



Webinar

Scaling Zero Liquid Discharge (ZLD)
in Bangladesh's Fashion Supply Chain

February 5th, 2026 | 10:00 AM CET

SCALING ZLD IN BANGLADESH

AGENDA

- Introduction
- Water risks in Bangladesh
- Relevant upcoming legislation in Bangladesh
- Outcomes pilot
- Opportunities and challenges
- Financial model QStone Capital



PROJECT PARTNERS

Donors



PMA



Grantees

(Project Lead Partner)



(Co-Lead)

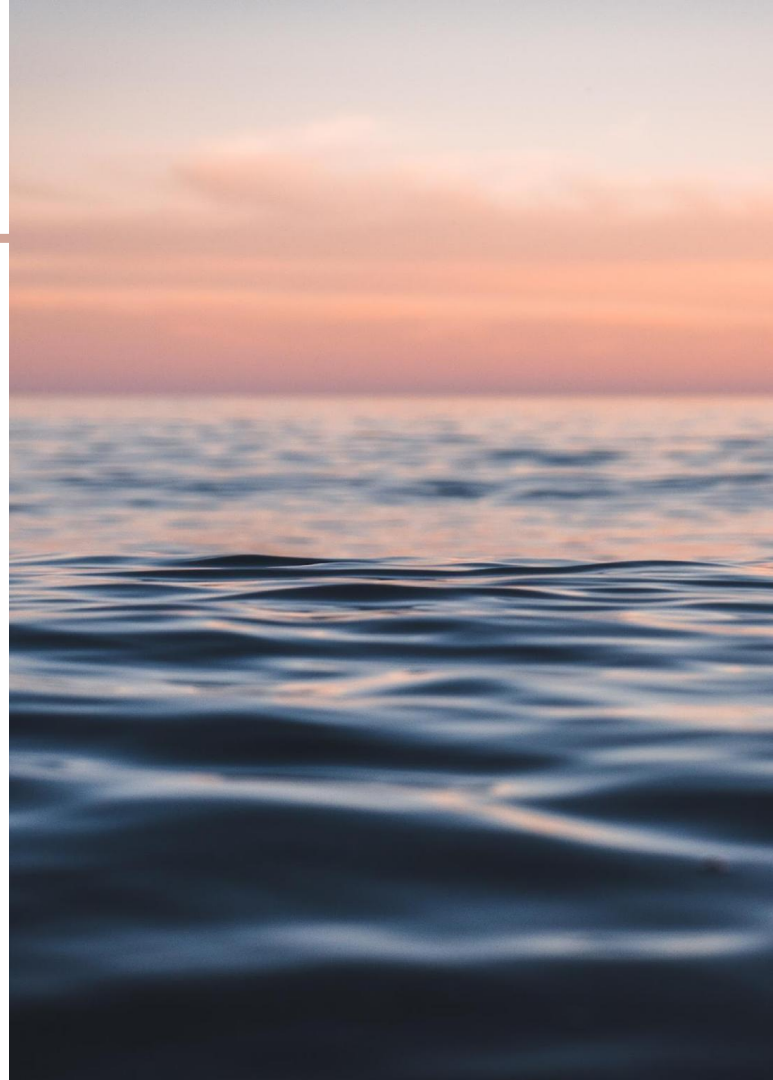


Technical Partners



WATER RISKS BANGLADESH

- Depleting water table in the textile industrial zones
- Pollution of watersheds
- Low availability of the water to the community
- Not recycling the treated water



RELEVANT UPCOMING LEGISLATION IN BANGLADESH

- 7th five year plan - sets target for ZLD
- 8th five year plan - sets target for water pricing
- Environmental Conservation Rules 2023 (Color 150 Pt-Co)
- ZDHC

RECYCLING PILOT AND OUTCOME

Mr. Rajib Ul Haque, CTO, Kingsley

INDUSTRY CHALLENGES

- Lack of technical knowhow on water recycling i.e., in membrane, advanced and oxidation technology
- Import tax of recycling equipment are around 40%
- High CAPEX and OPEX
- Factories lack advisory support from local experts on recycling
- Heavy dependency on the foreign suppliers and cost overrun
- Lack of incentives to the factories
- Performance of the supplied system is not up to the mark



SOLUTION FOR RECYCLING

- Production process should be more efficient in water use
- More water recycling with membranes
- Management of brine, perhaps its recycling
- Cost effective solution
- Developing more local expertise on the recycling technology
- Continuous after sales service



