*
2. ***Road and Railway Networks**: Power for lighting, signalling, and communication systems.*
3. ***Transmission Lines and Substations**: Electricity for powering transmission infrastructure.*

BACKGROUND

Development of a Power Generation and Transmission Master Plan, Kenya

As we have seen the LAPSSET Corridor Energy requirements are 15GW Generation capacity and will follow recommendations in the Government's Vision 2030 programme, Medium and Long-term plan for 2015 – 2020 and 2015 – 2035 Long-Term proposals. Hydroelectricity - Grand Falls Dam - enhanced by 796MW by 2028 and a further 500MW by 2030.

Lapsset Corridor

The Lamu Port South- Sudan, Ethiopia Transport (LAPSSET) Corridor Program is a regional multi modal infrastructure program integrating roads, railway and pipeline components in Kenya, South Sudan and Ethiopia. The single largest project of its nature in Eastern Africa and is intended to provide seamless connectivity, enhance trade and logistics within the region by providing an alternative and strategic corridor to serve the landlocked neighbouring countries of Ethiopia and South Sudan.

Energy is an important factor in the success of LAPSSET Corridor and as such funding for this 600MW has been arranged by Afri Fund Capital

This Early Stage Strategy is for the first 600MW of 15GW in total

LAPSSET Corridor – Early-Stage Strategy of 600MW

This strategy will enable the introduction of two 300MW Solar Farms at LAMU and Isiolo into the Kenya Energy mix and assist the Energy transition to Net ZERO in line with the GoK Vision 2030.

***Kenya's competitive positioning** - Kenya is well-positioned to take lead in the global energy transition building on its energy journey to attract significant investments not just in generation capacity but also in increasing productive use of green energy.*

To achieve this, Kenya should utilize its competitive advantages in the following areas:

• It possesses abundant and diverse renewable energy resources. Kenya has a large and mostly untapped supply of renewables including geothermal, wind, solar, and hydro resources, with high generation capacity factors amounting to over 150 GW. These can provide a competitive edge in international markets as Kenya has limited reliance on fossil fuels and can onboard new green energy demand centers without needing to decommission any plants.

DRIVE KENYA TO TAKE A QUANTUM LEAP TO 100 GW BY 2040 UNDERPINNED BY RENEWABLE ENERGY SOURCES. To effectively capture the growing investments made globally in green financing by leveraging Kenya's competitiveness in renewables and presence of policy enablers that support the ecosystem; it will need to institute measures including:

• Increasing capacity generation to 100 GW by 2040, in Geothermal, Hydropower, Wind, Solar, and developing industrial applications of Hydrogen

• Attracting USD 300 billion in green energy investment to increase generation, distribution, and transmission capacity as well as stimulate demand for energy

• Diversify funding pools for energy investments, including mobilizing domestic funds to de-risk local projects and stimulating investor appetite and power trading.

Future demands - The future power demands generated from the preferred investment framework strategy are identified in the table below.

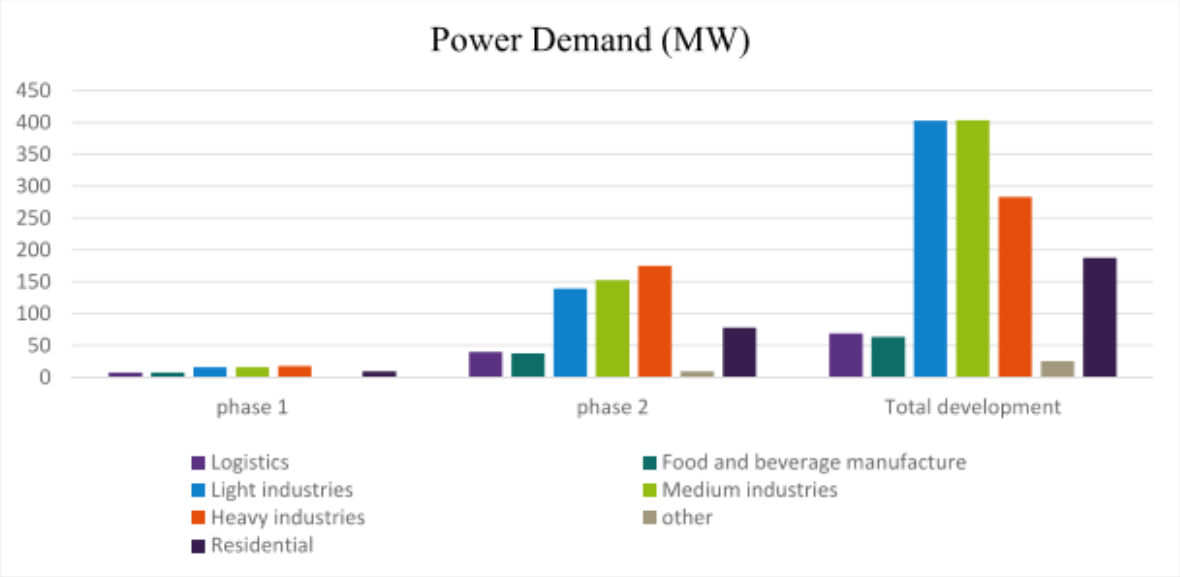
Taken from the LCDA PRELIMINARY MASTER PLAN FOR LAMU PORT CITY AND INVESTMENT FRAMEWORK April 2017.

Table 17: Power demand estimates by phase

Phase	MW (cumulative)
1	75
2	632
3	1,434

The power demands by sector in each phase are identified in the chart below. Light and medium industries are the sectors with the largest power demands.

Figure 5: Power demands by sector and phase



Source: *LCDA PRELIMINARY MASTER PLAN FOR LAMU PORT CITY AND INVESTMENT FRAMEWORK - April 2017.*

Section from the GoK Energy White Paper - KENYA ENERGY SECTOR ROADMAP 2040 July 2022.

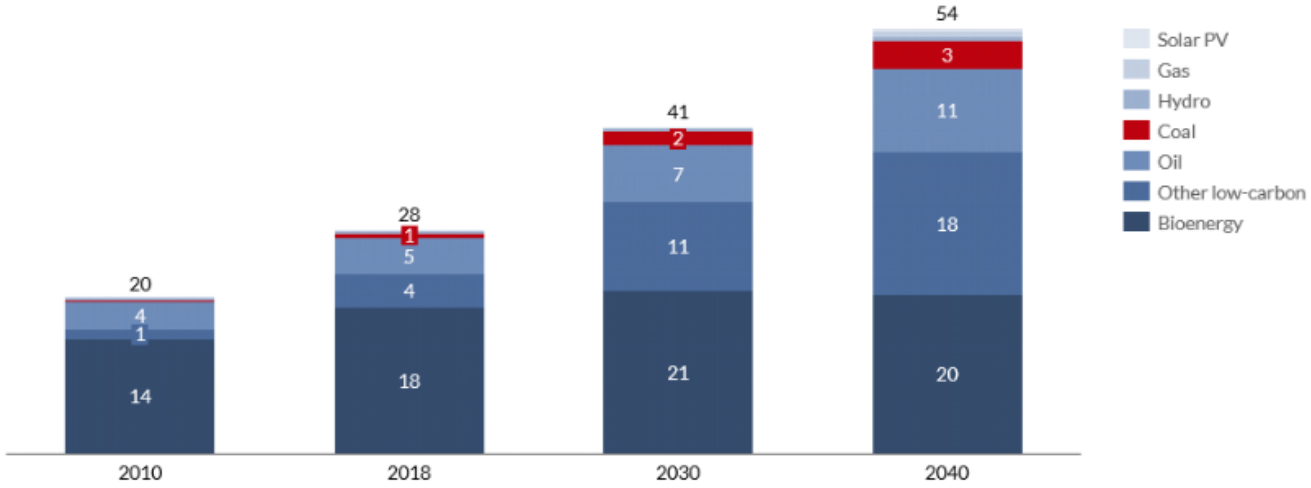
"Outcome 1: Establish energy as a transformational public good that is inclusive and serves the needs of Kenya's population. An energy system that is consumer-focused and inclusive, ensuring that all Kenyans have access to clean, affordable, and modern energy that improves their livelihoods and enables them to be an active participant in nation building to 100% access to electricity by 2030 a 50% reduction in household electricity bills by 2040 an Increased per capita consumption to be at par with upper middle-income economies by 2040 to 100% access for micro and small enterprises

• Outcome 2: Establish Kenya as a global leader in the drive towards decarbonized economic growth. Stimulate the efficient use of clean energy in Kenya at both industrial and household level to Low-carbon electricity at the core a Smart power grids to enhance efficiency o End reliance on back-up generators and their emissions impact by re-capturing demand and replacing with non-emitting solutions o 50% reduction in unsustainable household biomass use by 2040 o Decarbonize high carbon-emitting demand sectors. Use green energy to create competitive advantage in decarbonized sectors e.g., green hydrogen, Direct Air capture and storage

• Outcome 3: Drive Kenya to take a quantum leap to 100 GW installed capacity by 2040 underpinned by renewable energy sources. Tapping all the renewable resources Kenya must increase the installed capacity from 3 GW to 100 GW and attract more than USD 300 billion worth of green energy investments to Increase capacity generation to 100 GW by 2040 - Kenya is the Regional Green Pioneer of new energy sector technologies to Attract USD 300 billion in green energy investment to Diversify funding pools for energy investments including mobilizing innovative green financing and domestic funds to de-risk local projects and stimulate investor appetite

• Outcome 4: Establish Kenya as an investment destination of choice for industries that are seeking to decarbonize. Kenya positions itself to ensure the country can capitalize on opportunities in renewable energy especially in attracting energy-intensive sectors seeking to decarbonize o Attract new high-growth high-energy intensive industries by improving the country's business environment to Stimulate additional bankable clean energy demand from traditional sectors including development of industrial parks and agro-processing zones to Leverage Kenya's competitive advantage to tap into regional power pools to Stimulate a 24-hour economy."

Figure 16: Kenya's primary energy demand (Mtoe; 2010 - 2040)[23]



Note: Mtoe represents 'megaton of oil equivalent'. Energy balance shows the commodity balances translated into a standard energy unit for all the fuels together from production to final use, for example, gas produced may be transformed into electricity and then consumed by the domestic sector. '2040 STEPS represents forecasts factoring in current policy frameworks; The Africa Case is built on the premise of Agenda 2063, including full access to electricity and clean cooking.'

Source: *GoK Energy White Paper - KENYA ENERGY SECTOR ROADMAP 2040-July 2022.*

Benefits of solar farms in the context of climate change mitigation:

Renewable Energy Generation:

For LAPSSET Corridor, Solar farms harness sunlight to generate electricity, providing a clean and renewable energy source. At LAMU, a fixed mounting solar farm has 1.683 kWh / kWp vs tracked mounting 2.190 kWh / kWp This reduces dependence on fossil fuels, which are major contributors to greenhouse gas emissions responsible for climate change. The potential Isiolo site has fixed mounting 1.746 kWh / kWp vs. tracked mounting 2.259 kWh / kWp.

Greenhouse Gas Emission Reduction:

Solar energy production is associated with minimal greenhouse gas emissions compared to conventional fossil fuel-based power generation. The use of solar power within LAPSSET Corridor helps decrease the overall carbon footprint, mitigating the impacts of climate change.

Air and Water Quality Improvement:

Unlike traditional power plants, solar farms do not release pollutants in their operations into the air or water during operation. This improves air quality and reduces water pollution, positively impacting the environment and public health within LAPSSET Corridor..

Mitigation of Climate Change Impacts:

By reducing reliance on fossil fuels within LAPSSET Corridor, solar farms contribute to slowing down climate change in Kenya and Globally. This, in turn, helps mitigate the adverse impacts of climate change, such as rising temperatures, sea level rise, extreme weather events, and disruptions to ecosystems.

Job Creation and Economic Development:

The development and maintenance of solar farms create hundreds jobs, contributing to economic development in LAPSSET Corridor and other regions where these projects are implemented. This aligns with broader sustainable development goals, including poverty reduction and increased employment opportunities.

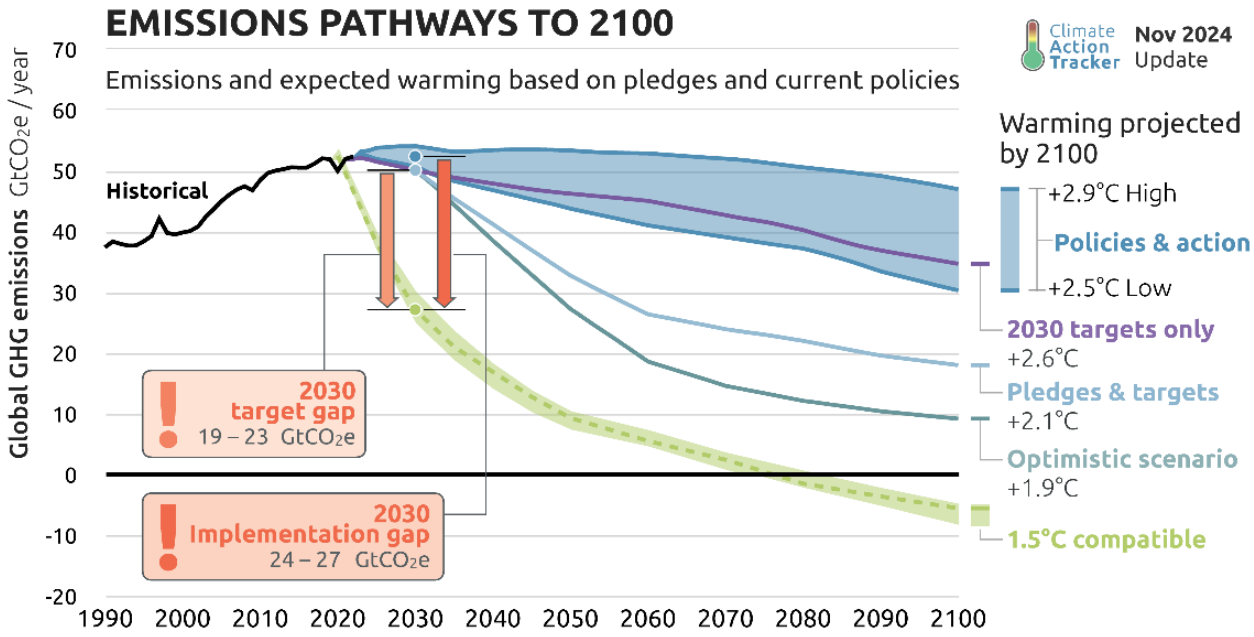
Diversification of Energy Sources:

Solar farms contribute to a more diversified energy mix, reducing vulnerability to energy supply disruptions and price fluctuations associated with fossil fuels. This enhances energy security and resilience, aligning with strategies focused on sustainable and reliable energy sources.

Global Situation

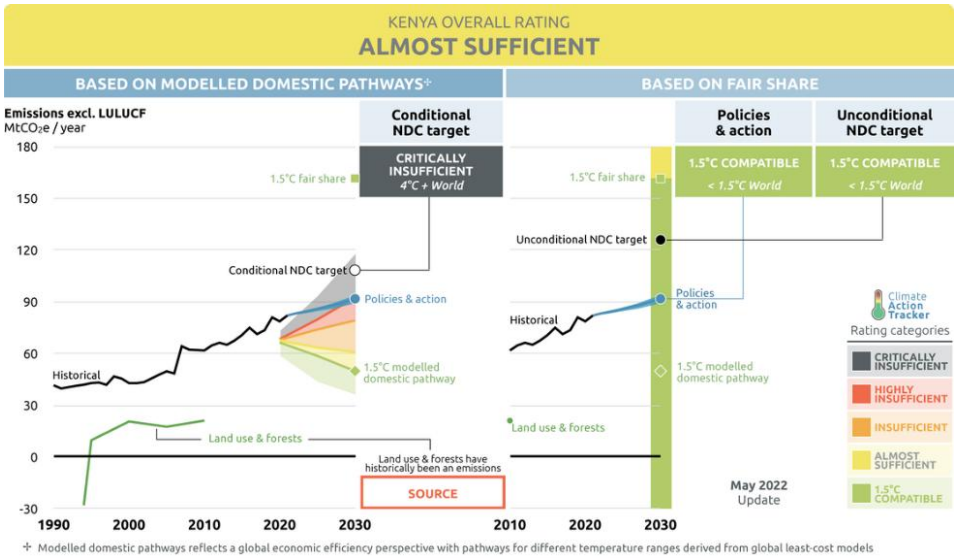
The Climate Action Tracker is an independent scientific project that tracks government climate action and measures against the globally agreed Paris Agreement aim of "holding warming well below 2°C, and pursuing efforts to limit warming to 1.5°C." A collaboration of two organisations, Climate Analytics and New Climate Institute, the CAT has been providing this independent analysis to policymakers since 2009.

Global



Source:https://climateactiontracker.org/media/images/CAT_202411_Graph_EmissionsPathwaysto2100.original.png

KENYA is on target, below are 2022 data – Kenya is now Sufficient in 2025



Renewable Energy Developments possible

Research by PSECC Ltd over the past twenty-seven months have indicated 16.752 GW is required by the GoK for LAPSSET Corridor 15 GW will be developed:

Fig. 1

PSECC Ltd - Phase One Railway & Economic Zones - Energy Installed & Cost Recommendations to meet Kenya Government, LCDA targets, NDC's and IPCC emission reduction.

		MW (2024 – 2028)		Cost	MW (2028 – 2035)		Cost
• expansion in geothermal	-	1,887	MW	US$ 2,830 m	3,113	MW	US$ 4,669 m
• solar PV	-	500	MW	US$ 500 m	500	MW	US$ 500 m
• solar farms	-	2,000	MW	US$ 1,770 m	1,000	MW	US$ 885 m
• solar PV Manufacturing plant	-	25	MW	US$ 10 m	50	MW	US$ 20 m
• waste plants	-	180	MW	US$ 900 m	180	MW	US$ 900 m
• wind farms	-	150	MW	US$ 328 m	350	MW	US$ 766 m
• green hydrogen	-	1,100	MW	US$ 1,432 m	1,100	MW	US$ 1,432 m
• dams – hydroelectricity	-	796	MW	US$ 796 m	500	MW	US$ 500 m
• climate smart agriculture Bio-Fuels	-	191	M Ltrs	US$ 190 m	150	M Ltrs	US$ 190 m
• Nuclear	-	-	-	- -	940	MW	US$ 4,800 m
• Clean Coal Technology	-	2,040	MW	US$ 2,107 m	-	-	- -
	Total	8,869	MW	US$ 10,863m	7,883	MW	US$ 14,662 m

US $25.525 BILLION REQUIRED FOR ENERGY PROJECTS

- *Solar PV Manufacturing plant will not generate 25 MW of energy – it is the output per year of Solar panels*
- *Kenya - ambitious targets for geothermal energy. Expansion of its Hydroelectricity, geothermal power production to 5,000 MW by 2030, medium-term 1,887 MW by 2017 were required*
- *Kenya had plans for 960MW coal plant in Kitui. The proposed Lamu Coal Power Station had a potential for 1,050 MW (1,410,000 hp) coal-fired thermal power station in Kenya (1,410,000 hp). It could be possible to develop this using Clean Coal Technology if required to assist the transition.*

Afri-Fund Capital, Credit Invest

Funding provision for LAPSSET Corridor. Afri Fund Capital has arranged funding for the Energy projects. President Ruto has also signed a framework agreement for collaboration on the development of sustainable green industries in Kenya with a UK investor to produce 30 GW of green hydrogen in Kenya.

Also, the Kenya Nuclear Energy Authority have plans for 1,000 MW of Nuclear Energy to commence in 2027 after personnel have been trained.

The objective is to bring the entire land mass traversed by the LAPSSET Corridor into active economic activities will provide the country with ample and multiple revenue generating activities, create employment and contribute to economic growth. Solar Farms can assist that goal.

The program will also position the country strategically as a trade and logistics hub by serving the lower parts of Ethiopia and South Sudan and giving access an efficient transport network to over 100 million people. It will also link with the Northern Corridor via a link from Isiolo to Nairobi and therefore help to ease business for the regional countries of Uganda, Rwanda, Burundi and Democratic Republic of Congo.

President Ruto's commitment

President William Ruto in November 9, 2022, had arrived back from Sharm El-Sheikh, Egypt where he attended the 2022 United Nations Climate Change Conference (COP27). The President called on developed nations to invest in Africa to unlock its clean energy production potential citing wind power, geothermal electricity, and solar energy – this 600MW Solar Farms proposal assist that process.

The President signed a framework agreement for collaboration on the development of sustainable green industries in Kenya with an investor to produce 30 GW of green hydrogen in Kenya. There exists opportunities in Kenya to produce 20 GW of wind-power, 10 GW of geothermal electricity and being at the equator, considerable amounts of solar energy to establish a further 3GW.

Kenya is well known for its abundant geothermal and Hydroelectricity energy. However, it also has huge potential for solar and wind exploitation. That is why the government aims to have 600 MW of solar power generation capacity installed by 2030, up from less than 100 MW currently installed (South Africa's largest solar project alone is almost 100 MW). It is expected that this number will increase eventually to 5,000MW with many projects in the pipeline.

This is an "Early-Stage Strategy" - Solar Farm Pre-Feasibility Study – a detailed technical Feasibility offer will follow on these Renewable Energy Solar Farms:

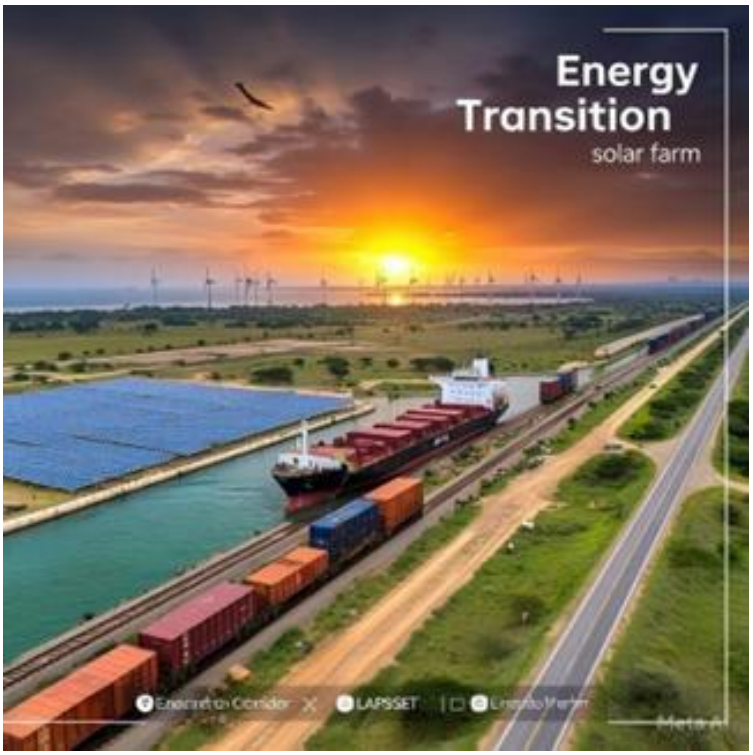
• Solar Farms provide power to the Green hydrogen plants and could be a critical enabler of the global transition to sustainable energy and net zero emissions economies.

• There is unprecedented momentum around the world to fulfil Solar and hydrogen's longstanding potential as a clean energy solution.

Solar Farms and especially Hydrogen is emerging as one of the leading options for storing energy from renewables with hydrogen-based fuels potentially transporting energy from renewables over long distances – from regions with abundant energy resources, to energy-hungry areas thousands of kilometers away.

The Solar Farm and Green Hydrogen Strategy and Roadmap for Kenya has been developed, Hydrogen strategy by the European Union Global Technical Assistance Facility (GTAF) for Sustainable Energy, in close cooperation with the Delegation of the European Union to Kenya (EU), the Ministry of Energy and Petroleum (MoEP) for Kenya.

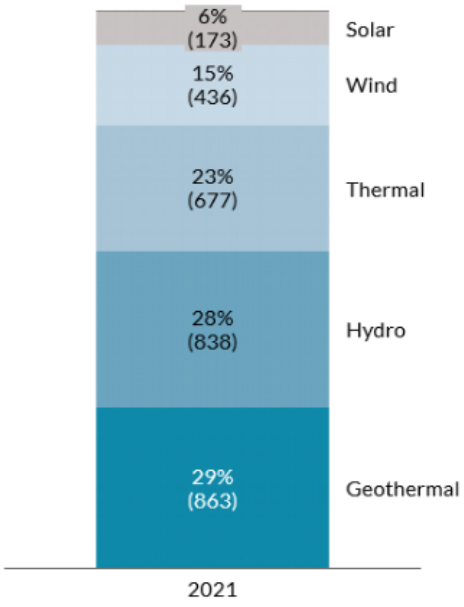
Solar farms play a significant role in climate change mitigation and are aligned with strategies like the LAMU Port-South Sudan-Ethiopia Transport (LAPSSET) Corridor in several ways.



Taken from the GoK Energy White Paper KENYA ENERGY SECTOR ROADMAP 2040 July 2022.

Kenya has made considerable efforts towards climate mitigation and adaptation in the energy sector, leveraging its competitive advantages in renewables to accelerate the shift to a low carbon economy. Renewable energy sources currently account for over 75% of the country's installed power generation capacity, with geothermal (863 MW), hydro (838 MW), Wind (436 MW), and Solar (173 MW) being the leading contributors. A continued increase in renewable energy supply will underwrite Kenya's transition to low carbon and a clear roadmap is necessary to ensure all stakeholders continue to work towards this goal.

Figure 12: Shift in the renewable energy mix (MW)[17]



Source: *GoK Energy White Paper - ENYA ENERGY SECTOR ROADMAP 2040-July 2022.*

As well as this first 600MW of Solar Farms we can offer in the full LAPSSET Corridor Energy programme twenty 50MW solar farms totaling 1,000 MW, one for every twenty miles of the Lapsset Corridor or by having ten larger 300MW solar farms for SEZ's totaling 3,000MW. Solar PV panel Manufacturing plants can be provided for Solar PV panels for each solar farm at the same price or lower than those normally imported from China. This lower panel cost makes it possible to build a solar farm at a cost of USD 660 to 800,00 per MWh.

The Renewable Electricity Energy can provide power to SEZ's and for Green hydrogen production, which is defined as hydrogen produced by splitting water into hydrogen and oxygen using renewable electricity.

