



OVERVIEW OF WATER-WASTE LANDSCAPE IN SINGAPORE

Innovation Norway Singapore- July 2021

SINGAPORE'S WASTE AND WATER MANAGEMENT: SEVERE CHALLENGES AND AMBITIOUS INFRASTRUCTURE PROJECTS

Did you know? Singapore will be facing severe waste and water challenges the next decades.

- At very high waste generation per capita, Singapore has insufficient recycling rates, especially for domestic solid waste (only 22%).
- The current waste handling strategy lies in incineration of the 7.7 million tons; and depositing the ash at the [Semakau Landfill](#). However, at the current rate, this landfill will be filled by 2035, and there are no alternative deposition sites.
- Organic waste, especially food waste is currently also incinerated after treatment; representing a huge untapped potential for conversion into fertile soil, fertilizer for domestic and export use and into animal and aquaculture feed.
- Singapore is aiming for water self-sufficiency by 2060, when import contracts with Malaysia expires. Catchment of rainwater covers 20%; while desalination capacity will grow to 30% and so-called [NewWater](#) (treated wastewater) shall cover 50% of future water needs.

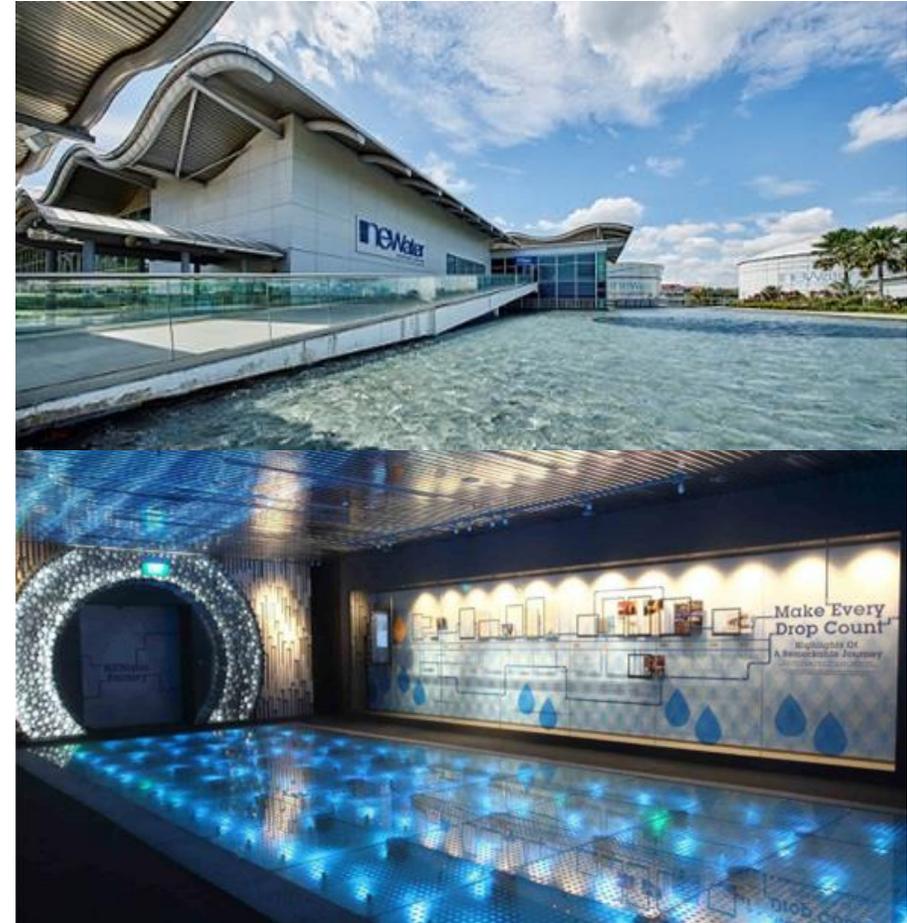


^ The [Zero Waste Singapore](#) is a non-profit organization established 2016 to help Singapore eliminate the concept of waste and accelerate towards a circular economy.

SINGAPORE'S WASTE AND WATER MANAGEMENT: SEVERE CHALLENGES AND AMBITIOUS INFRASTRUCTURE PROJECTS

Singapore government takes a regional lead on sustainable waste management.

- The government masterplan is to create S\$40M economic opportunity and 30,000 “high-value” jobs in local recycling industry by 2025.
- The long-term strategy for sustainable waste management has 3 core elements:
 - Minimizing the overall amount of waste through the three R's: [Reduce, Reuse and Recycle](#).
 - [Zero Waste Master Plan](#) (now until 2030) – reduce ash deposit with 30%; increase domestic recycling from 22-30%; increase industrial recycling from 74-81%.
 - Position Singapore as regional centre for waste management technology.
- The multi-billion dollar flagship projects [Integrated Waste Management Facility \(solid waste\)](#) and [Tuas Water Reclamation Plant](#) represents opportunities for state-of-the-art technology and solution providers.
- Developing and acquiring advanced water treatment technologies, Singapore is well on its way to obtain water self-sufficiency based on desalination and treatment of used water (called “[NEWater](#)”). Public investment of S\$670M to develop leading water technologies since 2006.



^ The NEWater showroom . Photo: Public Utilities Board

GENERAL WASTE MANAGEMENT: LINEAR TO CIRCULAR STRATEGIES

- Waste management is handled by [National Environment Agency](#) (NEA), which plans, develops and administers solid (general) and hazardous waste.
- **Packaging waste** constitutes over 30% of the solid waste (1.6M tons in 2018) and is today largely collected and incinerated.
 - NEA is planning to implement a bottle and can [Deposit Refund Scheme](#) by 2023, and are now consulting external experts (including TOMRA) for scheme design.
- “Foodie country” Singapore generates more than 750,000 tons of **food waste** per year, of which only 18% is recycled, the rest incinerated.
- Under the Resource Sustainability Act, large food waste generators (hawker centres, malls, restaurants, supermarkets etc.) will be required to **implement on-site food waste sorting and treatment** by 2024/25.
- **Problem statements*/opportunities** related to food waste management:
 - Solutions for source **segregation** (sorting) of food waste
 - Solutions to **track and measure** amount of organic/inorganic food waste
 - Space-effective **on-site waste treatment** systems; generating useful

Waste Type	Total Generated ('000 tonnes)	Total Recycled ('000 tonnes)	Recycling Rate	Total Disposed ('000 tonnes)
Construction& Demolition	1,440	1,434	99%	6
Ferrous Metal	1,278	1,270	99%	8
Paper/Cardboard	1,011	449	44%	561
Plastics	930	37	4%	893
Food	744	136	18%	607
Wood	438	289	66%	149
Horticultural	400	293	73%	107
Ash & Sludge	252	25	10%	226
Textile/Leather	168	6	4%	161
Used Slag	129	127	98%	3
Non-Ferrous Metal	126	124	99%	2
Glass	75	11	14%	64
Scrap Tyres	33	31	94%	2
Others (stones, ceramic, rubber, etc.)	210	15	7%	195
Overall	7,234	4,247	59%	2,984

