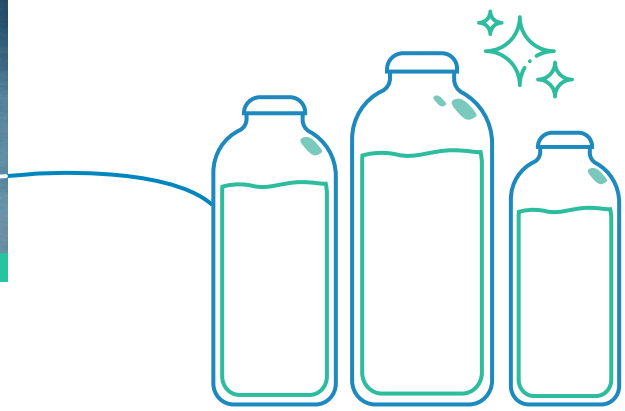
SEA circular
solving plastic pollution at source



Circular solutions for plastic pollution

Drinking water system with zero plastic packaging

UN environment programme 50 1972-2022

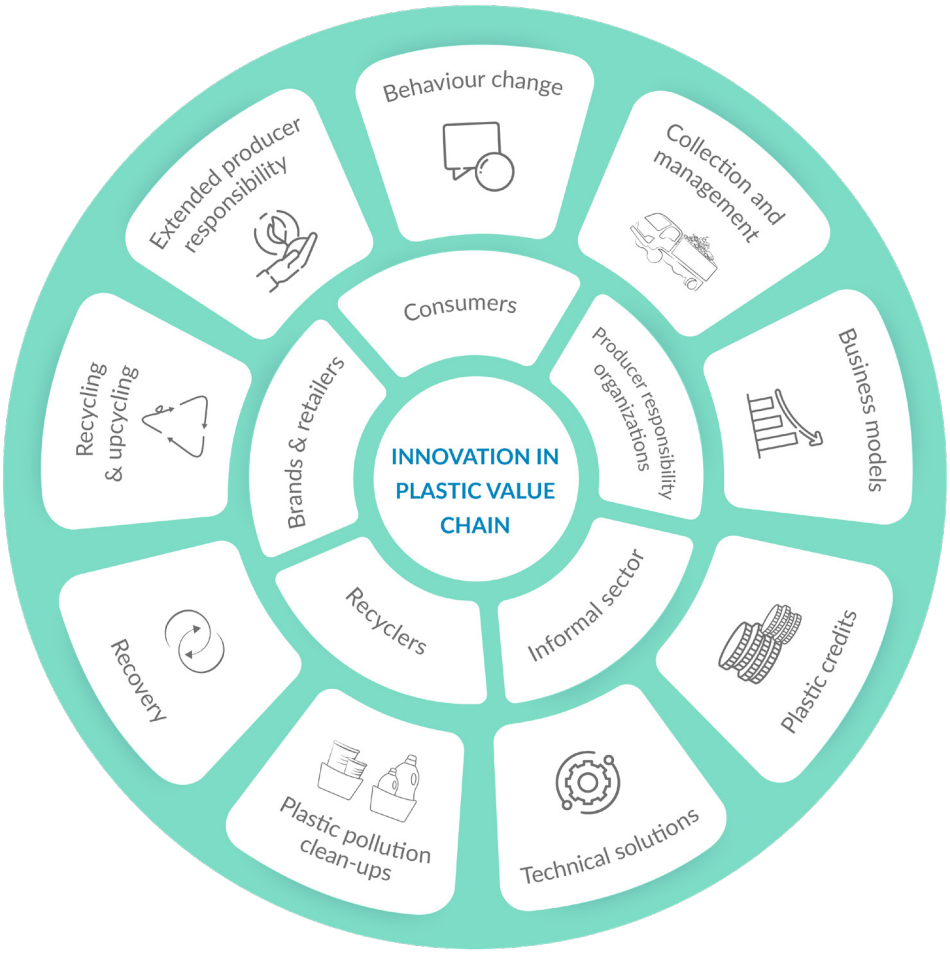
COBSEA
COORDINATING BODY ON THE SEAS OF EAST ASIA

Sweden Sverige

About the case study

This good practice case study is part of a series of knowledge products developed by the SEA circular project to showcase exemplary market-based solutions that bring about transformational changes in the way plastic is managed in the value chain. This series captures circular economy approaches, ranging from innovative business models to behaviour change initiatives, to address plastic pollution. These approaches form part of the SEA circular project's "circularity framework for the plastic value chain".