As we have seen Kenya presents itself as highly vulnerable to climate change effects – this is a major problem and this problem can be resolved, mitigated, lead to sustainable growth, 1,000's of jobs created and we aim to indicate just how that can be done and provide the funding to achieve an enhanced Solar Farm and Green Hydrogen Energy program for the Lapsset Corridor.

Electricity supplied at least cost $0.05 KWh.

Energy policies and strategies *- Kenya is currently in a dynamic development phase with regards to its domestic energy. The last two decades - the country has been facing challenges in growing energy demands via unreliable and expensive means of energy generation and import.*

The fuels industry, commerce, transportation and agriculture are backbones of the Kenyan economy; therefore, provision of safe and reliable energy is a vital requirement for socio-economic development in the coming years. Energy is a key enabler to achieve the country's future aspirations of "accelerated economic growth; increasing productivity of all sectors; equitable distribution of national income; poverty alleviation through improved access to basic needs; enhanced agricultural production; industrialization; accelerated employment creation and improved rural-urban balance", as captured in the development plan, Kenya Vision 2030.

The goal of Kenya's energy sector is to "ensure sustainable, adequate, affordable, competitive, secure and reliable supply of energy to meet national and county needs at least cost, while protecting and conserving the environment".

LAPSSET Update - Towards the later months of the year 2024, Afri - Fund Capital entered into negotiations with the Kenya Electricity Transmission Company KETRACO to jointly develop power transmission lines from the energy sources to the LAMU Port. We have entered into an MOU for a joint Transmission Lines development between Afri Fund Capital and KETRACO to develop the following energy lines

1. POWER LINE ONE- From SODDO in Ethiopia (Renaissance Dam) to LOIYANGALAN Kenya to the LAPSSET Corridor to supply 600MW of power as an initial power supply to the LAPSSET corridor project. The governments of Kenya and Ethiopia have agreed to share and exchange power as part of the East African Power pool agreement EAPP.

2. POWER LINE TWO- MOYALE (LAKE TURKANA WIND POWER PROJECT) line to Nairobi, to the coastal city of Malindi and to the PORT of LAMU . This line will serve as redundancy line to ensure the corridor has sufficient power in its initial development and supply the other coastal regions with sufficient power.

These two lines will serve as an energy place holders as Afri-Fund Capital and our HORIZON CONSORTIUM partner PSECC Energy UK work to develop a masterplan to develop 15000MW of power on the LAPSSET Corridor. Our vision is to make the LAMU PORT a power HUB for the generation and distribution of energy to the nation of Kenya and the region.

STRATEGY

Feasibility Studies

These studies will be undertaken to provide "Least Cost Option"s and best practice technology for the Railway, Roads, SEZ's and all Renewable Energy projects.

Targets will be met....

Doing development differently: How Kenya is rapidly emerging as Africa's renewable energy superpower. Lapsset Corridor will be a showcase of what is possible for Infrastructure development in a Sustainable manner one that mitigates Climate Change. It increases the Renewable Energy generation in Kenya whilst reducing Carbon Dioxide Emissions inline with the Energy White Paper targets - National Determined Contributions and surpass those expectations together with meeting increased energy demand. This positions Kenya as a major country in the AfCTA one Africa market place with this low cost total funding package.

Key Data

The Energy and Petroleum Statistics report 2021, provides key data on renewable energy and other energy sub-sectors. According to the report, the total electricity generation decreased slightly from 11,620.7GWh in 2019 to 11611.34GWh in the year 2020. During the period under review, 92.3 per cent of electricity was generated from renewable sources. Electricity generation from geothermal, hydro and wind power sources accounted for 43.6, 36.5 and 11.5 per cent of electricity, respectively in 2020.

We are further proposing increasing Kenya's Renewable Energy by 15 GW by 2035 to hopefully include two 470MW Nuclear SMR Plants from 2027 onwards.

Diversification of the KENYA and LAPSSET Corridor Energy mix is a requirement of a Sustainable Energy Transition to meet the changing climate and reliance of fossile fuel in Transportation sectors.

The LAPSSET Corridor

Traversing nine counties, namely; Lamu, Garissa, Isiolo, Meru, Laikipia Baringo, Samburu, Marsabit and Turkana.

At the regional level, the core participating countries are the Republic of Kenya, Federal Democratic Republic of Ethiopia and Republic of South Sudan. The program will create a second strategic corridor to the land locked neighbouring countries of Ethiopia and South Sudan.

Project Objectives

Among others, the project will entail the following:

(vii) A port at Manda Bay, Lamu;
(viii) A standard gauge railway line to Juba in South Sudan and Addis Ababa in Ethiopia;
(ix) Road network; (iv) Oil pipelines (Southern Sudan and Ethiopia);
(x) An oil refinery at Bargoni, Kenya;
(xi) Three airports; and
(xii) Three resort cities.

The 600MW of Renewable Energy for the first stage of the LAPSSET Corridor in Kenya would likely be used to power various components of the project, including:

Infrastructure Development

4. ***LAMU Port****: Electricity for port operations, lighting, and security.*
5. ***Road and Railway Networks****: Power for lighting, signalling, and communication systems.*
6. ***Transmission Lines and Substations****: Electricity for powering transmission infrastructure.*

Industrial and Economic Development

1. ***Special Economic Zones (SEZs)****: Power for industries, manufacturing, and processing units.*
2. ***Agricultural Processing and Irrigation****: Electricity for powering irrigation systems, processing plants, and cold storage facilities.*
3. ***Tourism and Hospitality****: Power for hotels, resorts, and other tourist infrastructure.*

Social and Community Development

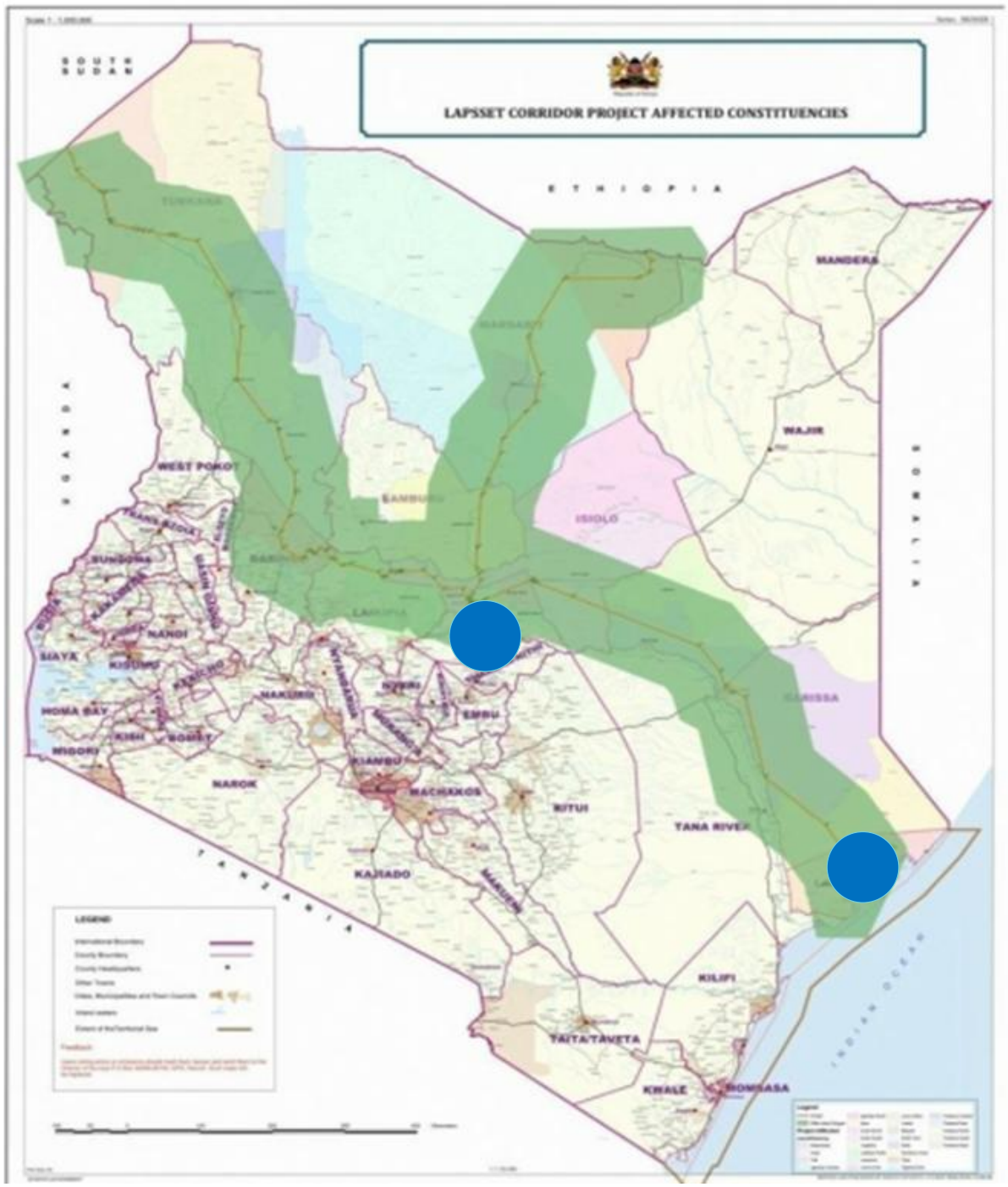
1. ***Rural Electrification****: Electricity for homes, schools, healthcare facilities, and community centers.*
2. ***Water Supply and Sanitation****: Power for water treatment plants, pumping stations, and sewage systems.*
3. ***Telecommunication Networks****: Electricity for powering telecommunication towers and networks.*

Other Uses

1. ***Electric Vehicle Charging****: Power for charging electric vehicles used for transportation along the corridor.*
2. ***Data Centers and IT Infrastructure****: Electricity for powering data centers, server rooms, and other IT infrastructure.*
3. ***Security and Surveillance****: Power for security cameras, sensors, and other surveillance systems.*

By providing 600MW of renewable energy, PSECC Ltd can help support the early development of the LAPSSET Corridor, promote economic growth, and improve the quality of life for local communities in Kenya.

Fig.2 Proposed locations of the new 300MW Solar Farms – LAMU and Isiolo



300MW Solar Farm

This work can start with the two 300MW solar farms at LAMU Port and Isiolo and will see the continued Energy Transition of Kenya to mitigate Clime Change.

*When selecting a site for a solar farm in **Lamu** or **Isiolo** in Kenya, several key factors must be considered to ensure optimal performance, economic viability, and minimal environmental and social impact.*

Critical considerations:

1. Solar Resource Potential

- ***Solar Irradiance**: We have assessed the average daily solar radiation (kWh/m²/day) in the area. Both Lamu and Isiolo have high solar potential, but exact measurements should be taken.*
- ***Sunshine Hours**: Ensure the site has consistent sunlight with minimal cloud cover.*
- ***Shading**: Avoid areas with obstructions (mountains, trees, or buildings) that could cast shadows on panels.*

2. Land Availability and Topography

- ***Land Size**: Ensure sufficient flat or gently sloping land (typically 5-10 acres per MW for large-scale solar farms).*
- ***Soil Stability**: Avoid flood-prone or erosion-prone areas.*
- ***Land Use**: Prefer barren or low-value agricultural land to minimize displacement.*

3. Grid Connection and Infrastructure

- ***Proximity to Substations**: Closer distance reduces transmission losses and connection costs.*
- ***Grid Capacity**: Confirm the local grid can handle the additional power without costly upgrades.*
- ***Road Access**: Good transport infrastructure for construction and maintenance.*

4. Environmental and Social Impact

- ***Biodiversity**: Avoid ecologically sensitive areas (e.g., wildlife reserves, wetlands).*

- ***Land Ownership****: Engage with local communities to avoid conflicts (especially in Isiolo, where pastoral land is common).*
- ***Water Usage****: Solar farms need minimal water, but cleaning panels may require some.*

5. Economic and Regulatory Factors

- ***Government Incentives****: Check for feed-in tariffs, tax exemptions, or grants under Kenya's Renewable Energy Policy.*
- ***Permits & Approvals****: Obtain necessary licenses from* ***EPRA (Energy and Petroleum Regulatory Authority)****, NEMA (environmental impact assessment), and county governments.*
- ***Power Purchase Agreement (PPA)****: Secure a buyer (e.g., Kenya Power or private off-takers).*

6. Security and Risk Factors

- ***Theft/Vandalism****: Lamu has had security challenges; consider fencing and surveillance.*
- ***Extreme Weather****: Assess risks of dust storms (Isiolo) or high humidity (Lamu).*

7. Climate Resilience

- ***Temperature Effects****: High temperatures (common in Isiolo) can reduce panel efficiency.*
- ***Dust & Sand****: Frequent cleaning may be needed in arid regions.*

8. Local Community Engagement

- ***Employment Opportunities****: Involve locals in construction and maintenance.*
- ***Compensation****: Fairly compensate landowners if private land is leased.*

Comparison: Lamu vs. Isiolo

Factor	***Lamu***	***Isiolo***
Solar Potential	*High (coastal, good irradiance)*	*Very high (arid, less cloud cover)*
Land Availability	*Limited (wetlands, forests)*	*Abundant (mostly arid/semi-arid)*
Grid Access	*Good (New Substation for LAMU)*	*Better (near national grid lines)*
Security	*Moderate (past insecurity issues)*	*Relatively stable*
Community Impact	*Potential land disputes*	*Pastoral land use considerations*

A detailed ***feasibility study*** *(including solar resource assessment, environmental impact assessment, and grid studies, community engagement) is essential before finalizing the site.*

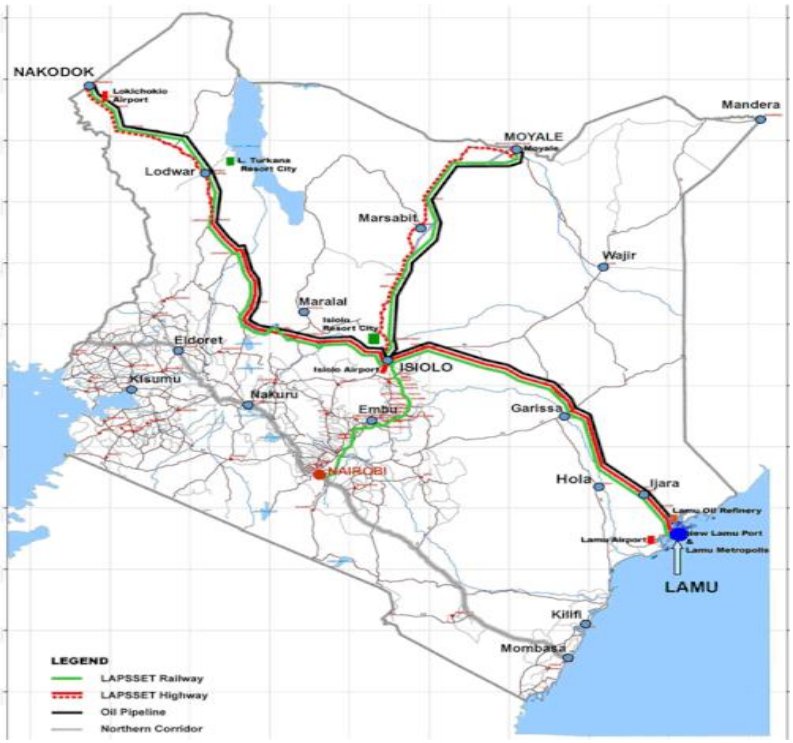
LAPSSET Corridor Kenya

Project Summary

Two x 300 MW Solar farms Isiolo, Lamu for LAPSSET Corridor

The below summary shall give an overview about 2 initial projects to support the 600MW Energy supply for the "Early Stage" of the Lapsset Corridor and the Net ZERO Vision of the Government of Kenya.
The vision of the Lapsset initiative is to connect Kenya, South Sudan and Ethiopia over an infrastructure corridor providing access to a deepwater seaport of the landlocked South Sudan and Ethiopia.

Fig 3. Kenya map



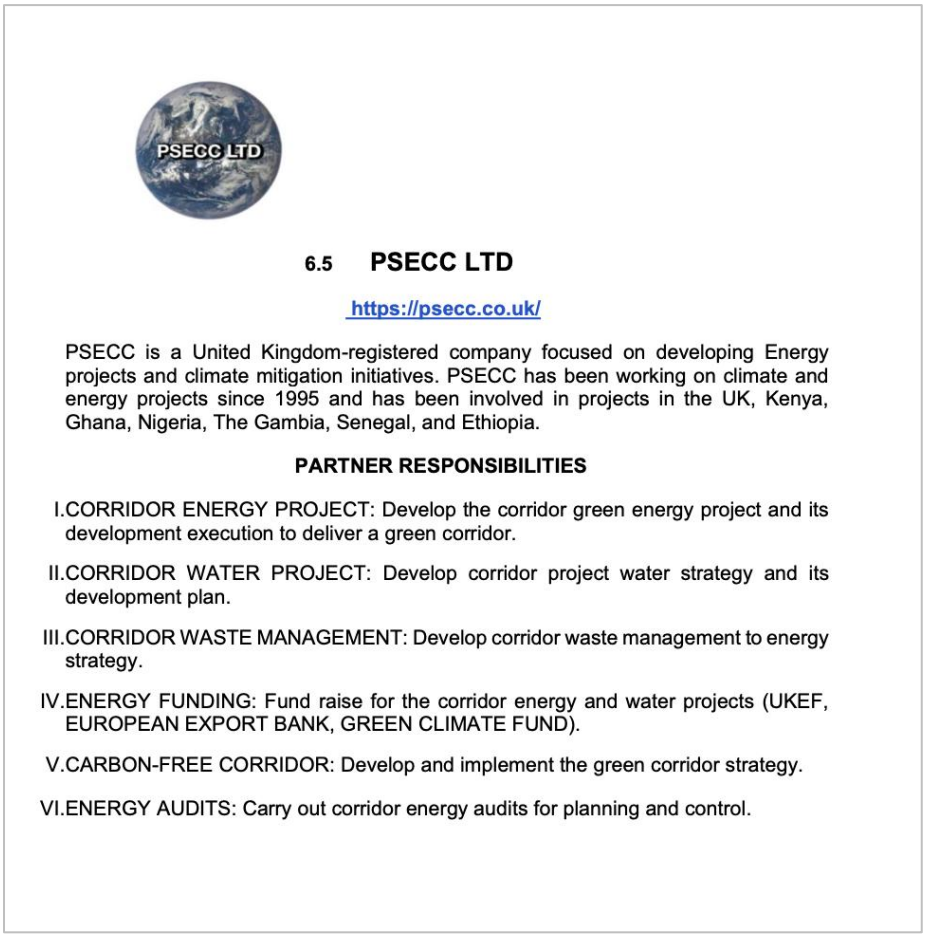
The Lapsset Corridor Project consists of:

- Lamu Port at Manda Bay, 3 berths operational
- Railway and Highway system to connect the 3 countries
- Oil refinery at Isiolo
- Crude Oil pipeline ending in Lamu Port
- 3 Airports in Kenya
- Several economic zones

Power supply generated by renewable sources for LAPSSET Corridor to achieve the Net Zero Goal of the Countries. The total installation size for solar power is expected to be 3,000MW of the total of 15,000 MWp.

Swiss Joule - Our role:

Swissjoule is a sub-contractor and collaborating with and is mandated by PSECC Ltd to plan and coordinate the Energy generating projects. PSECC Ltd. Is an accredited member of THE HORIZON CONSORTIUM PARTNERS PROJECT FRAMEWORK by AGREEMENT signed on 08.April 2024.
The first two projects for Lapsset Energy should be one 300MW solar farm at Isiolo, operational by December 2026 and another 300MW solar farm with Green Hydrogen plant at LAMU Port and could be operational in June/ July 2026. Below a definition of the PSECC Ltd. Responsibilities as defined on page 12 of the agreement:



1. New Port Lamu 300 MW Solar

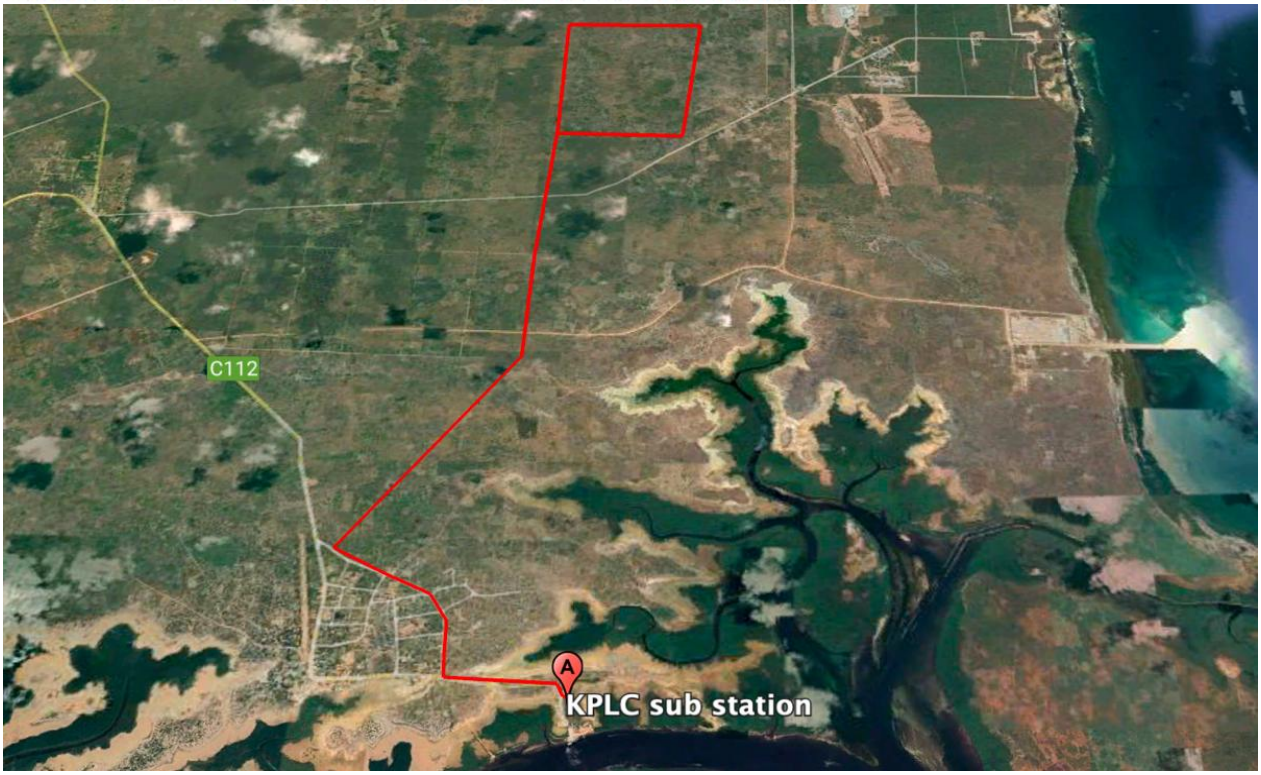
New Port of Lamu has a strategic role within the LAPSSET Corridor as a regional transport hub. It is expected to become the biggest deep-sea port in East Africa.

New Port of LAMU is an already existing deep-water port at the Indian Ocean, currently operating 3 berths, built and financed by Government of Kenya and CCCC.
The area is known for excellent irradiation (fixed mounting 1.683 kWh / kWp vs. tracked mounting 2.190 kWh / kWp). A new substation has been built to provide power to LAMU.

Option1: Fig 4. Prelim. Location LAMU Port Solar farm 320 hectares, Distance to Substation 7 km

Option2: Fig 5. Prelim. Location LAMU, 320 hectares, Distance to Substation 10 km
Soil condition: suitable for simple ramming (assumption) – connection to the LAMU Substation (Exact location to be negotiated)

328.5km 220kV Rabai - Malindi - Garsen - Lamu line



As of April 2025, the first initiatives are fully funded through Afri-Fund Capital, (Exact location to be negotiated). In order to plan the different solar projects early and to position the EPC, we kindly request to provide the following:

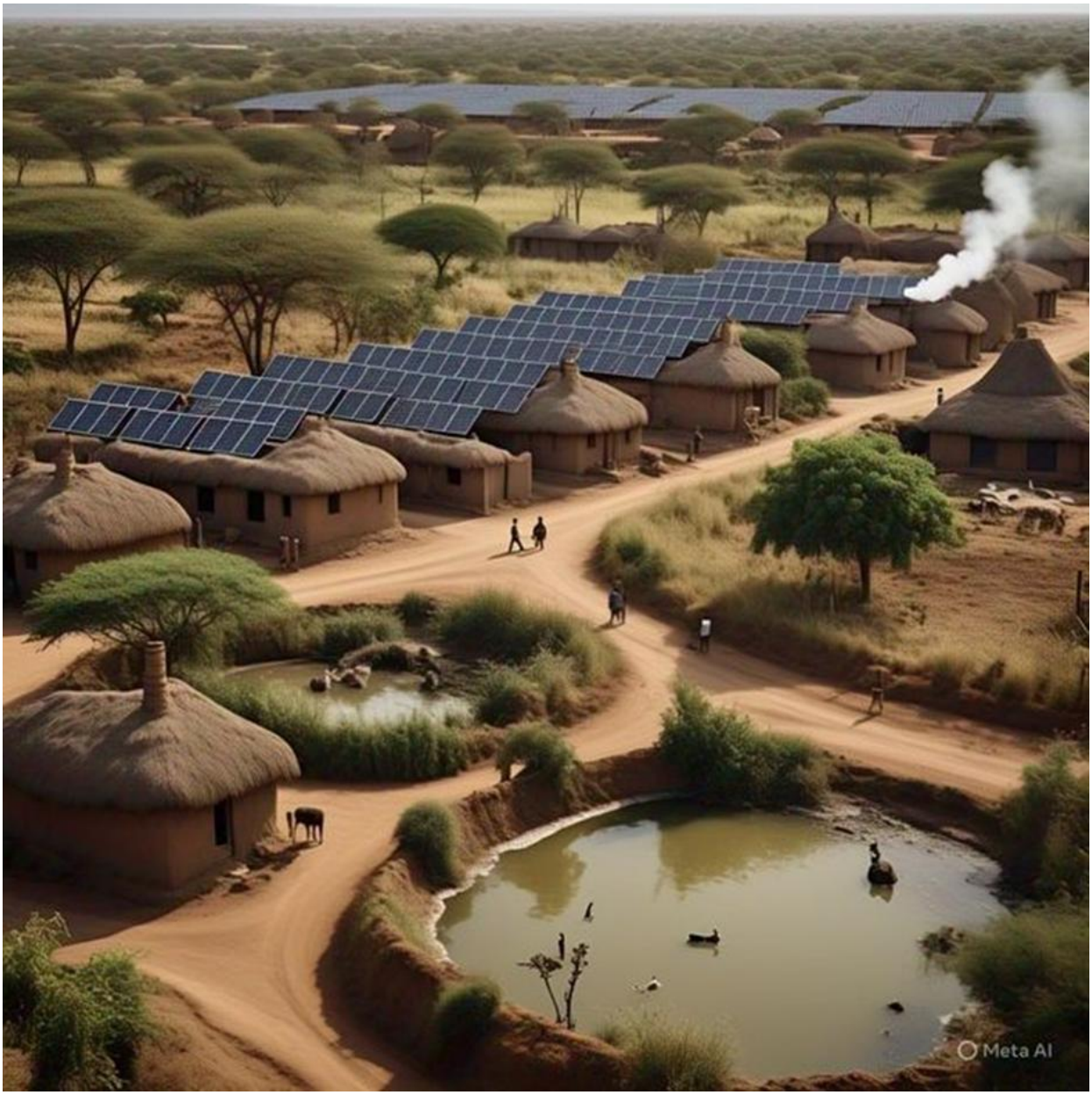
1. Main components to be used with data sheets for solar panel bi-facial, tracked mounting system, inverters ...
2. Implementation schedule
*3. Preliminary Ball park pricing for turnkey **without** grid connection, substation, … .*
4. Updated reference list
5. Short description of China Urban-Rural Holding Group Co., Ltd.