^ [2019 Waste Statistics and Overall Recycling](#). Photo: NEA



INCINERATION AND ASH MANAGEMENT: SHORTAGE OF LAND

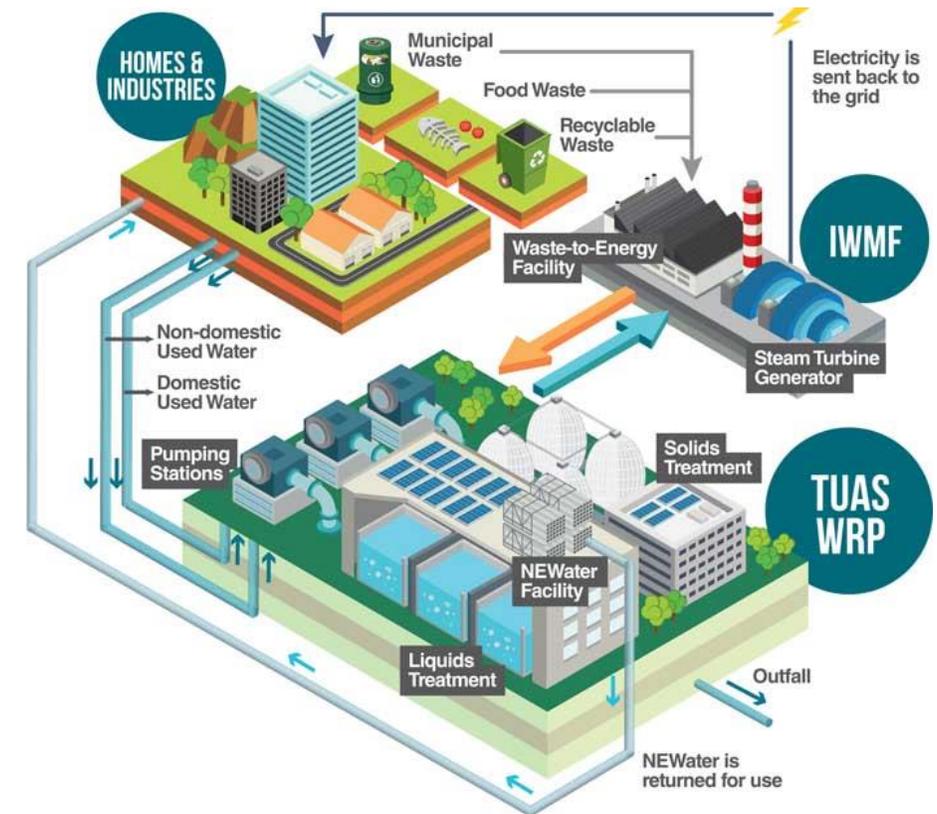
- 92% of waste in Singapore is incinerated through incineration plants and ash (top and bottom) is deposited at Semakau Island landfill. The incineration plants provide 3% of electricity generation.
- The 4 incineration plants in Singapore are operated by private companies on long-term contract for waste receipt and energy generation. Thus incineration is expected to be the dominant waste handling solution for the next 5-7 years, despite push for higher recycling.
- However, there are challenges and opportunities for improvements and new solutions on:
 - **Removal of heavy metals and dioxin** in the fly ash (top-ash)
 - **Utilization of ash** for e.g. building materials as alternative to deposit – so called NEWS and ideas.
 - **Material extraction** technologies pre-incineration
 - **New business models** and new prototypes development



^ Singapore's only landfill, the purpose-built trash island of Semakau, started operations in 1999, and is projected to be completely full by 2035. Photo: NEA

TUAS NEXUS: USD 9.5B FLAGSHIP WASTE AND SLUDGE MANAGEMENT FACILITIES

- The first phase of the [Integrated Waste Management Facility](#) (IWMF) will consist of a 2,900 ton/day Waste-to-Energy (WTE) facility; a 250 ton/day Materials Recovery Facility (MRF) handling solid waste from industry and household.
- Designed for 1,98 TWh electricity generation per year.
- For the second phase the [Tuas Water Reclamation Plant](#) (TWRP) will be integrated. This facility handles domestic and non-domestic sludge for so-called [NEWater](#) recovery (drinking water).
- The S\$1.5B EPC contract was awarded April 2020 to consortium of [Keppel Seghers](#); [ST Engineering](#) and China Harbour for the WTE and MRF. IWMF expected to be completed by 2024/2025.
- Although the main plant components are in place, developers may be interested in unique and state-of-the-art improvements within:
 - **Maximization of energy recovery** (component design, energy integration, utilization of biogas)
 - **Minimization of environmental impact** (air, land and water emissions)
 - **Efficiency on sludge handling**; reducing energy and space (Norwegian company Cambi has solutions for thermal hydrolysis sludge pre-treatment for both Jurong and Tuas plants)
 - **Integration and synergies** between solid and liquid waste treatment.



^ NEA's Integrated Waste Management Facility (IWMF) and PUB's Tuas Water Reclamation Plant (TWRP) will be co-located to maximize both energy and resource recovery in their respective solid waste and used water treatment processes. The co-located IWMF and TWRP will be the first of its kind that is being planned from ground up. It will enable NEA and PUB to reap the benefits of a water-energy-waste nexus. Photo: PUB

WATER SELF-SUFFICIENCY BY 2060 - THE 4 TAPS OF WATER IN SINGAPORE

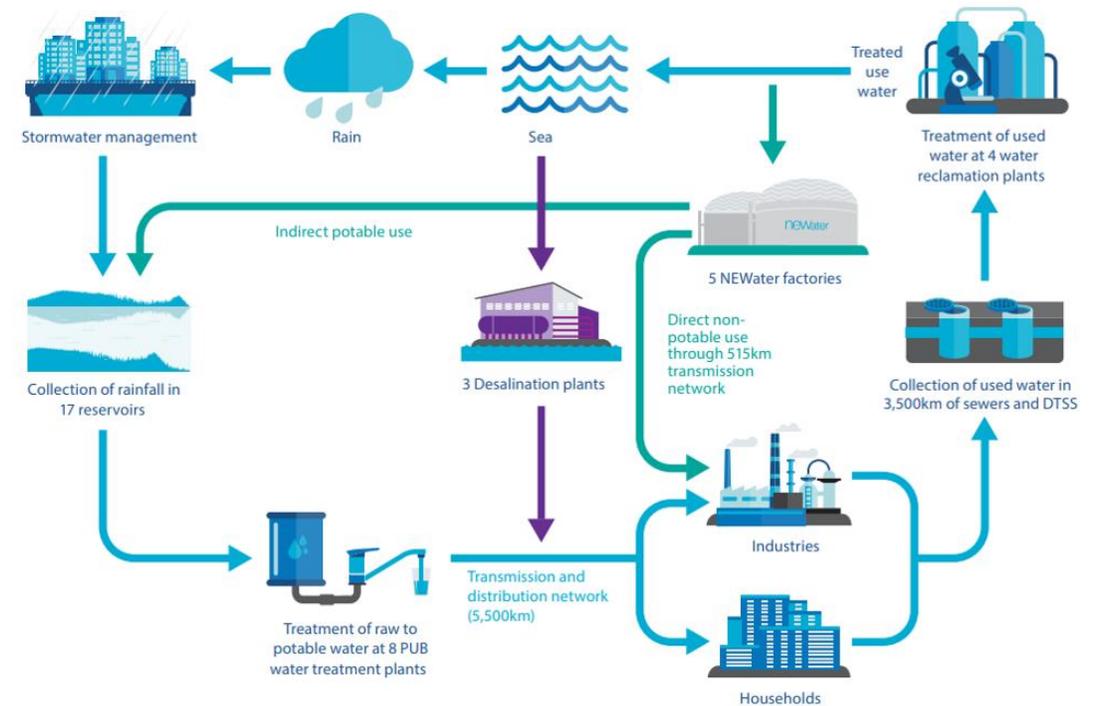
Water supply has always been a major problem and security risk for the small, flat and densely populated island of Singapore.

The government pledges to shift from dependency of imported water from Malaysia to self-sufficient by 2060 through 3 additional sources :

- Rainwater catchment - up to 20% of the water source
- Desalination
- So-called NEWater: reused and reclaimed water from household and industry.

In the context of this project, opportunities for Nordic solutions lies in the NEWater segment: technologies for cost- and energy-efficient water purification and treatment; especially related to water extraction and recycling from water treatment facilities.

Every drop counts - Singapore's water story: Our 4 national taps - <https://www.gov.sg/features/every-drop-counts>



^ Diagram of Singapore's integrated water management system. Photo: [PUB](#)

