



# The Ganga Wastewater Program

## Strengthening Life Cycle Costing through Public-Private Partnerships

### CASE SNAPSHOT

SECTOR	COUNTRY	TIMELINE	COST	RESULT
Water and Sanitation	India	2014–Present	<ul style="list-style-type: none"><li>Over US \$ 4 billion is being invested in the Clean Ganga program<sup>1</sup> to clean the Ganga River.</li><li>Includes US \$ 1.5 billion in investment through PPP projects, of which US\$ 650 million will come from private sector sources<sup>2</sup>.</li></ul>	<ul style="list-style-type: none"><li>12 PPP contracts awarded to treat around 600 million liters/day of wastewater.</li><li>Integrating long-term operation and maintenance into PPP contracts has broken the cycle of build-neglect-rebuild.</li></ul>

<sup>1</sup>UN Environment Programme. 2023. Restoring India's Holiest River

<sup>2</sup>World Bank Group. 2024. Cleaning up the Ganga: \$1.5B Mobilized Through Replication of PPPs

# **CASE STUDY SUMMARY: REJUVENATING THE GANGA THROUGH INNOVATIVE PUBLIC-PRIVATE PARTNERSHIPS**

## **THE OBJECTIVE**

The Clean Ganga program (“Namami Gange”) aims to bring the heavily polluted Ganga River back to life through the development of sustainable, effective, and bankable wastewater treatment projects. In partnership with the World Bank Group, the Government of India developed an innovative “hybrid annuity” PPP model that can attract private investment in a way that incentivizes performance over the long term.



# THE CHALLENGE

The Ganga River, despite its profound cultural and spiritual significance, had become one of the most polluted rivers in India. Decades of unchecked urban and agricultural growth, combined with underperforming wastewater treatment infrastructure, has created serious environmental and public health concerns that were impacting more than 600 million people and 50 major cities<sup>2</sup>.

To make the river safe again, the Government of India launched the Clean Ganga program in 2014 to tackle the 3 billion liters of untreated sewage being discharged into the river every day<sup>3</sup>.



## Drivers for change:

- Heavy pollution due to untreated wastewater created environmental and health concerns for millions of people.
- Billions of dollars invested since 1970s generated limited results<sup>4</sup>. For example, more than half of sewage treatment plants (STPs) in the river catchment were either non-operational or performing poorly<sup>4</sup>.
- Lack of incentives for long-term performance under traditional procurement practices<sup>4</sup>.
- A recognition of the need for private sector expertise and finance to effectively construct, operate, and maintain STPs over the long-term.



## Outcome needed:

To provide cleaner water for millions of people living in the Ganga River basin, with better incentives for the private sector to deliver long-term measurable outcomes.