In order to reduce time and effort it is of course possible to use a blueprint of projects already offered.

Next steps:

The above information will be aggregated, the consortium and the funders will be informed. Award of offers will be based on a blend of the "Least Cost option", components, warranties for components and services, collateral and implementation schedule. Whereas the benchmark pricing is currently around 410,000 $ / MWp for EPC.

The early EPC can get a foot in the door and will set the benchmark for components and pricing. The offering EPC can also get access to the other technologies beyond Solar. This can be Wind, Hydrogen, Waste processing, pumping for irrigation and the infrastructure work.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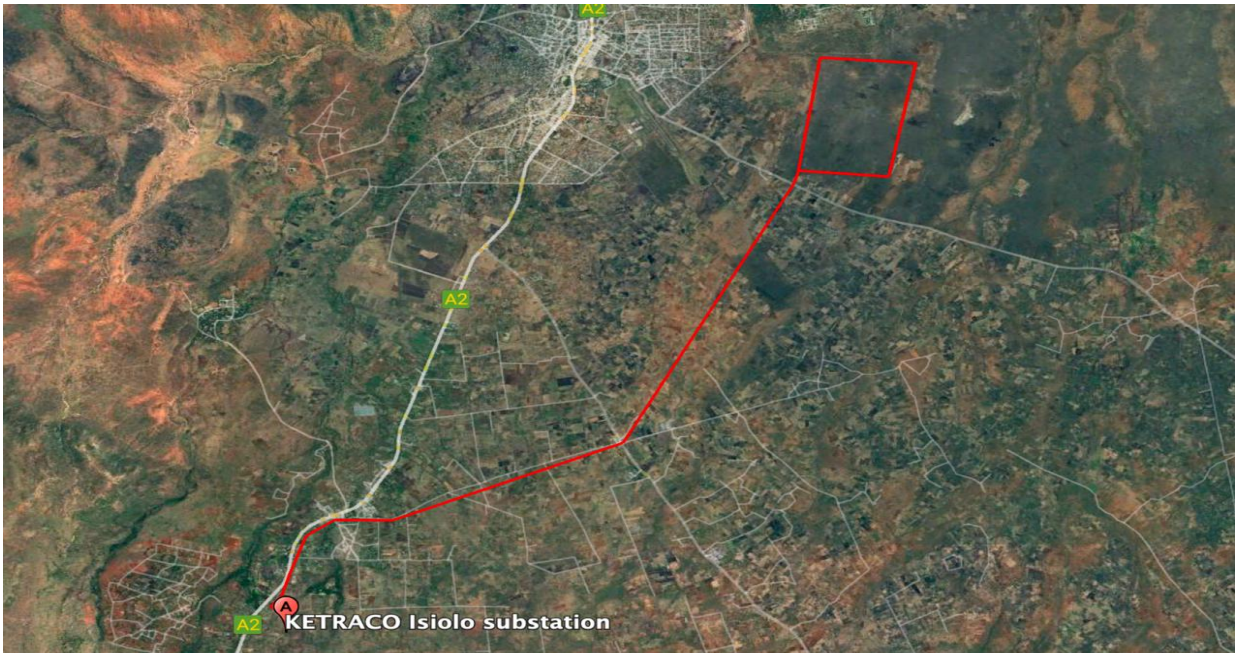
2. Isiolo 300 MW Solar

Isiolo is the key hub for the Lapsset corridor.

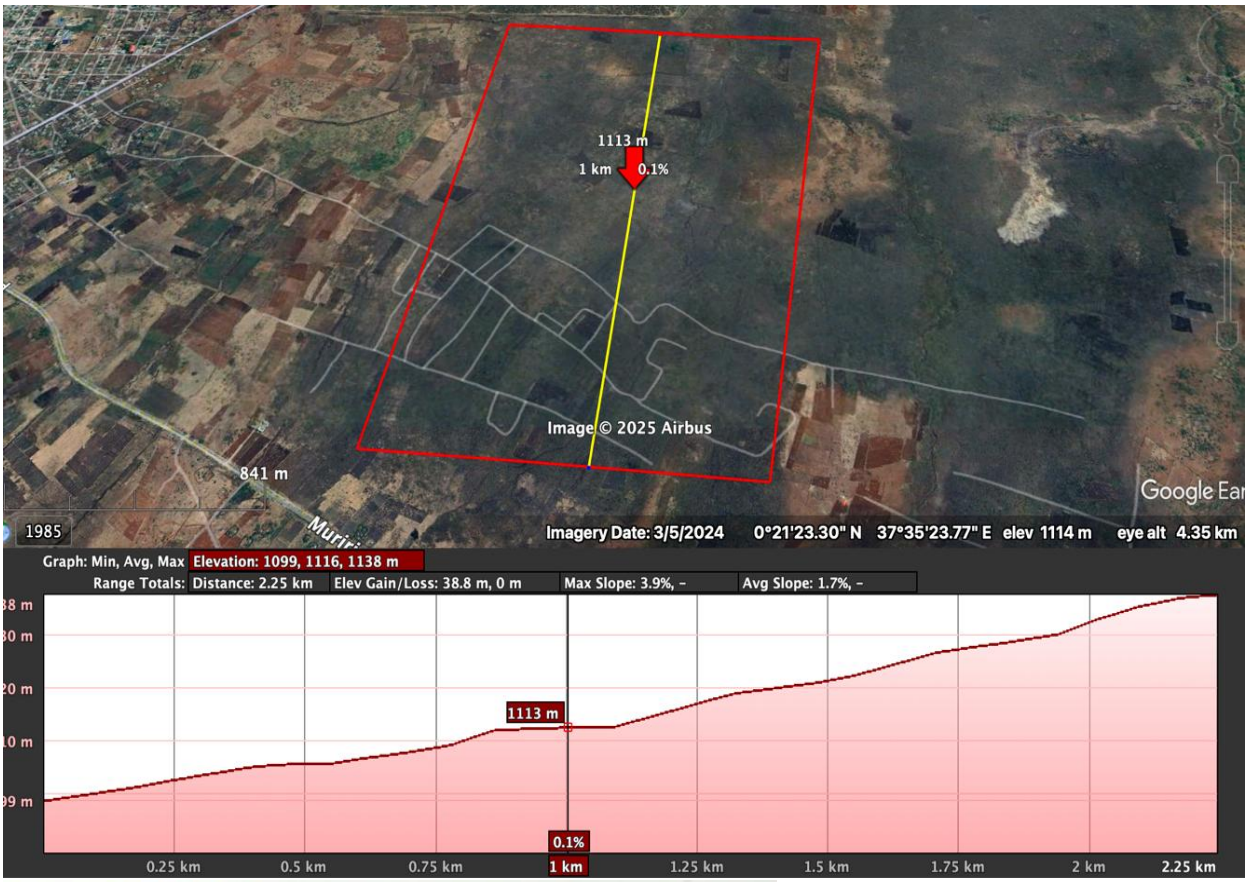
The transportation system (railway, highway, airport) will center in this area.
An oil refinery and business parks are in the planning.
All this results in high demand for electricity.
Substations are already erected and operational.

The area is known for excellent irradiation (fixed mounting 1.746 kWh / kWp vs. tracked mounting 2.259 kWh / kWp) and high wind speeds of up to 9,98 m/s for a 100-meter pole that could be suitable for Wind Turbines on the same site.

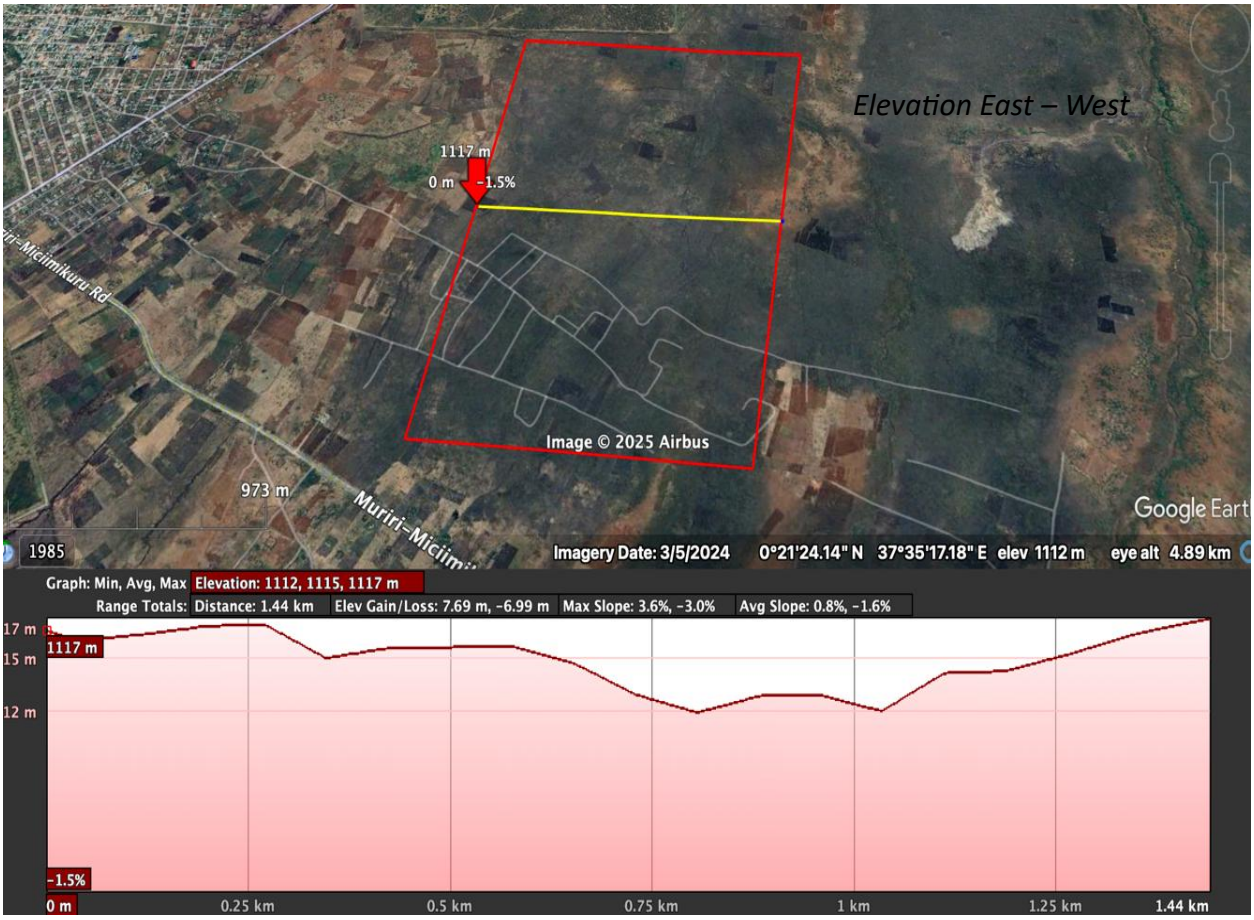
Fig 6. Location proposed for Isiolo 300MW Solar Farm



Prelim. Location Isiolo Solar farm, 320 hectares, Distance to Substation 12km,
Soil condition: suitable for simple ramming (assumption)
Distance to Port Mombasa 690 km, approx. 12hrs one way
Distance to New Port LAMU 530 km
Fig 7. Topography
Elevation North – South



Elevation North – South


Elevation East – West
1117 m
0 m
-1.5%
Muriri-Miciimikuru Rd
Image © 2025 Airbus
973 m
Google Earth
1985
Imagery Date: 3/5/2024
0°21'24.14" N 37°35'17.18" E elev 1112 m
eye alt 4.89 km
Graph: Min, Avg, Max Elevation: 1112, 1115, 1117 m
Range Totals: Distance: 1.44 km
Elev Gain/Loss: 7.69 m, -6.99 m
Max Slope: 3.6%, -3.0%
Avg Slope: 0.8%, -1.6%
17 m
15 m
12 m
1117 m
-1.5%
0 m
0.25 km
0.5 km
0.75 km
1 km
1.25 km
1.44 km


PSECC
PSEC

THE Best Strategy

Developing 600MW of solar farms within the LAPSSET Corridor presents a significant opportunity for sustainable energy generation and economic development. The best strategy would involve a multi-faceted approach, considering technical, economic, social, and environmental aspects.

1. Strategic Planning and Assessment:

- ***Detailed Resource Assessment:*** *Conduct thorough Feasibility study and solar resource assessments across the LAPSSET Corridor to identify the most suitable locations for solar farms based on irradiance, land availability, and grid connectivity potential.*
- ***Land Use Planning:*** *Integrate solar farm development into the broader land use planning framework of the corridor, considering potential conflicts with other infrastructure projects, agricultural land, and human settlements. Prioritize the use of degraded or less productive land where feasible.*
- ***Environmental and Social Impact Assessment (ESIA):*** *Undertake comprehensive ESIAs for each proposed solar farm location to identify and mitigate potential negative impacts on biodiversity, water resources, local communities, and cultural heritage. This should include consultations with all relevant stakeholders.*
- ***Grid Integration Study:*** *Conduct detailed studies to determine the optimal points of interconnection to the existing and planned electricity grid infrastructure within the LAPSSET Corridor. This includes assessing grid capacity, stability, and the need for upgrades or new transmission lines.*
- ***Phased Development:*** *Implement the 600MW target through a phased approach, starting with pilot projects or smaller-scale developments to gain experience, test technologies, and refine strategies before large-scale deployment.*

2. Technological Considerations:

- ***Technology Selection:*** *Evaluate different solar photovoltaic (PV) technologies (e.g., crystalline silicon, thin film) based on efficiency, cost-effectiveness, suitability for the local climate conditions, and long-term performance.*
- ***Energy Storage Integration:*** *Explore the integration of battery energy storage systems (BESS) to enhance grid stability, manage intermittency of solar power, and provide ancillary services. This is particularly important for ensuring a reliable power supply to the LAPSSET Corridor and beyond.*
- ***Smart Grid Technologies:*** *Incorporate smart grid technologies for efficient monitoring, control, and management of the solar farms and the overall electricity network. This can help optimize energy flow and reduce losses.*

3. Economic and Financial Strategies:

- ***Public-Private Partnerships (PPPs):*** *Leverage PPP models to attract private sector investment, expertise, and efficiency in the development, financing, construction, and operation of the solar farms. The LAPSSET Corridor Development Authority (LCDA) actively encourages PPPs.*
- ***Investment Incentives:*** *Implement supportive policies and incentives, such as tax breaks, feed-in tariffs, and streamlined permitting processes, to encourage investment in solar energy projects within the corridor.*
- ***Green Financing:*** *Explore access to green bonds, climate finance mechanisms, and other international funding sources dedicated to renewable energy projects.*
- ***Local Content Requirements:*** *Implement local content policies to promote the participation of local businesses and communities in the solar farm value chain, creating jobs and fostering economic inclusion. This could include local manufacturing of components, installation services, and operation and maintenance.*

4. Social and Community Engagement:

- ***Community Consultation and Participation:*** *Engage local communities throughout the project development process, from initial planning to operation. Address their concerns, ensure transparency, and seek their input to foster a sense of ownership and support.*
- ***Benefit Sharing Mechanisms:*** *Implement mechanisms to share the benefits of the solar farms with local communities, such as revenue sharing, land lease agreements with fair compensation, and investment in local development projects (e.g., schools, healthcare facilities).*
- ***Job Creation and Skills Development:*** *Prioritize local job creation during the construction and operation phases of the solar farms. Invest in training and skills development programs to equip local people with the necessary expertise for the renewable energy sector.*

5. Environmental Sustainability:

- ***Minimizing Land Footprint:*** *Optimize the design and layout of solar farms to minimize land use and potential impacts on ecosystems. Explore innovative approaches such as agrivoltaics (integrating solar panels with agriculture) where appropriate.*
- ***Water Management:*** *Implement efficient water management practices for cleaning solar panels and other operational needs, especially in the arid and semi-arid regions of the LAPSSET Corridor. Consider water-saving technologies.*
- ***Waste Management and Recycling:*** *Develop strategies for the proper management and recycling of solar panel waste at the end of their lifecycle.*

- ***Biodiversity Conservation:*** *Implement measures to mitigate potential impacts on local biodiversity, such as habitat restoration, wildlife corridors, and careful site selection to avoid sensitive ecological areas.*

6. Infrastructure Development and Integration:

- ***Coordinated Infrastructure Planning:*** *Ensure that the development of solar farms is well-coordinated with other infrastructure projects within the LAPSSET Corridor, such as roads, railways, ports, and other energy infrastructure (e.g., transmission lines for other energy sources).*
- ***Power Transmission Infrastructure:*** *Invest in the development of robust and reliable power transmission infrastructure to evacuate the generated solar power to demand centers within the corridor and potentially to the national grid.*
- ***Access Roads and Logistics:*** *Plan for the necessary access roads and logistical infrastructure to facilitate the transportation of equipment and materials during the construction and operation phases.*

7. Policy and Regulatory Framework:

- ***Clear Regulatory Framework:*** *Establish a clear and supportive regulatory framework specifically for renewable energy development within the LAPSSET Corridor, addressing issues such as permitting, land acquisition, grid connection standards, and power purchase agreements.*
- ***Long-Term Energy Policy:*** *Align the solar farm development with the long-term energy policy and goals of Kenya and the participating countries in the LAPSSET initiative.*
- ***Inter-Governmental Coordination:*** *Foster strong coordination and collaboration among the governments of Kenya, Ethiopia, and South Sudan to ensure the smooth implementation of cross-border energy projects.*

By implementing these strategies in a comprehensive and integrated manner, the development of 600MW of solar farms in the LAPSSET Corridor can contribute significantly to the region's energy security, economic growth, and sustainable development goals. It is crucial to prioritize sustainability, community involvement, and long-term planning to maximize the benefits and mitigate potential risks.

OKR'S AND KPI'S

The **LAPSSET Corridor Energy Programme** includes ambitious renewable energy projects, such as **two 300MW solar farms (Lamu and Isiolo) and a 600MW project**, as part of its **Early-Stage Strategy**. To ensure effective execution, **Objectives and Key Results (OKRs)** and **Key Performance Indicators (KPIs)** would be established to track progress, feasibility, and strategic alignment.

Since **land has been secured and funding is already in place** for the **600MW solar farms (300MW Lamu + 300MW Isiolo)** under the **LAPSSET Corridor Energy Programme**, the **OKRs and KPIs** for the **Early Stage Strategy** would shift from feasibility/financing to **execution readiness, construction milestones, and stakeholder alignment**.

Updated OKRs (Objectives & Key Results) for Early Stage Strategy

Objective 1: Accelerate Project Development & Construction Readiness

- **KR1:** Finalize engineering, procurement, and construction (EPC) contracts by [Q3 2025].
- **KR2:** Achieve 100% land clearance and geotechnical surveys by [Q4 2025].
- **KR3:** Secure all remaining permits (environmental, county govt, NEMA) by [Q4 2025].

Objective 2: Ensure Seamless Grid Integration & Transmission

- **KR1:** Sign Power Purchase Agreement (PPA) with KPLC (Kenya Power) by [Q1 2026].
- **KR2:** Confirm grid interconnection design with KETRACO by [Q2 2026].
- **KR3:** Complete 30% of transmission infrastructure grid connection and (substations, lines) by [Q3 2026].

Objective 3: Optimize Financial & Risk Management

- **KR1:** Ensure 100% disbursement of committed funds aligned with milestones.
- **KR2:** Establish a risk mitigation plan for supply chain delays (e.g., solar panel imports).

- **KR3:** Lock in 70% of supply contracts (solar panels, inverters) by [Q3 2025].

Objective 4: Maximize Local Impact & Sustainability

- **KR1:** Train & employ 1,000+ local workers (50% from Lamu/Isiolo) by construction start.
- **KR2:** Achieve 40% women participation in workforce (vs. Kenya's 30% energy sector avg).
- **KR3:** Offset 600,000+ tons CO_2/year (aligned with Kenya's NDCs).

KPIs (Key Performance Indicators) for Execution Phase

Project Development & Construction

KPI 1: % completion of EPC contractor selection and appointment (Target: 100% by Q2 2025).

KPI 2: Weeks ahead/behind schedule on land prep (Target: 0 delays).

KPI 3: Number of critical permits pending (Target: 0 by Q3 2025).

Grid & Energy Offtake

KPI 4: PPA execution status (Target: Signed by Q3 2026).

KPI 5: MW of grid capacity confirmed (Target: 600MW firm commitment).

KPI 6: % transmission infrastructure completed (Target: 100% by Q4 2026).

Financial & Supply Chain

💰 **KPI 7:** % of committed funds released (Target: 100% on schedule).

💰 **KPI 8:** % of key equipment (solar panels, inverters) procured (Target: 70% by Q4 2025).

Social & Environmental Impact

KPI 9: Number of local jobs created (Target: 1,000+ by construction start).

KPI 10: Gender diversity in workforce (Target: 40% women).

KPI 11: Carbon reduction (Target: 600,000+ tons CO_2/year).

Critical Risks & Mitigation Strategies

1. **Delays in EPC Contractor Mobilization** → Pre-qualify 3+ tier-1 contractors.
2. **Grid Connection Bottlenecks** → Partner early with KETRACO/KPLC.
3. **No Supply Chain Disruptions** → Diversify solar panel suppliers (China).
4. **Community Resistance** → Ongoing CSR programs (health, education, local hiring).

With **land and funding secured**, the focus shifts to **execution KPIs**: EPC contracts, PPAs, local hiring, and carbon impact. The **Early Stage Strategy** now hinges on **timely construction kick-off** and **grid integration**.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POWER PURCHASE AGREEMENT (PPA) TERM SHEET

Project: 600MWp Solar PV Plants (Lamu + Isiolo) – LAPSSET Corridor

Parties:

- **Seller:** [Project SPV Name]
- **Buyer:** Kenya Power (KPLC)
- **Guarantor:** Ministry of Energy & Petroleum (GoK)

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1. Commercial Terms

Term	Detail
Capacity	600MWp (300MWp Lamu + 300MWp Isiolo)
Contract Duration	25 years (from **Commercial Operation Date, COD: Sept 2026**)
Tariff	**Fixed USD 0.05/kWh** (no escalation; adjusted only for *Change in Law*)
Offtake	KPLC to purchase **100% of generation** (take-or-pay)
COD Deadline	**Sept 2026** (delay penalties: USD 500/day/MW after 90-day grace period)

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2. Technical Terms

Term	Detail
Grid Connection	KETRACO to build 220kV substations by **Q2 2026** (Seller covers last-mile costs)
Metering	Bi-directional meters (KPLC remote monitoring)
Performance	≥97% availability (penalties below 90%)

3. Financial & Security Terms

Term	Detail
Payment Terms	Monthly payments in **USD (100%)**, net 45 days
Bank Guarantees	- **Performance Bond**: 10% of CAPEX - **Debt Service Reserve**: 6 months
Termination	KPLC pays **150% of outstanding debt + 2 years lost revenue** if political termination

4. Risk Allocation

Term	Detail
Force Majeure	12-month suspension allowed (no penalties)
Change in Law	Tariff adjustment for new taxes/regulations
Currency Risk	USD-pegged tariff (no KES fluctuation risk)

5. Conditions Precedent (CPs)

1. **Permits**: NEMA, ERC, and county approvals by **Q1 2026**.
2. **Grid Readiness**: KETRACO to confirm substation completion by **Q2 2026**.
3. **Financial Close**: Full funding evidenced by **Q4 2025**.

6. Unique LAPSSET Provisions

- **Lamu Port Priority**: 20% of output reserved for Lamu industrial zone (dedicated offtake).
- **Ethiopia Export Option**: Right to wheel excess power via LAPSSET transmission line (subject to Ethiopia-Kenya bilateral agreement).
- **Sovereign Guarantee**: GoK to backstop KPLC payments if credit rating falls below 'B'.

Annexes

1. **Technical Specifications** (LAPSSET-compliant grid code).
2. **Tariff Model** (ERC-approved USD 0.05/kWh justification).
3. **Security Templates** (Performance bond format).

Critical Notes

- **USD 0.05/kWh Challenge**: Kenya's current solar tariffs range USD 0.07–0.12/kWh. Justify this discount via:

  CAPEX savings (LAPSSET infrastructure synergy).

