



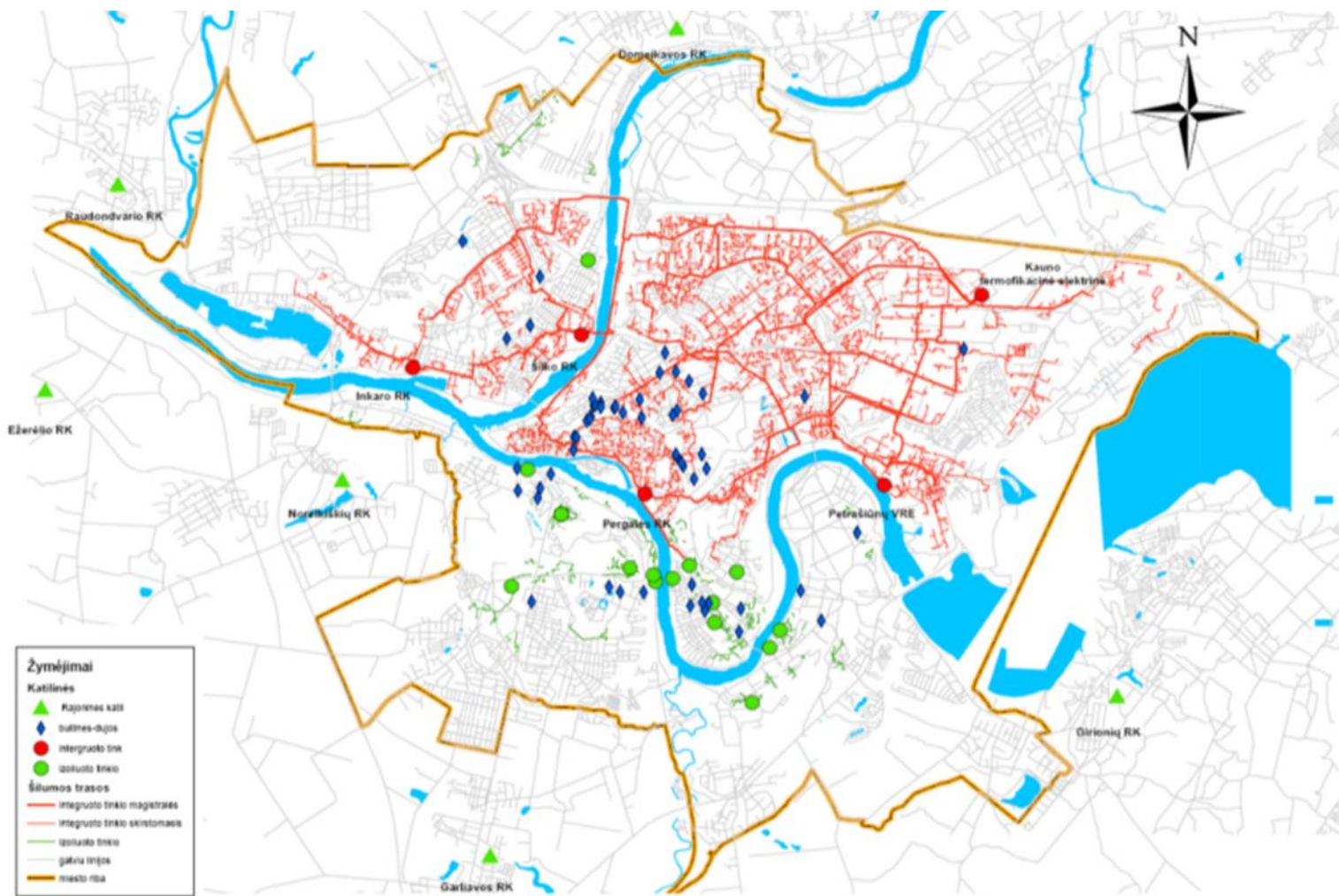
ASSETS MANAGEMENT IN THE LITHUANIAN DISTRICT HEATING NETWORKS

Dr. Valdas Lukoševičius

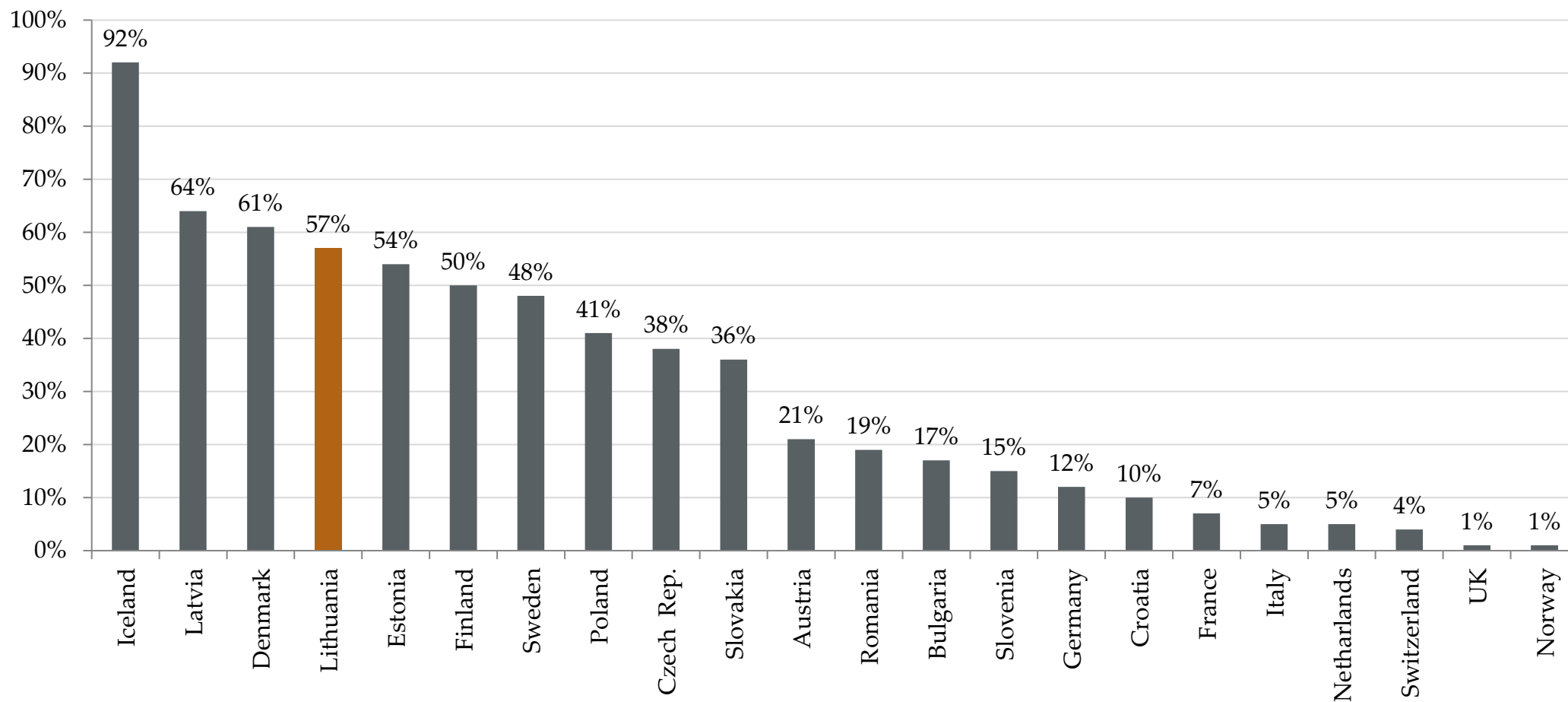
District heating in Lithuania

Annual DH production	~ 9 TWh
