Implementation of UWWTD in Germany and its linkage with WFD

Warsaw, Sep. 26, 2011
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legal situation

- Federal Structure – legislative power distributed between Federal Government and Federal States
- Framework competence of the Federal Government
- Complementing legislation of Federal States
- Enforcement with Federal States
- Municipalities responsible for water supply and waste water treatment
- EU legislation covering both Federal Government and Federal States competences
legal requirements for waste water discharges

Waste Water Ordinance – Federal Ordinance

long history since mid seventies

WWO stipulates

➤ technological derived standards for urban and industrial sectors (minimum requirements)

➤ standards for discharge to public sewer systems

➤ emission values including nutrient removal (N+P) for UWWTs since 1989,

➤ coherent monitoring strategy for all discharges – different to regulations of UWWTD

➤ immediate applicable for new installations
legal requirements for waste water discharges

Waste Water Ordinance – Federal Ordinance

but has

▶ no explicit time limits for retrofitting of existing installations
▶ no explicit dependency on classification of receiving waters
▶ no regulations on monitoring frequency

⇒ Federal States competence
Waste Water Charges Act
additional legal instrument + incentive

- charge for discharge of waste water levied by the FS
- based on noxiousness of the waste water
- revenue accruing from waste water charges used for measures for maintaining or improving water quality
- 50% reduction of charges by compliance with BAT
- costs of construction or enlargement of a waste-water treatment plant may be set off against the charges due for WWCA
Reunification – different situations in both parts
population density / connection rate to waste water treatment plants

»old Länder« ~ 90 % biological treatment

»new Länder« ~ 60 % biological or mechanical treatment

European situation from ~40 % to ~100 % connection rate
The situation in Germany prior to UWWTD implementation

Implementation of UWWTD in Germany

Specific problems in implementation of UWWTD

WFD water management problems / urban waste water

Lessons learned

Legal implementation

Federal and Federal states legislation required

- Waste water ordinance stipulating
  - emission standards using the German method
  - monitoring methods to be applied
  - sampling/compliance procedures (2h samples, gliding 80 percentile)

- 16 Federal states ordinances stipulating
  - sensitive areas (since 2007 whole Germany catchment of sensitive area)
  - agglomerations (mostly catchment of 1 treatment plant)
  - minimum sampling frequencies..

- use of article 5(4) for assessment of nutrient reduction requirements
### emission standards

<table>
<thead>
<tr>
<th>Parameter</th>
<th>emission standard [mg/l]</th>
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<tbody>
<tr>
<td></td>
<td>UWWTD</td>
</tr>
<tr>
<td>COD</td>
<td>125</td>
</tr>
<tr>
<td>BOD(_5)</td>
<td>25</td>
</tr>
<tr>
<td>P</td>
<td>2-1</td>
</tr>
<tr>
<td>N(_{tot})</td>
<td>15-10</td>
</tr>
<tr>
<td>N(_{inorg})</td>
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</tr>
</tbody>
</table>
check for compliance with UWWTD regulation

Annex D ... Alternative methods to those mentioned in paragraphs 2, 3 and 4 may be used provided that it can be demonstrated that equivalent results are obtained....

Method comparison probability of noncompliance using different monitoring strategies (parameters, sampling frequency...) applied to modeled discharges (research project using all available information in Germany)
advances of German Monitoring strategy

- consistent system for all waste water discharges
- less averaging out of emission peaks
- immediate availability of results
- requires only yes / no information
- no storage of retain samples
- less analytical costs through screening methods
## Development of waste water treatment in Germany