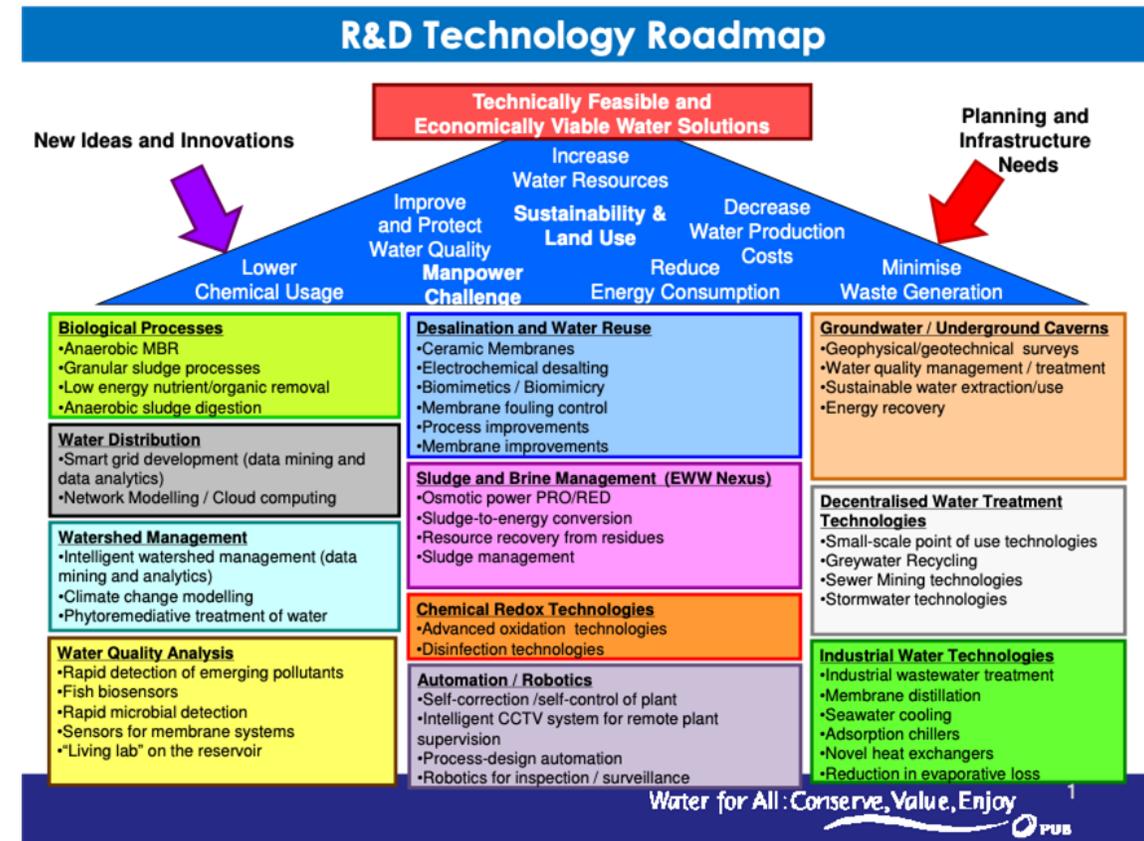
WATER MANAGEMENT: RELEVANT PROBLEM STATEMENT AREAS

The main problem statements related to water management in Singapore are being continuously addressed:

- Improved energy and resource efficiencies for existing and new water treatment plants
- New technologies – membranes, biological, chemical..
- System and plant integration
- From waste removal to Resource Recovery
- Space utilization
- “Smart Nation” – water and waste management in a smart and holistic societal context with energy, transport, living, recreation
- Establishing NEWater plants as test-bedding for new technologies.

Nordic companies may respond to some of these problem statements based on crossover technologies:

- Water purification – experiences from land and petroleum industry
- Membrane technology
- System integration, efficiency
- Resource recovery
- Floating plant solutions – Multi Purpose Floating Structures



^ R&D Technology Roadmap. Photo: [PUB](#)

THE SMART PUB ROADMAP

Transforming PUB into the Smart Utility of the Future



SMART DRAINAGE GRID

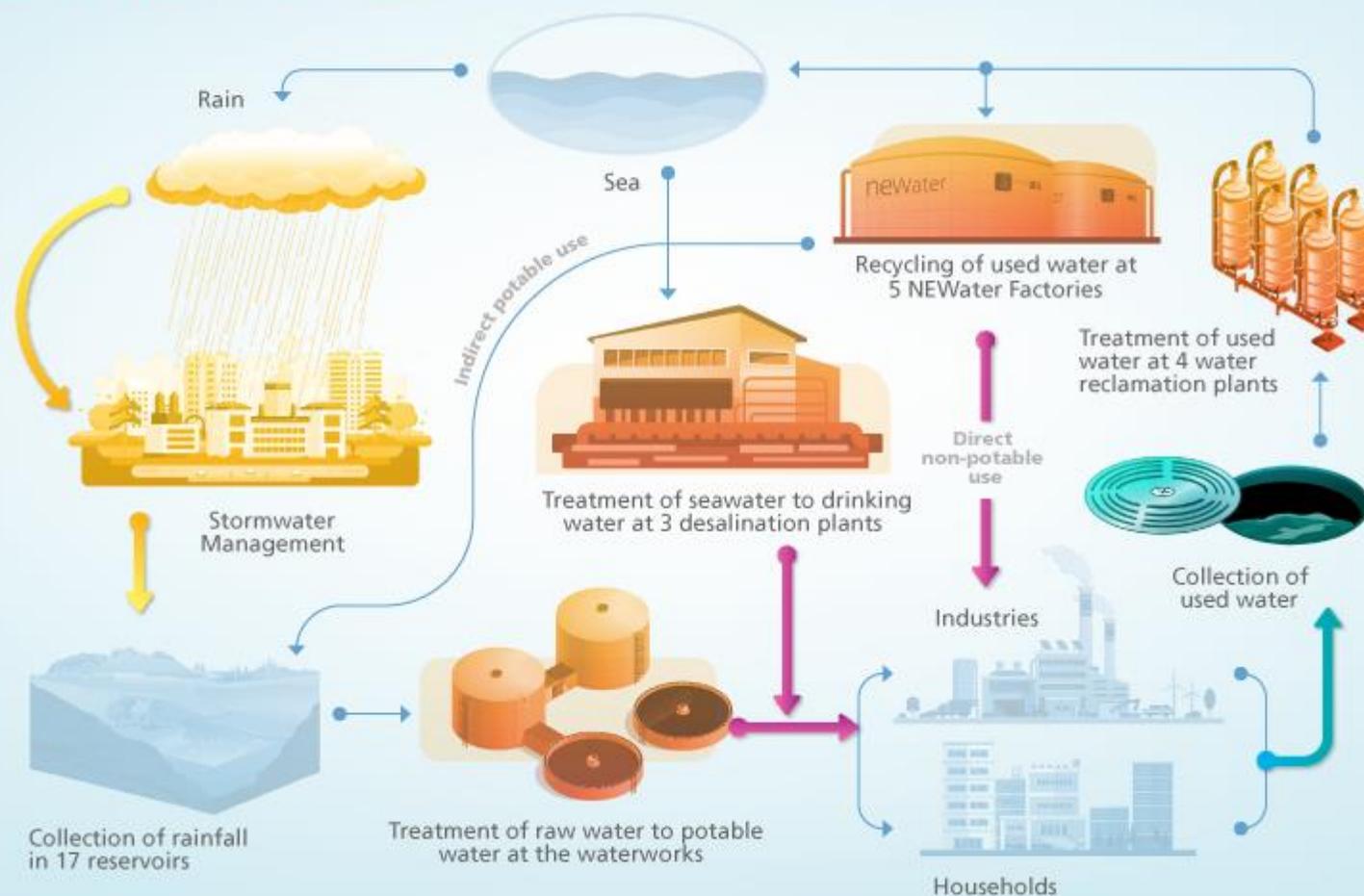
- Hydrometeorological and water quality monitoring
- Strategic planning and maintenance of infrastructure

SMART PLANTS

- Data-driven Decision Support with machine learning
- Autonomous systems to perform manual, high risk jobs
- Diagnostic troubleshooting

SMART WATER GRID

- Extensive monitoring of network pressure, flow and water quality
- Pre-emptive leak detection
- Predictive load dispatch: Using demand forecasting enabled by pervasive sensing and data analytics



DIGITAL OPERATIONS SUPPORT

- 360° situational awareness and system oversight with improved operations dashboards and mobile connectivity
- Reducing wastage and enhancing resilience with data analytics
- Enhancing productivity by automating manual workflows
- Encouraging collaboration and knowledge sharing through digital platforms

SMART SEWER GRID

- Pre-emptive asset repair and replacement
- Monitoring network and tunnel structural integrity
- Illegal discharge tracing and modelling

PUTTING IT ALL TOGETHER - THE FUTURE OF WATER-WASTE-FOOD INFRASTRUCTURE LANDSCAPE

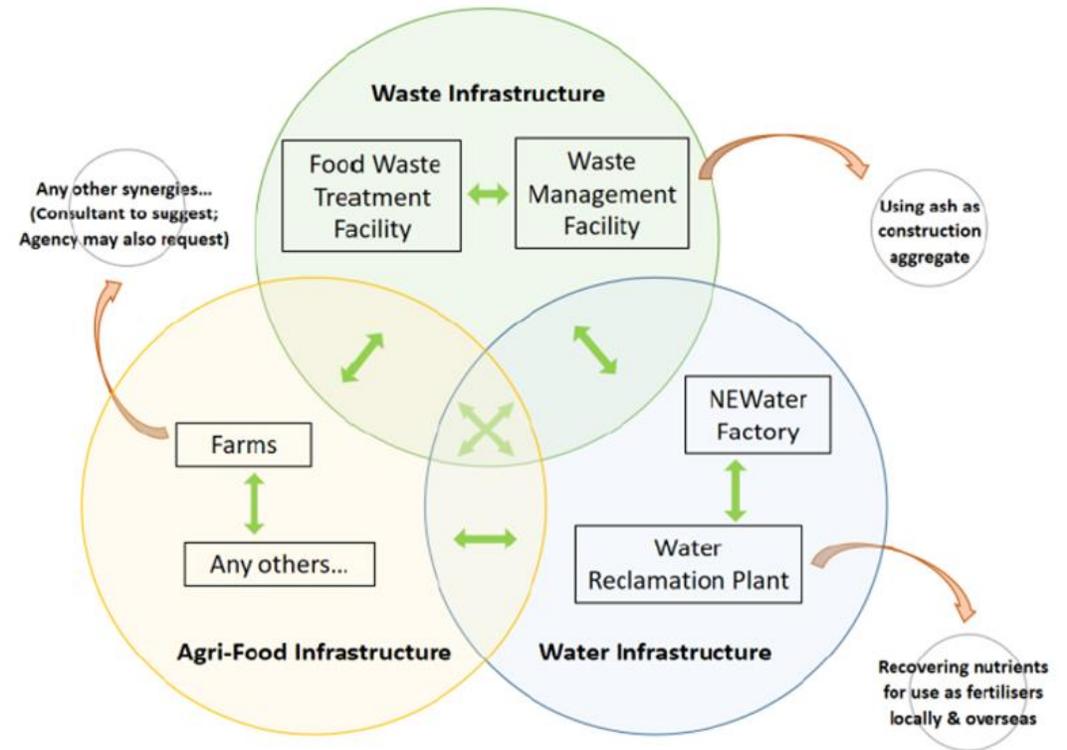
The Singapore government will make heavy investments over the next 2-3 years to harness synergies across the water, waste and food infrastructure landscape. Identifying technologies and solutions to become operational within the next 10 years.

