

Webinar series: Wastewater treatment solutions for climate mitigation

1st webinar: Unlocking mitigation pathways





WEBINAR SERIES

Wastewater Solutions for Climate Mitigation

Unlocking Mitigation Pathways



Housekeeping Rules

- This session is being recorded: The webinar will be recorded and used as part of the upcoming training programme.
- Stay muted during presentations: Please keep your microphone muted unless you're speaking to avoid background noise.
- Use the chat for questions: You can share your questions or comments in the chat box anytime. We'll address them during the Q&A. There will be time for live questions after the presentations.
- Be respectful and inclusive: We welcome diverse voices and encourage respectful dialogue throughout the event.

Règles de Bienséance

- Cette session est enregistrée: Le webinaire sera enregistré et utilisé dans le cadre du futur programme de formation.
- Restez en mode silencieux pendant les présentations: Merci de garder votre micro coupé, sauf lorsque vous prenez la parole, afin d'éviter les bruits de fond.
- Utilisez le chat pour vos questions: Vous pouvez partager vos questions ou commentaires à tout moment dans la boîte de discussion. Nous y répondrons pendant la séance de questions-réponses. Il y aura également un temps prévu pour les questions en direct après les présentations.
- Soyez respectueux et inclusifs: Nous soutenons la diversité des voix et encourageons un dialogue respectueux tout au long de l'événement.

Agenda

- Welcome and opening remarks
- UNEP/DHI report: Wastewater treatment solutions for climate mitigation
- Real-world examples from Senegal and Germany
- Q&A
- Closing remarks
- Wrap up

Unlocking Mitigation Pathways

Opening remarks

06 May 2026 | 15:05–15:10

Presented By

Donovan Storey

CCAC-TEAP Coordinator





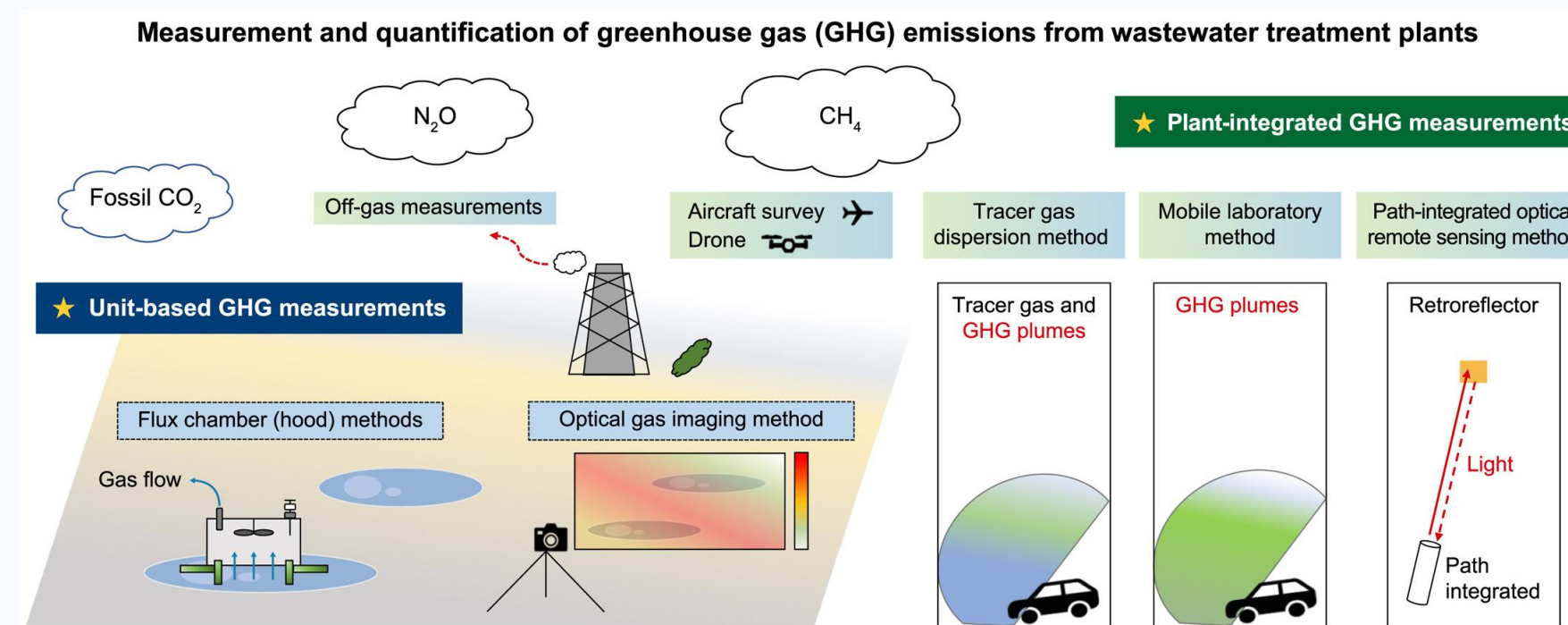
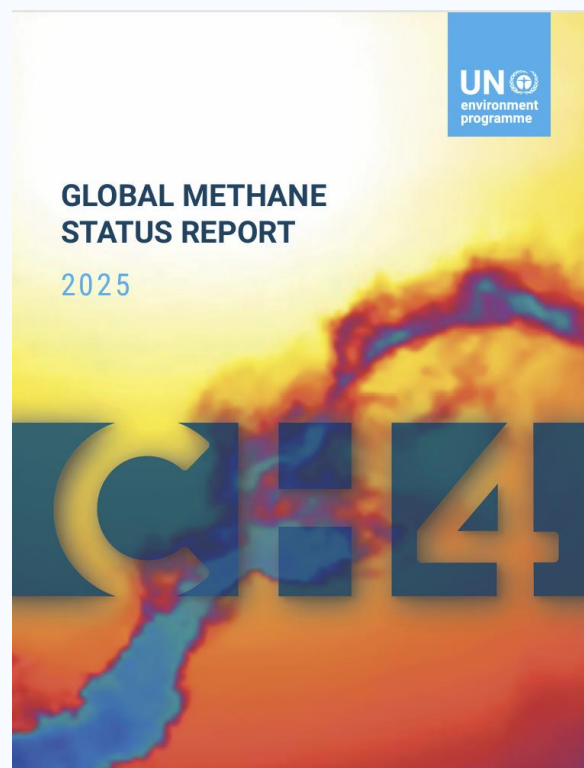
The CCAC Technology and Economic Assessment Panel (CCAC-TEAP): Identifying Wastewater Technologies that Support Science and Deliver Action

May 2026

Donovan Storey Manager, CCAC-TEAP

Why Wastewater, Why Now?

- ❑ Wastewater GHG emissions are accelerating and are significant SLCs (i.e. methane, nitrous oxide)
- ❑ Contribute around 5% of global non-CO₂ GHGs – will rise by 22% by 2030 due to increased collection & larger treatment systems
- ❑ Greater recognition: Countries including wastewater mitigation or adaptation measures has more than doubled, from 38 pre-2020 NDCs to 84 in the latest NDCs – **but** less than half have specific measurable actions
- ❑ UNFCCC reports emissions likely greater than estimated & more attention needed including through BTRs
- ❑ Especially important is getting the technology and investment right



What is the CCAC-TEAP?

CCAC-Technology and Assessment Panel (CCAC-TEAP): to identify and assess proven and scalable best practices and technologies available to achieve SLCP mitigation targets in the short to mid-term, while evaluating associated costs, economic viability, market readiness, and potential barriers to rapid deployment.

Its aspirations include:

- ☐ To advance SLCP mitigation measures identified as most impactful, by assessing specific technologies and practices that are available (known, or emerging)
- ☐ To attract financing to those technologies and practices, especially in partnership with MDBs
- ☐ To mobilise entrepreneurs and private sector engagement & overcome barriers
- ☐ To speed up adoption of impactful technologies and practices

Wastewater report to be developed through 2026 – Please engage!



