

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

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# Wastewater and Resource Recovery Current Status and Opportunities: Vietnam, Indonesia, The Philippines



# The Opportunity: Turning Waste Water Facilities into Resource Factories



**WATER:** from Used Water



**ENERGY:** from Bio Gas



**RARE EARTHS:** from Dust



**FERTILIZER:** from Nutrients

# Wastewater and resources recovery covers 7 of the 17 Sustainable Development Goals

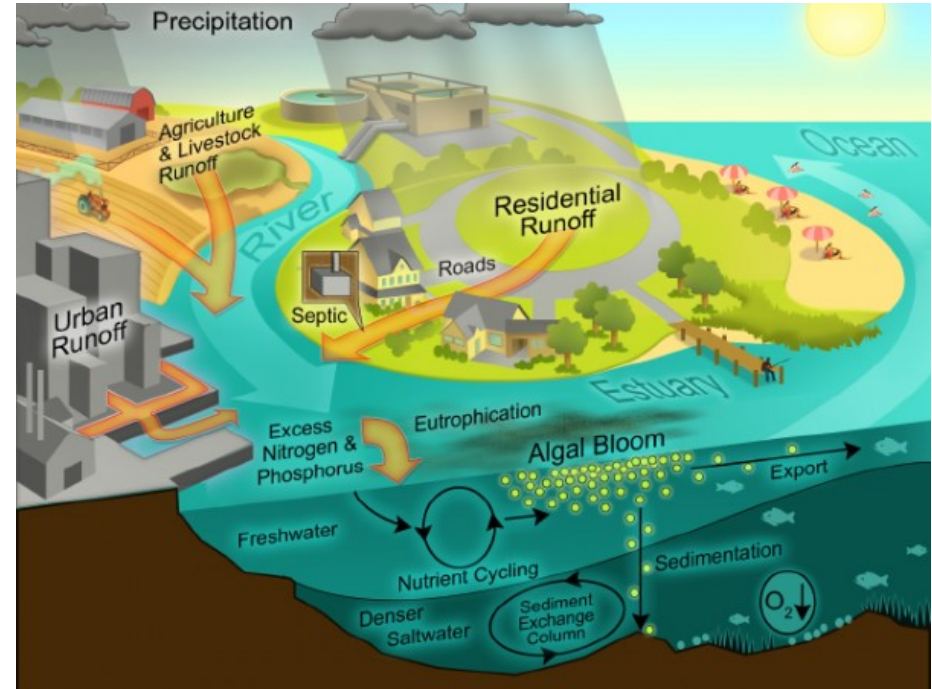
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|                                                                                                         |  |                     |                                                               |                                    |                                                                  |               |
| Contributes to the entire SDG 6 and in particular 6.3 reducing pollution and halving the proportion of untreated wastewater and 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**

