CASE LIBRARY · WATER & SANITATION

Urban Wastewater: 10 Practices That Worked

Verified city cases, with numbers and sources. Chosen so that a town of 31,000 finds itself in the list, not only a city-state with a sovereign fund.

LIVING CITIES EARTH · CASE LIBRARY · AUGUST 2026

Read the ten cases

Match a case to your city

WHY THIS PACK EXISTS

Inspiration is not evidence

City practitioners ask a concrete question: what worked, where, and at what cost. They are not asking for a vision.

This pack is the answer to one real request, from one city, delivered in a day: ten world practices in urban wastewater.

Answering with vision alone loses exactly the audience that can act - the people already holding a budget line and a mandate.

Evidence

Twelve cases. Forty-five open sources. Every figure in this document traces back to one of them, and where two sources disagree, both are printed.

HOW THIS PACK WAS BUILT

Ten different answers to ten different constraints

Not ten flagships. A flagship a city cannot repeat demoralises rather than inspires.

Selected against budgets, not against fame

A city of 30,000 cannot repeat Singapore - and should not have to read about it. The list spans a nine-figure megaproject and a town that started with septic trucks.

Every figure carries an open source

Cross-checked against at least two independent sources per case. Where sources disagree, both are shown as a range rather than averaged into a comfortable single number.

Every case includes what did not work

A case without criticism reads as an advertisement, and an advertisement is useless to a practitioner deciding where to put the next ten million.

THE TEN CASES

Ten cities, ten constraints

01 **Windhoek, Namibia**
Drinking water from sewage, for 55 years

02 **Singapore**
Sell it to industry first, win the public later

03 **Orange County, California**
Recycled water, cheaper than imported

04 **Santiago, Chile**
From 3% to 100% in twelve to fifteen years

05 **Atotonilco de Tula, Mexico**
Formalise what already works

06 **Chennai, India**
The plant had a customer before it had foundations

07 **Aarhus, Denmark**
A treatment plant that sells energy

08 **Amersfoort, Netherlands**
Find the buyer before you build the reactor

09 **East Kolkata Wetlands, India**
The city that treats sewage with fish

10 **Devanahalli and the CDD network**
Design for the conditions you actually have

CASE 01 · WINDHOEK, NAMIBIA

Drinking water from sewage, for 55 years

Direct potable reuse, run by a city that had no second option.

21,000 m³

of drinking water reclaimed per day since the 2002 plant

25-35%

of the city's drinking water supply

since 1968

the world's first direct potable reuse plant, no recorded quality incident

MECHANISM

Industrial effluent is separated from domestic before treatment - the cheapest barrier is the one you build upstream. Two of the three barriers here are not technological at all: source separation, and mandatory blending of reclaimed water with reservoir and groundwater before it enters the network. The treatment train itself - pre-ozonation, coagulation, flotation, dual-media filtration, ozone, activated carbon, ultrafiltration - sits between them. The city also wrote its own potable reuse protocol at a time when no international standard existed, and it is stricter than the standards in force today.

TRANSFERABLE

The institutional move, not the membranes. Separating industrial from domestic flow at the inlet is cheaper and more reliable than treating the mixture at the outlet. It requires source control and a capable municipal operator.

WHERE IT FALLS SHORT

Continuous, expensive laboratory monitoring and highly skilled operators are non-negotiable. The model was born of necessity - cities with alternatives rarely take on

a public debate about drinking reclaimed water. Salt accumulation in the loop is a permanent technical problem.

Sources disagree. Springer and Water360 give roughly 25% of the drinking water supply; WABAG, Veolia and CWEA give up to 35%. Probably different years and different bases - share of drinking water against share of total consumption. Not averaged here.

AT A GLANCE

PRACTICE	Direct potable reuse (DPR)
SCALE	350,000-460,000 people, depending on the source year
PERIOD	1968 first plant · 2002 new Goreangab plant · running today
LED BY	City of Windhoek; operated since 2001 by WINGOC (Veolia, Berlinwasser, WABAG)
MONEY	No capital figure found in open sources

SOURCES

1 WABAG - Direct Potable Water Reuse Plant, Windhoek CONTRACTOR

2 Water360 - Goreangab Water Reclamation Plant TRADE

3 Springer - Windhoek/Goreangab DPR case study PEER-REVIEWED

4 Victoria University - Global Potable Reuse Case Study 4 ACADEMIC

CASE 02 · SINGAPORE

Sell it to industry first, win the public later

Reclaimed water as a permanent tap in a national portfolio, not a drought reserve.

