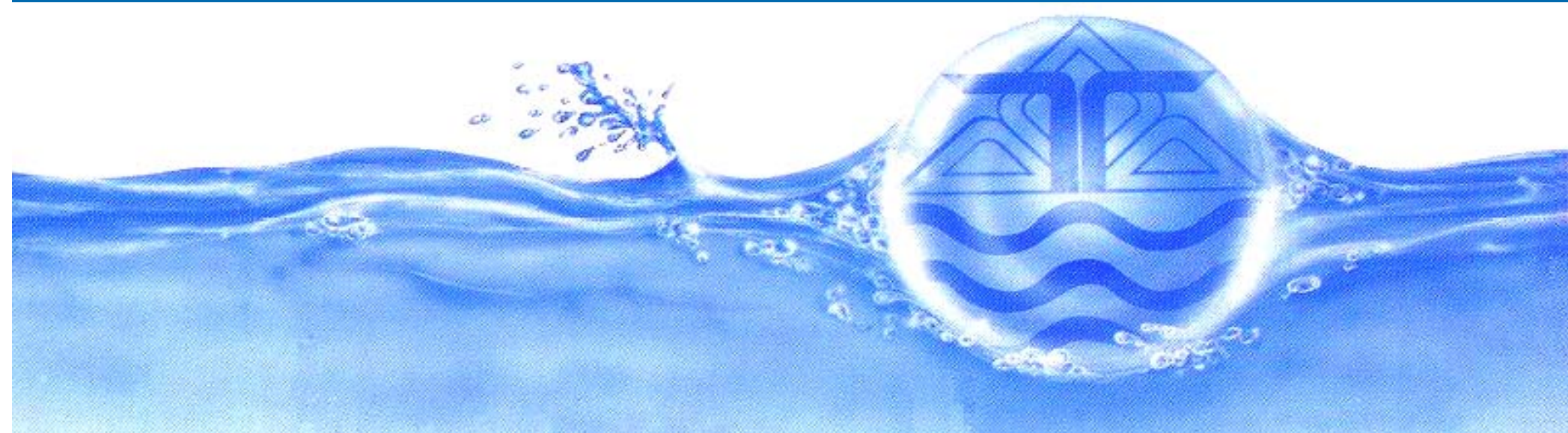


**AQUATHAI CO., LTD.**

**WATER & WASTE TREATMENT**





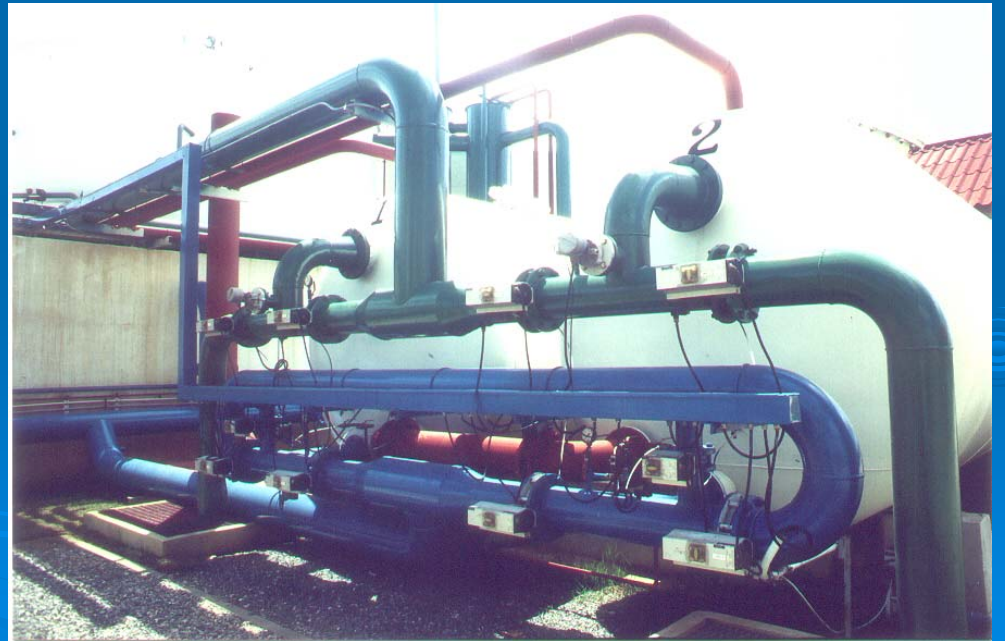
# Water and Wastewater Treatment Goods and Services