Unlocking Mitigation Pathways

1st presentation – Technical solutions for wastewater and the climate

06 May 2026 | 15:10–15:20

Presented By

Dr. Caroline Kimie Miyazaki

Programme Associate UNEP/CCAC



Wastewater treatment solutions for climate mitigation: a practical guide

Monitoring, managing and reducing greenhouse gas emissions from wastewater treatment plants



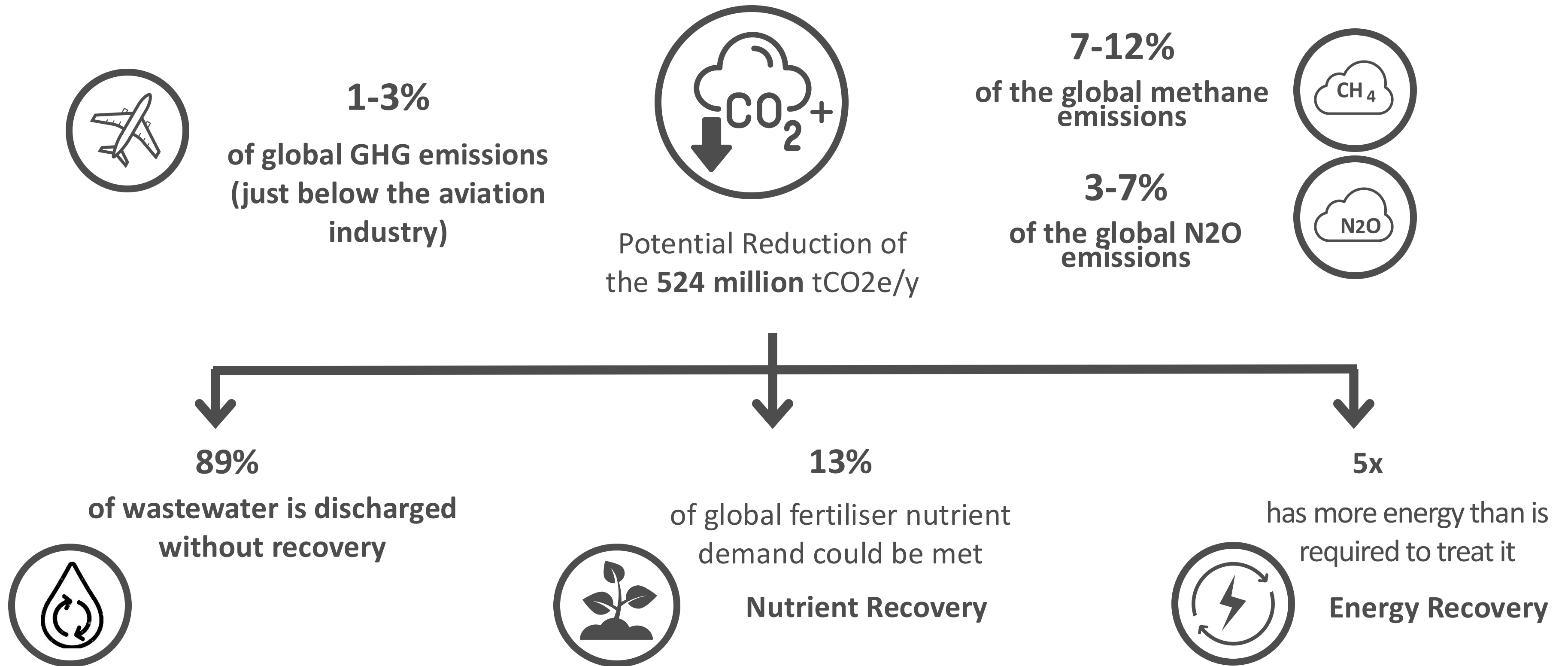
UNEP-DHI Report

Aim:

- Evaluate of global GHG emissions from wastewater treatment
- Mitigate GHG emissions
- Advocate for prioritizing GHG mitigation in the wastewater sector to address climate change



