Overview of the Technical Infrastructure of the European XFEL

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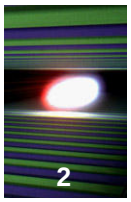
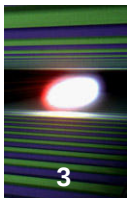
DESY, MKK/WP34

Organization of European XFEL



- The European XFEL is an own company, XFEL GmbH
- DESY is one of the shareholders
- The European XFEL project is organized in work packages, which are combined into six separate work package groups.
  - WPG-1 LINAC
  - WPG-2 Accelerator Subsystems
  - WPG-3 Photon Beam Systems
  - WPG-4 Control & Operation
  - WPG-5 Infrastructure
  - WPG-6 Sites & Buildings

Task Area of Work Package 34

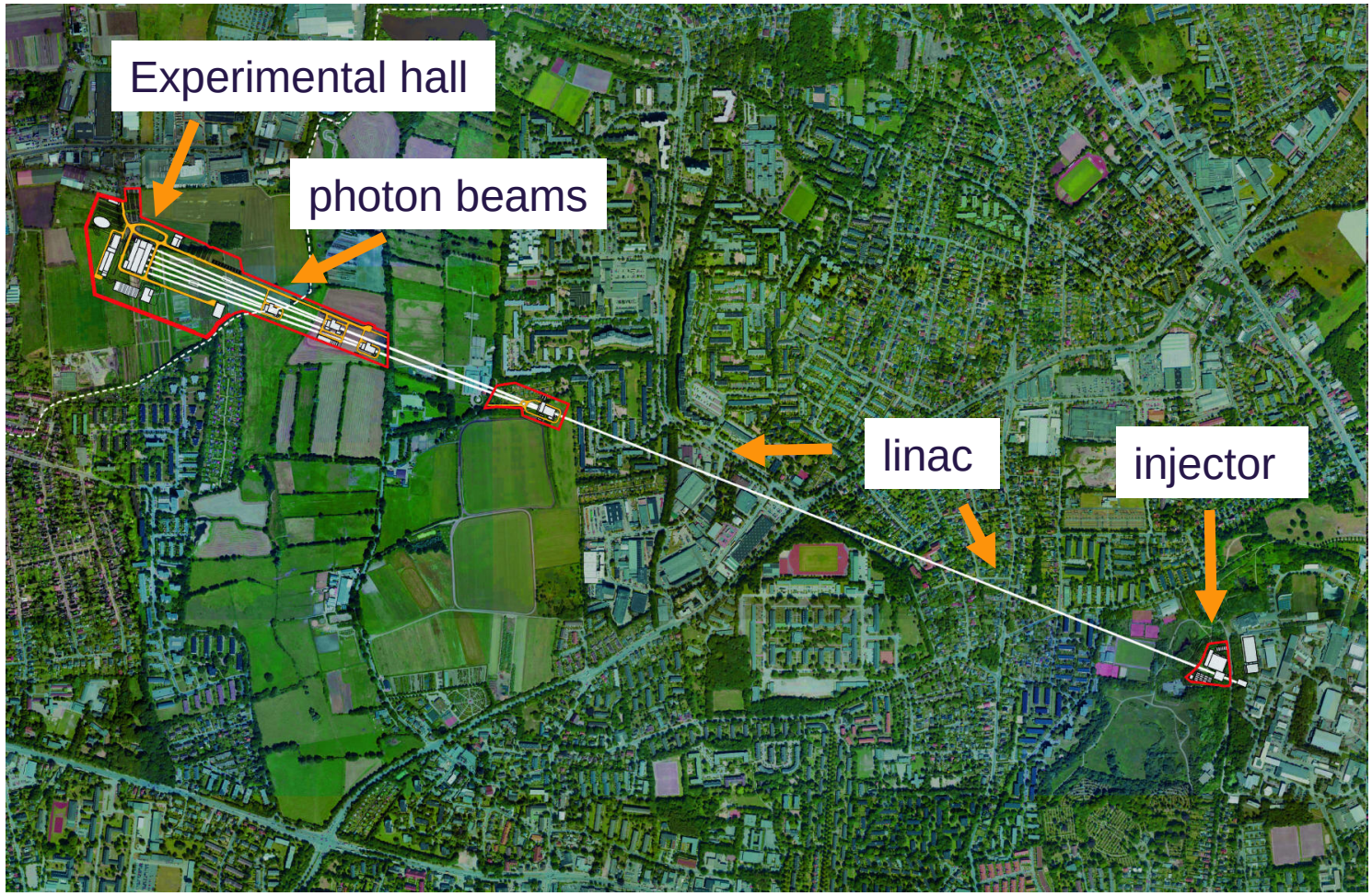


WP-34 Utilities belongs to WPG-5 Infrastructure

- High Power Supply, Emergency Power, UPS
- Water Cooling, Cold Water, Compressed Air
- Heating
- Ventilation and Air Conditioning
- Process Control and Automation
- Protection and Safety Systems
- IT Communication Networks
- Power Supplies for Magnets

This covers the DIN 276 “costing in building construction”