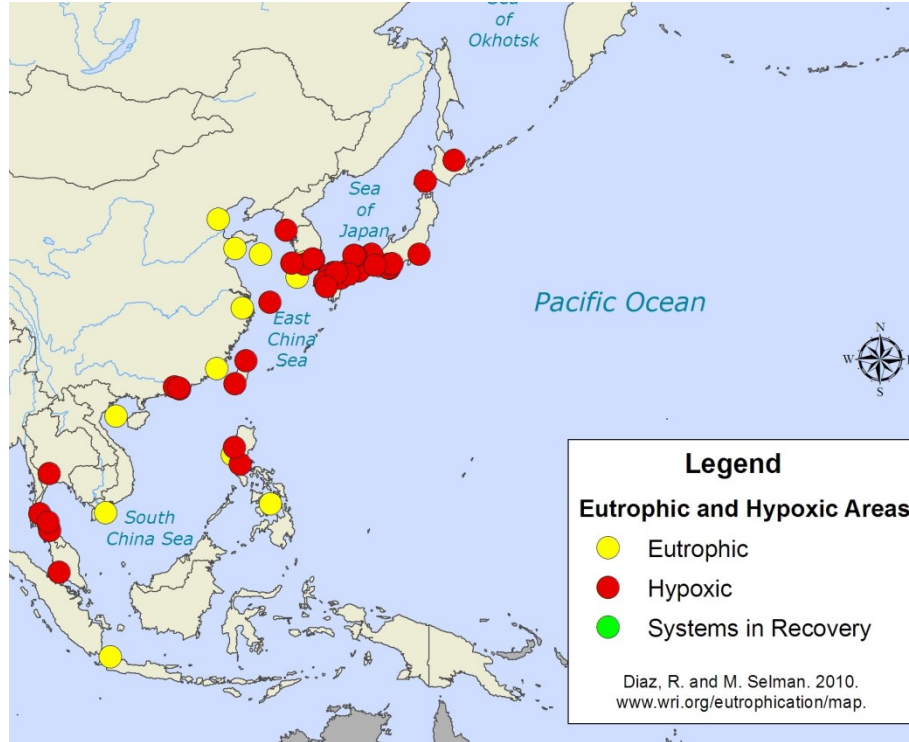
# The Challenge

## Waste Water pollution of water ways, coasts and oceans



# The Challenge: eutrophication & algal blooms

## Human, socio-economic and environmental impact



# Wastewater – Resource Recovery Technologies & Innovations



# Philippines: Del Monte Philippines, Inc. (Cagayan de Oro)

## Food processing - wastewater & bio-energy



- **Company:** Del Monte DMPI & Maynilad
- **Type of contract:** BT
- **Capacity:** 16,000 m<sup>3</sup>/day (16 MLD)
- **Technologies:** Anaerobic digestion in four (UASB type) methane reactors, SULFURIX™, BIOSULFURIX™ process for sulphur removal, followed by GASODRIX™ biogas drying – CHP – gas turbines
- **Operations:** 1 year operation contract after construction's completion
- **Finance:** Return on investment is projected : 2-5 years.

# Vietnam: Phu My Hung (HCMC)

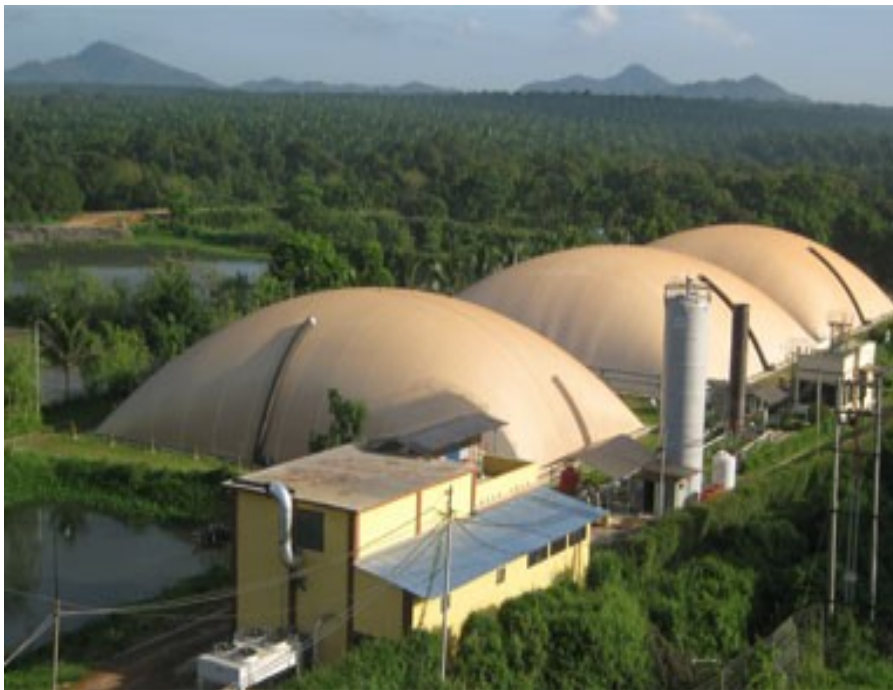
## Water re-use in urban development

- **City:** Ho Chi Minh City
- **Developer:** Phu My Hung
- **Year of delivery:** 2007 - 2009
- **Capacity:** 10,000 & 15,000 m<sup>3</sup>/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<sup>3</sup> / 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)