  GoK incentives (tax holidays, land subsidies).
- **Accelerated Timeline**: Sept 2026 COD requires:

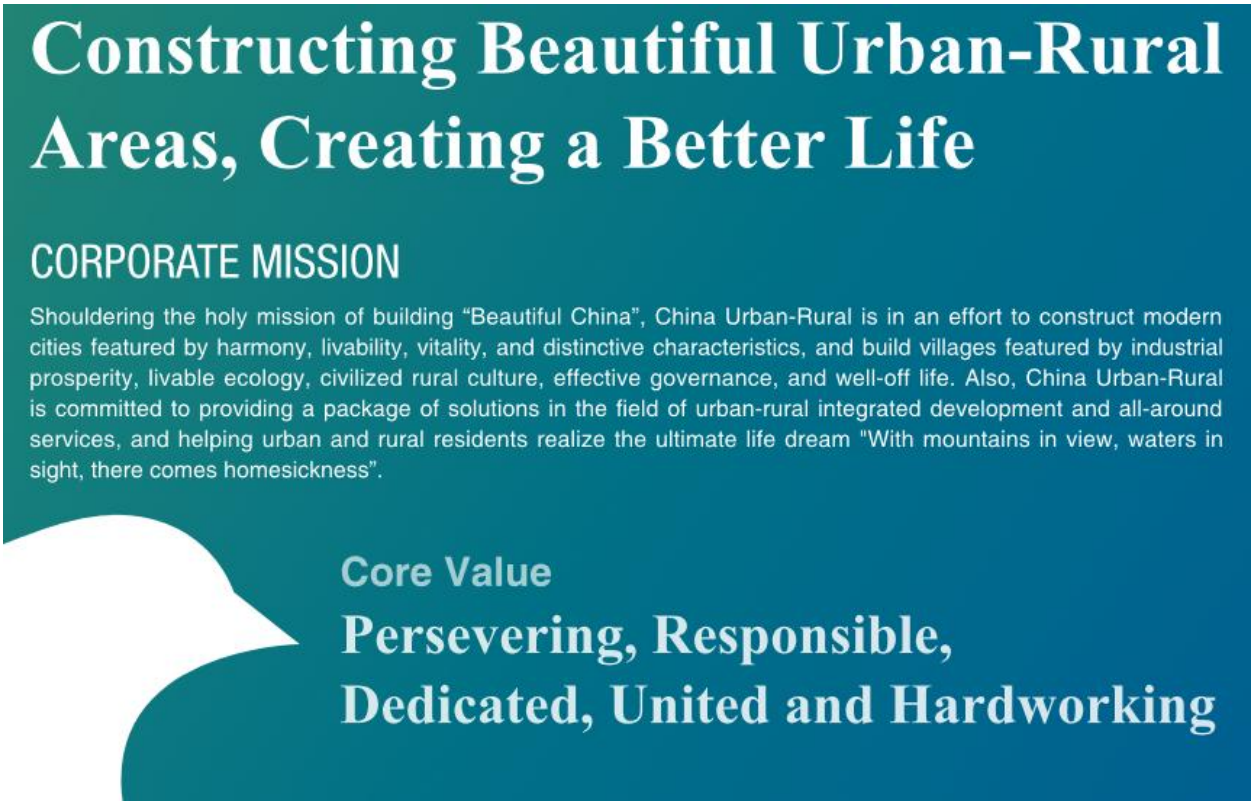
  EPC contract signed by **Dec 2025**.

  Modular construction (phase COD allowed).

EPC & CONSTRUCTION PROCESS

CHINA URBAN-RURAL HOLDINGS GROUP CO.,LTD.

This company we propose to do the Engineering, Procurement & Construction of each of the 300MW Solar Farms (parent company is CCCCC). This company was already involved with LAPSSET Corridor and the building and funding of LAMU Port and give good continuity going forward. With our offices in Nairobi and 2,200 staff globally, we can gain immense support for LAPSSET Corridor Energy, Waste and Water projects. This EPC company has the ability to install 3MW per day so for a 300MW solar farm it could be possible to do this in 100 days, our realistic time period in 200 to 300 days.


Constructing Beautiful Urban-Rural Areas, Creating a Better Life
CORPORATE MISSION
Shouldering the holy mission of building "Beautiful China", China Urban-Rural is in an effort to construct modern cities featured by harmony, livability, vitality, and distinctive characteristics, and build villages featured by industrial prosperity, livable ecology, civilized rural culture, effective governance, and well-off life. Also, China Urban-Rural is committed to providing a package of solutions in the field of urban-rural integrated development and all-around services, and helping urban and rural residents realize the ultimate life dream "With mountains in view, waters in sight, there comes homesickness".
Core Value
Persevering, Responsible, Dedicated, United and Hardworking


Development Goal of China Urban-Rural
Develop into the world first-class
"Urban-rural integration developer" and
"Urban-rural operation service provider"
with global competitiveness.


M & A
In view of local entry difficulty and strong professionalism in related industries like water, energy, and ecological environment, China Urban-Rural takes advantage of M & A to break industry barriers, quickly build its domestic leading position, and lay a sound development foundation.
Cultivation
Focusing on ecological forestry, ecological agriculture, and ecological park and ancillary industries, China Urban-Rural makes full use of social resources to cultivate urban-rural industry development sector and cultivate new business growth point.
Integration
China Urban-Rural cooperates with related downstream and upstream enterprises in investment, development, and operation to quickly make inroads into EPC, investment, and operation business in the field of urban-rural water, urban-rural energy, and urban-rural ecological environment. That turns simple "Value Chain" operation into all-dimensional "Value Network" operation, realizes mutual infiltration, mutual extension, and mutual cooperation between enterprises, and achieves "Win-win through competition and cooperation".
Innovation
China Urban-Rural strengthens its cooperation with universities, colleges and scientific research institutes to jointly tackle problems in key technologies and make innovations in commercial cooperation mechanism for product commercialization. Also, China Urban-Rural actively capitalizes on the capital market, strengthens the financial cooperation with funds, investment banks, and social capital, as well as makes synergic innovations in equity M & A, investment & financing, and asset management program, etc., in order to develop new products, new business patterns, and new fields for urban-rural integrated development.

URBAN-RURAL ENERGY

A core business sector of China Urban-Rural

In addition to bringing into play CCCC Group's comparative advantages in the field of infrastructure construction, China Urban-Rural, as an extension of the industry chain, is devoted to more efficient, more intelligent, and cleaner energy utilization while undertaking businesses like comprehensive utilization of natural gas (urban gas), LNG trade and logistics warehousing construction, heat supply and new energy utilization, and involvement in construction of National Energy Exchange.

Domestic leading urban-rural energy operation service provider

Three core business sectors

Urban gas and heat supply

Investment and operation of LNG terminal and receiving station

Multi-energy complementary, intelligent IoT and other integrated energy businesses

Urban gas and heat supply

Seize favorable opportunities arising from the industry integration, quickly make inroads into the market through M & A, and lay the business foundation.

Investment and operation of LNG terminal and receiving station

Seize development opportunities in international LNG market, strongly deploy construction of LNG wharf and receiving station, push ahead with international LNG business, and provide resource support from downstream terminals.

Multi-energy complementary, intelligent IoT and other integrated energy businesses

Take root in natural gas distributed energy and adopt multi-energy complementation and intelligent IoT to define integrated energy development as the company's future core competitiveness.

The offering EPC can also get access to the other technologies beyond Solar. This can be Wind, Hydrogen, Waste processing, pumping for irrigation and the infrastructure work.

URBAN-RURAL ECOLOGICAL ENVIRONMENT

A core business sector of China Urban-Rural

China Urban-Rural is committed to becoming the developer, operator, and service provider for ecological civilization. By virtue of its excellent technical strength and profound humanistic background, China Urban-Rural will provide customers with planning, investment, construction and operation services in the field of ecological environmental protection (including comprehensive ecological environment management, landscaping, solid waste treatment and recycling, soil remediation, and air pollution prevention & control).

Domestic leading urban-rural ecological environment business developer

URBAN-RURAL INTEGRATED DEVELOPMENT

An important business sector of China Urban-Rural

China Urban-Rural is committed to making city more livable and bettering the life, and it adopts a variety of models like EOD to elaborately develop products like new industrial city, transformation of old city, and rural complex, etc.

Cultivate integrated development business with characteristics of China Urban-Rural

URBAN AND RURAL EXPERT TEAM

URBAN CITY INTEGRATES THE WORLD
AND RURAL COUNTRY UNITES THE FAMILIES

Meng Zhaozhen

Academician, Chinese Academy of Engineering

Deputy Director of Landscape Architecture Experts Committee of the Ministry of Construction

Honorary Chairman of Chinese Society of Landscape Architecture

Leader of Landscaping Advisory Board of Beijing Municipal People's Government

Professor and Doctoral Supervisor of Beijing Forestry University

Honorary Chairman of Beijing Institute of Landscape Architecture

Yin Weilun

Member of the National Committee of the CPPCC

Academician, Chinese Academy of Engineering

Director of the Division of Agricultrual Sciences, Chinese Academy of Engineering

Vice Chairman and Legal Person of Chinese Society of Forestry

Member of the Standing Committee of Botanical Society of China

Vice Chairman of Beijing Association for Science and Technology

Zhang Jie

Academician, Chinese Academy of Engineering

Professor-level Senior Engineer

Doctoral Supervisor

Member of National Steering Committee for Water Supply and Drainage Engineering Discipline of Universities and Colleges

Famous Expert of the Ministry of Construction of the P. R. C.

Parent company: China Communications Construction Company, Ltd. (CCCC) & (CCCG)

China Communications Construction Company, Ltd. (CCCC) is a Chinese majority state-owned, publicly traded, multinational engineering and construction company primarily engaged in the design, construction, and operation of infrastructure assets, including highways, skyways, bridges, tunnels, railways (especially high-speed rail), subways, airports, oil platforms, and marine ports. CCCC has been a contractor for numerous ***Belt and Road Initiative projects.*** *The largest Infrastructure company in China and the Worlds largest company in Roads, Ports, Real estate, Energy with strong business networks and excellent expertise.*

Sample Projects

Mombasa-Nairobi Standard Gauge Railway

At 11: 00 local time on May 31, 2017, the first passenger train of Mombasa-Nairobi Standard Gauge Railway (SGR), which was built by China Road and Bridge, a subsidiary of CCCG started, marking the official completion and opening of the SGR.

Our Goals

CCCC will significantly reduce carbon emission in key areas, make significant breakthroughs in green and low-carbon technologies, significantly increase the scale of green and low-carbon industries, and reach peak carbon emissions in infrastructure construction by 2030 and in equipment manufacturing by 2028.

CCCC has participated in the construction of more than half of the offshore wind farms in China and over sixty offshore wind farms overseas.

Strengthen environmental education and enhance environmental awareness

Promote research and development of green and low-carbon construction technologies

Promote energy-efficient and high-efficiency techniques and equipment in construction

Reduce construction waste emissions

Actively develop emerging industries that are green and low-carbon, and encourage the use of clean energy sources such as solar and natural gas

Strengthen research, development and applications of low-carbon technologies, carbon capture and other technologies

Classify construction waste recycle and reuse waste building materials.

In order to plan the different solar projects early and to position the EPC, we will provide the following:

1. Main components to be used with data sheets for solar panel bi-facial, tracked mounting system, inverters .

2. Implementation schedule

3. Preliminary Ball park pricing for turnkey ***without*** *grid connection, substation, … .*

4. Updated reference list

5. Short description of China Urban-Rural Holding Group Co., Ltd.

In order to reduce time and effort it is of course possible to use a blueprint of projects already offered.

Next steps:

The above information will be aggregated, the consortium and the funders will be informed.
Award of offers will be based on a blend of the least cost option, components, warranties for components and services, collateral and implementation schedule. Whereas the benchmark pricing is currently around 410.000 $ / MWp.

Detailed breakdown of the typical stages:

1. Project Development and Planning:

- ***Site Identification and Assessment:*** *This involves identifying suitable land, considering factors like solar irradiance, land availability and topography, grid accessibility, environmental and social impact, and land ownership.*
- ***Feasibility Studies:*** *Technical, economic, and environmental feasibility studies are conducted to assess the viability of the project. This includes energy yield estimations, cost analysis, and preliminary environmental and social impact assessments (ESIAs).*
- ***Permitting and Approvals:*** *Obtaining necessary permits and approvals from local authorities and regulatory bodies is crucial. This includes land use permits, environmental licenses, grid interconnection agreements with Kenya Power (the national electricity utility), and approvals from the Energy and Petroleum Regulatory Authority (EPRA).*
- ***Financing and Funding:*** *Securing financing for the project is a critical step. This may involve a combination of equity investment, loans from local and international financial institutions, grants, and other funding mechanisms. Kenya has seen increasing interest from development finance institutions in renewable energy projects.*

2. Engineering, Procurement, and Construction (EPC):

- ***Design and Engineering:*** *Detailed engineering designs are developed, including the layout of solar panels, mounting structures, inverters, transformers, substations, and transmission lines. Electrical and civil engineering aspects are finalized. Specific technical design aspects include:*

  Solar Panel Placement: *Optimizing panel orientation and tilt to maximize sunlight capture.*

  Inverter Selection: *Choosing the appropriate type and capacity of inverters to convert DC to AC power.*

  Mounting Structure Design: *Ensuring stability against wind loads and other site-specific conditions like potential flooding.*

  Electrical Design: *Planning the wiring, switchgear, and transformers for efficient power transmission.*

  Grid Interconnection Design: *Meeting local grid connection requirements and regulations.*

  Monitoring Systems: *Implementing systems to track performance and identify issues.*

Security and Safety Features: *Designing for site security and worker safety during installation and maintenance.*

Environmental Considerations: *Incorporating measures for stormwater management, erosion control, and native vegetation landscaping.*

Grounding and Lightning Protection: *Protecting equipment from electrical storms.*

O&M Access: *Designing access roads for maintenance.*

- ***Procurement:*** *This involves selecting and procuring all necessary equipment and materials, including solar panels, inverters, cables, mounting structures, and other components.*
- ***Construction:*** *This is the main physical building phase, which typically includes:*

  Site Preparation: *Clearing and grading the land, creating access roads, and preparing foundations.*

  Mounting Structure Installation: *Installing the frames or trackers that will support the solar panels. Different types of mounts are used, including fixed-tilt and tracking systems.*

  Solar Panel Installation: *Mounting and securing the solar panels onto the structures.*

  Electrical Wiring: *Connecting the solar panels to each other and to the inverters using appropriate cables and connectors.*

  Inverter and Transformer Installation: *Installing the inverters to convert DC to AC power and transformers to step up the voltage for grid injection. Inverters are typically placed in cool, shaded areas for optimal performance.*

  Substation Construction: *Building the necessary substation infrastructure for connecting to the national grid. This includes switchgear, transformers, and control systems.*

  Transmission Line Construction: *Building or upgrading transmission lines to transport the generated electricity to the grid.*

  Installation of Monitoring and Control Systems: *Setting up systems to monitor the performance of the solar farm and control its operations.*

  Security Infrastructure: *Installing fencing, surveillance systems, and other security measures.*

Commissioning and Testing:

- ***Testing and Commissioning:*** *Once construction is complete, rigorous testing and commissioning are carried out to ensure all components are functioning correctly and safely. This includes checking electrical connections, system performance, and grid synchronization.*

4. Operation and Maintenance (O&M):

- ***Operation:*** *Managing the day-to-day operations of the solar farm to ensure optimal energy generation.*
- ***Maintenance:*** *Regular maintenance is essential to ensure the long-term performance and reliability of the solar farm. This includes cleaning solar panels, inspecting and maintaining equipment, vegetation control, and addressing any faults or issues that arise.*

Specific Considerations for Kenya:

- ***Regulatory Landscape:*** *Navigating the specific regulations and permitting processes in Kenya is crucial. EPRA plays a key role in licensing and regulating the energy sector.*
- ***Environmental and Social Impact Assessments (ESIAs):*** *These are critical in Kenya to ensure projects are environmentally and socially sustainable, considering local communities and biodiversity.*
- ***Grid Infrastructure:*** *The capacity and stability of the existing grid infrastructure in the project location are important factors for successful grid interconnection.*
- ***Local Content:*** *There may be requirements or incentives to utilize local labor and materials in the construction process.*
- ***Security:*** *Ensuring the security of the solar farm infrastructure is important in some regions.*

Kenya has been actively promoting renewable energy development, including solar, to diversify its energy mix and achieve its clean energy goals. Several solar farms have been successfully developed and are operational in the country, contributing to its growing renewable energy capacity.

FINANCIALS

Table. 1. LAMU Port

Financing Lamu Port 300MW Lapsset Corridor Kenya, tracked, bi-facial, backtracking

Capex	145,500,000	485	$/kWp	300,000	EPC Cost	410	123,000,000
Insurance fee	0	0.0%	of debt		Connection	55	16,500,000
Financing fee	0	0.0%	of debt		Reserves	20	6,000,000
Total contract value	145,500,000				Total	485	145,500,000
Equity of contract value	21,825,000	20%					
Debt of contract value	123,675,000	80%					
Interest rate	5.0%						
Repayments per year	2						
Contract period in full years	15		Escalator / year	Inflation	Irradiation		
PPA incentive	0.050	$/kWh	0.00%	4.00%	2,190		

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Turnover feed in	32,762,517	32,631,707	32,501,419	32,371,652	32,242,402	32,113,669	31,985,449	31,857,742	31,730,544	31,603,854	31,477,670	31,351,990	31,226,812	31,102,134	30,977,953	30,854,268	30,731,077	30,608,378	30,486,168	30,364,447
Insurance cost	1,455,000	1,513,200	1,573,728	1,636,677	1,702,144	1,770,230	1,841,039	1,914,681	1,991,268	2,070,919	2,153,755	2,239,906	2,329,502	2,422,682	2,519,589	2,620,373	2,725,188	2,834,195	2,947,563	3,065,466
Maintenance	2,763,000	2,873,520	2,988,461	3,107,999	3,232,319	3,361,612	3,496,076	3,635,920	3,781,356	3,932,611	4,089,915	4,253,512	4,423,652	4,600,598	4,784,622	4,976,007	5,175,047	5,382,049	5,597,331	5,821,224
Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lease	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Opex	2,763,000	2,873,520	2,988,461	3,107,999	3,232,319	3,361,612	3,496,076	3,635,920	3,781,356	3,932,611	4,089,915	4,253,512	4,423,652	4,600,598	4,784,622	4,976,007	5,175,047	5,382,049	5,597,331	5,821,224
EBITDA	28,544,517	28,244,987	27,939,230	27,626,975	27,307,939	26,981,827	26,648,334	26,307,141	25,957,920	25,600,325	25,234,000	24,858,573	24,473,658	24,078,853	23,673,742	23,257,888	22,830,842	22,392,133	21,941,274	21,477,757
- Amortization	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	0	0	0	0	0
EBIT	18,844,517	18,544,987	18,239,230	17,926,975	17,607,939	17,281,827	16,948,334	16,607,141	16,257,920	15,900,325	15,534,000	15,158,573	14,773,658	14,378,853	13,973,742	23,257,888	22,830,842	22,392,133	21,941,274	21,477,757
- Interest amount	3,091,875	5,970,713	5,674,704	5,363,710	5,036,971	4,693,692	4,333,034	3,954,118	3,556,019	3,137,766	2,698,339	2,236,667	1,751,622	1,242,022	706,623	144,120	0	0	0	0
EBT	15,752,642	12,574,274	12,564,527	12,563,266	12,570,967	12,588,135	12,615,300	12,653,024	12,701,901	12,762,559	12,835,661	12,921,906	13,022,036	13,136,832	13,267,119	23,113,769	22,830,842	22,392,133	21,941,274	21,477,757
P/L before tax	15,752,642	12,574,274	12,564,527	12,563,266	12,570,967	12,588,135	12,615,300	12,653,024	12,701,901	12,762,559	12,835,661	12,921,906	13,022,036	13,136,832	13,267,119	23,113,769	22,830,842	22,392,133	21,941,274	21,477,757
Corporate tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Profit / Loss	15,752,642	12,574,274	12,564,527	12,563,266	12,570,967	12,588,135	12,615,300	12,653,024	12,701,901	12,762,559	12,835,661	12,921,906	13,022,036	13,136,832	13,267,119	23,113,769	22,830,842	22,392,133	21,941,274	21,477,757
Accumulated P/L	15,752,642	28,326,916	40,891,443	53,454,709	66,025,676	78,613,811	91,229,111	103,882,135	116,584,036	129,346,595	142,182,256	155,104,162	168,126,198	181,263,030	194,530,149	217,643,918	240,474,760	262,866,893	284,808,167	306,285,925
Cash Flow																				
Profit Loss	15,752,642	12,574,274	12,564,527	12,563,266	12,570,967	12,588,135	12,615,300	12,653,024	12,701,901	12,762,559	12,835,661	12,921,906	13,022,036	13,136,832	13,267,119	23,113,769	22,830,842	22,392,133	21,941,274	21,477,757
+ Amortization	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	9,700,000	0	0	0	0	0
Available Cash Flow	25,452,642	22,274,274	22,264,527	22,263,266	22,270,967	22,288,135	22,315,300	22,353,024	22,401,901	22,462,559	22,535,661	22,621,906	22,722,036	22,836,832	22,967,119	23,113,769	22,830,842	22,392,133	21,941,274	21,477,757
- Repayment	2,817,025	5,847,087	6,143,096	6,454,090	6,780,828	7,124,108	7,484,766	7,863,682	8,261,781	8,680,033	9,119,460	9,581,133	10,066,178	10,575,778	11,111,177	5,764,780	0	0	0	0
Free Cash flow	22,635,617	16,427,187	16,121,431	15,809,176	15,490,139	15,164,027	14,830,534	14,489,342	14,140,120	13,782,526	13,416,201	13,040,774	12,655,859	12,261,054	11,855,942	17,348,989	22,830,842	22,392,133	21,941,274	21,477,757
Free Cash flow account	22,635,617	39,062,805	55,184,236	70,993,411	86,483,551	101,647,578	116,478,112	130,967,454	145,107,574	158,890,100	172,306,301	185,347,074	198,002,933	210,263,987	222,119,929	239,468,918	262,299,760	284,691,893	306,633,167	328,110,925
Debt Services																				
Credit sum	123,675,000	120,857,975	115,010,888	108,867,793	102,413,703	95,632,874	88,508,767	81,024,001	73,160,319	64,898,539	56,218,505	47,099,045	37,517,912	27,451,735	16,875,957	5,764,780	0	0	0	0
-Repayment	2,817,025	5,847,087	6,143,096	6,454,090	6,780,828	7,124,108	7,484,766	7,863,682	8,261,781	8,680,033	9,119,460	9,581,133	10,066,178	10,575,778	11,111,177	5,764,780	0	0	0	0
Residual debt	120,857,975	115,010,888	108,867,793	102,413,703	95,632,874	88,508,767	81,024,001	73,160,319	64,898,539	56,218,505	47,099,045	37,517,912	27,451,735	16,875,957	5,764,780	0	0	0	0	0

IRR on total investment	17.83%	Above figures are a rough estimation and subject to a review of the audited financials of the buyer of the last (3) three years. Subject to approval and internal credit approval. Therefore, not binding.
IRR on equity	87.69%	All terms and conditions are provided as mere indication without any obligation on our part.

WE HAVE ADOPTED A STANDARED METHOS FOR PROJECT FIUNDING OF EQUITE 20% : DEBT 80%

AFRI-FUND CAPITAL WILL HAVE THEIR OWN RATIO FOR FUNDNG AND ADJUSTMNENTS THEN WILL HAVE TO BE MADE TO EACH FINANCIAL SPREADSHEET FOR EACH PROJECT TO REFELCE THE CHANGES.

THE FREE CASH FLOW LINE IS THE OPERATIONAL PROFIT EACH YEAR AFTER ALL COSTS AND LOAN REPAYMENTS ARE TAKEN OUT.

