

REGENX GEOSPATIAL · OCTOBER 2026

Nigeria CO₂ Hotspots

Where the country's fossil carbon comes from, located with emission inventories, checked from orbit and in Google Earth, 2000 to 2026.

Prepared by Dinar Wali



Dangote refinery, Lekki · 2025-26

THE NATIONAL PICTURE

Half of Nigeria's fossil CO₂ comes from a sliver of its land

137.6 Mt

fossil CO₂ emitted in 2025 (EDGAR)

+58%

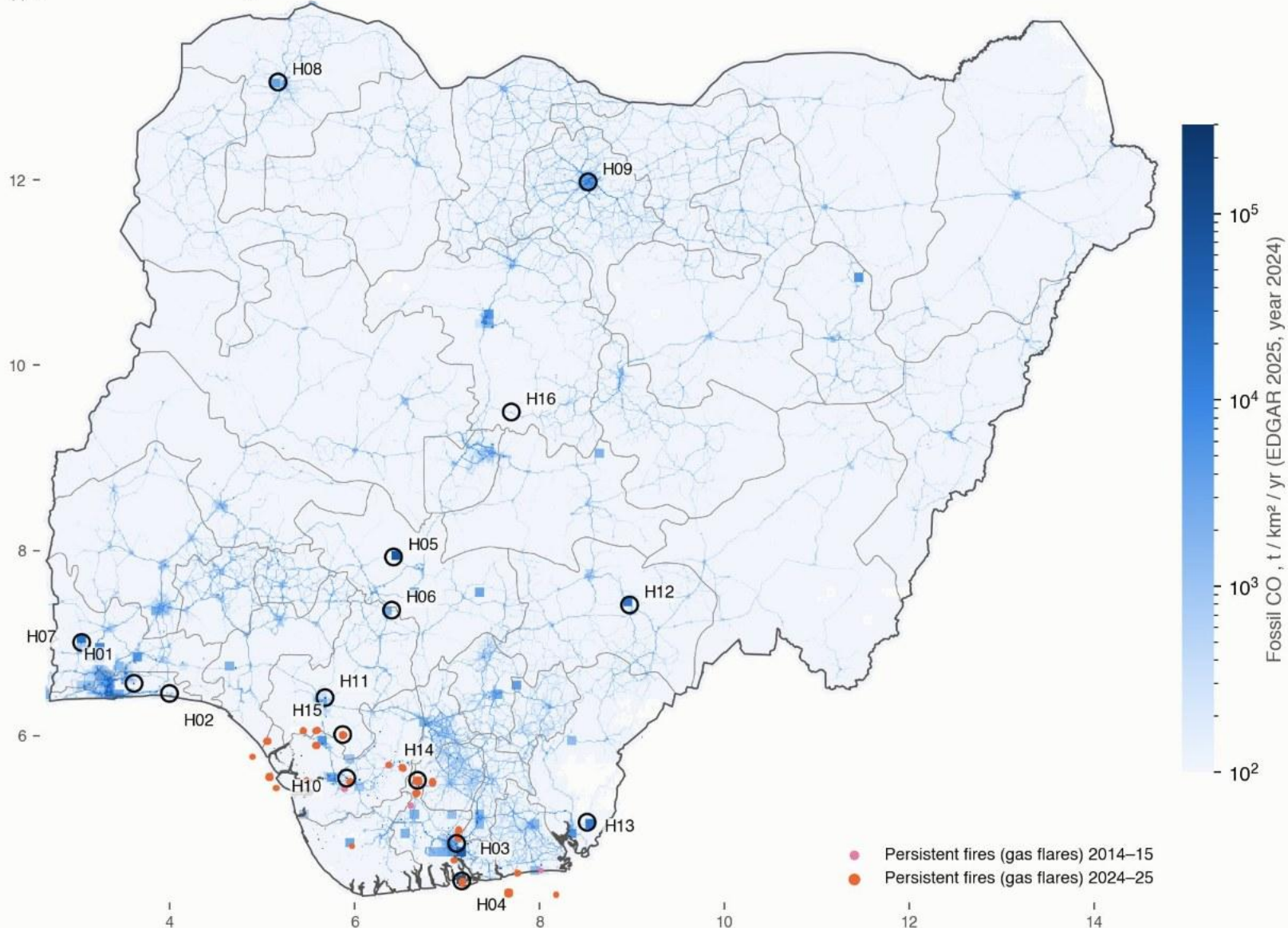
since 2005, up from 87.0 Mt

0.57%

of the land, 4,425 km²,
emits half the total

Source: EDGAR 2025/2026 GHG grids (EU JRC), 0.1° totals for 2005 and 2025, 1 km grid for 2024 · Analysis: Dinar Wali