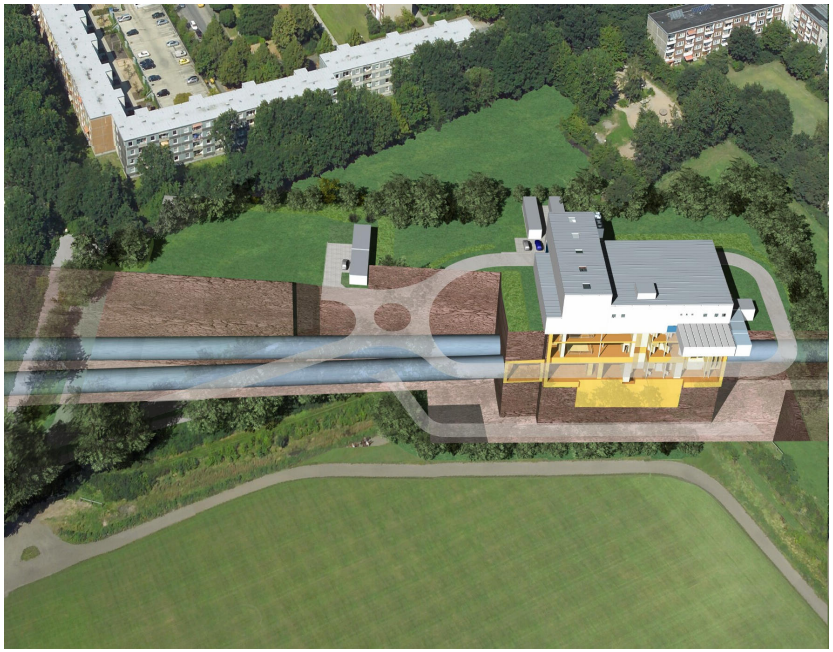
XFEL Site



DESY Premises

Injector and Entrance Shaft

Separation Shaft Osdorfer Born



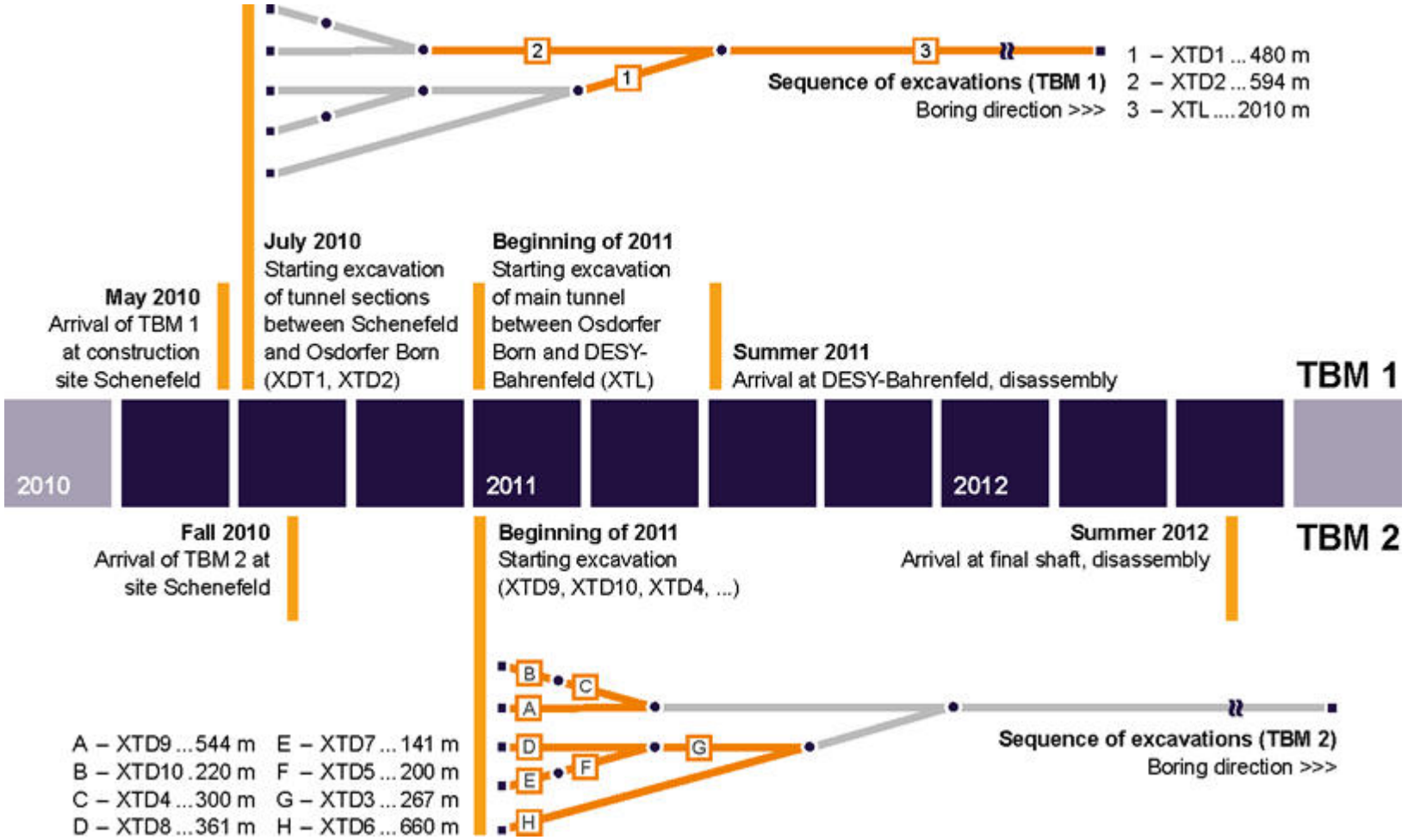
Tunneling Machine TULA

TULA: TUnnel for LAser

TULA bored the first tunnel XTD1 and arrived at XS1 shaft on September 6

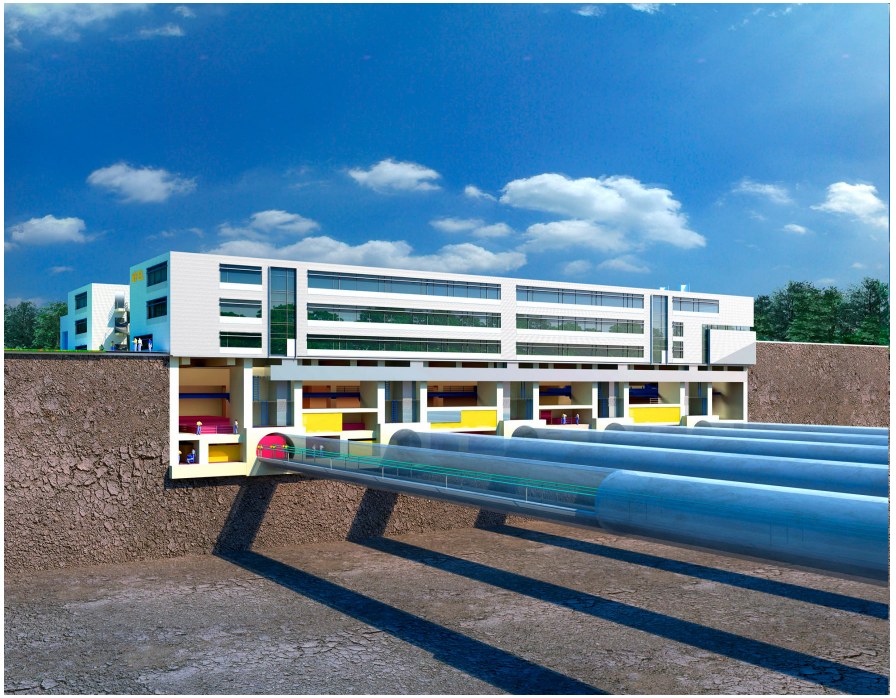
European XFEL

