Waste Management in Semarang City, Central Java, Indonesia

NASUKA
Center of Industrial Pollution Prevention Technology
Semarang, Central Java, Indonesia
A port city on the north coast of Java
Total population: 1.765 million (2015)
Total area: 373.7 km²
1. Research and development in industrial pollution prevention technology.
2. Technical services in environmental field through training, laboratory testing, consultation, standardization, calibration, certification and energy & environment audit.
SEMARRANG MAIN ACTIVITY

INDUSTRIAL ACTIVITY

- 5 INDUSTRIAL PARK
- 11,585 SMALL AND MEDIUM ENTERPRISES
- Various Industrial Sector
- 116 COMPANIES

INDUSTRIAL WASTE

HOUSEHOLD WASTE

HOUSEHOLD (555,448)
HOUSEHOLD WASTE

- **Wastewater**
  - 97% Of Waste Water Discharged Without Any Treatment

- **Solid Waste (Garbage)**
  - Solid Waste Was Treated Into Dumping On Public Landfill
  - (0.45 kg per person-day) or 800,000 kg /day
  - PET bottle or plastic (PP) waste are mostly recycled and reused as plastic seed by small and medium enterprises (SMEs), 40% total of garbage
HOUSEHOLD WASTE

Step of Recycling Processes

Household → Garbage Landfill → Scavenger → Collectors → Crusher → Plastic Scrap → PLASTIC INDUSTRY
Alternative Management For Household Waste

- As source of energy using bio-gas technology, still on development
- Composting organic waste household, already applied as pilot project.
- As RDF (Refuse Derived Fuel) in Cement Industry, planned at 2017
INDUSTRIAL WASTE

REDUCTION

REUSE

TREATMENT

DISPOSAL

ONLY 10% OF INDUSTRIES APPLY CLEANER PRODUCTION

MOSTLY TREAT THEIR WASTE DUE TO COMPLIANCE TO GOVERNMENT RULES

NO AWARENESS TO ENVIRONMENTAL RESPONSIBILITY

ENVIRONMENTAL Regulation and Rules in Indonesia, such as:
- Laws No.32/2009: Environmental Protection & Management
- Government Regulation No. 101/2014: Hazardous Waste Management
- Ministry Regulation No.3/2008: Utilization Procedure of Hazardous Waste
1. **Gas Emission**
   Some industries discharge their waste to the environment directly. However, other industries apply stack equipped with air pollution control like scrubber, cyclone, EP.

2. **Waste water**
   There are various characteristic wastewater depending on typical industry. Wastewater can be treated by physical, chemical, and biology technology.

3. **Solid waste**
   Solid waste are classified as Toxic And Hazardous Waste Managed By Other Specific Company and treated into Dumping, Incineration, and Reuse. Few industries manage their solid waste directly by incineration (Special permission is required).
SMALL AND MEDIUM ENTERPRISES (SMEs)

Waste management is almost neglected, because:

- No awareness to protect the environment
- No competency in WWTP operation
- No space available to construct WWTP
- No knowledge about waste management
- No competency in WWTP operation

*Need Technical Guidance and Financial support from Government*
There are many kind of SMEs, mainly Batik (textile) and Tofu industries.

Note:
- Total number of Batik and Tofu are 47,750 unit and 115,000 unit, in Indonesia.
- Total number of batik and Tofu SMEs in Central Java are 25,500 unit and 5,800 units.
- Total number of batik and tofu in Semarang are 25 unit and 67 unit.

Batik and tofu waste water become a problem for environment.

Tofu is a famous food for Indonesian.

Batik is intangible culture heritage of humanity by UNESCO.
Wastewater characteristics of batik and tofu industries

- High pollutant loading: COD, BOD, TSS
- High volume:
  - 20 liter/ kg soy bean
  - 8 liter / meter textile

Still no appropriate technology for wastewater treatment. Existing technologies mainly generate solid waste, need chemicals and spacious land.
Waste Management project of CIPPT

- Batik wastewater treatment using biology processes (anaerob and aerob), still on trial.
  Demonstrated in one of SMEs in Semarang.
- Tofu wastewater treatment is still on progress.
- RECP joint programme with UNIDO Indonesia, will be executed on November 2016 in Semarang.
Waste Management project of CIPPT

**Tofu Waste Water Treatment Plant (ON PROGRES)**
- Flow rate = 3 M3/day
- Product Capacity = 150 kg/day
- Biology Technology (anaerob-wet land)

**Batik Waste Water Treatment Plant (ON TRIAL)**
- Flow Rate = 5 M3/day
- Product Capacity = 1500 M textile/day
- Biology Technology (anaerob-aerob)
## Projects done by CIPPT

<table>
<thead>
<tr>
<th>Industry</th>
<th>Technology</th>
<th>Year</th>
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<tbody>
<tr>
<td>Plywood Industry</td>
<td>By Chemical and Biology Technology</td>
<td>2005</td>
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<tr>
<td>Chemical Industry</td>
<td>By Chemical and Biology Technology</td>
<td>2009</td>
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<tr>
<td>Carpet Industry</td>
<td>By Chemical Technology</td>
<td>2014</td>
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<tr>
<td>Bakery Industry</td>
<td>By Biology Technology</td>
<td>2015</td>
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<tr>
<td>Cassava Industry</td>
<td>By Biology Technology</td>
<td>2004</td>
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<tr>
<td>Hospital</td>
<td>By Biology Technology</td>
<td>2013</td>
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Thank You