



KAINJI HYDROELECTRIC DAM & WASTE WATER TREATMENT

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LOCATION

Lagos, Nigeria

About Lagos

- Lagos has a population of nearly 16,000,000
- 15% of residents have access to adequate sanitation services
- Only 55% of residents in Lagos have access to clean water

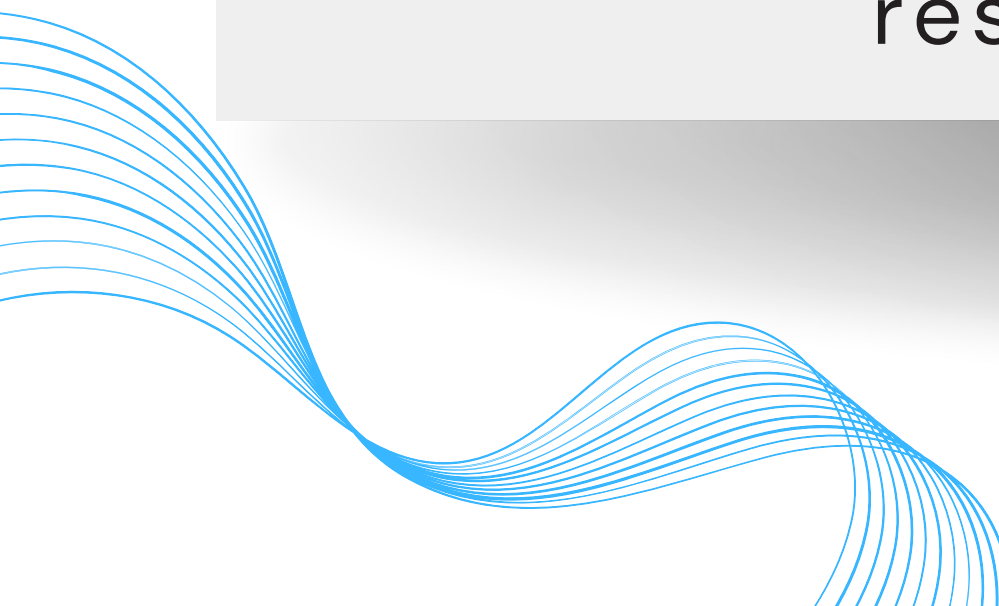


WHAT THE PROJECT WILL ACCOMPLISH



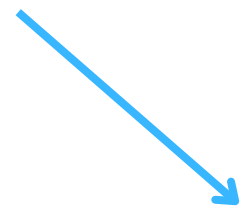
Goals of the project:

- Provide sanitary and sustainable recycling of waste
- Generate renewable energy from toxic wastewater
- Produce clean drinking water to residents of Lagos

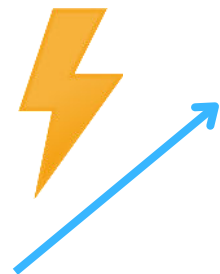


HOW WILL THE PROJECT WORK?

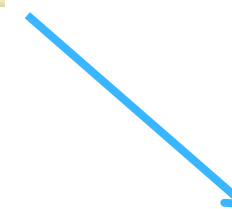
Public Toilets



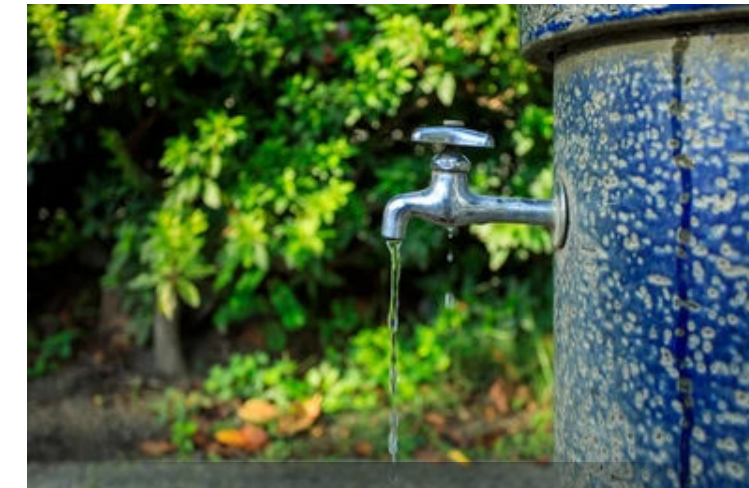
Kainji Dam



Lagos State Water Corp.