Wastewater emissions and opportunities

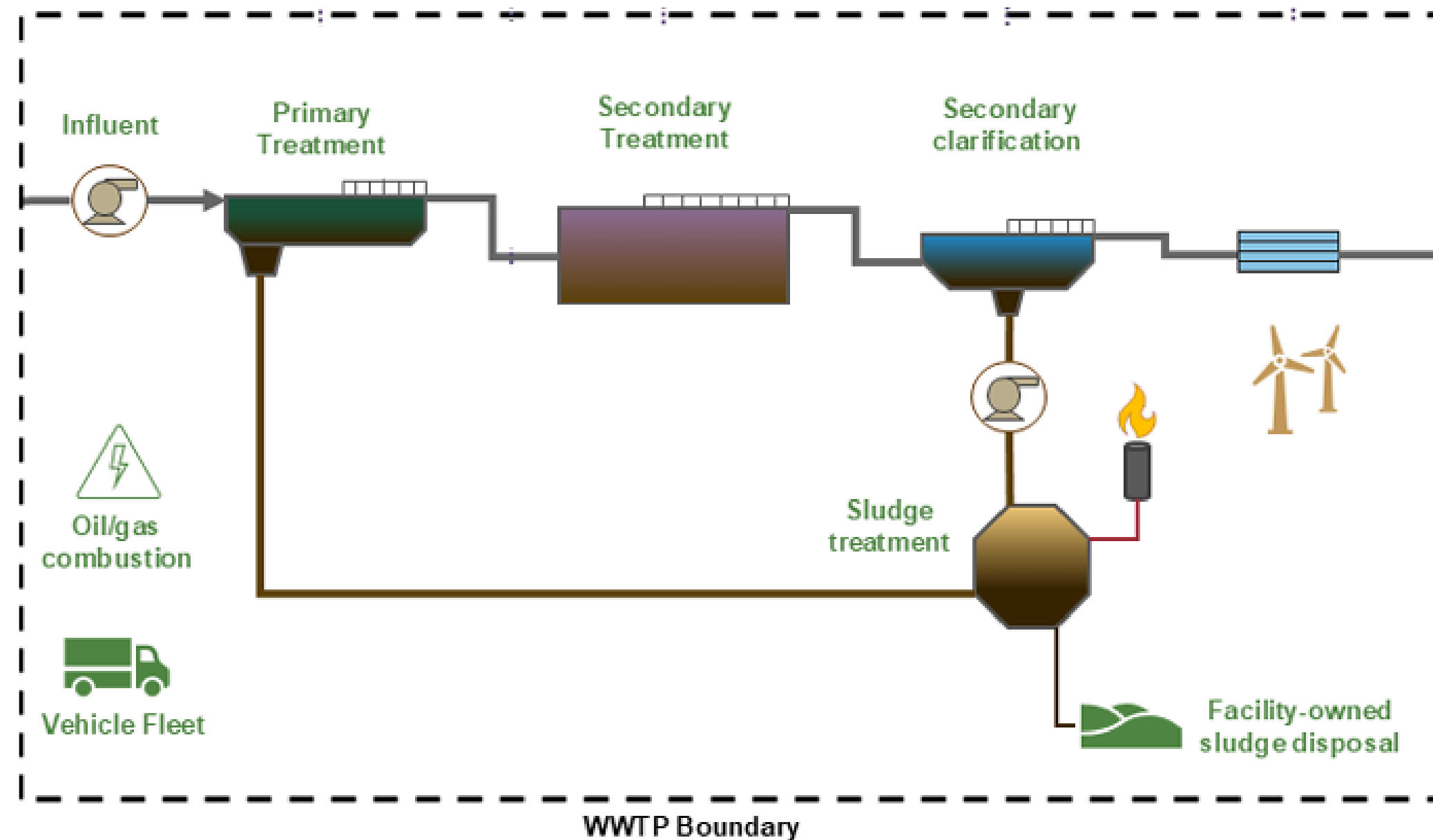


GHG emissions in the wastewater management cycle

Scope 1 – Direct Emissions from Operations

Scope 2 – Indirect Emissions from Onsite Energy Consumption

Scope 3 – Indirect Emissions from Value Chain



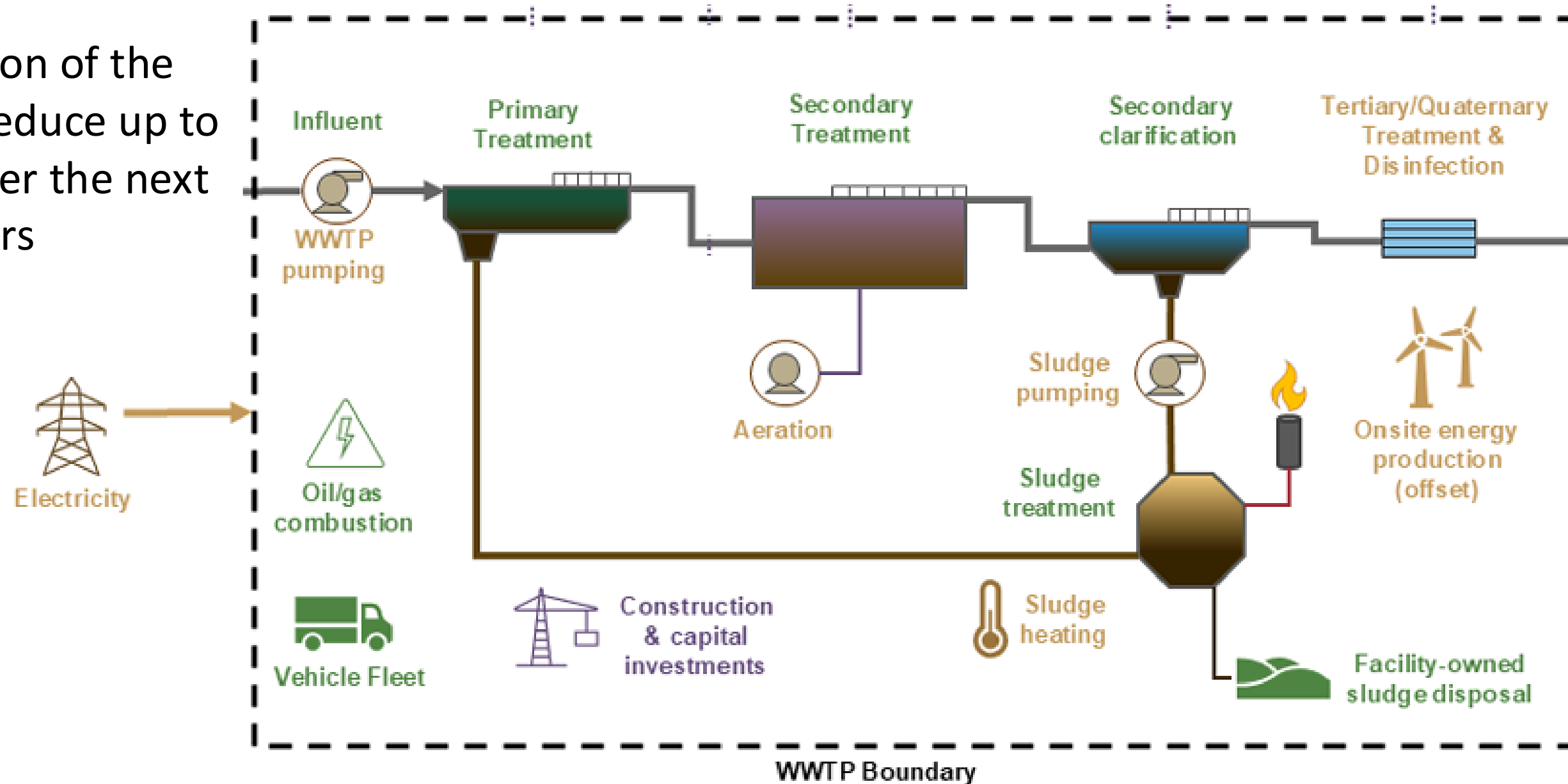
GHG emissions in the wastewater management cycle

Scope 1 – Direct Emissions from Operations

Scope 2 – Indirect Emissions from Onsite Energy Consumption

Scope 3 – Indirect Emissions from Value Chain

Decarbonization of the energy sector: reduce up to 60% globally over the next 10 years