Nigeria fossil-CO₂ hotspots



16 CANDIDATES

The coast and the cement belt

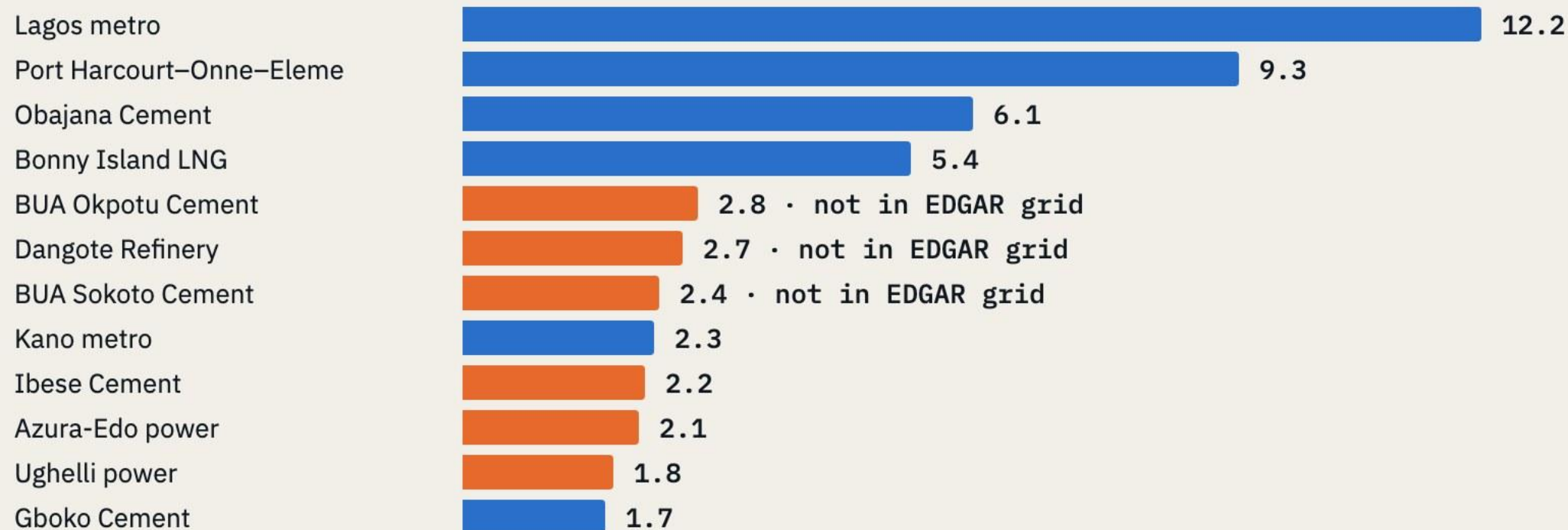
Lagos and the Port
Harcourt–Bonny corridor
hold the largest clusters.

Cement works form a second
belt inland, from Ogun through
Kogi and Benue to Cross River.

Orange dots are gas flares,
all in the Niger Delta.

The largest sites, Mt CO₂ per year

■ EDGAR cluster ■ Climate TRACE facility



Each bar shows the higher of the two inventories for 2024 · EDGAR 2025 1 km grid; Climate TRACE v6 · Gas-flare sites have no per-site figure and are not ranked

METHOD

Find it in the inventories, prove it from orbit



1 · Locate

Emission grids

EDGAR 1 km CO₂
for 2024, clustered
above 3,300 t/km²



2 · Attribute

Facilities

Climate TRACE
estimates for 259
plants, ports and fields



3 · Flares

Fire that never stops

MODIS pixels burning
on 60+ of 730 days



4 · Verify

From orbit

Sentinel-5P NO₂,
Landsat and Sentinel-
2 imagery, AlphaEarth

SITE ATLAS · GOOGLE EARTH PRO

Every hotspot, then and now

Latest and historical Google Earth imagery for the 16 sites, annotated feature by feature. Each site's atlas pages follow its story slide.