INDUSTRIAL SEGMENTS

Knit and Woven Dyeing

- High TDS, COD and Color load
- High cost for membrane
- High OPEX
- Higher cost for reject management
- Evaporation is expensive
- Need alternative of Evaporation

Denim and Twill Washing

- Moderate COD and TDS load
- Less color in treated wastewater
- Membrane cost is comparatively low
- Moderate OPEX
- Less cost on reject management
- ZLD can be achieved with multimembrane brine recovery

Sweater Washing

- Less COD, TDS and close to zero color load
- Membrane cost of comparatively very low
- Low OPEX
- Reject management is easy
- Easy to go for ZLD

SMEP PILOT

Demonstrate 80% wastewater recycling with appropriate reject management

A modular system consisting of 3 Modules in 20 feet containers

- Module 1 – Ultra Filtration
- Module 2 – Reverse Osmosis; 2 stage
- Module 3 – Advanced Oxidation System i.e., EC



SMEP PILOT

- To demonstrate 80% wastewater recycling with appropriate reject management
- It is a modular system consisting of 3 Modules in 20 feet containers



Ultrafiltration

- Bag Filter
- Cartridge Filter
- Ultrafiltration (UF)
- Acid dosing station (CEB)
- Caustic dosing station (CEB)
- Hypochlorite dosing stations (CEB)

Solidaridad



LENNTECH
Water Treatment Solutions

KINGSLEY



Reverse Osmosis

- Reverse Osmosis (RO1)
- Reverse Osmosis (RO2)
- Bisulphite dosing stations
- Antiscalant dosing station
- CIP flushing station



Reject Maneagement

- Advanced Oxidation System
- Electrocoagulation (EC)
- Dissolve Air Floatation (DAF)
 - Sand Filter
- Polishing Oxidation