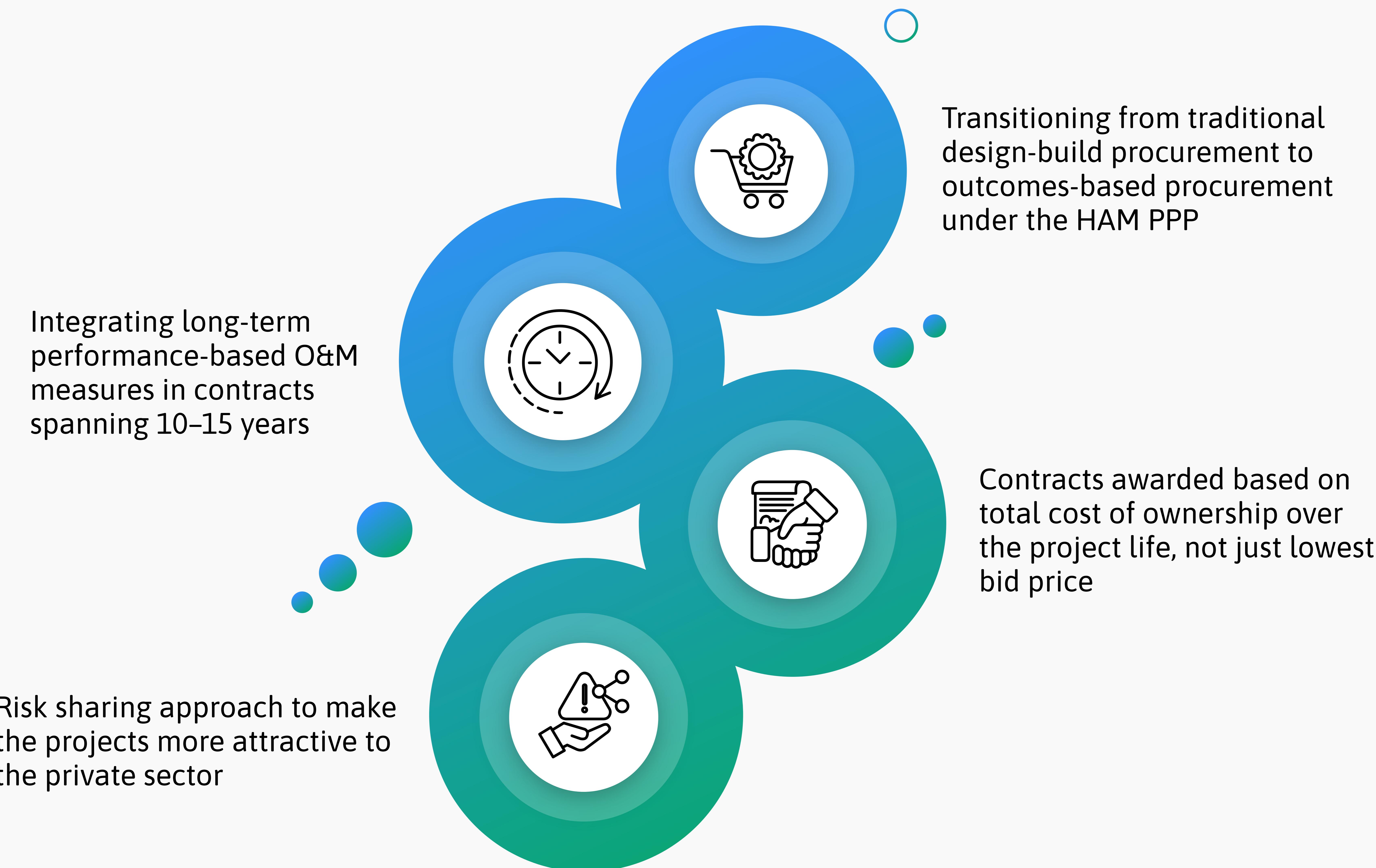
<sup>2</sup>Haddad, A. 2018. [The World's Largest River Clean-up Program](#)

<sup>3</sup>Gupta, N. 2019. [India: Cleaning up the Ganga with private sector support](#)

# THE SOLUTION

The Clean Ganga initiative applied a mix of institutional, technical, operational, and financial innovations to address the long-standing wastewater challenge in the Ganga basin. Central to this was a much greater focus on life cycle costing (LCC) principles. This is achieved via a hybrid annuity model (HAM) – a PPP procurement approach that incentivizes the private partner to minimize total lifetime costs and operate the asset efficiently and sustainably over the long-term.

## Snapshot of the final solutions:



## Procurement

The foundation for the LCC approach was the new procurement process. In the past, wastewater treatment plants were designed and built by the private sector based on a least-cost bidding process, before being handed over to the public sector for long-term operation. By contrast, the HAM PPP model combined design and construction with a 10-15 operation and maintenance period. Under this approach, the private partner receives payment for 40% of the total contract upon completion of construction, while the remaining 60% is paid as an annuity over 15 years of O&M, linked to operational performance of the plant.