## China: Xiangyang, Hubei Province

### Sludge to energy production & fertilizer

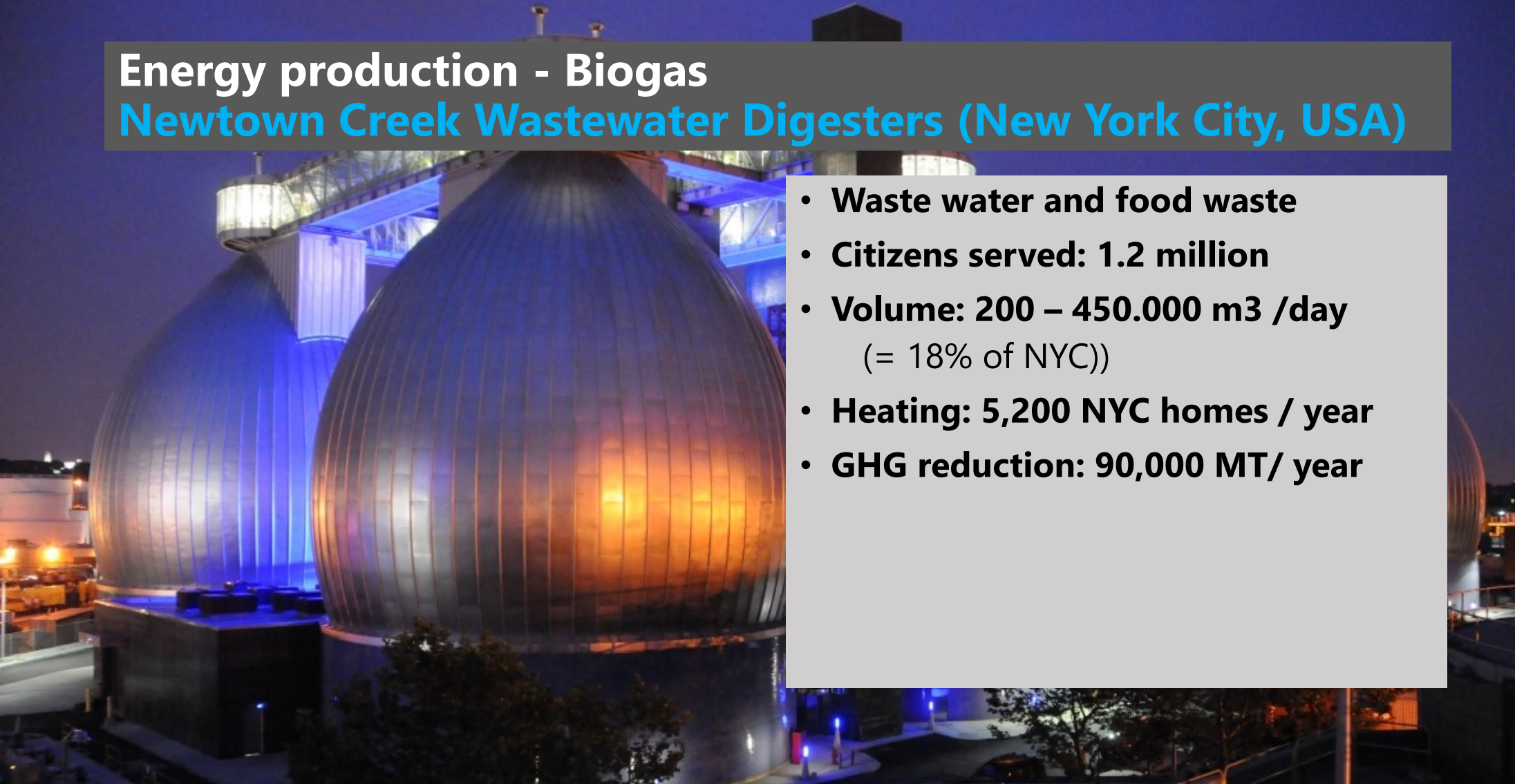


- **Waste water & organic waste**
- **Citizens served: 2 million p.e.**
- **Volume: 450 tons / day**
- **Energy : 2.1 million m<sup>3</sup> / year**
- **Biosolids: 60 tons for 80 ha / year**
- **Invest: Unknown**
- **BOO (Build- Own-Operate)**
- **Revenue: US\$1.5 million / year**