Z&Z Production
Process



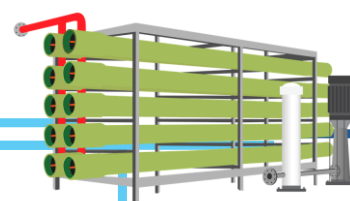
MBR/UF ETP



4.25 m³/hr or
85 %

5 m³/hr or 100%

1st stage RO

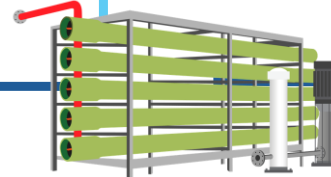


3.5 m³/hr or
70 %

0.75 m³/hr or
15 %

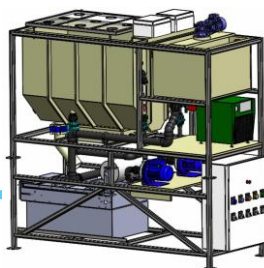
1.5 m³/hr or
30%

2nd stage RO



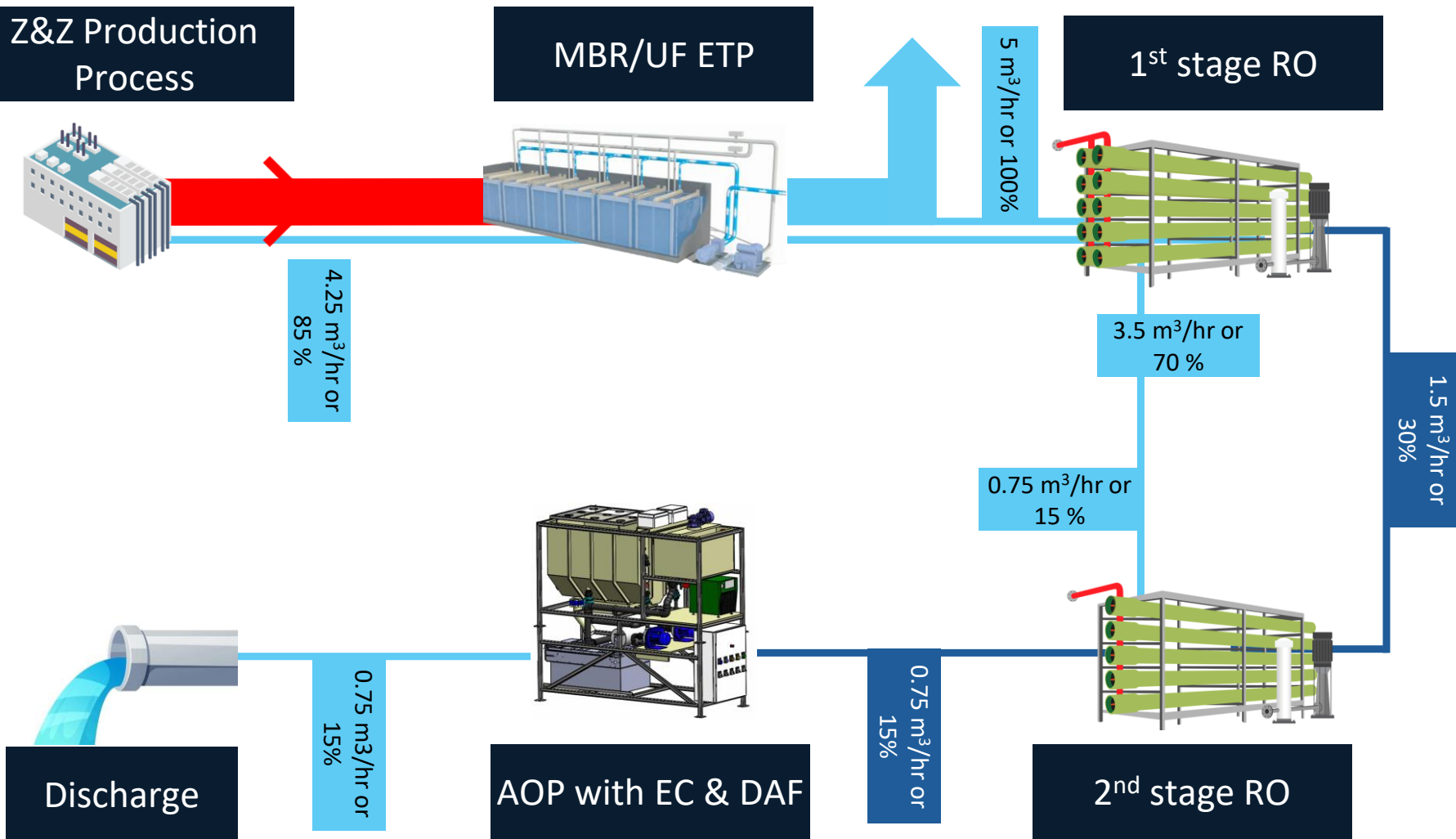
0.75 m³/hr or
15%

AOP with EC & DAF



0.75 m³/hr or
15%

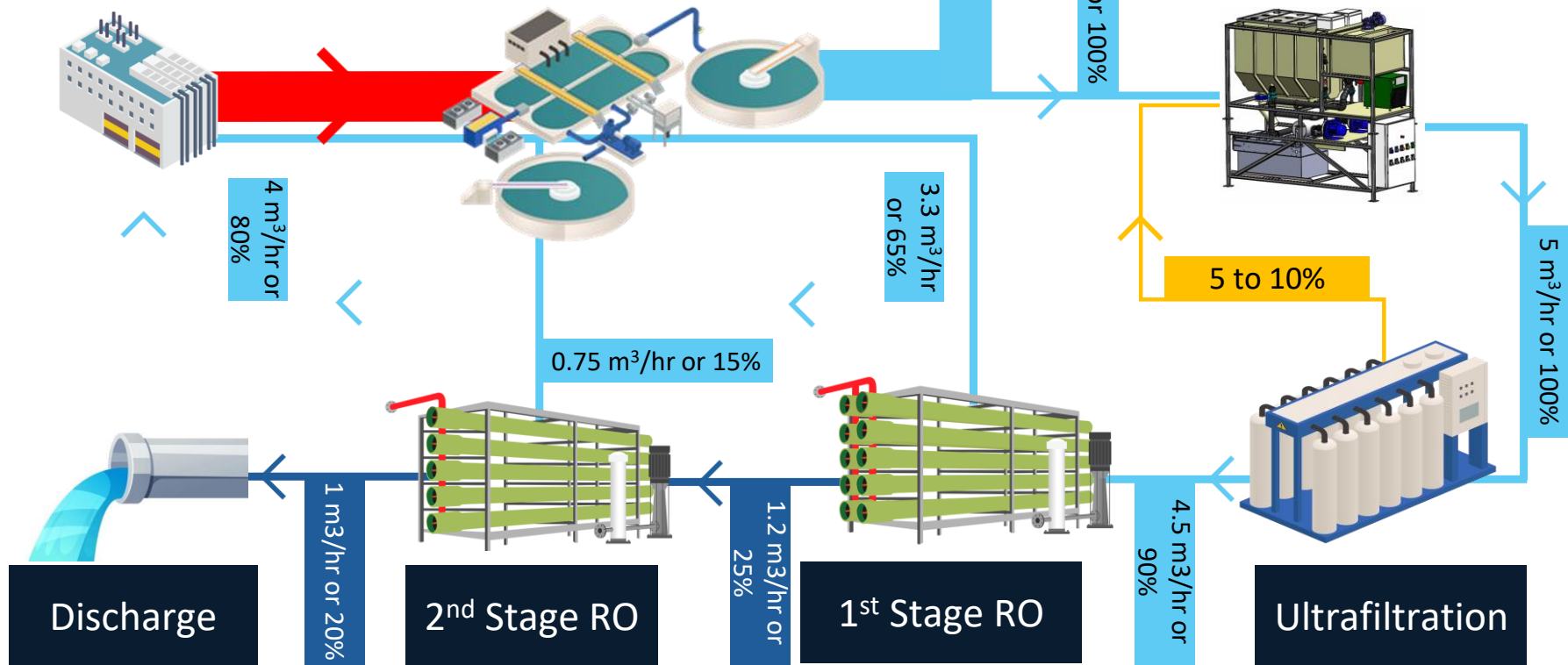
Discharge



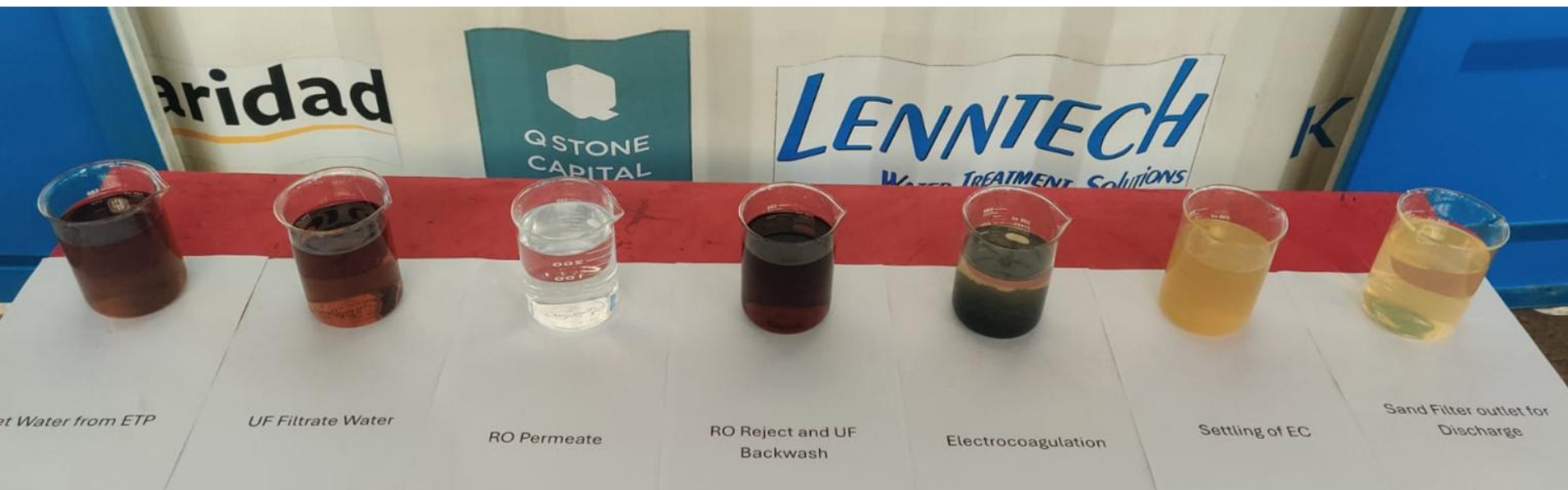
Z&Z Production
Process

ASP Biological ETP

AOP with EC & DAF



RESULT OF THE PILOT

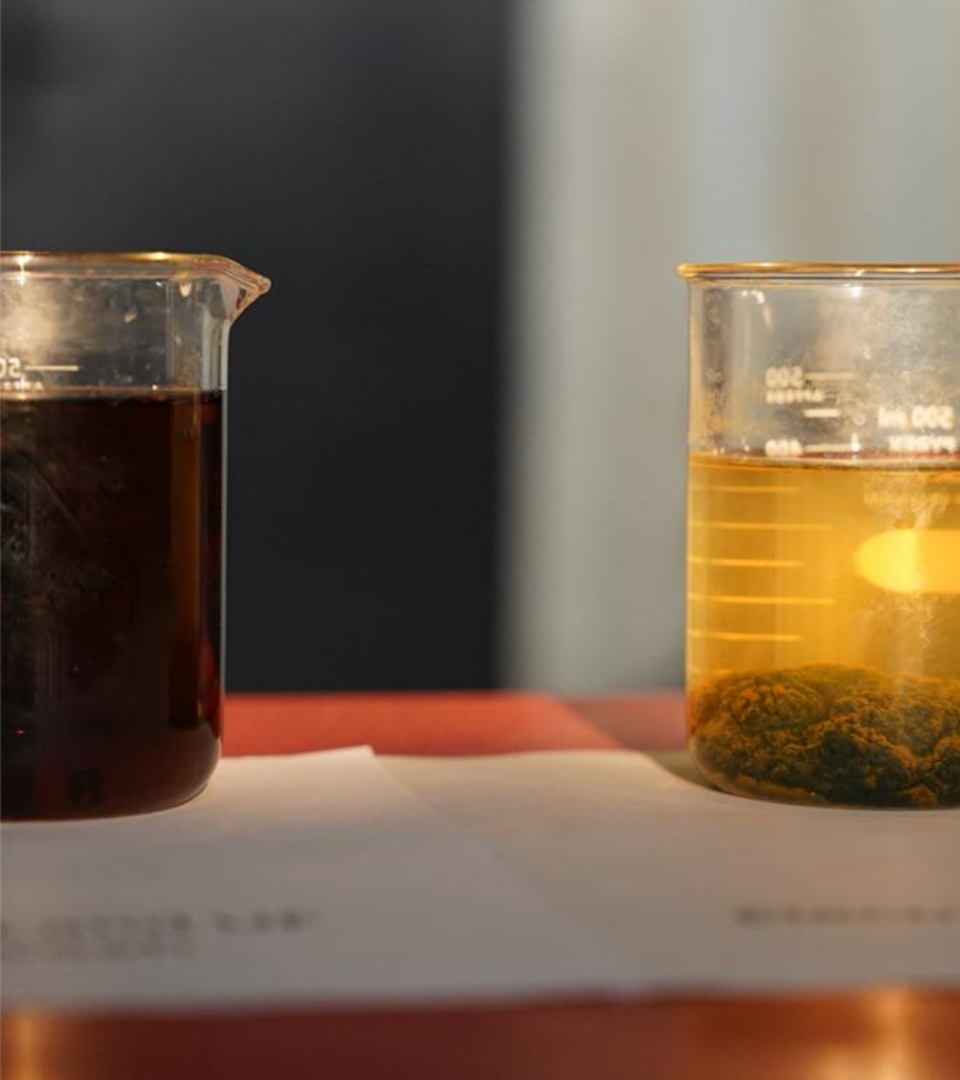


RESULT OF THE PILOT WITH POLISHING OXIDATION



WATER CHARACTERISTICS DIFFERENT TREATMENT STAGES