- Goods
- Technologies
- Services

# Water and Wastewater Treatment Goods

- Equipment or specific materials for the supply, treatment and transport of water
- Equipment or specific materials for the collection, treatment and transport of wastewater

# Water Treatment Goods and Technologies



# Water/Wastewater Treatment Goods

## ➤ General Mechanical equipment

- Pump
- Air blower
- Tanks
- Gates and valves
- Pipe and fitting



# Water/Wastewater Treatment Goods (cont')

- General Electrical equipment
  - Generator
  - Transformer
  - Switchgear
  - Cable and accessories
  - Motor Control Center (MCC)
  - Switchboard
  - Low, Medium, High Voltage accessories

# Water/Wastewater Treatment Goods (cont')

- General Control and Instrument
  - PLC, DCS
  - SCADA
  - Instrument (flow, level, pressure, temperature, water quality)
  - Control panels
- Laboratory and Water Quality analyses
  - Lab apparatus and instrument

# Water Treatment Goods (cont')

## ➤ Process Equipment in Water

- Screen (coarse and fine)
- Chemicals
  - Coagulant (alum, PAC,  $\text{FeCl}_3$ )
  - Polymer
  - Caustic and acid (lime, soda ash,  $\text{NaOH}$ ,  $\text{H}_2\text{SO}_4$ ,  $\text{HCl}$ )
  - Biocide
  - Scale and corrosion inhibitor
  - Disinfection (chlorine, chlorine dioxide, chloramine, ozone, UV)
- Flocculation and clarifier
- Dissolved Air Flotation (DAF)



# Water Treatment Goods (cont')


## ➤ Process Equipment in Water (cont')

- Filter
  - Sand media, anthracite, carbon, green sand
  - Filter vessels
  - Underdrain, filter nozzles
- Membrane
  - Micro-, ultra-, nano-, electrodialysis, reverse osmosis
- Ion exchanger
- Gas stripper (aerator, degasifier, decarbonator)

# Wastewater Treatment Goods

- Screen (coarse and fine screen)
- Comminution
- Grit removal
- Clarifiers (primary and secondary)- scraper
- Dissolved Air Flotation (DAF)
- Aeration (aerator, diffuser)
- Granular filter (for tertiary treatment)
- Membrane (for tertiary treatment)
- Disinfection (chlorine, UV, ozone, chlorine dioxide)
- Odor control (wet scrubber, biofilter, carbon filter)

# Water/Wastewater Treatment Goods (cont')

- Sludge treatment
    - Thickener
    - Sand drying bed, sludge lagoon, belt press, filter press, centrifuge, dryer
    - Aerobic and anaerobic sludge digester
  - Chemical preparation and dosing
    - Polymer preparation
    - Metering pump
    - Lime saturator
    - In-line flocculator
- 

# Water Treatment Technologies

## ➤ Clarifier types

- Sludge recirculation clarifier (scraper)
- Sludge blanket (upflow, flat bottom) w/ or w/o pulse
- Rectangular clarifier (with scraper)
- Lamella clarifier, tube settler, incline plate
- Other High rate clarifier (contact adsorption, floc seeding type)

# Wastewater Treatment Technologies

## ➤ Process variants

- Activated sludge
  - Conventional, Complete-mix, Step-feed, extended aeration, pure O<sub>2</sub>,
  - Sequencing Batch Reactor (SBR)
  - Deep shaft, deep tank
  - Oxidation ditch
- Biological Nutrient Removal (BNR) Trickling filter
- Rotating Biological Contactor (RBC)
- Pond treatment (stabilization pond, aerated lagoon, etc.)
- Natural treatment (constructed wetland, floating aquatic, overland-flow)
- Membrane Bioreactor (MBR)
- Anaerobic process (Digestion, UASB, anaerobic filter, anaerobic contact, expanded bed)

# Wastewater Treatment Technologies

- Anaerobic Sludge Digester
  - Mixing type (mechanical mixer, pump, gas mixing)
  - Tank shape (cylindrical, egg-shaped, waffle bottom)
  - Gas collection/holder (floating, fixed type)

# Water and Wastewater Treatment Services

- Professional Services
  - Engineering Services
  - Integrated Engineering Services
- Environmental Services



# Engineering Services


- Engineering and consulting services
- Design consultancy services in civil and structural engineering
- Design consultancy services in mechanical and electrical engineering
- Design consultancy services in process engineering
- Design consultancy services in other design engineering
- Consultancy services in project management, construction and installation supervision
- Consultancy services in other engineering field



# Integrated Engineering Services

- Integrated engineering services in turnkey or design-build in water/wastewater projects
- Integrated engineering services and project management for design-build water/wastewater projects

