WORLD BANK GROUP

Achieving Universal Electrification

World Bank Group

Geospatial data for energy policy and planning in Asia-Pacific

(Virtually) April 25th, 2021

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Sr. Geographer, World Bank Data Group



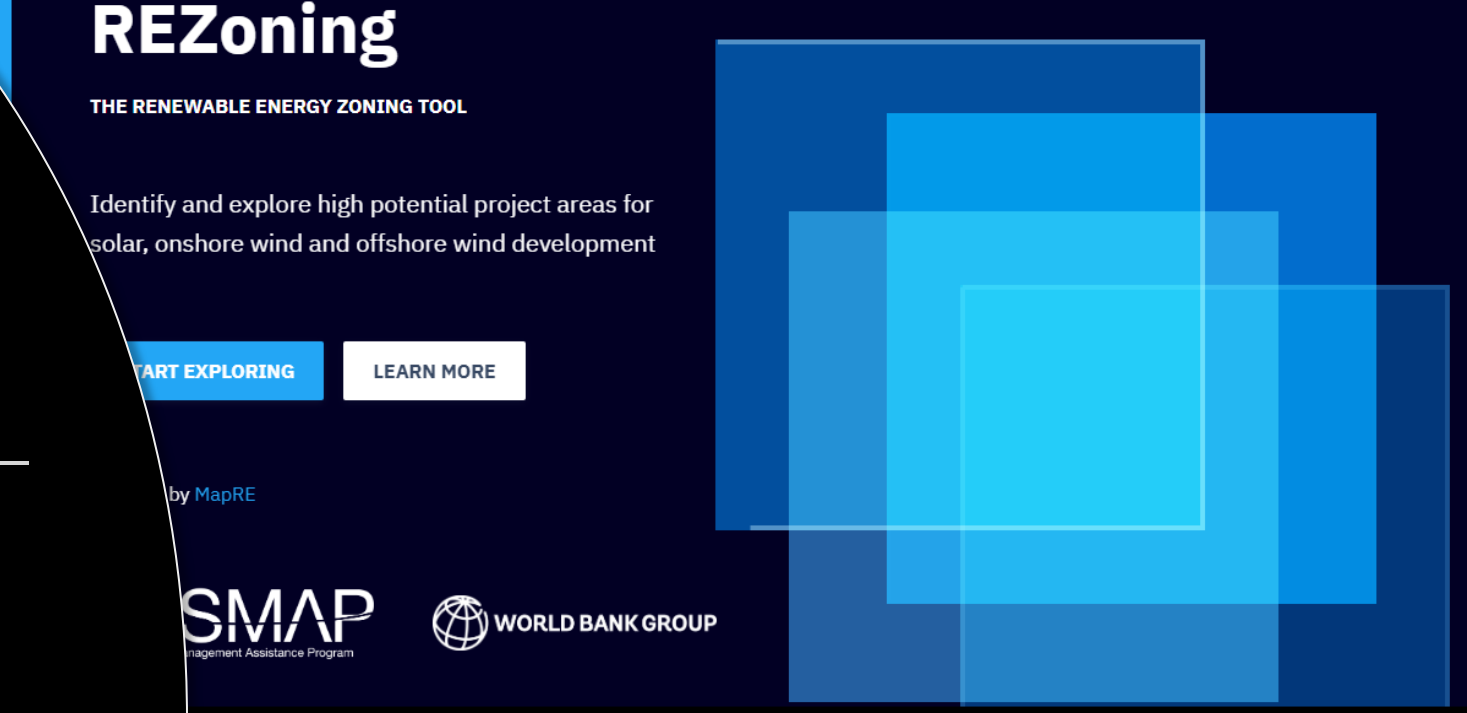
Data Group's Global Operations Support Team

Presentation Overview

The GOST team have led the development of two platforms focused on energy issues:

Global Electrification Platform (GEP) – least-cost electrification solutions

RE-Zoning – explore the potential of renewable energy: solar, offshore wind, onshore wind





How much will it cost to reach universal electrification in sub-Saharan Africa?

How many people will be affected?

What solutions will be used?