The short-term (2-3 years) objectives include:

- Identify **additional synergies** from the [Tuas NEXUS](#).
- Identify and assess **applicable technologies** for water-waste-food infrastructure integration – cost effective and practical.

Solutions and technologies shall address the future integrated infrastructure landscape comprising:

- **Waste** management facilities: municipal solid waste; recyclables; source-segregated food waste and dewatered sludge
- **Water** reclamations plant (producing NEWater)
- **Farms**: aquaculture, plant/vegetable, poultry etc.
- **Ancillary facilities**: cooling, heating, power generation, carbon capture/utilization etc.



PUTTING IT ALL TOGETHER - THE FUTURE OF WATER-WASTE-FOOD INFRASTRUCTURE

LANDSCAPE

Examples of problem statements include:

- **Organic waste – recovery of nutrients**
 - Extract nutrients and trace substances from water reclamation
 - Produce fertilizers for national agriculture (hydroponic..), aquaculture and for export
- Optimize **Waste-to-energy** processes: sludge valorising; various forms of gasification; hydrothermal liquefaction/catalytic gasification..
- **CO2 utilization**: chemical binding (carbonates..)
 - landfill/building materials;
 - utilization in farming and aquaculture (algae/crop growth, biochar, fertilizers..)
- **Energy/exergy optimization**: adopting emerging trends and technologies for harnessing, reusing and storing residual heat and cold energy; energy carrier conversion (power-to-X etc)

The recent migration in policy from “linear” to more “circular” resource management in Singapore opens for new objectives and opportunities for Nordic solutions across the integrated water-waste-food infrastructure



Ministry of Sustainability
and the Environment

— S I N G A P O R E —



National
Environment
Agency

Safeguard · Nurture · Cherish



Singapore
Food
Agency

Safe Food For All



SINGAPORE'S
NATIONAL
WATER AGENCY

^ The MEWR Family: [Ministry of the Environment and Water Resources \(MEWR\)](#), [Public Utilities Board \(PUB\)](#): Water Management; [National Environment Agency \(NEA\)](#): Waste and [Singapore Food Agency \(SFA\)](#).



THE OPPORTUNITIES FOR NORDIC SOLUTIONS

Waste Management:

- Solutions for waste collection, measuring segregation, sorting and transport from household and eateries/shops. Especially relevant for **food waste** given NEA's [new regulations](#) starting 2021.
- Solutions related to the [Deposit Refund Scheme](#) for packaging to be implemented by 2022.
- Solutions for consumer awareness and engagement in reducing waste, sorting and reuse.
- Solutions for converting waste to value; such as [food waste to fertilizer](#) or fish feed.
- Technologies for improved energy, space and resource efficiency for the current and future waste treatment related to [Waste-to-Energy](#).

Water & Food Management:

- Technologies for enhanced energy/cost efficiency for water treatment and [water use reduction](#) across all sectors from households to industry.
- Water and resource management related to [local food production](#): agriculture and aquaculture, including RAS.



Gateway to Southeast Asia (SEA):

- With 12% of the world's population and among the fastest growing prosperity and urbanisation regions, SEA represents one of the most relevant markets for sustainable waste, water and food solutions.
- Most of the multinational companies operating in the SEA waste and water management industries in SEA have regional headquarter or offices in Singapore, offering effective gateways into SEA markets for relevant solutions.
- This program will aim to connect Nordic participants with regionally acting stakeholders in Singapore to address opportunities in selected SEA countries such as Vietnam.

An aerial photograph of a tropical coastline. The top half of the image shows a dense, lush green forest covering a hillside. The bottom half shows a white sandy beach curving along the shore, with waves breaking and creating white foam. The entire image has a semi-transparent blue overlay.

Problem Statements given by SG stakeholders

ADB VENTURES

PROBLEM STATEMENTS



[ADB Ventures](#) is The Asian Development Bank's (ADB) new facility to scale technology solutions for impact in Asia and the Pacific. ADB Ventures aspires to be a leading ImpactTech support platform with a robust portfolio of ImpactTech investments, partners across a thriving ImpactTech ecosystem, and meaningful accomplishments towards sustainable development goals.

Here are the problem statements from ADB Ventures under the Circular Economy theme:

- Coordinating circular value chains through data (platform/marketplace)
- Circular product design (recycled fiber, food waste to feedstock, bio-based plastics, etc.)
- Use, reuse, share, and repair (second-hand clothing/equipment marketplace and technologies, reusable packaging, etc.)
- Collection & reverse logistics
- Sorting & preprocessing (recycling of plastic/textile/battery/precious metal etc.)
- Traceability and other technology enablers for circularity
- Sustainable/closed-loop supply chains

ALBA SINGAPORE

PROBLEM STATEMENTS



A major generator of food waste in Singapore are Hawker Centres which are food centres which house a variety of stalls that offer local, Asian, or western dishes. This variety, coupled with the popularity of Hawker Centres, means that the food waste generated from Hawker Centre is heterogenous, voluminous, and often mixed with non-food waste. Singapore, however, does not have an effective food waste treatment solution, at scale, until the Integrated Waste Management Facility is operational in 2024.

1. Develop an effective system to segregate food waste from non-food waste (e.g plastic cups, cutlery, plates) from the waste generated from Hawker Centres for further treatment.
2. Design an effective system to treat and revalorise food waste from Hawker Centres and other sources of mixed food waste at scale.

Problem statements provided by [ALBA Singapore](#) - one of the leading recycling and environmental services companies as well as raw material providers worldwide, operates with its two brands – ALBA and Interseroh – within Germany, Europa and Asia.



SEMBCORP WATER INNOVATION NANJING PROGRAM (SWING) **PROBLEM STATEMENTS**



[Sembcorp](#) Water Innovation Nanjing (SWING) program focuses on collaboration with innovative water companies to build technology capabilities through the stages of pilot projects, technology localization and commercialization in targeted markets. These technologies are inclusive of but not limited to advanced oxidation processes, biological treatment, chemical treatment, water reuse, energy reduction, process control technologies and sludge management. [Download the full PDF here.](#)

1. Treatment of recalcitrant organics in industrial wastewater

Sembcorp is seeking cost efficient treatment processes for the removal of recalcitrant organics. Targeted wastewater industries for its technology application would include petrochemicals, pharmaceuticals, chemicals and textiles.

2. Treatment of wastewater with high ammonia or nitrogen content

Sembcorp is seeking cost efficient technologies suitable for the removal of N in wastewater with high concentration of ammonia but low in carbon content. Targeted wastewater industries for its technology application would include pharmaceuticals, petrochemicals, leachate and coal-to-chemical production.

3. Treatment of high salinity wastewater

Sembcorp is seeking cost efficient technologies for treatment high salinity wastewater. Targeted wastewater industries for its technology application would include chemicals, pharmaceuticals and textiles.

4. Zero liquid discharge (ZLD)

Sembcorp is seeking reliable and low cost Zero-Liquid-Discharge and salt recovery technologies. Targeted wastewater industries for its technology application would include coal-to-chemical, petrochemicals and textiles.

