Cutting Methane Emissions Partnership and Opportunities

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Partnership on methane can mobilize additional government resources

Three parts to the presentation:

- Methane: the Global Picture
- Methane: Pioneering results from Nigeria
- Methane: Agenda to extend these results more generally

Why methane? Why the energy sector?

Climate physical risks:

- IPCC: cutting methane is the single most effective strategy to limit warming to 1.5˚C. Energy sector is priority
- Reducing emissions is not solely a global warming issue, methane has a disproportionately large impact on health

Climate transition risks:

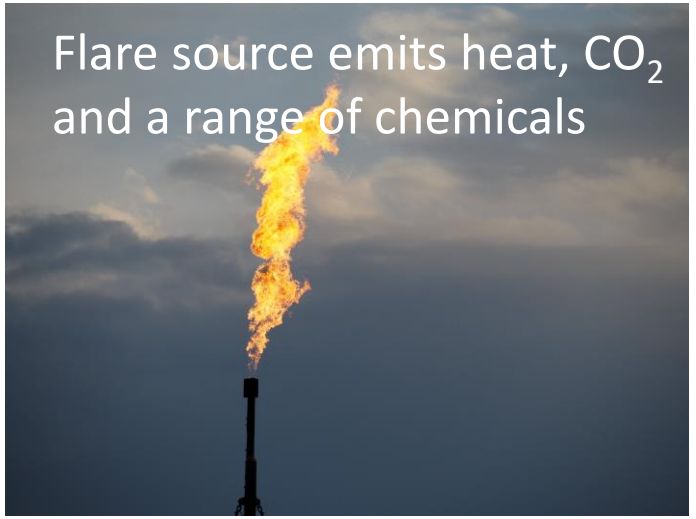
- Global Methane Pledge (150 countries) + U.S.-China Joint Glasgow Declaration on Enhancing Climate Action

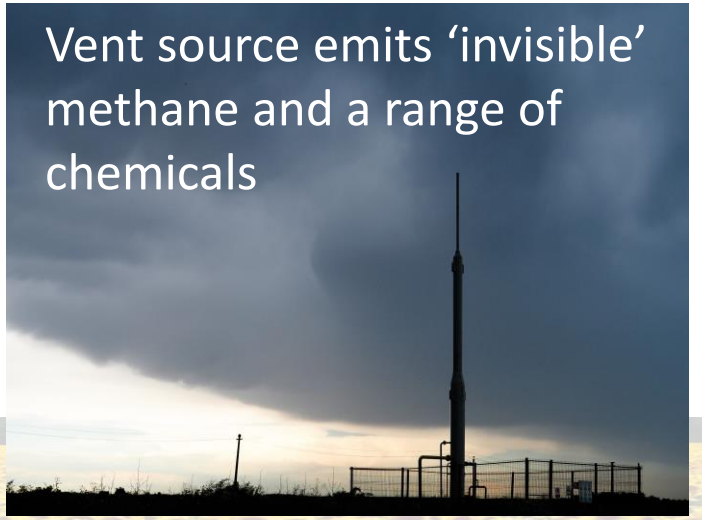
Positive result from tackling physical risks and transition risks:

- Reducing methane emissions gives countries immediate national and *local* benefits, including air quality
- Contributes to 11/17 SDGs, including food security, human health, energy access

Why natural gas flaring and venting in the Oil & Gas industry?

- Gas flaring is the controlled combustion of natural gas associated with production. It is done for operational, safety or commercial reasons.
- Venting is the direct release of natural gas into the atmosphere, creating methane and other emissions. Emissions from venting are harder to detect than gas flaring.
- World Bank finds that 21 / 28 jurisdictions ban routine flaring and venting; 54 oil producers have committed to end routine flaring. Yet, flaring emissions did not decline over ten years and increased in 2021.
- The 100 largest 'super-emitter' flares that account for one quarter of all gas flared globally are all located in low- and middle-income countries.





Photos from Clean Air Task Force, on https://www.flickr.com/photos/cleanairtaskforce/

Solutions-focused research and engagement with partners…

2020-2021 UNU-WIDER research published which establishes:

a. how much global gas can be made available by eliminating unnecessary methane wastage and GHG emissions

b. solutions for a successful methane reduction strategy based on a Diamond Model (next slides)

This knowledge demonstrates that policies to reduce these emissions do NOT need large financing by governments or new technologies

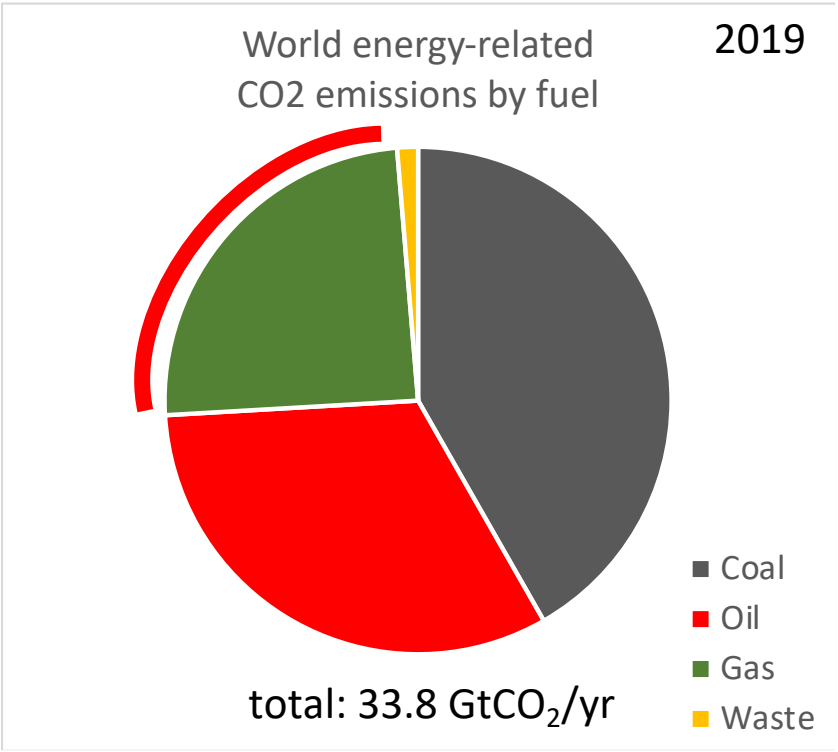
2021-2023 convening multi-stakeholder Roundtables to mobilize partners for action:

a. 2022 Action Plan developed

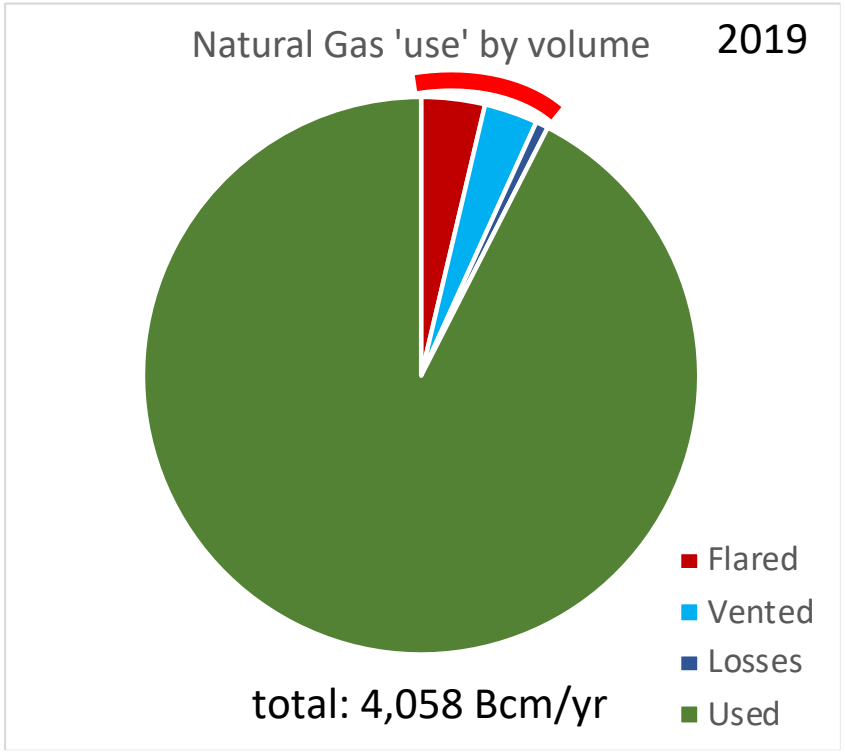
b. Multiple follow up engagements with partners, which are getting results

Revenue opportunity: 7.5% of global gas is wasted, w/sales value of $100 billion/year; gas flaring & venting important in world energy emissions

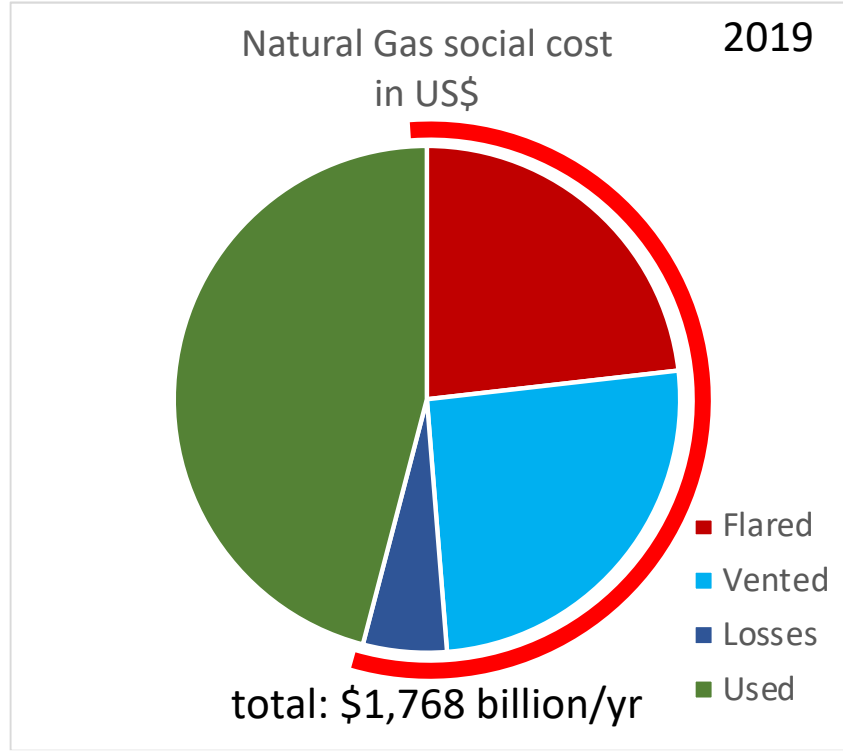
natural gas contributes 25% to global CO_2 emissions



7.5% of global gas is wasted



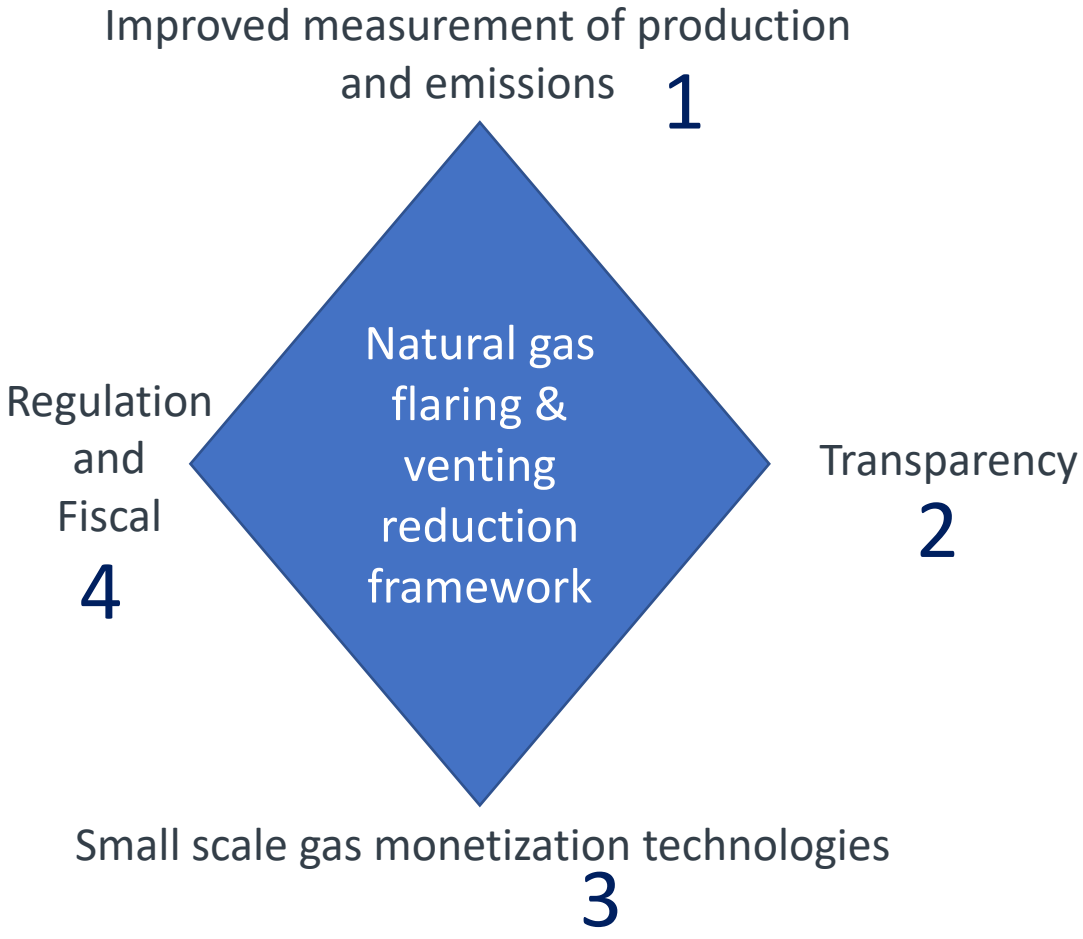
wasted gas causes 54% of social cost



Solutions are available today: require partnership

The four ‘keys’ to reducing emissions:

- **Measurement** using satellite technology
- **Transparency** on exact location and volumes of gas being flared and vented
- Technologies for **small scale gas utilization** exist to create additional energy access
- **Regulations and fiscal** measures are key



*UK Patent (pending) 2020621.5

COP 27: Action Plan published with CGD: the Key Actors*

Oil and gas producing countries could volunteer to apply satellite technology to measure—and fiscal policies to disincentivize—methane emissions from wasteful gas flaring, especially from "Super-Emitter" flares (following Nigeria's example). Egypt (COP27 chair) and Indonesia (G20 chair) could take leadership roles in this initiative;

MDBs and other donors should help developing countries to take advantage of the available technology in pursuit of country objectives (as the UK's FCDO) did in Nigeria;

The IMF should ensure with immediate effect that it urges, in its annual (Article IV) consultation with each oil and gas producer, its innovative fiscal policy advice of applying penalties for excess methane emissions.