GEP - Bringing access planning to the next level

UNIVERSAL ELECTRICITY ACCESS

EFFORT 2

EFFORT 1

STARTING POINT

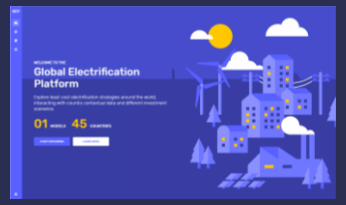
GEP

EFFORT 1 EFFORT 2 EFFORT 3

STARTING POINT

DUPLICATION OF EFFORTS

THE GEP



EXPLORER, GENERATOR, TOOLBOX

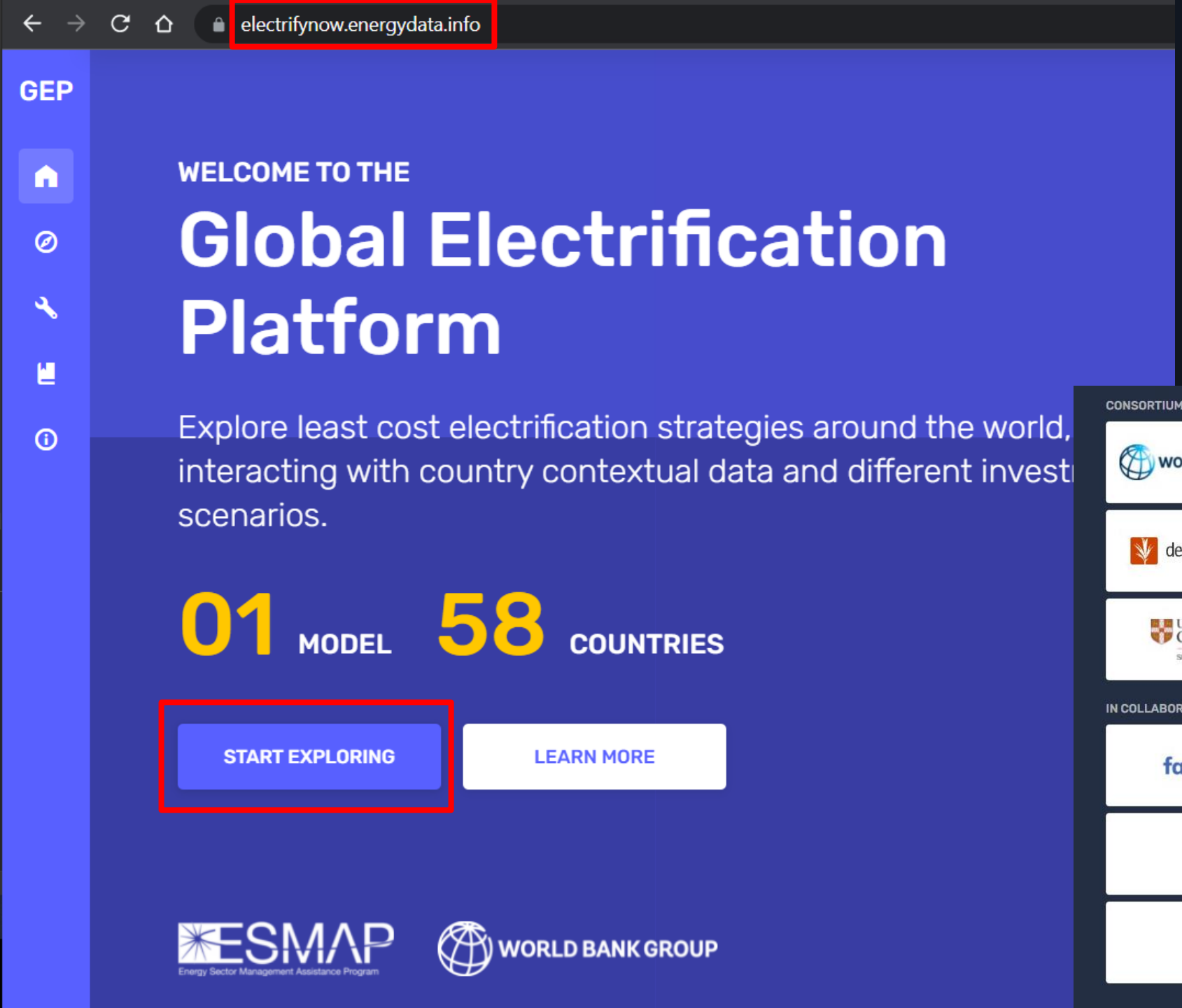
CAPACITY BUILDING

STANDARDS

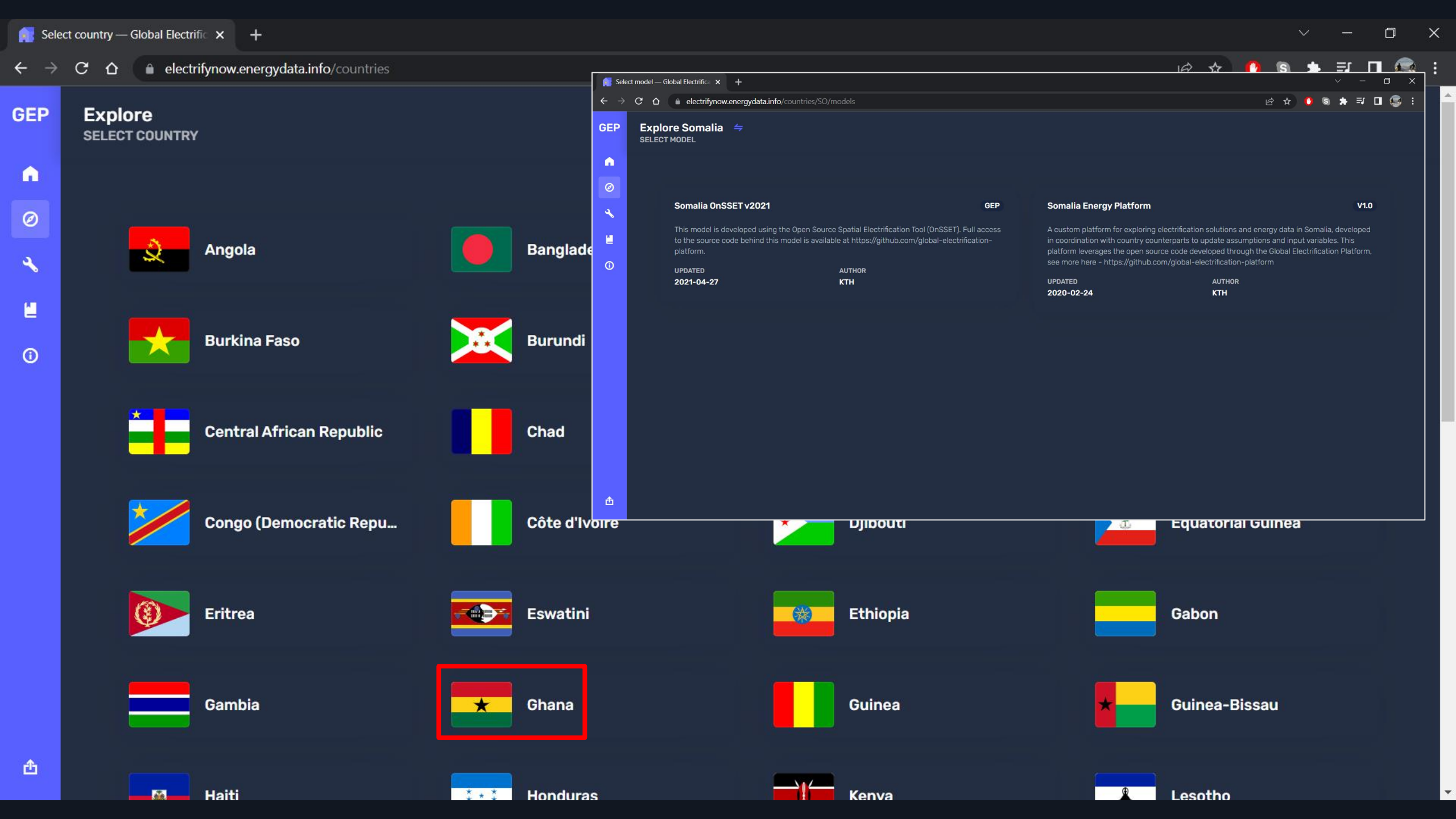
COLLABORATIONS

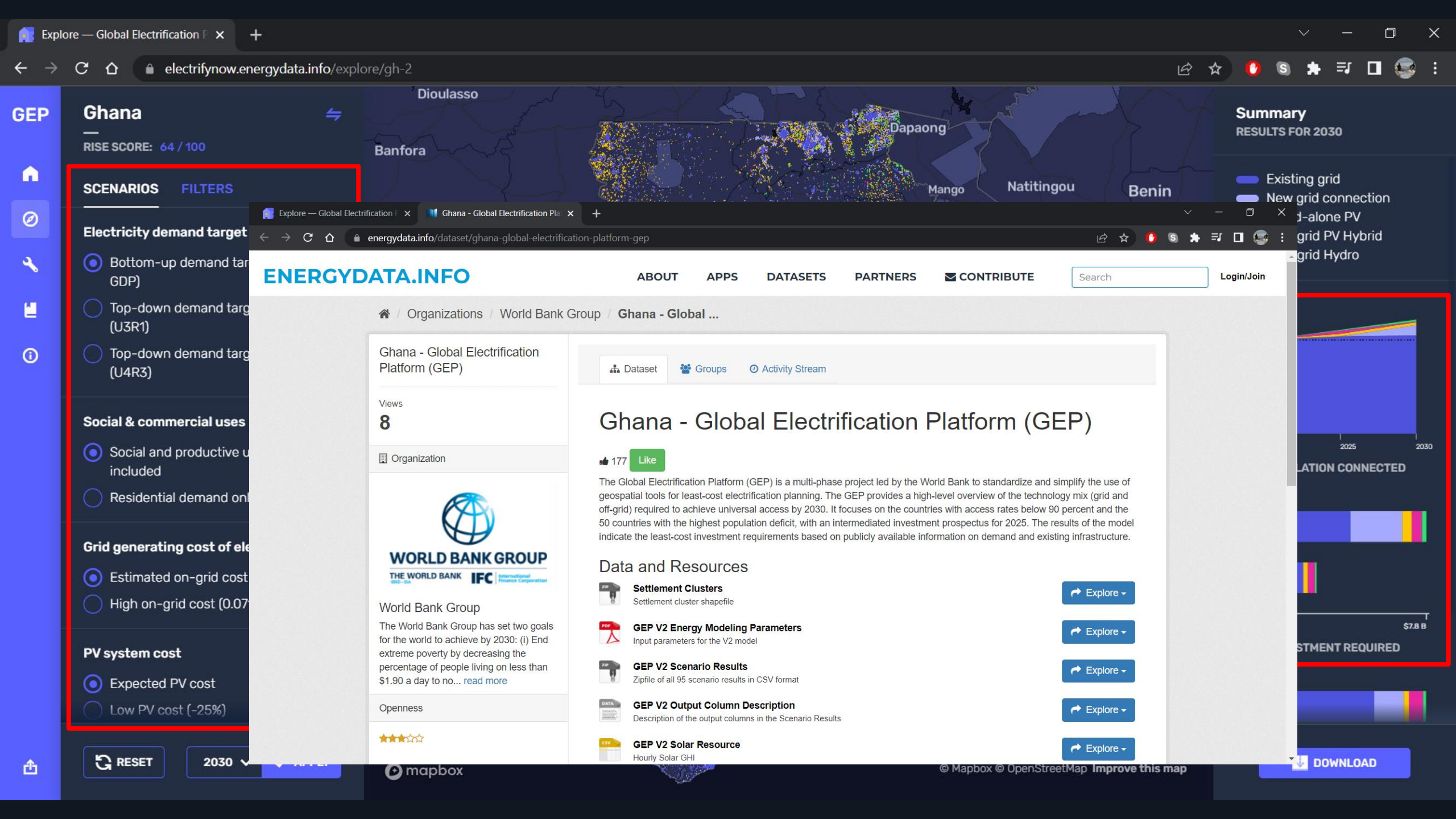
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ESMAP
Energy Sector Management Assistance Program


electrifynow.energydata.info
GEP
WELCOME TO THE
Global Electrification Platform
Explore least cost electrification strategies around the world, interacting with country contextual data and different invest scenarios.
01 MODEL
58 COUNTRIES
START EXPLORING
LEARN MORE
ESMAP
Energy Sector Management Assistance Program
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CONSORTIUM
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ESMAP
developmentSEED
Derilinx
Google
UNIVERSITY OF CAMBRIDGE
IN COLLABORATION WITH
facebook
pTIMUS
POWER ALL
DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
UKaid


Select country — Global Electrific
electrifynow.energydata.info/countries
GEP
Explore
SELECT COUNTRY
Angola
Bangladesh
Burkina Faso
Burundi
Central African Republic
Chad
Congo (Democratic Repu...
Côte d'Ivoire
Djibouti
Equatorial Guinea
Eritrea
Eswatini
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Haiti
Honduras
Kenya
Lesotho
Select model — Global Electrific
electrifynow.energydata.info/countries/SO/models
GEP
Explore Somalia
SELECT MODEL
Somalia OnSSET v2021
GEP
This model is developed using the Open Source Spatial Electrification Tool (OnSSET). Full access to the source code behind this model is available at https://github.com/global-electrification-platform.
UPDATED
2021-04-27
AUTHOR
KTH
Somalia Energy Platform
V1.0
A custom platform for exploring electrification solutions and energy data in Somalia, developed in coordination with country counterparts to update assumptions and input variables. This platform leverages the open source code developed through the Global Electrification Platform, see more here - https://github.com/global-electrification-platform
UPDATED
2020-02-24
AUTHOR
KTH


Explore — Global Electrification
electrifynow.energydata.info/explore/gh-2
GEP
Ghana
RISE SCORE: 64 / 100
SCENARIOS
FILTERS
Electricity demand target