Public Faucets

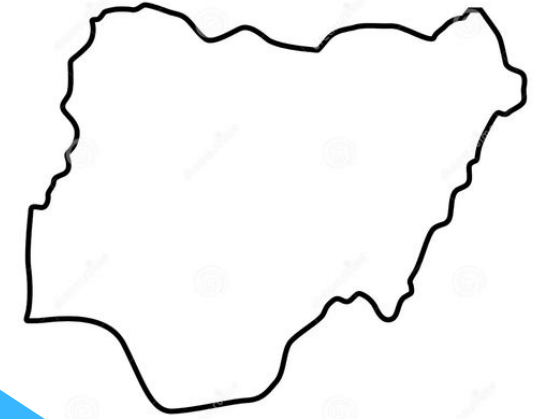


WHY IS THIS PROJECT IMPORTANT?



- Increase access to sanitary restrooms, which will help to reduce the spread of diseases and illnesses
- Increase access to convenient clean drinking water that will further prevent sickness and improve quality of life
- Increased power production due to extra input from sewage can lighten the need for importing electricity
- Improve sanitation and water access issues through a mostly renewable cycle

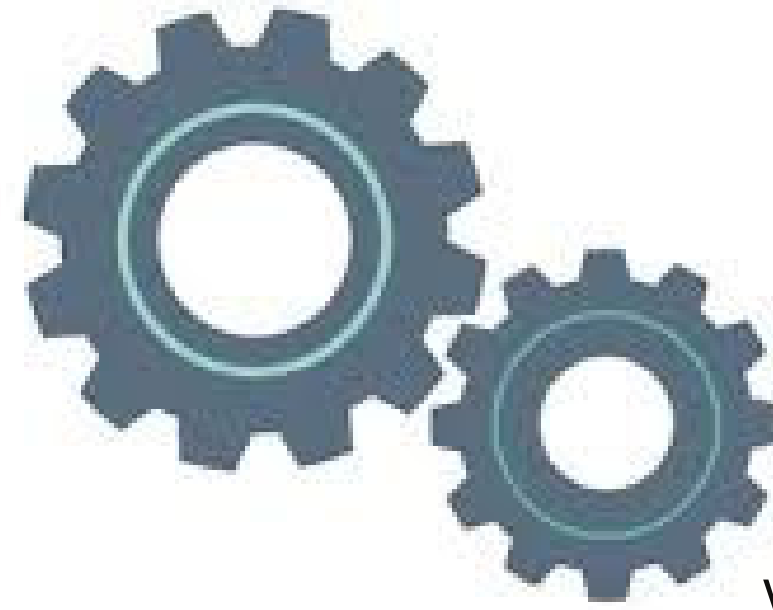
WHY LAGOS?



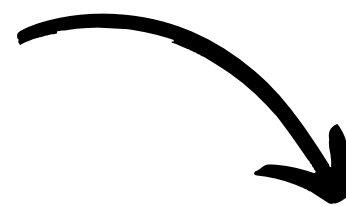
- Most facilities that are needed to carry out the project are already established
- The hydro plant is upstream of the water treatment facility
- The water treatment facility is right next to the city

MECHANICAL OPERATION

How we are able to power turbines with waste water and then treat the waste water



Collected waste water is transported to the reservoir at Kainji Dam by the waste trucks
STEP 1