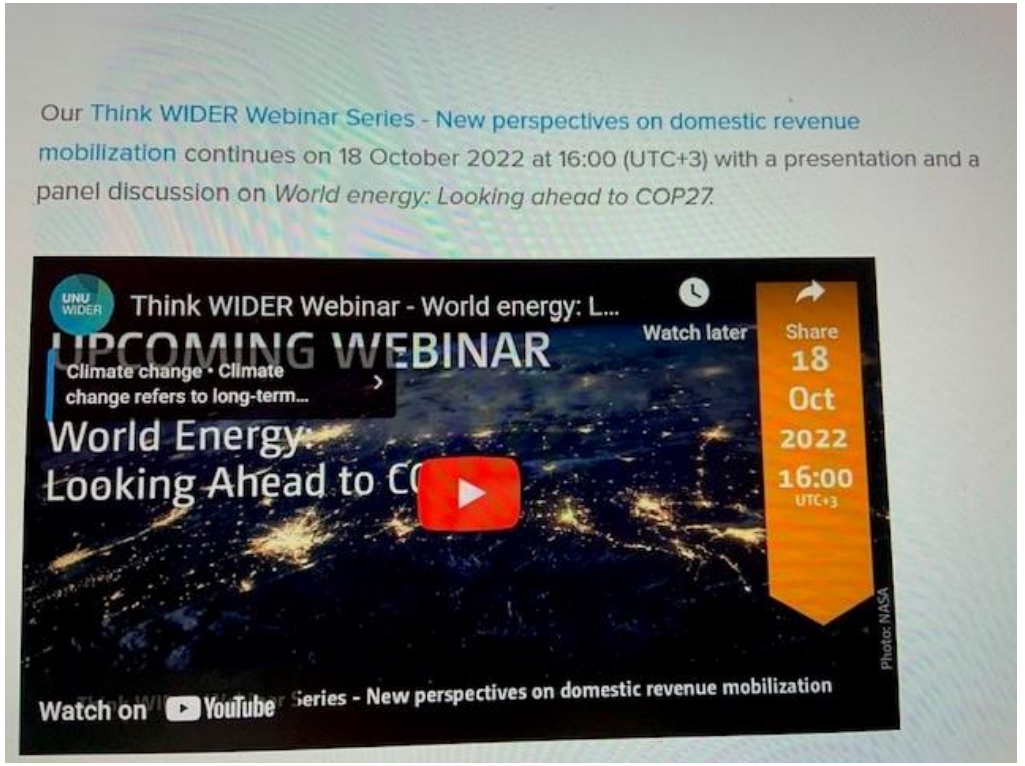
* Center for Global Development Blog: February 2022

UNU-WIDER: COP27 Multi-Stakeholder Roundtable

- **Top message**: The reduction of methane emissions by addressing the huge global wastage of gas caused by flaring and venting should be immediately prioritized for global emissions objectives
- Leading participants:
  - Oil and Gas industry
  - IFIs including IMF and World Bank Global Gas Flaring Reduction initiative
  - Norway as key bilateral
  - multiparty networks such as the Climate and Clean Air Coalition
  - Center for Global Development
  - expert research organizations including Kayrros, Oxford Policy Management Ltd
  - advisory NGOs including the Climate Policy Initiative

Oil and Gas Producers… with Egypt taking leadership role

UNU-WIDER convened COP27 Webinar with Dr Mahmoud Mohieldin, the UN Climate Change High Level Champion for COP27 who discussed regulation via the IMF, climate and health



Donors (including MDBs) should help countries adopt the available technologies

Working with the UK FCDO to help countries implement technologies:

- 2022-2023 FCDO supported two major studies on 'super-emitter' flares for Regulators in Nigeria (see following slides). Using detailed **satellite measurements** based on methodologies used by the World Bank, Nigeria EITI:
  i. nine 'super-emitter' gas flares + 58 onshore flares contributed 47-64% of Nigeria's total gas flaring
  ii. these flares together wasted around US$ 770 million annually of usable gas, (Q4 2021 LNG prices)
- Results widely shared:
  i. with Regulators June 2022, September 2022, April 2023
  ii. Vice President's Office and Special Adviser to the President of Nigeria on Oil and Gas
  iii. NOSDRA "National Stakeholders Summit on the Use of Satellite for tracking Gas Flare and emissions"
  iv. draft reports sent to Operators for comment (in process)
- FCDO Nigeria Chaired meeting for MDBs / donors June 2023

Nigeria: Offshore Asset performance: using flare intensity and flare variability to distinguish routine flaring from non-routine flaring

Bonga (Shell)

Agbami (Chevron)

Usan (Total, Exxon)*

* 2013 SEC reporting highlighted that Usan FPSO flare was responsible for 20% of Total S.A. Group's global gas flaring.

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Why is gas being flared in offshore Nigeria?