16

sites

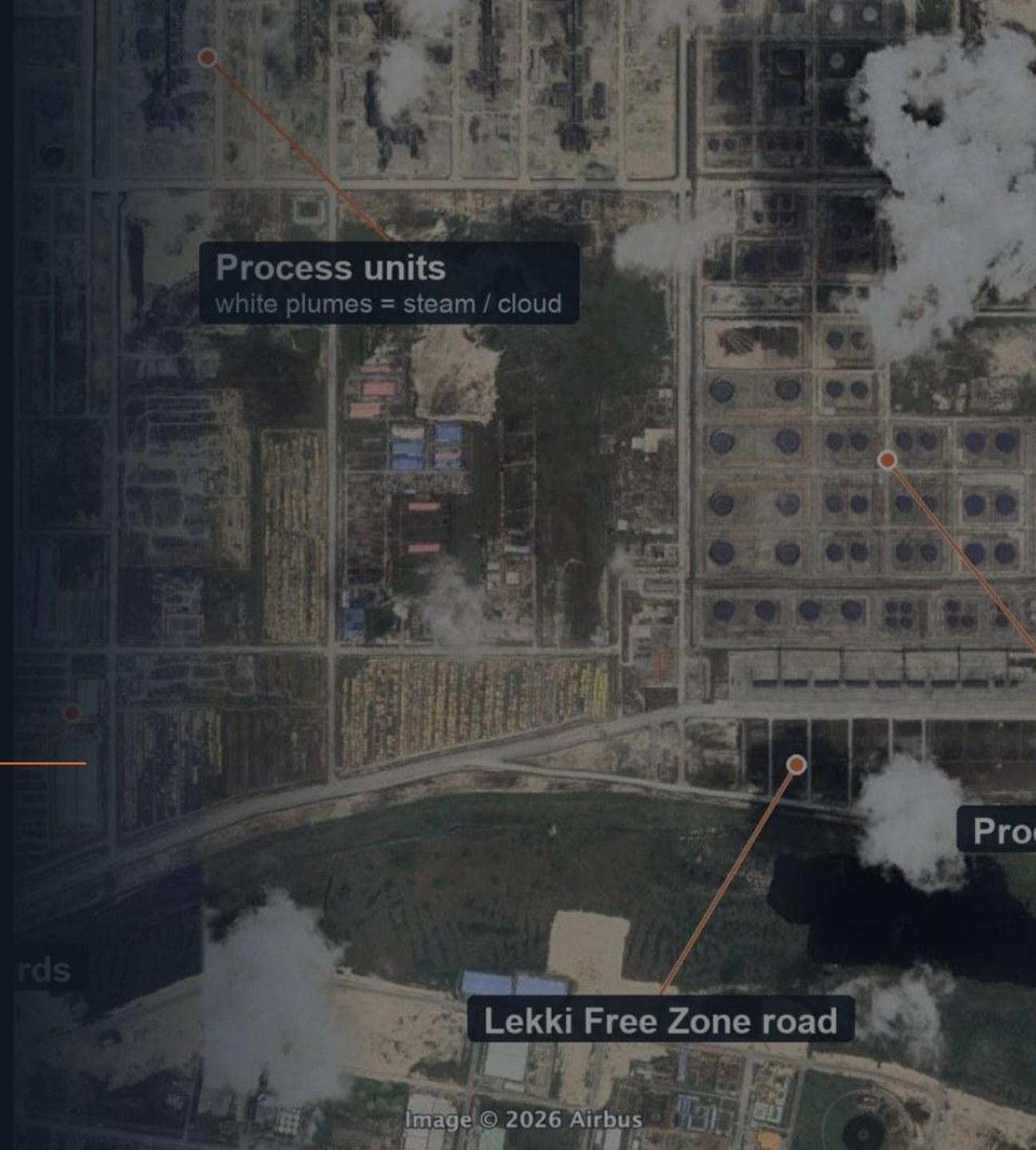
28

annotated views

2006–26

imagery dates

Prepared by Dinar Wali · RegenX · Imagery: Google Earth Pro (Airbus, Maxar, CNES, Landsat/Copernicus)



Process units

white plumes = steam / cloud

Pro

Lekki Free Zone road

Image © 2026 Airbus

Three coastal clusters emit 27 Mt a year



12.2 Mt

Lagos metro. 962 km² of traffic, Egbin power and industry



9.3 Mt

Port Harcourt. Fertiliser, refineries and Afam power; highest NO₂



5.4 Mt

Bonny Island LNG. The most intense 100 km² in the country

H01 · Egbin power station, Ikorodu (Lagos)

Then · 2 May 2013

Lagos metro cluster 12.2 Mt CO₂/yr (EDGAR 2024) · Egbin 2.06 Mt (Climate TRACE) · 1,320 MW gas-fired



Fuel / gas storage tanks

Egbin power station
operating since the 1980s

500 m

Image © 2026 CNES / Airbus

Google Earth Pro · annotated by Dinar Wali

H01 · Egbin power station, Ikorodu (Lagos)

Now · 8 Feb 2024

Lagos metro cluster 12.2 Mt CO₂/yr (EDGAR 2024) · Egbin 2.06 Mt (Climate TRACE) · 1,320 MW gas-fired



500 m

H03 · Port Harcourt – Onne – Eleme industrial belt

Then · 20 Dec 2013

EDGAR cluster 9.3 Mt CO₂/yr · Port Harcourt Fertilizer 3.15 Mt, Onne 1.64 Mt (Climate TRACE) · highest NO₂ (×2.34)



Port Harcourt city

Industrial complexes

1 km

Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

H03 · Port Harcourt – Onne – Eleme industrial belt

Now · 30 May 2025

EDGAR cluster 9.3 Mt CO₂/yr · Port Harcourt Fertilizer 3.15 Mt, Onne 1.64 Mt (Climate TRACE) · highest NO₂ (×2.34)



Port Harcourt city

Industrial complexes
tanks and process plant

Eleme / Oyigbo settlements

1 km

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H04 · Bonny Island – Nigeria LNG

Then · 13 Jan 2014

EDGAR cluster 5.4 Mt CO₂/yr in 100 km² · LNG trains, power plant and export terminal



Loading jetties

LNG storage tanks

Oil export terminal tanks

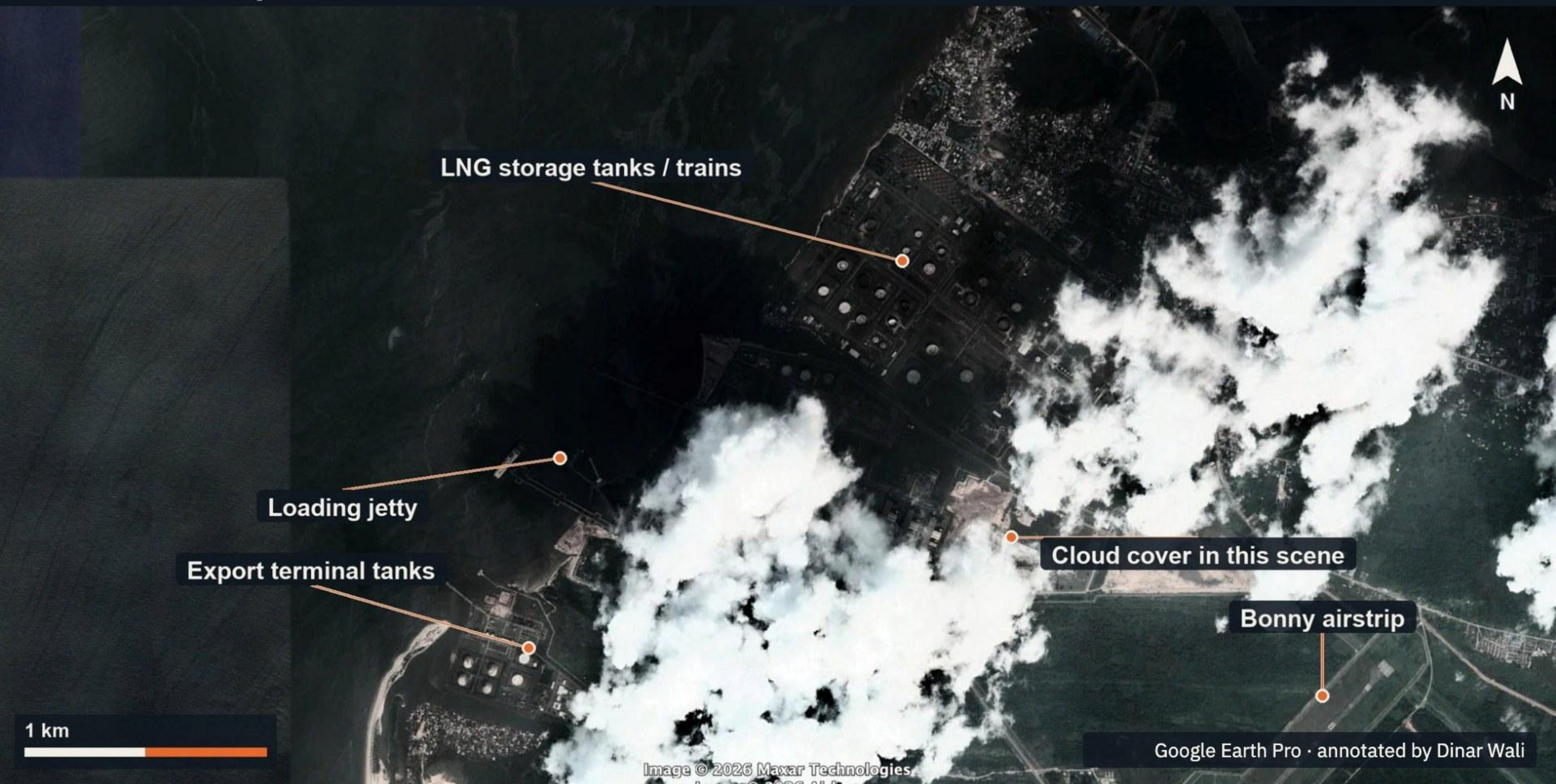
LNG process trains
gas treatment, liquefaction

