Profitable reduction of water utilities' carbon footprint

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CAMBI

Cambi transforms sewage sludge into renewable resources

The Cambi THP process boosts biogas production, a sustainable fuel for road transport or convertible to green electricity

Cambi offers the thermal hydrolysis process (THP) as part of any sludge line with anaerobic digestion.

In the wastewater treatment process, the solid fraction is separated from the sewage to undergo further treatment.

Municipal sewage is collected by the wastewater infrastructure from urban areas into a wastewater treatment plant.

Cambi THP treatment halves biosolids volumes and produces high-quality soil improvers

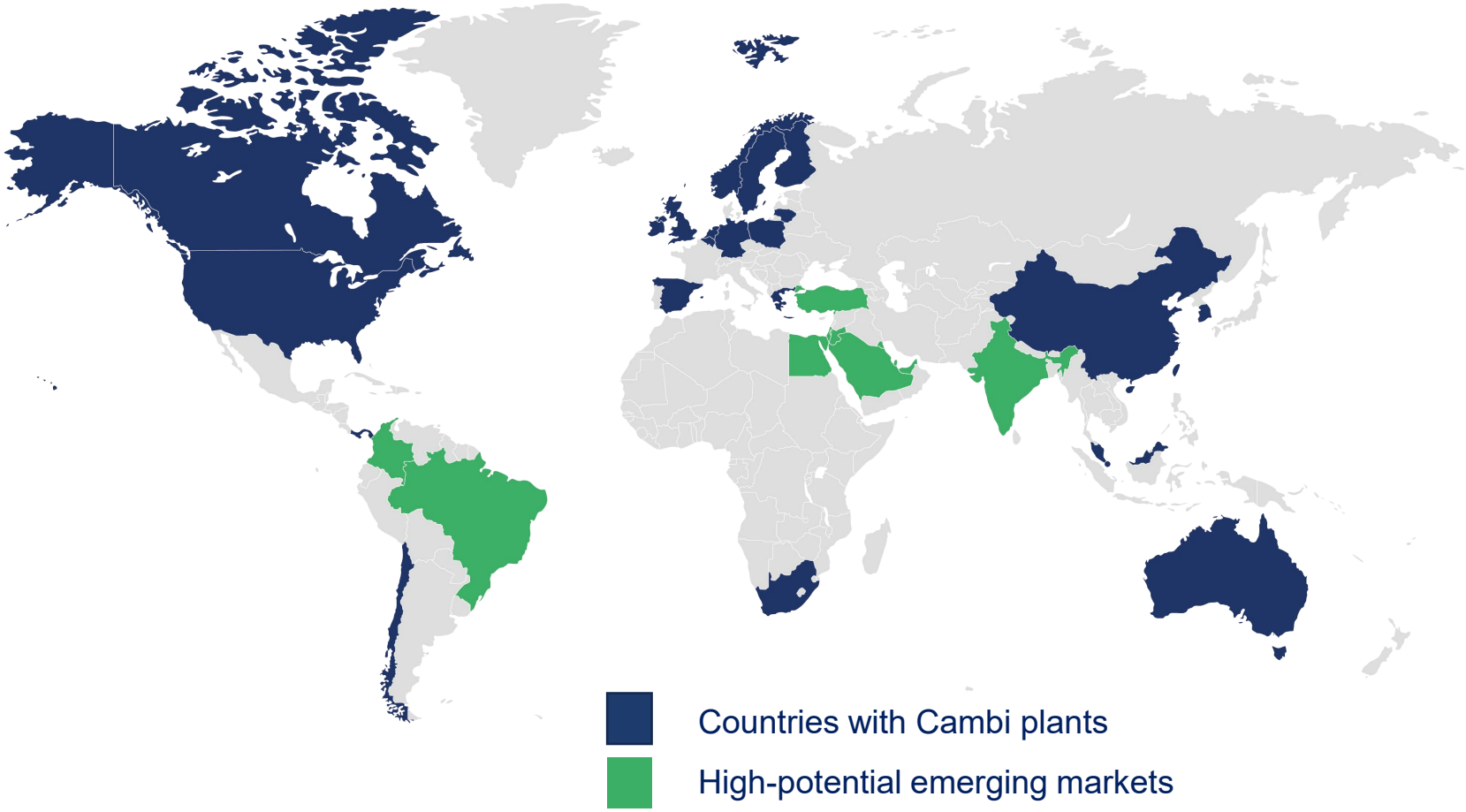
World leader in thermal hydrolysis solutions