YEAR ONE FREE CASH FLOW IS USD 22.635 MILLION

GOK RECEIVE USD 6.79 MILLION IN YEAR ONE

ACCUMULATIVE PROFIT BY YEAR TWENTY IS USD 328 MILLION

GOK RECEIVE USD 98.4 MILLION

TABLE 2. ISIOLO

Financing Isiolo 300MW Lapsset Corridor Kenya, tracked, bi-facial, backtracking

Capex	148,500,000	495	$/kWp	300,000	EPC Cost	420	126,000,000												
Insurance fee	0	0.0%	of debt		Connection	55	16,500,000												
Financing fee	0	0.0%	of debt		Reserves	20	6,000,000												
Total contract value	148,500,000				Total	495	148,500,000												
Equity of contract value	22,275,000	20%																	
Debt of contract value	126,225,000	80%																	
Interest rate	5.0%																		
Repayments per year	2				Irradiation														
Contract period in full years	15		Escalator / year	Inflation	2,259														
PPA incentive	0.050	$/kWh	0.00%	4.00%															
Year	**1**	**2**	**3**	**4**	2028	2029	2030	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
	2024	2025	2026	2027	33,258,259	33,125,469	32,993,210	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Turnover feed in	33,794,761	33,659,829	33,525,436	33,391,580	1,737,240	1,806,730	1,878,999	32,861,479	32,730,274	32,599,592	32,469,433	32,339,793	32,210,670	32,082,064	31,953,971	31,826,389	31,699,316	31,572,751	31,446,691	31,321,135
Insurance cost	1,485,000	1,544,400	1,606,176	1,670,423	3,232,319	3,361,612	3,496,076	1,954,159	2,032,325	2,113,618	2,198,163	2,286,089	2,377,533	2,472,634	2,571,540	2,674,401	2,781,377	2,892,632	3,008,338	3,128,671
Maintenance	2,763,000	2,873,520	2,988,461	3,107,999	0	0	0	3,635,920	3,781,356	3,932,611	4,089,915	4,253,512	4,423,652	4,600,598	4,784,622	4,976,007	5,175,047	5,382,049	5,597,331	5,821,224
Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lease	0	0	0	0	3,232,319	3,361,612	3,496,076	0	0	0	0	0	0	0	0	0	0	0	0	0
Opex	2,763,000	2,873,520	2,988,461	3,107,999	28,288,699	27,957,128	27,618,135	3,635,920	3,781,356	3,932,611	4,089,915	4,253,512	4,423,652	4,600,598	4,784,622	4,976,007	5,175,047	5,382,049	5,597,331	5,821,224
EBITDA	29,546,761	29,241,909	28,930,800	28,613,158	9,900,000	9,900,000	9,900,000	27,271,401	26,916,592	26,553,364	26,181,355	25,800,192	25,409,486	25,008,831	24,597,809	24,175,981	23,742,892	23,298,070	22,841,023	22,371,240
- Amortization	9,900,000	9,900,000	9,900,000	9,900,000	18,388,699	18,057,128	17,718,135	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	0	0	0	0	0
EBIT	19,646,761	19,341,909	19,030,800	18,713,158	5,140,826	4,790,469	4,422,375	17,371,401	17,016,592	16,653,364	16,281,355	15,900,192	15,509,486	15,108,831	14,697,809	24,175,981	23,742,892	23,298,070	22,841,023	22,371,240
- Interest amount	3,155,625	6,093,820	5,791,708	5,474,301	13,247,873	13,266,659	13,295,760	4,035,646	3,629,339	3,202,462	2,753,975	2,282,784	1,787,738	1,267,630	721,192	147,091	0	0	0	0
EBT	16,491,136	13,248,089	13,239,092	13,238,857	13,247,873	13,266,659	13,295,760	13,335,755	13,387,254	13,450,901	13,527,380	13,617,408	13,721,748	13,841,201	13,976,617	24,028,890	23,742,892	23,298,070	22,841,023	22,371,240
P/L before tax	16,491,136	13,248,089	13,239,092	13,238,857	0	0	0	13,335,755	13,387,254	13,450,901	13,527,380	13,617,408	13,721,748	13,841,201	13,976,617	24,028,890	23,742,892	23,298,070	22,841,023	22,371,240
Corporate tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other taxes	0	0	0	0	13,247,873	13,266,659	13,295,760	0	0	0	0	0	0	0	0	0	0	0	0	0
Profit / Loss	16,491,136	13,248,089	13,239,092	13,238,857	69,465,046	82,731,705	96,027,465	13,335,755	13,387,254	13,450,901	13,527,380	13,617,408	13,721,748	13,841,201	13,976,617	24,028,890	23,742,892	23,298,070	22,841,023	22,371,240
Accumulated P/L	16,491,136	29,739,225	42,978,317	56,217,173				109,363,220	122,750,473	136,201,375	149,728,754	163,346,163	177,067,911	190,909,112	204,885,729	228,914,618	252,657,510	275,955,580	298,796,603	321,167,843
Cash Flow					13,247,873	13,266,659	13,295,760													
Profit Loss	16,491,136	13,248,089	13,239,092	13,238,857	9,900,000	9,900,000	9,900,000	13,335,755	13,387,254	13,450,901	13,527,380	13,617,408	13,721,748	13,841,201	13,976,617	24,028,890	23,742,892	23,298,070	22,841,023	22,371,240
+ Amortization	9,900,000	9,900,000	9,900,000	9,900,000	23,147,873	23,166,659	23,195,760	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	9,900,000	0	0	0	0	0
Available Cash Flow	26,391,136	23,148,089	23,139,092	23,138,857	6,920,639	7,270,996	7,639,091	23,235,755	23,287,254	23,350,901	23,427,380	23,517,408	23,621,748	23,741,201	23,876,617	24,028,890	23,742,892	23,298,070	22,841,023	22,371,240
- Repayment	2,875,108	5,967,645	6,269,757	6,587,164	16,227,234	15,895,662	15,556,669	8,025,820	8,432,127	8,859,003	9,307,490	9,778,682	10,273,728	10,793,835	11,340,273	5,883,642	0	0	0	0
Free Cash flow	23,516,028	17,180,444	16,869,334	16,551,693	90,344,733	106,240,395	121,797,064	15,209,935	14,855,127	14,491,898	14,119,890	13,738,727	13,348,020	12,947,366	12,536,344	18,145,248	23,742,892	23,298,070	22,841,023	22,371,240
Free Cash flow account	23,516,028	40,696,472	57,565,806	74,117,499				137,006,999	151,862,126	166,354,024	180,473,914	194,212,640	207,560,661	220,508,027	233,044,370	251,189,618	274,932,510	298,230,580	321,071,603	343,442,843
Debt Services					104,525,325	97,604,686	90,333,690													
Credit sum	126,225,000	123,349,892	117,382,247	111,112,489	6,920,639	7,270,996	7,639,091	82,694,599	74,668,780	66,236,653	57,377,650	48,070,159	38,291,478	28,017,750	17,223,915	5,883,642	0	0	0	0
-Repayment	2,875,108	5,967,645	6,269,757	6,587,164	97,604,686	90,333,690	82,694,599	8,025,820	8,432,127	8,859,003	9,307,490	9,778,682	10,273,728	10,793,835	11,340,273	5,883,642	0	0	0	0
Residual debt	123,349,892	117,382,247	111,112,489	104,525,325				74,668,780	66,236,653	57,377,650	48,070,159	38,291,478	28,017,750	17,223,915	5,883,642	0	0	0	0	0
IRR on total investment	18.15%		Above figures are a rough																	
IRR on equity	89.74%		All terms and conditions are provided as mere indication without any obligation on our part.																	

WE HAVE ADOPTED A STANDARED METHOS FOR PROJECT FIUNDING OF EQUITE 20% : DEBT 80%

AFRI-FUND CAPITAL WILL HAVE THEIR OWN RATIO FOR FUNDNG AND ADJUSTMNENTS THEN WILL HAVE TO BE MADE TO EACH FINANCIAL SPREADSHEET FOR EACH PROJECT TO REFELCE THE CHANGES.

YEAR ONE FREE CASH FLOW IS USD 23.52 MILLION

GOK RECEIVE USD 7.07 MILLION IN YEAR ONE

ACCUMULATIVE PROFIT BY YEAR TWENTY IS USD 343.44 MILLION

GOK RECEIVE USD 103.03 MILLION

CARBON CREDITS

600MW of solar farm in Kenya would save a significant amount of carbon dioxide emissions each year compared to traditional fossil fuel power generation. While the exact amount can vary depending on the specific fossil fuel it displaces and the efficiency of the solar farm, we can make an estimation based on available data.

1. Carbon Dioxide Emissions from Fossil Fuels:

- *Coal-fired power plants emit approximately* ***0.85 tons of CO_2 per MWh*** *of electricity generated.*
- *Natural gas-fired power plants emit approximately* ***0.4 tons of CO_2 per MWh*** *of electricity generated.*

2. Carbon Dioxide Emissions from Solar Energy:

- *The lifecycle emissions of solar panels, including manufacturing, transportation, installation, and operation, are significantly lower. Studies indicate around* ***0.041 to 0.05 tons of CO_2 equivalent per MWh****.*

3. Calculating Potential Savings:

To estimate the savings, we need to consider the annual electricity generation of a 600 MW solar farm. The actual output depends on factors like sunlight hours and the plant's efficiency (Performance Ratio).

- *Kenya has a high average solar irradiance, with Nairobi experiencing around* ***2525 hours of sunlight per year****, which is approximately* ***6.9 hours per day****.*
- *The average annual generation per unit of installed solar capacity in Kenya is around* ***1400-1600 kWh per kilowatt-peak (kWp)****. This translates to* ***1.4-1.6 GWh per MWp per year****.*

*Assuming a conservative estimate of **1.4 GWh per MW per year** for electricity generation:*

- *Annual generation of a 600 MW solar farm = 600 MW x 1.4 GWh/MW/year = **840 GWh per year** (840,000 MWh).*

Now, let's compare the emissions if this electricity were generated from fossil fuels:

- ***If replacing coal:** 840,000 MWh x 0.85 tons CO_2/MWh = **714,000 tons of CO_2 saved per year**.*
- ***If replacing natural gas:** 840,000 MWh x 0.4 tons CO2/MWh = **336,000 tons of CO_2 saved per year**.*

Considering the lifecycle emissions of solar:

- *Emissions from the solar farm = 840,000 MWh x 0.05 tons CO_2/MWh (using a higher estimate) = **42,000 tons of CO_2 equivalent per year**.*

Therefore, the net savings would be:

- ***Compared to coal:** 714,000 tons - 42,000 tons = **approximately 672,000 tons of CO_2 equivalent saved per year**.*
- ***Compared to natural gas:** 336,000 tons - 42,000 tons = **approximately 294,000 tons of CO_2 equivalent saved per year**.*

Additional Information from Sources:

- *One source mentions a 50 MW solar project in Kenya expected to save **1,081 kiloton (1,081,000 tons) equivalent of carbon dioxide in greenhouse gas emissions annually**. Scaling this linearly to 600 MW would suggest savings of around **12,972,000 tons per year**, which seems very high and might be based on specific assumptions about the displaced energy sources.*
- *Another source indicates a target of **400,000 tons of CO_2 to 900,000 tons of carbon equivalent reduced annually** from a broader renewable energy initiative aiming for 600 MW of installed capacity. This suggests that a 600 MW solar farm could contribute significantly to these savings. A detailed study will be undertaken within any Feasibility Financial study.*

*A 600 MW solar farm in Kenya is likely to save **hundreds of thousands of tons of carbon dioxide emissions each year**, with estimates ranging from around **294,000 tons to potentially over 672,000 tons or more** depending on the fossil fuel it displaces and the specific assumptions used. The higher figure of over a million tons from one source might include broader impacts or different baseline comparisons.*

It's important to note that these are estimations. The actual carbon dioxide savings will depend on the operational efficiency of the solar farm, the specific mix of energy sources it displaces in the Kenyan grid, and the methodology used for calculating lifecycle emissions. However, it is clear that such a large-scale solar project would make a substantial contribution to reducing greenhouse gas emissions in Kenya.

To determine the number of carbon credits and potential revenue, we need to consider the following:

1. Carbon Credits:

- ***One carbon credit typically represents one metric ton (or tonne) of CO2 equivalent avoided or removed from the atmosphere.***
- *Therefore, the estimated annual savings in CO2 equivalent directly translate to the potential number of carbon credits generated by the solar farm.*

    ***Compared to coal:** Approximately **672,000 carbon credits** per year.*

    ***Compared to natural gas:** Approximately **294,000 carbon credits** per year.*

2. Revenue from Carbon Credits:

The revenue generated depends on the price at which these carbon credits can be sold in the carbon market. Carbon credit prices vary significantly based on several factors, including:

- ***The type of carbon credit:** Credits from renewable energy projects are generally well-regarded.*
- ***The verification standard:** Credits certified by reputable organizations (e.g., Verra, Gold Standard) often command higher prices.*
- ***The market (compliance vs. voluntary):** Compliance markets (mandated by regulations) and voluntary markets have different pricing dynamics.*
- ***The project specifics:** The location, scale, and co-benefits of the project can influence the price.*
- ***Market supply and demand:** Current market conditions play a significant role in pricing.*

Current Carbon Credit Prices (as of early April 2025):

It's difficult to give a precise current price for carbon credits from a solar farm in Kenya without specific market data for that region and project type. However, based on recent reports:

- ***Average prices in the voluntary carbon market in 2024 were around $4.8 per tonne of CO2 equivalent.*** *However, prices for higher-quality, nature-based, or removal credits can be significantly higher.*
- ***Projections for the future vary widely.*** *Some expect prices to rise significantly by 2030 and 2050 as climate targets become more pressing.*
- ***Prices in compliance markets (like the EU ETS or California's market) are typically higher and more volatile.*** *As of early 2024, EU carbon prices were around €71 per ton (approximately $76 USD).*

Estimating Potential Revenue:

Let's use a range of potential carbon credit prices to estimate the annual revenue:

- ***Low Price:*** *$5 per carbon credit*
- ***Mid Price:*** *$15 per carbon credit*
- ***High Price:*** *$30 per carbon credit (for high-quality credits in a favorable market)*

Revenue Estimates (Compared to Coal):

- ***Low:*** *672,000 credits x $5/ credit =* ***$3,360,000 per year***
- ***Mid:*** *672,000 credits x $15/credit =* ***$10,080,000 per year***
- ***High:*** *672,000 credits x $30/credit =* ***$20,160,000 per year***

Revenue Estimates (Compared to Natural Gas):

- ***Low:*** *294,000 credits x $5/ credit =* ***$1,470,000 per year***
- ***Mid:*** *294,000 credits x $15/ credit =* ***$4,410,000 per year***
- ***High:*** *294,000 credits x $30/credit =* ***$8,820,000 per year***

Important Considerations:

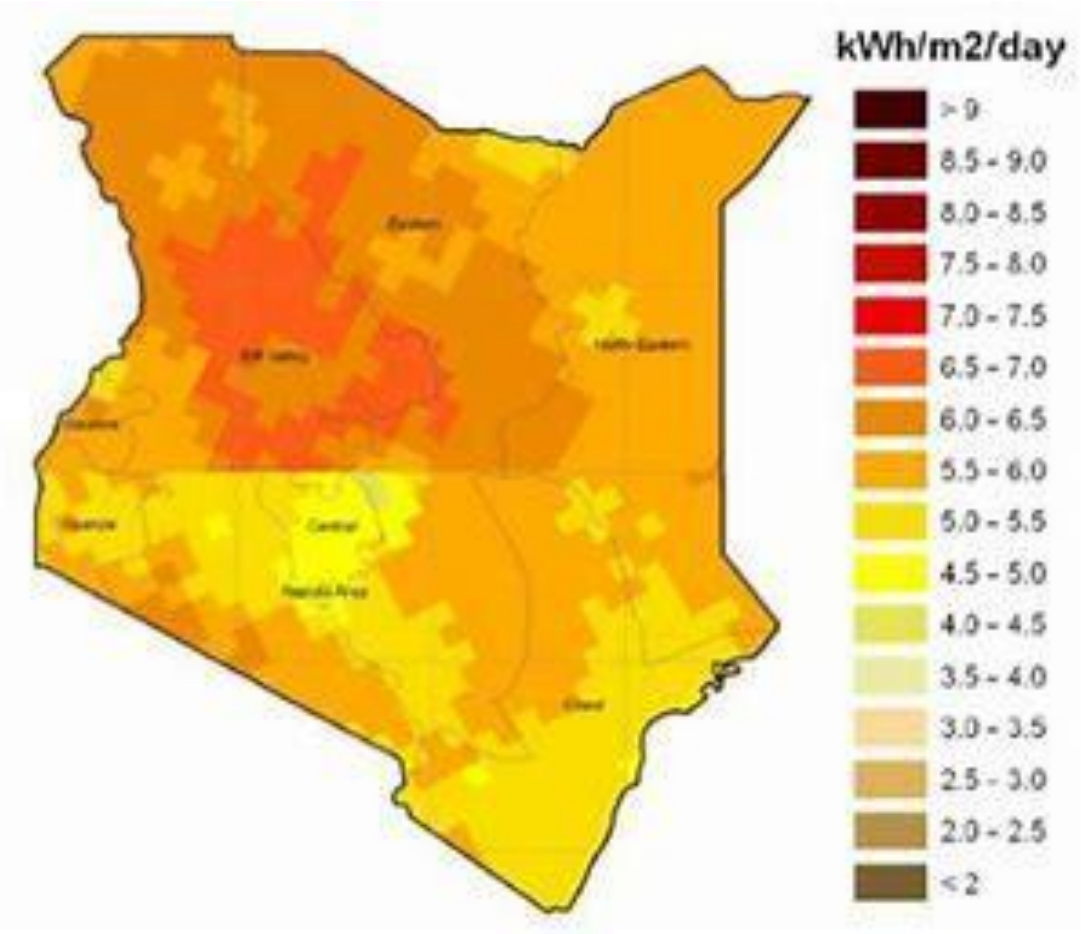
- ***Market Volatility:*** *Carbon credit prices are subject to fluctuations based on market dynamics, policy changes, and the overall progress towards climate goals.*

- ***Certification Costs:*** *Obtaining certification for carbon credits involves costs related to registration, monitoring, and verification. These costs would need to be factored into the overall profitability.*
- ***Additionality:*** *To be eligible for carbon credits, the emission reductions from the solar farm need to be "additional," meaning they would not have occurred without the project. This is usually straightforward for renewable energy projects replacing fossil fuels.*
- ***Transaction Fees:*** *Selling carbon credits on exchanges or through brokers may involve transaction fees.*
- ***Policy and Regulation in Kenya:*** *The specific regulations and policies regarding carbon credits in Kenya would need to be considered.*

A 600 MW solar farm in Kenya could potentially generate ***hundreds of thousands of carbon credits annually****, leading to a significant potential revenue stream. However, the actual revenue will be highly dependent on the prevailing carbon credit prices, which can vary considerably. Based on current market information and price ranges, the annual revenue could range from* ***a few million to potentially over $20 million USD per year*** *(when compared to coal), and from* ***one million to nearly $9 million USD per year*** *(when compared to natural gas).*

To get a more accurate estimate of potential carbon credit revenue, a detailed market analysis specific to renewable energy projects in Kenya and the chosen carbon crediting mechanism would be necessary.

Fig 8. Kenya Solar Resource



Our total cost of USD 41MWp is at the lowest limit, in line with the "Least Cost Option" for LAPSSET Corridor and GoK / LCDA requirements.

Fig 9.

Tabulated Energy Matrix of Cost per MWh and CO2 Emissions per MWh

Tabulated comparison of the **average cost per MWh** and **Carbon Dioxide (CO_2) Emission Factors** for various energy technologies relevant to the **LAPSSET Corridor Energy Projects**:

Energy Technology	Avg. Cost per MWh (USD)	CO_2 Emission Factor (kg CO_2/MWh)
Solar PV	40 - 80	5 - 50 (manufacturing & installation)
Onshore Wind	30 - 70	5 - 25 (manufacturing & installation)
Geothermal	50 - 100	15 - 50 (drilling & operations)
Biomass	60 - 120	20 - 100 (combustion & supply chain)
Green Hydrogen (for Power)	100 - 250	0 - 5 (if fully renewable-powered)
Hydro Power (Conventional)	40 - 100	5 - 30 (reservoir emissions)
Hydro Power (Run-of-River)	50 - 120	5 - 20 (minimal reservoir emissions)
Hydro Power (Pumped Storage)	100 - 200	10 - 50 (construction & operation)
Ocean Tidal Lagoons	150 - 300	5 - 25 (construction & maintenance)
Ocean Wave	200 - 400	10 - 30 (manufacturing & deployment)
Ocean Thermal Energy (OTEC)	200 - 500	10 - 50 (construction & operation)
Nuclear	60 - 150	5 - 15 (fuel cycle & construction)

An energy transition for the Lamu Port-South Sudan-Ethiopia Transport (LAPSSET) Corridor project in Kenya would involve a shift from conventional, often fossil fuel-based energy sources to more sustainable and environmentally friendly alternatives. Here are key components that could be included in an energy transition strategy for the LAPSSET Corridor:

Renewable Energy Integration:

Prioritize the integration of renewable energy sources such as solar, wind, and hydroelectric power into the energy mix for the corridor. This can involve the installation of solar farms, wind turbines, and other renewable energy infrastructure to generate clean and sustainable power.

Green Hydrogen Production:

Explore the potential for green hydrogen production along the corridor, using renewable energy sources for electrolysis. Green hydrogen can be used as a clean fuel for transportation and industrial activities, contributing to reduced carbon emissions.

Electrification of Transportation:

Promote the electrification of transportation within the corridor, especially the Railway. This can involve the use of electric vehicles (EVs), electric buses, and electric rail transport. Establish charging infrastructure and support the adoption of electric vehicles to reduce reliance on conventional fossil fuel-powered transport.

Energy Storage Solutions:

Implement energy storage solutions, such as battery storage systems, to store excess energy generated during peak times and release it during periods of high demand. This helps in stabilizing the energy supply and ensuring a reliable power grid.

Energy Efficiency Measures:

Implement energy efficiency measures across the corridor, including the use of energy-efficient technologies in buildings, transportation, and industrial processes. This can reduce overall energy consumption and enhance the sustainability of the project.

Community Engagement and Capacity Building:

Engage local communities in the energy transition process and provide capacity-building initiatives. This can include training programs for local residents on renewable energy technologies and creating opportunities for local employment in the renewable energy sector.

Regulatory and Policy Support:

Develop and implement supportive policies and regulations that encourage the transition to clean energy within the corridor. This may involve providing incentives for renewable energy projects, setting emissions reduction targets, and establishing regulatory frameworks that support sustainable practices.

International Collaboration:

Seeking international collaboration and partnerships for technical expertise, funding, and knowledge exchange. Engage with international organizations, governments, and financial institutions to leverage support for the energy transition within the LAPSSET Corridor.

Research and Innovation:

Support research and innovation in clean energy technologies. Encourage the development and deployment of innovative solutions that can enhance the efficiency and sustainability of energy infrastructure along the corridor.

Monitoring and Evaluation:

Establish mechanisms for monitoring and evaluating the progress of the energy transition. Regularly assess the impact of the implemented measures on energy efficiency, emissions reduction, and overall sustainability, and make adjustments as needed.
By incorporating these elements into an energy transition plan, the LAPSSET Corridor project can contribute to Kenya's sustainable development goals, reduce environmental impacts, and enhance the resilience and longevity of the infrastructure.

ALIGNMENT WITH LAPSSET

Regarding the LAPSSET Corridor strategy, it is important to note that the LAPSSET Corridor is a regional infrastructure project in East Africa, aiming to connect the landlocked countries of South Sudan and Ethiopia to the Kenyan coast. While the primary focus of LAPSSET is on transport infrastructure (such as roads, railways, and pipelines), integrating renewable energy sources like solar farms along the corridor aligns with broader sustainable development goals and can enhance the overall environmental sustainability of the project.

The use of clean energy in the corridor can contribute to reducing the environmental impact of transportation and other activities associated with the development of the corridor. Integrating sustainable practices, including renewable energy, can help ensure that infrastructure development is aligned with global efforts to address climate change and promote environmental sustainability.

***Lamu Planning and Investment Framework is a guideline for implementation of LAPSSET Corridor** Program which is a regional flagship project, intended to provide transport and logistics infrastructure aimed at creating seamless connectivity between the Eastern African Countries of Kenya, Ethiopia and South Sudan. The Purpose is to align stakeholders around a shared vision for Lamu and to unlock funding and delivery in order that there is a clear path to deliver the socio-economic and environmental benefits linked to the LAPSSET Corridor project.*

The LAPSSET corridor is identified as a link between Lamu, Kenya's Northeastern province, Ethiopia and Southern Sudan. The project involves the development of a new transport corridor from the new port at Lamu through Garissa, Isiolo, Mararal, Lodwar, and Lokichogio to branch at Isiolo to Ethiopia and Southern Sudan. Projects within the corridor identified in Vision 2030 comprise: a new road network, railway line, oil refinery at LAMU, oil pipeline, Lamu Airport and free port at LAMU (Manda Bay) in addition to resort cities at the coast and in Isiolo and Turkana.

The National Spatial Plan (NSP) - LAMU is identified as a gateway town, which needs to have its functionality and livability enhanced to make it more attractive and competitive. The NSP supports LAMU as an emerging growth area and identifies several projects such as the development of the Special Economic Zone (SEZ) and the resort city as critical to achieving this. To this end, LAMU is chosen as a potential site for one of the 300MW Solar Farms.

The Lamu County Spatial Plan (CSP) - The draft plan does refer to the LAPSSET project, identifying the different elements of the project such as the Lamu port, the corridor (for railway, pipeline etc.), oil refinery, resort city, international airport, and port city. The CSP identifies that the LAMU Port City will reach a population of 1.25 million by 2050.

The Integrated LAMU Metropolitan Area Structure Plan – The County Government of LAMU is in the process of preparing this plan, and draft was published in 2016. The plan sets out a detailed land use zoning plan for the port, industrial area and new metropolis and we hope the 300MW site for the Solar Farm will be agreed to.

The implementation of solar farms in the Lamu Port-South Sudan-Ethiopia Transport (LAPSSET) Corridor project in Kenya can bring about numerous benefits. Advantages of incorporating solar farms into the corridor are as follows:

1. ***Clean and Renewable Energy:*** *Solar farms generate electricity using sunlight, a clean and renewable energy source. This helps reduce dependence on fossil fuels, contributing to a more sustainable and environmentally friendly energy mix.*
2. ***Reduced Greenhouse Gas Emissions:*** *Solar energy is a low-emission energy source. By utilizing solar power in the LAPSSET Corridor, the project can significantly reduce greenhouse gas emissions compared to traditional fossil fuel-based power generation, helping combat climate change.*
3. ***Energy Independence:*** *Solar energy provides a degree of energy independence by harnessing a local and abundant resource—sunlight. This reduces reliance on imported fuels and enhances the resilience of the energy infrastructure along the corridor.*
4. ***Cost Savings and Long-Term Stability:*** *While there may be initial investment costs, solar farms offer long-term cost savings as sunlight is free. The stable and predictable nature of solar power generation contributes to the stability of energy costs over the project's lifespan.*
5. ***Job Creation and Economic Development:*** *The development, construction, and maintenance of solar farms create job opportunities. This can stimulate economic development in the regions along the LAPSSET Corridor, providing employment and fostering local skills and expertise in the renewable energy sector.*
6. ***Diversification of Energy Sources:*** *Solar farms contribute to diversifying the energy sources within the corridor. A diversified energy mix enhances energy security and reduces vulnerability to supply disruptions or price fluctuations associated with a single energy source.*
7. ***Scalability and Modular Design:*** *Solar farms are scalable and can be designed in a modular fashion, allowing for flexibility in capacity expansion based on the energy demand of the corridor. This adaptability is beneficial for accommodating future growth and changes in energy needs.*
8. ***Reduced Transmission Losses:*** *Locally generated solar power can reduce the need for long-distance transmission of electricity, minimizing energy losses during transportation. This improves overall energy efficiency and grid reliability.*
9. ***Environmental Conservation:*** *Solar farms have a relatively low environmental impact compared to some other forms of energy generation. They do not involve fuel extraction, and their operation has minimal air and water pollution, preserving local ecosystems.*
10. ***Alignment with Sustainability Goals:*** *Integrating solar farms aligns with global and national sustainability goals. Kenya has set ambitious targets for increasing the share of renewable energy in its energy mix, and solar power can play a crucial role in achieving these goals.*
11. ***Technological Innovation and Research:*** *Implementing solar farms encourages technological innovation and research in the renewable energy sector. This can lead to advancements in solar technology and the development of more efficient and cost-effective solutions.*

Solar farms can provide a range of economic, environmental, and social benefits to the LAPSSET Corridor project in Kenya, contributing to its overall sustainability and resilience.