5 plants

from the 2000 pilot to the fifth and largest, opened in 2017

up to 40%

of national daily water demand

55% by 2060

the declared national target

MECHANISM

Reclaimed water was sold to wafer fabs, electronics and petrochemicals - industries that need water cleaner than tap and pay for it as an input. The economics closed without a fight over public opinion. Only a small share was blended into the reservoirs, symbolically rather than by force.

Demand grew fifteenfold: from 4 mgd for about 20 companies in 2003 to roughly 60 mgd for more than 360 companies by 2010. The water has passed over 150,000 scientific tests and exceeds both WHO and US EPA standards.

TRANSFERABLE

The sequence. Industrial offtake builds the economics; public trust follows over years, not press conferences. Applicable to any city with water-hungry manufacturing - automotive, food, textile, electronics.

WHERE IT FALLS SHORT

Capital-intensive. It works on strong central planning and a high level of public trust in the state; copying the technology into a low-trust institutional

environment does not copy the result.

> **Cite with the year.** Before the fifth plant the figure was 30%, and older material still quotes it.

AT A GLANCE

PRACTICE	System-wide reuse, industry as first customer
SCALE	City-state, 5.6-6 million people
PERIOD	Pilot 2000 · brand launch 2003 · five plants by 2018
LED BY	PUB, the national water agency
MONEY	DBOO contracts with private operators; PUB tendered around US$3bn of water infrastructure over a decade

SOURCES

1 PUB Singapore - Singapore's Water Loop OPERATOR

2 WaterWorld - Reclaimed wastewater meets 40% of demand TRADE

3 National Library Board - Four National Taps GOVERNMENT

4 ScienceDirect - Beyond NEWater: Singapore's reuse prospects PEER-REVIEWED

CASE 03 · ORANGE COUNTY, CALIFORNIA

Recycled water, cheaper than imported

Indirect potable reuse through an aquifer that doubles as storage and as a psychological buffer.

492,000 m³

per day - 130 mgd after the 2023 expansion

$750-850

per acre-foot, below the cost of imported water

$900m+

invested across three phases since 2008

MECHANISM

Three things at once. The aquifer serves as storage and as a psychological buffer - this is water from a well, not water from a sewer. The project also cancelled the need for a second ocean outfall, and that avoided cost carries the business case. Underneath sits deliberate financial engineering: subsidised federal and state loans (CWSRF around $182m, WIFIA $135m), grants, and an operating subsidy of $121 per acre-foot for 23 years.

The system covers 35% of the water district's total demand, has produced over 400 billion gallons since 2008, ran at 98.9% availability in 2023, and recycles 100% of the sanitation district's suitable flow.

TRANSFERABLE

The accounting method. Count avoided capital works and drought resilience alongside the price of water, or the project will never pencil out. Second: the aquifer as a buffer where direct potable reuse is politically impossible.

WHERE IT FALLS SHORT

Needs a suitable aquifer - without one the scheme does not exist. Reverse osmosis is energy-hungry and the brine has to go somewhere; here it goes to the ocean, which is not an option everywhere. And $900m is a megacity benchmark, not a best practice for a mid-sized city.

AT A GLANCE

PRACTICE	Indirect potable reuse via groundwater recharge
SCALE	About 1 million people, roughly a third of the county
PERIOD	Launched January 2008 · expanded 2015 and 2023
LED BY	Orange County Water District with Orange County Sanitation District
MONEY	Over US$900m: $481m in 2008, $142m in 2015, $284m in 2023

SOURCES

1 OCWD - About the Groundwater Replenishment System OPERATOR

2 US EPA - CWSRF case study: OCWD GWRS GOVERNMENT

3 Smart Water Magazine - GWRS as a scalable model TRADE

CASE 04 · SANTIAGO, CHILE

From 3% to 100% in twelve to fifteen years

A regulatory design case, not a technology case. Nothing here was invented.

3% → 100%

of the city's sewage treated, from the late 1990s to today

US$113m

for the Mapocho interceptor, 29 km of tunnel up to 3 m across

21 discharges

into the urban river closed by 2011

MECHANISM

No new technology - activated sludge is a century old. What changed was a regulated tariff that let operators recover their investment under a regulator's supervision. Infrastructure followed the money, not the decree. Chile privatised its water utilities under regulation with the explicit aim of attracting that investment.