Tunnel Boring Scheme



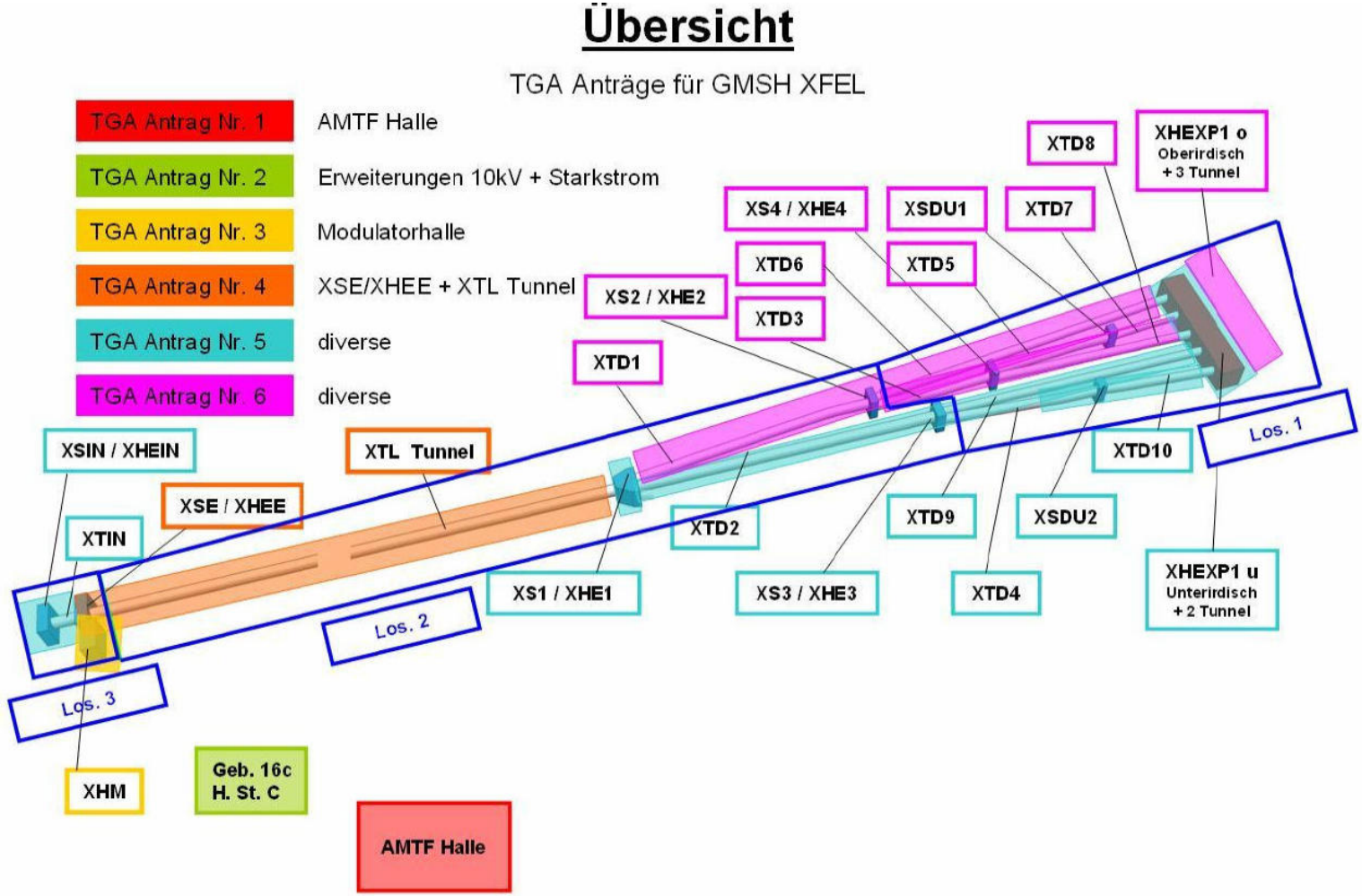
Construction Site Schenefeld

Experimental Hall Schenefeld



Schenefeld Premises after Construction

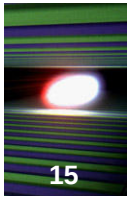
Schedule of Technical Infrastructure



High Power Supply

Electrical Power	17,5 GeV, 10 Hz	
	Power	Energie
XFEL cryogenic plant	2.3 MW	14.6 GWh