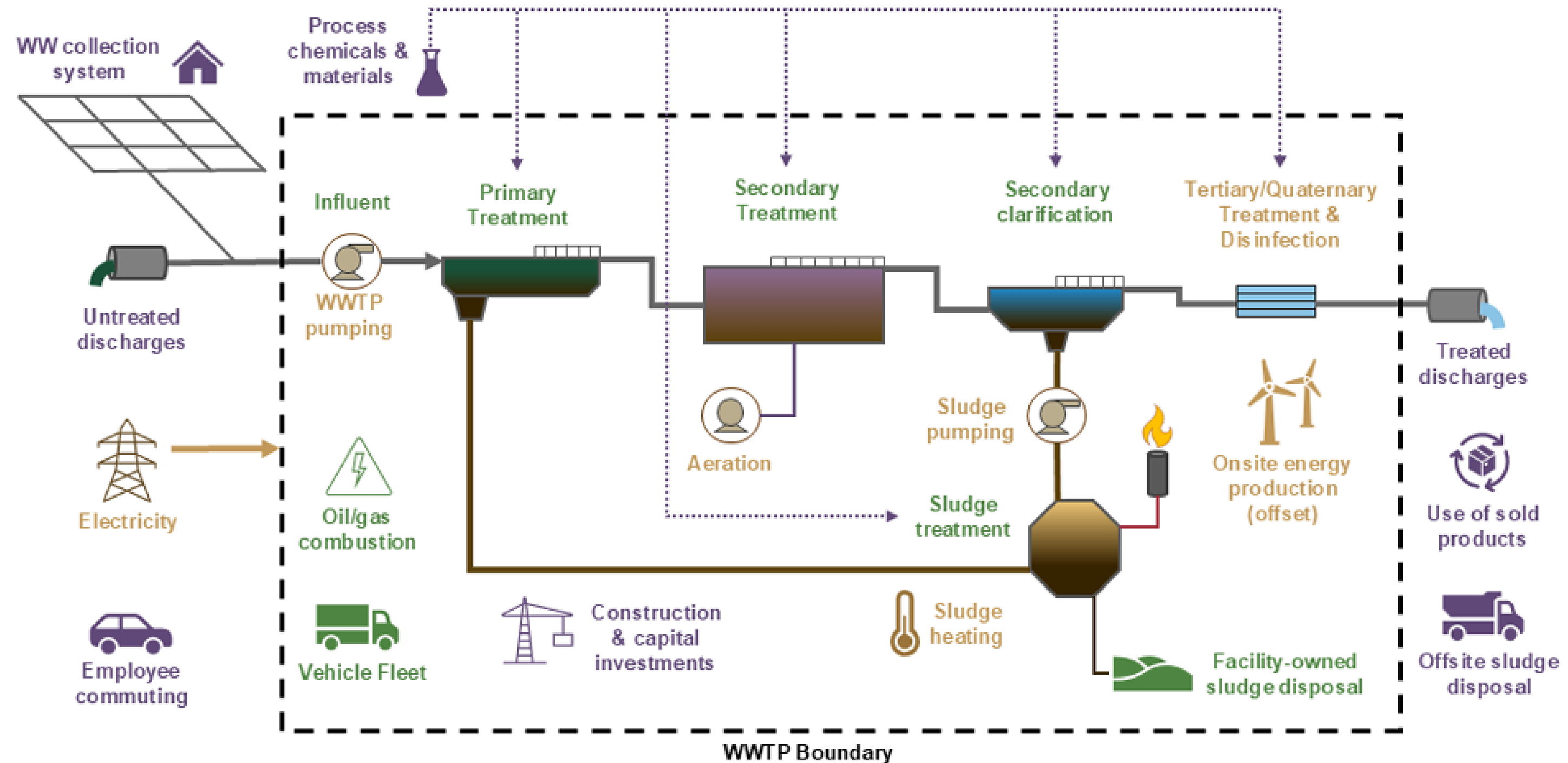


GHG emissions in the wastewater management cycle

Scope 1 – Direct Emissions from Operations

Scope 2 – Indirect Emissions from Onsite Energy Consumption

Scope 3 – Indirect Emissions from Value Chain

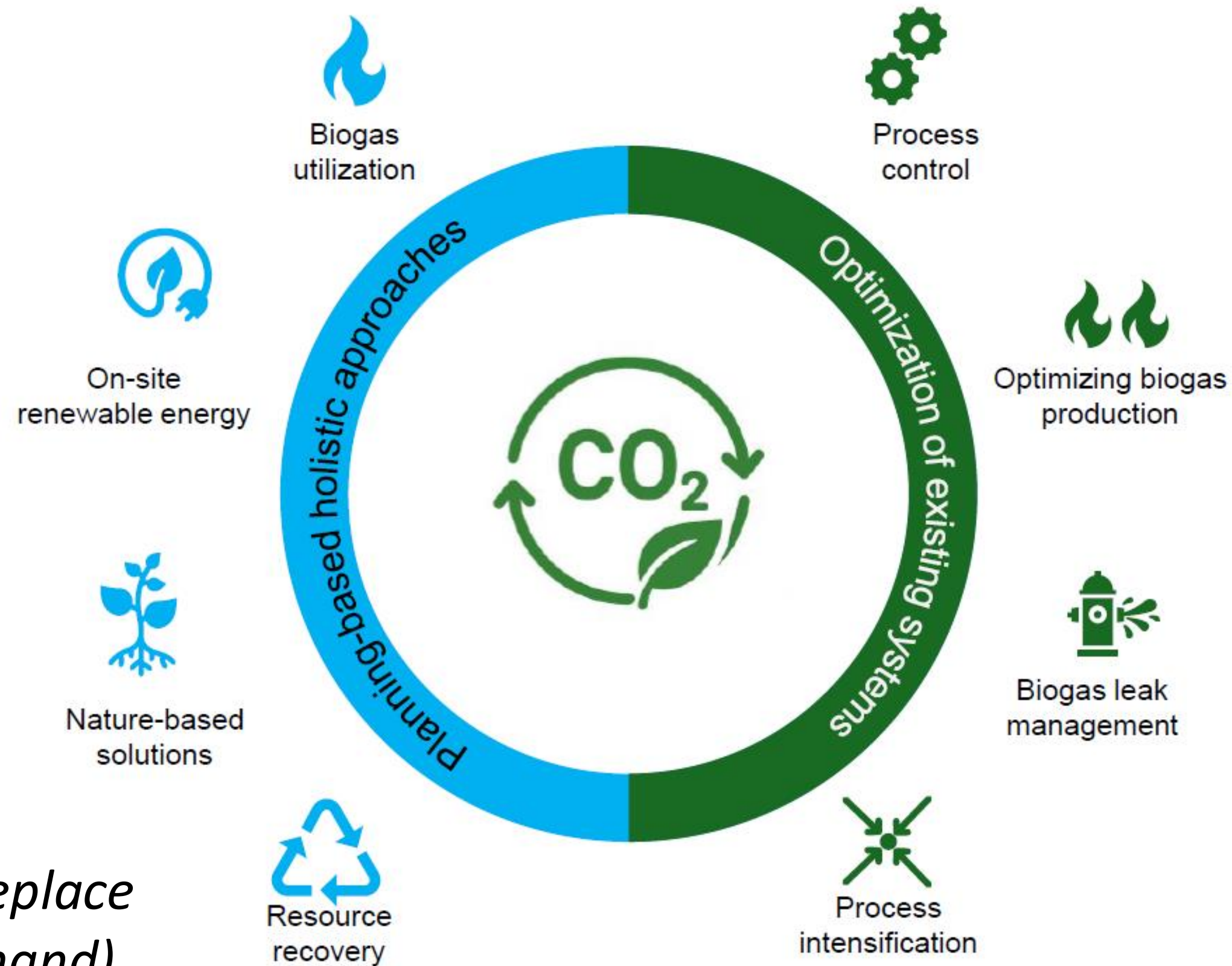


GHG Emissions Mitigation Strategies

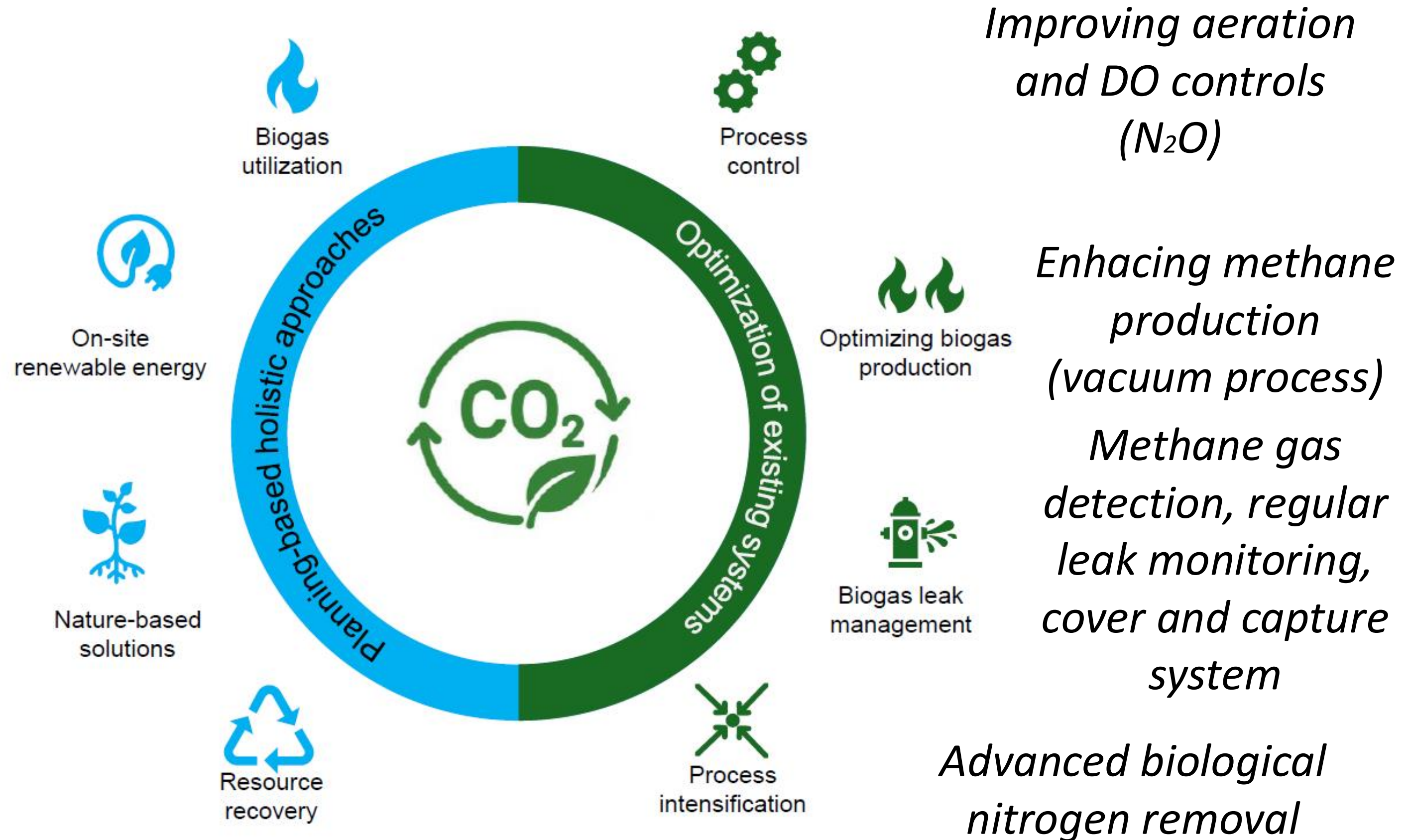
*Energy neutrality
through renewable
energy (Scope 1 and 2)*