77 reference plants

24 countries

110 million people can be served by Cambi's thermal hydrolysis

1.1 million tonnes CO_2 mitigated annually



Cambi THP offers a highly attractive value proposition

		Conventional	Cambi thermal hydrolysis for sludge treatment
Environmental	Low carbon footprint		• Independent studies show lowest carbon footprint for all biosolids outlets[1]
Environmental	Energy efficient process		• Energy efficient process: heat is recycled to pre-heat feedstock[2]
Environmental	Increased biogas production		• Typically, 30-40% more biogas[2]
Economic	Digestion efficiency		• Typically, 3 times higher digester throughput, reducing need for investment in new digesters and subsequently new land[2]
Economic	Lowest lifetime costs		• Operational benefits offset (occasionally) higher capex[2]
Economic	Easy to maintain		• Reliable, high uptime and low maintenance costs[2]
Quality	Low residual volume		• Reducing the final volume by 50%, significantly reducing disposal costs[2]
Quality	High biosolids quality		• Low odour, with guaranteed pathogen kill (all viruses, bacteria, fungi, protozoa, and worms)[2]

Cambi THP patented advanced sludge treatment offers the best available solution, both environmentally and economically

1. Source: Barber, W. (2009). The carbon footprints of various biosolids treatment processes. WEF Biosolids Technical Bulletin, May-June.
2. Source: Cambi

Thermal hydrolysis reduces the footprint of anaerobic digestion

Considerable value in having smaller or fewer digesters in space-constrained wastewater treatment plants