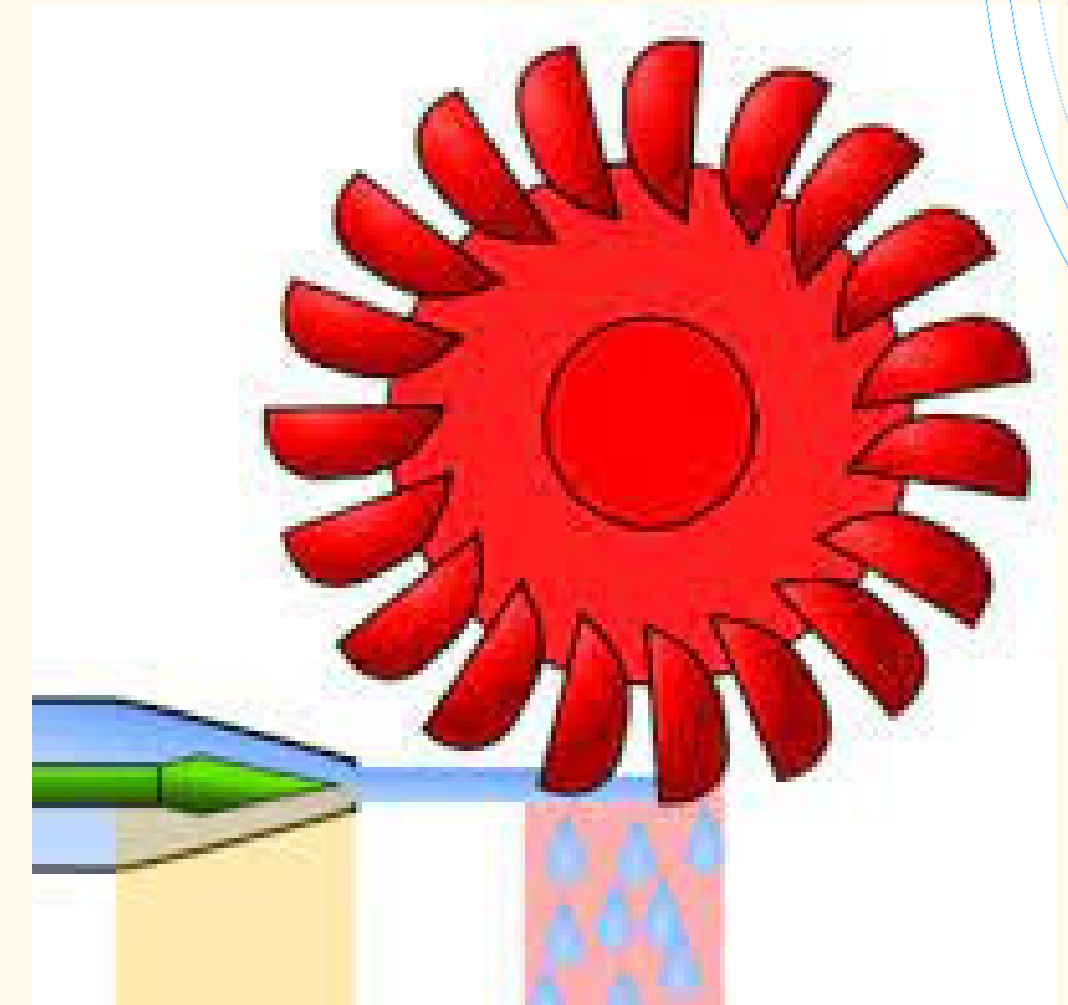
Waste water is pumped through nozzles our four Pelton Turbines and after use is funneled into the waste pipes
STEP 2



Waste water is moved through pipes to the Lagos State Waste Water Treatment plants, to clean and purify the waste into potable water
STEP 3

REQUIRED CAPITAL

- Pipes created with Duplex steel and with an interior ceramic coating
- Four 35 MW Pelton Turbines
- Three Nozzles on each turbine
- Reservoir for waste water (25 km³)
- Trained and untrained labor