Circularity framework – plastic value chain



Background and problem

Five Asian countries have been identified among the largest sources of marine plastic pollution globally.[1] In Indonesia, over 60 per cent of the 7.8 million tons of plastic waste generated is mismanaged, improperly disposed of in open dumpsites, or left uncollected.

A World Bank study highlighted some of the key challenges that Indonesia faces, such as limited waste collection services and limited waste disposal infrastructure, which contribute to these numbers. Several priority actions are under way, including promotion of a circular economy to prevent plastic pollution at the source and extend the life cycle of plastic items.

Aside from a large volume of mismanaged plastic waste, Indonesia also faces a significant water crisis: 18 million people lack access to clean water[2] and 24 million lack access to a safe and regular water supply.[3] Given Indonesia's archipelagic nature, there are thousands of water suppliers in the country and many do not meet the necessary water quality safety standards and regulations. During the dry season, in certain parts of the country, low income households could spend as high as one third of their monthly income for drinking water delivery.[4]

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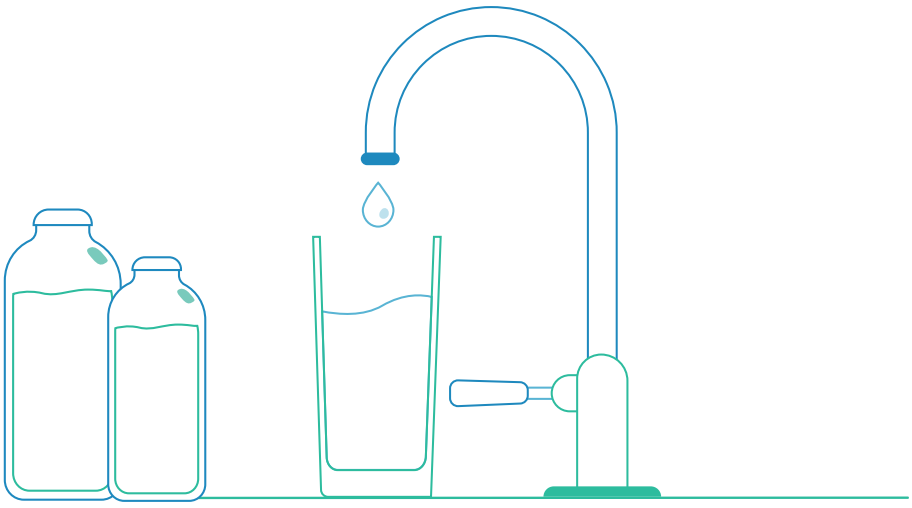


1. Beatriz Garcia, Mandy Meng Fang, and Jolene Lin, "Marine Plastic Pollution in Asia: All Hands on Deck!", *Chinese Journal of Environmental Law*, vol. 3 (August 2019).
2. Water.org, "Indonesia's water and sanitation crisis". Available at https://water.org/our-impact/where-we-work/indonesia/ (accessed 5 May 2022).
3. Wateroam, "The Water Crisis: Indonesia", 21 December 2020. Available at https://www.wateroam.com/social-awareness/the-water-crisis-indonesia.
4. Ibid.

Rural Indonesia resorts to buying clean water for about USD 22.5 per 5,000-litre tank,[5] a heavy burden for a country where 7 per cent of the population is living on less than USD 3.20 per day.[6] Certain parts of the urban population, including establishments, pay 10 times the normal cost for water.

In this context, PT PIPA, a water sustainability consultant engaged in social and rural development through its affiliate non-governmental organizations (NGOs) – namely the Air Kita Foundation – aims to promote water ethics and water education. Since its establishment in 1998, PT PIPA has been focused on water efficiency solutions for both water utilities and big water users in the private sector.

However, convincing Indonesian society to address the true cost of water is a major challenge, despite its growing scarcity and the growing population. A lack of awareness about water as a valuable commodity means that efforts to optimize the potential of a circular economy have been limited, but the reality of growing water risks is already affecting business security in the long run.