Since 2017 three plants have been converted into biofactories. Sludge now yields 49 GWh of electricity, 177 GWh of gas and 84 GWh of heat, plus 137,000 tonnes of biosolids a year used as fertiliser.

TRANSFERABLE

The financing mechanism - treatment does not pay for itself, a regulator-protected tariff plus targeted subsidy for poor households pays for it. And the politics: a mayor gets a riverfront people can use, not a plant outside town.

WHERE IT FALLS SHORT

Tariff rises hit poor households first; without a working subsidy mechanism the model reproduces inequality. Water privatisation remains politically charged

across Latin America - the Chilean result is quoted as the argument for it, and the bills as the argument against.

> **Sources disagree.** The Alliance for Water Stewardship gives 3% in 1999; UNFCCC and Aguas Andinas give 3.6% in 2005. The baseline year differs, the order of magnitude does not - read it as "about 3% at the turn of the 2000s".

AT A GLANCE

PRACTICE	Tariff reform and institutional redesign as the driver of infrastructure
SCALE	Metropolitan region, over 8 million people
PERIOD	Late 1990s to full coverage by the early 2010s
LED BY	Aguas Andinas, a regulated private operator
MONEY	US$2.3bn of private investment in treatment across Chile, 2000-2017; US$113m for Mapocho Urbano Limpio

SOURCES

1 World Bank - Wastewater: From Waste to Resource, Santiago MULTILATERAL

2 Alliance for Water Stewardship - Water Resilience for Santiago NGO

3 UNFCCC - Santiago Biofactory MULTILATERAL

4 SUEZ Water Handbook - El Trebal Mapocho WWTP CONTRACTOR

CASE 05 · ATOTONILCO DE TULA, MEXICO

Formalise what already works

The largest treatment plant in the world, designed around a century-old irrigation economy.

35 m^3/s

average capacity, up to 50 m^3/s at peak

6-11% → 60%

of the Valley of Mexico's wastewater now treated

80-90k ha

of farmland irrigated with the treated flow

MECHANISM

Two decisions that are usually missed. The state took 49% of the initial investment through FONADIN instead of the customary 40%, which is what made a public-private partnership of this size bankable at all.

And a century-old informal practice was formalised rather than abolished: treatment was designed so that farmers keep the nutrients they have relied on for generations, instead of having to buy fertiliser. Biogas cogeneration covers 60-80% of the plant's own electricity and avoids around 145,000 tonnes of CO_2 a year.

TRANSFERABLE

The risk-sharing structure - directly applicable inside the Mexican legal framework - and the habit of designing treatment around the end user of the water rather than around an abstract discharge standard.

WHERE IT FALLS SHORT

A centralised solution at this scale does not replicate at city level. Long-term accumulation of heavy metals and pathogens in Mezquital soils is discussed in the literature and not resolved. A 25-year concession locks the technology in for a generation.

Needs checking. The exact commissioning date could not be confirmed in open sources. Confirm with CONAGUA before publication.

AT A GLANCE

PRACTICE	Mega-scale PPP with agricultural reuse
SCALE	Sewage equivalent to 12.6 million residents of Mexico City; about 700,000 people benefit directly in the Mezquital Valley
PERIOD	Contract January 2010 · 25-year DBOT concession · 50-year design life
LED BY	CONAGUA, delivered by the Aguas Tratadas del Valle de México consortium
MONEY	US$710-900m; estimates differ. FONADIN funded 49% of the initial investment

SOURCES

1 World Bank - Wastewater: From Waste to Resource, Atotonilco MULTILATERAL

2 ACCIONA - Atotonilco WWTP CONTRACTOR

3 WaterWorld - Mexico's new giant in town TRADE

4 CGIAR - Rural-Urban Water Trading, chapter 17 ACADEMIC

CASE 06 · CHENNAI, INDIA

The plant had a customer before it had foundations

The most commercially replicable model in this pack.

126,000 m^3

per day sold to industry - about a fifth of the city's sewage

16m m^3

of freshwater freed for the city each year

691 users

industrial customers, among them Hyundai, Nissan, Samsung India and Apollo Tyres

MECHANISM

What matters here is the contract, not the treatment train. Industry in Chennai is required to use treated municipal effluent - a mandate, not an offer. Guaranteed offtake turns a budget line into revenue-backed infrastructure that can be financed as such.

Two tertiary plants with reverse osmosis, 45 MLD each, feed industrial clusters through 60 km and 28.5 km of pipeline. Specific energy at Koyambedu is 1.88 kWh/m^3, low for a reverse osmosis scheme.