Parameter s	Unit	Raw Wastewater	UF		1st and 2nd Stage Reverse Osmosis		Advanced Oxidation Process	
			UF Filtrates (RO Feed Parameters)	UF Backwash / AOP Feed	RO Permeate (Recycle to factory)	RO Reject (AOP Feed Parameter)	Total AOP Feed	Discharge
Recycling %	%		95	5	70	25	30	30.00
Flow	m³/hr	5	5	0.25	4	1.25	1.50	1.50
pH	--	11	7	7	7	7	7	7.00
COD	mg/l	150	120	720	5	442	488	<80
BOD5	mg/l	30	25	125	2	89	94	<15
Color	Pt. Co.	2500	2250	7250	0	8550	8333	<150
TDS	mg/l (<)	1500	1500	1500	100	5420	4767	>4766
TSS	mg/l	70	5	1300	0	19	233	<15



OPEX for 70% recycling and 30% brine management

- CAPEX depends on the characteristics of the feed wastewater
- OPEX is USD 0.12 to 0.30 per m³ water recycled.
- 3 million to 1 million for 100 m³/hr plant capacity

NEXT STEPS AFTER PILOT

- Brine management without evaporator
- Brine concentration with High Pressure RO
- Brine purification with multiple membrane
- Reuse of the brine in dyeing process
- The last discharge will go again to AOP

FINANCIAL MODEL QSTONE CAPITAL

The Basic Financial Challenge

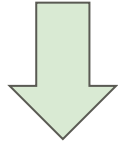
No adequate compensation for textile factories to migrate to ZLD

Textile factories are willing to transition to ZLD and broader sustainability goals. While innovative technologies reduce the cost gap with linear systems, a significant financing gap remains.