*Treatment wetlands
(low-energy treatment)*

*Nutrient recovery (replace
global fertilizer demand)*

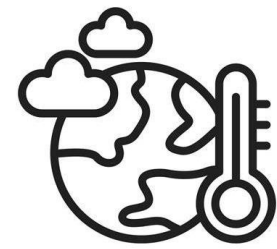


GHG Emissions Mitigation Strategies





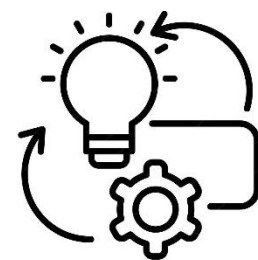
Conclusions



Wastewater must be recognized as a climate solution

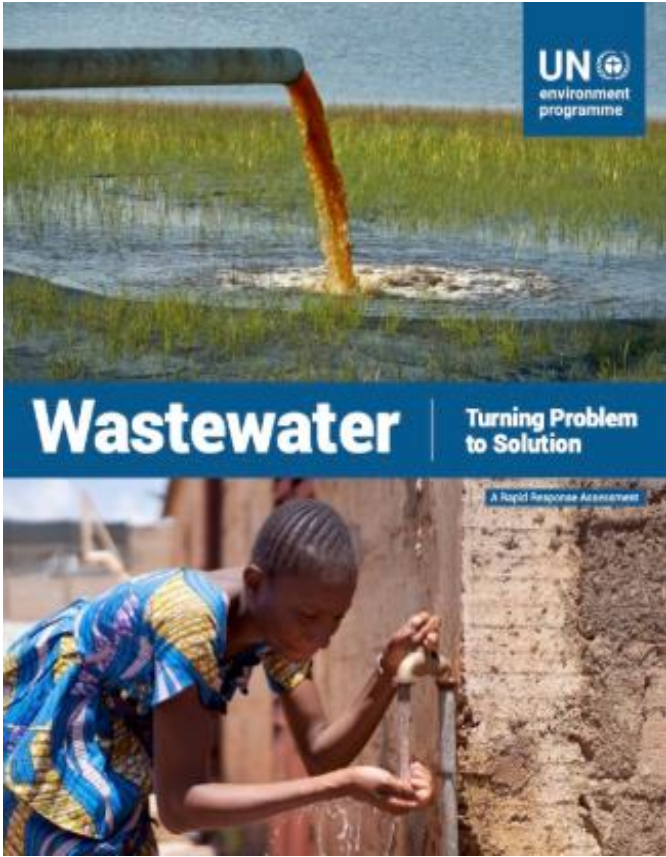


Policy and finance are key to scaling mitigation

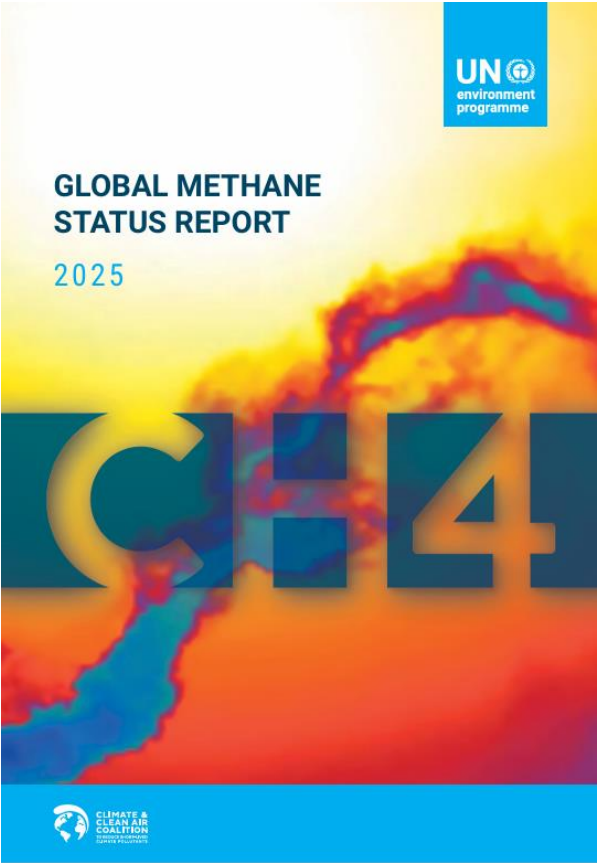


Mitigation actions are available and implementable now

Wastewater Climate Related Resources



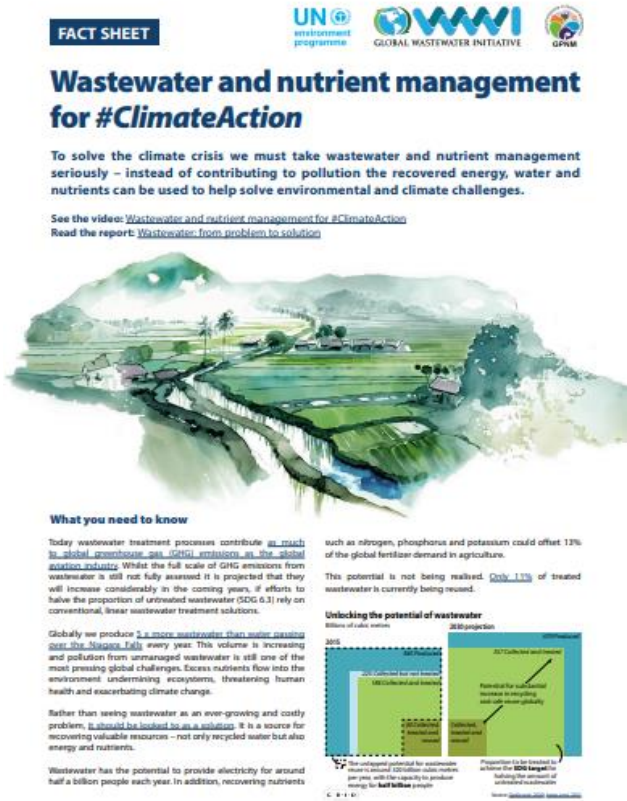
Wastewater Turning Problem to Solution



Global Methane Status Report 2025