TRANSFERABLE

Build against a supply contract rather than a budget allocation. It needs an industrial cluster within pipeline range and the regulatory will to mandate - or a freshwater tariff high enough to make the mandate unnecessary.

WHERE IT FALLS SHORT

Reverse osmosis leaves brine that has to be disposed of. Sixty kilometres of pipeline is a large share of the capital cost and ties the plant to specific customers.

The mandate solves demand administratively; in a jurisdiction without that power the business case is weaker.

AT A GLANCE

PRACTICE	Selling reclaimed water to industry as the payback model
SCALE	City of 9-11 million; around 691 industrial users
PERIOD	Construction from 2017 · both plants live at the end of 2019
LED BY	Chennai Metro Water (CMWSSB), with World Bank support
MONEY	Koyambedu INR 396.5 crore build plus 197.6 crore for 15 years of operation; Kodungaiyur INR 235 crore plus 205 crore. 15-year DBO

SOURCES

1 World Bank - Chennai recycles wastewater at scale MULTILATERAL

2 Government of India, DMEO - AMRUT case study GOVERNMENT

3 Springer - Koyambedu water reclamation plant PEER-REVIEWED

4 IDE Technologies - Koyambedu Plant CONTRACTOR

CASE 07 · AARHUS (MARSELISBORG), DENMARK

A treatment plant that sells energy

The lowest entry cost on this list, and the least glamorous mechanism.

153%

energy self-sufficiency in 2015: 9,628 MWh produced against 6,311 MWh consumed

1 GWh/year

of electricity saved, about 25% of consumption

under 5 years

payback on most of the measures applied

MECHANISM

No breakthrough. A dozen measures worth 3-5% each, applied systematically against one clear metric - advanced SCADA, a new turbo compressor, anammox treatment of reject water, optimised fine-bubble aeration on the consumption side; efficient cogeneration units and maximised biogas yield on the production side. Plus consolidation from 14 small plants down to 4, because a large installation is more efficient to run.

The surplus was achieved on the plant's own sludge, with no imported organic waste - a pure optimisation result, not a reclassification into a biogas facility. Between 2 and 2.9 GWh of surplus heat now goes into the district network.

TRANSFERABLE

Almost all of it. Energy audit, sludge digestion, cogeneration - standard kit for a mid-sized city. The condition is that the plant has to be big enough to pay back the cogeneration, which is exactly why consolidation came first.

WHERE IT FALLS SHORT

The heat surplus only monetises where there is district heating. Anammox needs stable operation and qualified staff. Consolidating plants means more pumping stations and trunk sewers, and some of the gain goes back into moving the water.

AT A GLANCE

PRACTICE	Energy-positive treatment plant
SCALE	Plant serves 200,000-220,000 people; the utility serves 350,000
PERIOD	Program from 2006 · steady surplus from 2015
LED BY	Aarhus Vand, the municipal utility
MONEY	Most measures paid back in under five years

SOURCES

1 Aarhus Vand - 150% energy self-sufficiency at Marselisborg OPERATOR

2 Baltic Smart Water Hub - Turning wastewater into green energy MULTILATERAL

3 WaterWorld - Self-sufficient wastewater treatment TRADE

4 State of Green - 150% energy self-sufficiency at a WWTP GOVERNMENT

CASE 08 · AMERSFOORT, NETHERLANDS

Find the buyer before you build the reactor

Phosphorus recovery, where the offtake contract is the technology that matters.

900 tonnes

of struvite a year, roughly fifty lorry loads

20-30%

of the new sludge facility's cost covered by struvite sales

~7 years

payback on the conversion

MECHANISM

A ten-year offtake contract makes the revenue predictable and the project financeable - that, and not the reactor, is what closes the case. There is a hidden saving too: uncontrolled struvite scaling in the pipework stops, and with it the maintenance and replacement bill it generated every year.

The plant recovers 45% of incoming phosphorus and up to 85% from the liquid phase, and returns a 2 million kWh annual surplus to the national grid. The product, Crystal Green, is 99.6% pure struvite and certified in the EU's top category.

TRANSFERABLE

The principle, not the reactor: look for the buyer before building the plant. For most cities the sensible first step is biogas - simpler, cheaper, same logic.

WHERE IT FALLS SHORT

900 tonnes a year is modest; Ostara's Chicago reactor produces 10,000. The economics depend on phosphate fertiliser prices and on a certified market for

secondary fertiliser - in a jurisdiction without that certification the product cannot be sold. The project also carried an EU subsidy; without it the payback is longer.