Green hydrogen (H_2) is a versatile energy carrier that can be applied to decarbonize a wide range of sectors. It can be used directly or in the form of its derivatives like e-methanol, e-ammonia, or e-fuels to replace fossil fuels, coal or gas.

The following is the targeted strategic objectives for Green Hydrogen in Kenya.

<u>PSECC Ltd propose 2,200MW of Green Hydrogen – Eight plants in total</u>

LAMU Port could have a Green Hydrogen plant in time, which would use 100MW of electricity from the solar farm. Only around 40% of global carbon dioxide (CO_2) emissions originate from power generation which can be decarbonized via electrification. The other 60% of CO_2 emissions originate from industry, mobility, buildings and others. These can be decarbonized via sector coupling, using green hydrogen and its derivatives to make renewable energy available to those sectors. This is why the production of sustainable hydrogen is such a crucial issue and so too are Solar Farm developments.

Green hydrogen, produced through renewable energy sources like wind or solar power, can offer several benefits to the LAPSSET Corridor.

Clean Energy for Transportation:

Green hydrogen can be used as a clean fuel for various modes of transportation within the LAPSSET Corridor, such as trucks, trains, and ships. This can help reduce the carbon footprint of transportation activities associated with the corridor, contributing to sustainability goals.

Renewable Energy Integration:

Green hydrogen production can serve as a way to store excess energy generated from intermittent renewable sources like solar and wind. During periods of high renewable energy production, surplus electricity can be used for electrolysis to produce hydrogen, which can be stored and later used as a reliable energy source when renewable generation is low.

Energy Storage and Grid Balancing:

Hydrogen can be used as a form of energy storage, providing a means to store excess energy generated during peak times and release it when demand is high or renewable energy generation is low. This helps in balancing the electricity grid and ensuring a stable and reliable power supply along the corridor.

Decentralized Power Generation:

Green hydrogen production facilities can be distributed along the corridor, providing decentralized power generation. This can enhance energy resilience and reduce transmission losses associated with centralized power plants.

Job Creation and Economic Development:

The establishment of green hydrogen infrastructure, including production facilities and distribution networks, can create job opportunities and stimulate economic development in the regions along the LAPSSET Corridor.

Environmental Sustainability:

Green hydrogen production is a clean and sustainable process when powered by renewable energy sources. Using green hydrogen in transportation and industrial activities along the corridor can significantly reduce greenhouse gas emissions, contributing to environmental sustainability goals.

Technology Transfer and Innovation:

Implementing green hydrogen infrastructure within the LAPSSET Corridor can facilitate technology transfer and innovation. This can lead to the development of local expertise in renewable energy and hydrogen technologies, fostering a culture of innovation and sustainability.

International Cooperation and Funding Opportunities:

As the global community places increasing emphasis on reducing carbon emissions, projects incorporating green hydrogen can attract international cooperation and funding support. The LAPSSET Corridor, by adopting green hydrogen technologies, may become eligible for financial support and partnerships focused on sustainable development.

The adoption of green hydrogen within the LAPSSET Corridor can bring about environmental, economic, and technological benefits, contributing to the overall sustainability and resilience of the infrastructure project.

Pre EPC studies:

OMNICORP

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P.O. BOX 45322 - 00800, Nairobi
5th Avenue Building, Ngong Rd, Nairobi

QUOTATION FOR FEASIBILITY STUDY OF 300 MW LAMU SOLAR POWER PLANT

Location: Lamu County, Kenya

Date: MAY 08TH , 2025

This quotation covers professional services for the Pre-feasibility study and Environmental and Social Impact Assessment (ESIA) of a 300 MW solar photovoltaic (PV) power plant in Lamu, Kenya.

Component	Scope of Work	Cost (KSHS)
Pre-Feasibility Work and Preparation	• Preliminary work that will include, scope development, liaison with KPLC, Ketraco • Potential Sites Identifications in relation to Kenya Power Network strategy and plans for the region. • Mobilization and demobilization costs • Transmission Route and Termination point identification. • Phase 1 final reporting compiling and presentation	6,000,000
Environmental and Social Impact Assessment (ESIA)	• Baseline environmental and biodiversity surveys. • Stakeholder engagement and public consultation. • Social impact assessment • Mitigation plan and ESMP preparation. • Submission to NEMA and licensing support	8,000,000

PHASE 1 TOTAL COST

Subtotal: Kshs 14,000,000 (Fourteen Million.)

Taxes (VAT 16%): kshs 2,240,000 (Two million two hundred forty thousand)

Grand Total: Ksh 16,240,000. (Sixteen million two hundred forty thousand)

PAYMENT TERMS

- 60% advance upon contract signing
- 40% upon submission of the final report
- Subject to access to the site and relevant permits/support from local authorities

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QUOTATION FOR TECHNICAL STUDY OF 300 MW LAMU SOLAR POWER PLANT

Location: Lamu County, Kenya

Date: MAY 08TH , 2025

This quotation covers professional services for the Technical study of a 300 MW solar photovoltaic (PV) power plant in Lamu, Kenya.

Topographical Survey	• Detailed topographical mapping of approximately 2,000 acres. • Use of drone/LiDAR and ground control points. • GIS data acquisition and analysis • Contour map production (0.5m intervals).	9,500,000
Grid Connection Study	• Load flow analysis and grid impact assessment. • Identification of optimal interconnection point. • Review of Kentraco transmission lines' capacity. • Transmission route survey • CAPEX Cost estimations	8,000,000
Geotechnical Survey and Soil Sampling	• Subsurface investigation and borehole drilling. • Soil sampling and laboratory testing (CBR, permeability, etc.) • Analysis of soil bearing capacity • Foundation recommendations for structures and equipment. • Assessment of erosion, flood risk, and water table levels	9,850,000
Hydrological Study	• Assessment of flood risk and drainage patterns. • Rainfall analysis and water table behavior. • Impacts of seasonal water flow on infrastructure. • Recommendations for stormwater management. • Coordination with local water authorities	3,000,000

preliminary technical assessment, Conceptual Layouts and Cost estimates and	• Energy yield assessment (PVSyst simulation). • General Layout • Preliminary electrical Design –AC Side, DC Side, SLD, Earthing and Lighting protection • Preliminary civil & Structural Designs – • Preliminary Design Report and BOQs	7,000,000
Financial pre-screening & Economic Analysis	• CAPEX and OPEX estimation • Energy yield assessment (PVSyst simulation). • Financial modeling (IRR, NPV, payback, LCOE). • Risk and sensitivity analysis.	4,000,000
Reporting & Project Management +Financial & Economic Analysis	• Phase 2 report, • Project coordination and communication. • Presentation to client and financiers	2,500,000

Subtotal: Ksh 41,350,000 (Forty-one million three hundred fifty thousand.)

Taxes (VAT 16%): Ksh 6,616,000 (Six million six hundred sixteen thousand)

Grand Total: Ksh 47,966,000. (Forty-seven million nine hundred sixty-six thousand)

PAYMENT TERMS

- 60% advance upon contract signing
- 40% upon submission of the final report
- Subject to access to the site and relevant permits/support from local authorities

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5th Avenue Building, Ngong Rd, Nairobi

QUOTATION FOR FEASIBILITY STUDY OF 300 MW ISIOLO SOLAR POWER PLANT

Location: Isiolo County, Kenya

Date: MAY 08TH , 2025

This quotation covers professional services for the Pre-feasibility study and Environmental and Social Impact Assessment (ESIA) of a 300 MW solar photovoltaic (PV) power plant in Isiolo, Kenya.

Component	Scope of Work	Cost (KSHS)
Pre-Feasibility Work and Preparation	• Preliminary work that will include, scope development, liaison with KPLC, Ketraco • Potential Sites Identifications in relation to Kenya Power Network strategy and plans for the region. • Mobilization and demobilization costs • Transmission Route and Termination point identification. • Phase 1 final reporting compiling and presentation	6,000,000
Environmental and Social Impact Assessment (ESIA)	• Baseline environmental and biodiversity surveys. • Stakeholder engagement and public consultation. • Social impact assessment • Mitigation plan and ESMP preparation. • Submission to NEMA and licensing support	8,000,000

PHASE 1 TOTAL COST

Subtotal: Kshs 14,000,000 (Fourteen Million.)

Taxes (VAT 16%): kshs 2,240,000 (Two million two hundred forty thousand)

Grand Total: Ksh 16,240,000. (Sixteen million two hundred forty thousand)

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QUOTATION FOR TECHNICAL STUDY OF 300 MW ISIOLO SOLAR POWER PLANT

Location: Isiolo County, Kenya

Date: MAY 08TH , 2025

This quotation covers professional services for the Technical study of a 300 MW solar photovoltaic (PV) power plant in Isiolo, Kenya.

Topographical Survey	• Detailed topographical mapping of approximately 2,000 acres. • Use of drone/LiDAR and ground control points. • GIS data acquisition and analysis • Contour map production (0.5m intervals).	9,500,000
Grid Connection Study	• Load flow analysis and grid impact assessment. • Identification of optimal interconnection point. • Review of Kentraco transmission lines' capacity. • Transmission route survey • CAPEX Cost estimations	8,000,000
Geotechnical Survey and Soil Sampling	• Subsurface investigation and borehole drilling. • Soil sampling and laboratory testing (CBR, permeability, etc.) • Analysis of soil bearing capacity • Foundation recommendations for structures and equipment. • Assessment of erosion, flood risk, and water table levels	9,850,000
Hydrological Study	• Assessment of flood risk and drainage patterns. • Rainfall analysis and water table behavior. • Impacts of seasonal water flow on infrastructure. • Recommendations for stormwater management. • Coordination with local water authorities	3,000,000

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Reporting & Project Management +Financial & Economic Analysis	• Phase 2 report, • Project coordination and communication. • Presentation to client and financiers	2,500,000

Subtotal: Ksh 41,350,000 (Forty-one million three hundred fifty thousand.)

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Grand Total: Ksh 47,966,000. (Forty-seven million nine hundred sixty-six thousand)

PAYMENT TERMS

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Table 2.

Following is the tentative timeline of the Solar Farm program, divided into 3 phases:

Phases	Name	Description	Time Frame
Phase 1:	*Feasibility ESIA Topographical / Grid connections / PPA*	*Strategic pathway*	*June 2025 to Sep' 2025*
Phase 2:	*LAMU Port Solar Farm*	*300MW*	*Sep' 2025 to Sep' 2026*
Phase 3:	*Isiolo Solar Farm*	*300MW*	*Dec' 2025 to Dec' 2026*

One of the EPC chosen is China Urban-Rural Holding Group Co. Ltd

This EPC company has the ability to install 3MW per day so for a 300MW solar farm it could be possible to do this in 100 day, our realistic time period in 200 to 300 days.

COSTCOST

Table 3. The details of the indicative cost are provided below (dependent upon exact criteria – 410,000MW):

Title 300MW of Solar Farms	Cost (USD)	MWh per year
Phase 1. Implementation / Feasibility Study / EIA etc (approximately)	*$300,000*	
Phase 2. LAMU Port 300MW Solar Farms	*$145.5 Million*	*657,000 MWh*
Phase 3. Isiolo 300MW Solar Farms	*$145.5 Million*	*677,700 MWh*

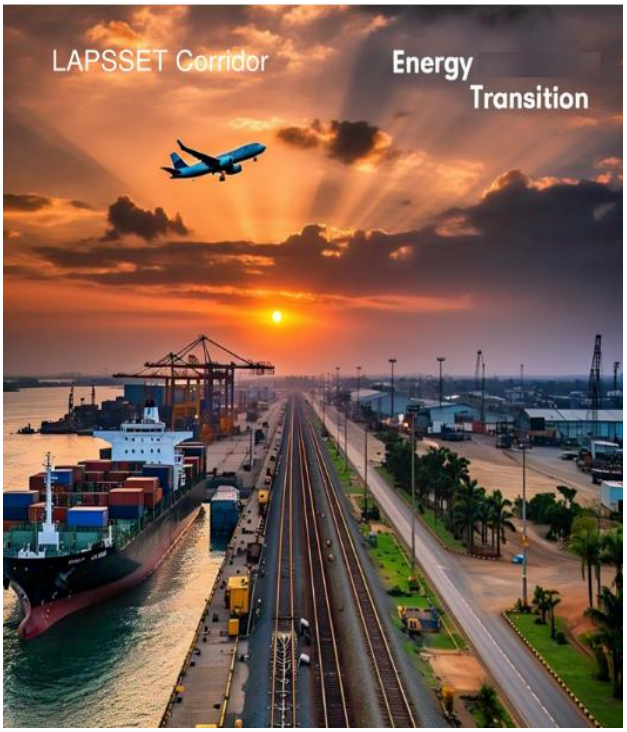
Items	Horizon Company
PSECC Ltd coordination	
Coordinator	*PSECC Ltd*
Project Manager	*GLEEDS*

Table 4. PSECC Ltd calculations (to be confirmed once plant is operational and O&M considered) – indicative.

Electricity production each year	*Revenue (USD)*
Annual generation of electricity from 2x 300MW of solar farms will generate 1,334,700MWh in total per year and electricity sold at $0.05KWh	*$46,151,645 Million* *$671.5 Million over twenty years*
Government 30% share of revenue over twenty years	*$ 201.46 Million*
Afri-Fund Capita 35% revenue share over 20 years	*$235.02 Million*

Loan repayments will then have to be made.

The annual generation of electricity from a solar farm depends on various factors, including the solar farm's capacity factor, which represents the actual electricity output as a percentage of its maximum potential output. Additionally, solar irradiance, which is the amount of sunlight the area receives, plays a crucial role.



CO_2 SAVINGS PER YEAR FOR 600MW

CO_2 Savings from a 600 MW Solar Farm in Lamu, Kenya – 27% factor

Assumptions:

1. ***Location:*** *LAMU, Kenya (high solar potential, ~5.5–6.0 kWh/m²/day)*
2. ***Installed Capacity:*** *600 MW*
3. ***Capacity Factor: 27%*** *(higher than Kenyan average due to LAMU's strong solar irradiation)*
4. ***Displaced Carbon Intensity:***
   - ***300 gCO_2/kWh*** *(Kenya's grid average, mostly geothermal/hydro)*
   - ***700 gCO_2/kWh*** *(if displacing diesel generators, common in Lamu)*
5. ***Annual Energy Generation:***

   Energy (GWh/year)=Capacity (MW)×Capacity Factor×8,760 hoursEnergy (GWh/year)=Capacity (MW)×Capacity Factor×8,760 hours

6. ***CO_2 Savings:***

   CO_2 Savings (tons/year)=Energy (GWh)×Carbon Intensity (tons CO_2/GWh)CO_2 Savings (tons/year) =Energy (GWh)×Carbon Intensity (tons CO_2/GWh)

Calculations:

1. Annual Energy Generation:

600 MW×0.27×8,760 hours=∗∗1,419GWh/year∗∗600 MW×0.27×8,760 hours=∗∗1,419GWh/year∗∗

2. CO_2 Savings Scenarios:

Scenario	***Carbon Intensity***	***CO_2 Savings (tons/year)***
Displacing Kenya's Grid	*300 gCO_2/kWh*	***425,700 tons***
Displacing Diesel	*700 gCO_2/kWh*	***993,300 tons***

Summary Table (Lamu-Specific):

Parameter	***Value***
Location	*LAMU, Kenya*
Solar Irradiation	*~5.5–6.0 kWh/m²/day*
Capacity Factor	*27% (higher than avg.)*
Annual Generation	***1,419 GWh/year***
Grid Displacement	*300 gCO_2/kWh → **425,700 t***

Parameter	*Value*
Diesel Displacement	*700 gCO_2/kWh → **993,300 t***

Main results:

Best Case (Replacing Diesel): ~993,300 tons CO_2/year *(massive impact, as Lamu relies on diesel).*
Grid-Mix Scenario: ~425,700 tons CO_2/year *(still substantial, equivalent to ~92,000 cars off the road).*
Higher Output Than Kenyan Average: *Lamu's stronger sunlight boosts generation by **~8%** vs. 25% CF.*

Comparison to Other Kenyan Regions:

Location	*Capacity Factor*	*600 MW Solar CO_2 Savings (tons/year)*
National Avg.	*25%*	*394,200 (grid) / 919,800 (diesel)*
Lamu	***27%***	***425,700 (grid) / 993,300 (diesel)***
Northern Kenya	*30%+*	*Up to 1.1M tons (if displacing diesel)*

Why Lamu?

- ***Diesel Dependency:*** *LAMU's grid is less stable, often relying on diesel generators (high emissions).*
- ***Solar Potential:*** *Coastal LAMU has **less cloud cover** than inland areas, improving efficiency.*
- ***LAPSSET Corridor:*** *Future industrial demand makes solar critical for decarbonization.*

Final Answer:

*A **600 MW solar farm in Lamu, Kenya, saves:***

- ***425,700 tons CO_2/year*** *(if displacing Kenya's grid).*
- ***993,300 tons CO_2/year*** *(if replacing diesel generation).*

(For exact figures, a detailed solar yield study for Lamu would refine the capacity factor further.)

CO_2 SAVINGS FROM ALL TECHNOLOGIES

To estimate the carbon dioxide (CO_2) savings from different Renewable Energy technologies is important for LAPSSET Corridor in Kenya, capacity factor of each technology and the carbon intensity of the electricity generation they displace. The capacity factor represents the actual output of the Renewable Energy technology compared to its maximum potential output - please tabulate this for the following: Geothermal 5,000MW, Solar PV 1,000MW, Solar Farms 3,000MW, Wind Farms 500MW, Waste-to-Energy plants 360MW, Green Hydrogen Plants 2,200MW, Hydroelectricity Dams 1,296MW, Bioethanol plant 341MW, Nuclear SMR 940MW and Clean Coal Gasification 2,040MW.

As we have seen, research by PSECC Ltd over the past twenty-seven months have indicated 16.752 GW is required by the GoK for LAPSSET Corridor 15 GW will be developed:

PSECC Ltd - Phase One Railway & Economic Zones - Energy Installed & Cost Recommendations to meet Kenya Government, LCDA targets, NDC's and IPCC emission reduction.

		MW (2024 – 2028)		Cost	MW (2028 – 2035)		Cost
• expansion in geothermal	-	1,887	MW	US$ 2,830 m	3,113	MW	US$ 4,669 m
• solar PV	-	500	MW	US$ 500 m	500	MW	US$ 500 m
• solar farms	-	2,000	MW	US$ 1,770 m	1,000	MW	US$ 885 m
• solar PV Manufacturing plant	-	25	MW	US$ 10 m	50	MW	US$ 20 m
• waste plants	-	180	MW	US$ 900 m	180	MW	US$ 900 m
• wind farms	-	150	MW	US$ 328 m	350	MW	US$ 766 m
• green hydrogen	-	1,100	MW	US$ 1,432 m	1,100	MW	US$ 1,432 m
• dams – hydroelectricity	-	796	MW	US$ 796 m	500	MW	US$ 500 m
• climate smart agriculture Bio-Fuels	-	191	M Ltrs	US$ 190 m	150	M Ltrs	US$ 190 m
• Nuclear	-	-	-	- -	940	MW	US$ 4,800 m
• Clean Coal Technology	-	2,040	MW	US$ 2,107 m	-	-	- -
	Total	8,869	MW	US$ 10,863m	7,883	MW	US$ 14,662 m

*To estimate the **CO_2 savings** from different renewable energy technologies in the **LAPSSET Corridor (Kenya)**, we need:*

1. ***Installed Capacity (MW)***
2. ***Capacity Factor (%)*** *– Actual output vs. maximum potential*
3. ***Carbon Intensity Displaced (gCO_2/kWh)*** *– The emissions from the energy source being replaced (likely Kenya's grid or diesel generators)*
4. ***Annual Energy Generation (GWh/year)*** *= Capacity (MW) × Capacity Factor × 8,760 hrs/year*
5. ***CO_2 Savings (tons/year)*** *= Energy Generated (GWh/year) × Displaced Carbon Intensity (tons CO_2/GWh)*

Assumptions:

- ***Kenya's grid carbon intensity****: ~300 gCO_2/kWh (mostly geothermal & hydro, but displaced energy could be from diesel or coal in some cases).*
- ***Capacity Factors****: Based on typical performance in Kenya/East Africa.*
- ***Clean Coal Gasification & Nuclear SMR*** *are* ***not renewable*** *but included for comparison.*

Estimated CO_2 Savings from all LAPSSET Corridor (15GW) Renewable Energy Projects

Technology	***Capacity (MW)***	***Capacity Factor (%)***	***Annual Generation (GWh/year)***	***Displaced Carbon Intensity (gCO_2/kWh)***	***CO_2 Savings (tons/year)***
Geothermal	*5,000*	*85%*	*37,230*	*300*	***11,169,000***
Solar PV (Rooftop)	*1,000*	*20%*	*1,752*	*300*	***525,600***
Solar Farms (Utility)	*3,000*	*25%*	*6,570*	*300*	***1,971,000***
Wind Farms	*500*	*35%*	*1,533*	*300*	***459,900***
Waste-to-Energy	*360*	*70%*	*2,207*	*300*	***662,100***
Green Hydrogen*	*2,200*	*50%*	*9,636*	*300 (if replacing fossil H_2)*	***2,890,800***
Hydroelectric Dams	*1,296*	*60%*	*6,811*	*300*	***2,043,300***
Bioethanol Plant	*341*	*80%*	*2,389*	*300*	***716,700***
Nuclear SMR	*940*	*90%*	*7,412*	*300*	***2,223,600***
Clean Coal Gasification	*2,040*	*85%*	*15,200*	*800 (vs. traditional coal)*	***12,160,000***

Main observations:

1. ***Highest CO_2 Savings:***

   Geothermal (11.2M tons/year) *– High capacity factor & large capacity.*
   Clean Coal Gasification (12.2M tons/year) *– But only if replacing traditional coal (high emissions).*
   Hydro & Nuclear *also contribute significantly.*
2. ***Solar & Wind:***

   Lower capacity factors reduce annual output, but still substantial savings (~1-2M tons/year combined).
3. ***Green Hydrogen:***

   Assumes it replaces fossil-fuel-based hydrogen (e.g., for industry/transport).
4. ***Bioethanol & Waste-to-Energy:***

   Smaller scale but still meaningful (~0.5-0.7M tons/year each).

Limitations:

- ***Grid displacement factor****: If renewables replace mostly hydro/geothermal (already low-carbon), savings decrease.*
- ***Storage/curtailment****: Solar/Wind may face intermittency losses.*
- ***Green Hydrogen*** *savings depend on end-use (e.g., replacing diesel in transport = higher savings).*

Emissions from Conventional Electricity:

The emissions depend on the energy mix of the region. If we assume a generic value, let's say 0.5 kg CO_2 per kWh, then the emissions from conventional electricity would be:

$$\text{Emissions conventional} = 221{,}440\text{MWh/year} \times 0.5\text{kg } CO_2\text{/kWh}$$

Emissions from Green Hydrogen Plant:

Green hydrogen is considered a clean energy source during operation. However, emissions might occur during the manufacturing of the electrolyzer, construction, and other lifecycle stages. If we assume a conservative estimate for the emissions associated with green hydrogen production (including the manufacturing of the electrolyzer), at 2 kg CO_2 per kg of hydrogen produced, then the emissions from the green hydrogen plant would be:

1. ***Emissions Factor***

Emissionsgreen hydrogen=(Electricity Consumptionhydrogen production×Hydrogen Yield)×2 kg CO2/kg h ydrogen Emissions green hydrogen=(Electricity Consumption hydrogen production ×Hydrogen Yield)×2kg CO_2/kg hydrogen.

To calculate the net CO_2 savings:

Net CO_2 Savings = Emissionsconventional−Emissionsgreen hydrogen Net CO_2 Savings = Emissions conventional−Emissions green hydrogen

Net CO_2 Savings=(221,440 MWh/year×0.5 kg CO_2/kWh)−(Electricity Consumption hydrogen production×Hydrogen Yield×2 kg CO_2/kg hydrogen)Net CO_2 Savings=(221,440MWh/year×0.5k g CO_2/kWh)−(Electricity Consumptionhydrogen production×Hydrogen Yield×2kg CO_2/kg hydrogen)

The actual electricity consumption for hydrogen production and hydrogen yield would depend on the efficiency of the electrolyzer and other factors specific to the green hydrogen plant.

These calculations involve some assumptions and estimations, and the actual emissions can vary based on the specific conditions and technologies used in the green hydrogen plant. It is recommended to obtain more precise data for the particular plant in question for a more accurate assessment of CO_2 savings.

"AI for Energy Transition" – PSECC Ltd have designed a platform for system checks and balances, Energy, Water, Waste, Emissions monitoring and reporting for the 600MW of Solar Farms and all subsequent Renewable Energy projects.

Why AI is needed for the energy transition Global energy systems and in the LAPSSET Corridor are in transformation, and several key trends are driving AI's potential to accelerate energy transition. The global energy system is currently undergoing a massive transformation, and in the decades ahead, it will continue to become more decentralized, digitalized and decarbonized as indicated in this 600MW strategy proposal.

To reach the commitments made under the 2015 Paris Agreement – limiting the global temperature rise to well below 2°C – this transition must accelerate. In recent years, the energy sector has become increasingly digital and it is clear that further digitalization will be a key feature of the energy transition and an essential driver of the sector's progress towards ambitious climate goals.

The energy transition in Kenya and globally together with LAPSSET Corridor must be swift and coordinated; digitalization is needed as an enabler To achieve deep decarbonization, it will be necessary to shift swiftly to an energy system with no or extraordinarily little carbon dioxide emissions.

The efforts to decarbonize our energy system in the LAPSSET Corridor are leading to an increasingly integrated and electrified energy system with much more interaction between the power, transport, industry and building sectors, and a system that will consist of interdependent energy and telecommunication networks. To accelerate the shift towards a widespread, affordable, low-carbon energy supply, there is a need for greater optimization of every aspect of this energy system, as well as greater coordination and cooperation between each component.