Bottom-up demand tar
GDP)
Top-down demand targ
(U3R1)
Top-down demand targ
(U4R3)
Social & commercial uses
Social and productive u
included
Residential demand onl
Grid generating cost of ele
Estimated on-grid cost
High on-grid cost (0.07
PV system cost
Expected PV cost
Low PV cost (-25%)
RESET
2030
Dioulasso
Banfora
Dapaong
Mango
Natitingou
Benin
Summary
RESULTS FOR 2030
Existing grid
New grid connection
d-alone PV
grid PV Hybrid
grid Hydro
2025
2030
LATION CONNECTED
$7.8 B
STMENT REQUIRED
DOWNLOAD
mapbox
© Mapbox © OpenStreetMap Improve this map
Explore — Global Electrification
Ghana - Global Electrification Pla
energydata.info/dataset/ghana-global-electrification-platform-gep
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Organizations / World Bank Group / Ghana - Global ...
Ghana - Global Electrification Platform (GEP)
Views
8
Organization
WORLD BANK GROUP
THE WORLD BANK
IFC
World Bank Group
The World Bank Group has set two goals for the world to achieve by 2030: (i) End extreme poverty by decreasing the percentage of people living on less than $1.90 a day to no... read more
Openness
Dataset
Groups
Activity Stream
Ghana - Global Electrification Platform (GEP)
177
Like
The Global Electrification Platform (GEP) is a multi-phase project led by the World Bank to standardize and simplify the use of geospatial tools for least-cost electrification planning. The GEP provides a high-level overview of the technology mix (grid and off-grid) required to achieve universal access by 2030. It focuses on the countries with access rates below 90 percent and the 50 countries with the highest population deficit, with an intermediated investment prospectus for 2025. The results of the model indicate the least-cost investment requirements based on publicly available information on demand and existing infrastructure.
Data and Resources
Settlement Clusters
Settlement cluster shapefile
Explore
GEP V2 Energy Modeling Parameters
Input parameters for the V2 model
Explore
GEP V2 Scenario Results
Zipfile of all 95 scenario results in CSV format
Explore
GEP V2 Output Column Description
Description of the output columns in the Scenario Results
Explore
GEP V2 Solar Resource
Hourly Solar GHI
Explore

Explore — Global Electrification

electrifynow.energydata.info/explore/gh-2?year=2030&scenario=1_0_1_1_1_0&filters=r2_3791917%7Cr0.009_265.211%7C1_2_5_6_7_3%7Cr0_24.014%7Cr0_43.517%7Cr2...