Key LCC features in the procurement process include:



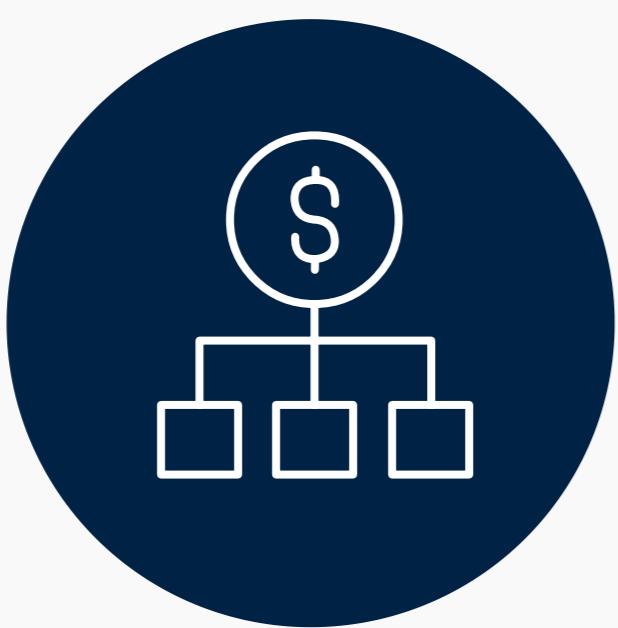
**Bidding process:** Bids are evaluated based on the net present value (NPV) for construction, operation, and maintenance over a 15-year period, based on a common set of technical specifications<sup>6</sup>.



**Incentives:** Annuity payments are linked to the performance of the STPs, promoting accountability and incentivizing consistent service delivery. Key Performance Indicators (KPIs) relate to the availability of the facility and quality of discharged effluent and digested sewage sludge. Developers are also given rights to revenues generated from by-products, such as biogas and treated effluent, to incentivize private sector innovation<sup>5</sup>.

## Financial

While the link between PPPs and long-term performance incentivizes is not new, for the Ganga program, traditional Build-Operate-Transfer (BOT) models were viewed as too risky by the private sector due to the absence of stable revenue streams and concerns over delayed payments from municipalities. To address these challenges, the program incorporated innovative funding and de-risking mechanisms.



**Financing structure:** The IFC helped design the financial structure for the HAM for the first three projects in Varanasi, Haridwar, and Mathura. Rather than linking payments to revenue, the government assumes all payment responsibilities under the contract, addressing a key bankability issue.



**Guarantees:** In 2020, The World Bank provided a guarantee to backstop the government's payment obligations for three HAM PPPs. This instrument helped reduce the risk of non-payment, thereby attracting private developers. It also helped alleviate public financing pressures by reducing the amount of money required in reserve accounts.

## Technical

The Ganga River Program encompasses building and upgrading STPs, expanding sewer networks, and establishing robust water quality monitoring systems<sup>2</sup>. While each project had its own specifications, some notable technical innovations that have featured in the program so far include:

- Reusing treated wastewater for industrial purposes. For example, in Mathura, Uttar Pradesh, the IFC piloted a project where Indian Oil Corporation uses treated wastewater to cool its refinery, saving 20 million liters of freshwater daily<sup>4</sup>.
- Generating biogas through anaerobic digestion of the sewage sludge, providing operators with additional revenue streams<sup>4</sup>.
- Deploying automated water quality monitoring of 20 water quality parameters at over 100 stations along the river to assess pollution control measures and STP performance<sup>6</sup>.

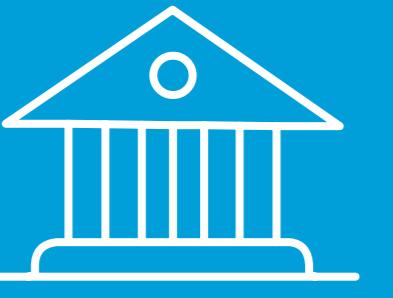
<sup>5</sup>World Bank Group. 2020. [Project Signing: World Bank provides \\$400 million to Enhance Support for Rejuvenating the Ganga](#)



# THE ENABLERS

To enable the implementation and scale-up of this LCC approach, the Clean Ganga initiative was underpinned by upstream reforms in policy, planning, procurement, and institutional capacity. These enablers created the conditions for downstream technical and financial innovations to emerge, take root, and scale effectively.