SEMBCORP WATER INNOVATION NANJING PROGRAM (SWING) **PROBLEM STATEMENTS**



5. Sludge management

Sembcorp is seeking innovative solutions that are able to reduce sludge generation and/or manage sludge efficiently in a bid to reduce to operational costs of wastewater treatment. These solutions may fall in 3 categories:

- i. Reduction of amount of sludge generated in physical, chemical, and biological process of wastewater treatment
- ii. Reduction of the water content in sludge that is slated for disposal
- iii. Re-purposing of sludge for reuse and/or recovery

6. Treatment of oily wastewater

Sembcorp is seeking cost-effective technologies for treatment of FOG and can achieve reduction of oil waste produced (in a form of sludge). Targeted wastewater industries for its technology application would include F&B and petrochemicals.

7. Digitization

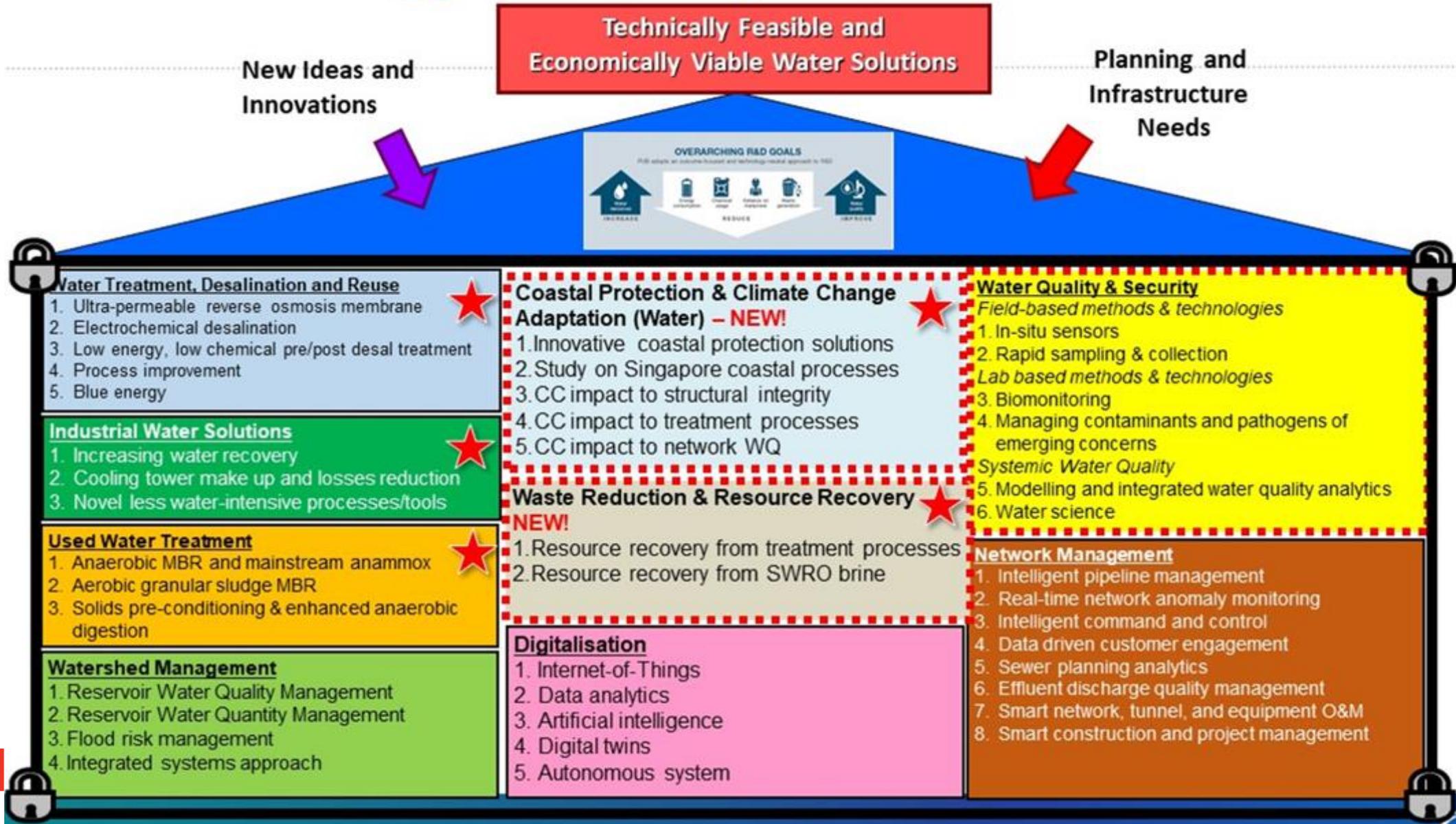
Sembcorp is seeking new technologies that are able to convert analog signals/ flow meters that do not have digital signal into digital data.

8. Process control & optimization

With more than two decades of operation of centralized industrial wastewater plants, Sembcorp has identified various identified areas for process optimization and is seeking new innovative technologies to address these challenges. These areas may cover, but not limited to:

1. Process optimization for anaerobic and aerobic biological systems
 - o Aeration control | o Cultivation of microbes with enhanced efficiencies or higher tolerance to inhibitory compounds
2. Membrane control systems to optimize chemical cleaning and higher permeate output
3. Chemical dosing control systems | 4. Advanced sensors and transmission methods

WATER MANAGEMENT PROBLEM STATEMENTS AREAS



Water Treatment, Desalination and Reuse

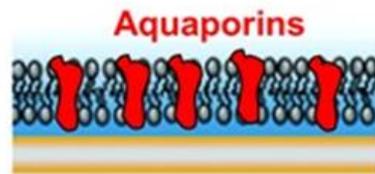
Target: Achieving $\sim 1\text{kWh/m}^3$ for desalination at system level

Current: 3.5 kWh/m^3



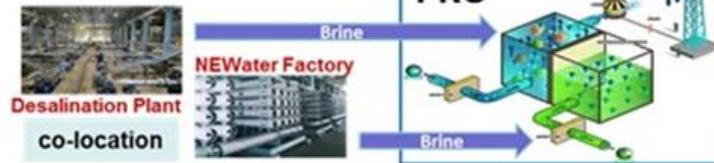
SWRO

Short-Term: 2.0 kWh/m^3



Aquaporins

- ✓ Low energy pre/post treatment
- ✓ Ultra-permeable membranes
- ✓ Blue Energy: Pressure-Retarded Osmosis (PRO)



Long-Term: $\sim 1.0\text{ kWh/m}^3$

- ✓ New Process & Design Improvement

Water Treatment, Desalination and Reuse

Target: Achieving $<0.2\text{kWh/m}^3$ for NEWater at 90% recovery

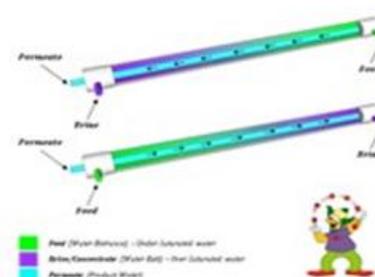
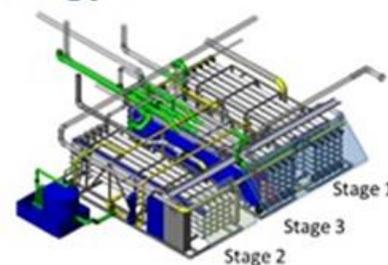
Current : 75% Recovery, 0.4 kWh/m^3

Two stage BWRO



Short-Term: 90% Recovery, 0.4 kWh/m^3

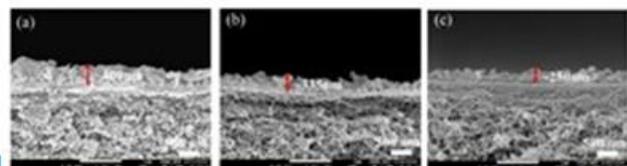
✓ ROTEC Flow Reversal Technology



Long-Term: 90% Recovery, 0.2 kWh/m^3

- ✓ Ultra-permeable membranes
 - Bio-programmable membranes
 - POSS membrane

0% POSS 0.1% POSS 0.1% POSS pH control



Waste Reduction & Resource Recovery **NEW**

Target by 2025: To reduce the amount of dewatered sludge sent to incineration to **0.11 kg dry solids/m³ used water**

- Long-term Goal: **0.08 kg dry solids/m³ used water** by 2060

- Goal: *“Towards a Zero Waste Nation”*
- Tech to be piloted and test-bedded by 2025 include:

Resource Recovery from Treatment Processes

- Slagging gasification of sludge/sludge ash at Waste-to-Energy Research Facility
- Pyrolysis to biochar/useful materials
- Phosphorus recovery
- Hydrothermal process
- Feasibility study of reusing waterworks sludge
- Waste-to-biopolymer
- Carbon capture, utilisation and storage