GEP

Ghana

RISE SCORE: 64 / 100

SCENARIOS FILTERS

Electricity demand target

- Bottom-up demand target (Poverty-GDP)
- Top-down demand target - Low (U3R1)
- Top-down demand target - High (U4R3)

Social & commercial uses

- Social and productive uses demand included
- Residential demand only

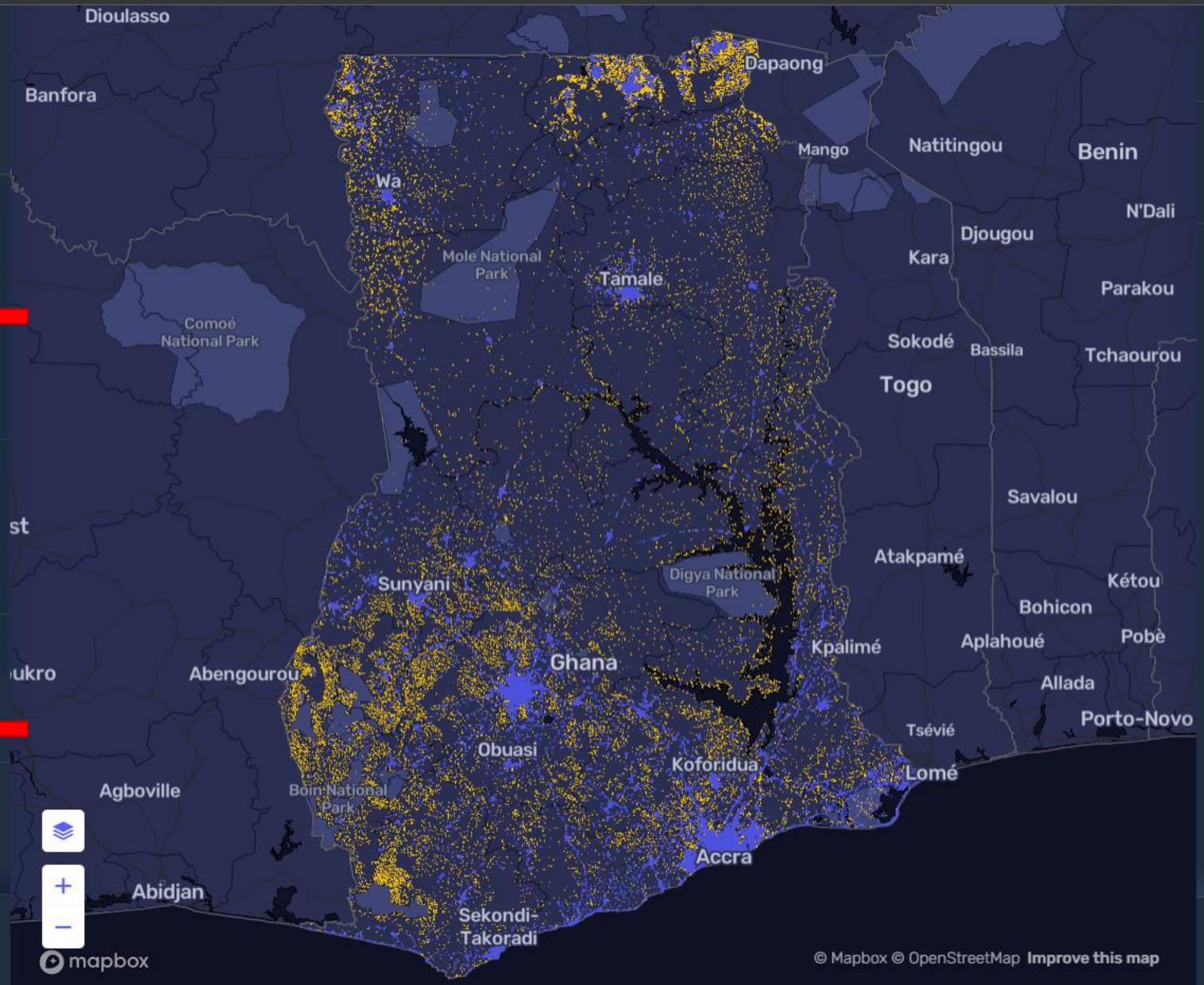
Grid generating cost of electricity

- Estimated on-grid cost (0.055 $/kWh)
- High on-grid cost (0.071 $/kWh)

PV system cost

- Expected PV cost
- Low PV cost (-25%)

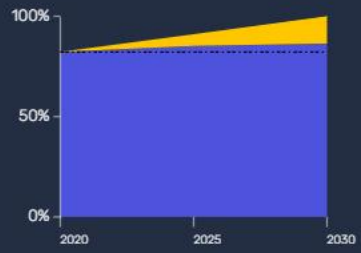
RESET 2030 APPLY



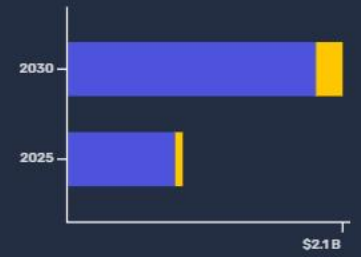
Summary

RESULTS FOR 2030

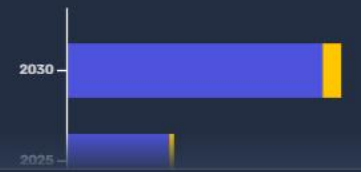
- Existing grid
- Stand-alone PV
- New grid connection