Global Nitrous Oxide Assessment



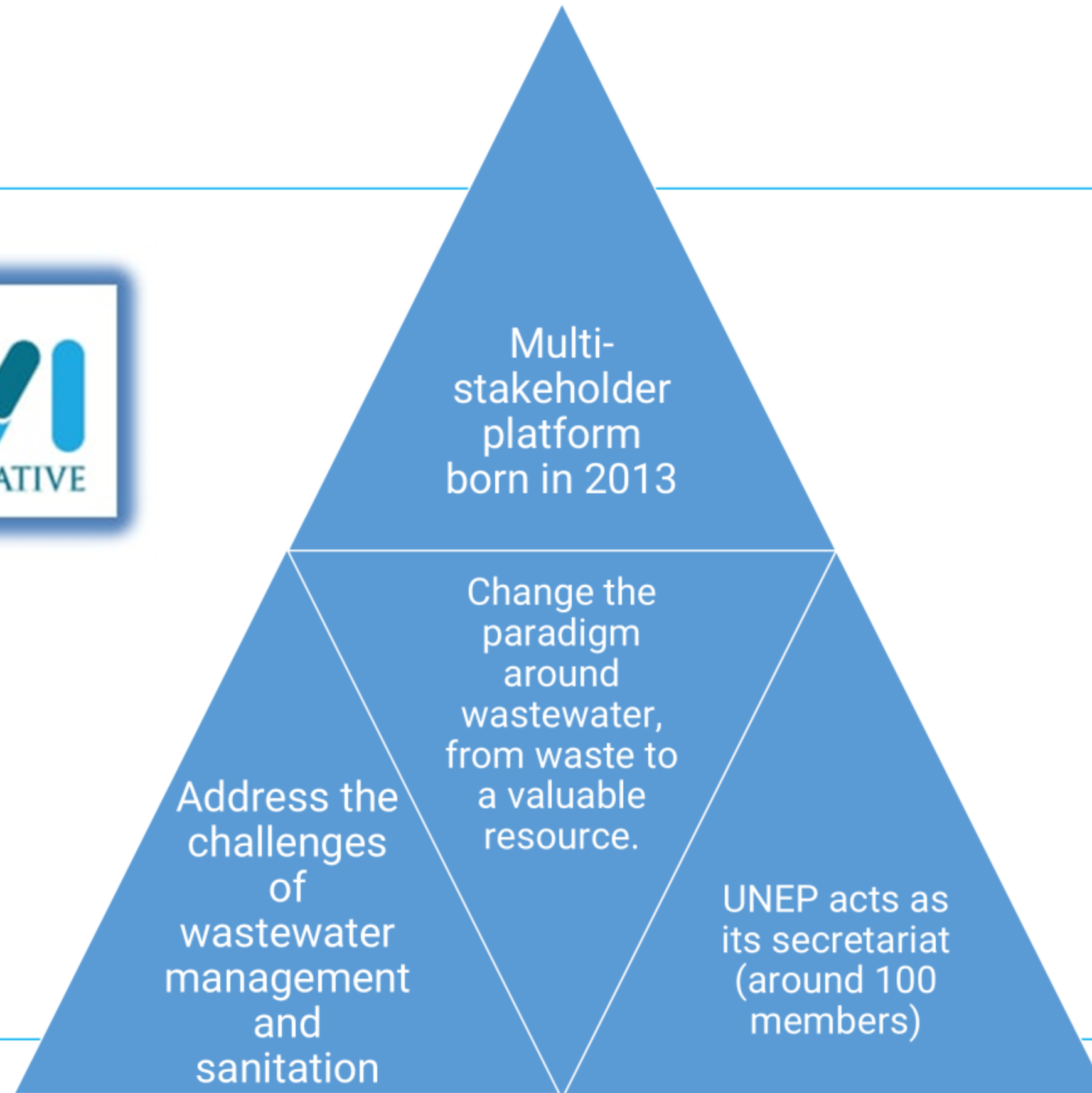
Wastewater and Climate Action Factsheet



Fact-Sheet: Methane Mitigation in the Wastewater Sector



Global Wastewater Initiative



Thank you!

caroline.miyazaki@un.org



**Fast action on methane to keep
a 1.5°C future within reach**

Unlocking Mitigation Pathways

2nd presentation – Dakar/Senegal study case

06 May 2026 | 15:20–15:30

Presented By

Abdoulaye Mallo Gueye

Head of the Water Treatment and Derivative Products
Development Department Dakar/Senegal





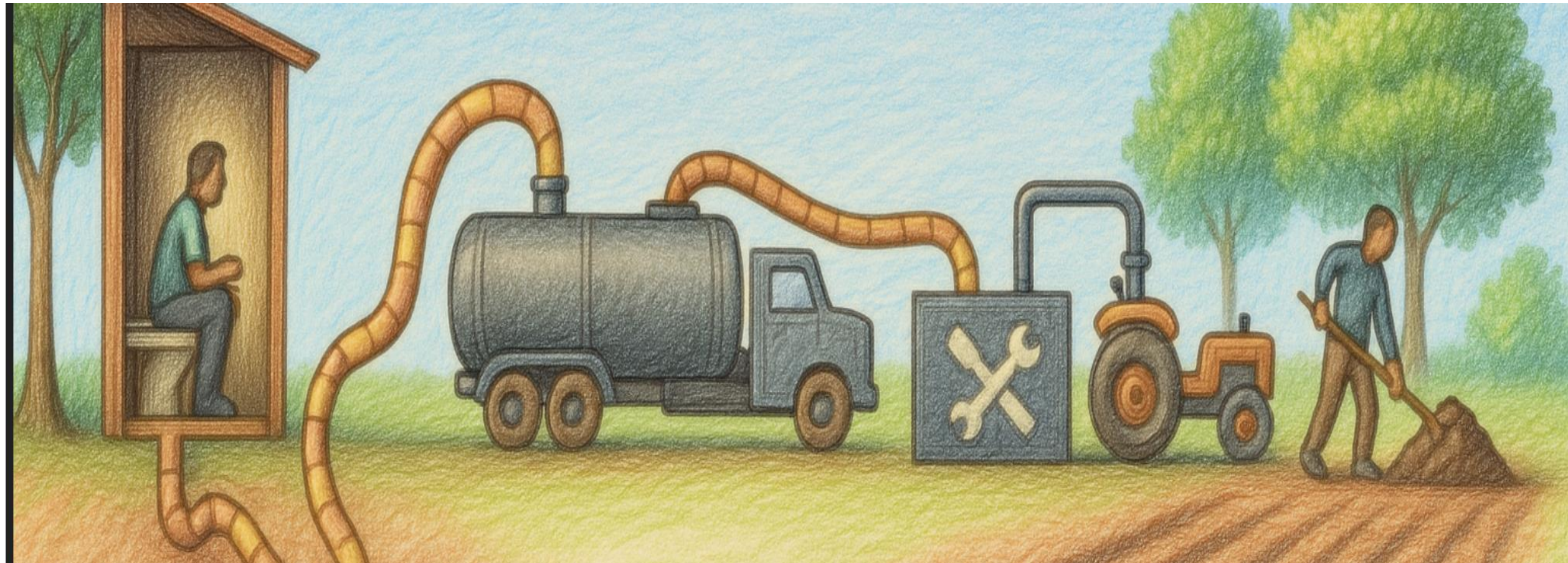
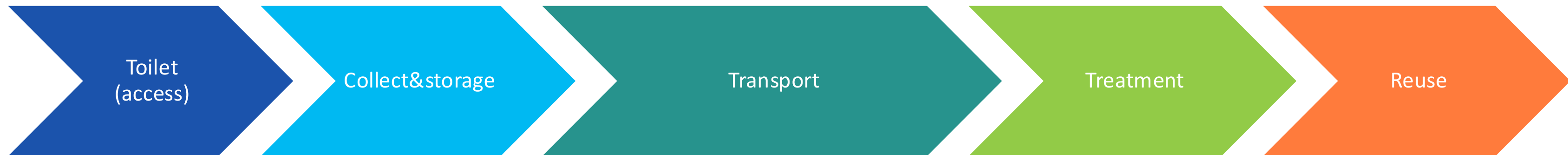
Low-Carbon Sanitation in Senegal