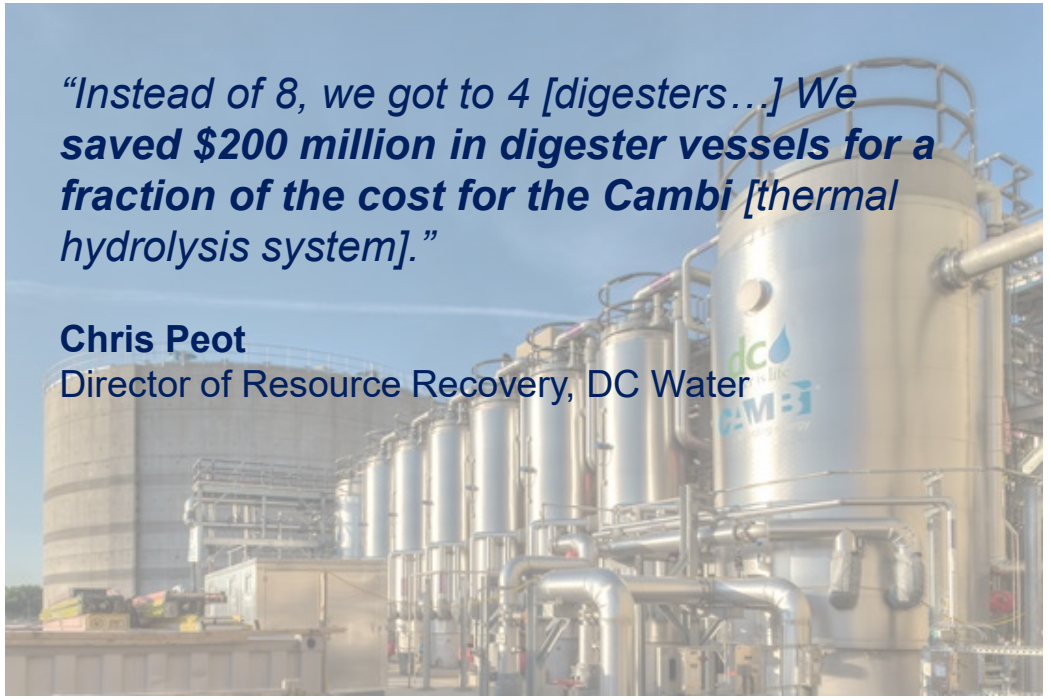
Manchester, UK – Davyhulme WWTP

Lowest CAPEX for greenfield digestion projects

Much more efficient digestion reduces need for digester tank volume drastically

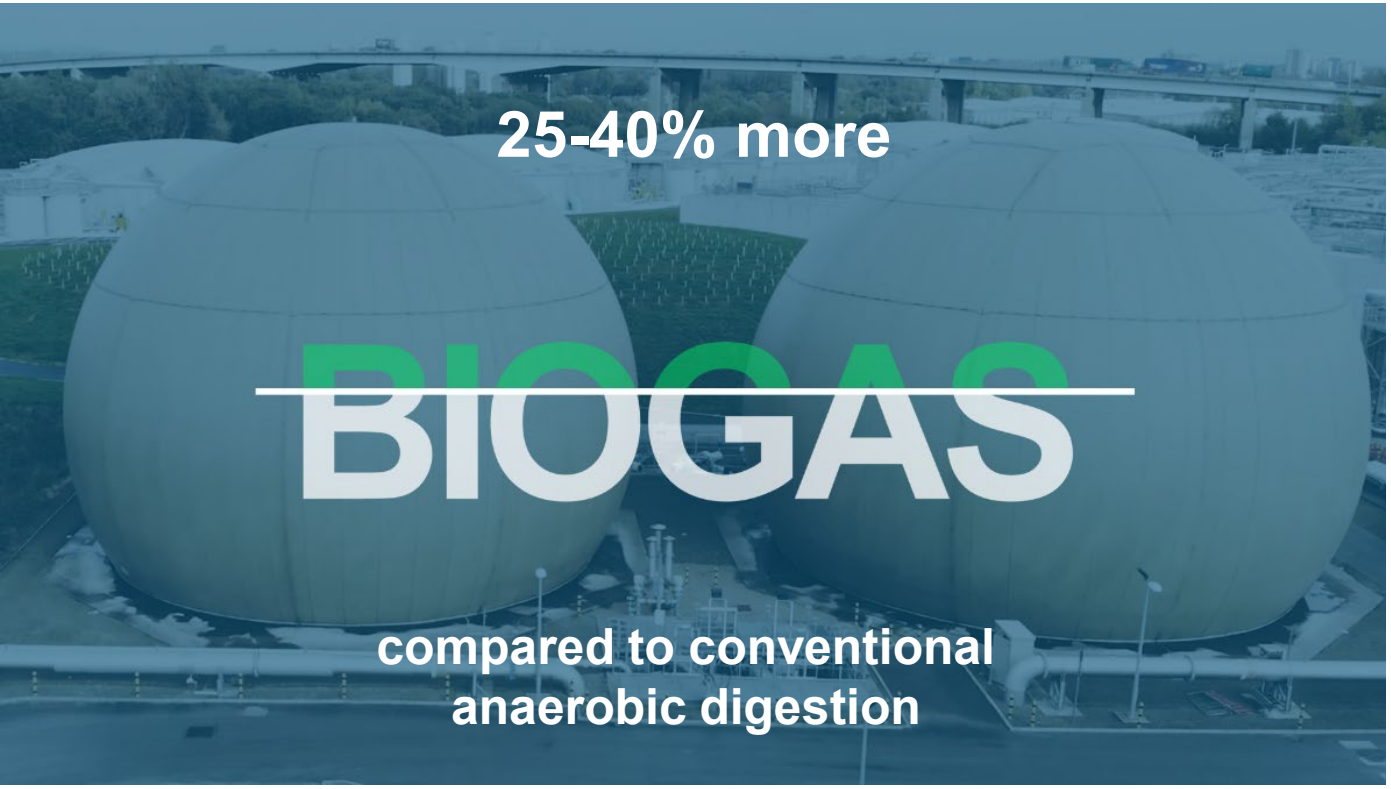
With THP, DC Water achieved 35% overall CAPEX savings

- THP a profitable investment from day one
  - Significant capital savings compared to traditional design with conventional digestion: 58 vs. 174 thousand m^3 total digestion capacity
- Saving $20 million in annual operating costs