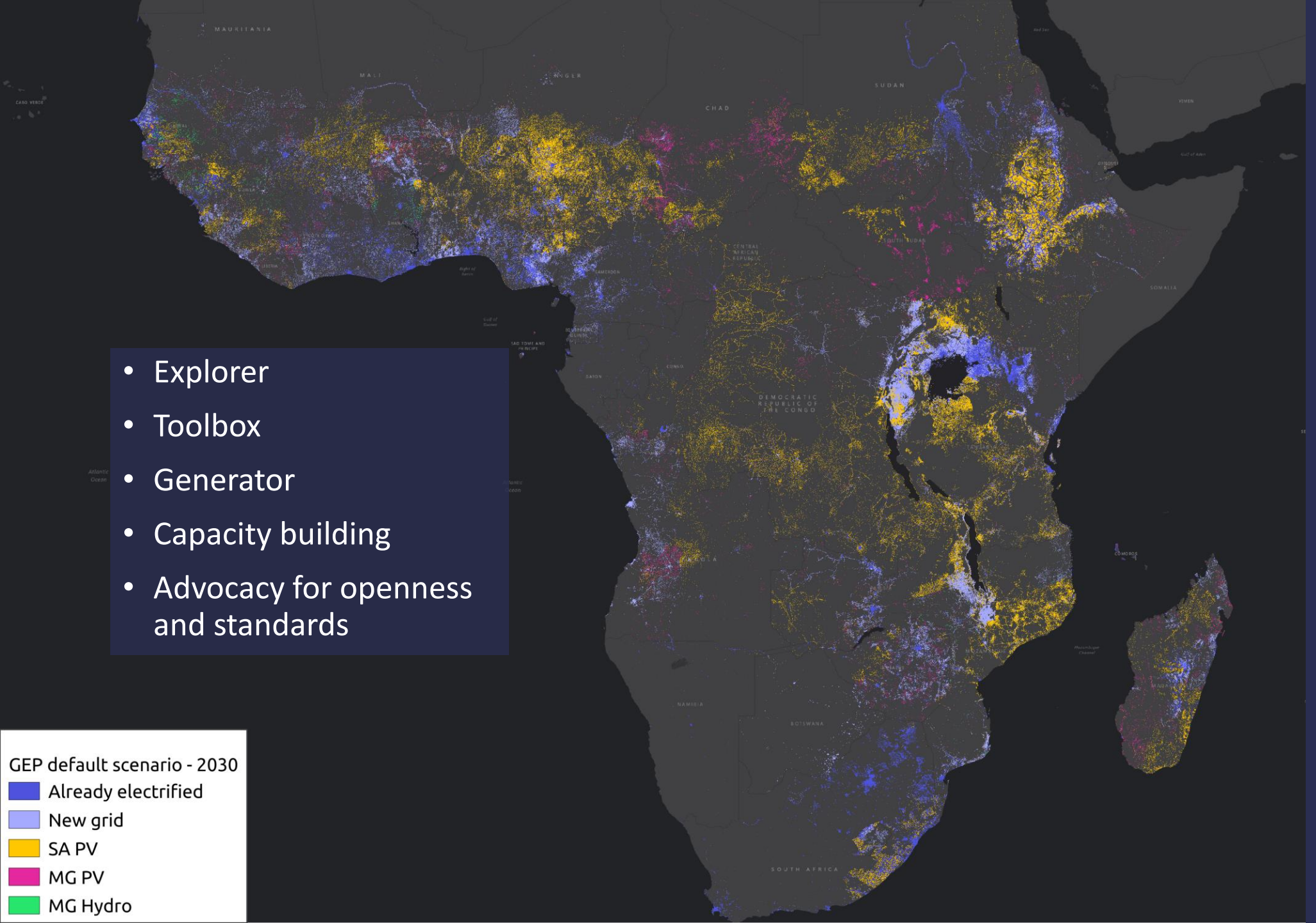
POPULATION CONNECTED



INVESTMENT REQUIRED



DOWNLOAD



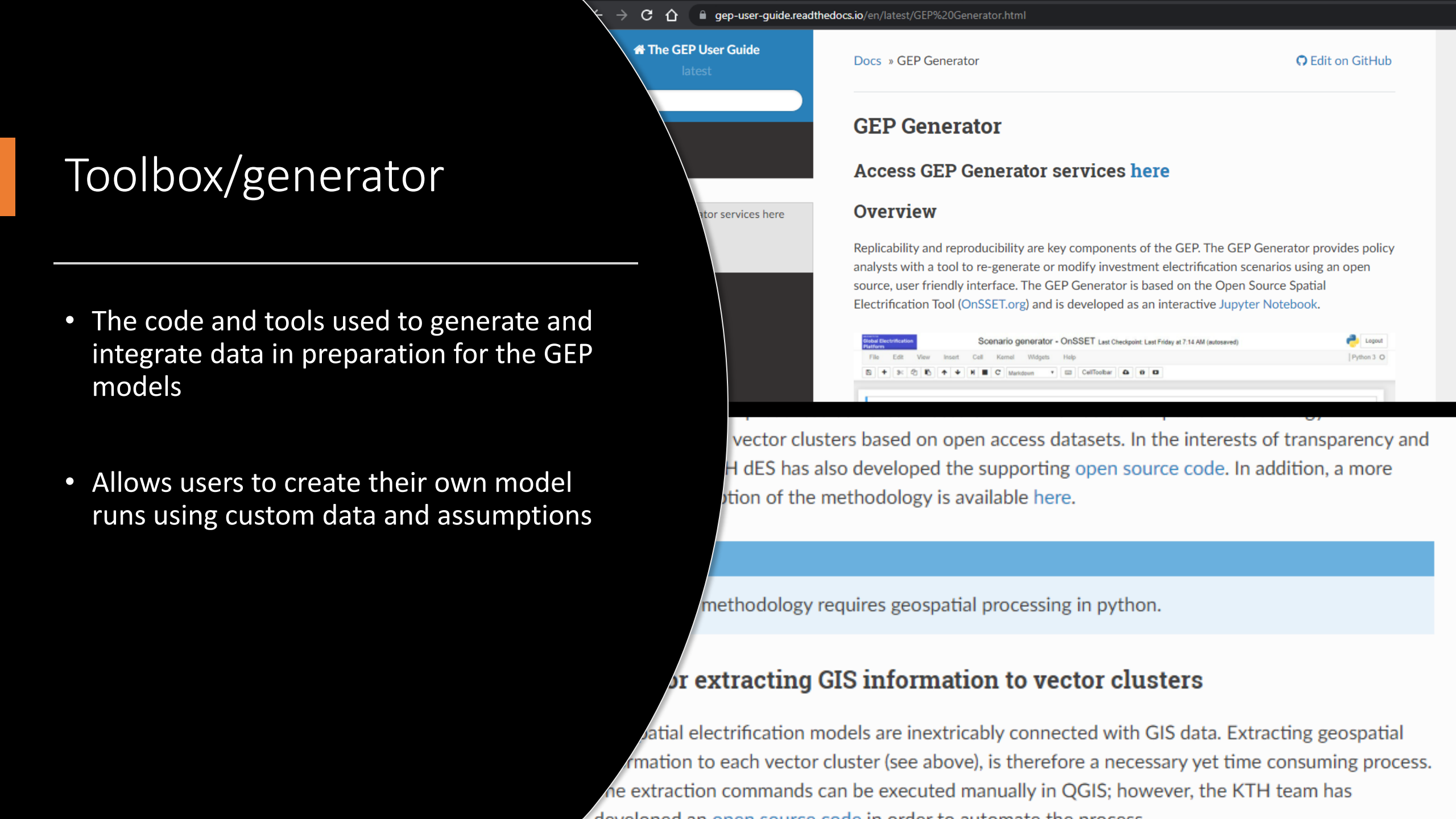
- Explorer
- Toolbox
- Generator
- Capacity building
- Advocacy for openness and standards

All data are available on

energydata.info

Toolbox/generator

- The code and tools used to generate and integrate data in preparation for the GEP models
- Allows users to create their own model runs using custom data and assumptions

