Opportunities for Wastewater and Resource Recovery in the Philippines, Viet Nam, and Indonesia

Presented by:

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On behalf of:

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Wastewater & Resource Recovery Initiative
PEMSEA – ARCOWA co-operation

Partnership: PEMSEA and ARCOWA (supported by GEF and UNDP)

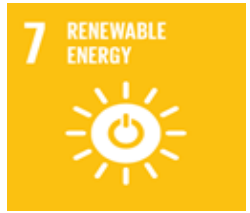
Geography: East Asia – 3 countries (The Philippines, Vietnam & Indonesia)

Focus: accelerate the uptake of and investment in advanced wastewater treatment and resources recovery (urban and industrial) to create a positive impact on the environment

Wastewater and resources recovery cover 7 of the 17 Sustainable Development Goals - importance

Contributes to the entire SDG 6 and in particular 6.3 reducing pollution and halving the proportion of untreated wastewater an increasing recycling, and 6.4 Water use & Water Scarcity

Contributes to SDG 3.9 reducing the exposure to hazardous chemicals in water



Contributes to 7.2 to increase in share of renewable energy and 7.3 improvement in energy efficiency

Contributes to 9.1 to develop sustainable and resilient infrastructure and 9.4 to upgrade infrastructure to make them sustainable and efficient

Contributes to 11.6 reducing environmental impact of cities, especially through addressing municipal waste management

Contributes to 13.a fulfilling commitmenTs made under the UNFCCC and Paris agreement by reducing carbon emissions related to (untreated) wastewater

Contributes to 14.1 reduce marine pollution from land-based activities, incl. nutrient pollution

Note: SDG 6.3 By 2030, improve water quality by **reducing pollution**, eliminating dumping and minimizing release of hazardous chemicals and materials, **halving the proportion of untreated wastewater** and substantially increasing recycling and safe **reuse** globally

THIS REQUIRES: Adding NEW wastewater treatment infrastructure for 500,000 people per day every day until 2030

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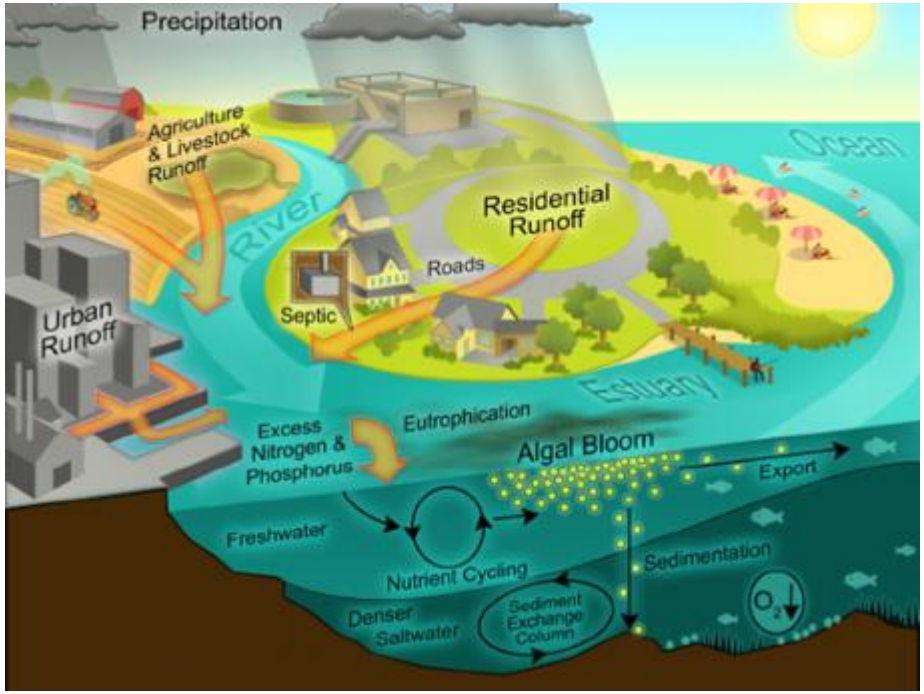
The Challenge
Waste Water pollution of water ways, coasts and oceans