<table>
<thead>
<tr>
<th>Year</th>
<th>Germany</th>
<th>»Old Länder«</th>
<th>»New Länder«</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>-</td>
<td>91</td>
<td>--</td>
</tr>
<tr>
<td>1987</td>
<td>-</td>
<td>93</td>
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<td>1991</td>
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<td>75</td>
</tr>
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<td>1995</td>
<td>92</td>
<td>95</td>
<td>77</td>
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<td>1998</td>
<td>93</td>
<td>96</td>
<td>80</td>
</tr>
<tr>
<td>2001</td>
<td>95</td>
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</tr>
<tr>
<td>2005</td>
<td>96</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2007</td>
<td>96</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Development of waste water treatment in Germany

10,000 plants / 150,000,000 pe
Development of waste water treatment in Germany
Development of waste water treatment in Germany

load reduction acc. Art. 5(4)

<table>
<thead>
<tr>
<th>Parameter load reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
</tr>
<tr>
<td>N</td>
</tr>
</tbody>
</table>

- factually compliant since 2002
- in spite of delays in some projects
- necessary freedom to cope with some delays
reasons for high costs in the »new Länder«
- FMMs (frequently made mistakes) -

- overestimation of needed capacity
  - drinking water consumption dropped to 1/3 (often << 100 \(1/\text{capita } \ast d\))
  - industrial decline and unrealistic expectations in industrial development

- insufficient planning and control
  - sudden organizational changes
  - insufficient technical and financial expertise at municipality level
  - insufficient guidance / control from regional / Länder level (technical & financial)
  - rural areas

- unclear legal basis for tariffs (cost recovery)
- depreciation calculations
urban waste water as source of pollution

- no problems organic pollution (untreated waste water)
- relevant source for nutrients
- relevant source for heavy metals
- relevant source for priority substances
- higher discharge loads from storm water events / rain water compared to regular operation
  - key point for future work
heavy metals in urban waste water

content in sewage sludge (in Perc. of Maximum)

- Cadmium
- Chromium
- Copper
- Lead

Year:
- 2006
- 1998
- 1990
- 1982
- 1977
The situation in Germany prior to UWWTD implementation

Implementation of UWWTD in Germany

Specific problems in implementation of UWWTD

WFD water management problems / urban waste water

Lessons learned

Heavy metals in urban waste water

<table>
<thead>
<tr>
<th>Category</th>
<th>Copper (t/a)</th>
<th>Zinc (t/a)</th>
<th>Lead (t/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load stormwater</td>
<td>119.3</td>
<td>459.2</td>
<td>25.5</td>
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<tr>
<td>Load UWWT discharges</td>
<td>101.1</td>
<td>204</td>
<td>102.8</td>
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<tr>
<td>Other zinc coated products</td>
<td>58.9</td>
<td>151.7</td>
<td>9.7</td>
</tr>
<tr>
<td>Drinking water systems</td>
<td>72.2</td>
<td>480.3</td>
<td>16.9</td>
</tr>
<tr>
<td>Building materials</td>
<td>16.9</td>
<td>16.9</td>
<td>9.7</td>
</tr>
<tr>
<td>Traffic (i.a. tyres und brake pads)</td>
<td>9.7</td>
<td>47.3</td>
<td></td>
</tr>
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<td>Drinking water systems</td>
<td>9.7</td>
<td></td>
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<tr>
<td>Load UWWT discharges</td>
<td>72.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discharges to surface water [t/a]</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UWWT implementation / WFD linkage

WFD water management problems / urban waste water

Lessons learned
Nutrients – Eutrophication problems in coastal areas

Consequences for WFD-POM planning

- nutrient removal legally and practically implemented according to UWWT
- substantial part of smaller plants with nutrient removal
Nutrients – Eutrophication problems in coastal areas
Consequences for WFD-POM planning

- analyses of reduction potentials
- overall cost comparison
  - higher sophisticated techniques for big plants
  - nutrient removal on smaller plants
  - measures targeting diffuse inputs
Lessons learned

- cost savings through
  - good conceptual, technical and financial planning
  - legal framework for cost recovery + guidance
- regulations and improvements for indirect discharge
- careful analyses for WFD measures
- remaining problems – diffuse contamination and stormwater discharges