Resource Recovery from SWRO Brine

- Recovery of minerals/metals from SWRO brine



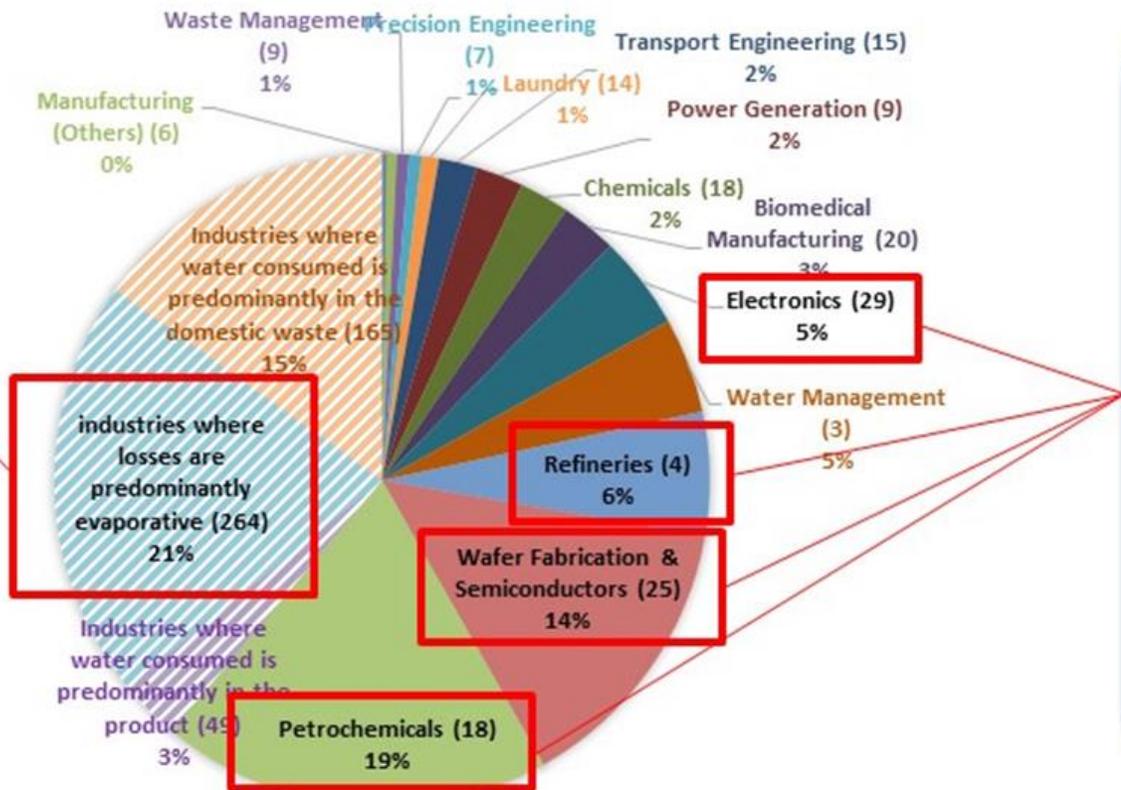
Industrial Water Solutions

Target by 2025: To reduce industrial water consumption cumulatively (2015-2025) by **30 MGD**
Long-term Goal: A cumulated **100 MGD** reduction by 2060

Tech to be developed by 2025:

1) Reduce Cooling Tower Make-Up & Losses

- High COC technology
- Alternative cooling technologies



2) Increase Water Recovery

- High RO recovery technologies
- Recalcitrant COD removal tech
- Zero Liquid Discharge

3) Novel Less Water-Intensive Processes / Tools

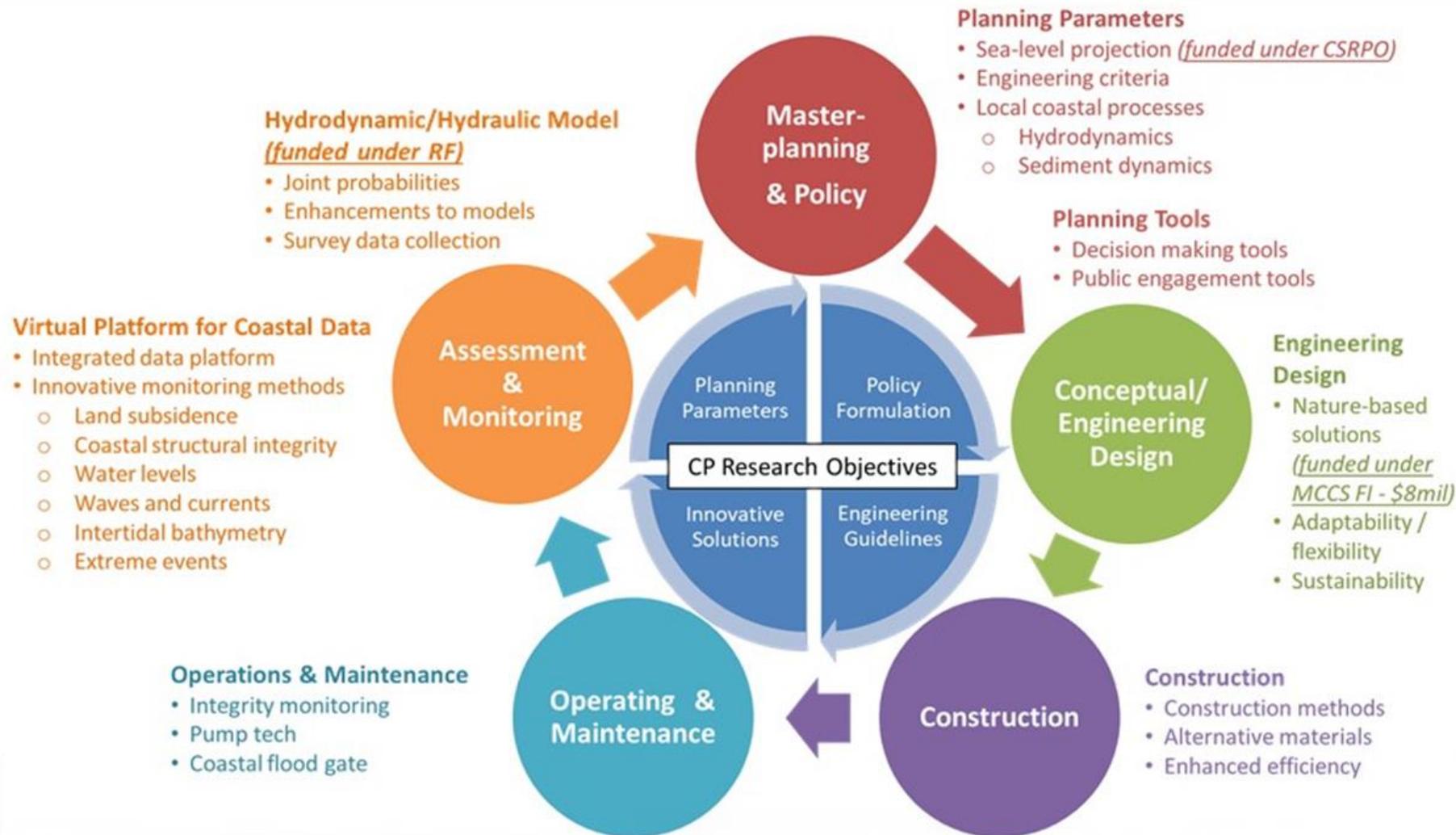


Coastal Protection **NEW**

Viewing 2 STDC_combin...

Target by 2025: Laying the foundation for implementing coastal protection works around Singapore's coastline to adapt to sea level rise