PT PIPA aims to tackle the dual challenge of plastic and water by addressing "business as usual" practices, prioritizing the hospitality sector given its consumption of bottled water. PT PIPA's credentials and expertise allowed it to convince and engage partners on the financial, social and environmental benefits of a circular initiative. It has brought about an innovative and integrated drinking water solution that provides fast return on investment, a measurable positive carbon footprint and a tangible contribution to plastic avoidance, allowing water to be saved and encouraging accountability.

5. Ganug Nugroho Adi, "Central Java villagers face skyrocketing water price amid drought", Jakarta Post, 4 September 2017.
6. Water.org, "Indonesia's water and sanitation crisis". Available at https://water.org/our-impact/where-we-work/indonesia/ (accessed 5 May 2022).

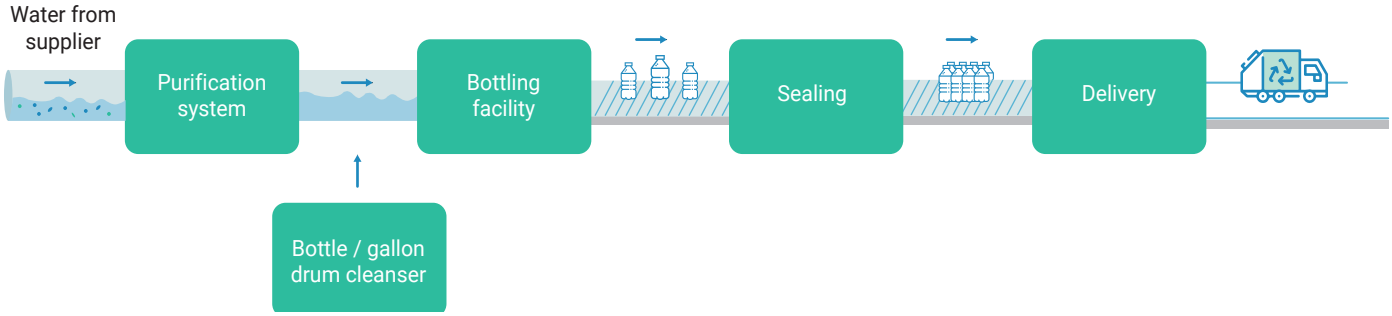
Interventions

PT PIPA targets big water users like hotels, which traditionally provide drinking water in plastic bottles and tend to be extensive contributors to the dual challenge of water and plastic bottles. This is exacerbated by the common perception that bottled water is cleaner and safer for consumption, and a lack of awareness of the harm it causes.

As part of its consulting process, PT PIPA articulates the real business problem, identifies levers that, when tapped into, provide optimal benefits, and packages a set of solutions to deliver results. Given the nature of this problem, they underlined the need to work with businesses that are committed to sustainable development.

Having successfully implemented an award-winning circular economy showcase* with Mercure Convention Center (MCC) in Ancol, Jakarta, PT PIPA offered to help Accor hotel group (in Indonesia) scale up their sustainability road map, their declared commitment to fighting plastic pollution and their contribution to preserving the oceans.

The main attraction for MCC included a fast return on investment, an immediate solution to implement the Accor hotel sustainability road map concerning single-use plastics disposal, and the lack of traceability of drinking-water quality.



Under its “Free2Flow” brand, PT PIPA designed an integrated “on-site” and “on-demand” purification solution, with point-of-use (POU) and glass bottling, offering the following advantages:

- on-site purification of own water bought from municipal utility providers;
- assurance of the utmost safety and hygiene;
- removal of the need for plastic bottles without affecting consumer confidence
- lower price of water per bottle used in the facility.

The solution involves a combination of unique and best-in-class purification technology, integrated with systems that clean bottles and gallon drums, refill them after sanitizing, and cap and seal them.
This solution grants **complete autonomy**, a very **attractive return on investment** and a **significant reduction in single-use plastic** bottles.

* MCC was awarded “Green Hotelier of the Year” by the International Tourism Partnership in 2018 and its water efficiency performances were rated as exceptional.