Heat losses in DH networks	15 %
Used heat production capacity	~ 3175 MW
The length of DH pipelines	2872 km

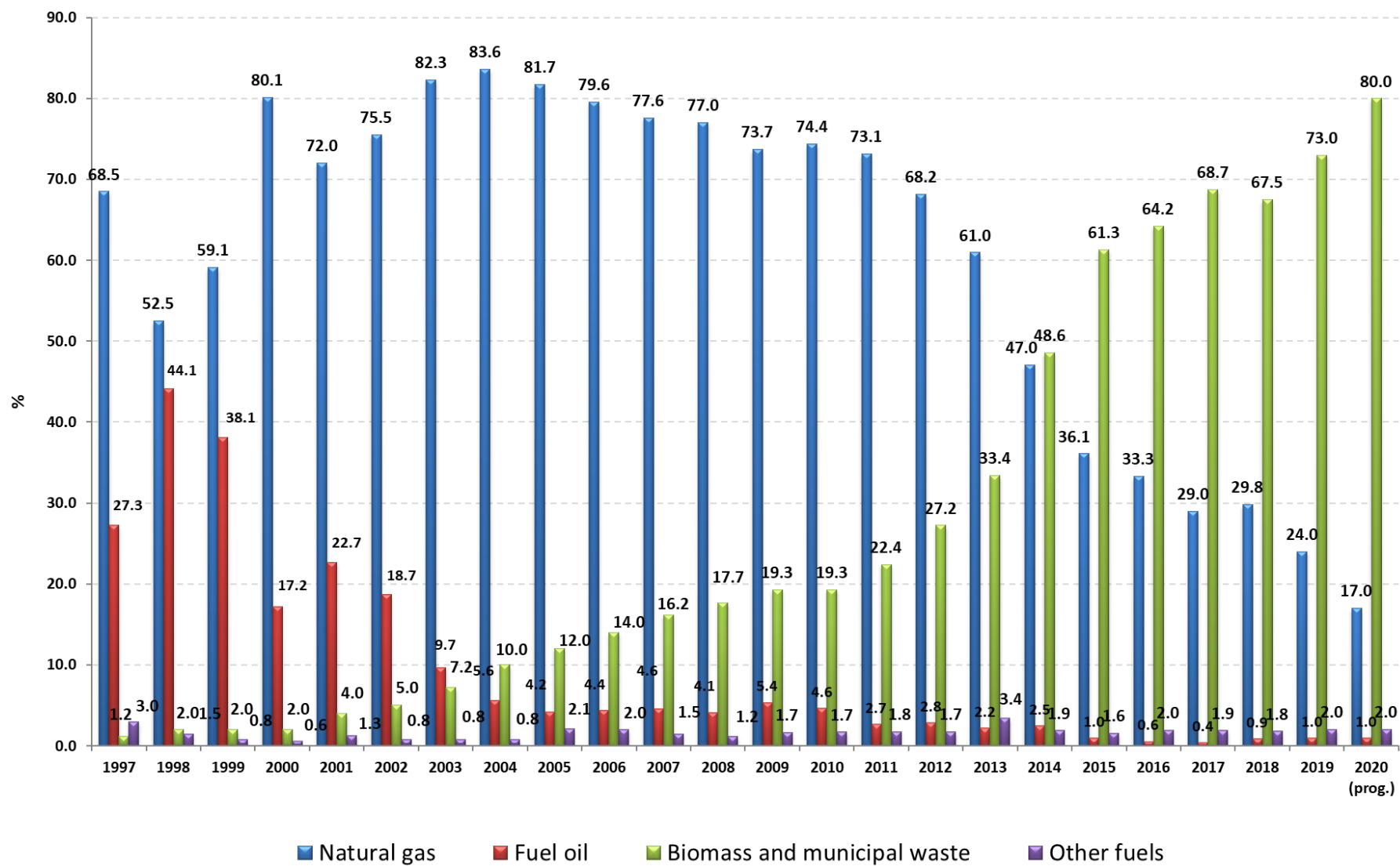
DH networks have been installed in all cities and towns