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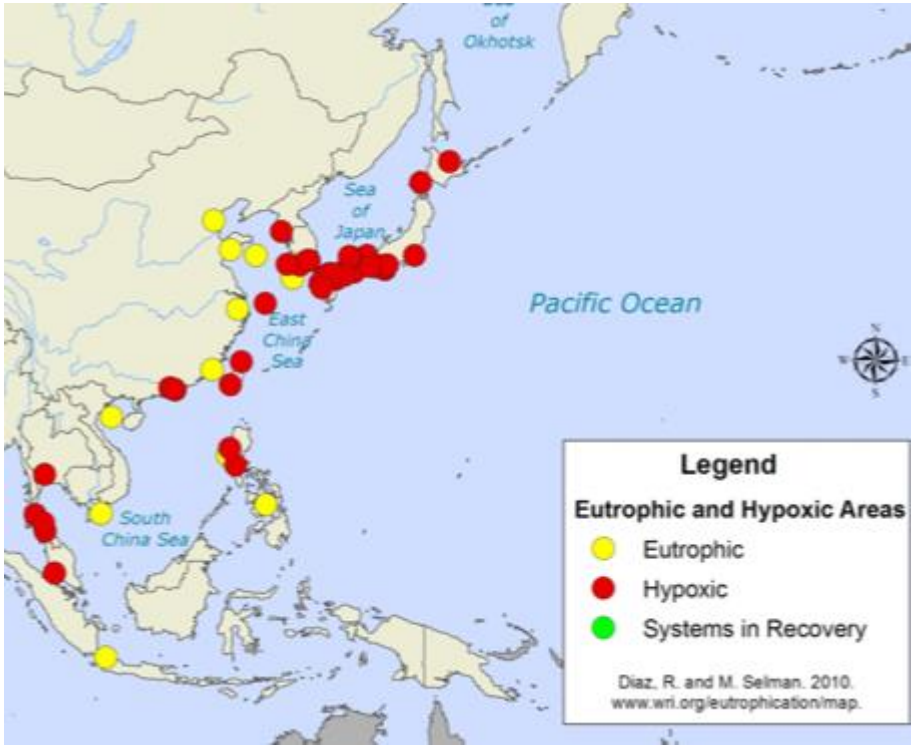
The Challenge: eutrophication & algal blooms - East Asia
Human health, socio-economic and environmental impact



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The Challenge
Waste Water: a source of GHG emissions

Untreated and inadequate treated wastewater is leading to significant GHG emissions (CH4, NOx) (ca. 3% of global emissions). Wastewater treatment cost are ca. 40 – 80% (fossil fuel – based) energy costs

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The Opportunity:
Turning Waste Water Facilities into Resource Factories

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From Waste Water Facility to Resource Recovery Factory
Drivers and Opportunities – Summary Overview

Water Re-use

Water re-use :
Drivers of change:
- Water scarcity demands new water sources
- Regulation prohibits potable water re-use

New - Water production:
Opportunities:
- New technologies produce high quality water
- Cost effective technologies
- Growing public acceptance

Energy Production

Energy in-efficiency: 10-50%
Drivers of change:
- Old pumps, aeration (i.e. wear from use, age)
- Changed conditions (i.e. need for different treatment)
- High energy costs

Energy production
Opportunities:
- New technology to produce bio-energy from wastewater
- Addition of organic waste to improve energy production
- Energy efficiency in treatment
- Towards energy positive plants

Nutrients, Fertilizers & Materials

Nutrients
Drivers of Change:
- Stringent water quality norms require additional treatment
- Wastewater sludge disposal too expensive

Fertilizer production
Opportunities
- New technologies available to create struvite
- Demand for grassland slow release fertilizer
- Additional source of income

Reductions in energy use and cost savings of 50 – 80% can be achieved in many wastewater systems

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Wastewater to resource recovery: Overall process used to identify initial investment case(s)

Goal

Improved water quality in coastal areas for sustainable development

Final Outcome

Mobilize investments in advanced waste water treatment and resource recovery that generate public and private benefits and returns

Results current phase:

Sound country assessments
Scoping of initial investment cases

1. Country level diagnostics for selected countries

- *Waste water and Resource Recovery as Opportunity*

2. Project long-list scoping in selected countries

- *Initial potential and focus*

3. Project Level Opportunity

- *pre-feasibility studies*

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Current Status and Opportunities:
Vietnam, Indonesia, The Philippines background

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Philippines: Del Monte Philippines, Inc. (Cagayan de Oro)
Food processing - wastewater & bio-energy

- **Company:** Del Monte DMPI
- **Type of contract**: BT
- **Capacity**: 16,000 m3/day (16 MLD)
- **Technologies**: Anaerobic digestion in four (UASB type) methane reactors, SULFURIXTM, BIOSULFURIXTM process for sulphur removal, followed by GASODRIXTM biogas drying – CHP – gas turbines
- **Operations**: 1 year operation contract after construction's completion
- **Finance:** Return on investment is projected : 2-5 years.

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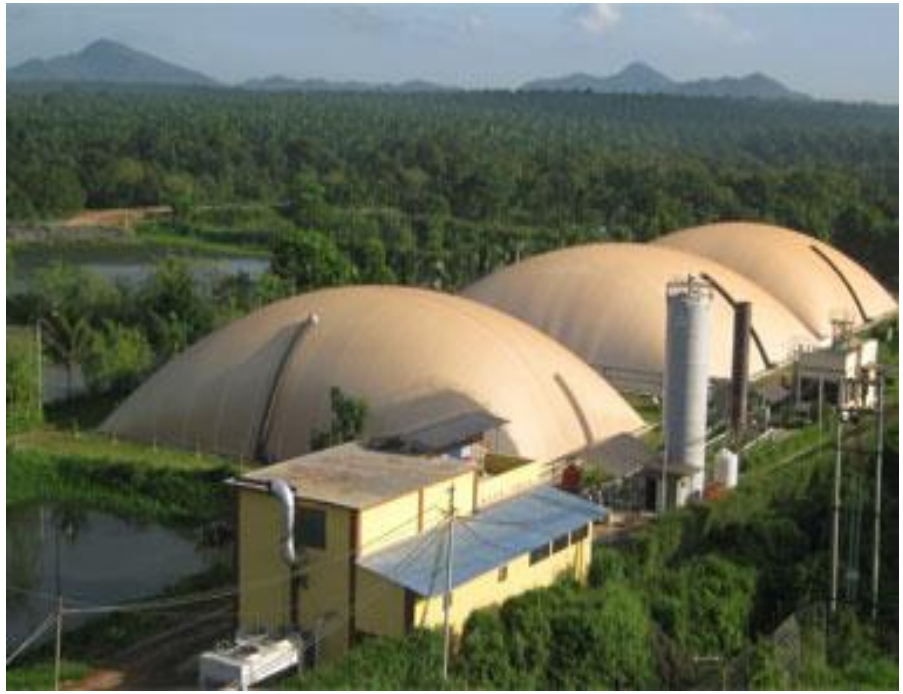
Vietnam: Phu My Hung (HCMC)
Water re-use in urban development

- **City: Ho Chi Minh City**
- **Developer:** Phu My Hung
- **Year of delivery**: 2007 - 2009
- **Capacity**: 10,000 & 15,000 m3/day
- **Technologies**: water re-use / sludge for landscaping
- **Finance:** CAPEX USD 5.8 million

Indonesia: PT Autsindo Nusantara Jaya (Belitung)
Wastewater - POME & Bio-energy



- **Client:** PT Austindo Aufwind New Energy (AANE)
- **Type of contract**:
- **Capacity**: 0 – 900 m^3 / day
- **Energy generated:** 1.2 MW (2012) - 1.8 MW (2016).
- **Technologies**: Anaerobic digestion - CHP
- **Finance:** USD 750,000 loan (LIBOR+2.75percent - 3 years)