Modulator hall, XSE, XHEE, Injector XIN, XTL-tunnel	7,0 MW	40.2 GWh
Shaft XS1, hall XHE1 tunnel XTD1, XTD2	2.9 MW	16.1 GWh
Shaft XS2-XS4, hall XHE2-4, tunnel XTD3-10	2.2 MW	14.4 GWh
Sum XFEL machine	14.4 MW	85.3 GWh
Experimental hall XHEXP1	3.4 MW	18.6 GWh
Sum XFEL	17.8 MW	103.9 GWh

Water Cooling, Chilled Water, Compressed Air



- **LCW water**
  - Supply temperature: 30 °C
  - Nominal pressure PN: 10 bar
  - Pressure difference: 4 bar
- **Rack cooling water**
  - Supply temperature: 20°C
  - Nominal pressure PN: 10 bar
  - Pressure difference: 4 bar
- **Cold water for air conditioning**
  - Supply temperature: 20°C

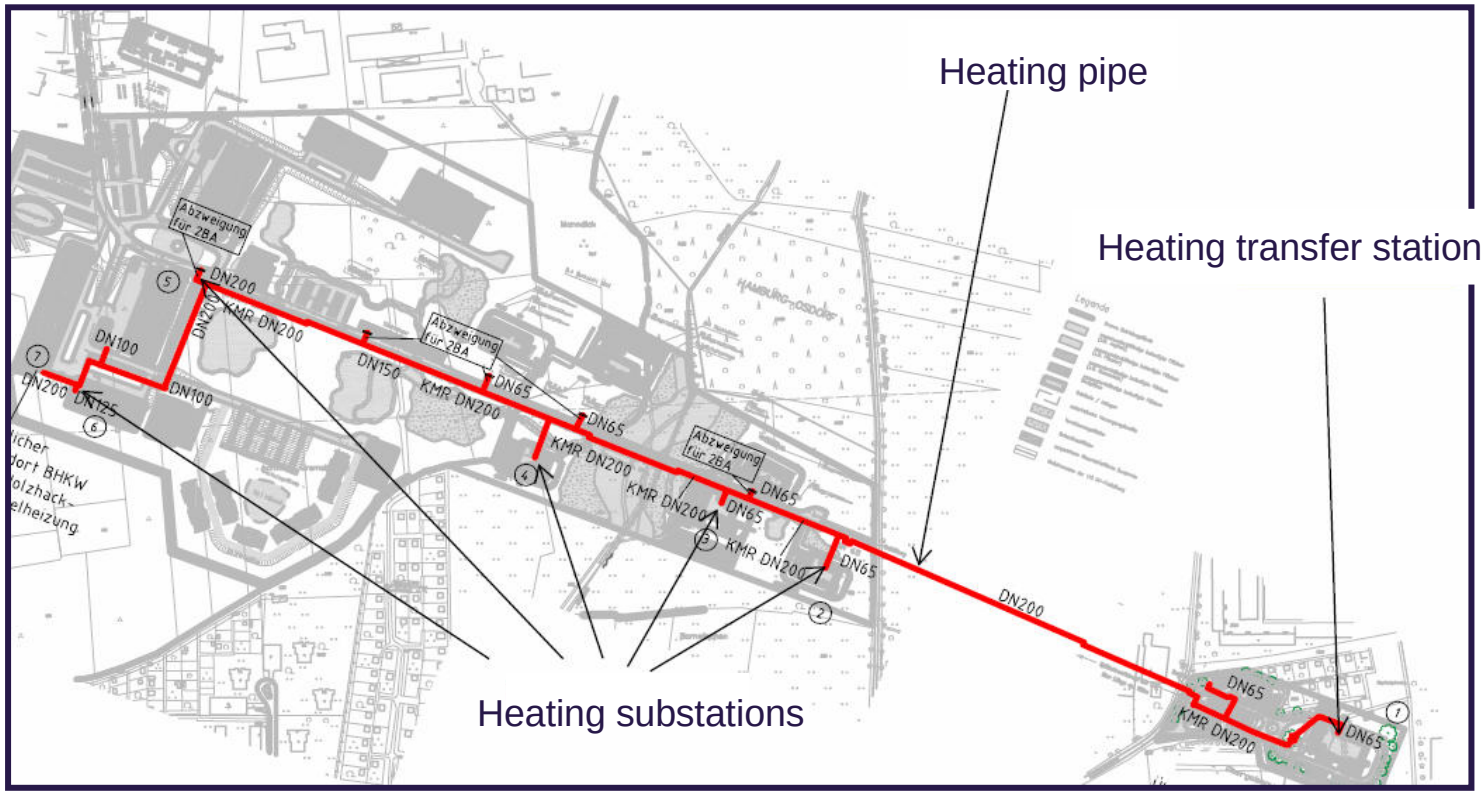
Water Cooling, Chilled Water, Compressed Air

