Ministry of Industry

Water Resources for Industrial Utilization in Myanmar

World Water Day 2017

Tin Tin Htoo (Ms.)
Deputy Director General
Directorate of Industrial Collaboration

Nay Pyi Taw 13th Mar, 2017
Contents

- Policy and Guidelines of the Ministry
- Water Management
  - Exploration
  - Waste Water Treatment
  - Flood Protection
- Future Plans
- Requirements
Policy and Guidelines of the Ministry
Water and Air Pollution Control Plan
(Standing Order No. 3)

- Enacted by the Ministry of Industry in 1995

- Main Objectives
  - To control wastes
  - To reduce wastes
  - To eliminate wastes
Criteria of Analytical Data of Liquid Effluent

- Temperature
- pH
- Suspended Solid
- Total Solid
- Hardness
- Carbonates
- Sulphates
- Chloride
- Ammonia – N
- $\text{BOD}_5$ (Biochemical Oxygen Demand)
- COD (Chemical Oxygen Demand)
- Chromium
- Heavy Metals
- Oil and Grease
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Range</th>
<th>Remark</th>
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<tr>
<td>B. O. D(5 days at 20°C)</td>
<td>ppm</td>
<td>20–60</td>
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<tr>
<td>Suspended Solids</td>
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<td>pH Value</td>
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<tr>
<td>Formaldehyde</td>
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<td>Phenols and Cresols</td>
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<td>Free chlorine</td>
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<td>Zinc</td>
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<td>max</td>
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<tr>
<td>Chromium</td>
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<td>max</td>
</tr>
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<td>Arsenic</td>
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<td>Copper</td>
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<td>1</td>
<td>max</td>
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<tr>
<td>Mercury</td>
<td>ppm</td>
<td>0.005</td>
<td>max</td>
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<td>Cadmium</td>
<td>ppm</td>
<td>0.03</td>
<td>max</td>
</tr>
<tr>
<td>Barium</td>
<td>ppm</td>
<td>1</td>
<td>max</td>
</tr>
<tr>
<td>Selenium</td>
<td>ppm</td>
<td>0.02</td>
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<td>Lead</td>
<td>ppm</td>
<td>0.2</td>
<td>max</td>
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<tr>
<td>Nickel</td>
<td>ppm</td>
<td>0.2</td>
<td>max</td>
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<td>Insecticides</td>
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<td>Radioactive materials</td>
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<tr>
<td>Temperature</td>
<td>⁰C</td>
<td>40</td>
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<tr>
<td>Colour and Odour</td>
<td></td>
<td></td>
<td>Not Objectionable when mixed in receiving water</td>
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</table>
Waste water from the factories shall not be discharged directly into the river, creek, lake and pond unless it has been pre-treated when they are in the following conditions:

(a) High acidity

(b) High alkalinity

(c) High temperature

(d) Presence of toxic chemicals (e.g. Cyanide, Arsenic, Mercury, Cadmium, Lead, Chromium, P C Bs: Polychlorinated Biphenyl)
The following relevant treatment methods shall be used before discharging:

(a) **Elimination of** *suspended solid*
    Sedimentation, vacuum and pressure floatation methods

(b) **Elimination of** *colloidal solid*
    Chemical coagulation and adsorption

(c) **Elimination of** *inorganic dissolved solid*
    Neutralization, pH control, oxidation–reduction methods, ion–exchange method, passing through activated carbon

(d) **Elimination of** *organic dissolved solid*
    Lagooning, activated sludge, oxidation ditch, trickling filter method, natural treatment method using the water hyacinth ponds
Disposal of waste water after treating;
Managing to use the suitable methods for solid waste, liquid and vapour to minimize the environmental impact;
Control of emission of toxic gas, vapour and dust;
Obtaining prior permission to operate business or preliminary surveying the environment or assessing the environmental impact and designing the procedure of environmental conservation;
Designing the supporting procedure assessing the social impact, the effect of health and natural disaster impact;
Establishing service companies to be carried out environmental management.
Industrial Policy (February 2016)

Chapter IX

Standing on as the Green Industries

The following environmental conservation measures shall be done:

- Measuring cleanliness of air;
- **Testing water resources**;
- Monitoring the ecosystem of aquatic animals;
- Surveying the socio-economic development;
- Surveying the public health;
Water Management

Water Exploration
Management

- Permanent Secretary of Ministry of Industry participates as a member of the National Water Resources Committee (NWRC).