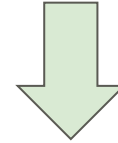
Fashion brands and Textile producers struggle both to quantify this gap and to make long-term financial commitments, as their sourcing models rely on short-term contracts.

Seasonal or per-order compensation, even if provided, does not offer the financial security required for factories to make large upfront ZLD investments.

Two complementary financial mechanisms to enable the textile industry's transition to sustainability



**A 1% Sustainable RMG (ZLD)
surcharge paid by end
consumers at the point of
sale**



**Securitized proof of avoided
pollution, issued as
blockchain-based digital
tokens**

THEY KEY CONSUMER QUESTION

Is the EU consumer willing to pay extra for sustainable production?*

Based on two separate surveys conducted by QStone and Solidaridad at different points in time, a clear majority of consumers indicated willingness to pay for sustainable production.

However, consumers expect full transparency and a cost-effective use of their contribution

* AS AN EXAMPLE OF ONE OF THE EXPORT MARKETS FOR THE BANGLADESH TEXTILE INDUSTRY

THE FINANCIAL SOLUTION : TWO ELEMENTS

A 1% sustainability surcharge at checkout on ready-made garments produced in Bangladesh and sold in export markets could fully finance the textile industry's transition to full sustainability, including Zero Liquid Discharge (ZLD).

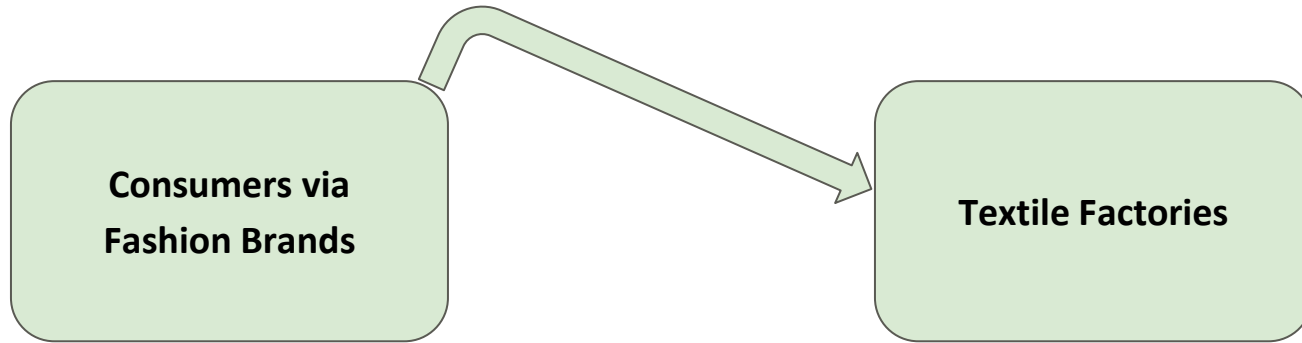
→ **Potential to generate up to USD 700 million annually.**

(Western) consumers increasingly recognise their co-responsibility for sustainable textile production.

→ QStone and Solidaridad's data shows that a 1% price increase does not affect purchasing decisions. Transparent traceability of how the 1% surcharge is collected and used would further increase consumer acceptance.

FINANCIAL SOLUTIONS PART 1

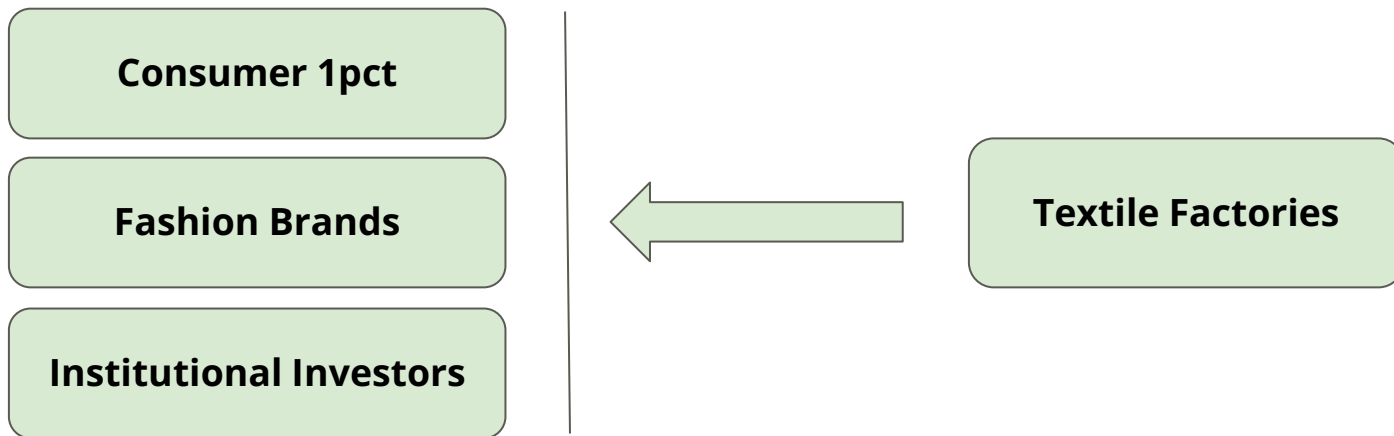
1PCT surcharge building the bridge from the consumers to factories