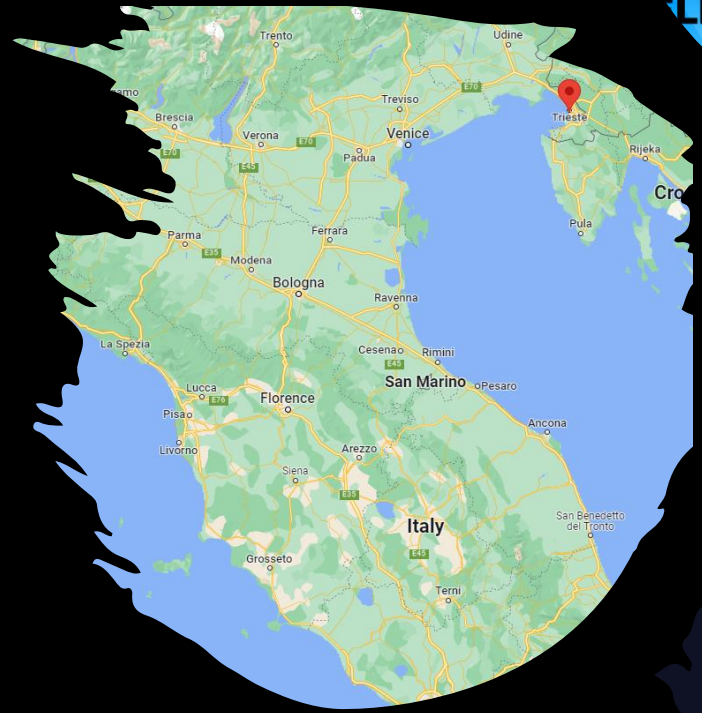


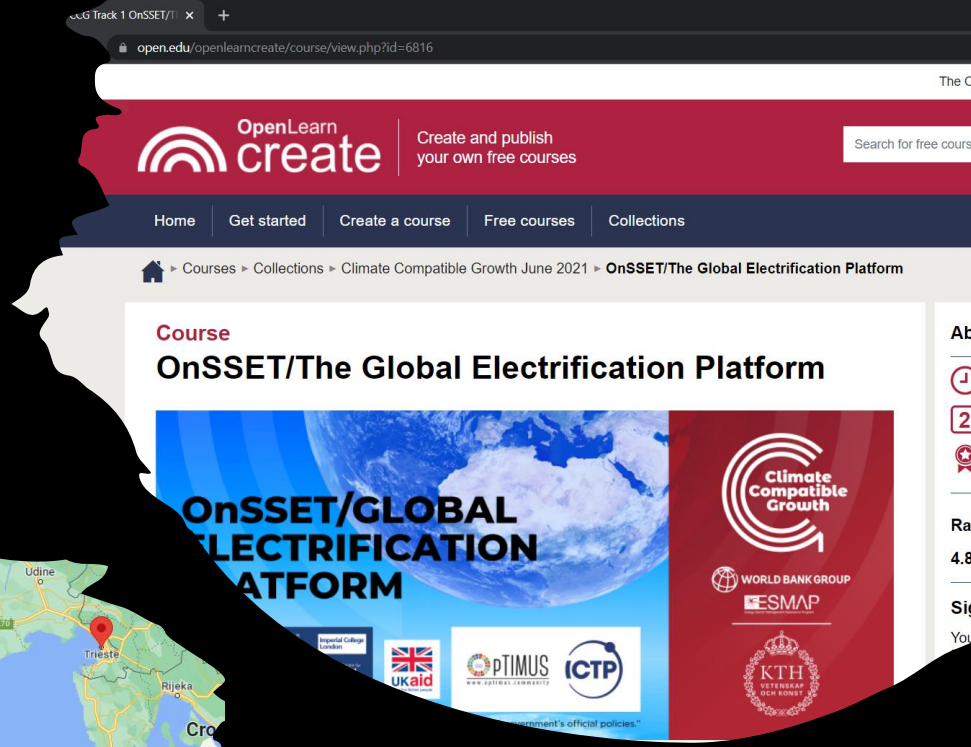
Capacity Building

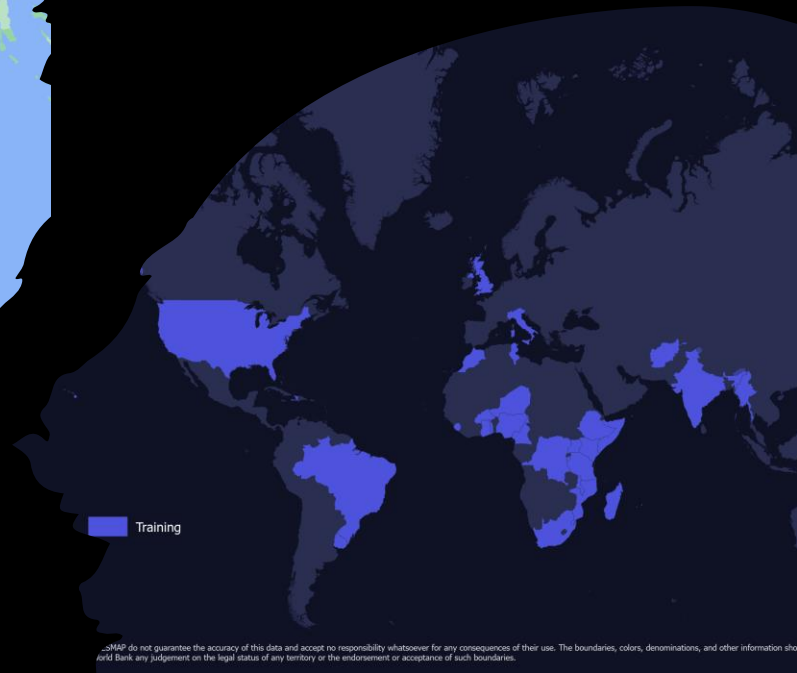
Delivered 6 in-person courses across the globe training over 100 students:

- GEP electrification planning
- GIS for energy
- Open energy tools and data

Developed an online course through the Open University







So what will it cost?