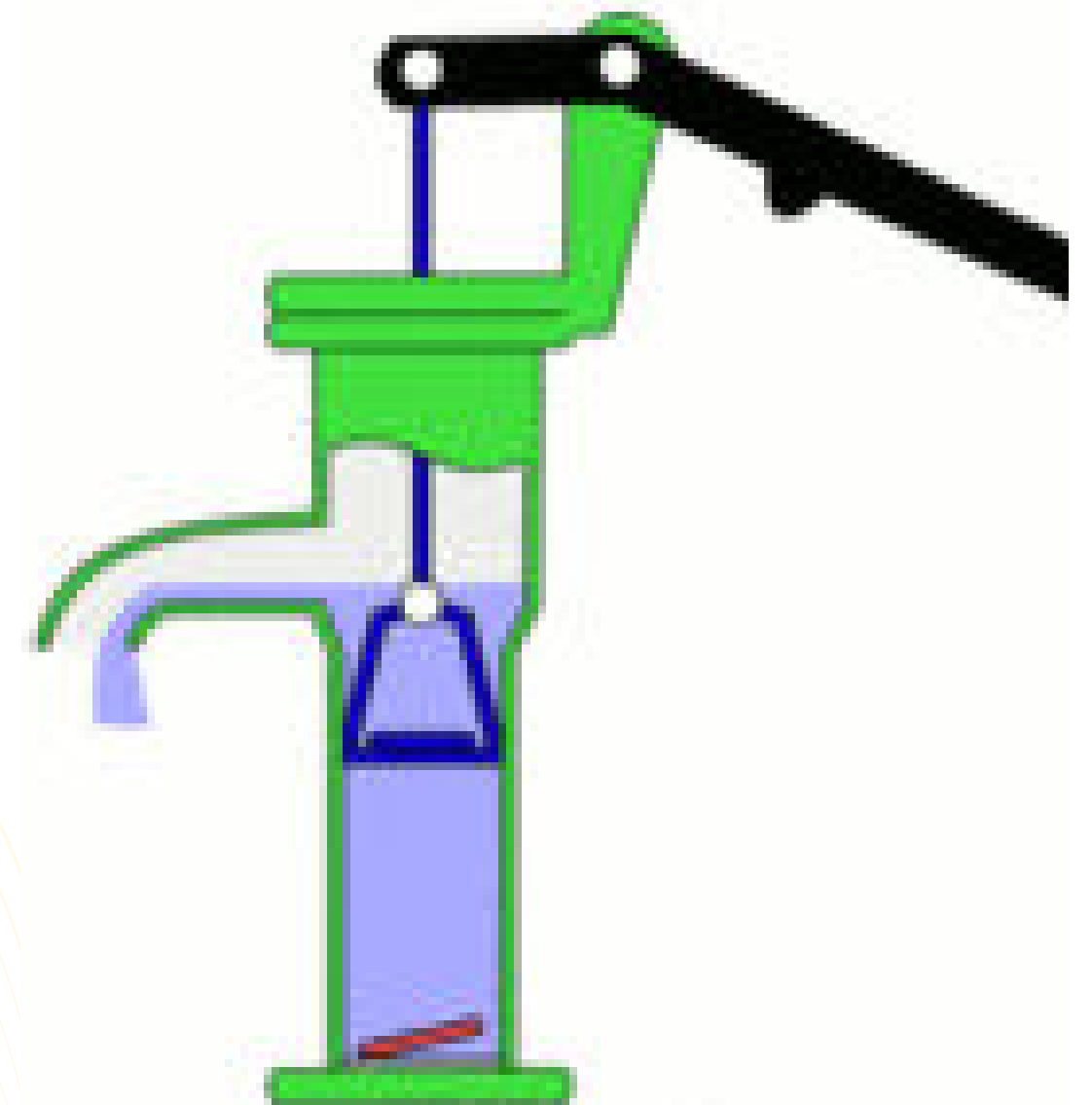


BACK TO LAGOS

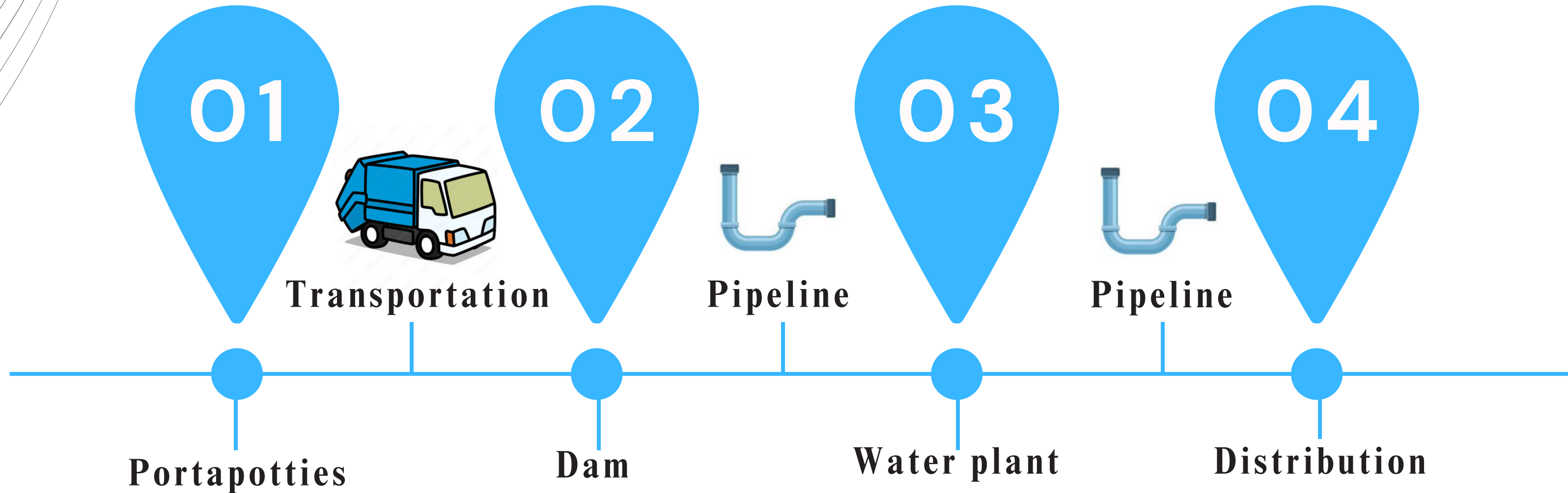
The new potable water will then return to the community of Lagos in the form of several hand pumps located around the city