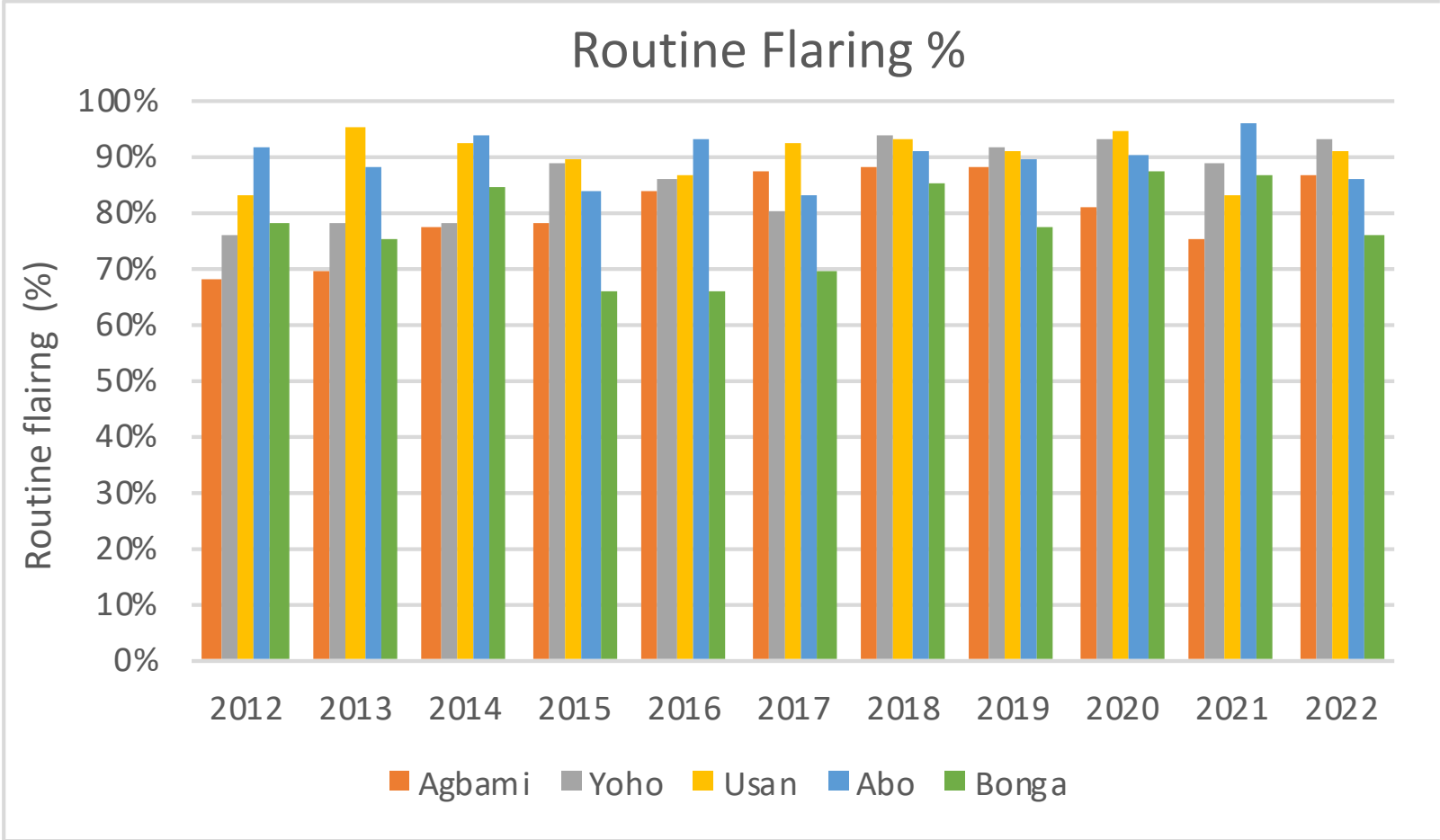
Distinguish different types of flaring

All five offshore assets were designed not to flare routinely.
Yet each of these assets is flaring at a scale that makes it a global super-emitter.

Natural gas flaring appears to be related to two distinct causes:

- flaring caused by operational upsets such as process trips and equipment failures (flaring for safety reasons)
- Flaring caused by structural process equipment unavailability or lack of gas handling capacity (flaring to produce)

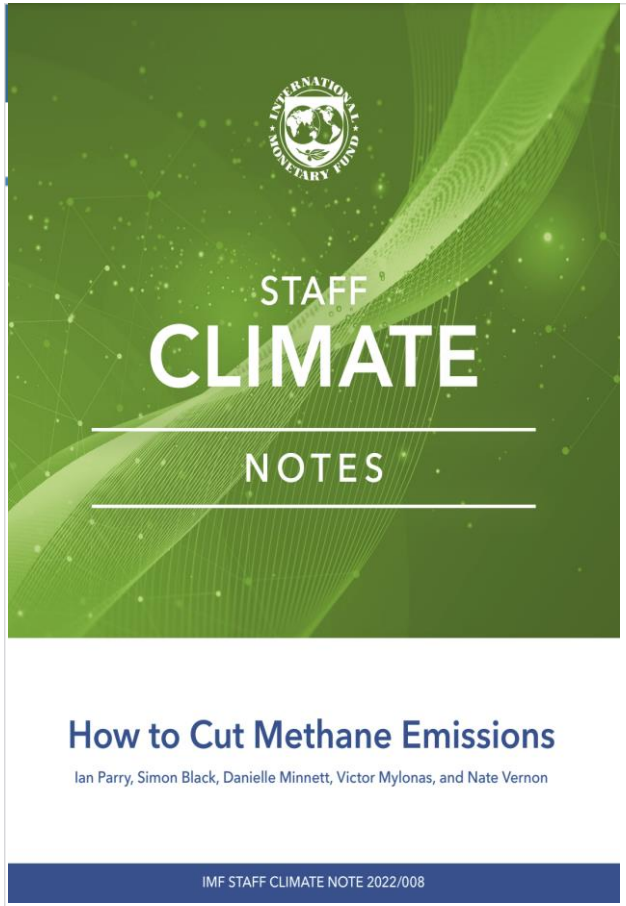
Nigeria: Satellite data show all five offshore super emitters flare routinely, for a decade+; yet these assets were designed for ‘zero routine’ flaring



The vast majority of gas flared is due to routine flaring

The Role of the IMF: annual consultations and possible penalties

- **Working with the Center for Global Development (CGD) and the IMF**
- UNU-WIDER research cited in IMF Staff Climate Note
- IMF Proposals to cut methane emissions:
  - Benefit Regulators who do not have to prove how much methane was emitted
  - Create incentives for operators to repurpose the gas flared for community access and/or LNG exports
  - Methane may be eligible for technical support under IMF's newly established Resilience and Sustainability Facility

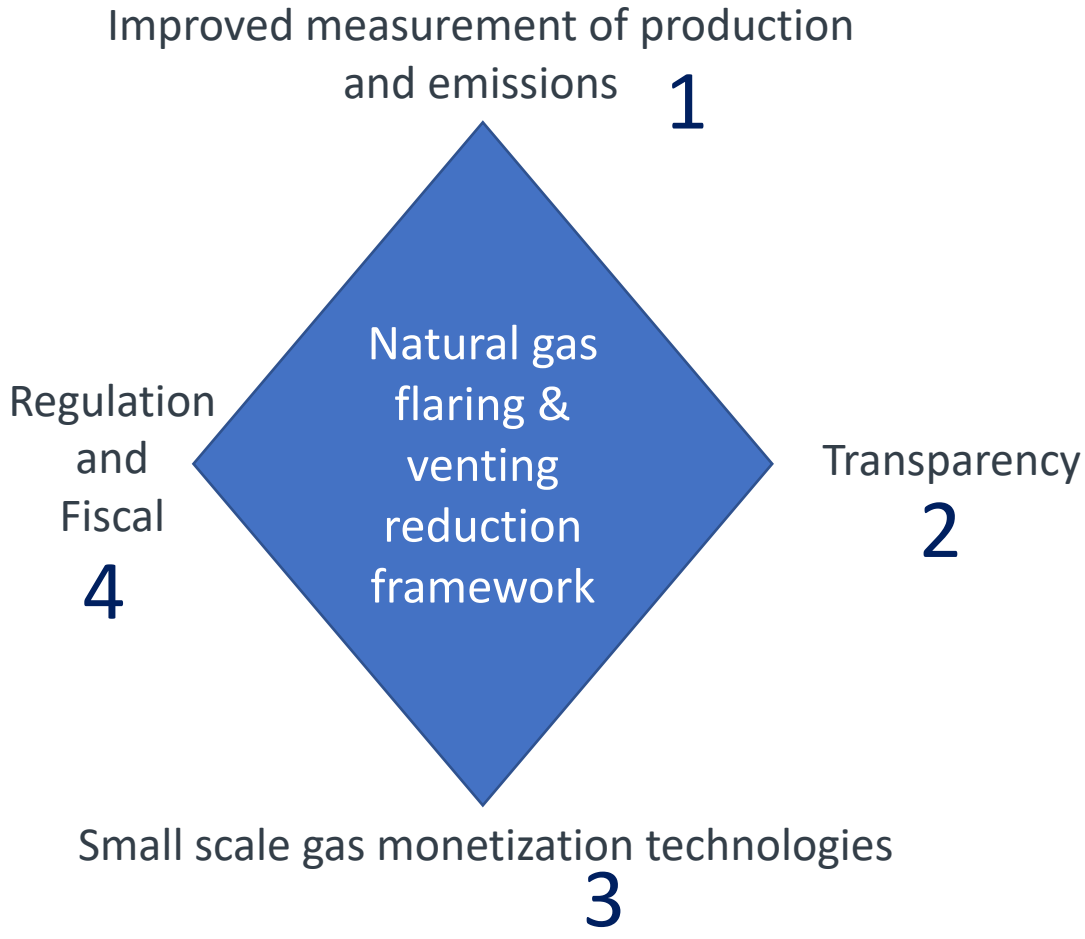


Agenda to extend these results more generally …

Scale up these practical proposals on methane:

