The Swedish Water and Waste Water Sector

Short information
Priorities 2011

- Consequences due to climate changes
- Energy efficiency project
- Water Frame Work Directive implementation
- Crisis and readiness management
- Investments and renewal of technique and water pipes system
- Upstream approach and recycling of nutrients
- New communications strategy
- New research and development strategy
Personell

- In Sweden, water and wastewater issues have always been organised as a municipal utility.
- All these utilities are run by approximately 6 000 persons.
- Of these, 2 000 are technicians at water works and wastewater treatment plants,
- 2 000 work on pipe networks and the rest in the offices.
Three administrative levels

• On the central level there is the Parliament (Riksdagen) and the Government and the various Ministries.
• On the regional level there is the County Administration that has an examining, supervising and co-ordinating function.
• On the local level there are 290 municipalities, which are responsible for planning, construction and operation of the facilities for water and wastewater. The municipalities also own these facilities.
• The median size of a municipality is only 16,000 inhabitants. The largest, Stockholm, has more than 700,000 inhabitants and the smallest, Bjurholm, less than 3,000.
Three main sources of revenue

- Local income tax, income from services and state grants.
- The right to levy taxes is a precondition for local authority independence.
- The fact that local income tax and income from services account for two thirds of municipal revenue means that local authorities retain broad control over the nature of their activities.
- In 2010 the revenue from state grants amounted to 17% of the total municipal income and taxes for 60%. Income from services amounted to 14%.
Sweden is rich in water

- Lakes account for 9% of the total area of the country.
- There are almost 100,000 lakes, 90% of which have an area of less than 1 square km.
- The four largest lakes constitute a quarter of the total lake area.
- The average runoff in all rivers amount to nearly 200 cubic km.
- This means that only 0.5% of the theoretically available resource is extracted for municipal use.
Legal situation

- The effluent from municipal wastewater treatment plants is subject to the licensing rules as expressed in the Environmental Code that succeeded the Environmental Act in 1999.
- The Code is a framework covering most of the legislation relevant to the environment.
- Other major legislation within the field is the Health Act, the Public Water and Wastewater Plant Act, and the Food Act. Drinking water quality is the responsibility of the Ministry of Agriculture with the National Food Administration as the central supervising agency.
- On a local level the municipal committee for environment and health exerts the supervision.
Wastewater pipes

- The construction of interceptors during the first half of the 1900s permitted the collection of wastewater and conveyance to the treatment plant. Up to the mid 1950s this combined sewerage system was used in most places. Since that time, a separated system with one foul sewer and one stormwater sewer has been preferred for new developments.

- Several combined systems have been rebuilt into separate systems, but still some 20 to 25 % of all urbanised areas are served by combined systems. These systems are most commonly situated in the old downtown areas.
Drinking water

• Sweden has slightly over 2000 publicly owned water works
• 10% based on the withdrawal of surface water, serving 51% of the population.
• Some 7% of the works withdraw their water from artificial groundwater and these works serve 23% of the consumers.
• The groundwater-based plants (more than 1 700 in number) serve the remaining 26%.
• There are a total of 7.7 million customers, close to 90% of the total population. The total production may be expressed as 330 litres per person and day.
Drinking water

51% surface water
26% groundwater
23% artificial recharge
Sewerage in Sweden

• 2000 WWPT
• Treat sanitary sewage, stormwater from combined systems, drainage and infiltrated water. $Q_{\text{wastewater}} = 2 \times Q_{\text{drinking water}}$
• All people in urban areas connected to a sewage plant.
• Sweden started the implementation of wastewater treatment early and the most intensive period for construction was the 1960s and 1970s.
• Biological/ chemical and nitrogen removal serve 36%
• Biological/ chemical plants serve 58%
• Biological or chemical only 6 %
• Environmental success! The effluent load 2010 = effluent load 1900
• Sweden may have the most far-reaching effluent standards in the world for treated wastewater.
Limit values

- Emission standards are not used to any great extent.
- Limit values (mg/l): BOD7 10-15
- P 0.2-0.5
- N 10-20.
- WWTP produce 230 000 tons/y sludge
- Contains 6 000 tons of P
- Sufficient to supply up to 8 % of the arable land.
- Only 30 % of the sludge is used in agriculture.
Wastewater

- Treatment
- Drainage
- Pumping stations
- Stormwater
Klagshamns WWTP

90 000 pe
20 000 m³/d
The age of different sewerage pipes

Age - material profil for sewerage pipes (S+A+D) in Malmö 2008
(baserat på datorkörning 2008-01-25)
Sjölunda

550 000 pe
110 000 m³/d
Water mains

• The total length of the water mains is 67 000 km which means 8.8 meters per connected person. These figures do not include the private house connections. If these were to be included the figure could double. The pipe material is 55 % cast iron, 19% PVC, 14 % PE and the rest other materials. PE is the dominating material in new pipes.
Sewerage pipes

- The total length of the sewers amounts to 92 000 km, of which 32 000 consists of stormwater sewers. This gives an average of 12 metres per connected person. The figures here, as well as those for water mains, do not include the house connections. The pipe material is 80% concrete, 13% PVC, 3% PE and the rest other materials.
Revaq – Sludge recycling
Costs

- During 2010, the total costs for running the publicly owned facilities in Sweden were SEK 16 billion including an additional VAT charge of 25%. Out of this cost, 42% may be referred to the production and distribution of drinking water and the remainder to the collection and treatment of sewage. Of the total cost, 37% is the cost of interest on capital. The value of all the assets may be estimated at SEK 500 billion, of which 350 or 70% is for the infrastructure, i.e. the pipe network.
Fees

- Connection fees
- Rates for managing water supply and wastewater
- The tariffs cover on average 99% of the total costs of operation and capital. The remaining 1% is put on the local authority, i.e. municipal tax. All the large municipalities cover all their costs by means of tariffs. Two thirds of municipalities cover the full cost by tariffs.
Ongoing research in Sweden

- Research in water policies, politics
- Treatment of water and wastewater
- Monitoring, evaluation of operation
- Chemical and microbiological analysis
- Usage of resources (water, sludge, biogas, energy)
- Environmental system assessments – ecology, water flows, sustainability
- Very little research on pipes
- Very little research on maintenance
- Modest research on economy and management
Chalmers: Drinking water treatment; risk assessments; safety

Luleå: Storm water management; treatments in cold climate

KTH: Wastewater treatment

Linköping: Water policy; water sensors

Lund: Wastewater treatment; drinking water treatment; water policies; hydrology; hydraulics