

NATO Workshop on Physical and Cyber Safety in Critical Water Infrastructure  
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## Overview: Preparedness in the European/German sanitation and sewerage systems

Martin Oldenburg

University of Applied Sciences Ostwestfalen-Lippe, Germany  
Department of Environmental Engineering and Applied Informatics

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## Wastewater Treatment in Germany

class	Size (p.e)	Number		Plant size		Connected p.e.		Treated volume	
		Number	Rate [%]	[mio p.e.]	Rate [%]	[mio p.e.]	Rate [%]	[mio m³]	Rate [%]
	<b>total</b>	<b>9.632</b>	<b>100</b>	<b>152,1</b>	<b>100</b>	<b>119,7</b>	<b>100</b>	<b>9.988</b>	<b>100</b>
1	< 1.000	4.135	43,1	1,5	1,0	1,1	0,9	113	1,1
2	1.000 – 5.000	2.387	24,8	6,0	3,9	4,5	3,8	528	5,3
3	5.000 – 10.000	864	9,0	6,2	4,1	4,9	4,1	511	5,1
4a	10.000 – 50.000	1.657	17,2	37,9	24,9	29,5	24,7	2.740	27,4
4a	50.000 – 100.000	315	3,3	22,2	14,6	16,8	14,1	1.373	13,8
5	> 100.000	256	2,7	78,3	51,4	62,8	52,5	4.722	47,3

Connection rate to public wwtp > 95 %

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## Wastewater sector in Germany and Europe

- Germany
  - Population: 82.8 mio
  - length of wastewater sewer: 575.580 km
  - wastewater volume: 10 bn m³ per year
  - no. of wwtp: 9.632
  - > 50.000 p.e. 571
  - (60 % of treated ww)
- Europe
  - Population: ~ 525 Mio.
  - length of wastewater sewer: ~ 3 mio. km
  - no. of utilities: > 18,000

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## Environmental data

- In Germany: open access to environmental data

The screenshot shows the 'Umwelt.de' website interface. A search bar contains the word 'Wasser'. Below the search bar, there is a table of environmental data points. Each row includes a checkbox, a description of the data point, and a date. The table is partially visible, showing various categories of environmental data.

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## Cyber Security in Germany

- Risk Assessment (Sektor Study in 2015)
- Standard Guideline  
DWA-M 1010 (DVGW W 1001)  
IT-Safety – Standards Water/wastewater  
August 2017
- Safety Standard water/wastewater (B3S WA)  
March 2018  
certified by Federal Office for Information Security (FOIS)  
(first standard in general)

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### Critical scenarios (risk assessment)

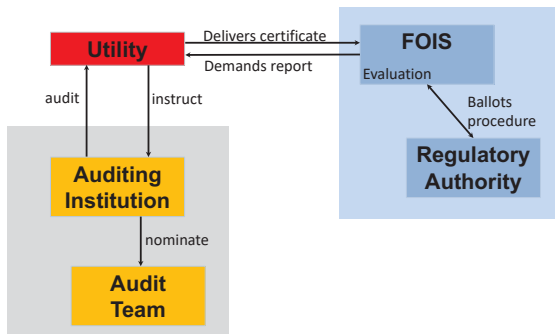
- Sewer system:
  - < 1 d: - flooding of catchment areas
    - impact on buildings and road infrastructure
    - impact on surface and ground water
  - > 1 d: - no transport of polluted wastewater; impact on hygiene
    - flooding of agricultural areas; loss of products being harvested
    - flooding of infrastructure systems (transport etc.)
- Critical elements:
  - Pump control systems
  - Process control system
  - Sensors and sensor systems

### Critical infrastructure systems wastewater

- Utilities which serve ww-transport and treatment for > 500,000 p.e. or are operating wwtp > 500,000 p.e. belong to critical infrastructure systems.
- Membership in IP KRITIS is mandatory.
- IT-security has to be in accordance to legal demands (deadline 18.03.2018; renewal every 2 years).
- For small utilities Sewer system the membership „alliance for cyber security“ is recommended.

### Industry specific security standard (B3S WA)

Certification process



### Documents necessary for certification

Following documents have to be delivered to FOIS (BSI)

- Sheet KI: information on the audited critical infrastructure and the contact person
- Sheet PS: information on the suitability of the auditing body and the audit team
- Sheet PD: information on how the audit is to be performed
- Sheet PE: information on the audit result and the security deficiencies identified

### Tasks of the operator (utility)

Following information are necessary at audits beginning:

- Scope
- Identification and documentation of the relevant processes
- Creating a risk analysis and assessment
- Design, realisation and documentation of the appropriate safety procedure

### Risk assessment

Evaluation of the following aspects:

- Control of entrance
- Back-up strategy
- Fire protection facilities
- Operation during electricity cuts
- Redundance of control systems
- Control of access for special areas like server room
- Qualification of staff
- Concept during failure of process systems
- Protection of buildings
- Remote access
- Integration of external buildings in the control system

### Tasks of the operator (utility)

- Identification and instruction of auditing institution (list of certified auditing institutions available on FOIS homepage)
- Execution of audit
- Preparation of the report
- Delivering of certificates

### Demands on the audit team

- At least 2 persons
- Competences on the field of:
  - Special procedures in accordance to the demands of FOIS
  - Auditing competence
  - Cyber security competence
  - Competence in the branch

### Estimation of effort for the audit

Staff, involved in the area of scope	Audit days
1 -10	2
11 - 15	2.5
16 - 15	3
> 25	4

Depending on the number of applications an increase of max. 25 % is possible.

### Time effort for the audit

Phase	Activity	Time shares
Step 1	Preparation of the audit as well as examination of the suitability of the scope	5 %
Step 2	Creation of the audit plan	5 %
Step 3	Checking of documents	25 %
Step 4	On-site inspection	55 %
Step 5	Follow-up of the on-site inspection	5 %
Step 6	Drawing up of the audit report	5 %

### Deficities categories

- Auditors may use the following deficite categories:
  - Severe or significant deviation and security deficiency, respectively
  - Minor deviation and security deficiency, respectively
  - Recommendation
  - No deviation

### Conclusion and outlook

- Assessment of cyber security for wastewater facilities behind water facilities
- Procedure for systems > 500.000 p.e.
- Formalised procedure of certification
- Experience has to be achieved from projects