- producing countries (e.g. Nigeria, Indonesia) would see increased revenues and local benefits
- donors/MDBs to provide financial and technical assistance
- the IMF to act on its proposals in its annual consultations
- Investors, facing multiple risks, could support global Top 200 super-emitters list

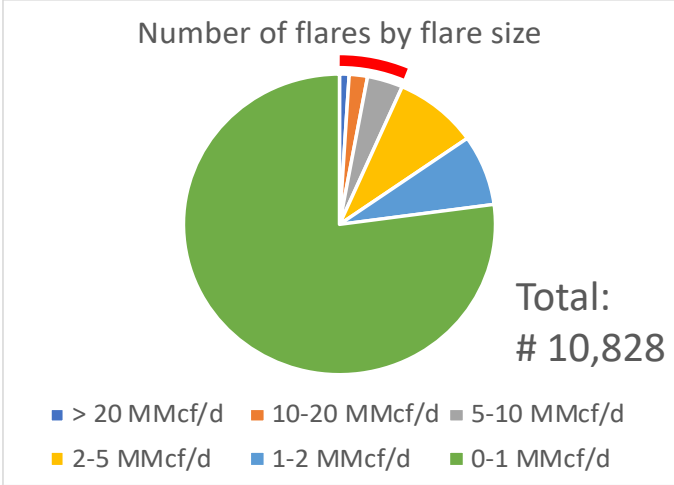
➔Rapidly reducing methane emissions is the single most effective strategy to limit warming to 1.5˚C.

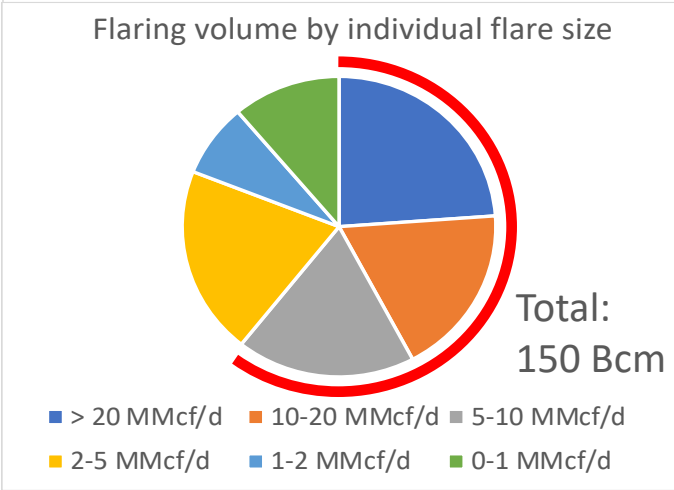


Prioritize super-emitters – 6.6% of global flares burn 60% of all natural gas flared

Opportunity: Identify the global Top 200 super-emitters of flaring activity and methane emissions using geospatial technologies

- Product: (annual) ranked list of global flaring and methane hotspots
- Method: uses satellite imagery and advanced analytics
- Results:
  - Address the **asymmetry between producers and regulators**, who lack the tools to identify the emitters, the volumes of gas being flared, the social impact (SCAR) of chemical releases
  - Prioritize mitigation opportunities to reduce emissions and repurpose the gas
  - Enable benchmarking of performance by investors and others





Source materials include UNU-WIDER peer-reviewed, published research

- 4 natural gas related papers with UNU-WIDER*, including:
- Capturing economic and social value from hydrocarbon gas flaring and venting: evaluation of the issues https://doi.org/10.35188/UNU-WIDER/2021/939-6
- Capturing economic and social value from hydrocarbon gas flaring and venting: solutions and actions https://doi.org/10.35188/UNU-WIDER/2021/940-2

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*Part of Extractives for development (E4D)—risks and opportunities, financed by the Norwegian Agency for Development Cooperation (Norad)

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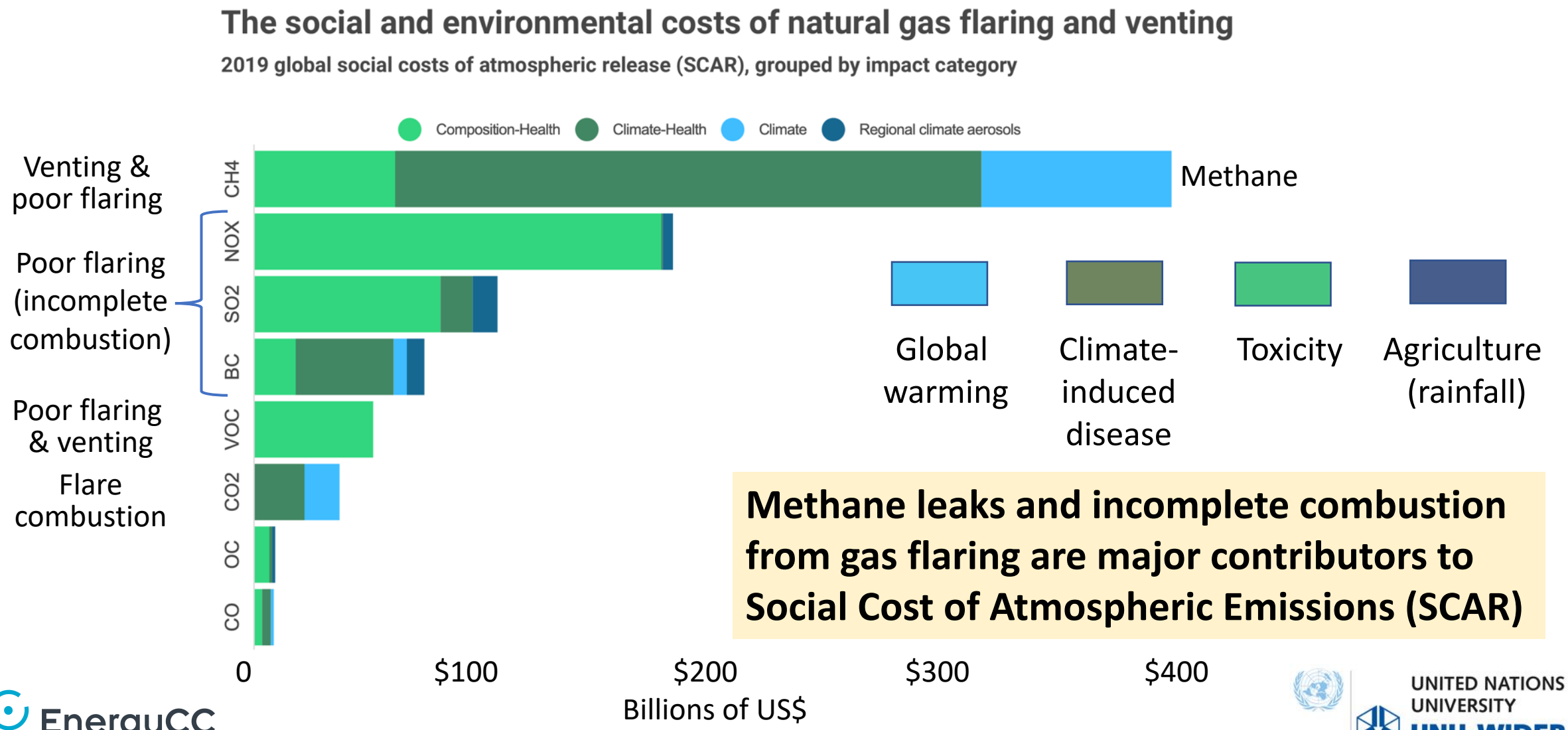
BACK UP SLIDES