1 km

H04 · Bonny Island – Nigeria LNG

Now · 10 Dec 2021

EDGAR cluster 5.4 Mt CO₂/yr in 100 km² · LNG trains, power plant and export terminal



LNG storage tanks / trains

Loading jetty

Export terminal tanks

Cloud cover in this scene

Bonny airstrip

1 km

H09 · Kano metro

Now · 7 May 2025

2.3 Mt CO₂/yr EDGAR cluster over 310 km² · transport-dominated · 2.3 → 4.1 Mt (2005 → 2025)



2.5 km

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

NEWEST EMITTER

Dangote refinery, Lekki

2.65 Mt in 2024



2000-02 • Landsat 7

Coastal bush



2016-17 • Sentinel-2

Sand fill for the platform



2025-26 • Sentinel-2

650,000 bbl/day refinery, operating

Emissions: Climate TRACE 2024. Not yet visible in EDGAR's 1 km grid • Imagery: Landsat 7 SR, Sentinel-2 composites, 7 km frames

H02 · Dangote Petroleum Refinery, Lekki Free Zone

Then · 17 Dec 2013

2.65 Mt CO₂ in 2024 (Climate TRACE) · 650,000 bbl/day · not yet in EDGAR's 1 km grid



Future refinery site
forest and swamp, no works yet

500 m

Image © 2026 CNES / Airbus

Google Earth Pro · annotated by Dinar Wali

H02 · Dangote Petroleum Refinery, Lekki Free Zone

Now · 20 Nov 2024

2.65 Mt CO₂ in 2024 (Climate TRACE) · 650,000 bbl/day · not yet in EDGAR's 1 km grid



Process units

white plumes = steam / cloud

Crude oil tank farm

Pipe racks / laydown yards

Product storage tanks

Lekki Free Zone road

500 m

Google Earth Pro · annotated by Dinar Wali

Image © 2026 Airbus

Cement plants rose on bare savanna

Obajana, Kogi · 6.1 Mt

Okpotu, Benue · 2.8 Mt

Mfamosing, Cross River · 1.6 Mt

2000–02



2025–26



NO₂ +23% since 2019

NO₂ +45% since 2019

NO₂ +36% since 2019

Six cement works, 17 Mt between them



Obajana · Kogi · 6.1 Mt



Okpotu · Benue · 2.8 Mt



Sokoto · Sokoto · 2.4 Mt



Ibese · Ogun · 2.2 Mt



Gboko · Benue · 1.7 Mt



Mfamosing · Cross River · 1.6 Mt

H05 · Obajana Cement (Dangote), Kogi

6.1 Mt CO₂/yr (EDGAR 2024) · Africa's largest cement plant · built after 2002

Then · 18 Nov 2011



Water reservoir

Airstrip

First production lines
plant at about one-third of today's size

Obajana town (smaller)