2.4 Million cubic meters of waste water processed

Approximately 1.68 million cubic meters of treated water



PROPOSED POLICIES



PERMISSIONS

Dam

- Nigerian government
- Mainstream Energy Solutions

Wastewater management plant

- Nigerian Government
- Lagos waste water management plant permission

Pipeline

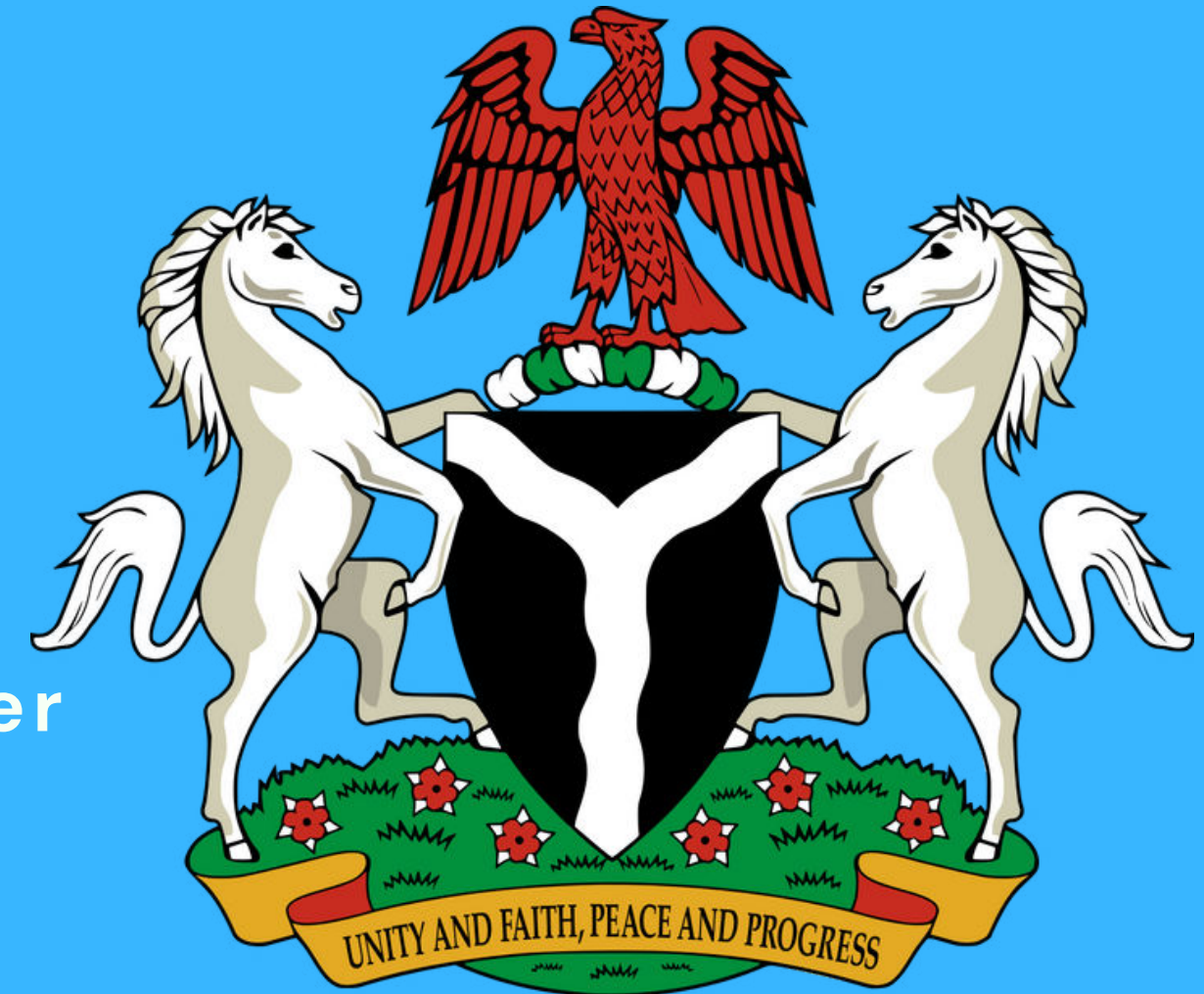
- Nigerian government to build it and connect to public faucets



Permission
Granted

STAKEHOLDERS

- Nigerian Government
- Lagos State Water Corporation
- Street Vendors that are selling drinking water
- Communities effected by pipeline
- The citizens who will be ingesting the water



WHO WILL PROVIDE FUNDING ?

- Climate Change Funds
- Recent 2023 COP 28 secured pledges for the Green Climate Fund to reach 12.8 B from 31 countries.
- The Green Climate Fund specifically states they must be invested in mitigation and adaptation with focus on LDCs and African States.
- Unicef Finance For Sanitation in West Africa, Revolving Fund for Sanitation.