Reducing atmospheric emissions ….. not solely a global warming issue



Methane leaks and incomplete combustion from gas flaring are major contributors to Social Cost of Atmospheric Emissions (SCAR)

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Opportunities for domestic energy access and livelihoods: **modern gas technologies** are modularized and containerized

A standard package WSCE **MiniLNG**-1 at a remote natural gas well site. The capacity is 4,000 US gallons (350,000 ft^3/d)

GE's '**CNG** In A Box'™

MTRINC membrane fuel gas conditioning 1-15 MMscf/d

Caterpillar G3512 **Natural Gas Power** Module

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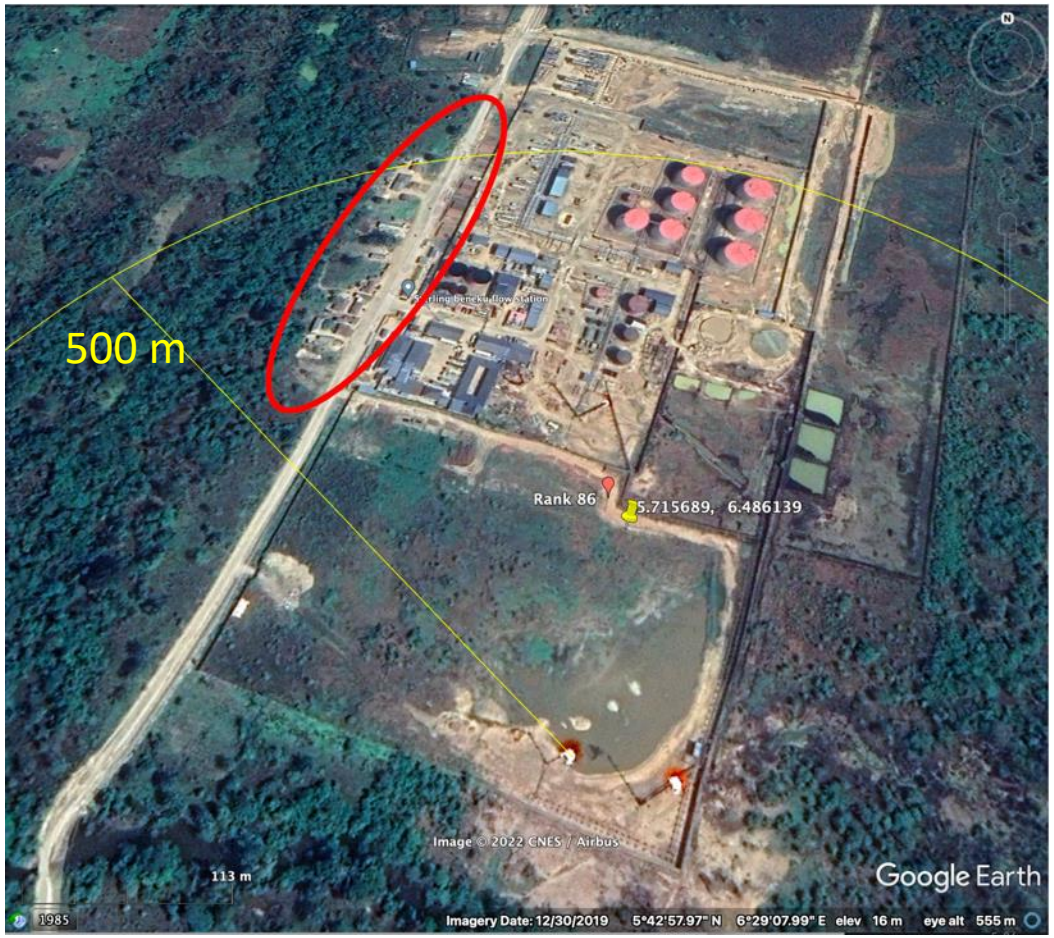
The Opportunity for health and food security: VNF and Google Earth satellites show communities located within short distances of large gas flares

Flare assessments complemented by community impacts



Detail of the Sterling Beneku (Kwale) flow station, showing dwellings located near the boundary fence area (enlargement of the red oval area in the figure above). The nearest dwelling is at only 330 meter distance.