1 km

H05 · Obajana Cement (Dangote), Kogi

6.1 Mt CO₂/yr (EDGAR 2024) · Africa's largest cement plant · built after 2002

Now · 13 Dec 2024



Raw-material / coal stores

Water reservoir

Plant airstrip

Production lines (kilns, mills)
main CO₂ source: fuel + limestone

Storage sheds

Obajana town

1 km

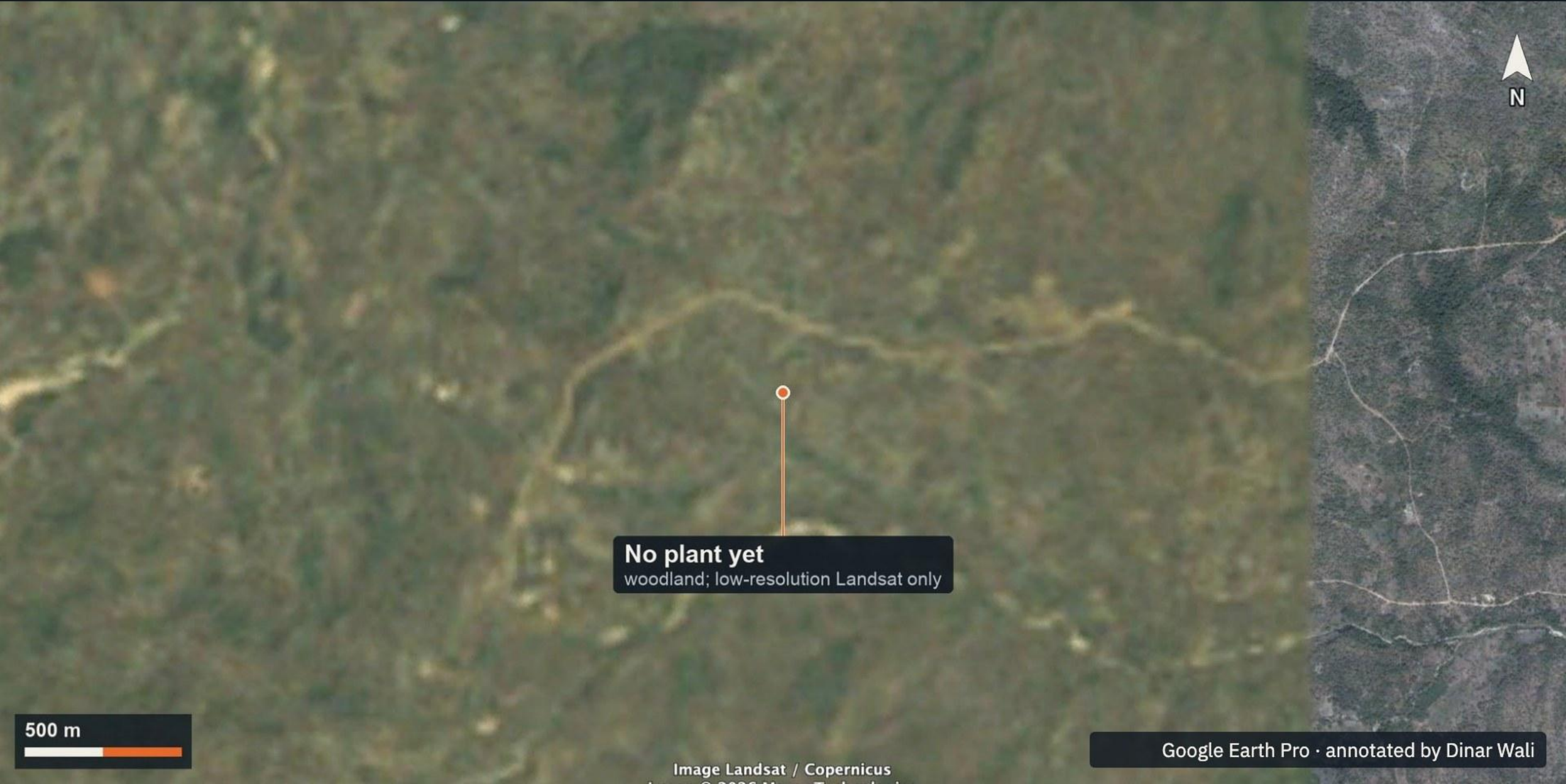
Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H06 · BUA Okpotu Cement, Benue

Then · 23 Nov 2006

2.83 Mt CO₂/yr (Climate TRACE) · missing from EDGAR's grid · NO₂ +45% since 2019



No plant yet
woodland; low-resolution Landsat only

500 m

Google Earth Pro · annotated by Dinar Wali

Image Landsat / Copernicus
Imagery 2026-01-01 10:00:00 UTC

H06 · BUA Okpotu Cement, Benue

Now · 1 Mar 2025

2.83 Mt CO₂/yr (Climate TRACE) · missing from EDGAR's grid · NO₂ +45% since 2019



500 m

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H07 · Ibese Cement (Dangote), Ogun

Then · 19 Jan 2014

2.2 Mt CO₂/yr (Climate TRACE) · 2.0 Mt EDGAR cluster · NO₂ ×2.28 national median



Kiln lines (before expansion)

Haze over quarry area

1 km

Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

H07 · Ibese Cement (Dangote), Ogun

Now · 21 Jan 2026

2.2 Mt CO₂/yr (Climate TRACE) · 2.0 Mt EDGAR cluster · NO₂ ×2.28 national median



Staff housing

Kiln lines & cement mills

Limestone quarries

Flooded pit

Quarry benches

1 km

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H08 · BUA Sokoto Cement, Kalambaina

Then · 27 Sep 2013

2.36 Mt CO₂/yr (Climate TRACE) · the far north's largest point source · under-allocated by EDGAR



Older, smaller plant
before the new kiln lines

Limestone quarry

500 m

H08 · BUA Sokoto Cement, Kalambaina

2.36 Mt CO₂/yr (Climate TRACE) · the far north's largest point source · under-allocated by EDGAR

Now · 30 Mar 2025



500 m

Limestone quarry

Clinker / cement storage

Kiln lines

Coal / fuel stockyard
dark ground

Sokoto city edge

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H12 · Gboko Cement (Dangote), Benue

Then · 5 Jan 2014

1.7 Mt CO₂/yr EDGAR cluster · 1.18 Mt (Climate TRACE) · NO₂ +31% since 2019



Plant before expansion

Limestone quarry

500 m

Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

H12 · Gboko Cement (Dangote), Benue

Now · 18 Nov 2025

1.7 Mt CO₂/yr EDGAR cluster · 1.18 Mt (Climate TRACE) · NO₂ +31% since 2019



Gboko town

Kiln lines & preheater towers

Clinker silos

Flooded limestone quarry

500 m

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H13 · Mfamosing Cement (Lafarge), Cross River

Now · 3 May 2022

1.6 Mt CO₂/yr EDGAR cluster · 1.13 Mt (Climate TRACE) · NO₂ +36% since 2019



Stockyard

Limestone quarry (open pit)