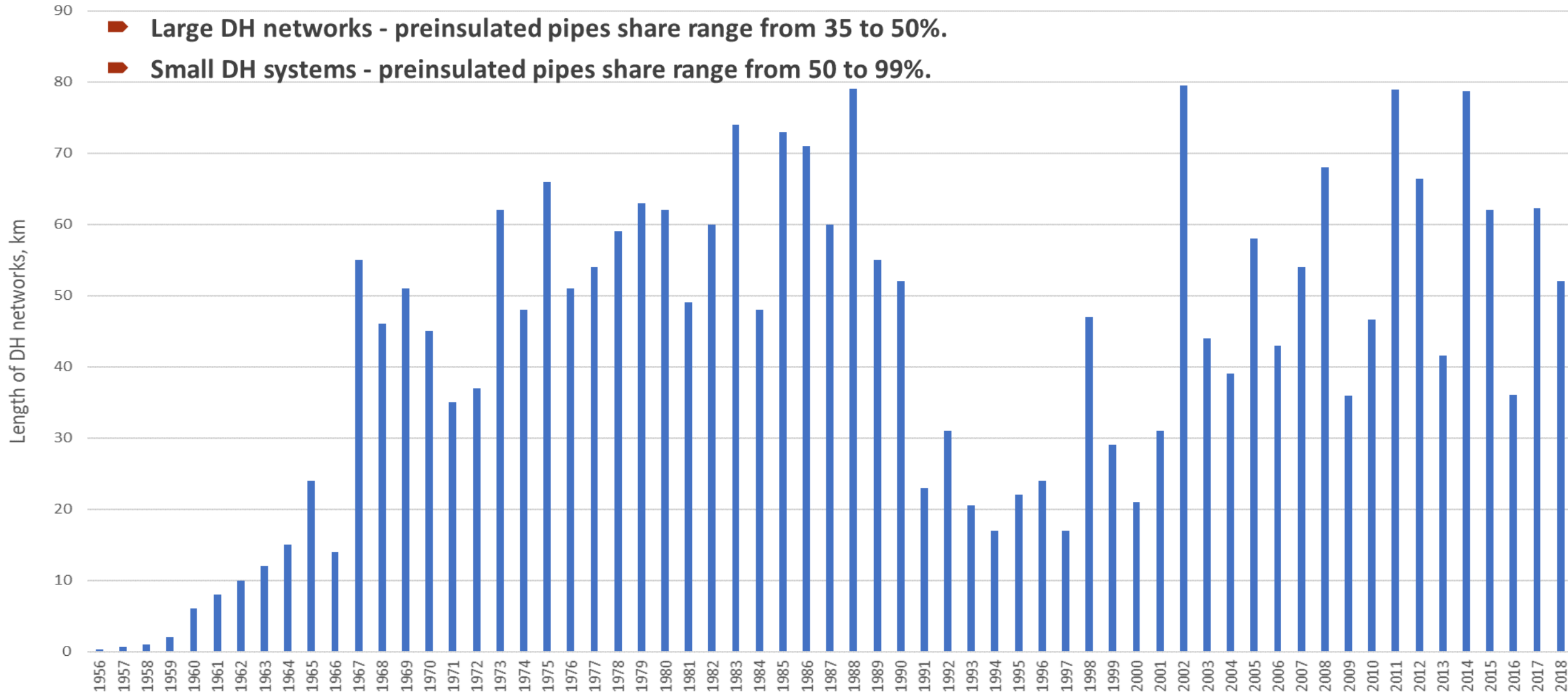
District heating share in European countries