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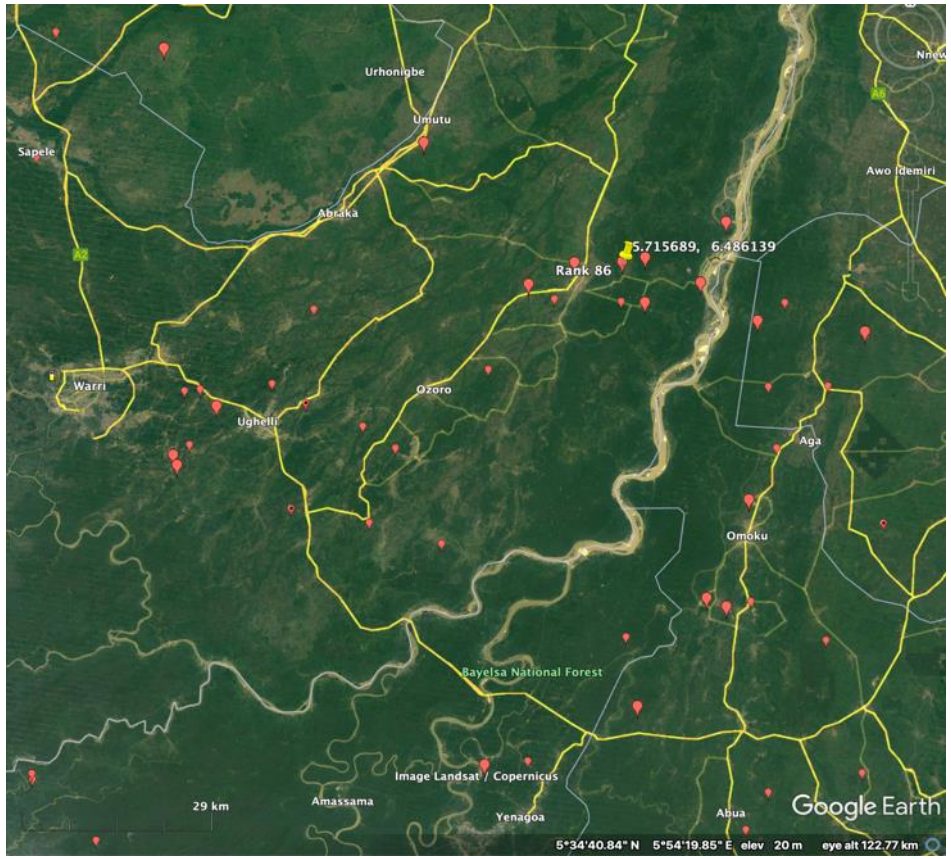
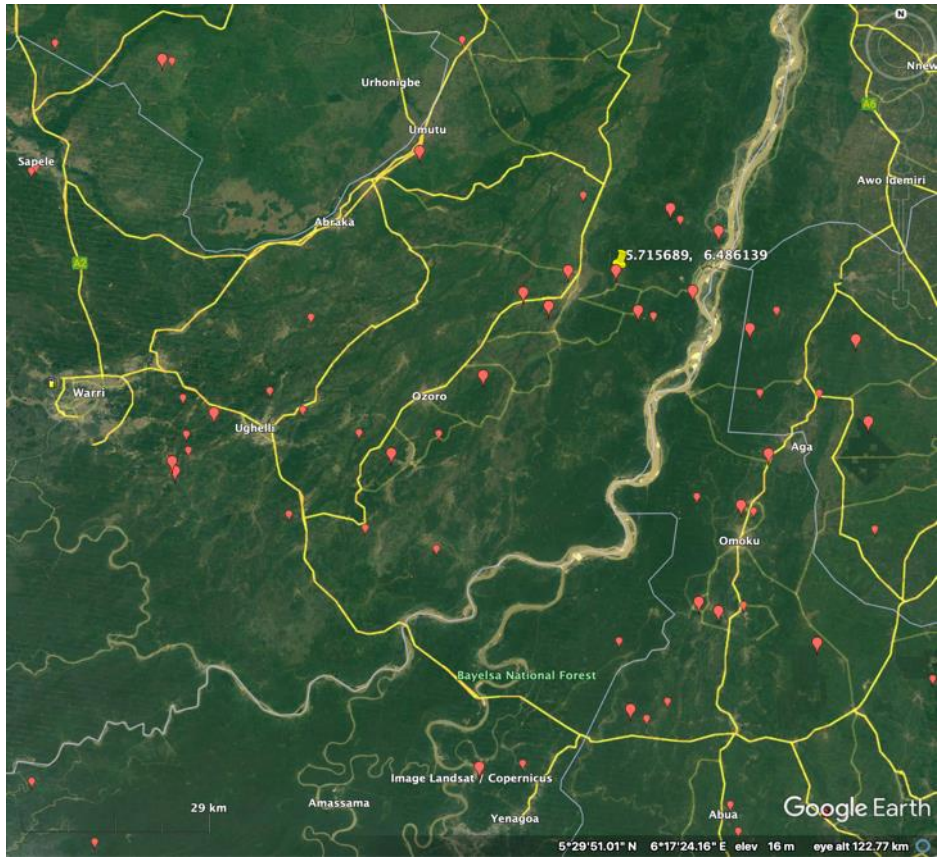
The Opportunity for additional revenues:
East Warri flaring increased 24% during 2017 – 2020 to USD [illegible] million per year (at Q4 2021 LNG prices)

Regional analysis to quantify flare performance over long time periods

In 2017, **51** flares in Warri area combust **188** MMscf/d gas



In 2020, **62** flares in Warri area combust **234** MMscf/d gas



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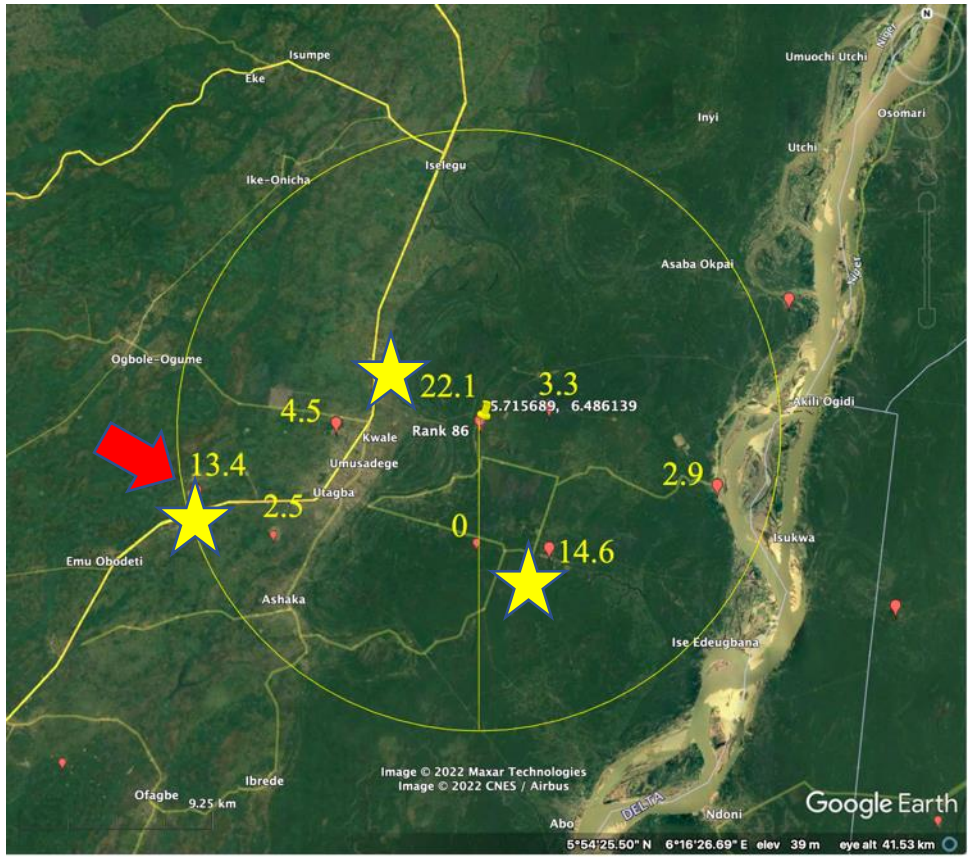
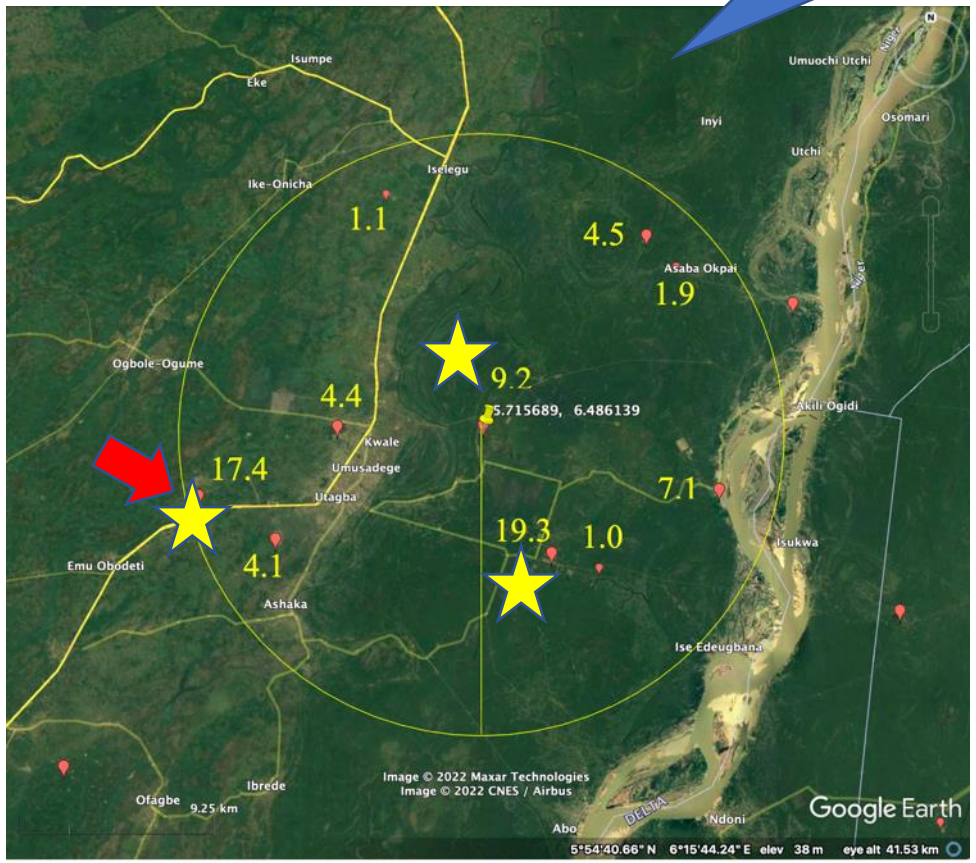
The Opportunity from 3 Super-emitters alone: 70 MMscf/d gas flared valued at USD 200 million per year using Q4 2021 LNG prices