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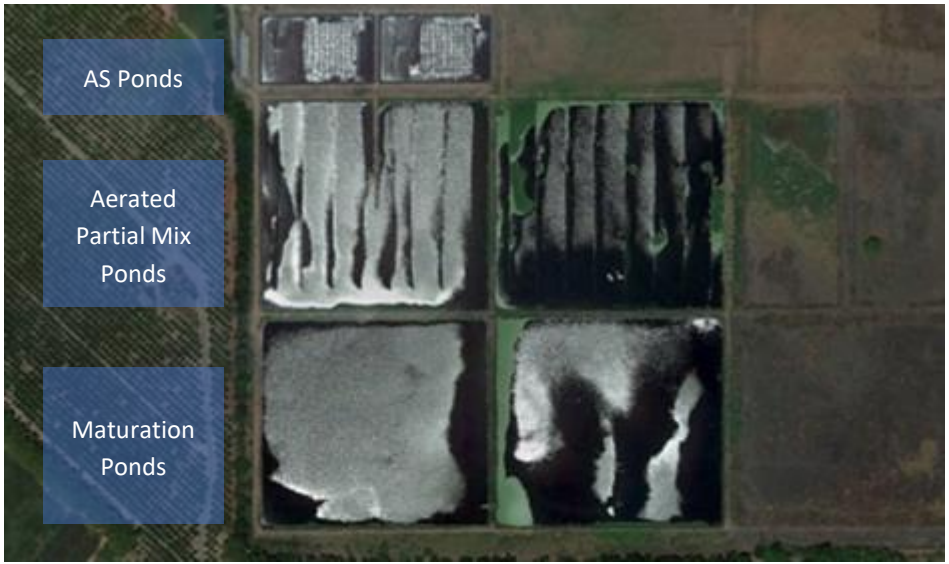
Initial investment case
Industrial Zone (Philippines): Current wastewater treatment



Area: 12 hectares
Design Capacity: 27 MLD

WWTF ponds	No. of tanks	Dimensions per tank			Total Volume m^3	Total Surface Area m^2	Computed Hydraulic Retention Time (HRT) day
		Length m	Width m	Depth, m			
Activated Sludge Ponds	2	85	46.5	3.5	3,945.5	7,905	1
Aerated Partial Mixed Ponds	2	180	147.5	2	106,200	53,100	4
Maturation Ponds	2	180	155	1.5	83,700	55,800	3

Main drivers for upgrade:

- Non-compliant with new wastewater effluent norm
- Potential for water re-use
- Expansion of activities

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Initial investment case
CAPEX - OPEX

WWTF Enhancement Options	CAPEX (PHP Million)	OPEX (PHP Million / Year)
Retrofitting Options		
Option 1: A^2O Process	71	91.2
Option 2: Bardenpho Process	78.5	137.7
Option 3: Chemical Phosphorus Removal	68	64.4
New Systems Options		
Option 4: Membrane Biological Rector (MBR)	1,012	67.7
Option 5: Sequence Batch Reactor (SBR)	681	55.5

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Initial investment case
Preliminary Financial Analysis

WWTF Enhancement Options	Return on Investment (ROI)	Payback Period Year	Net Present Value (NPV) PHP	Internal Rate of Return (IRR)
Retrofitting Options				
Option 1: A^2O Process	4.04	4.01	130,838,010	31 %
Option 2: Bardenpho Process	-2.41	> 10	-227,492,881	-
Option 3: Chemical Phosphorous Removal	8.15	1.54	333,017,824	71 %
New Systems Options				
Option 4: Membrane Biological Rector (MBR)	-0.65	> 10	-1,619,431,631	-
Option 5: Sequence Batch Reactor (SBR)	-0.13	> 10	-832,109,461	-

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CONCLUSIONS
Waste Water & Resources Recovery as Opportunity

Conclusions:

- Technology available and ready to be applied
- Costs vs. returns need careful analysis
- Requires top management willingness to incorporate new technologies

Next steps:

- Focused efforts on specific industries / larger urban areas
- Investment in (pre-) feasibility studies & portfolio development required
- Private sector involvement needs: tariff reviews, new PPP models, new financing vehicles

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OPPORTUNITIES FOR WASTEWATER AND RESOURCE RECOVERY IN THE PHILIPPINES, VIET NAM, AND INDONESIA

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