Long-term Goal: 100% coastline protected by 2050



WATER MANAGEMENT PROBLEM STATEMENTS AREAS

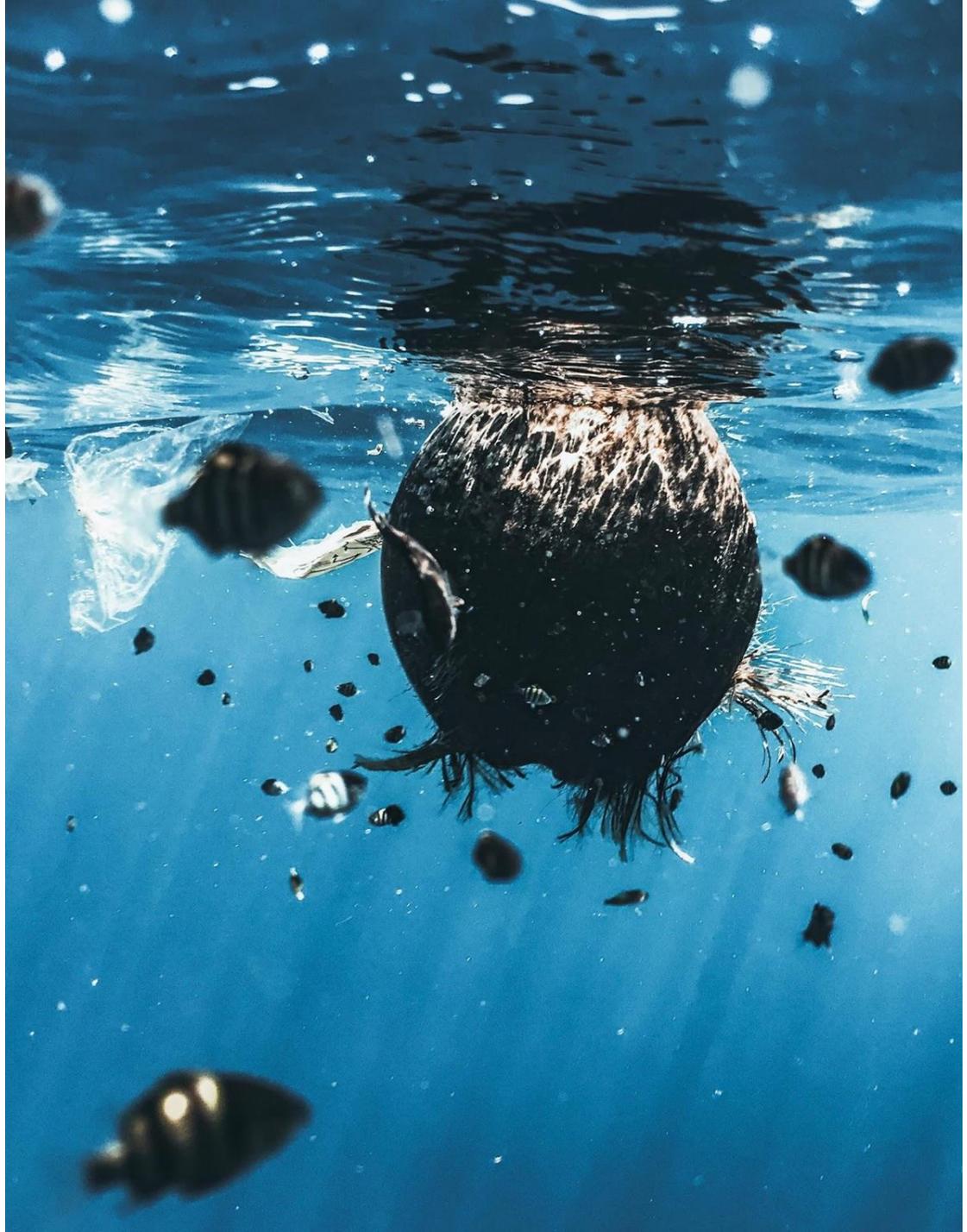
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- New technologies – membranes, biological and chemical..
- System and plant integration
- From waste removal to Resource Recovery
- Space utilization
- “Smart Nation” – water and waste management in a smart and holistic societal context with energy, transport, living, recreation
- Establishing NEWater plants as test-bedding for new technologies.

Also, Nordic companies may respond to some of these problem statements based on **cross-over technologies in water management:**

- Water purification – experiences from land and petroleum industry
- Membrane technology
- System integration, efficiency
- Resource recovery
- Floating plant solutions – Multi Purpose Floating Structures

**We might include new problem statement areas later on*



WASTE MANAGEMENT PROBLEM STATEMENTS AREAS

Waste and sludge management facilities related opportunities for companies with relevant solutions within:

- Maximization of energy recovery (component design, energy integration, utilization of biogas)
- Minimization of environmental impact (air, land and water emissions)
- Efficiency on sludge handling; reducing energy and space (Cambi is offering their pyrolysis solution for example)
- Integration and synergies between solid and liquid waste treatment.

Incineration and ash management related challenges and opportunities for improvements and new solutions on:

- Removal of heavy metals and dioxin in the fly ash (top-ash)
- Utilization of ash for e.g. building materials as alternative to deposit – so-called NEWS and ideas.
- Material extraction technologies pre-incineration
- New business models and new prototypes development

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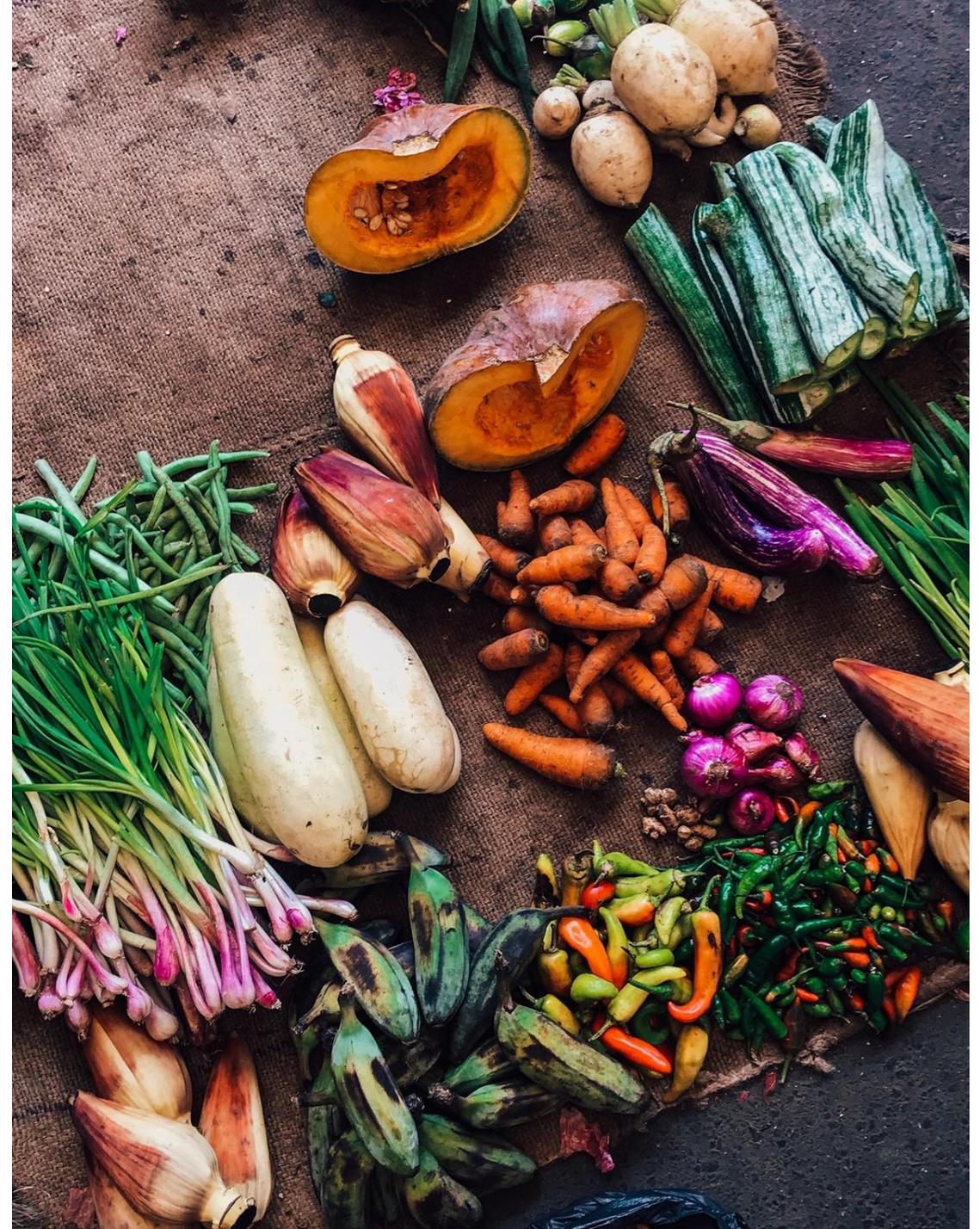


FOOD WASTE MANAGEMENT PROBLEM STATEMENTS AREAS

Problem statements /opportunities related to **food waste management**:

- Solutions for source segregation (sorting) of food waste and transfer to an on-site treatment facility
- Recycle food waste cost efficiently within existing facilities to support circularity concept
- Reduce food waste disposals in food malls
- Solutions to track and measure amount of organic/inorganic food waste
- Space-effective on-site waste treatment systems; generating useful outputs
- Aiming for zero fruit loss

*We might include new problem statement areas later on





Innovation Challenges

CIRCULAR ECONOMY RELATED INNOVATION CHALLENGES IN SINGAPORE: PUB GLOBAL INNOVATION CHALLENGE

Application Deadline: August 10, 2021

Challenge Website:

<https://www.pub.gov.sg/innovationchallenge>

PUB is launching the 2021 GIC with four challenge statements:

- a) The real-time identification of prohibited organic compounds in sewers,
- b) Mapping of underground utilities,
- c) Cost-effective rainfall monitoring,
- d) Innovative solutions for coastal protection measures.

