Sewerage Plan for the Prevention of Global Warming

Earth Plan 2010

Hideki Yamada
Bureau of Sewerage, Tokyo Metropolitan Government
Today’s Agenda

1. Current State
   sewerage operation, GHG emissions

2. Early approach
to reduce GHG emissions
   measures, achievement, issues

3. Earth Plan 2010 (new approach)
target, main measures

4. Summary
Current State
Current State of Wastewater Treatment in Tokyo

1. Extension of sewer pipes: About 16,000 km

2. Wastewater treatment plants: 20 plants

3. Pumping stations: 85 stations

4. Treated wastewater volume: About 5.6 million m$^3$/day

5. Dewatered sludge: About 3,300 Wt/day (total incinerated volume)

[Maintenance results for fiscal 2009]
Current State of Greenhouse gas emissions in The Tokyo Sewerage

Overall emissions: 856,000t-CO₂/year

- C₂O around 44%
  - Emissions from electricity used during sludge treatment: 93,000t-CO₂

- N₂O around 44%
  - N₂O from sludge incineration: 236,000t-CO₂
  - N₂O from water treatment: 139,000t-CO₂
  - Emissions from electricity used during water treatment: 283,000t-CO₂
  - Fuel and chemicals: 105,000t-CO₂

[Maintenance results for fiscal 2009]
Early approach to reduce GHG emissions
Measures

Reduction of greenhouse gases emitted during waste water treatment

Water treatment process

- Introduction of micro bubble aeration
- Introduction of energy saving stirrers

Sludge treatment process

- Sludge carbonization
- High-temperature incineration of sludge
Results

(1,000 t-CO₂)

About 16% reduction

<table>
<thead>
<tr>
<th>GHG emissions</th>
<th>FY1990</th>
<th>FY2009</th>
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</thead>
<tbody>
<tr>
<td>N₂O emissions from water treatment</td>
<td>134</td>
<td>139</td>
</tr>
<tr>
<td>N₂O emissions from sludge incineration</td>
<td>429</td>
<td>236</td>
</tr>
<tr>
<td>CO₂ emissions from fuel/electricity consumption</td>
<td>396</td>
<td>449</td>
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<tr>
<td>Chemical sources</td>
<td>59</td>
<td>32</td>
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Issues

- Additional facilities
- Increasing supplemental fuel

CO₂ emissions from electricity and fuel consumption increase

Over 90% of GHG reductions is occupied of N₂O reduction

Alternative reduction is necessary

Methods for suppressing N₂O emissions from water treatment has not been established

Development of technology is needed
Earth Plan 2010
Target for Earth Plan 2010

Greenhouse gas emissions (10,000t-CO₂)

- FY 2000: Base year, 99.1
- FY 2014: Reduction target, 81.3
- FY 2020: Reduction target, 74.3

- 18% reduction target line
- 25% reduction target line
Main measures in Earth Plan 2010

1. Promote exhaustive energy-saving efforts
2. Overview of the treatment process/method
3. Use of unused or renewable energy
1. Promote intensive energy-saving efforts

- Pressure dehydrator
- New centrifugal dehydrator
1. Promote intensive energy-saving efforts

![Bar chart showing the reduction in CO2 emissions and use of electricity and chemicals across different dehydration methods. The chart indicates an about 30% reduction in CO2 emissions compared to conventional centrifugal dehydrators.](chart.png)
1. Promote intensive energy-saving efforts

Relation between sludge moisture rate and heat development

The lower the moisture, the easier it becomes to ignite

The higher the heat, the easier it becomes to ignite

Low moisture sludge (about 74%)
2. Overview of the treatment process/method

Optimization of the aeration system

- **Large scale blower**
  - Reaction tank
  - Airflow is hard to control
  - With this tank in an optimum state

- **Small scale blower**
  - Airflow is hard to control

Change of aeration equipment

Optimum state
2. Overview of the treatment process/method

Coupling of dehydrator and incinerator

- Introduction of energy efficient dehydrator
- Shorter dewatered sludge travel distance
  - Reduced power for transportation
- Low water content sludge
  - Supplemental fuel reduction

From water treatment facility:

- Thickener

Process:

- Pump
- Dehydrator
- Incinerator
2. Overview of the treatment process/method

Fluidized bed incinerator with turbo charger
2. Overview of the treatment process/method

Multilayer fluidized bed incinerator

- Exhaust gas
- Dewatered sludge
- Liquid incinerator
- Equipment efficiently waste heat
- Blower
- Chimney
- Blower
- Dust catcher
- Waste gas treatment equipment
- Blower

Dewatered sludge
3. Use of unused or renewable energy

Solar-electric Power Generation

(Single-axis tracked panel type)  (Fixed type)

[Place of installation: Kasai Water Reclamation Center]
3. Use of unused or renewable energy

**Sludge carbonization furnace**

- Dewatered sludge
- Pyrolysis gas
- Dryer
- Carbonizing furnace
- Exhaust gas
- Chimney
- Carbide
- Coal thermal power plants

Place of installation: Tobu Sludge Plant
3. Use of unused or renewable energy

Sludge gas furnace

Place of installation: Kiyosemizu reclamation center
4. Summery

We will achieve the goal in Earth Plan 2010.

About 25% reduction

Thanks for your attention

Web site address
http://www.gesui.metro.tokyo.jp/

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