This requires a better understanding of, and better mechanisms to monitor and control, the ways in which power grids, buildings, industrial facilities, transport networks, and other energy-intensive sectors integrate and interact with one another. This is where digitalization comes in: it is the key to linking the different sectors into the most reliable, affordable and cleanest system possible. Optimizing each sector separately would exclude flexibility-generating options and reduce the scope for system-wide transformation processes that would maximize the benefits of digital technology for the full energy system, as well as more broadly for the Kenya economy, the environment and society within LAPSSET Corridor.

Digital technologies already automate complex processes and we have used these in the LAPSSET ESG Smartboard, orchestrate systems, and facilitate information sharing in the energy sector, and software already plays a significant role in managing our energy systems. With the explosion in the availability of data, and as performance continues to improve, digital technologies will play an increasingly central role in driving a swift and cost-efficient energy transition. These technologies will facilitate performance improvements and cost savings through a combination of automation, optimization, and the enabling of new business and operational models both within and beyond the traditional value chain of generation, transmission, distribution, trade and consumption within the LAPSSET Corridor.

Source: World Economic Forum - Harnessing Artificial Intelligence to Accelerate the Energy Transition - 2021

Decarbonizing the power sector is the starting point for full-system decarbonization. The transformation of the energy system will include a rapid expansion of the renewable power supply and vast clean electrification of heat, industry and transport. As electric vehicle (EV) adoption grows, battery storage costs decline, and buildings and heavy industry turn to net-zero electricity, the share of global energy demand met by electricity is projected to grow by 60% from 2019 to 2050. Electricity will increasingly be used to provide heating and cooling (e.g. heat pumps), transport (e.g. EVs) and even raw materials such as hydrogen (electrolyzers). As electricity supplies more sectors and applications, it will become the central pillar of the global energy supply. This will create both new opportunities for value creation and put new pressures on our current systems of power generation, transmission, trade and distribution.

LAPSSET Corridor

Presentation in ESG-SmartBoard

Welcome to LAPSSET Corridor

Sustainability Impact platform

PSECC Ltd - 15 GW Energy Development projects for LAPSSET Corridor

Green Hydrogen

Hydroelectricity

Geothermal

Solar PV

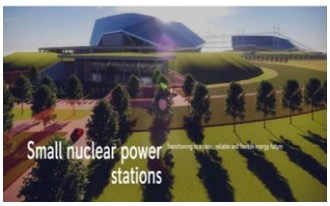
Solar PV with Food production

Wind Farms

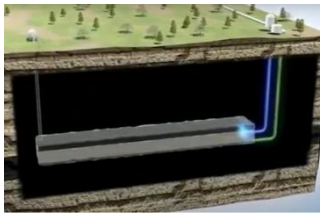
600MW - Solar farms proposed at LAMU Port and Isiolo.

Solar Farms

Pumped Hydro



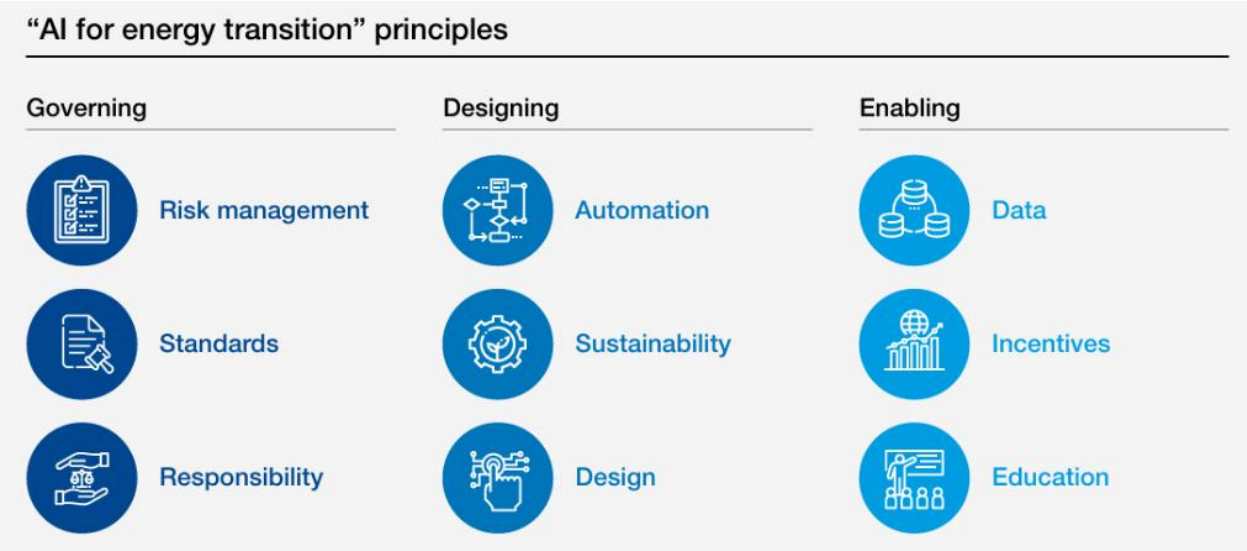
Small Modular Reactors (Nuclear – Base load)



Clean Coal Underground Gasification (SynGas – transportation fuels)

Waste Management

Tidal Energy



Website: ***https://lapsset.esg-smartboard.com/***

Password is 1952

Lists all Government Policies & Strategies

Monitoring, checks & balances, Emissions, Project control

ESG-SmartBoard

ESG - Environmental, Social & Governance

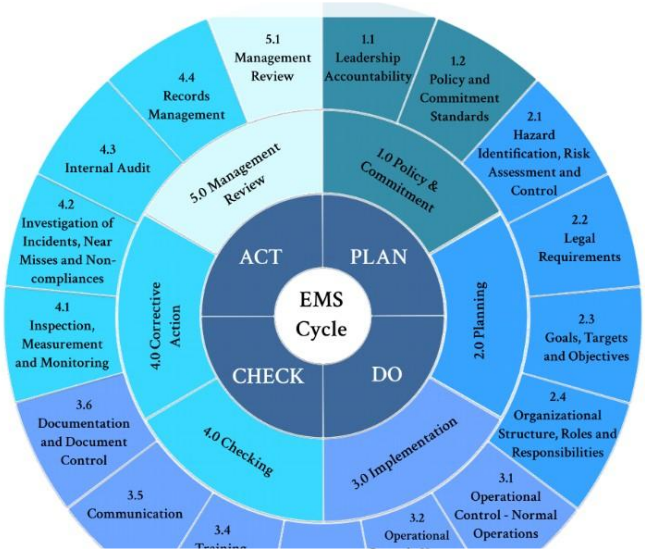
EMS - Environmental Management system

CCM - Climate Change Mitigation

PM - Project Management

CA - Company Admin

One stop platform for Environmental Management of LAPSSET Corridor



Content

Vision and Background

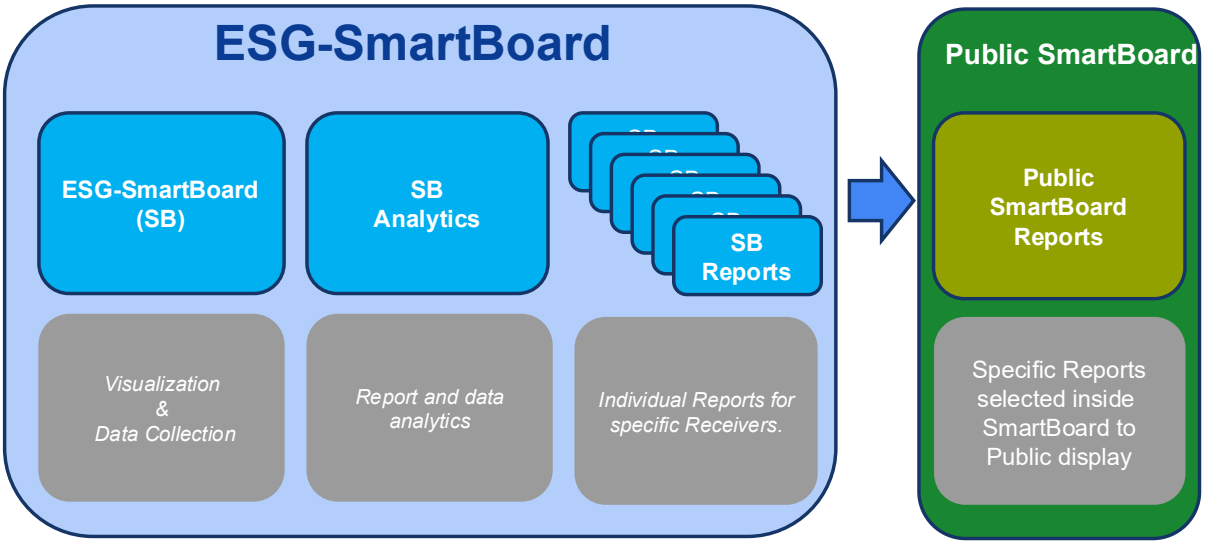
Assess and Improve energy, water, and waste management to ensure environmental compliance, good governance, and attract investment.

"The main vision behind the ESG-Smartboard with EMS is to determine current energy, water and waste usage and generation in the LAPSSET Corridor in order then to make recommendations for the Green Strategy, Energy, Water & Waste Policies going forward with LAPSSET".

"The EMS section will enable good measurement of all environmental data and continued improvement with Climate Change Mitigation and this in turn will demonstrate to investors Environmental compliance and good governance and open the door to more funding capability."

Sustainability Communication flow

Communication from ESG-SmartBoard



Reporting Sections


Resort Cities


Lamu Port


Airports


Road


SEZ's


Railway


Pipeline

Reporting Topics with Data Points


Green Corridor

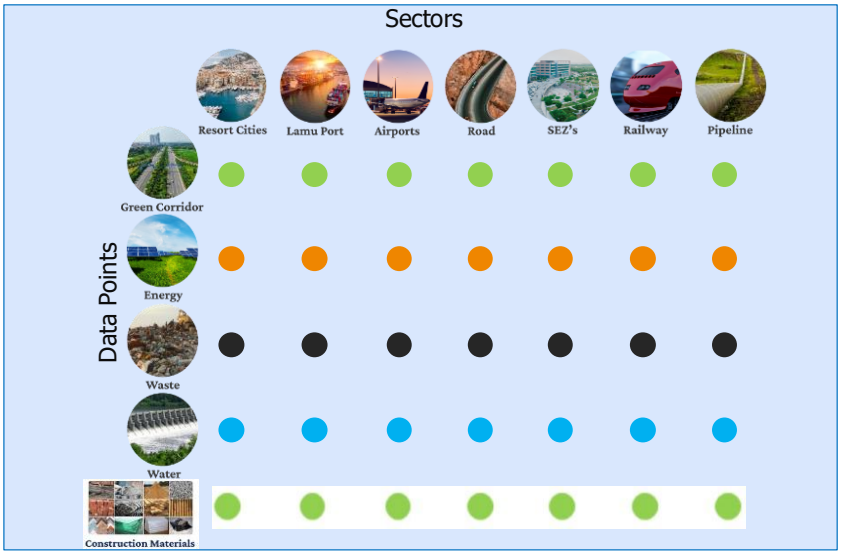

Energy


Waste


Water


Construction Materials

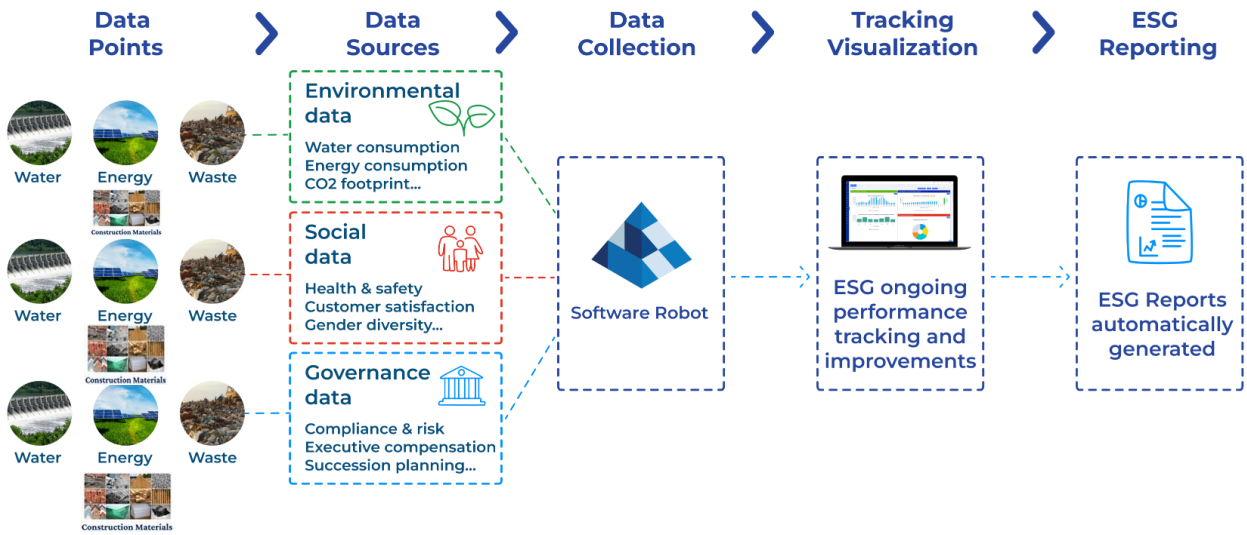
Reporting Matrix for LAPSSET Corridor



The Sustainability Impact Flow

The flow in the ESG SmartBoard, including Environmental Management System (EMS), will enable easy and reliable collection of all environmental data and continued improvement and this in turn will demonstrate to investors Environmental compliance and good governance and potentially open the door to more funding capability.

Automatic Data Collection



Automatic Data Collection

ESG-SmartBoard provides the possibility for collecting the data automatically using a Software Robot

A software robot is a dedicated software program which mimics the manual data collection and repeats the collection at a pre -set schedule.

The Robot will go straight to the source and collect the data and present them in ESG -SmartBoard.

This means near real-time reporting and ongoing improvements.

Consortium Partners

Lapsset Corridor Development Authority, Kenya

Afri Fund Capital Limited, Kenya

Port Consultants Rotterdam, Netherlands

Shive-Hattery, USA

AI/NEPAD/AFDB, Africa

Yapi Merkezi, Turkey

Kenya Railways, Kenya

Howard Humphreys, Kenya

Nico Van Der Meulen Architects, South Africa

PSECC Ltd, UK

Larsen & Toubro, India

Kenya ports Authority, Kenya

Credinvest International Finance, Malta

Dinamik Project Engineering, Turkey

African Wildlife Foundation, Kenya

Armstrong & Duncan, UK

Gleeds International, Kenya

Tony Blair Institute, UK/Kenya

Mota Engil, Portugal

Consortium Partners

#	Partner	Tags	Link
1	Lapsset Corridor Development Authority, Kenya	Infrastructure Development, Transport, Economic Integration, Regional Connectivity, Ports, Highways, Railways, Oil Pipelines	https://lapsset.go.ke/
2	Afri Fund Capital Limited, Kenya	Investment, Financial Services, Capital Management, Private Equity, Venture Capital, Economic Growth, Africa	https://afrifundcapital.com/
3	Port Consultants Rotterdam, Netherlands	Port Development, Maritime Consulting, Engineering, Logistics, Terminal Operations, Infrastructure Planning Netherlands	https://portconsultantsrotterdam.org/
4	Howard Humphreys, Kenya	Engineering Consultancy, Infrastructure, Construction, Project Management, Environmental Services, Kenya	https://howardhumphreys.co.ke/
5	PSECC Ltd, UK	Sustainable Energy, Carbon Reduction, Energy Efficiency, Renewable Energy, Carbon Management, Sustainability Consulting, UK	https://psecc.co.uk/
6	Shive-Hattery, USA	Architecture, Engineering, Design, Consulting, Infrastructure, Construction, USA	https://www.shive-hattery.com/
7	AU/NEPAD/AFDB, Africa	Regional Development, Economic Integration, Infrastructure, Policy Advocacy, Sustainable Development, Investment, Africa	https://www.afdb.org/en/news keywords/nepad
8	Tony Blair Institute, UK/Kenya	Governance, Policy Advisory, Public Sector Reform, Economic Development, Leadership, UK, Kenya	https://www.institute.global/
9	Credinvest International Finance, Malta	Finance, Investment Banking, Wealth Management, Capital Markets, Corporate Finance, Malta	https://www.credinvestonline.com/

Consortium Partners

#	Partner	Tags	Link to website
10	Dinamik Project Engineering, Turkey	Engineering, Project Management, Construction, Consultancy, Infrastructure Development, Turkey	https://www.dinamikproje.com/v2/
11	African Wildlife Foundation, Kenya	Conservation, Wildlife Protection, Environmental Sustainability, Community Development, Ecotourism Kenya, Africa	https://www.awf.org/
12	G. Nico Van Der Meulen Architects, South Africa	Architecture, Design, Residential Projects, Commercial Projects, Interior Design, South Africa	https://www.nicovdmeulen.com/
13	Armstrong & Duncan and Gleeds International / Global, Kenya	Quantity Surveying, Project Management, Construction Consultancy, Cost Management, Infrastructure Projects, Kenya	https://www.adak.co.ke/
14	Gleeds International / Global, UK	Construction Consultancy, Project Management, Cos Management, Quantity Surveying, Infrastructure, Global	https://www.gleeds.com/en/
15	Yapi Merkezi, Turkey	Construction, Engineering, Infrastructure Projects, Railway Construction, Project Management, Turkey	https://yapimerkezi.com.tr/
16	Mota Engil, Portugal	Construction, Infrastructure Development, Engineering, Project Management, Transportation, Portugal	https://www.mota-engil.com/en/
17	Larsen & Toubro, India	Engineering, Construction, Technology, Infrastructure, Manufacturing, Project Management, India	https://www.larsentoubro.com/
18	Kenya ports Authority, Kenya	Port Management, Maritime Operations, Logistics, Shipping, Infrastructure, Kenya	https://www.kpa.co.ke/
19	Kenya Railways, Kenya	Rail Transport, Infrastructure Development, Logistics, Transportation, Rail Network, Kenya	https://krc.co.ke/

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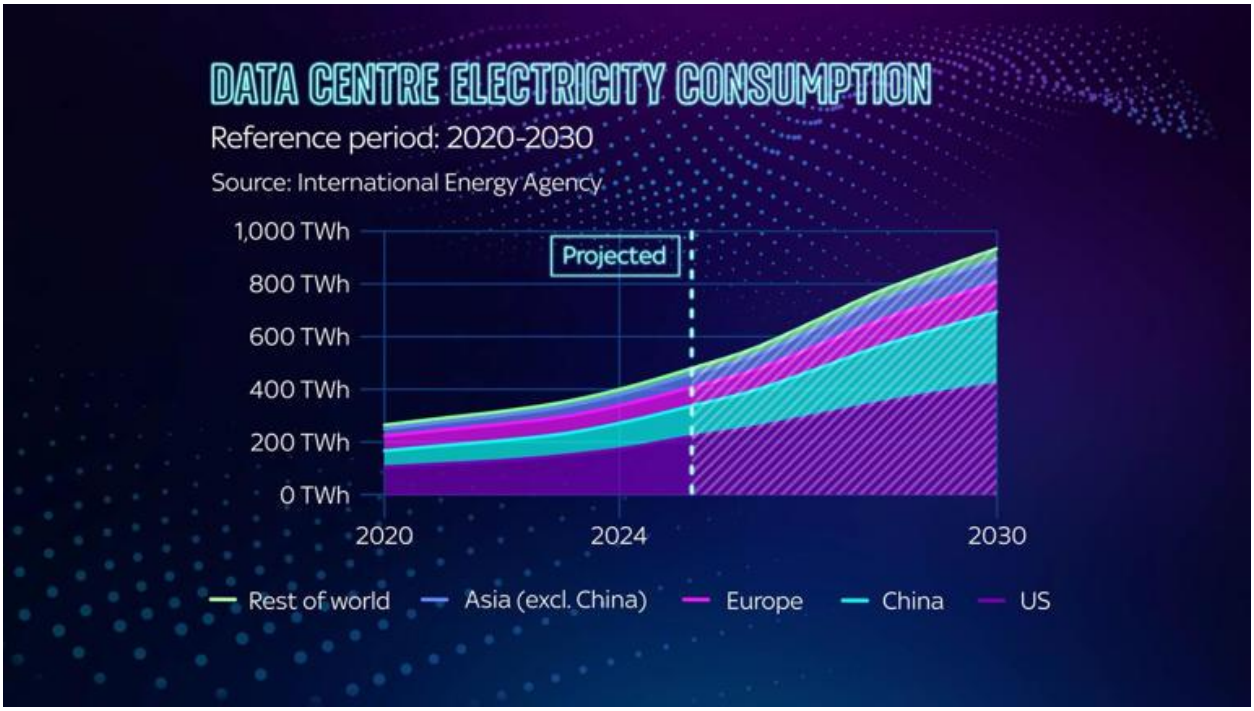
Generic Report

Data

Blog

Amount of electricity needed to power world's data centres expected to double in five years

This is important for the LAPSSET Corridor in order to make allowances for increased electricity use and the possible siting of new Data Centres within the SEZ's.



Source: (IEA) - The amount of electricity needed to power the world's data centres is expected to double in the next five years, according to the International Energy Agency (IEA).

It will come as racks of servers hosting the latest AI models and cloud computing services use three times more electricity than the UK each year, the agency added. The rise in demand, predicted to be highly concentrated around the world's tech and population hubs, will put pressure on utility companies, grid infrastructure and the planet.

"AI is one of the biggest stories in the energy world today," says Fatih Birol, executive director of the IEA. "In the United States, data centres are on course to account for almost half of the growth in electricity demand; in Japan, more than half; and in Malaysia, as much as one-fifth."

In the US, data centres, largely being built to train and operate AI, are expected to consume more electricity by 2030 than the manufacturing of all the nation's energy-intensive goods including Aluminum, steel, cement and chemicals, a report from the IEA found.

But the agency also predicts that AI will be an essential tool in informing us how to manage future energy demand, engineer more efficient data centres and accelerate the development of new, cleaner sources of electricity generation.

ECO-HUB
SERVICES LTD
Environmentally Certified

OMNICORP INTERNATIONAL LTD & ECO-HUB SERVICES LTD JOINT VENTURE PROPOSAL FOR ENVIRONMENT & SOCIAL IMPACT ASSESSMENT PROPOSAL

FOR THE PROPOSED 300MWp SOLAR PROJECT (GROUND MOUNTED) PROJECT LAMU & ISIOLO

12TH APRIL 2025

RESPONSIBILITIES

	DATE	NAME	FUNCTION
Elaboration	12.04.2025	John Oirere	Lead Environment, Health, and Safety Consultant
	12.04.2025	Vincent Odhiambo	Overall Project Head and Coordinator.

REVISION HISTORY

VERSION	DATE	AUTHOR	COMMENTS

Prepared for:

PSECC LIMITED

ATT; Alan Brewer
MSc. Environmental Engineering
PGrad Dip Env Eng. PGrad Cert Env Eng.

Introduction

The National Environment Management Authority (NEMA) oversees all aspects the of ESIA process in Kenya. The Environmental Management and Co-ordination Act (EMCA Cap 387), stipulates that an ESIA study shall be conducted in accordance with the general ESIA guidelines and administrative procedures issued by the Authority.

A detailed work plan to be employed has been outlined towards the end of this sub-

section. **Data collection procedures**

The data collection will be carried out through issuance of questionnaires/ standard interview schedules, use of checklists and matrices, observations and photography, site visits, desk top environmental studies and scientific tests, where necessary in the manner specified in the Environmental (Impact Assessment and Audit) Regulations, 2003.

In brief, the study process will use the following key methods to gather required data: -

- Reconnaissance Surveys
- Public Participation Questionnaires
- Public Forums/ Community/ Stakeholders Consultations
- EIA Matrices
- EIA Checklists

Information required

The following information is required in order to complete the scope of works related to the proposed project undertaking.

- Any existing project reports detailing project technical details/ description and objectives,
- Summarized Bill of Quantities/ costs (stamped by a Quantity Surveyor),
- Project development program,
- Architectural drawings approved by the county physical planner from the County,
- Contact persons in the field,
- Projected development program for the project,
- Provision of a list of the major stakeholders involved in the development,
- Introduction letters/documents to be provided to the consultants while in the field sites and communities/neighbors,
- Project feasibility study report (if any)
- Full access to other relevant information to the extent of its availability,
- Full access to the project site belonging to the client as the consultant may request,
- Any other data/ information relevant to the study should be provided,
- A copy land ownership document (title deed/ lease title).

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT TASKS

The proposed ESIA project report will mainly aim at developing systems that shall be environmentally friendly, economically viable, socially acceptable and sustainable for the project. To achieve these objectives and Terms of Reference (TOR) the project will be undertaken under the following Key Tasks as outlined below: -

Task 1: ESIA Screening and Scoping

To undertake a consultative ESIA screening and scoping through desktop studies, literature review, development and administration of checklists, identification and preliminary consultations with key stakeholders, reconnaissance trip to the project area and identification of key issues. The key issues that will emerge during the screening stage will be included in the ESIA Study Report and TORs that will be developed for approval by NEMA. The TORs for NEMA approval as required by EMCA Cap 387 will outline the main outputs of this task that will be carried out in the first week of the ESIA study. It will give provision for scoping the key issues identified and to be addressed in the study.

Task 2: Description of the Proposed Project

The Consultant will provide a good description of the relevant components of the project based on the existing baseline surveys and existing maps (at appropriate scale) where necessary and including the following information: location; general layout of activities/ components, approaches, operations, required off -site investments; and life span. The final project objectives should be outlined. This information will be collected from existing project documents and interviews of the project proponents/ developers.

Task 3: Description of the Environment/ Baseline Surveys

The Consultant will assemble, evaluate and present baseline data on the relevant environmental characteristics of the study area. This task refers to all baseline surveys outlined below:

- The climate, habitat and vegetation, soils, geology, demographic and settlement characteristics; the physical environment; historical archeological monuments and cultural heritage etc.
- The socio-economic profile of the area in terms of existing population trends, road and communication networks, key economic activities, etc.

This data will be generated using the methodology described above and field surveys using questionnaires. Secondary data sources like government institutions will be a supplement for this component.