# Energy production - Biogas

## Newtown Creek Wastewater Digesters (New York City, USA)

- Waste water and food waste
- Citizens served: 1.2 million
- Volume: 200 – 450.000 m<sup>3</sup> /day  
(= 18% of NYC)
- Heating: 5,200 NYC homes / year
- GHG reduction: 90,000 MT/ year



# Energy production & water re-use

## Atotonilco WWTP (Mexico City, Mexico)



- **Waste water**
- **Citizens served: 10 million p.e.**
- **Volume: 3,024 MLD**  
(= 60% of Mexico City)
- **Energy production: 60% of energy required**
- **Water re-use: 80,000 ha irrigated land**
- **Invest: US\$786 million (DBOT)**

# 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

# ENABLING CONDITIONS FOR SCALING-UP



...  
mindset  
policy  
regulations  
money  
skills  
...



# WASTE WATER – RESOURCE RECOVERY

## Drivers for transition

### **Governments ready**

Advanced WWT & RR is used around the world

New environmental legislation and regulation

Political commitment to act, incl. through SDG and national policies

Societies demanding cleaner environment

Opportunity to in Asia and other regions

Local government some interest to access opportunity

### **Technology available**

Water re-use technology - safe, available and affordable

Energy recovery from waste water available and affordable

Fertilizer from waste water technology available and used

Material recovery – leading edge but available

### **Business opportunity**

Water supply security from using re-used water

Energy cost reduction (efficiency & production)

Potential new business from fertilizers and other materials recovered

Avoiding penalties on non-compliant wastewater discharge

Beyond donor projects focus: private investments

# MUNICIPAL WASTEWATER TREATMENT

## Conditions & opportunities

### CONDITIONS

- significant untreated **wastewater** effluent leading to (major) **pollution**
- **political will** to address this challenge, incl. through raising wastewater tariffs
- more than **300,000 citizens / p.e.**
- wastewater **collection system** in place or under development (e.g. sewerage, faecal sludge collection from septic tanks)
- willing to engage with the **business** sector for wastewater treatment
- **enforcement** of more stringent effluent requirements
- new models for **PPPs** and review of tariffs

### OPPORTUNITIES

- **high and rising water demand**: opportunity and interest for re-use of clean water produced from wastewater (e.g. during water scarcity)
- **high and rising energy costs**: opportunity to produce and sell bio-energy from wastewater treatment
- **local demand for use of quality fertilizer** in agriculture: opportunity to produce quality bio-char and chemical fertilizer from wastewater treatment

# INDUSTRIAL WASTEWATER TREATMENT

## Conditions & opportunities

### CONDITIONS

- industrial park with multiple industries and enterprises
- regulation and enforcement to address industrial wastewater
- industrial park wastewater collection system in place (sewerage)
- more than 3 MLD of wastewater (with high organics loading)
- businesses willing to engage
- enforcement of strict effluent requirements

### OPPORTUNITIES

- high and rising (industrial) water demand: opportunity and interest for re-use of clean water produced from wastewater (e.g. inside industrial park / outside)
- high and rising energy costs: opportunity to produce and sell bio-energy from wastewater treatment (e.g. to industries in industrial park)
- demand for industrial efficiency: opportunity to recover selected raw materials from waste stream (e.g. valuable rare earths, metals)

# WASTEWATER TREATMENT - RESOURCE RECOVERY

## MAJOR NEW OPPORTUNITY

### **Conclusions:**

- Technology available and ready to be applied
- Costs vs. returns need careful analysis
- More awareness needed and willingness to incorporate new technologies

### **Next steps:**

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



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

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