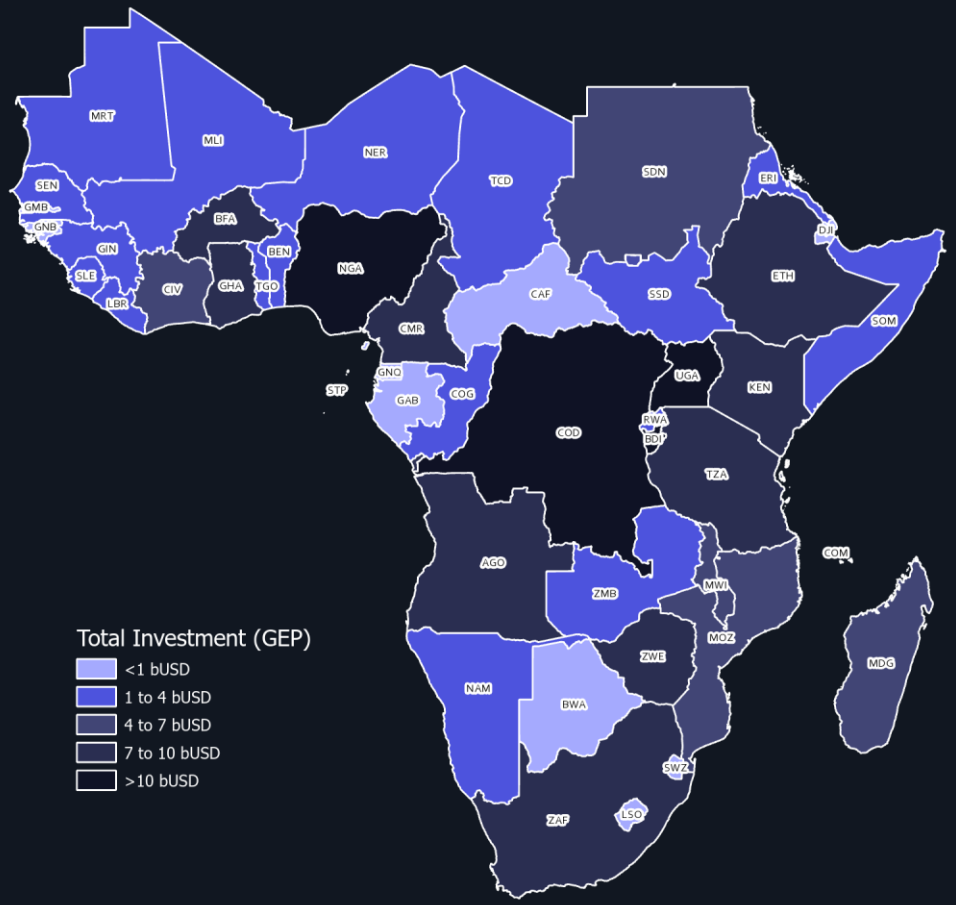
Required investment : **191 bUSD**

Investment per technology

- Grid – 71% / 136 bUSD
- MG – 8 % / 16 bUSD
- SA PV – 20 % / 39 bUSD

People Connected

- Grid - 1,004,639,409
- MG - 67,832,033
- SA PV - 376,053,838



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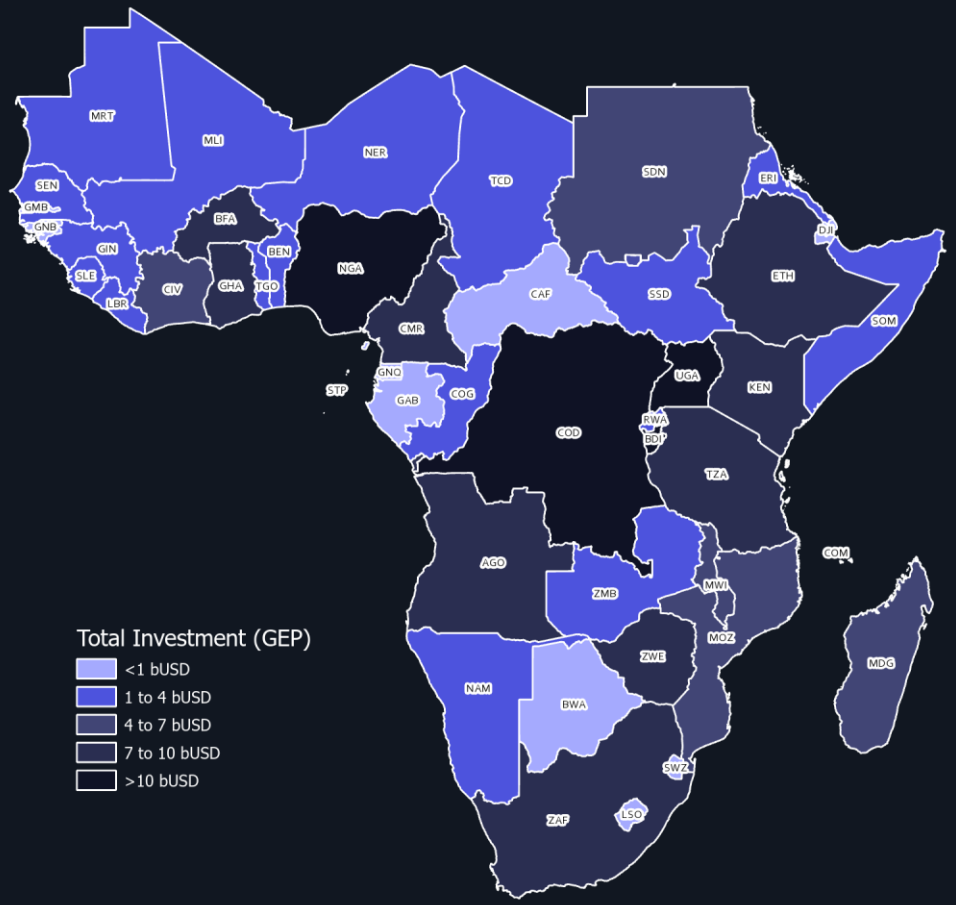
ESMAP
Energy Sector Management Assistance Program

So what will it cost?