Kiln lines & stacks

500 m

Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

GAS-FIRED POWER

New plants in Edo and Delta



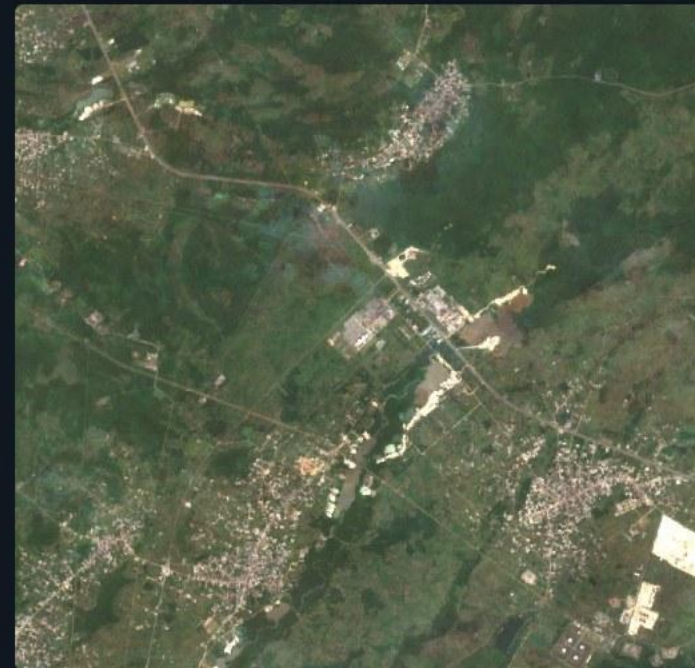
Azura-Edo · 2000-02

Farmland and bush



Azura-Edo · 2025-26

2.1 Mt · 461 MW plant



Ughelli · 2025-26

1.8 Mt · flares nearby

H10 · Ughelli power station, Delta

1.81 Mt CO₂/yr (Climate TRACE) · persistent gas flares nearby

Then · 15 Jan 2011



Ughelli power station

Second industrial compound

500 m

Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

H10 · Ughelli power station, Delta

1.81 Mt CO₂/yr (Climate TRACE) · persistent gas flares nearby

Now · 6 May 2024



Ughelli power station
gas turbines

Second industrial compound

Sand-dredging ponds

500 m

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

H11 · Azura-Edo & Ihovbor power, Benin City

Then · 5 Feb 2013

Azura-Edo 2.12 Mt + Ihovbor 0.60 Mt CO₂/yr (Climate TRACE) · gas-fired



Future Azura-Edo site: bush

Cleared site
Ihovbor plant under construction

500 m

H11 · Azura-Edo & Ihovbor power, Benin City

Now · 6 May 2024

Azura-Edo 2.12 Mt + Ihovbor 0.60 Mt CO₂/yr (Climate TRACE) · gas-fired



Azura-Edo IPP
461 MW, built 2016–18

Benin City suburbs

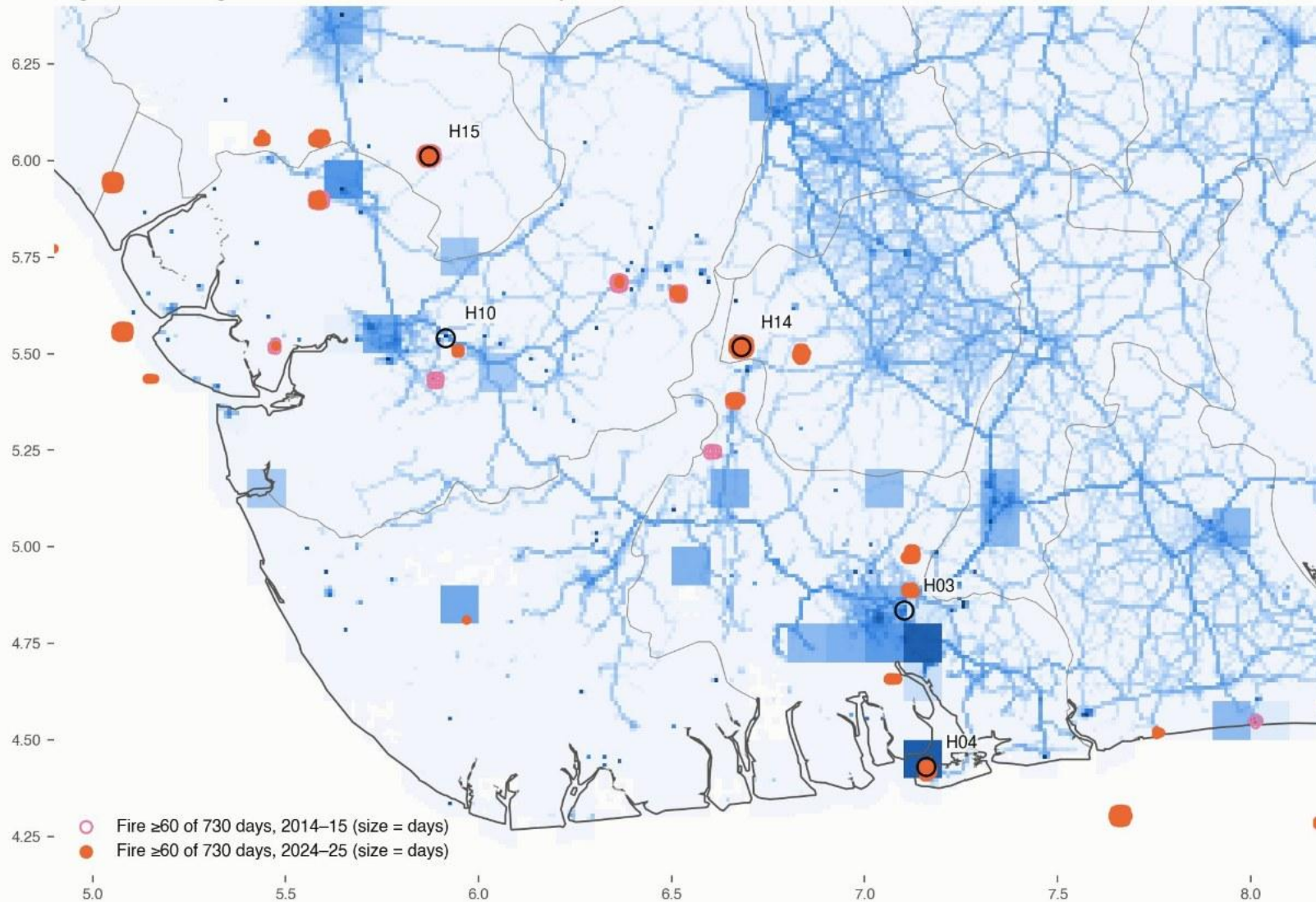
Ihovbor power plant
site cleared by 2013