PT PIPA mobilized one of the world leaders in purification technology: Bluewater, a company based in Sweden. Packed with a series of purification layers with decreasing membrane size, this system removes everything from hair, sand and pollen to viruses, sugar and aqueous salts through a superior patented osmosis system. The system removes contaminants down to a size of <0.0001 microns and the resulting water is unmatched in purity.

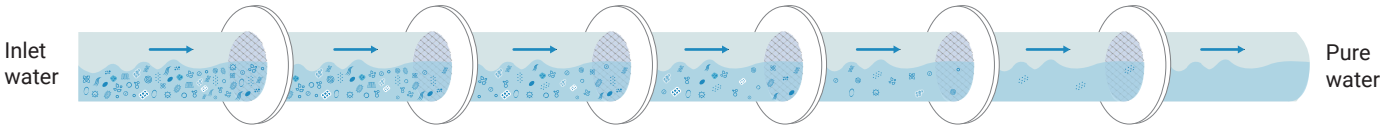
However, the ingenuity of the solution is not just in the filtration system but also in its ability to remineralize the purified water and integrate the downstream “tailor-made” processes of cleaning and filling systems for sterilized glass bottles, water fountains, dispensers, and pumping, piping and storage tanks. The system can cater to a range of bottles per day, from 100 to 6,000 litres.

Patent technology SuperiorOsmosis™ removes contaminants down to a size of smaller than 0.0001µm

SuperiorOsmosis™ compared to other technologies:

Email: project@pipa.co.id

Particle filtration	Microfiltration	Ultrafiltration	Nanofiltration	Reverse Osmosis	SuperiorOsmosis™
>1000–1.0µm	>1.0–0.1µm	>0.1–0.01µm	>0.01–0.001µm	>0.001–0.0001µm	>0.001–0.0001µm



Red blood cells	Coal particles	Viruses	Low molecular weight compounds	Metal ions
Hair	Bacteria	Proteins	Synthetic dye	Heavy metals (e.g. lead, arsenic, cadium, mercury)
Sand	Asbestos	Large organics and oil emulsion	Pharmaceutical residues (e.g. medicine, antibiotics, veterinary drugs)	Sugar
Pollen	Microplastics	Nanoplastics		Aqueous salt

Challenges

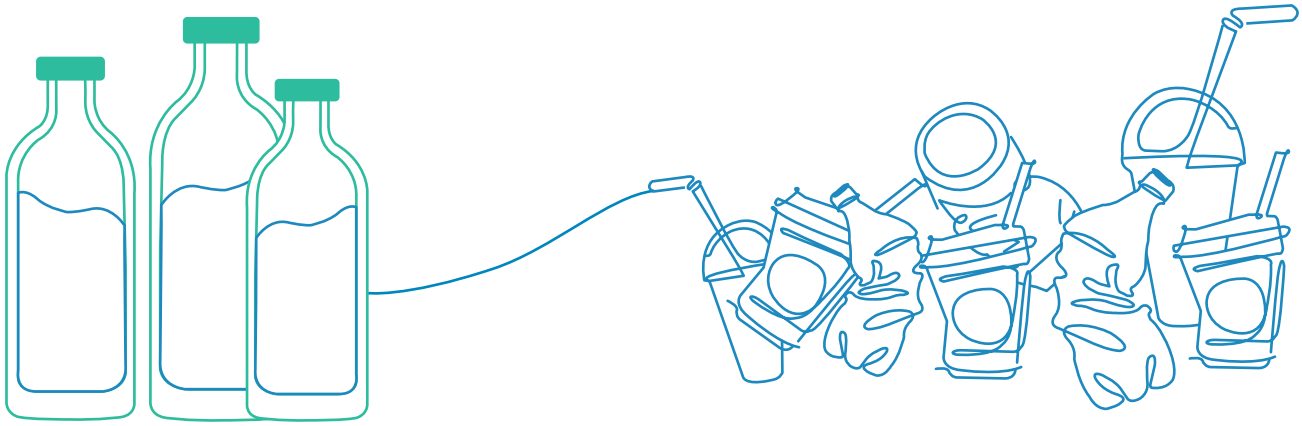
While the technical solution tackles the operational problem at hand, it is neither easy nor straightforward. There are significant challenges that remain, such as acceptance of the solution at a business level and managing the consumer experience, which are still being tackled, with the ultimate aim of making this into a "turnkey" solution that businesses can benefit from.