AT A GLANCE

PRACTICE	Phosphorus recovery; a by-product turned into a revenue line
SCALE	Sewage of about 300,000 people; sludge from an area of about 1 million
PERIOD	Project from 2013 · commissioned 17 June 2016
LED BY	Vallei en Veluwe water authority with Ostara and Eliquo Water & Energy
MONEY	EU LIFE+ co-funding; payback around seven years

SOURCES

1 Ostara - Europe's first nutrient recovery facility CONTRACTOR

2 Dutch Water Sector - Next-step sludge treatment TRADE

3 Nutrient Platform - Phosphorus from wastewater in Amersfoort TRADE

4 European Sustainable Phosphorus Platform - Struvite recovery ASSOCIATION

CASE 09 · EAST KOLKATA WETLANDS, INDIA

The city that treats sewage with fish

A system nobody built, and the legal work that saved it.

12,500 ha

of ponds and channels, around 254 sewage-fed fisheries

a third

of the city's sewage treated, at near-zero energy

5 t/ha

of fish a year; 20,000 people working, 150,000 fed by the system

MECHANISM

The decisive action was legal, not engineering. Sewage flows by gravity into settling channels, then into shallow ponds where sunlight and algae finish the treatment and the algae feed the fish; the spent water irrigates fields and paddy. It had worked that way for a century, unrecognised as infrastructure and threatened by construction, not by breakdown.

Dr Dhrubajyoti Ghosh documented it as the kidneys of the city. Ramsar status followed in 2002, then a Calcutta High Court freeze on changing land use inside the 12,500 hectares, then a management authority. The city did not build a treatment works - it protected one that already existed.

TRANSFERABLE

The order of operations: find what already works informally, protect it, then build. And the economic logic - the system survives because it feeds 150,000 people. A nature-based solution with no beneficiary earning an income from it will be built over.

WHERE IT FALLS SHORT

This is a warning as much as a model. The inflow carries effluent from 538 tanneries, and heavy metal accumulation in fish and soil is confirmed by peer-reviewed research. The area keeps shrinking to illegal construction, which Ramsar status has not stopped. India's own environment ministry rules effectively forbid discharging sewage into wetlands, so the system lives in a legal grey zone. Do not replicate without separating industrial effluent first - see Windhoek.

AT A GLANCE

PRACTICE	Nature-based treatment at near-zero energy
SCALE	12,500 ha; the city generates around 750 MLD
PERIOD	Working since the 1930s · Ramsar status 2002
LED BY	Nobody, initially. Documented by Dr Dhrubajyoti Ghosh; managed by EKWMA
MONEY	No treatment capital cost. Management plan budget INR 110.7 crore

SOURCES

1 EKWMA - East Kolkata Wetlands Management Authority OPERATOR

2 India Water Portal - Protecting the kidneys of Kolkata NGO

3 Scientific Reports - Health risk and metal contamination in the EKW PEER-REVIEWED

4 Scope Kolkata - East Kolkata Wetlands NGO

CASE 10 · DEVANAHALLI AND THE CDD NETWORK, INDIA

Design for the conditions you actually have

The most relevant case here for a municipality under 100,000 people.

31,000

people in the town that hosts India's first nature-based faecal sludge plant

450+ systems

delivered across the network in fifteen years

up to 80%

lower operating cost than a conventional plant

MECHANISM

The engineers designed from operating constraints rather than from datasheet performance. They assumed the power would fail, the moving parts would break and nobody would repair them. So: gravity instead of pumps, plants and bacteria instead of chemicals, no moving parts at all. A system that performs worse in ideal conditions and keeps running in real ones.

Sludge arrives by tanker from pits and septic tanks, is separated, dewatered on drying beds and polished in planted filters. The network treats more than 5 billion litres a year; local reuse cuts household freshwater consumption by up to half. The model has been replicated in other Indian cities - Gulbarga entirely at state expense - and in Nepal, Bhutan, Afghanistan and Africa.

TRANSFERABLE

Start with the septic trucks you already have, not the sewer you do not. Work with existing pits and tanks, begin with a reception point for tankers, and invest in systems that need neither electricity nor scarce skills. The first step costs an order of magnitude less than most cities assume.