Close-up analysis: 3 global super-emitters from marginal fields in 15 km radius

In 2017, **8** flares wasted **63.4** MMscf/d



In 2020, **10** flares wasted **70** MMscf/d

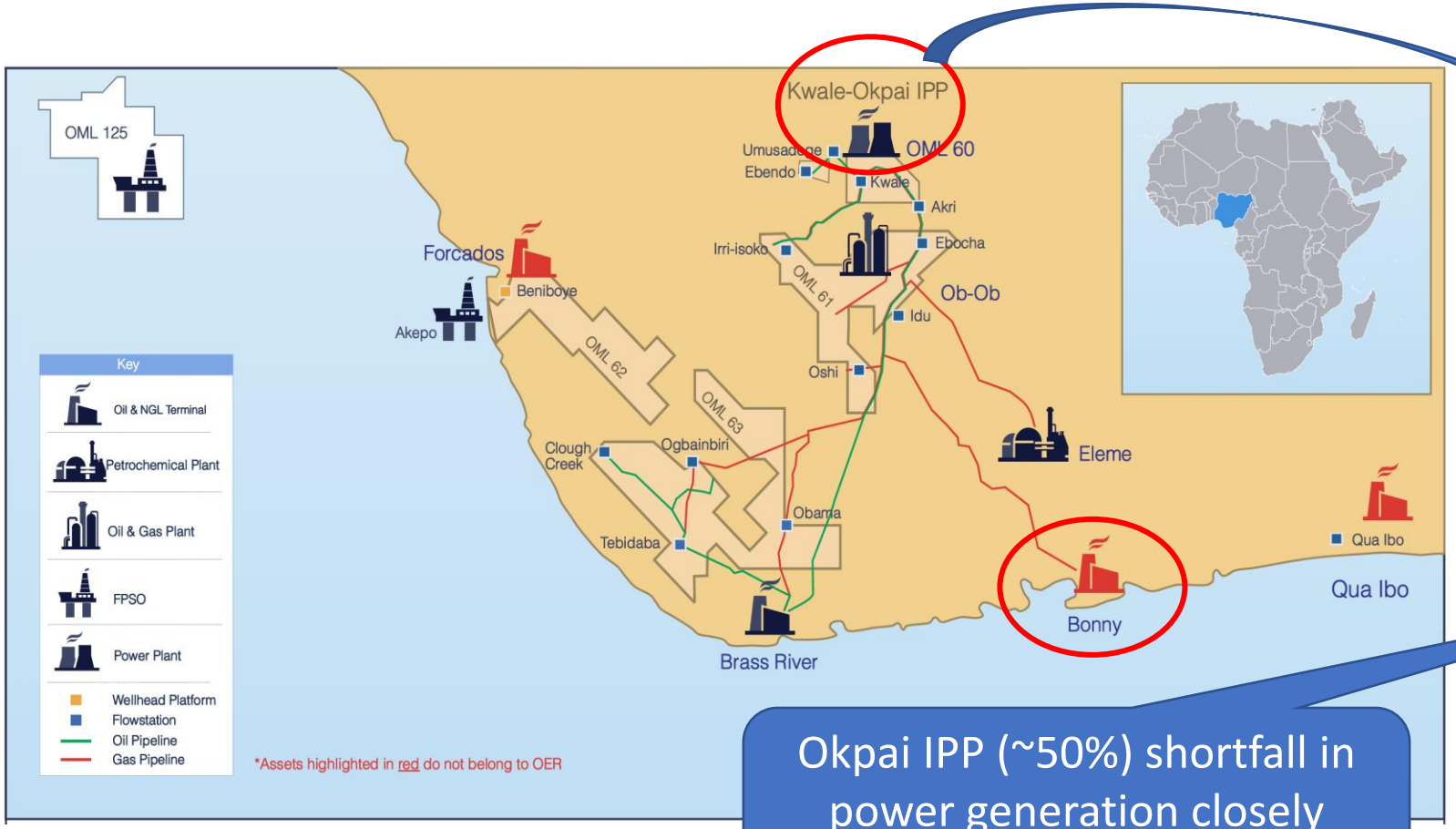


Ebendo flow station

Global Super-emitters

(rates in MMscf/d)

Solutions available today: Many gas flares are connected to gas infrastructure, including Bonny LNG plant



Gas flaring evaluation combined with infrastructure analysis

Okpai IPP (~50%) shortfall in power generation closely matches amount of gas flared…

Okpai IPP was built in 2005 and expanded in 2019 to reduce gas flaring…

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In conclusion: reducing natural gas flaring supports 11 of the 17 SDGs: including food security, energy access, livelihoods, health

SDG to benefit from reduced flaring & venting

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How is this Action Plan being implemented?

Progress being made with collaboration between:

- UN agency and international research institute (UNU-WIDER)
- International climate agencies (COP27 High Level Champion)
- Bilateral agencies (FCDO)
- Think tanks (EnergyCC and Center for Global Development)
- International Financial Institutions (IMF)
- Oil and Gas producing country Regulators (Nigeria)

The following slides provide examples of progress to reduce methane emissions

The role of the IMF: annual consultations and possible penalties

- **Working with the Center for Global Development (CGD) and the IMF to realise emission reduction benefits:**
  i. by adding methane reduction to the established Article IV procedures;
  ii. requiring all producing countries to report routinely on their actions in this area;
  iii. including methane in technical support for countries accessing IMF's Resilience and Sustainability Trust.

- IMF invited comments, subsequently incorporated, into its IMF Staff Climate Note 'How to Cut Methane Emissions' https://www.imf.org/en/Publications/staff-climate-notes/Issues/2022/10/28/How-to-Cut-Methane-Emissions-525188.

- Specific actions for the IMF on methane set out in a CGD April 2023 Blog: https://www.cgdev.org/blog/imfs-2023-climate-resolutions-modest-idea-quick-win....

- ….and for the RST: Launching the RST: Country Policies Must Adapt—and So Too Must IMF Conditionality, February 2023 https://www.cgdev.org/blog/launching-rst-country-policies-must-adapt-and-so-too-must-imf-conditionality