Strategic Program for the Transformation of WWTPs – ONAS



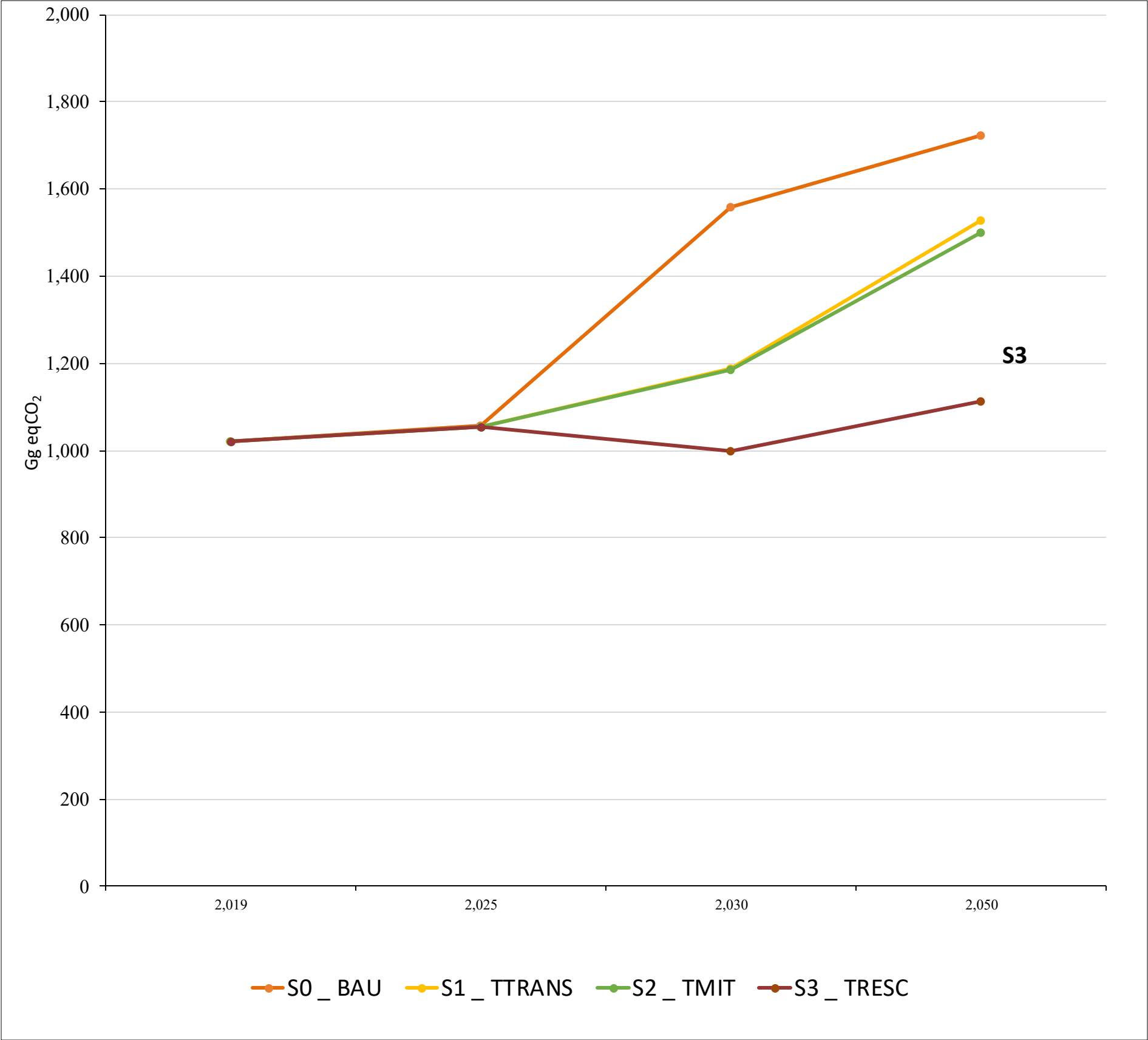
Mr. Abdoulaye Mallo GUEYE
Electromechanical Engineer
Specialized in Water & Sanitation

Sanitation Systems : Centralized & On-site



Key Data from the Liquid Sanitation Sector

More than 1,000 Gg
CO₂e/year
Estimated emissions
from the wastewater
sector



Context of WWTPs in Senegal



50% Current Wastewater Treatment Rate



Case Study: Cambérène WWTP



- Expansion of WWTP treatment capacity: from 19,000 m³ to 92,000 m³ per day
- Reuse of treated water and bio-fertilizers: 11,000 m³ per day
- Significant reduction in carbon footprint
- Adoption of bio-digesters & energy production by cogeneration



Key study Camberene WWTP



Before Rehabilitation (2014-2023)



Situation Overview

- Overload >150% of treatment capacity, reducing efficiency
- Total emissions: 1.58 million tCO₂e
- Low wastewater treatment performance
- Biogas not recovered; flared into atmosphere



Key Statistics

1.58M

tCO₂e Emissions

96.6%

CH₄ Share

150%

0%

⚠ Critical Issue

High methane emissions (96.6% of total GHG) due to anaerobic conditions and lack of biogas capture system.



Emission Breakdown

CH₄

96.6%

1.53M tCO₂e

N₂O

2.1%

33K tCO₂e

CO₂

1.3%

20K tCO₂e

Total GHG Emissions

1.58M tCO₂e



Treatment Performance

- Primary treatment only (no secondary/tertiary)
- Low removal efficiency for organic matter
- High BOD and COD in effluent
- No sludge treatment or stabilization

Key study Camberene WWTP



Key study Camberene WWTP



Key Results & Recommendations

Key Results

7.4M
tCO₂e Reduction

95%
CH₄ Mitigation

925K
tCO₂e Emissions

65%
Biogas Recovery

CH₄ Mitigation Strategy

- Combustion in cogenerators reduces CH₄ emissions by 95%
- Diffuse emissions significantly reduced through containment
- Biogas capture system prevents atmospheric release

Carbon Credit Opportunities

- GGGI, ONAS, Gates Foundation
- Certification through CDM or voluntary markets

Recommendations

- Establish MRV System
Implement Monitoring, Reporting, and Verification system for accurate emissions tracking
- Develop Carbon Credits Project
Pursue certification through CDM or voluntary carbon markets
- Biosolids Valorization
Partner for agronomic use of treated sludge
- Climate Finance
Leverage Green Climate Fund, CDM, and other financing mechanisms

Next Steps

- Complete MRV system installation and staff training
- Finalize carbon credit certification process
- Establish partnerships for biosolids management

Why this project is strategic

\$700 Million Investment Program (conditional projects, NDC 3.0)

Vision: Transform wastewater treatment plants into multi-purpose platforms producing renewable energy, reusable water, and bio-fertilizers.



THANK YOU FOR YOUR ATTENTION



Unlocking Mitigation Pathways

3rd presentation – Hamburg/Germany study case

06 May 2026 | 15:30–15:40

Presented By

Karam Michel Koudary

Project Management and Coordination HAMBURG WASSER





CLIMATE CHANGE MITIGATION: APPROACH TO ENERGY EFFICIENCY

HAMBURG WASSER

Karam Koudary – Project Manager | 06 May 2026

AGENDA

- 01 HAMBURG WASSER – intro
- 02 Energy Management & Optimisation Measures



01 ABOUT HAMBURG WASSER



Supply and drainage area



Today we supply more than 2.3 million people in the Hamburg metropolitan region with drinking water and purify their wastewater.

HAMBURG WASSER at a glance



2.474
employees



116 million m³/a
drinking water supplied



183 million m³/a
treated waste water



€674 million €/a
revenue



74%
Self-generation quota
of electricity

• Photo: Ulrich Perrey / HW

Source: Annual report 2023



**Excl.
Biogenic
CO₂**

HW-Climate Change Protection Plan



By 2030:

- **50%** reduction in Scope 1 & 2 emissions (*baseline year 2021*)
- Improved data foundations for Scope 3 emissions (procurement, construction, waste)

By 2040:

- **90%** reduction in emissions in Scope 1, 2 and significant Scope 3 areas (*baseline year 2021*)
- Offsetting of unavoidable residual emissions



02

ENERGY MANAGEMENT

Biological Treatment: Replacement of Aeration System I & II

- Replacing surface aerators by a modern pressure aeration system
- Advanced measuring equipment for oxygen transfer control
- In operation since end of 2010 (I) and 2020 (II)
- Investment 30,5 Mil. €

Energy Savings:
25 GWh/a (-50%)