**GREEN
CLIMATE
FUND**

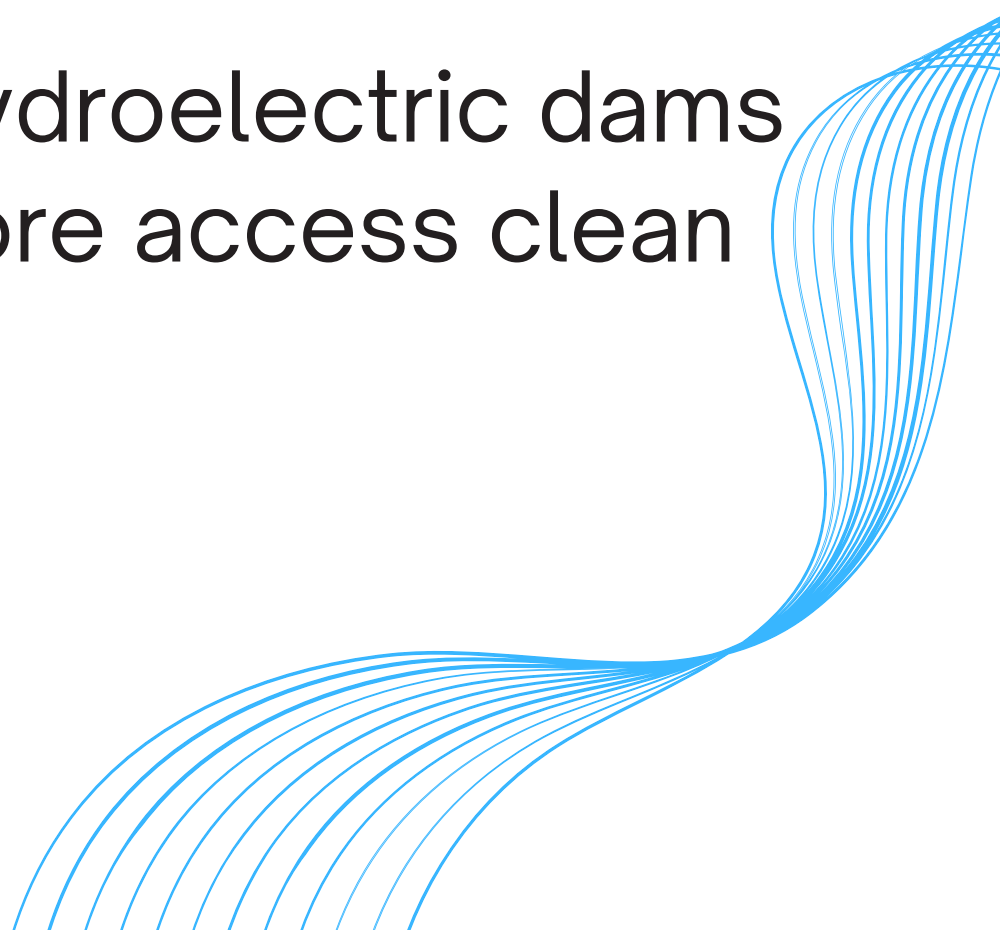
REVENUE SOURCE

- Electricity produced will be the sole source of revenue.
- Within the last few years, Nigeria has imported hundreds of GW of power, therefore are in an energy deficit and are in need of more.
- The energy created at the hydroelectric dam will be sold to the power companies and distributed through local communities.





WHERE TO INVEST PROFITS

- We will be reinvesting all profits to further improve communities.
 - This money will go to upgrade local infrastructure including sanitary bathroom stations and reliable sewage systems.
 - When financially suitable, the goal is to create more hydroelectric dams paired with the water-treatment facilities to ensure more access clean power and water.
- 



SUSTAINABILITY

Environment

- Several aquatic organisms in the lagoon are commercially important species, providing food and income for surrounding communities and beyond.

- They include organic and inorganic pollutants which produce potential health risks for fish, shrimps and crabs—and people who eat them.
- They include heavy metals such as mercury and cadmium, as well as organic compounds PCBs, phenols, PAHs and organotins



- No Contamination downstream
- Decrease of wastewater flooding into freshwater
- Using renewable recourses effectively (What is already done)

SUSTAINABILITY

Public Health



- Nigeria is expanding, the World health report indicated that globally, 23 percent of death occurrences and 26 percent of children deaths ranging up to 4 million children under five every year are due to environmental factors
- The number of diagnosed cases of diseases such as dysentery and cholera has increased in Lagos. This is due to drinking water containing chemical and bacterial pollution.