Consumers are reaching out to Factories enabled by Fashion Brands to finance the migration towards ZLD

FINANCIAL SOLUTIONS PART 2

Connecting the bridge from the side of the factories



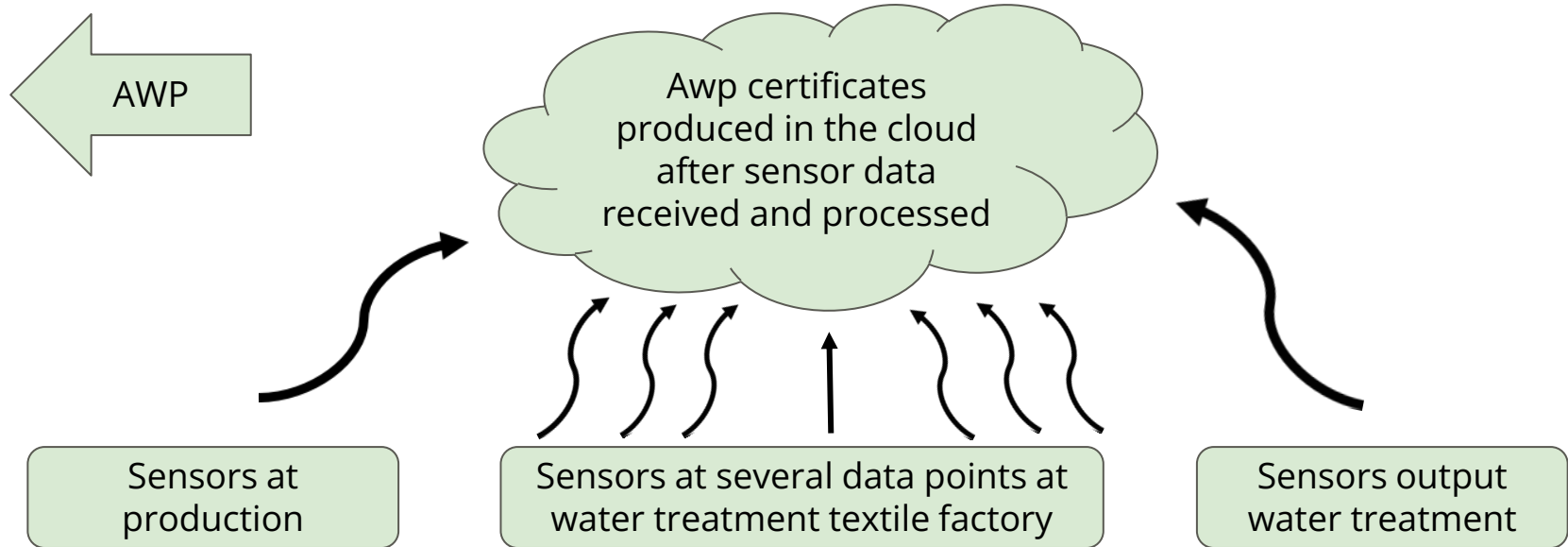
1. Textile factories are offered an integrated financing structure linking consumers, fashion brands, and institutional investors to support the transition to ZLD.
2. The structure facilitates full-scale ZLD implementation at the factory level.