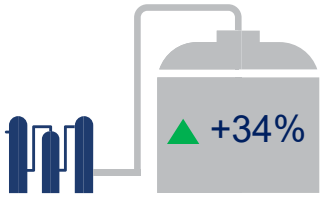
Higher biogas production increases revenue, cutting net cost

Sell in the market (for renewable credits) or use to replace fossil fuels on site

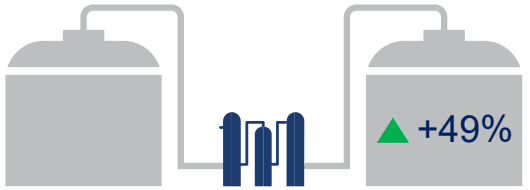


Biogas performance

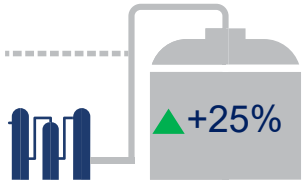
With different THP configurations at Thames Water sites



THP (before digester)



THP (between digesters)



WAS-only THP

Beijing Drainage Group:
+43% with THP

Lower biosolids handling costs

Significant reduction in operational budgets

50% less biosolids

- Higher conversion of the organic matter into biogas
- Better dewatering

High quality biosolids may open new outlets, such as recycling to land

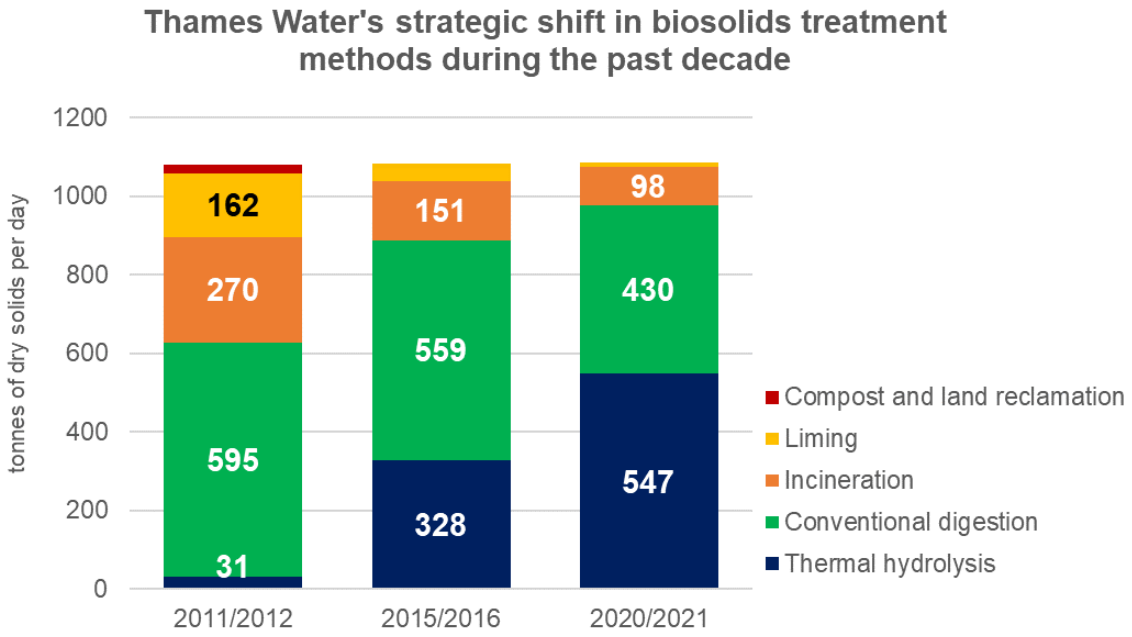
- Lower cost per tonne
- In some cases turned into a product

Source: Bloom Soil, DC Water's resource recycling business enabled by Cambi THP at the Blue Plains WWTP near Washington, DC

Lowest OPEX option among biosolids management alternatives

Better digestion, dewatering and biosolids quality significantly reduce cost of biosolids handling

Thames Water optimises biosolids management with THP



"We have 30 different sludge centres, so we have a lot of different experiences [with different technologies]. ***We found the most overall benefit from THP****.*