500 m

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

Niger Delta — gas-flare sites from MODIS fire persistence



GAS FLARING

The inventory puts flares in the wrong place

EDGAR spreads oil-and-gas emissions over coarse 0.1° blocks (blue squares).

The flares MODIS sees burning for months (orange) mostly sit outside them.

23 flare sites in 2024–25, all between 4.3° and 6.1° N.

MODIS fire on ≥ 60 of 730 days. Counts are not volumes.

H14 · Persistent fire cluster, Ogba/Egbema area

Now · 30 Dec 2022

Largest MODIS persistent-fire cluster 2024–25: 19 km², fire on up to 229 of 730 days



Most persistent fire pixel (± 0.5 km)

no flare stack visible in this scene



River channel

500 m



Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

H15 · Gas-flare site, Delta/Edo border

Now · 30 Nov 2024

Largest flare site 2014–15 (fire on 255 of 730 days) · still 2nd in 2024–25 (225 days)



Well pads

Flow station / gas plant

Scorched flare pits
orange burnt ground

Well pad

500 m

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

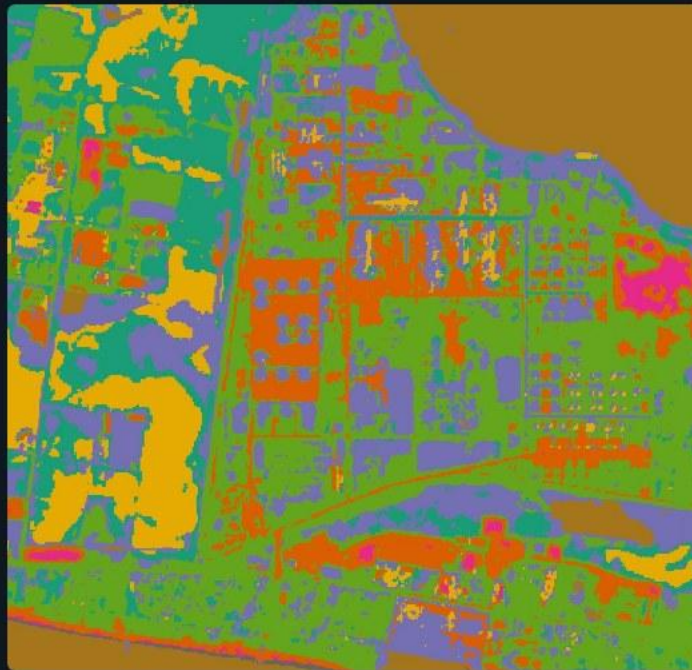
THE EARTH ENGINE SCRIPT'S METHOD

AlphaEarth embeddings date the change



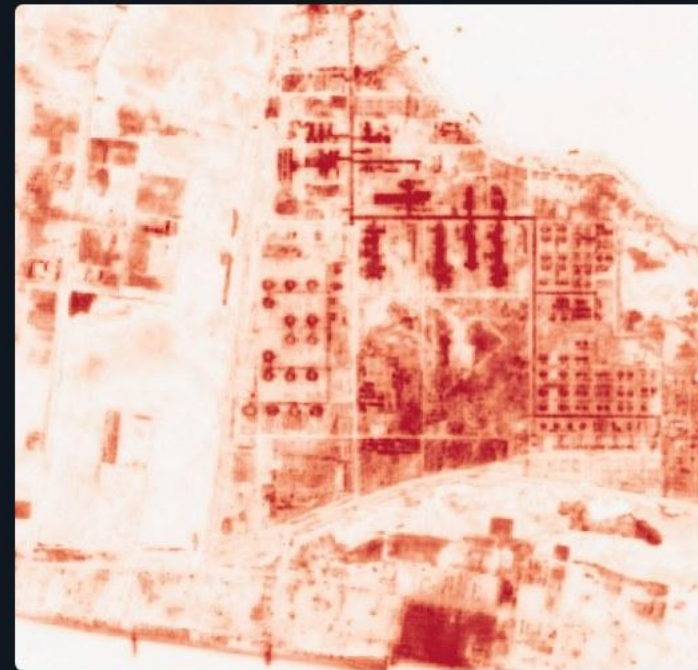
True colour · 2025-26

What the camera sees



k-means, $k = 8$ · 2024

Tanks, units, sand and bush separate



Change 2017 → 2024

58% of the 2 km radius changed

GOOGLE/SATELLITE_EMBEDDING/V1/ANNUAL · 500 samples, wekaKMeans, as in the linked script · Change = dot product of 2017 and 2024 vectors



REJECTED • SOUTHERN KADUNA

One inventory hotspot is not real

EDGAR places **0.69 Mt** in a single 1 km pixel at 9.495° N, 7.695° E, appearing only in 2025.