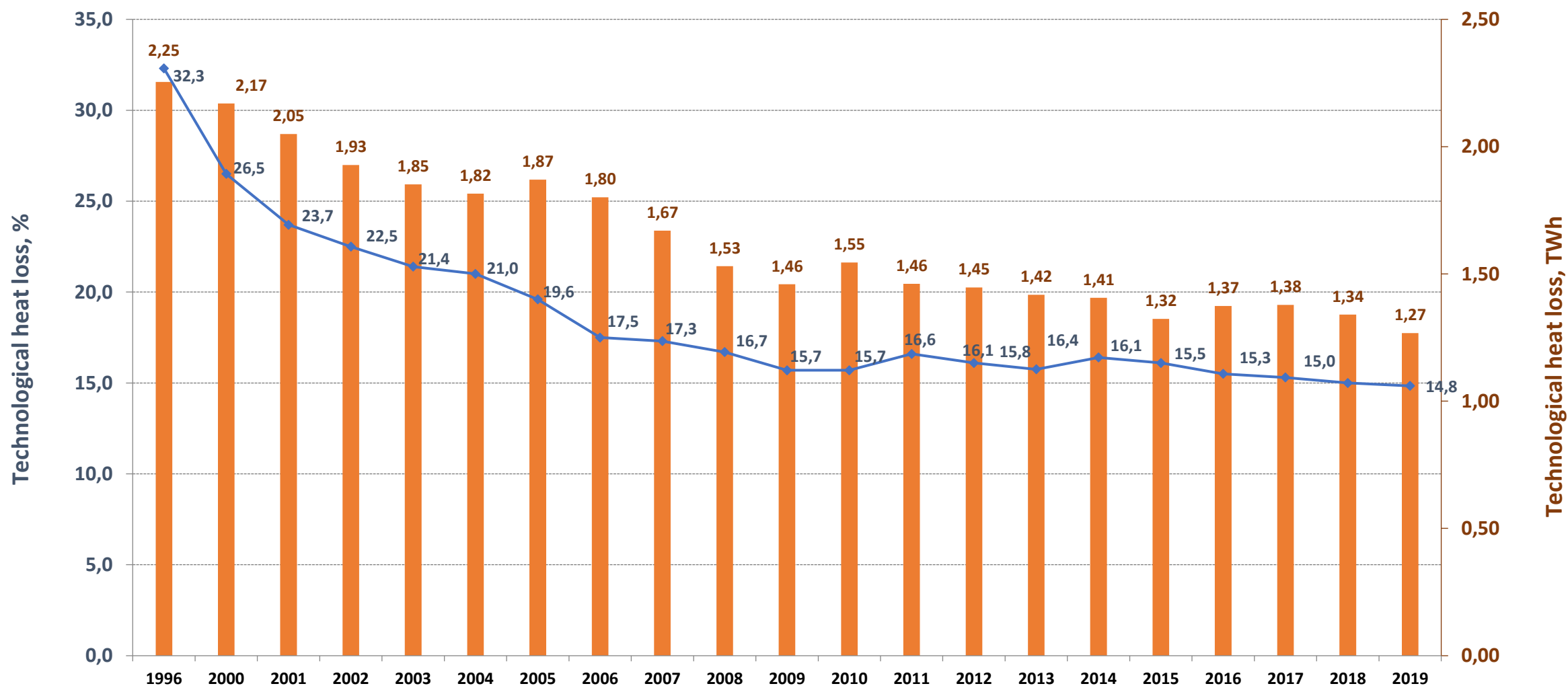
RES and natural gas share



Annual replacement and expansion of DH networks, km



Heat losses in the DH networks

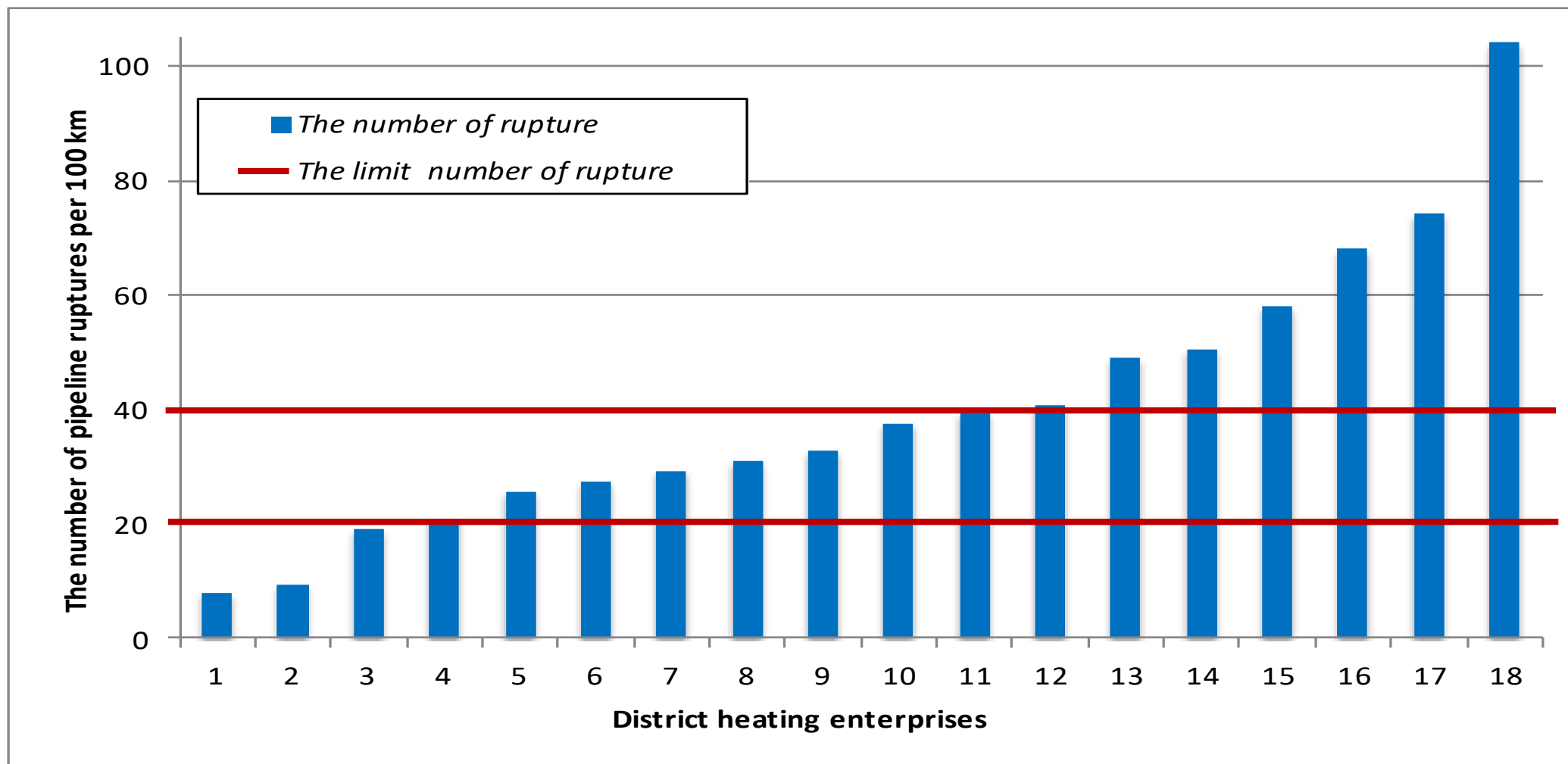




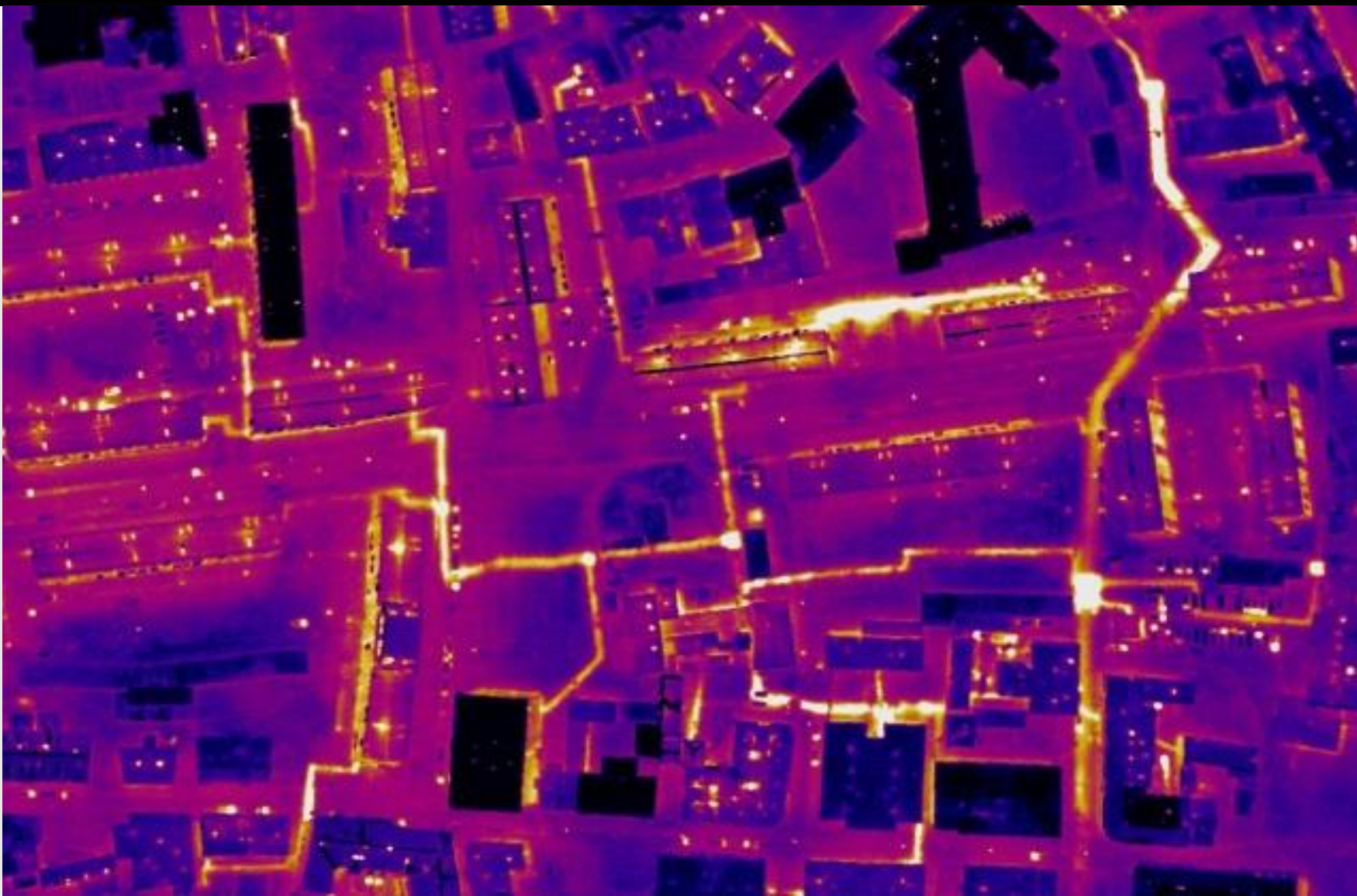
Management of DH supply reliability



Most failures caused by external corrosion