- An officer of the Ministry participates in the Expert Group of NWRC.

- Submitting monthly report to NWRC.
Exploration

- Most of the factories under the Ministry of Industry use the resource water from the rivers and creeks due to their location of short distance from rivers and creeks.

- The factories in the Thagaya Industrial Zone utilize the resource water from Sittaung River. We do emphasis on cooperation with the Directorate of Water resources & Improvement of River System (DWIR) for the sustainable water management.

- Some factories especially private factories / enterprises which are far from the rivers are using underground water.
Water pumping System
No.(31) Heavy Industry (Thayet)
Water Pumping Station

No. (35) Heavy Industry (Chauk)

Ayeyarwaddy River Bank

Established in 2007
Water Pumping Station
Thagaya Industrial Zone

- 3 Heavy Industries
- 1 R & D Center
- 1 ITC

Pontoon House
at the Sittaung River Bank
Established in 2008
Water Pumping Station
No.(21) Heavy Industry (Tha-Htone)

Pontoon House
at Doan Tha Mi Creek
No.(21) Heavy Industry (Tha-Htoney)

Centrifugal Pump

Pipe Line

Water Storage and Filtration
No.(21) Heavy Industry (Tha-Htone)

Raw Water Pumping Station

Sedimentation Tank
No.(21) Heavy Industry (Tha-Htone)

Water Treatment Plant

Drinking Water Pump

Water Reservoirs
## Ministry of Industry
### Utilization and Disposal Water of Industries

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Industry Classifications</th>
<th>Number of Factories</th>
<th>Utilized Water (per month)</th>
<th>Disposal (per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Textile and Garment</td>
<td>29</td>
<td>45.28</td>
<td>12.49</td>
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<tr>
<td>2</td>
<td>Tyre &amp; Rubber Products</td>
<td>2</td>
<td>30.52</td>
<td>3.51</td>
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<tr>
<td>3</td>
<td>Paper and Pulps</td>
<td>2</td>
<td>17.05</td>
<td>4.00</td>
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<td>4</td>
<td>Steel Mill</td>
<td>2</td>
<td>16.26</td>
<td>2.43</td>
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<tr>
<td>5</td>
<td>Heavy Machineries</td>
<td>4</td>
<td>13.09</td>
<td>4.09</td>
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<tr>
<td>6</td>
<td>Pharmaceutical</td>
<td>4</td>
<td>10.50</td>
<td>7.60</td>
</tr>
<tr>
<td>7</td>
<td>Cement and Ceramic</td>
<td>4</td>
<td>8.07</td>
<td>4.47</td>
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<td>8</td>
<td>Electrical Products</td>
<td>4</td>
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<td>9</td>
<td>Miscellaneous</td>
<td>6</td>
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<tr>
<td>10</td>
<td>Household Goods</td>
<td>2</td>
<td>0.29</td>
<td>0.07</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>59</td>
<td>142.98</td>
<td>39.28</td>
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</table>