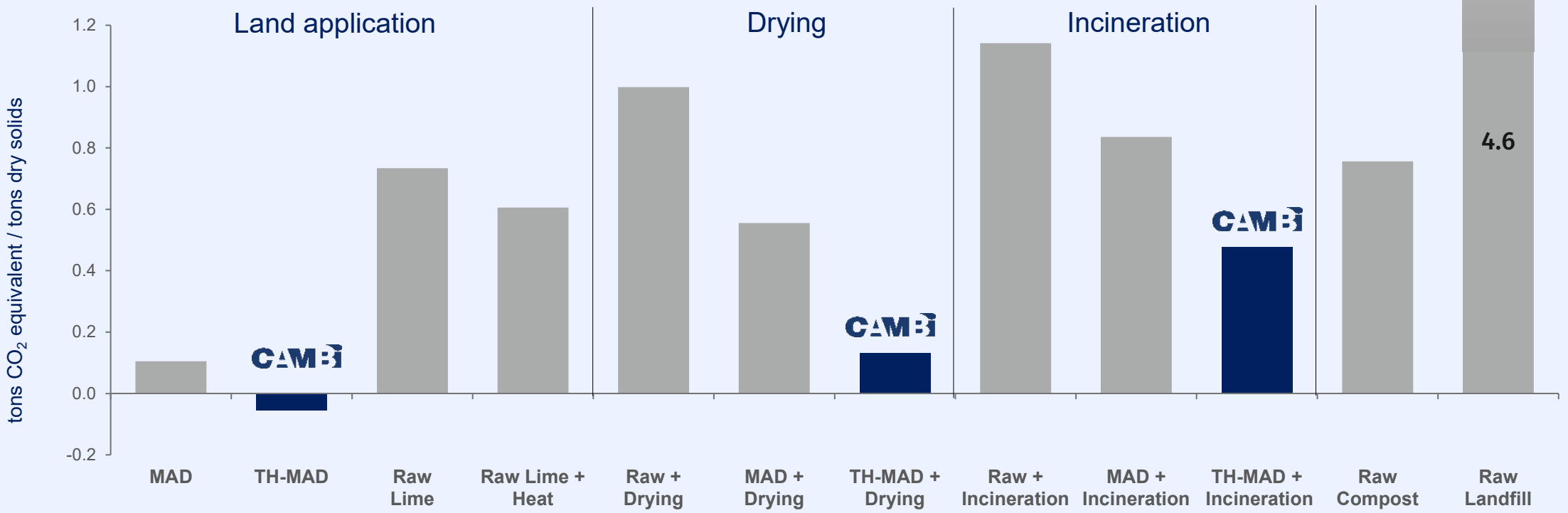
[We got here because,] fundamentally, […] it needs to be robust, it needs to be reliable and it needs to give me a cost effective treatment."

Paul Fountain
Senior Consultant Biosolids, Thames Water

Source: Thames Water, 2021. Courtesy of Paul Fountain, Senior Consultant Biosolids, Thames Water

Lowest carbon footprint

Irrespective of biosolids reuse outlet



Cambi THP reduced carbon emissions in Beijing by 400 ktCO2e

…compared to the second best considered alternative, incineration

Emissions related to sludge management in Beijing

Baseline Landfill	Alternative Incineration	Solution Cambi THP with biosolids recycled to land
High methane emissions	1.8 million tonnes CO_2 equivalent reduction	2.2 million tonnes CO_2 equivalent reduction

Cambi serves customers through various delivery models

Technology sales

- Core equipment to end customers and contractors
- Ancillary equipment
- Complete sludge treatment solutions
- Engineering support

Cambi Group

Services

- Spare parts, remote monitoring and maintenance support
- Upgrades

- Recycling of sludge through Grønn Vekst

DBO projects

- Long term ownership/ operations of sludge projects including THP
- Open to different types of projects, depending on customer preference (e.g. PPP, DBFO, BOT)

Cambi Invest

Cambi well positioned to enter into ownership and operations

Strong growth outlook for private financing

DBO projects allow for complete solutions offering

- Design and Build: Cambi expertise allows **minimising of investment** through optimal integration of the THP with surrounding equipment
- Operations: Experience and data from plants allow Cambi to **optimise plant performance and improve operational economics**
- Disposal: Develop the local market to **reduce the unit cost of sludge handling** (building on Grønn Vekst expertise)