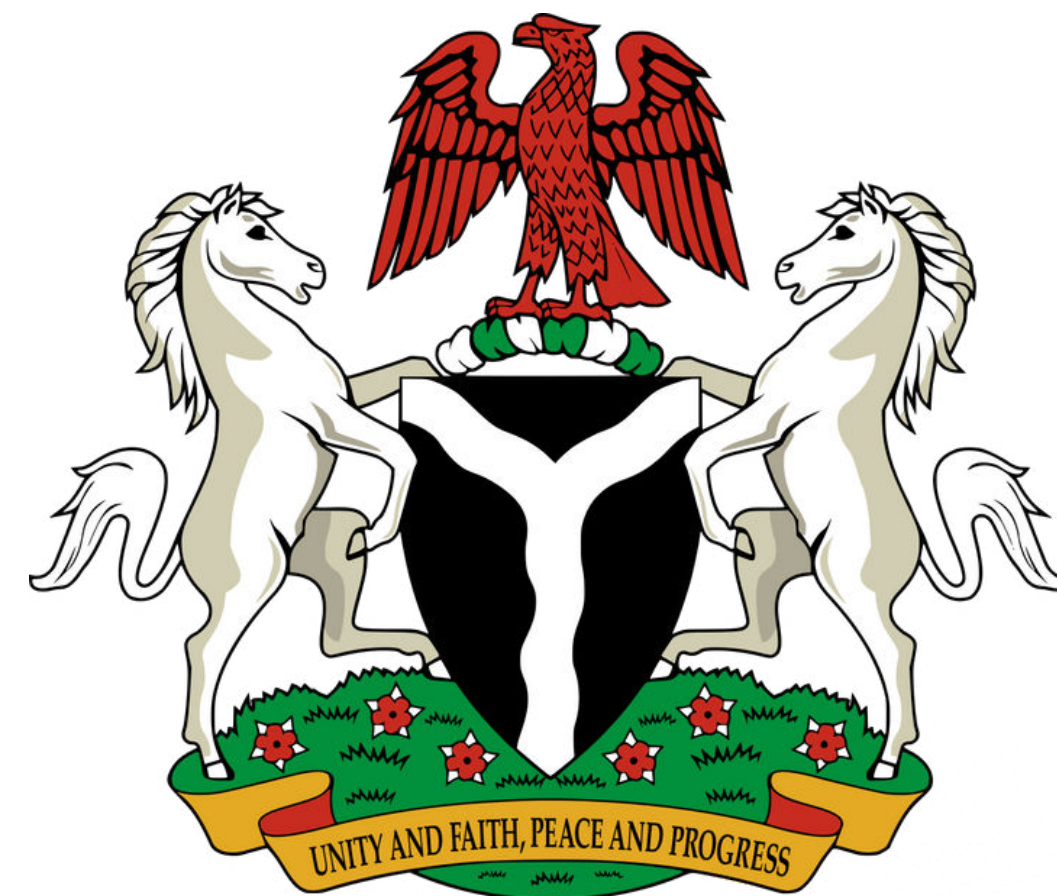
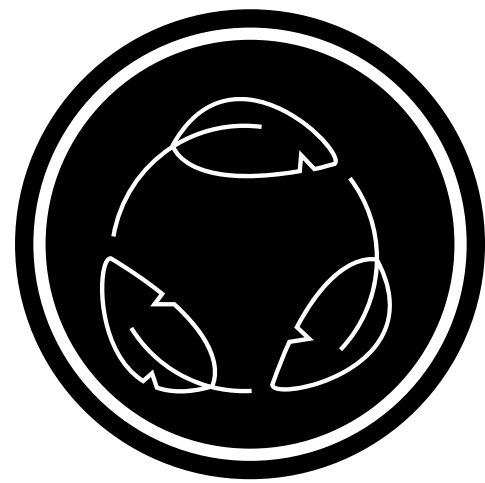
SUSTAINABILITY

Economical

The SURWASH Program
(Improving water supply, sanitation, and
hygiene services)

Government of Nigeria National Action Plan
(NAP) for the Revitalization of Nigeria's
Water Supply, Sanitation, and Hygiene
Sector.

- The \$700 million credit from the International Development Association (IDA)* will provide 6 million people with basic drinking water services and 1.4 million people access to improved sanitation services.



SUSTAINABILITY



01

BETTER LIVES FOR EVERYONE

02

INCREASES ACCESSIBILITY FOR
FRESH DRINKING WATER

03

MORE JOB OPPORTUNITIES FOR
THE LOCATION

04

IMPROVED AND RESTORED DAM IN
CONNECTION WITH RESERVOIR

Social





OUR SDG'S



This goal focuses on promoting healthy lifestyles and providing modern, efficient healthcare for all, so that preventable illnesses continue to decrease around the globe.

**GOOD HEALTH &
WELLBEING**



Having clean water and functioning sanitation systems are inherently linked. This SDG cites reducing pollution and eliminating hazardous chemical and raw sewage dumping as necessary steps on the way to improving overall water quality and access to drinking water.

**CLEAN WATER &
SANITATION**



This SDG works towards universal access to electricity, while also shifting our reliance away from fossil fuels and towards renewable sources. Improving infrastructure in the developing world is a key priority in this goal

**AFFODRABLE &
CLEAN ENERGY**

BONUS SDG'S

8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11 SUSTAINABLE CITIES
AND COMMUNITIES



13 CLIMATE
ACTION



WORKS CITED

“Electricity. Power Systems and Renewable Energy.” International Trade Administration | Trade.Gov, www.trade.gov/country-commercial-guides/electricity-power-systems-and-renewable-energy. Accessed 8 Jan. 2024.