\( \approx \) gals in million

(27.5%)
<table>
<thead>
<tr>
<th>Industry Classifications</th>
<th>Utilization</th>
<th>Disposal</th>
<th>Total Utilization</th>
<th>Total Disposal</th>
</tr>
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<tbody>
<tr>
<td>Textile and Garment</td>
<td>12.49</td>
<td>12.69</td>
<td>142.98</td>
<td>39.28</td>
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<td>Rubber Products</td>
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<td>Paper and Pulp</td>
<td>4.00</td>
<td>4.13</td>
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<td></td>
</tr>
<tr>
<td>Steel Mill</td>
<td>2.43</td>
<td>2.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Machineries</td>
<td>4.09</td>
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<td>Pharmaceutical</td>
<td>7.60</td>
<td>7.60</td>
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<tr>
<td>Cement and Ceramic</td>
<td>8.07</td>
<td>8.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Products</td>
<td>0.42</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>0.20</td>
<td>0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HouseHold Goods</td>
<td>0.07</td>
<td>0.07</td>
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# Utilization and Disposal Water of Registered Private Industries inspected by the Directorate of Industrial Supervision and Inspection (January, 2017)

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Industry Classifications</th>
<th>Number of Factories</th>
<th>Utilization</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Food and Beverages</td>
<td>27</td>
<td>958,980</td>
<td>326,100</td>
</tr>
<tr>
<td>2</td>
<td>Clothing and Wearing Apparel</td>
<td>3</td>
<td>3,195,000</td>
<td>1,695,000</td>
</tr>
<tr>
<td>3</td>
<td>Household Goods</td>
<td>2</td>
<td>105,000</td>
<td>18,000</td>
</tr>
<tr>
<td>4</td>
<td>Industrial Raw Materials</td>
<td>4</td>
<td>180,000</td>
<td>54,000</td>
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<tr>
<td></td>
<td>Total</td>
<td>36</td>
<td>4,438,980</td>
<td>2093,100</td>
</tr>
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(47%)
Utilization and Disposal Water of Registered Private Industries inspected by the Directorate of Industrial Supervision and Inspection (January, 2017)

<table>
<thead>
<tr>
<th>Industry Classifications</th>
<th>Gallons in Thousand</th>
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<tbody>
<tr>
<td>Food and Beverages</td>
<td>958.98</td>
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<tr>
<td>Clothing and wearing</td>
<td>3195</td>
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<tr>
<td>Household Goods</td>
<td>105</td>
</tr>
<tr>
<td>Goods</td>
<td>18</td>
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<tr>
<td>Industrial Materials</td>
<td>180</td>
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<tr>
<td>Raw</td>
<td>54</td>
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</table>

Utilization (Total 4438.98) Disposal (Total 2093.1) (47%)
Water Management

Waste Water Treatment
The Industrial Waste and Waste Water discharged from registered private factories are regularly inspected in accordance with the enacted Standing Order of the Ministry of Industry, Myanmar National Water Policy and National Environmental Quality (Emission) Guidelines.

Waste Water is treated by Physical Process, Chemical Process, Biological Process before discharged and disposed into waste water collecting tanks, plantation yards, creeks, drainage lines and specific areas defined by the City Development Committees through the waste water pipelines.
Evidential Show Case

“Yaung Ni” Distillery Factory (Ayeyawaddy Region)’s Waste Water Treatment System

<table>
<thead>
<tr>
<th>Criteria</th>
<th>EQG Standard</th>
<th>Treatment Result before Cooperation</th>
<th>Treatment Result after Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.O.D</td>
<td>250 ppm</td>
<td>700 ppm</td>
<td>200 ppm</td>
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<tr>
<td>B.O.D</td>
<td>50 ppm</td>
<td>3200 ppm</td>
<td></td>
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<tr>
<td>T.S.S</td>
<td>50 ppm</td>
<td>477.5 ppm</td>
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<tr>
<td>T.D.S</td>
<td>2000 ppm</td>
<td>10 ppm</td>
<td>10 ppm</td>
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</table>
Waste Water Treatment System