WHERE IT FALLS SHORT

Needs land - more than a compact mechanical plant. Does not address industrial effluent. Works only where sludge collection logistics function: without regular, legal emptying the plant stands idle. Treatment quality is below a tertiary scheme, which may not be enough for discharge into a sensitive water body.

AT A GLANCE

PRACTICE	Decentralised treatment (DEWATS) and faecal sludge management
SCALE	Devanahalli, 31,000 people; the CDD network reaches 500,000-700,000
PERIOD	Faecal sludge plant commissioned November 2015 · service life 15-25 years
LED BY	CDD Society, a Bangalore NGO; technology developed with BORDA
MONEY	Operating cost up to 80% lower, capital cost 30-50% lower than conventional

SOURCES

1 CDD Society India IMPLEMENTER

2 Stanford Social Innovation Review - Fixing India's sewage problem INDEPENDENT

3 Center for High Impact Philanthropy, UPenn - CDD India ACADEMIC

4 CDD Society - Annual report 2016-17 IMPLEMENTER

TWO MORE, FOR SPECIFIC PROFILES

When the city has informal settlements, or a construction boom

Outside the main ten, but necessary if either profile is yours.

11 · eThekwini (Durban), South Africa

After the cholera outbreak of 2000 the municipality abandoned the idea of extending sewers to everyone and built a tiered service instead: a free basic volume of water at 200 litres per household per day, more than 85,000 urine-diversion toilets in ten years, and community ablution blocks converted from shipping containers - 218 units across 109 sites. The department took the Stockholm Industry Water Award in 2014.

It is in this pack because of the criticism, not despite it. Researchers at the UKZN Centre for Civil Society call the dry toilets a failed experiment and a question of dignity: around 80,000 households in black communities received a dry toilet in the yard while other districts flush. The municipality's own studies found the contents did not break down sufficiently, and the plan to have residents bury the compost themselves did not work. A technical fix that ignores perceived fairness creates a new conflict.

Sources: Circle of Blue · IWA, J. Water Sanit. Hyg. Dev. · Centre for Civil Society, UKZN (criticism)

12 · San Francisco, USA

Article 12C of the municipal health code, the Non-potable Water Ordinance, requires new buildings to install onsite water reuse. The threshold has tightened: from 250,000 square feet in November 2016 to 100,000 square feet from 1 January 2022. Residential buildings install greywater systems, commercial ones blackwater. More than 100 projects have been delivered.

At the water utility's own headquarters, a Living Machine treating water in street-level planters cuts the building's potable demand by 40-60% - sources use different baselines - saving around 800,000 gallons a year. By 2040 the city expects to free some 2 million gallons of drinking water a day. Capital cost shifts to developers; the utility avoids expanding central capacity. A side effect: a supplier market for compact systems has formed.

Sources: SFPUC - Onsite Water Reuse · SFPUC Onsite Water Reuse Guidebook · Stormwater Solutions

HOW TO CHOOSE

Match the case to the constraint

Start from the situation your city is actually in, not from the case with the best photographs.

CITY SITUATION	WHERE TO START	CAS
Under 100,000 people, no sewer network, tight budget	Faecal sludge reception plus DEWATS	10
Existing plant, high electricity bill	Energy audit, digestion, cogeneration	07
Water-intensive industry nearby	Build against a supply contract	06
Farmland around the city, irrigation shortage	Treatment designed for farmers	05
River running through the city as an open sewer	Interceptor plus tariff reform	04
Acute drinking water shortage	Multi-barrier scheme, starting with source separation	01
Informal settlements without networks	Tiered service, handled with care for dignity	11
Active new construction	Onsite reuse mandate	12
An informal system already working	Protect it legally first	09

METHOD AND LIMITS

What we checked, and what we did not

Compiled from open sources on 21 August 2026 and cross-checked against at least two independent sources per case.

Three disagreements between sources are shown as ranges rather than averaged: Windhoek's reuse share, Santiago's baseline year, and the cost of the Atotonilco project. One item is flagged as needing confirmation: the Atotonilco commissioning date.

Contractor materials are marked as such in every source list. They are marketing with facts attached, and their figures were verified independently wherever that was possible.

No city has confirmed its own description here. Confirmation and a direct quote should be sought before publication, at least for the cases where the community can reach the city directly.

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WHAT THIS PACK DEMONSTRATES

The library is the product

One request from one city, answered in a day, with sources anyone can open and check.

Once the library is verified, an assistant can answer from it - from a checked corpus with citations, not from open generation.

The same pipeline produces twenty cases, then fifty, across mobility, waste, housing and governance.

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