Water pumps

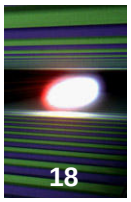
Cooling tower

Heating of Osdorfer Born and Schenefeld Premises

- District heating foreseen
- Transfer station at XSE1, Osdorfer Born



Ventilation and Air Conditioning



Requirements are multi-purpose

- Air exchange
- Remove moisture and heat loses
- Heating in winter and shut down time
- Temperature control of the room
- Remove smoke

VAC systems are cost drivers

- Voluminous ventilation ducts
- Large air handling units
- Building size is influenced by VAC systems
- Operation costs for cooling, air dryer, heating etc

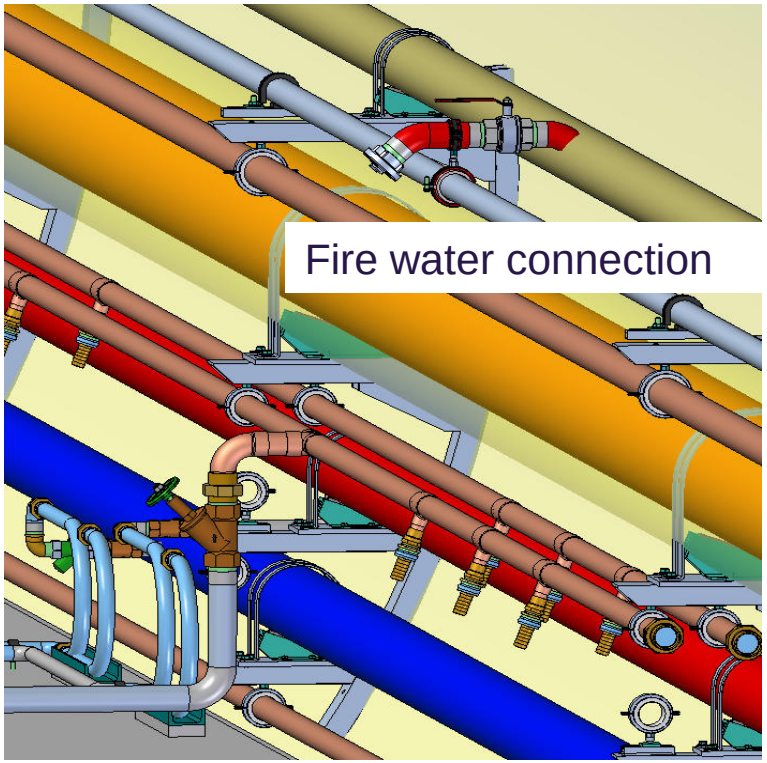
Process Control and Automation

- Control and regulation of water cooling systems
- Process data archiving utilities and technical infrastructure
- Alarming shift crew and workshops