1. Decanter + Filter Press (COD, TSS ≤ 1000 mg/L)
2. Plate Heat Exchanger (Temperature 70°C - 40°C)
3. Primary Settling Tank (COD, TSS ≤ 1000 mg/L)
4. Equalization Tank (COD ≤ 40000 mg/L)
5. Buffer Tank (pH 4 to 5)
6. Anaerobic Reactor (COD ≤ 4000 mg/L)
7. Degasifier (COD ≤ 4000 mg/L)
8. Lamella Clarifier (COD ≤ 5000 mg/L)
9. Aeration Tank (COD ≤ 40000 mg/L)
10. Lagoons (15) Nos (COD, TSS ≤ 1000 mg/L)
11. Gravel and Sand Filter (COD, TSS ≤ 1000 mg/L)
12. Activated Carbon Filter (2) Nos (COD, TSS ≤ 1000 mg/L)
13. Chlorine Dosing Pot and Holding Tank (COD ≤ 1000 mg/L)

COD (70000-80000 mg/L)
COD (60000-70000 mg/L)
COD (50000 mg/L)
COD (<200 mg/L)
COD (400 mg/L)
COD (700 mg/L)
COD (1000 mg/L)
COD (4000 mg/L)
COD (5000 mg/L)
Waste Water Measuring with pH Meter

“Yaung Ni”
Distillery Factory
Ayeyawaddy Region
Practices of the State Own Enterprises (SOEs) under the Ministry of Industry

- Discharging into the rivers and creeks after waste water treatment system according to the specified quality standards.

- Sedimentation and evaporation of the water to the air by using the reservoirs and sedimentation tank.

- Using the ways of Physical Chemical and Biological Processes.

- Using close circuit to reduce the water utilization quantity and to conserve the environment.
High Grade Paper Mill (Thabaung) Biological Treatment Process

Used of Method:

- Aerobic Treatment
- Anaerobic Treatment
- Suspended Growth Method (Activated Sludge)
- Attached Growth Method
- Anaerobic Digestion (Methane Termination)
Operation Process of Waste Water Treatment in the Paper Mill

1. Neutralization
2. Screening
3. Primary clarification
4. Equalization
5. Aeration [AS]
6. Secondary clarification
7. Drain to river

Mud Cake

Dewatering

Return sludge
Mesh Screen (Mesh 1000 mm x 1800mm - 16 Nos)
Primary Clarifier (φ 42 m, Depth 4.5 m)
Cooling Tower

Primary Sludge Tank
(6m x 6m, Depth -5m)
Excessive Sludge Tank (5 m x 5m, Depth -4.5m)

Hydrolysis Tank (25m x 17 m, Depth 6m x 2 Nos)
Aeration Tank (73.5 m x 24 m, Depth -9m - 2 Nos)
Blower House (Air Blower - 4 Nos)
Flow rate - 80 m$^3$/min, Max; Pressure - 0.5 MPa

Distribution Well
(4 m x 4 m, Depth -6 m)
Secondary Clarifier (φ 37m, Depth -3m - 2 Nos)

Secondary Sludge Tank (8 m x 8m, Depth -5m)
Sludge Thickener (ϕ 17m, Depth -3m)

Dewater House

Belt Press Machine
Capacity - 800 kg Sludge Cake/hr
Quality of Water Disposal

Before treatment

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tr>
<td>BOD</td>
<td>401 mg/l</td>
</tr>
<tr>
<td>COD</td>
<td>1700 mg/l</td>
</tr>
<tr>
<td>pH</td>
<td>6 ~ 9</td>
</tr>
<tr>
<td>Ss</td>
<td>766 mg/l</td>
</tr>
<tr>
<td>T</td>
<td>50°C</td>
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After treatment

<table>
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<td>&lt; 100 mg/l</td>
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<tr>
<td>COD</td>
<td>&lt; 400 mg/l</td>
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<tr>
<td>pH</td>
<td>6 ~ 9</td>
</tr>
<tr>
<td>Ss</td>
<td>&lt; 100 mg/l</td>
</tr>
<tr>
<td>T</td>
<td>30°C</td>
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Waste Water Measuring with pH Meter