Shortlisted proposals will receive pilot funding of up to S\$250,000 each, mentorship from PUB's in-house experts, access to real-world testbeds in PUB facilities and the opportunity to commercialise these solutions. GIC 2021 is open to all companies, innovators and researchers across the globe from 29 Jun to 10 Aug 2021.



PUB Global Innovation Challenge

PUB, Singapore's National Water Agency, is in constant pursuit of great ideas to transform into a Smart Utility of the Future. PUB Global Innovation Challenge seeks to accelerate our discovery and adoption of digital solutions and smart technologies to improve operational excellence and meet future water needs.

PUB invites companies, researchers, and innovators from all around the world to propose solutions to our challenges. Selected applicants of the PUB Global Innovation Challenge will be given the opportunity to validate their ideas and find the product-market fit in the water industry.

CIRCULAR ECONOMY RELATED INNOVATION CHALLENGES IN SINGAPORE: ALLIANCE TO END PLASTIC WASTE – REQUEST FOR PROPOSALS

Alliance to End Plastic Waste are looking for impactful and scalable solutions that generate value and move us up the waste hierarchy, helping us to achieve a future free of plastic waste—from the collection and containment of waste, to packaging designs that increase opportunities for circularity, to community action and educational programmes.

Requests for proposals: <https://endplasticwaste.org/Request-for-Proposal>

- Reclaiming the Value from Plastic Waste, deadline July 31: projects that revolve around mechanical processes to capture economic value from the plastic waste. This in turn will support the investment in and operation of necessary waste management infrastructure.



CIRCULAR ECONOMY RELATED INNOVATION CHALLENGES IN SINGAPORE: National Environment Agency

[NEA | Grants and Awards](#)



To Reduce Food Waste Disposal from Commercial Premises and Enhance Recycling

Kwok Wai Choong
Deputy Director (Industry Development & Promotion Division)
National Environment Agency

Organised by: IPI
Key Partner: Enterprise Singapore
Network Partner: enterprise singapore network
As Part of: SWITCH

Challenges faced

Resource Sustainability Act

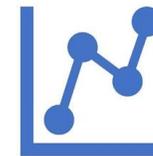


Mandatory food waste segregation for treatment from 2024/2025

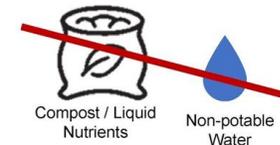
High Contamination of Food Waste



Lack of food data to track tenants' food waste segregation efforts



Outputs from existing on-site food waste treatment systems are not fully utilised by premises



CIRCULAR ECONOMY RELATED INNOVATION CHALLENGES IN SINGAPORE: SUSTAINABILITY OPEN INNOVATION CHALLENGE

Application Deadline: 19th February 2021 12:00 PM (GMT +8)

Challenge Website: [Enterprise Track](#) / [Industry Track](#)

This call leverages Singapore's commitment to develop new technologies/solutions for key sustainability areas such as Waste Reduction, Green Transport, Green Packaging, Renewable Energy and Resource Efficiency in two tracks.

Enterprise Track:

- Aiming for zero fruit loss
- Move towards zero fossil-based plastic packaging

Industry Track:

- Helping F&B operators improve food waste segregation and transfer to an on-site treatment facility
- Recycle food waste cost effectively within existing facilities
- Reduce food waste disposal in food malls



CIRCULAR ECONOMY RELATED INNOVATION CHALLENGES IN SINGAPORE: **THE LIVEABILITY CHALLENGE**

Challenge Website: <https://www.theliveabilitychallenge.org/>

The Liveability Challenge (TLC) is a global platform that hunts for and accelerates the launch of innovative solutions to urban challenges of the 21st century in cities in the tropics. Offering Asia's biggest prize for sustainability solutions, and the only platform seeking ideas for cities in the world's tropical belt, TLC is a key highlight in Singapore's calendar of sustainability events.

TLC is accepting proposals with the most disruptive, game-changing ideas that will help cities **accelerate decarbonisation** and **address its resource challenges**. Finalists will pitch their solutions to some of Asia's most sought-after investors at TLC Grand Finale (June or July) for the chance to secure up to S\$1 million in grant funding, and other exclusive opportunities.



Think you have a million-dollar idea?

NOW ACCEPTING SOLUTIONS TILL 15 APRIL 2021!



USEFUL LINKS

Ministry of Sustainability and the Environment - <https://www.mse.gov.sg/>

National Environment Agency (NEA) - <https://www.nea.gov.sg/>

Waste Management: <https://www.nea.gov.sg/our-services/waste-management>

Food Waste: www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/food-waste-management

PUB, Singapore's National Water Agency - <https://www.pub.gov.sg/>

20 - 24 June 2021 Singapore International Water Week - <https://www.siww.com.sg/>

20 - 24 June 2021 World Cities Summit: Liveable and Sustainable Cities: Adapting to a Disrupted World - <https://www.worldcityssummit.com.sg/>

20 - 24 June 2021 CleanEnviro Summit Singapore (CESG) - <https://www.cleanenvirosummit.gov.sg/>

IPI Tech Expert White Paper on Sustainable Industrial Wastewater Management - <https://bit.ly/download-tech-expert-wasterwater-whitepaper>

Every drop counts - Singapore's water story: Our 4 national taps - <https://www.gov.sg/features/every-drop-counts>

Capitaland 2030 Sustainability Master Plan <https://www.capitaland.com/content/dam/capitaland-sites/international/about-capitaland/sustainability/xchallenge/doc/CapitaLand%202030%20Sustainability%20Master%20Plan.pdf>

Singapore's Towards Zero Waste Masterplan - <https://www.towardszerowaste.gov.sg/zero-waste-masterplan/>

2020 Guide to Singapore Government Funding and Incentives for the Environment

<http://www.greenfuture.sg/2020/02/16/2020-guide-to-singapore-government-funding-and-incentives-for-the-environment/>

USEFUL LINKS

PUB, NEA find a way to convert sludge and food waste into energy <https://www.straitstimes.com/singapore/pub-nea-find-a-way-to-convert-sludge-and-food-waste-into-energy>

Leadership in sustainability: Where does Singapore stand?
<https://www.eco-business.com/opinion/leadership-in-sustainability-where-does-singapore-stand/>

Turning trash into treasure: NEA to reuse landfill material
<https://www.straitstimes.com/singapore/turning-trash-into-treasure-nea-to-reuse-landfill-material>

How to make a nation of food lovers value food
<https://www.straitstimes.com/opinion/how-to-make-a-nation-of-food-lovers-value-food>

Beyond the 3 Rs: How can Singapore move forward on sustainability?
<https://www.businesstimes.com.sg/brunch/beyond-the-3-rs-how-can-singapore-move-forward-on-sustainability>

'It is not easy, but it can be done' - The challenges of raising Singapore's recycling rate
<https://www.channelnewsasia.com/news/singapore/in-focus-singapore-recycling-sustainability-blue-bins-waste-12972634>

Turning Singapore's trash to treasure <https://www.straitstimes.com/singapore/turning-trash-to-treasure-0>

Food too good to waste <https://www.straitstimes.com/singapore/food-too-good-to-waste>

Work begins on Singapore's first integrated water and solid waste treatment plant in Tuas
<https://www.straitstimes.com/singapore/environment/work-begins-on-singapores-first-integrated-water-and-solid-waste-treatment>



USEFUL LINKS

Singapore is building a 42,000-home eco 'smart' city

<https://edition.cnn.com/style/article/singapore-tengah-eco-town/index.html>

Singapore to launch multi-ministry Green Plan to tackle climate change challenges

<https://www.channelnewsasia.com/news/singapore/singapore-green-plan-climate-change-sustainability-goals-14088522>

CDL pledges to reach net zero carbon emissions by 2030

<https://www.straitstimes.com/business/companies-markets/cdl-pledges-to-reach-net-zero-carbon-emissions-by-2030>

Singapore's first large-scale desalination plant capable of treating both seawater and freshwater opens

<https://www.channelnewsasia.com/news/singapore/keppel-marina-east-desalination-plant-pub-freshwater-seawater-14111868>

Singapore unveils Green Plan 2030, outlines green targets for next 10 years

<https://www.channelnewsasia.com/news/singapore/singapore-green-plan-2030-targets-10-years-14161356>

Dole Asia launches US\$2M fund to support startups in sustainability, food access and waste

<https://e27.co/dole-asia-launches-us2m-fund-to-support-startups-in-sustainability-food-access-and-waste-20210219>