42

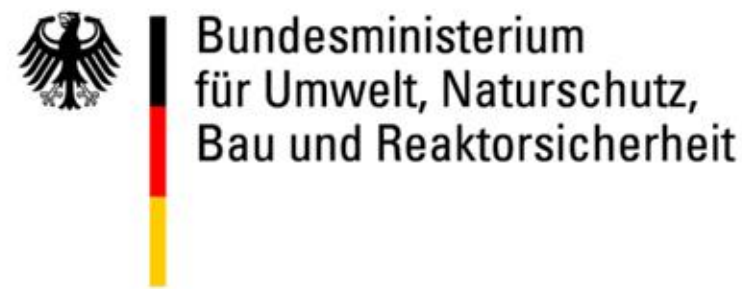


Energy Production - Covering Sludge Storage Tank

Membrane Cover on Sludge Storage Tank	
Goal	Reducing methane emissions
Technology	Membrane cover
Benefit	Recovering 1,800 m³/d digester gas Additional gas storage capacity (6,500 m³)
Funding:	80% by German Government (total investment 2.5 Mil. €)
Start of Operation	2019



Gefördert durch:



Energy Production:
4 GWh Digester Gas / a

Incineration
Plant Nr. 1



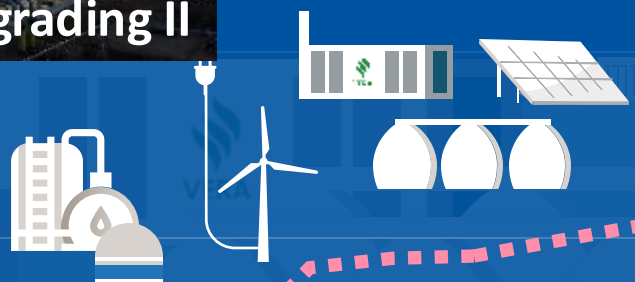
CO₂ PRODUCER



Biogas Upgrading II

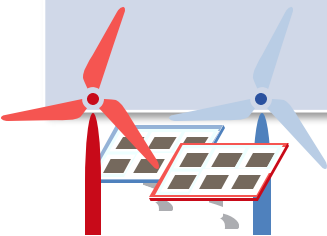


Biogas Upgrading I

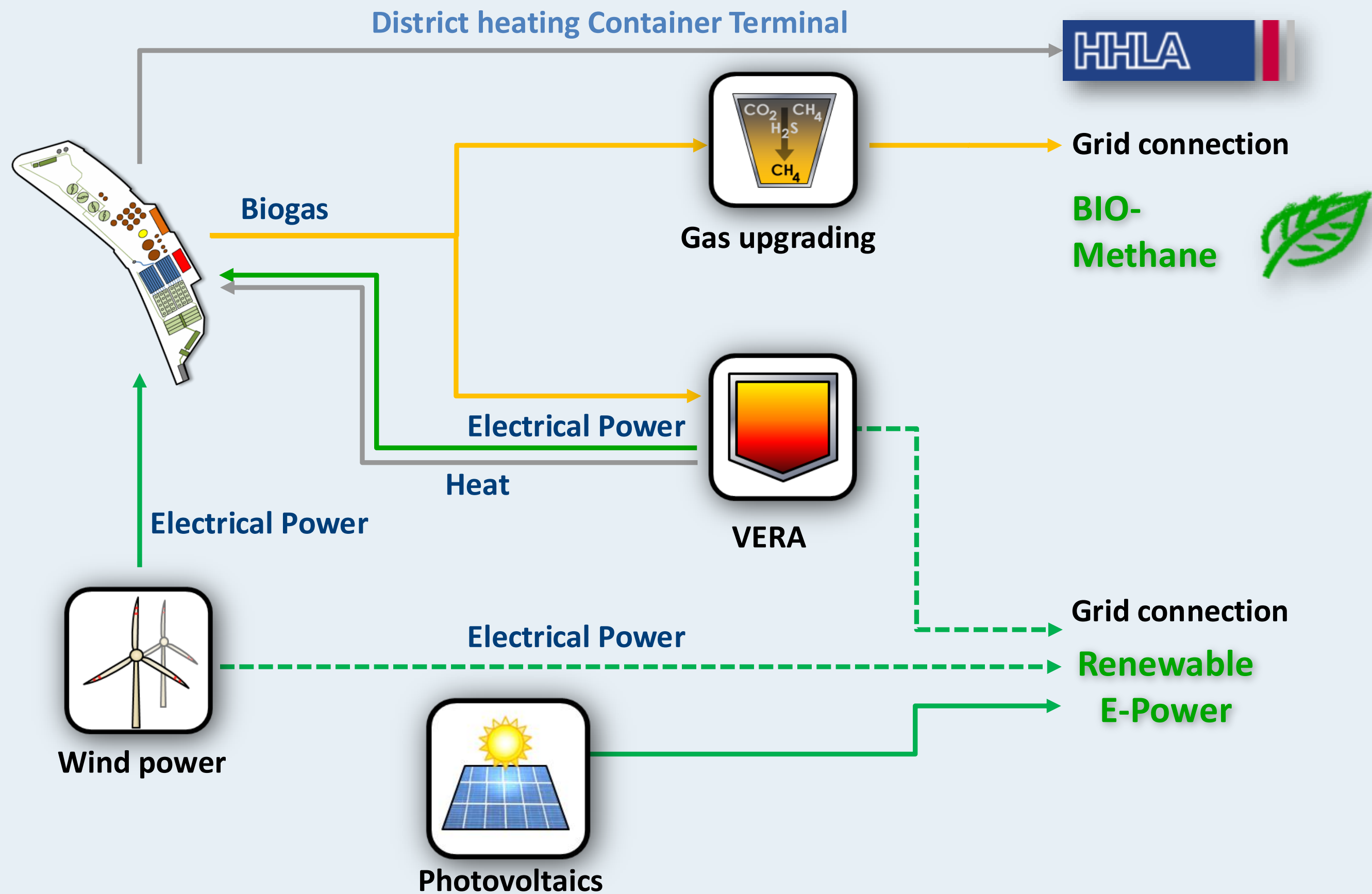


Co-Substrate Storage
Tank

Project	Investment	Start of Operation	Energy Production (el.)
Digester Gas and Sludge Incineration Plant	97 M €	1997	62 GWh/a
Wind Turbines I+II (Dradenau) 2.5 MW	9 M €	2010	14 GWh/a
Biogas Upgrading Plant I	7.5 M €	2011	8 GWh/a
Wind Turbine III (Koehlbrandhoeft) 3 MW	6 M €	2014	10 GWh/a
Biogas Upgrading Plant II	8 M €	2020	20 GWh/a
Wind Turbine IV (Dradenau) 3.6 MW	-- €	2023	9 GWh/a
Total			123 GWh/a



Energy Flow Diagram at WWTP Hamburg



GHG Emissions in 2024 (t CO₂e)

10 %
electricity grid
feed

**Natural gas
quality**

**Currently
unavoidable
residual
emissions**



38,148 savings
via Renewable Energies



10,980 savings
via Biomethane Feed-in



24,831 emitted
via Incineration & Biological Processes



THANK YOU

Follow us on LinkedIn



Karam Koudary
Project Manager | Environmental Engineer
HAMBURG WASSER
karam.koudary@hamburgwasser.de
www.hamburgwasser.de



Unlocking Mitigation Pathways

Closing remarks

06 May 2026 | 15:50–15:55

Presented By

Alex Pires

Programme Management Office UNEP



CCAC – Technical Assistance Services

- Short-term assistance to help advance short-lived climate pollutant mitigation planning and implementation.
- Small-scale grants for short-term services, such as guidance on technology options, funding opportunities, and policy development.



Feedback Survey

Thank you for your participation in the **1st webinar of the Wastewater treatment solutions for climate mitigation: Unlocking mitigation pathways**

English



[Feedback Survey – Fill out form](#)

Français



[Enquête de satisfaction - Fill out form](#)

Thank you

WEBINAR SERIES

Wastewater Solutions for Climate Mitigation
Unlocking Mitigation Pathways

6 May 2026
2.00 PM EAT
Online





THANK YOU