Task 4: Analysis of the Legislative and Regulatory Considerations

Describe the pertinent international, regional and national (NEMA) regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, sitting, land use control, etc., at international, national, regional and local levels. This will set the environmental legal and institutional framework for future by the management of the proposed project. The focus will be on EMCA CAP 387, Water Act 2016, Public Health Act, Occupational Safety and Health Act 2007, Vision 2030, County laws, World Banks IFC Guidelines, International Multilateral Environmental Agreements etc.

Task 5: Determination of the Potential Impacts of the Proposed Project

The consultant will analyze and distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. Impacts which are unavoidable or irreversible will be identified. Wherever possible, description of impacts quantitatively, in terms of environmental costs and benefits will be undertaken and assign economic values when and where feasible. The extent and quality of available data will be characterized, explaining significant information deficiencies and any uncertainties associated with predictions of impact. When describing the impacts, the consultant will indicate those that are irreversible or unavoidable and which can be mitigated. The consultant will also identify the types of special studies likely to be needed for this project in future.

Task 6: Public Consultations and Inter-Agency Coordination

Public participation is an important aspect in ESIA undertaking as stipulated by both the Constitution of Kenya and EMCA 1999. The consultant will assist in coordinating the environmental assessment with other government agencies, in obtaining the views of local people/ businesses, affected groups, and in keeping records of meetings and other activities, communications, and comments and their dispositions. Such activities will include focus group meetings, environmental briefings for project staff and interagency committees, support to environmental advisory panels and public forums as need will arise.

Task 7: Analysis of the Alternatives to the Proposed Project

The consultant will describe alternatives that will be examined in the course of developing the proposed project and identify other alternatives which would achieve the same objectives. The concept of alternatives will extend to sitting, design, technology selection, implementation and phasing, and operating and maintenance procedures. Comparison of alternatives in terms of potential environmental impacts; capital and operating costs; suitability under local conditions; and instructional, training, and monitoring requirements will be done. To the extent possible, the costs and benefits of each alternative will be quantified incorporating the estimated costs of any associated mitigating measures. The consultant will include the alternative of not implementing the project, in order to demonstrate the environmental conditions without it.

Task 8: Development of Environmental and Social Management Plan to Mitigate Negative Impacts

The consultant will recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels. The impact and costs of those measures and of the institutional and training requirements to implement them will be estimated using current and project market prices of materials and services. Compensation to the affected parties (if any) for impacts which cannot be mitigated will be considered where need arises. A comprehensive environmental and social management plan including proposed work programs, budget / cost estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measure will be prepared.

Task 9: Development of Environmental Monitoring Plan

The consultant will prepare a detailed plan to monitor the implementation of mitigating measures and the impacts of the project during the whole cycle. Key parameters to be monitored and procedures will be identified clearly. An estimate of capital of operating costs and a description of other inputs (such as training and instructional strengthening) needed to carry out the monitoring will be included in the plan.

Task 10: ESIA Project Report Compilation

This will be a continuous exercise throughout the process until final submission. The environmental assessment Report will be concise and limited to significant environmental issues. The main text will focus on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting those data. Detailed or un-interpreted data will not be appropriate in the main text and will be presented in apprentices or a separate volume. The final Environmental and Social Impact Assessment Project Report will be outlined as below.

1. Cover Page
2. Declaration by NEMA ESIA Lead experts and the proponent
3. Executive Summary
4. Policy, Legal and Administrative Framework

5. Description of the Proposed Project
6. Description of the Environment/ Baseline Survey
7. Public Consultation and Participation
8. Significant Environmental Impacts
9. Analysis of Alternatives
10. Environmental Mitigation Management Plan
11. Environmental Monitoring Plan
12. List of References
13. Appendices

TIME SCHEDULE FOR THE ESIA UNDERTAKING

The data collection and ESIA Report submission to NEMA will take a maximum of 30 - 45 working days after the commencement of the work. The approval process will take a maximum of 45-90 days after submission of the project report to NEMA as required in EMCA, 1999. This is detailed in the table below.

Report Due/Activities	WEEKS		
	1-3	4-5	6-12
Task 1: Mobilization period / ESIA Screening and Scoping/ ESIA			
Task 2: Description of the Proposed Project			
Task 3: Description of the Environment/ Baseline Surveys			
Task 4: Analysis of the Legislative and regulatory Considerations			
Task 5: Determination of the Potential Impacts of the Proposed Project			
Task 6: Analysis of the Alternatives to the Proposal Project			
Task 7: Development of Environmental Management Plan to Mitigate Negative Impacts			
Task 8: Development of Environmental Monitoring Plan			
Task 9: Identification of Institutional Needs to Implement ESIA Recommendations			
Task 10: Inter-Agency Coordination and Public Participation			
Task 11: Final ESIA Project Report Compilation, Review and Final Submission to Proponent/ Developer and NEMA			
Task 12: Processing of ESIA Report Approval and License by NEMA			

FINANCIAL PROPOSAL

S/N	ITEM	RATE (Kshs.)
1	Professional Fee for ESIA Team	2,850,000.00.00
2	Field Work Expenses (Subsistence, Travels, Field Assistants, etc)	825,000.00.00
3	Public/ Community/ Neighbours' Consultations	690,000.00.00
4	Office Supplies, Telephone, Administration, Insurance and Publication of Reports	450,000.00.00
5	Contingencies	350,750.00
Sub-total of ESIA (VAT Exclusive)		**5,165,750.00**
VAT (16%)		**826,520.00**
Total Cost of the ESIA (VAT Inclusive)		**5,992,270.00**

Payment Terms:

- 50% on signing;
- 30% on report submission to NEMA;
- 20% on delivery of NEMA License.

Notes:

The Environmental Impact Assessment processing and monitoring fee of 0.1% of the total project cost has not been factored in the above cost. This fee will be established based on the approved BoQ (project cost).

OMNICORP INTERNATIONAL LIMITED
P. O. Box 45322-00800 NAIROBI

VINCENT ODHIAMBO

C.E.O

Chief representative; Omnicorp ECO-Hub Joint Venture.

中国城乡控股集团有限公司
CHINA URBAN-RURAL HOLDINGS GROUP CO.,LTD.

LETTER OF INTEREST

Date: April 25, 2025

Attn:
Alan Brewer MSc,
Director PSECC Ltd,
Horizon Consortium,
(LAPSSET Corridor),
Kenya

SUBJECT: 300MW Solar Project at Lamu Port of Kenya

Dear Sir,

We would like to thank you for your invitation to participate in multiple projects as following and glad to give EPC estimation for them.

1. EPC Cost Estimation

The total EPC cost is estimated at 120million USD for 300MW (DC side) Solar PV. The Unit price is around 400 USD per DC kilowatt, not including any tax , import duties and VAT of Kenya .

2. Working Scope and Boundary Conditions

2.1 Contractor 's scope of work includes photovoltaic area, substation , including: power plant design, equipment and material procurement, transportation, construction, installation, project management, commissioning, testing, and handover, It also includes the booster station within the plant, simple fencing, surveillance system, but excluding: power transmission line, grid access fee, land acquisition, clearing and removal of buildings and vegetation on the ground, and local government approval that is not related to power

plant construction and installation. The work interface is the substation outlet. the EPC solutions are proposed as below:

but not include significant administrative buildings, roads.

The total DC capacity is as above mentioned. 650Wp Mono-crystalline silicon Bi-facial PV Modules, single-axis tracking system(±60 degree) for PV module mounting system, 6250kW(50℃) centralized inverters are adopted.

The scope of work is engineering, procurement, construction, installation, commissioning of the PV solar Plants. All transmission lines shall be excluded in the EPC scope.

2.2 If the basic conditions vary, the price will be adjusted accordingly.

2.3 The current design is based on assumed geological conditions due to detailed geotechnical report not available in the RFP.

2.4 PV module, inverter and electrical/instrumental parts of trackers are imported from China, other equipment and material are considered to procured locally.

3. Technical Conditions

Please refer to the technical proposal to be provided later.

4. Explanation to Proposed Price

4.1 The following items are considered in the offer price:

EPC Contractor's/Subcontractor's freight Insurance, Employer's Liability/Worker's Compensation Insurance, Automobile Insurance is included in offer scope.

4.2 the following items are not included:

The financing cost of the project and the cost of forfeiting or buyout of accounts payable if EPC contractor is paid with usance letter of credit.

4.3 There should be price adjustment when the owner's proposed design and our proposal are different, such as PV module, inverter, tracker etc.

4.4 There should be price adjustment when the owner changes the clauses on payment.

4.5 The offer is based on the following commercial condition : please refer to the commercial articles submitted in EPC contract draft.

4.6 Local content value is not considered.

4.7 Advance payment is 30% of the contract value.

5.Others

5.1 The offer is based on the time schedule of 16 months from NTP up to COD. If the time schedule is changed, the offer will be changed accordingly.

5.2 The Currency for bidding and payment is US Dollars.

5.3 The estimation is non-binding with limited inputs from RFP and based on (but not limited to) all above notes, assumptions, clarifications with the owner and deviation, the quotation will be adjusted according to the change of above notes and assumptions or anything not mentioned may affect the quotation.

Yours Sincerely,

CHEN Xuekui

Director of Market

Overseas Business Department

"Company Brochure in separate document"

Initial detailed task list with dependencies for your **LAMU 300MW Solar Farm Gantt Chart**, subject to final changes.

This 600MW early-stage proposal is one where Solar Farms are chosen as the "Least Cost Option" and fastest to build.

One of the EPC selected is China Urban-Rural Holding Group Co. Ltd, parent company CCCC - This EPC company has the ability to install 3MW per day so for a 300MW solar farm it could be possible to do this in 100 day, our realistic time period is within 200 to 300 days, which is a very fast delivery.

---

1. Feasibility Study (Jun–Aug 2025)

Task	Start	End	Dependencies
Solar resource assessment	01-Jun-2025	15-Jun-2025	None
Land survey & geotechnical study	16-Jun-2025	30-Jun-2025	Solar data complete
Environmental Impact Assessment	16-Jun-2025	31-Jul-2025	Land survey complete
Financial modelling & ROI analysis	01-Jul-2025	15-July-2025	All above data
Feasibility report submission	18-Aug-2025	29-Aug-2025	Financial model approved

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2. Permitting & Approvals (Jul 2025-Aug 2026)

Task	Start	End	Dependencies
Land acquisition allocation	01-Jul-2025	15-Jul-2025	Feasibility started
NEMA (environmental) approval	16-Jul-2025	16-Oct-2025	ESIA draft complete
ERC license application	17-Oct-2025	16-Jan-2026	NEMA approval
PPA signing with Kenya Power	19-Jan-2026	31-March-2026	ERC license obtained

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3. Design & Procurement (Sep–Oct 2025)

Task	Start	End	Dependencies
PV array & electrical design	22-Sep-2025	26-Sep-2025	Permits secured
EPC contractor agreed costs	8-Sep-2025	15-Sep-2025	Design 50% complete
Solar panel procurement order	16-Sep-2025	17-Sep-2025	EPC selected
Transformer/inverter procurement	16-Sep-2025	30-Sep-2025	Design finalized

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4. Construction (Oct 2025–Dec 2026)

Task	Start	End	Dependencies
Civil Works			
Site clearing & fencing	01-Oct-2025	31-Dec-2025	Equipment on-site
Foundation installation	01-Jan-2026	02-Mar-2026	Site cleared
Electrical Infrastructure			
Substation connection review	03-Mar-2026	31-Mar-2026	Foundations complete
Cable trenching & laying	01-Apr-2026	29-May-2026	Substation 50% done
PV Installation			
Mounting structure assembly	01-Jun-2026	31-Aug-2026	Cable trenches ready
Solar panel installation	01-Sep-2026	30-Oct-2026	All structures up
Grid Integration			
Transformer/inverter commissioning	03-Nov-2026	01-Dec-2026	Panels installed
Grid connection testing	01-Dec-2026	12-Dec-2026	All systems energized

5. Commissioning (Dec 2026)

Task	Start	End	Dependencies
Performance testing (PV & grid)	14-Dec-2026	21-Dec-2026	Construction complete
Commercial Operation Date (COD)	22-Dec-2026	30-Dec-2026	Testing passed

---

Gantt Chart Template Setup

1. **Tool Recommendation**: Use **Microsoft Project** or **Excel** with conditional formatting.
2. **Dependencies**:

   Link tasks with **Finish-to-Start (FS)** relationships (e.g., ESIA must finish before NEMA approval).

   Highlight **critical path**: Permitting → Design → Procurement → Construction.
3. **Milestones**:

   Feasibility report approved (29-Aug-2025)

   PPA signed (31-Macrh-2026)

   Construction start (01-Oct-2025)

   COD achieved (30-Dec-2026)

Risk Mitigation Buffers

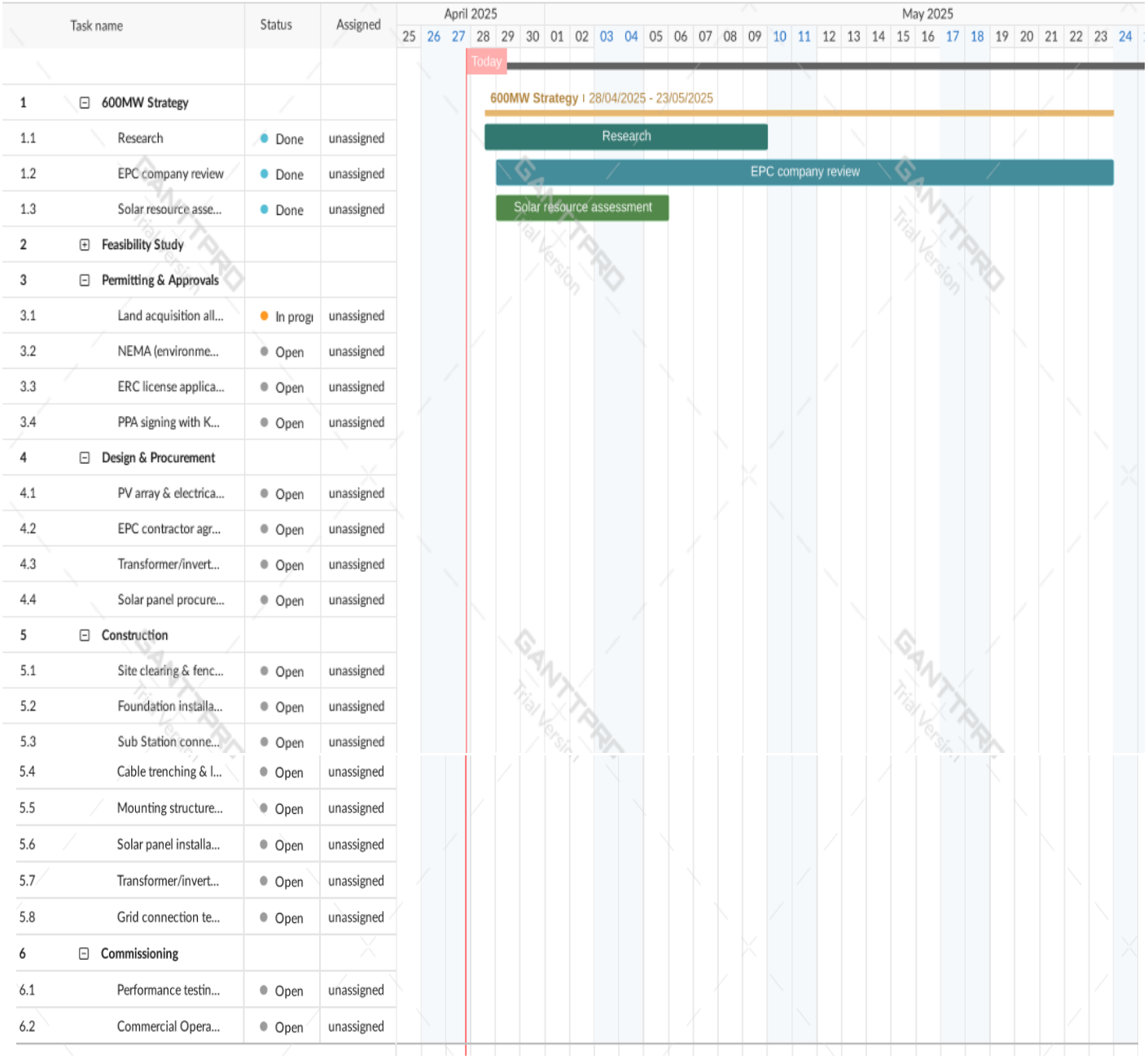
- Add **2-week buffers** after:

  Permitting (risk: delays in NEMA/ERC)

  Procurement (risk: shipping delays)

Snapshot

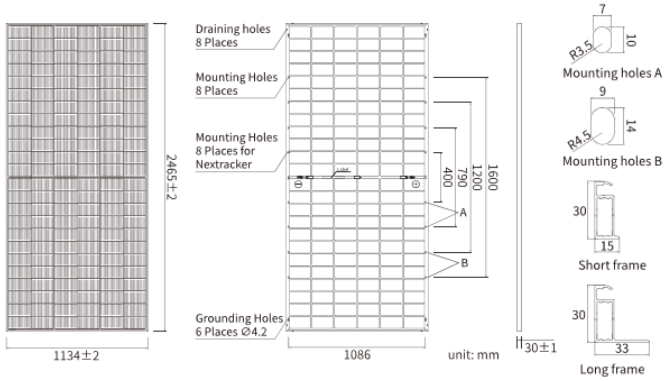
PSECC Ltd | LAMU 300MW Solar Farm




Harvest the Sunshine
650W
JA SOLAR
JAM72D42 LB
n-type Double Glass Bifacial Modules
Premium Cells
26%
Premium Modules
Comprehensive Certificates
DEEP BLUE 4.0

Type designation	SG350HX-20
Input (DC)	
Max. PV input voltage	1500 V
Min. PV input voltage / Startup input voltage	500 V / 550 V
Nominal PV input voltage	1080 V
MPP voltage range	500 V – 1500 V
No. of independent MPP inputs	6
Max. number of input connector per MPPT	5
Max. PV input current	6 * 75 A
Max. DC short-circuit current per MPPT	6 * 125 A
Output (AC)	
AC output power	352 kVA @ 30 ℃ / 320 kVA @ 40 ℃ / 295 kVA @ 50 ℃
Max. AC output current	254 A
Nominal output current	231 A
Nominal AC voltage	3 / PE, 800 V
AC voltage range	640 V – 920 V
Nominal grid frequency / Grid frequency range	50 Hz / 45 Hz – 55 Hz, 60 Hz / 55 Hz – 65 Hz
THD *	< 1 % (Rated Condition)
DC current injection	< 0.5 % In
Power factor at nominal power / Adjustable power factor	> 0.99 / 0.8 leading – 0.8 lagging
Feed-in phases / Connection phases	3 / 3
Efficiency	
Max. efficiency / European efficiency	99.02 % / 98.8 %
Protection	
DC reverse connection protection	Yes
AC short circuit protection	Yes
Leakage current protection	Yes
Grid monitoring	Yes
Ground fault monitoring	Yes
DC switch / AC switch	Yes / No
PV string current monitoring	Yes
Q at night function	Yes
Anti-PID and PID recovery function	Optional
Surge protection	DC Type II / AC Type II
General data	
Dimensions (W*H*D)	1148 mm * 779 mm * 371 mm
Weight **	≤ 106 kg
Isolation method	Transformerless
Degree of protection	IP66
Power consumption at night	< 6 W
Operating ambient temperature range ***	-30 ℃ to 60 ℃
Allowable relative humidity range	0 % – 100 %
Cooling method	Smart forced air cooling
Max. operating altitude	5000 m (> 4000 m derating)
Display	LED, Bluetooth+APP
Communication	RS485 / PLC
DC connection type	Evo2
AC connection type	Support OT/DT terminal (Max. 400 mm²)
Compliance	IEC 62109, IEC 61727, IEC 62116, IEC 60068, IEC 61683, VDE-AR-N 4110:2018, VDE-AR-N 4120:2018, EN 50549-2, UNE 217002, NTS, UTE C15-712-1:2013
Grid Support	LVRT, HVRT,active & reactive power control and power ramp rate control, Q-U control, P-f control

* Rated Condition: PV input voltage 1080V, AC voltage 800V, AC output power 320kW.
** Due to the multi-supplier for some key components, the actual weight may have a ± 8 % deviation, please refer to the actually delivered product.
*** The ambient temperature is determined as the average temperature obtained from at least four evenly distributed temperature monitoring points located at a distance of 1 meter from the equipment, at a height halfway up the machine. The temperature sensors must be shielded from airflow, thermal radiation, and rapid temperature fluctuations to prevent display inaccuracies.



MECHANICAL PARAMETERS

Cell	Mono
Weight	34.6kg
Dimensions	2465±2mm×1134±2mm×30±1mm
Cable Cross Section Size	4mm²(IEC), 12 AWG(UL)
No. of cells	144(6×24)
Junction Box	IP68, 3 diodes
Connector	QC 4.10-351/ MC4-EVO2A
Cable Length (Including Connector)	Portrait: 300mm(+) /400mm(-) Landscape: 1500mm(+)/1500mm(-)
Front Glass/Back Glass	2.0mm/2.0mm
Packaging Configuration	36pcs/Pallet, 576pcs/40HQ Container

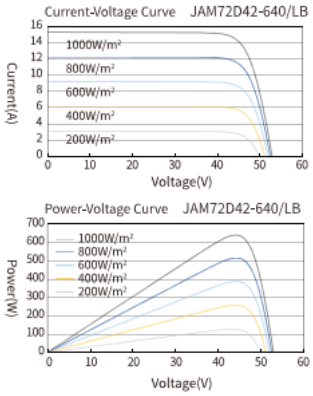
Remark: customized frame color and cable length available upon request

ELECTRICAL PARAMETERS AT STC

TYPE	JAM72D42 -625/LB	JAM72D42 -630/LB	JAM72D42 -635/LB	JAM72D42 -640/LB	JAM72D42 -645/LB	JAM72D42 -650/LB
Rated Maximum Power(Pmax) [W]	625	630	635	640	645	650
Open Circuit Voltage (Voc) [V]	52.27	52.47	52.67	52.87	53.07	53.27
Maximum Power Voltage(Vmp) [V]	43.71	43.90	44.10	44.29	44.49	44.67
Short Circuit Current(Isc) [A]	15.16	15.21	15.26	15.31	15.36	15.41
Maximum Power Current(Imp) [A]	14.30	14.35	14.40	14.45	14.50	14.55
Module Efficiency [%]	22.4	22.5	22.7	22.9	23.1	23.3
Power Tolerance	0~+3%					
Temperature Coefficient of Isc(α_Isc)	+0.045%/°C					
Temperature Coefficient of Voc (β_Voc)	-0.250%/°C					
Temperature Coefficient of Pmax(γ_Pmp)	-0.290%/°C					
STC	Irradiance 1000W/m², cell temperature 25°C, AM1.5G					

Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer.
They only serve for comparison among different module types.

CHARACTERISTICS



ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO

TYPE	JAM72D42 -625/LB	JAM72D42 -630/LB	JAM72D42 -635/LB	JAM72D42 -640/LB	JAM72D42 -645/LB	JAM72D42 -650/LB
Rated Max Power(Pmax) [W]	675	680	686	691	697	702
Open Circuit Voltage(Voc) [V]	52.27	52.47	52.67	52.87	53.07	53.27
Max Power Voltage(Vmp) [V]	43.71	43.90	44.10	44.29	44.49	44.67
Short Circuit Current(Isc) [A]	16.37	16.43	16.48	16.53	16.59	16.64
Max Power Current(Imp) [A]	15.44	15.50	15.55	15.61	15.66	15.71
Irradiation Ratio (rear/front)	10%					

* For Nextracker installations, maximum static load please take compatibility approve letter between JA Solar and Nextracker for reference.

OPERATING CONDITIONS

Maximum System Voltage	1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	30A
Maximum Static Load, Front*	5400Pa(112 lb/ft²)
Maximum Static Load, Back*	2400Pa(50 lb/ft²)
NOCT	45±2°C
Bifaciality	80%±5%
Safety Class	Class II
Fire Performance	UL Type 29/Class C

SG350HX-20

Multi-MPPT String Inverter for 1500 Vdc System

HIGH YIELD

- Up to 6 MPPTs with max. efficiency 99%
- 75A per MPPT, adapt to different PV module
- Max 30 inputs, adapt to different DC/AC ratios

LOW COST

- Q at night function, save investment
- Power line communication (PLC)
- Smart IV Curve diagnosis, active O&M

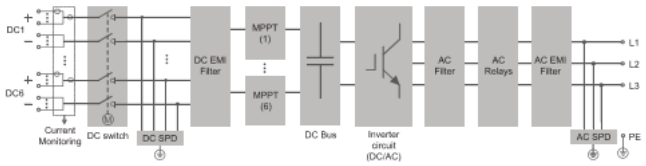
PROVEN SAFETY

- Intelligent DC switch, automatically cut off the fault
- 24h real-time AC and DC insulation monitoring
- IP66 protection, C5 design, adapt to all kinds of harsh environment
- Smart-cooled and dedusted fan with IP68 protection, low temperature rise, long lifecycle

GRID-FRIENDLY

- SCR≥1.1 stable operation in extremely weak grid
- Fastest Reactive power response time 30ms
- Compliant with global grid code

CIRCUIT DIAGRAM



EFFICIENCY CURVE

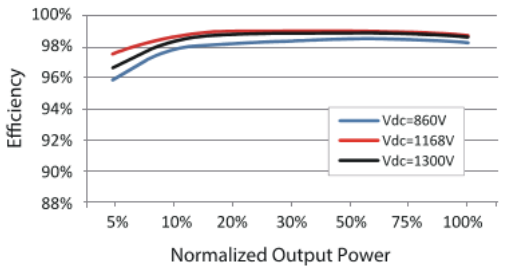


Table 5 Main characteristics of the single-axis trackers

Single-axis tracker characteristics	
Technology	Single-row
Configuration	1V
Tracking angle limits	+60 / -60 °
Number of modules per row	60 modules (maximum 90 modules)
Pitch distance	6.5 m
Minimum ground clearance	0.5 m
Designed for	BIFACIAL modules
Motor gap	2300.0 mm
Torque beam gap	0.0 mm
Gap between modules in the axis direction	0.0 mm
Gap between modules in the pitch direction	0.0 mm

Project Management Gantt Chart

CONTACT US

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