LEAK DETECTION – THERMAL VISION

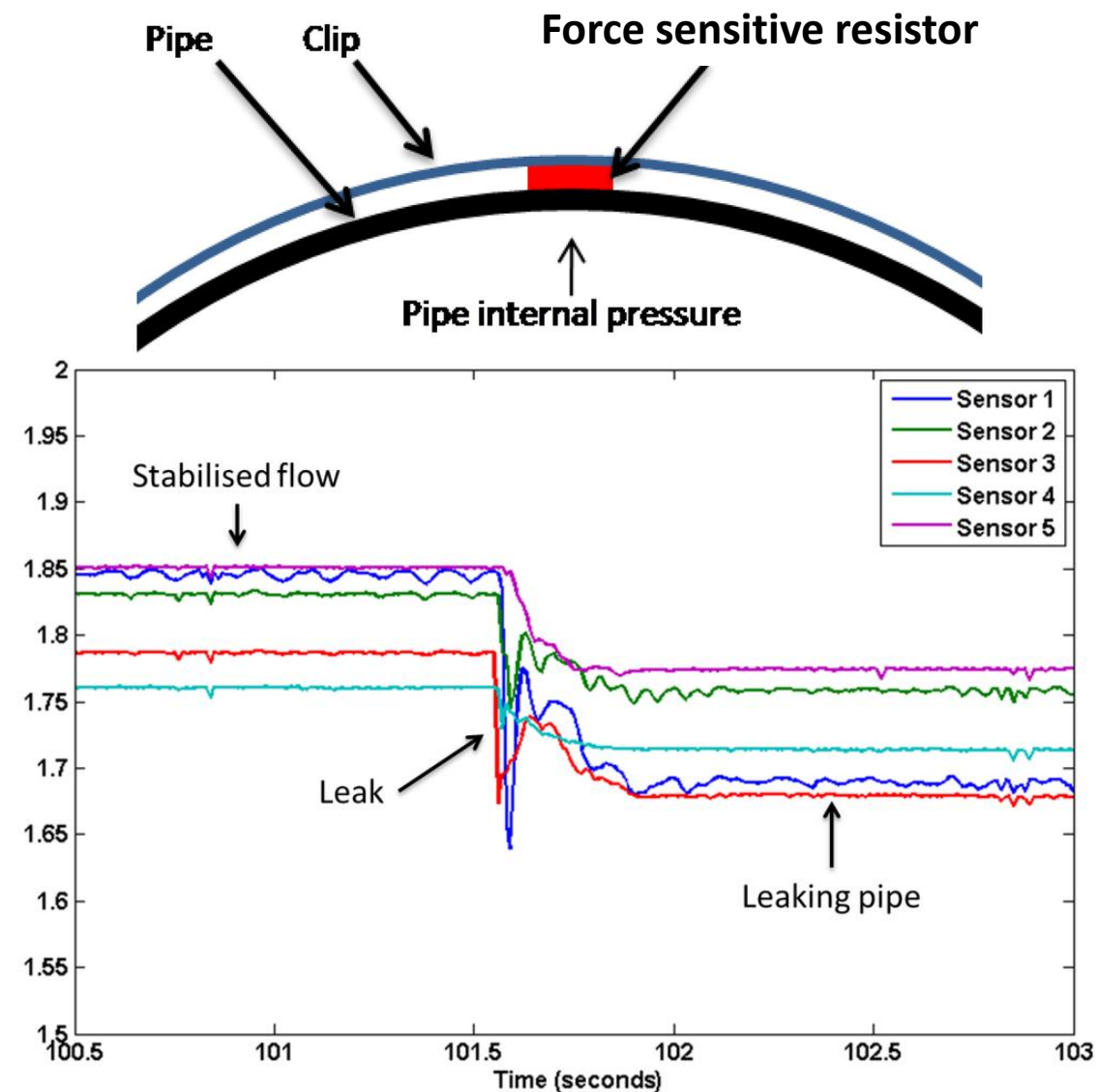
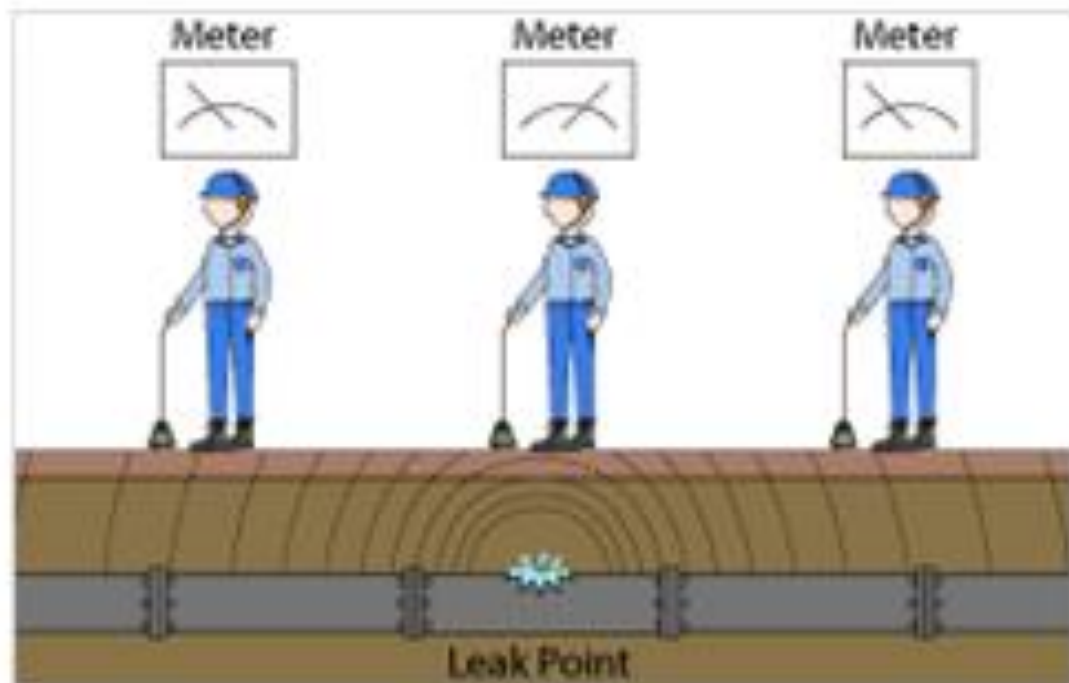


Regulation of pressure testing

- The reliability of underground pipelines is assessed according to the results of the annual hydraulic tests.
- Pressure test **must** be carried out **annually** in each DH network
- **Prior to the start of the heating season**, repaired networks must be hydraulically tested for leaks and strength.
- Each section of the district network must be tested at a pressure of **1.25 working pressure, but not less than 16 bar**.
- **The first hydraulic test** for preinsulated pipelines is performed **after 10 years after their start-up**