Lowering the threshold for customers to implement THP

- Access the environmental benefits **without the (perceived) complexity and risks** of advanced treatment solutions
- **No capex required**, instead pay-for-service model at competitive rates
- Avoid lengthy projects, with heavy involvement from consultants
- Allows **focus on core operations**: water and wastewater treatment

Several approaches to DBO project development

Private operators

Introduce THP as part of existing concessions

Merchant facilities

Identify merchant plant possibilities serving several (smaller) customers

Municipalities

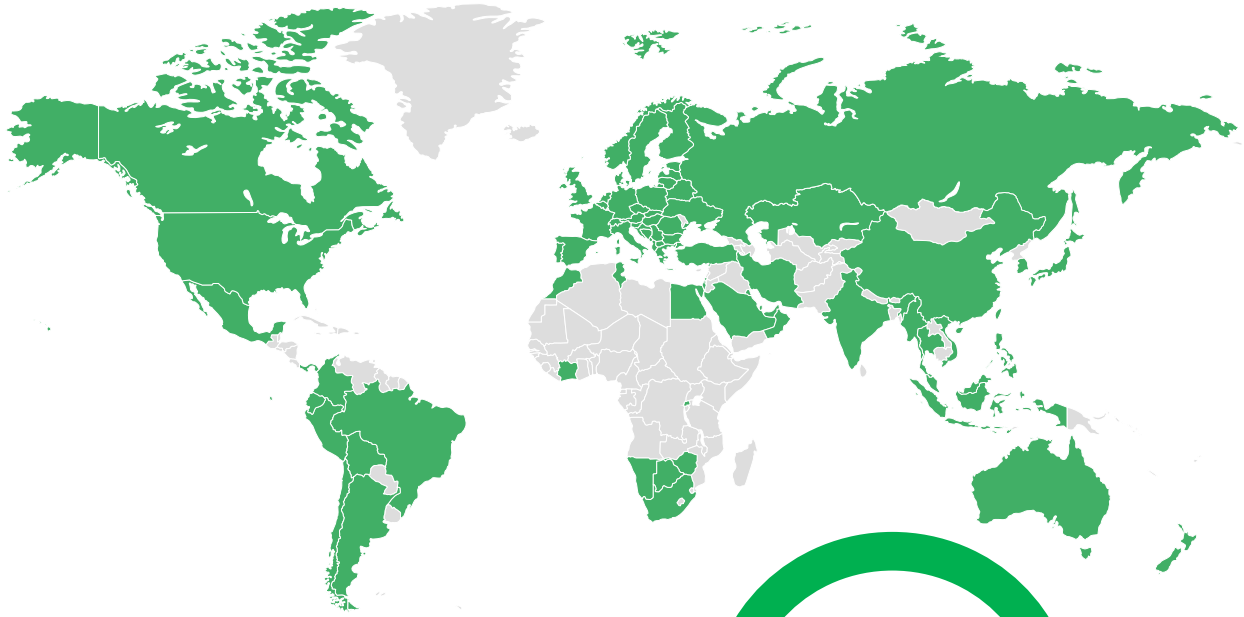
Proposing solutions to cities, aiming for negotiated contract

Public tenders

Responding to relevant DBO/ BOT/ PPP tenders

Cambi has tremendous growth potential

Capitalising on macrotrends and successful references



77

Reference plants

300+

Sales pipeline

3000+

Identified targets

Cambi is a trusted partner for many leading water utilities

Many of them have already pledged target dates for becoming carbon neutral

北京排水集团 BEIJING DRAINAGE GROUP CO.,LTD

anglianwater

Thames Water

United Utilities helping life flow smoothly

AGUAS andinas

Sydney WATER

PUB SINGAPORE'S NATIONAL WATER AGENCY

QUEENSLAND UrbanUtilities

Southern Water

Scottish Water Trusted to serve Scotland

NORTHUMBRIAN WATER

SEVERN TRENT

Dŵr Cymru Welsh Water

Cambi's equipment sales and DBO pipeline already includes most of the remaining water utilities that target reaching for net-zero emissions

Thank you

Contact us