2022, on 9 December. “WaterAid Nigeria Rolls Out Project to Improve Public Health in Lagos State.” WaterAid Nigeria, www.wateraid.org/ng/media/wateraid-nigeria-rolls-out-project-to-improve-public-health-in-lagos-state#:~:text=According%20to%20the%202021%20WASHNORM,have%20access%20to%20hygiene%20services. Accessed 8 Jan. 2024.

“About GCF.” Green Climate Fund, Green Climate Fund, 8 Dec. 2023, www.greenclimate.fund/about#:~:text=GCF%20is%20mandated%20to%20invest,LDCs%2C%20and%20African%20States).

Editor. “Lagos Generates 2.2billion Cubic Meters of Wastewater - Bello.” Naturenews.Africa, 26 Dec. 2022, naturenews.africa/lagos-generates-2-2billion-cubic-meters-of-wastewater-bello/.

Hermann-Friede, Janek. “Unlocking Finance for Sanitation in West Africa.” Water, Sanitation and Hygiene, knowledge.unicef.org/wash/resource/unlocking-finance-sanitation-west-africa. Accessed 8 Jan. 2024.

“Hydro Technology Extracts Energy from Sewage Water.” WaterWorld, WaterWorld, 29 Dec. 2015, www.waterworld.com/home/article/16200652/hydro-technology-extracts-energy-from-sewage-water.

“Improving Water Supply, Sanitation and Hygiene Services in Nigeria.” World Bank, World Bank Group, 26 May 2021, www.worldbank.org/en/news/press-release/2021/05/25/improving-water-supply-sanitation-and-hygiene-services-in-nigeria.

“Kainji and Jebba Hydro Electric Power Plants.” Nigeria ICRC PPP Platform, ppp.icrc.gov.ng/project/115. Accessed 8 Jan. 2024.

Lagos State Water Corporation, watercorporation.lagosstate.gov.ng/. Accessed 8 Jan. 2024.

WORKS CITED

“Lagos Water Supply and Pollution.” Internet Geography, 2 Sept. 2019, www.internetgeography.net/topics/lagos-water-supply-and-pollution/#:~:text=How%20does%20Lagos%20obtain%20its,supply%20that%20has%20been%20treated.

“Lagos Water Supply and Pollution.” Internet Geography, 2 Sept. 2019, www.internetgeography.net/topics/lagos-water-supply-and-pollution/#:~:text=How%20does%20Lagos%20obtain%20its,supply%20that%20has%20been%20treated.

“Lagos, Nigeria Metro Area Population 1950-2024.” MacroTrends, www.macrotrends.net/cities/22007/lagos/population#:~:text=The%20metro%20area%20population%20of,a%203.44%25%20increase%20from%202020. Accessed 8 Jan. 2024.

Nigeria - Kainji and Jebba Hydro Power Plant Rehabilitation Project ..., www.afdb.org/en/documents/document/nigeria-kainji-and-jebba-hydro-power-plant-rehabilitation-project-esia-summary-92103. Accessed 8 Jan. 2024.

“Pelton Turbine.” Pelton Turbine - Energy Education, energyeducation.ca/encyclopedia/Pelton_turbine#:~:text=The%20operation%20of%20a%20Pelton,is%20divided%20into%20two%20streams. Accessed 8 Jan. 2024.

“Resource Mobilisation.” Green Climate Fund, Green Climate Fund, 4 Dec. 2023, www.greenclimate.fund/about/resource-mobilisation#:~:text=GCF's%20Governing%20Instrument%20enables%20the,UNFCCC%2C%20entities%2C%20and%20foundations.

Tumba, Solomon James. Mainstream Energy Solutions Limited, www.mainstream.com.ng/. Accessed 8 Jan. 2024.

Unfccc.Int, [unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era#:~:text=Increasing%20climate%20finance&text=The%20Green%20Climate%20Fund%20\(GCF,countries,%20with%20further%20contributions%20expected](http://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era#:~:text=Increasing%20climate%20finance&text=The%20Green%20Climate%20Fund%20(GCF,countries,%20with%20further%20contributions%20expected). Accessed 8 Jan. 2024.

Unfccc.Int, [unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era#:~:text=Increasing%20climate%20finance&text=The%20Green%20Climate%20Fund%20\(GCF,countries,%20with%20further%20contributions%20expected](http://unfccc.int/news/cop28-agreement-signals-beginning-of-the-end-of-the-fossil-fuel-era#:~:text=Increasing%20climate%20finance&text=The%20Green%20Climate%20Fund%20(GCF,countries,%20with%20further%20contributions%20expected). Accessed 8 Jan. 2024.

THANK'S FOR WATCHING

Questions?