Cabinet for water pumps

Protection and Safety Systems

- Safety concept for underground shafts and tunnels
- Long XTL tunnel, 2100 m => long escape routes
- Fire walls every 600 m => escape time max 7 minutes

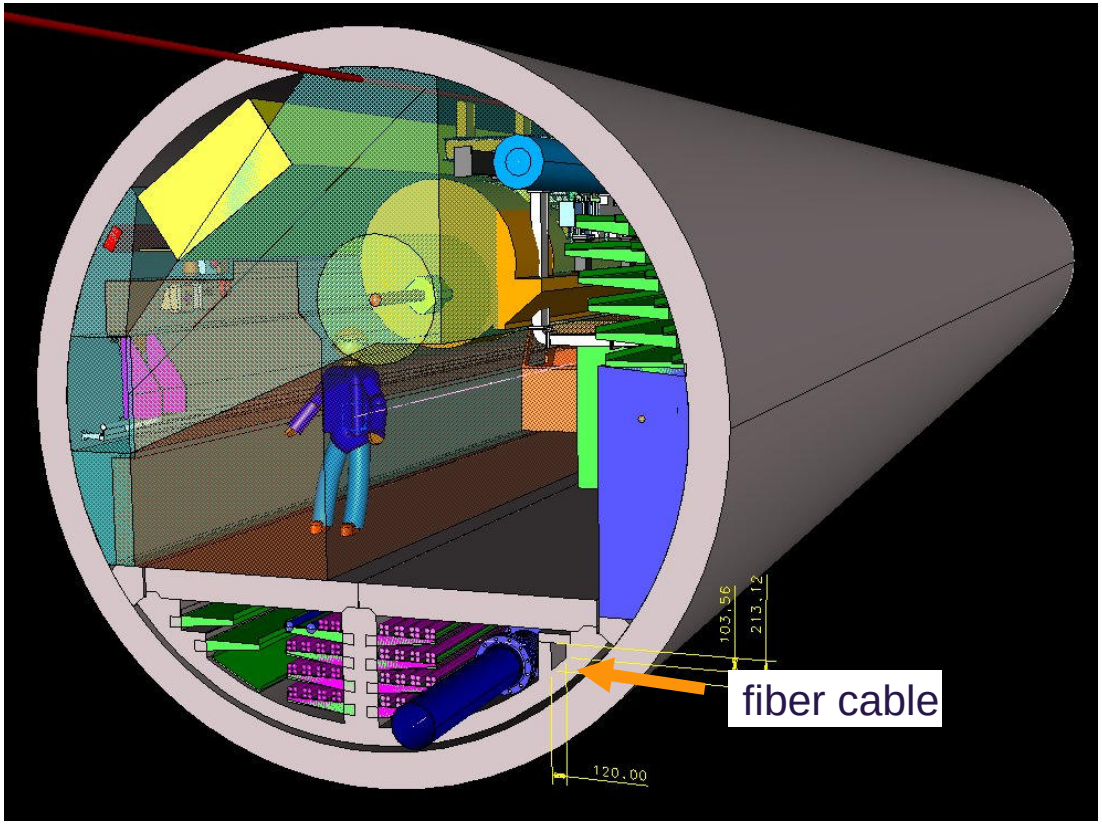


Fire water connection

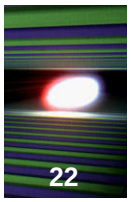
IT Communication Networks

- Fiber cable in the tunnel
- Temperature and moister influence the delay time

XTL tunnel



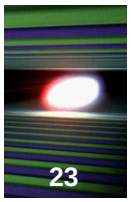
Conclusion



- The field of activity of utilities and technical infrastructure is large
- The requirements are often hard to fulfill or oppositional
- We have to find the best solution
  - According to the requirements
  - Cost-effective and easy to maintain
  - In the budget and in time

- This is a challenge
- Therefore we need
  - your experience and
  - your expertise

Conclusion



Thank you for your interest and your participation