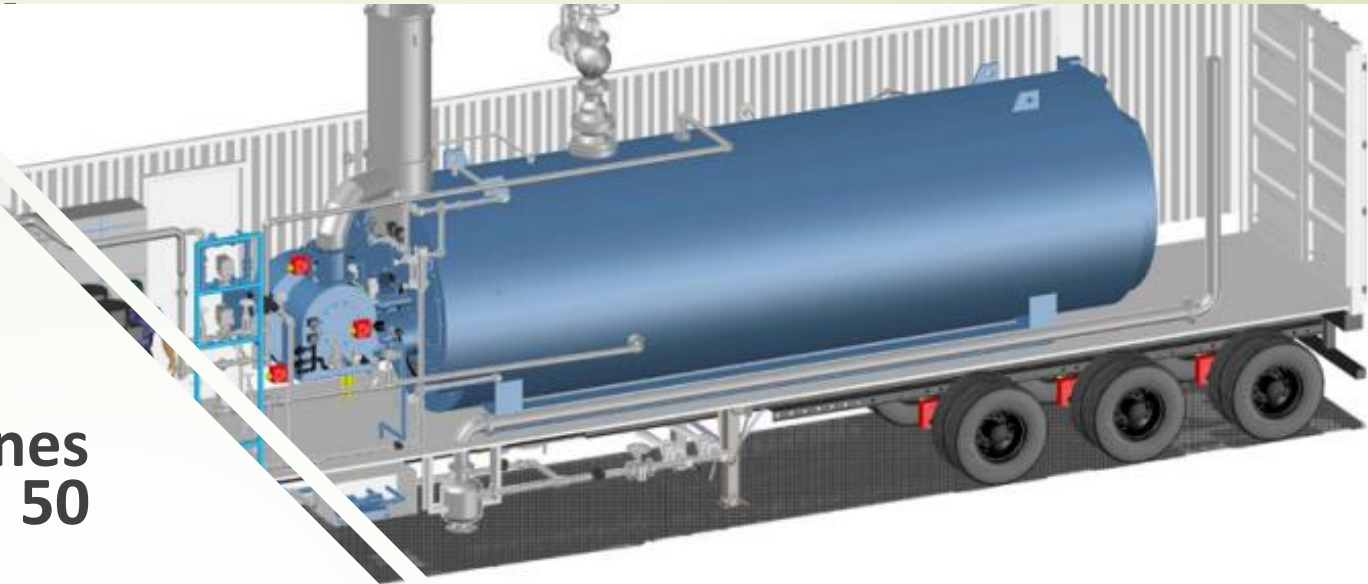


LEAK DETECTION (acoustic devices, pressure monitor)



Optimization of pressure testing process

- Pressed separate DH network zones using mobile water pumps (up to 50 zones)
- Usage of mobile boiler plants and heat generators
- Temporary heat pipelines
- Hot water disconnection during testing periods in most companies ranges from 1 to 5 days
- Modern mobile devices applied for leakage detection





Replacement of old tubes

MANAGEMENT OF LIFETIME *prevention of scaling, corrosion...*

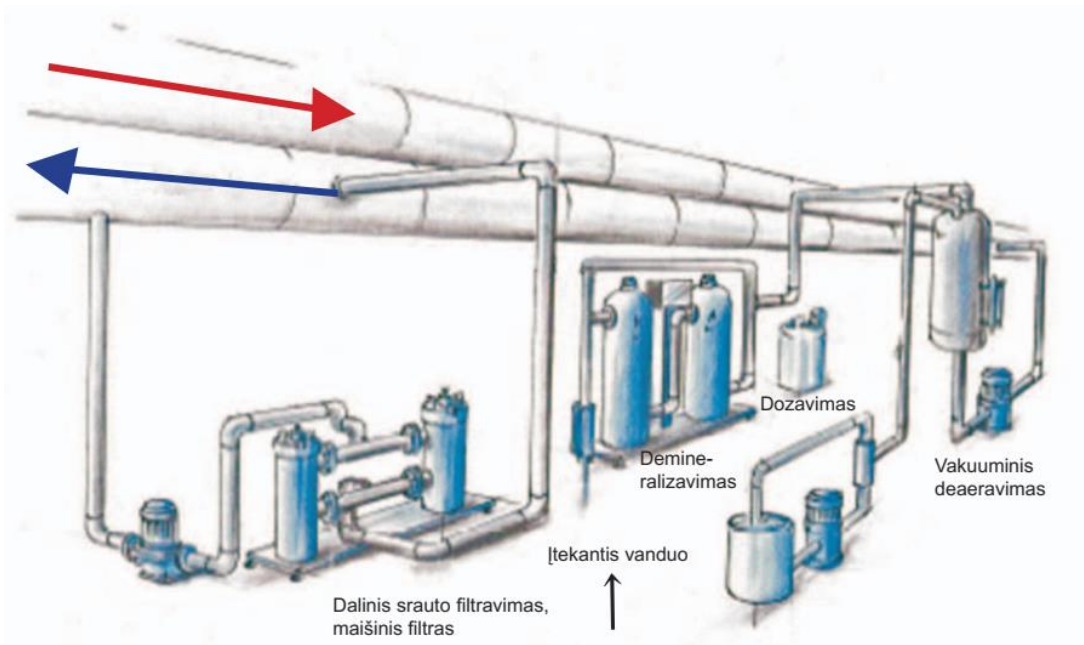


Lithuanian DH water quality norms

		Requirements for make-up water	Requirements for net water
pH		8.5-9.5	8.5-9.5
Free carbon dioxide		0	0
Oxygen	µg/l	<50	<20
Suspended solids	mg/l	<5	<5
Oil products	mg/l	<1	<1
Iron concentration	µg/kg	unregulated	<50
Hardness	µg – ekv/dm³	unregulated	unregulated
Ammonia concentration	mg/kg	unregulated	unregulated
Copper concentration	µg/kg	unregulated	unregulated

*The required pH of water is maintained by dosing ammonia.

Technologies applied for water treatment in DH systems



Filtration – Primary filtration, coagulation-filtration, fine filtration, etc.

Water softening – Na or H cation exchange filters.

Demineralization - Reverse osmosis (RO) device.