CORE MECHANISM

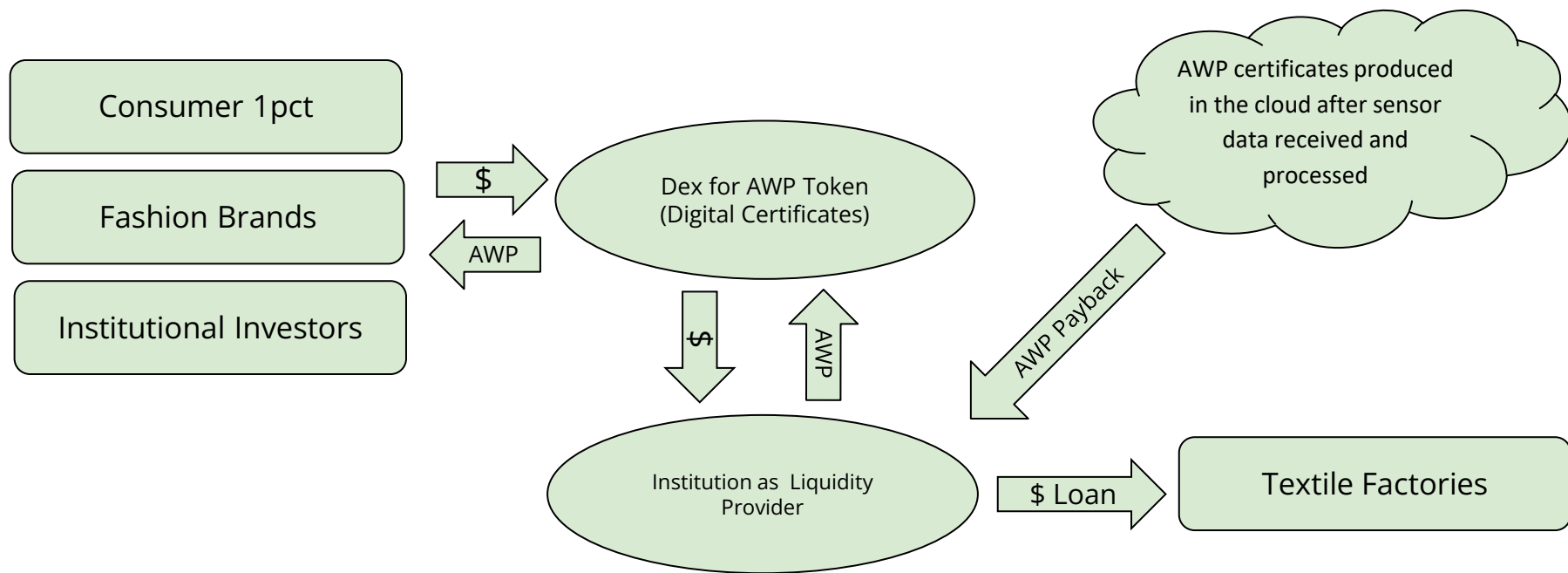
AUTOMATED VERIFICATION & ISSUANCE OF AWP TOKENS

1. Tamper-proof IoT sensors will be installed across the water treatment process (including sludge and brine), in line with an independent audit framework.
2. Sensor data will be automatically cross-checked and reported to a blockchain-based protocol, which will verify performance and issue an AWP Token per 100 m³ of water treated for reuse, representing avoided pollution.
3. Each token will be valued at the full cost of treating 100 m³ of water for reuse.
4. Factories will receive payment per issued token to finance ZLD installation and operation.

AWP DIGITAL CERTIFICATES PRODUCED BY AUTONOMOUS SENSOR SYSTEM AT FACTORIES



MARKETPLACE FOR DIGITAL CERTIFICATES PRODUCED BY CLOUD CONNECTED SENSOR AT MANUFACTURER



From Trading to an Immutable Digital Sustainability Claim by Retiring AWP Tokens

BENEFITS FINANCIAL SOLUTION

1. Enables financing of full ZLD migration at the factory level, rather than funding individual processes within a factory.
2. Creates universal AWP tokens with digitally secured transparency, verification, and immutability.
3. Allows institutional investors to kick-start the mechanism, while gaining a tool aligned with its core mandate, financing ZLD installations in exchange for AWP tokens as an annuity-like return.
4. Provides 1% consumers, fashion brands, and sustainable investors with a single, universal instrument to credibly claim sustainability.
5. Enables fashion brands to maintain their existing short-term negotiation and sourcing flexibility, while still accessing a robust sustainability claim, reducing the risk of greenwashing accusations.

BENEFIT TO ALL

Fashion Brands

Ability to offer customers a transparent, low-cost, and meaningful path to sustainability

Govt. of Bangladesh

Achievement of critical sustainability objectives without burdening the public budget

Retail Buyers

A low-threshold, tangible contribution to sustainable textile production

Textile Factories

No added pressure on margins due to sustainability requirements.

A clear pathway to long-term sustainability commitments

Bangladesh Society (Inc. Factory Workers)

No water pollution, Preservation of drinking water resources, Improved working conditions



CHANGE
THAT MATTERS