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Green Initiatives – Sharing IWK’s Experience
by Indah Water Konsortium Sdn Bhd

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BACKGROUND TO SEWERAGE SERVICES
Indah Water Konsortium Sdn Bhd (IWK), a national sewerage company, owned by the Government of Malaysia. It is responsible for providing sewerage services to more than 23.1 million population nationwide and covering almost 69,000 km² of area.
GREEN RESOURCES
IWK’s Green Initiatives

Bio-Fertiliser

Bio-Solids

Electrical Supply

R&D IWK-LGM: Bio-solids for Rubber Crop at RRIM nursery

R&D IWK-UTM: Bio-effluent for Landscape Plants

R&D IWK-UTM-JPP: Membrane CMF & RO for Bio-effluent Recycle

R&D AAIBE – UNITEN: RE from STP

Bio-Gas Engine

Nutrient value for Fertiliser Application

Composting

Bio-Effluent

Treated Effluent for Landscaping

Treated Effluent for Industries

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Sewage Treatment – One Green Resource Centre

One Green Resource Centre

Sewage Sludge

Wastewater Treatment

Anaerobic Digestion

BIO-SOLIDS
N – 3%; P – 1%, K - <0.1%
Organic Matter – 40-50%
CV – 2000-3500 kCal/kg DS

BIO-EFFLUENT
BOD < 5 mg/l
COD < 15 mg/l
SS < 5 mg/l

BIO-ENERGY
Methane – 65%
CV – 5000 kcal/m3

Energy
Fertilizer
Recycled Water
Fuel/Electricity

Towards Sustainable Development and Environment

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BIOEFFLUENT AS AN ALTERNATIVE WATER RESOURCES FOR NON-POTABLE USE
Raw Water Resources in Malaysia – Current & Future Potential

- Direct Extraction from River: 12,620 MLD
- Storage Dams: 2,274 MLD
- Ground Water: 204 MLD
- Treated Wastewater: (4000 MLD)
- Rain Water Harvesting
- Seawater (desalination)

Source:
Benefits of bio-effluent reuse:

- Reduce stress/demand on raw water resources, lower water footprint i.e. reduce water abuse by recycling (fit for purpose).
- Reduce demand on potable water contributes to lower energy consumption to treat and transfer potable water for non-potable use.
- Minimize contribution to carbon dioxide (CO2) emission.
Bioeffluent Reuse Initiatives – an Example of Pilot Projects


Before

After

- Rate of leaf growth increased by 5 fold.
- Rate of plant growth increased by 9 fold.
- Levels of pathogen in the bio-effluent can be reduced by use of UV or chlorination techniques.

Pilot Project with MPPD (2012)

- Advantages of using water from bio-effluent on landscape plants:
  i. Reduce dependency on potable water.
  ii. Contain nutrients for plant growth.
  iii. Cheaper source of water.
Bioeffluent Reuse Initiatives – an Example of Pilot Projects

Pilot Project with MBAS (2014/2015)

i. MBAS has commenced the trial period of 6 months starting from August 2014 – Jan 2015.

ii. Over 6 months period, IWK has provided total of 80m3 of treated effluent and 14 tonnes of biosolid.

iii. The growth rate for annual plants, leaves growth rate and physical appearance of the plant is better as compared using normal fertilizers.

Pilot Project with Alam Flora (2015)

i. The pilot project is implemented for one month duration (9 March – 10 April 2015).

ii. IWK has supplied 24m3/day of treated water to Alam Flora.

iii. Application are mainly for street and drain cleaning purposes.

iv. It will help Alam Flora to reduce the dependency on potable water supply.
Bioeffluent Reuse Initiatives – R&D on Effluent Tertiary Treatment

Double Stages PCF / UF – RO System

Aqua Nazeef Water Purifier System

i. A water purification technology from Korea by direct filtration. The performance benchmarked against existing commercial UF/MF and RO system.

ii. Effective water reclamation technology supply treated water for non-potable and industrial use.

iii. Showcase on Green Technology initiatives for sewerage sector.

i. A demo scale plant to treat wastewater.

ii. Adsorption process to remove impurities in raw sewage to produce treated water.

iii. Recyclable water for non-potable and industrial use.
Bioeffluent Reuse Initiatives – Reuse of Bioeffluent at IWK Regional STPs

• Regional STPs (RSTPs) plants equipped with polishing of bio-effluent using filter media.

• Approximately 10% (~41.7 MLD) of the bio-effluent will be recycled.

• Some applications of the recycled bio-effluent:
  • Compound cleaning,
  • Landscaping,
  • Polymer preparation,
  • Service water in plant operation, (equipment cleaning, etc).

• Green Technology application in sewage treatment plants.