Technological: Finding the right bottle type and design that matches the diverse requirements for cost, class, customer acceptance, quality, and compatibility with the purification and bottling process takes time.

Mindset: "Business as usual" practices are leading Indonesian industries to exclude the production of glass bottles for drinking water. PT PIPA, however, saw an opportunity to integrate circular economy principles by disrupting "business as usual".

Financial: As far as this showcase was concerned, the major bottleneck stemmed from the negative impacts of COVID-19, and the very low occupancy rate. The pandemic prevented many of PT PIPA's target partners from mobilizing the required capital expenditure and return on investment.

Collaboration: Assembling a high-quality integrated solution of this nature requires strong partnership among the different equipment suppliers and their technologies. COVID-19 mobility restrictions disturbed this. The hospitality sector involves two intervention levels: the management company focusing on operational expenditure and the building owners concerned with capital expenditure. Their priorities are not always aligned, requiring significant effort to create buy-in for new ideas.



Results

The solution was designed on the basis of full transparency to trigger a sense of ownership among all stakeholders, including buyers, subcontractors and users:

- transparency with hotel owners and operators to adjust the solution to their own operation criteria;
- transparency with subcontractors to engineer the most reliable operation;
- transparency with guests through a wide range of communications tools, including visible access to the facility.

The pilot project will save **400,000** single-use plastic bottles per year.

COVID-19 escalated the risk of virus transmission, which was already significant under traditional logistic practices such as dubious bottled water providers and use of multiple storage areas. Since this solution enables on-site production in a fully sterile environment, it **protects against the impacts of a traceability gap** and bypasses potential external mismanagement. In this instance, the input water from the utility provider had significant iron and scale content with total dissolved solids reaching 500 ppm. The purified water had 11–14 ppm after filtration.

Showing **return on investment** is a challenge in a country where many hidden costs are distorting cost-benefit analysis. Communication about the true cost of water is essential. Leveraging expertise and references allowed PT PIPA to clarify the true cost of water and **demonstrate financial benefits** in around 18 months.

The pilot project will **save 400,000 single-use plastic bottles per year** from this hotel establishment when run at only 75 per cent of its full capacity, and allow a drastic reduction in its carbon footprint due to a decrease in transportation between traditional water suppliers and consumption destinations. The solution offers **flexibility in terms of point of use** from bottles, dispensers, fountains and taps. It also provides **strong dissemination potential** in dense but remote Indonesian regions where water access is challenging and rivers are strewn with empty plastic bottles. “Free2Flow” has extremely **low energy consumption** (in the range of 30 kWh/day, equivalent to USD 1,000 /year, for the MCC showcase) and provides further benefits whenever energy access is challenging. The solution also positively highlights circular economy benefits, with Indonesia suffering from water challenges and Jakarta sinking due to overextraction of underground water.

Moving forward

Indonesia has openly declared its commitment to reducing plastic pollution to the United Nations. A slew of mass media campaigns have been launched to educate and inspire people to help address the problem. This is starting to influence the mindset of millennials and the younger generation. To address the gap between PT PIPA's communication reach and what is needed to influence the market, a strong partnership with communication and public relations professionals at Most Valued Business Indonesia has been established to provide critical insights and communicate to key stakeholders.

Committing to thought leadership interventions over the last year, the consulting firm has been invited to contribute to the United Nations-supported Global Tourism Plastics Initiative and was acknowledged twice by the Indonesia Business Council for Sustainable Development in 2012 and 2016 for its key contributions. Going forward, PT PIPA will strive to actively engage in multi-stakeholder dialogues with policymakers in the country, leverage the momentum built in the pilot project and expand implementation across the Accor network, and influence sustainability-minded hotel associations to replicate and scale the model.

To this end, PT PIPA will invest in turning this integrated solution into a turnkey model with a lower implementation cost and a shorter roll-out time, and ensuring buy-in from organizations, both big and small, with the sole aim of driving circularity through plastics avoidance.

We thank PIPA for sharing details of their exemplary innovations in the SEA circular project's series on the plastic value chain.