## Institutions



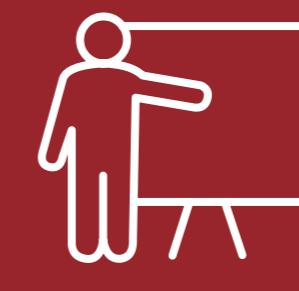
- Since 2011, the World Bank and IFC have supported the Government of India through the ongoing National Ganga River Basin Project, which included the establishment of the National Mission for Clean Ganga (NMCG) as the central agency to manage and implement the Clean Ganga program<sup>6</sup>. The NMCG is responsible for coordinating and financing activities aimed at the rejuvenation of the Ganga River.
- Centralized planning and project pipeline development was led by NMCG, with support from the World Bank, IFC, and other partners.
- Stakeholder engagement was critical to the program's success. NMCG conducted extensive consultations and roadshows with investors, lenders, contractors, and experts to gather feedback on the project structure and the bidding process<sup>8</sup>.
- Transferring counterparty credit risk from cities and local water utilities—often viewed as non-creditworthy—to a national-level entity significantly de-risked the asset, enhancing its bankability and appeal to private investors<sup>7</sup>.

## Procurement



- Procurement policies were reformed to prioritize total cost of ownership over upfront capital cost. Bid documents for the HAM PPPs included<sup>6</sup>:
  - Performance standards for the O&M phase.
  - Capped energy charges to control lifecycle costs.
  - Requirements for automated, real-time monitoring of effluent discharge quality.
- Bid evaluation criteria were based on Net Present Value, allowing for contractor selection that accounted for both construction and long-term operating costs<sup>6</sup>.
- Evaluation criteria also emphasized the contractor's O&M experience, proposed staffing structures, and automation readiness. This ensured the selection of technically competent and financially sound bidders.
- Contracts embedded KPIs related to plant availability, treated effluent, and sewage sludge quality. Penalties were applied for non-compliance during the O&M phase<sup>6</sup>.

## Capacity building



- IFC acted as PPP transaction advisor for the initial set of projects, playing a key role in structuring this new form of PPP contract.
- A dedicated project on automating water quality monitoring was implemented at the field level, enabling real-time performance tracking and more informed decision-making on treatment effectiveness and program impact<sup>5</sup>.
- Training programs were conducted for state agencies to support the transition from traditional lowest-capex procurement models to life cycle cost based assessments under the HAM framework<sup>6</sup>.

<sup>6</sup>National Mission for Clean Ganga (NMCG) (N.D) [Automatic Water Quality Monitoring on the River Ganga](#)

<sup>7</sup>Global Infrastructure Hub. 2022. [Clean Ganga Program](#)

# THE RESULT

- By 2024, 12 HAM contracts had been replicated across several states, enabling the treatment of around 600 million liters/day of wastewater.
- The program has mobilized over US\$1.5 billion in financing, including US\$650 million from private sector sources<sup>2</sup>.
- The HAM-PPP approach is breaking the cycle of build-neglect-rebuild and focusing attention on long-term performance.
- Compliance has improved through automated monitoring of effluent discharged, linked to and performance-based annuity payments.
- To date, the PPP opportunities have attracted considerable market interest and some projects report to have achieved cost reductions up to 26% below sanctioned costs<sup>6</sup>.
- Lifecycle costing and HAM-PPP models have become the standard for Ganga basin wastewater investments.

## QII PRINCIPLES IN ACTION

In addition to **Principle 2 (Economic Efficiency)**, the Ganga case also exemplifies the application of the following QII principles:

### Principle 6: Infrastructure Governance

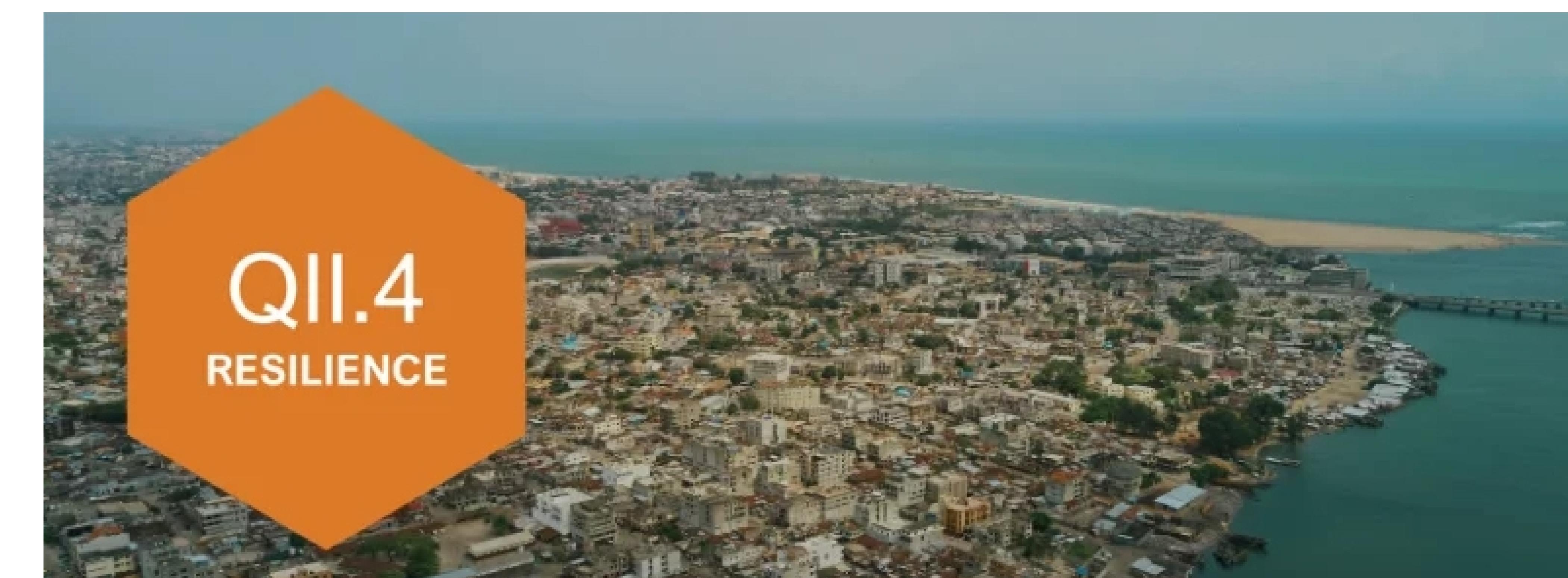
Procurement policies were overhauled to consider total cost of ownership during the evaluation process, not just upfront capital cost.

Contracts embedded KPIs for plant availability, treated effluent, and sewage sludge quality, improving contract transparency and accountability for construction and operations.

### Principle 4: Environmental Sustainability

The program emphasized pollution abatement through expanded treatment capacity, enforcement of effluent discharge standards, and the promotion of treated wastewater reuse.

These measures are expected to reduce untreated sewage discharge into the Ganga and promote resource-efficient plant operations, with real-time water quality monitoring systems now in place to track future progress.



# REFERENCES

- [IFC Story: "Breathing Life Back into the Ganga"](#)
- UN Environment Programme. 2023. [Restoring India's Holiest River](#)
- World Bank Group. 2024. [Cleaning up the Ganga: \\$1.5B Mobilized Through Replication of PPPs](#)
- Haddad, A. 2018. [The World's Largest River Clean-up Program](#)
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- World Bank Group. 2020. [Project Signing: World Bank provides \\$400 million to Enhance Support for Rejuvenating the Ganga](#)
- National Mission for Clean Ganga (NMCG) (N.D.) [Automatic Water Quality Monitoring on the River Ganga](#)
- Global Infrastructure Hub. 2022. [Clean Ganga Program](#)

## Related Materials

- World Bank (2023). Understanding and Mitigating Fiscal Risks of Infrastructure
- World Bank (2022). Managing the Fiscal Implications of PPPs: Case Studies

## Similar Case Studies

- Performance-Based Contracting in Ho Chi Minh City (Water Sector)
- Infrastructure Maintenance Practices in Pacific Island Countries