“Tiger Head” Cement Factory Mandalay Region
Waste Water Temperature Measuring by using Thermometer

Tiger Head Cement Factory Mandalay Region
Waste Water Measuring with pH Meter

“Linn Yaung Ni”
Cold Storage Factory
Mandalay Region
Waste Water Temperature Measuring by using Thermometer

U Hla Win
Ice Factory
Tanintharyi Region

15.12.2016
Waste Water Temperature Measuring by using Thermometer

U Aye Cho
Packaging Paper Industry
Magway Region
(2.12.2016)

U Phyu Nu
Rice Noodles (Monghingar) Industry
Rakhine Region
Waste Water Measuring with pH Meter

E-Lan Co., Ltd.  
Soap Industry  
Yangon Region  
(3.1.2017)

Golden Lotus  
Drinking Water Industry  
Nay Pyi Taw  
(18.1.2017)
Noise Measuring with Noise Level Detector

U Hla Than
Boat Yard
Tanintharyi Region
(16.12.2016)
No.(35) Heavy Industry (Chauk) Waste Water Drains
No.(31) Heavy Industry (Thayet) Waste Water Drain
Water Management
Flood Protection
Activities on Flood Protection

- **Trees Plantation** at the boundary of factories those are near from the rivers as the flood and storm preventer;

- **Building the retaining wall and land elevation** within the factory area, and trees plantation at the retaining track.

- **Construction dam** to control the flood near rivers and creeks.

- **Relocation of things** from the lower side to elevated location.

- **Making drains** around the factory.
Activities on Flood Protection (Cont;)

- Preparedness of water pumps.
- Pre-inspection of transformers and cable lines.
- Inspection and maintenance of roofs of stores and warehouses.
- Placing the sandbags, cleaning the drains around the store and warehouse and residential areas.
- Caring readiness of telecommunication and manual communication on natural disasters.
Activities on Flood Protection (Cont;)

- Organizing, undertaking, motivation and informing according to the weather announcement of Myanma Meteorology Department.

- Undertaking to be the systematic records arranging system.

- Education and awareness on preparedness, prevention, mitigation.

- Project planning for prevention and resettlement.
No.(31) Heavy Industry (Thayet) Concrete Embankment for Flood Protection
Future Plan
Water Crisis Occurred in Thagaya Industrial Park under the Ministry of Industry in 2016

- It must be taken care on falling down of water level of Sittaung River when the rare rainfalls and poor water input from the Paunglaung Dam.

- As a result, sand-dune and mud cloud appear so that pontoon station could not operate pumping the water and water supply to the industrial zone (Thagaya) was cut-off.
Measures to be undertaken

- In this regard, the followings shall be done with the firm cooperation of the Directorate of Water Resources and Improvement of River System (DWIR);

Ministry Side

- Defining minimum standard water level near the pump station and watching daily and move the pontoon appropriately.
- Digging the sand-dune around the 25 meters from the pontoon.
- Drains making for water inlet.

DWIR Side

- Care control and management of water flow in Sittaung River.
Other Activities

- **Recycling and reusing** of water, after treatment to specified standards.

- **Discharging** the waste water systematically after recycling.

- **Testing** the waste water by using testing instruments in accordance with the National Environmental Quality (Emission) Guidelines.

- **Inspection and surveying** on requirements of establishment of waste water treatment plant in the factories in accordance with the Environmental Conservation Rule 41.
Other Activities (Cont;)

- Instruction and guidance on Environmental Impact Assessment (EIA) as of the Environmental Conservation Rule 52.

- Instruction and Guiding to the industries those were established before the provision of the regulation of Environmental Conservation Law to be inline with such specified rules.

- Coordinating with relevant departments to discuss and share on knowledge of waste water.
Requirements
We Need;- 

- Statistic System 
- Measuring and Testing Equipments 
- Trainings and Capacity Building 
- Waste Water Treatment Technology 
- Experts and Auditors Trainings
Thank You