• Reduce dependency on potable water.
BIO-ENERGY RECOVERY
Producing RE from Biogas to Electricity with installed capacity of 330 kW Gas Engine

The first sewage biogas to electricity demonstration project in Malaysia at Jelutong STP, Penang. Installed capacity of 175 kW Gas Engine to generate electricity for internal consumption.
Energy Management and Recovery Potential

**CURRENT**
- Bio-Gas to Electricity
- Hydraulic Energy: Micro-hydropower

**FUTURE**
- Bio-Solids
- Solar Energy
- Sewage (Chemical Energy)
- Low Energy Processes & Green Systems

**ENERGY EFFICIENCES & SAVING DEVICES**
- VARIABLE SPEED DRIVE
- TURBO BLOWER
- LED LIGHT
Energy Recovery Potential from Biosolids
Bio-Solids into Fuel for Co-firing

Benefits of energy recovery from bio-solids:

• Environmental friendly outlet for bio-solids.
• Generate renewable energy and minimize greenhouse gas emission.
• Energy content available in the IWK bio-solids is comparable to other fuel materials.
• Reasonably low sulfur content indicate manageable emission.
NUTRIENT RECOVERY FROM BIOSOLIDS
**Biosolids as Nutrient Source**

**Advantages of Biosolids as Fertilizer**

1. Reducing the use of chemical fertilizer
2. Contains essential nutrients such as organic matter and minerals in addition to N, P and K
3. There is no smell; resources and reliable quantity
4. Low capital cost, installation, simple maintenance operations &
5. Lower price compared to organic fertilizer
Biosolids as Nutrient Source
- Pilot Project at Majlis Perbandaran Port Dickson

- Collaboration between IWK and Majlis Perbandaran Port Dickson (MPPD).

- Objective: To demonstrate the effectiveness of bio-solids and bio-effluent application on landscape plant compared to commercial fertilizers.

- Trial Location:
  - MPPD Nursery
  - Field trial at Landscape area
Biosolids as Nutrient Source  
- Replication Initiatives  1 State 1 Local Municipality Project

- The Proposal was presented to the National Green Technology and Climate Change Council.

- A total of 14 Local Municipalities have been identified to be involved in this green pilot project initiatives nationwide.

The Positive Impact Nationwide

- Greening of landscape areas with renewable and sustainable nutrient rich resources.

- Contribute towards resource recovery and Sustainable sewerage services.

- Realization of green technology initiatives through recycling of sewage by-products i.e. Biosolids and Bioeffluent.
IWK via National Green Technology and Climate Change Council, approaches Local Authorities in Malaysia to uptake biosolids and bioeffluent for landscaping purposes. Summary of implementation is as below:

**Biosolids as Nutrient Source**

- Replication Initiatives 1 State 1 Local Municipality Project

**Signing Letter of Agreement**
- Dewan Bandaraya Kuala Lumpur
- Majlis Perbandaran Kuantan
- Majlis Perbandaran Batu Pahat
- Majlis Perbandaran Hang Tuah Jaya
- Majlis Perbandaran Langkawi

**Implement Pilot Project**
- Majlis Perbandaran Port Dickson
- Majlis Bandaraya Alor Setar
- Majlis Perbandaran Kangar
- Majlis Bandaraya Ipoh
- Majlis Bandaraya Melaka Bersejara
- Dewan Bandaraya Kuala Lumpur

**Supply Agreement**
- Majlis Perbandaran Port Dickson
- Majlis Bandaraya Alor Setar
- Majlis Perbandaran Kangar
Biosolids as Nutrient Source
- Pilot Project at Majlis Perbandaran Port Dickson

• Positive effects of biosolids were observed, e.g. greener & glossier leaves and more flowering.
• Biosolids and bioeffluent was beneficial for landscape plants and adopted for greening landscape area in MPPD areas.
Biosolids as Nutrient Source
- Example of Case Studies at Other Local Authorities

Majlis Perbandaran Kangar (MPKPs) completed the 3-months trial period from 1/7/2013-30/9/2013.

Majlis Bandaraya Ipoh (MBI) completed the 3-months trial period from 1/8/2013-1/11/2013.

Dewan Bandaraya Kuala Lumpur (DBKL) completed the 3-months trial period in 2014.

Majlis Bandaraya Melaka Bersejarah (MBMB) completed the 3-months trial period from 1/8/2013-1/11/2013.
BENEFITS OF RESOURCE RECOVERY AND WAY FORWARD
Benefits of Resource Recovery in Sewerage Sector

- New source of economy and income development
- Development of new technology
- Job opportunities
- Lower commodity prices

- Reduce stress on raw water sources
- Sustainable waste management practices
- Conserve landfill space
- Minimize contribution to GHG
- Decrease in pollution
- Zero Waste Management

- Affordable water tariff, electricity tariff and waste disposal cost
- Reduced taxes
- Availability of water improved
- Public sanitation improved
- Sustainable and healthy living environment

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Conclusion

Sustainability through Zero Waste Management Concept

Waste to Resource and Waste to Wealth

Rebranding of Sewage Treatment Plant to 1 Green Resource Centre

Promoting the Blue Ocean Strategy for Sustainable Sewerage Industry

Resource Recovery of Sewerage Business

3 WINS

NATION

PEOPLE - Affordability

INDUSTRY - Sustainability

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THANK YOU

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