191 bUSD – default Scenario

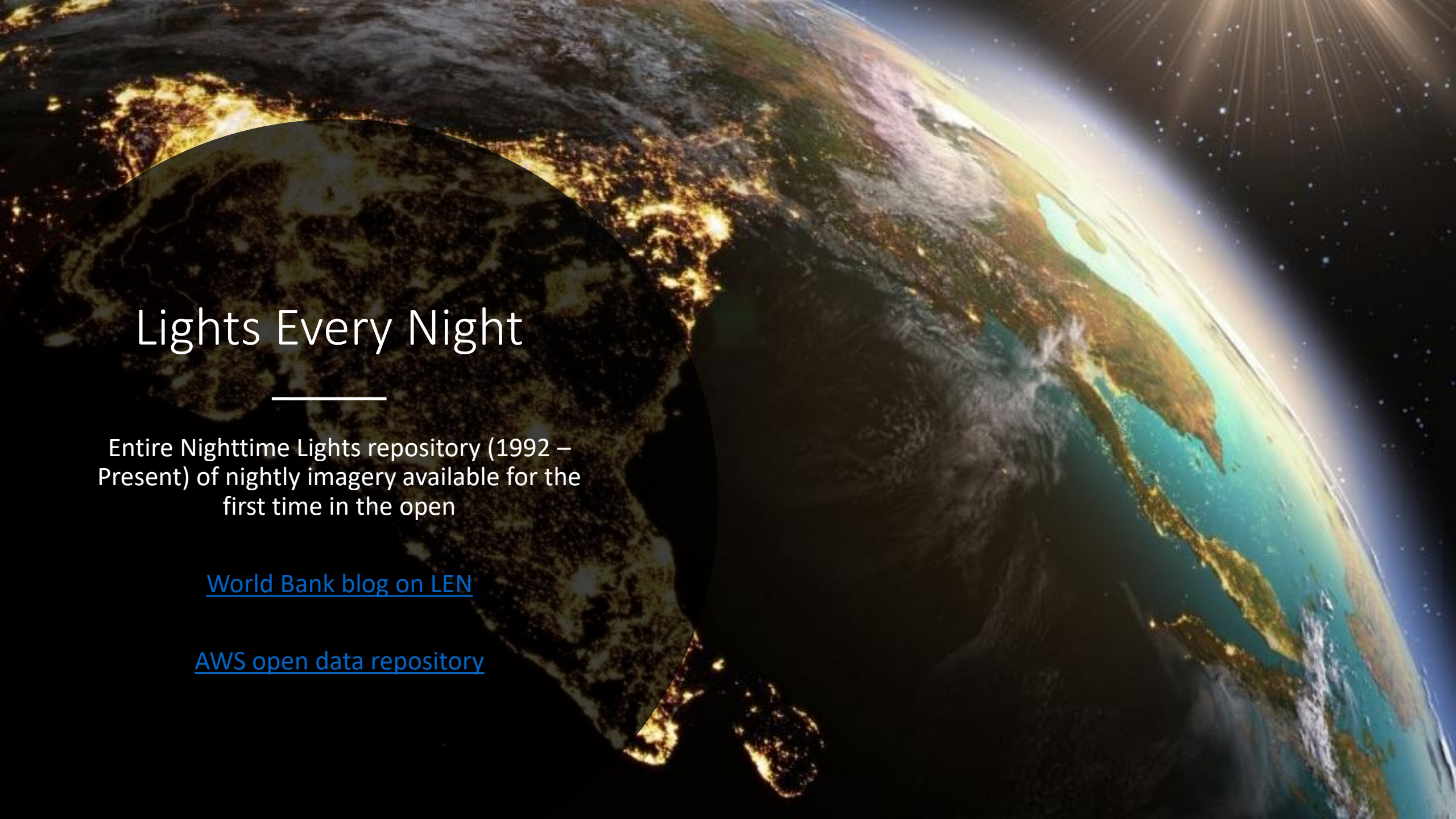
68 bUSD – cheapest scenario

420 bUSD – most expensive scenario



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ESMAP
Energy Sector Management Assistance Program



Lights Every Night

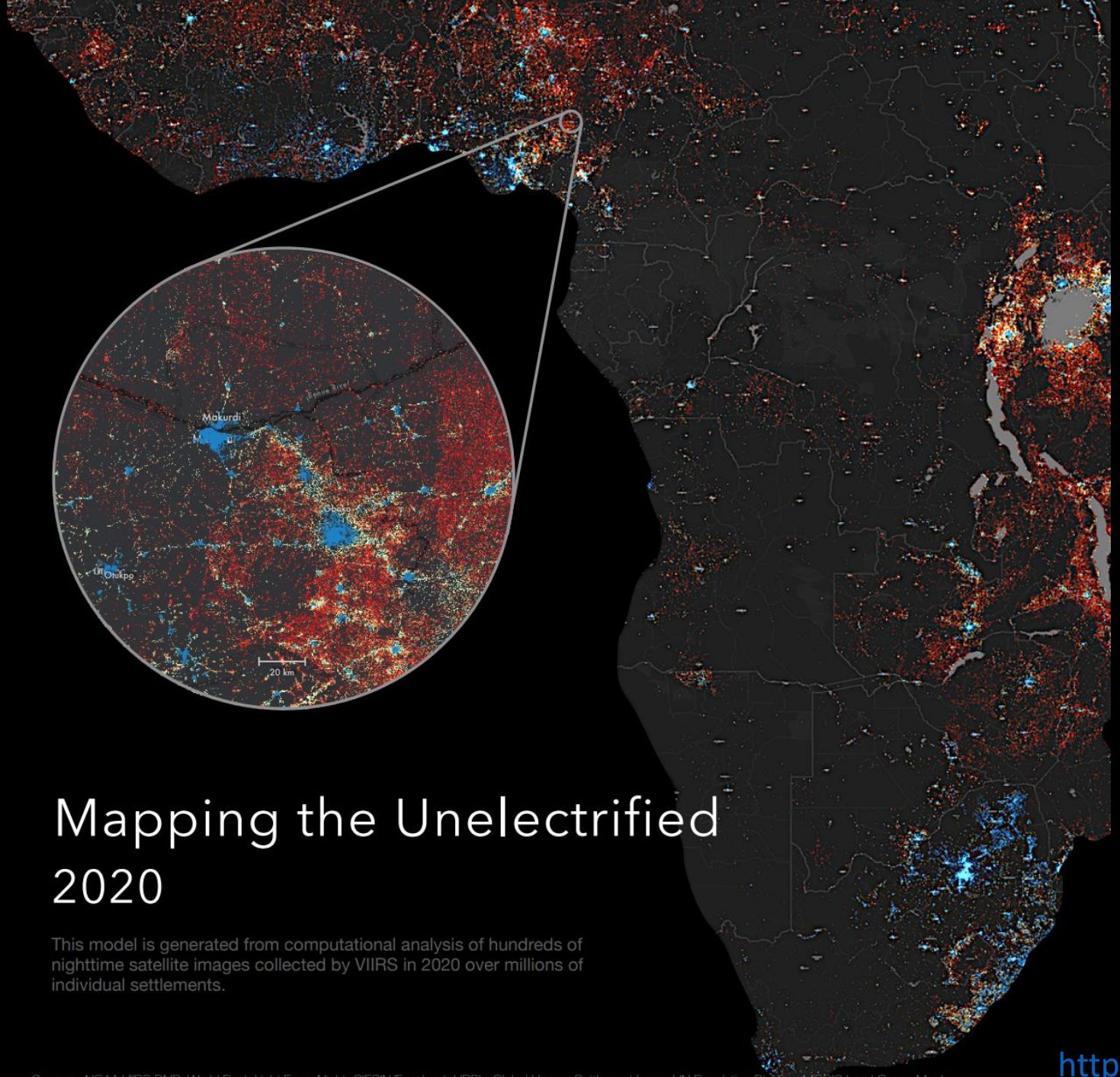
Entire Nighttime Lights repository (1992 – Present) of nightly imagery available for the first time in the open

World Bank blog on LEN

AWS open data repository

High Resolution Energy Access (HREA)

Settlement-level measures of electricity access, reliability, and usage derived from the complete archive of nightly VIIRS satellite imagery



Mapping the Unelectrified 2020

This model is generated from computational analysis of hundreds of nighttime satellite images collected by VIIRS in 2020 over millions of individual settlements.

Sources: NOAA VIIRS DNB, World Bank Light Every Night, CIESIN/Facebook HRSL, Global Human Settlement Layer, UN Population Division, MODIS Land Cover, Mapbox.

https://github.com/zachokeeffe/nightlight_electrification

Thank you!

- Benjamin P. Stewart – bstewart@worldbankgroup.org
- Global Electrification Platform - https://electrifynow.energydata.info/
- Lights Every Night - https://registry.opendata.aws/wb-light-every-night/
- High resolution energy access - http://www-personal.umich.edu/~brianmin/HREA/