# Mode of Supply

- Local supply and local presence
  - Cross-border supply
  - Consumption aboard
  - Commercial presence
  - Presence of Natural Persons
- 

# Environmental benefits from Goods and Services

- Access to improved water supply, safe drinking water, sanitation, hygiene
- Reduce water related disease in number of illnesses and deaths
- Promote better living and good environmental conditions
- Increased environmental and energy use efficiency
- Create a technology transfer and technical know-how and education in water and wastewater technology
- Create demand for related products and services, i.e., stimulate economy in return (economic activity and employment)
- Create and enhance an improved environment standards for tourism
- Increase an ability to meet overseas export standards and create competitiveness

# Environmental benefits from Goods and Services (cont')

- Relief of pressure on government budgets. Savings can be allocated to others.
- Creation of skilled and unskilled work for the local workers, in design, construction and operation of the facilities.
- Experience of local expertise export to other countries with similar needs and operating conditions.
- Create new opportunities to deploy skills and technologies for both local and foreign companies.
- Potential benefits from enhanced export flows in sub-regional or regional markets.
- Increased foreign direct investment flows may also expand the export of environmental goods and services from developing countries.

# Constraints with respect to Trade, Delivery in Developing Countries

- Technology development and advances are not ready for global competition.
- Locally made goods are limited for export or cross-border trading.
- Trade barrier, high tariff
- Budget constraint with price primarily as a main factor
- Skill level for technology acceptance
- Legal and regulation


# Domestic Regulation

- Registration, license, permits
  - Professional organizations (Council of Engineers, the Engineering Institute of Thailand)
    - License to perform design and project management of certain limitation/capacity in water and wastewater related works
    - Endorsement of design and calculation to be certified by licensed engineer(s)
  - Law and regulation
    - work permit for expats limited no. by management and/or specialist on temporary basis and 1 year stay at a time
    - company structure (limit to 49% foreign ownership)
    - Applicable tax and duties (Remittance tax for oversea engineering charge, import duty, proprietary tax, etc.)
  - Ministries (Labour, Commerce, Science and Technology)

# Domestic Regulation (cont')

- Technical and project specification and requirement
  - Local content preference where applicable
  - Qualification and specification differs and varies
- Procurement procedure of state/government organization
  - Shipping by Thai vessels
  - Tariff imposed on import varying by categories
  - 5% import duty blanket for environmental related projects
  - E-auction with lowest price

# Roles of Regulation, Supportive Policies

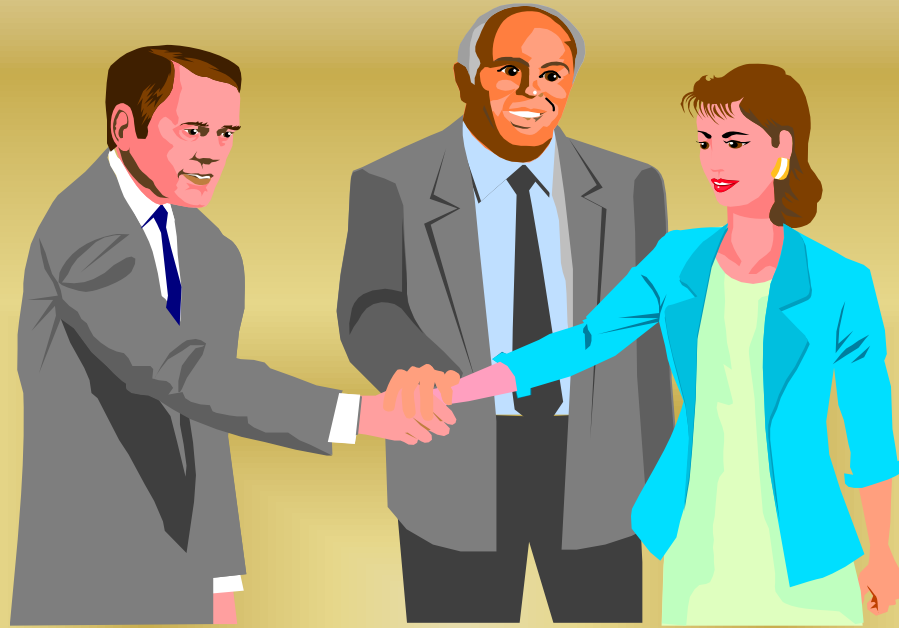
- **Progressive liberalization**
  - **License, permit, qualification and technical specification to be based on fair and transparent basis**
  - **Contract condition on a fair and acceptable with international standards such as FIDIC**
  - **Procurement procedure**
- 





# REMARKS





THANK YOU