No plant in any image, 2000–2026

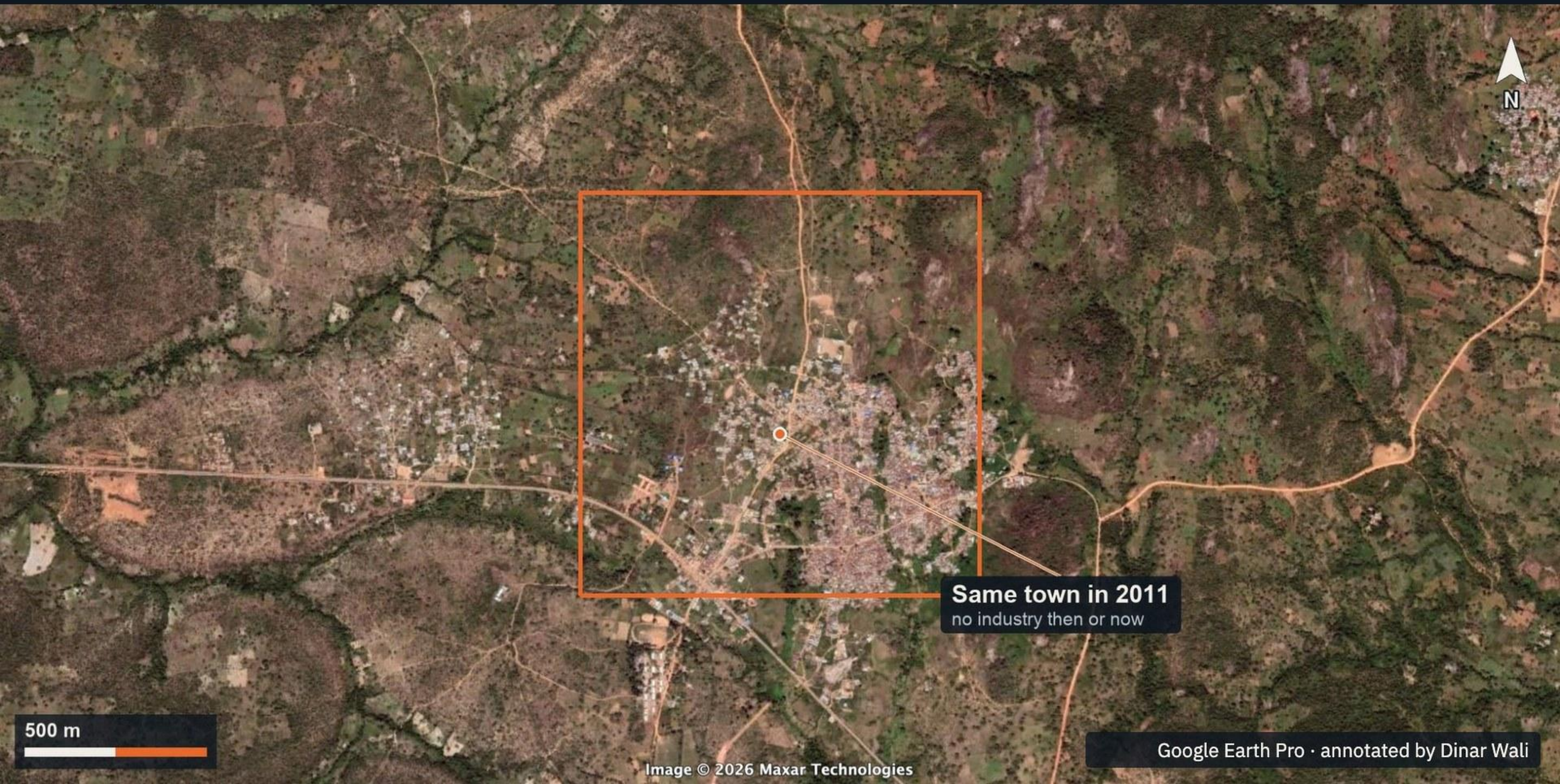
NO₂ at background, ×1.11

No facility in Climate TRACE

H16 · Rejected candidate, southern Kaduna

Then · 7 Nov 2011

EDGAR places 0.69 Mt in one 1 km pixel (2025 only) · no plant, NO₂ at background, no Climate TRACE facility



Same town in 2011
no industry then or now

500 m



Image © 2026 Maxar Technologies

Google Earth Pro · annotated by Dinar Wali

H16 · Rejected candidate, southern Kaduna

Now · 20 Sep 2023

EDGAR places 0.69 Mt in one 1 km pixel (2025 only) · no plant, NO₂ at background, no Climate TRACE facility



EDGAR 0.69 Mt pixel
houses and farmland only

500 m

Image © 2026 Airbus

Google Earth Pro · annotated by Dinar Wali

Limits and next steps

WHAT THE DATA CANNOT SAY

CO₂ is not measured directly. No satellite yet resolves one plant's plume over Nigeria; each site is an inventory figure checked with NO₂.

Flare counts are not volumes. MODIS overpass times changed after 2020.

Land and fire CO₂ are excluded. Forest and savanna fires add roughly 100 Mt.

WHAT COMES NEXT

Monthly NO₂ watch on the 15 sites, starting with the cement belt and the Dangote refinery.

High-resolution tasking over the 23 flare sites to map individual flare stacks.

Direct CO₂ plumes from the Copernicus CO2M mission once it is in orbit.

15 hotspots, each checked from orbit

Two coastal clusters, a cement belt, new gas power, and 23 flare sites the inventory misplaces.

Prepared by Dinar Wali · RegenX · October 2026