Atmospheric, vacuum or membrane type deaerators

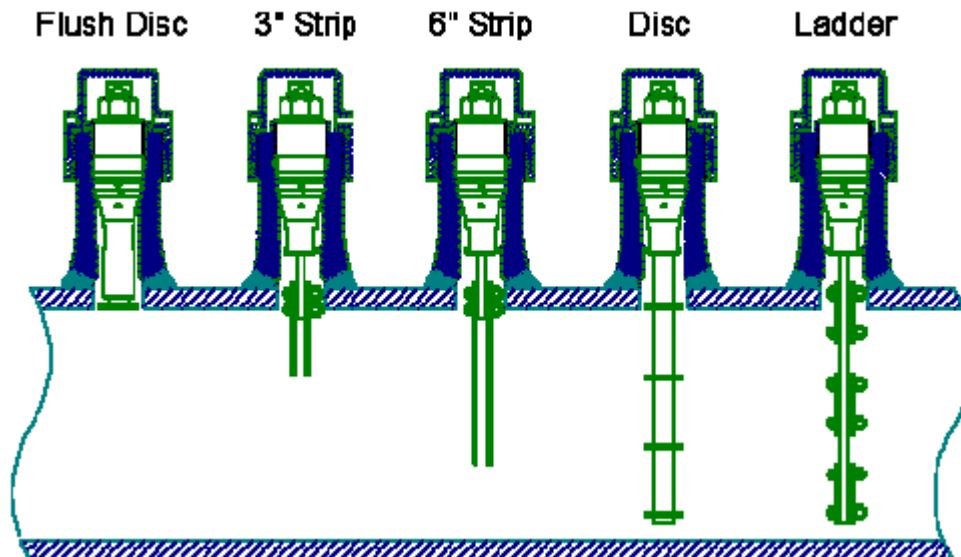
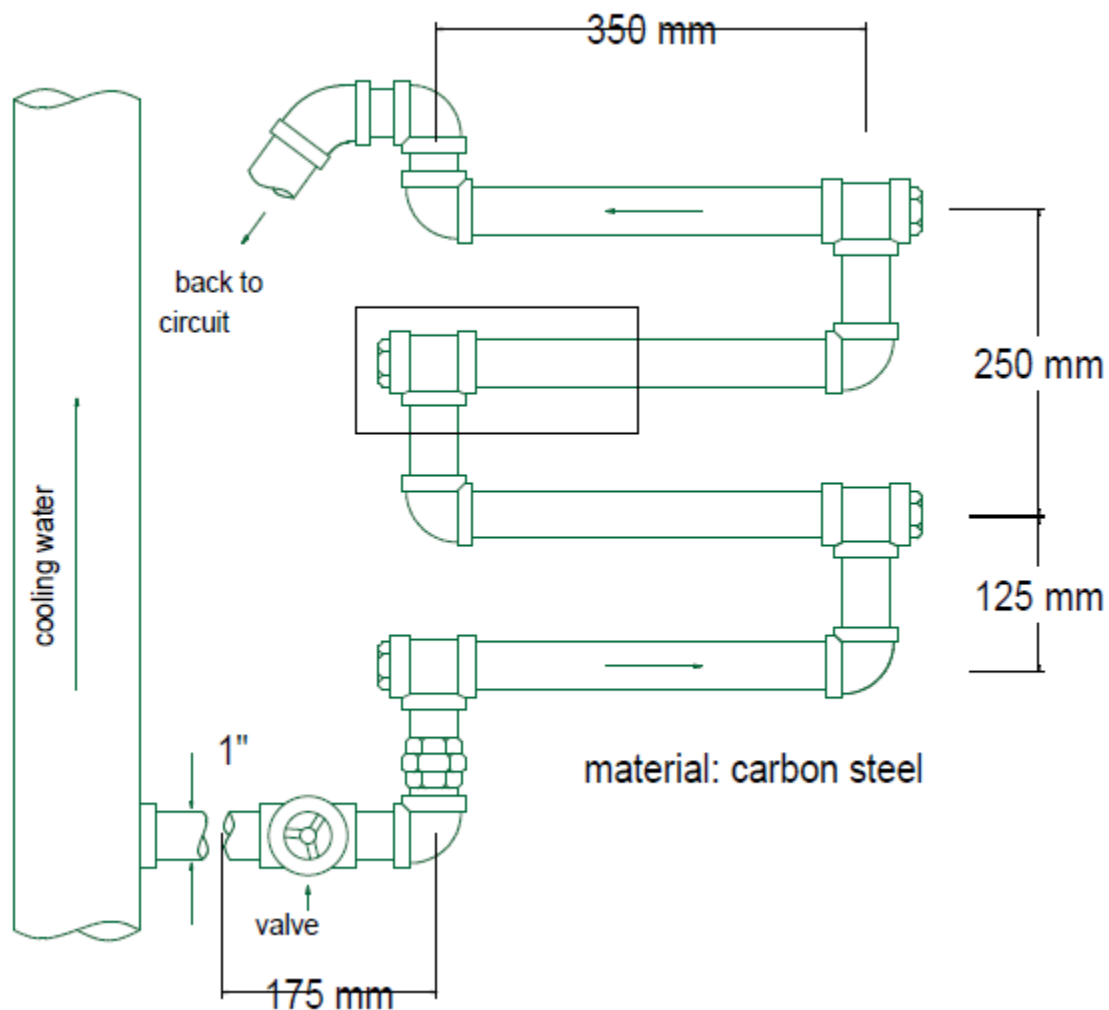
Dosage – additives for passivation layer, pH value maintained 9.8 ± 0.2 , oxygen removal, descaling...

Additives of water treatment chemical complexes to water in small DH networks.

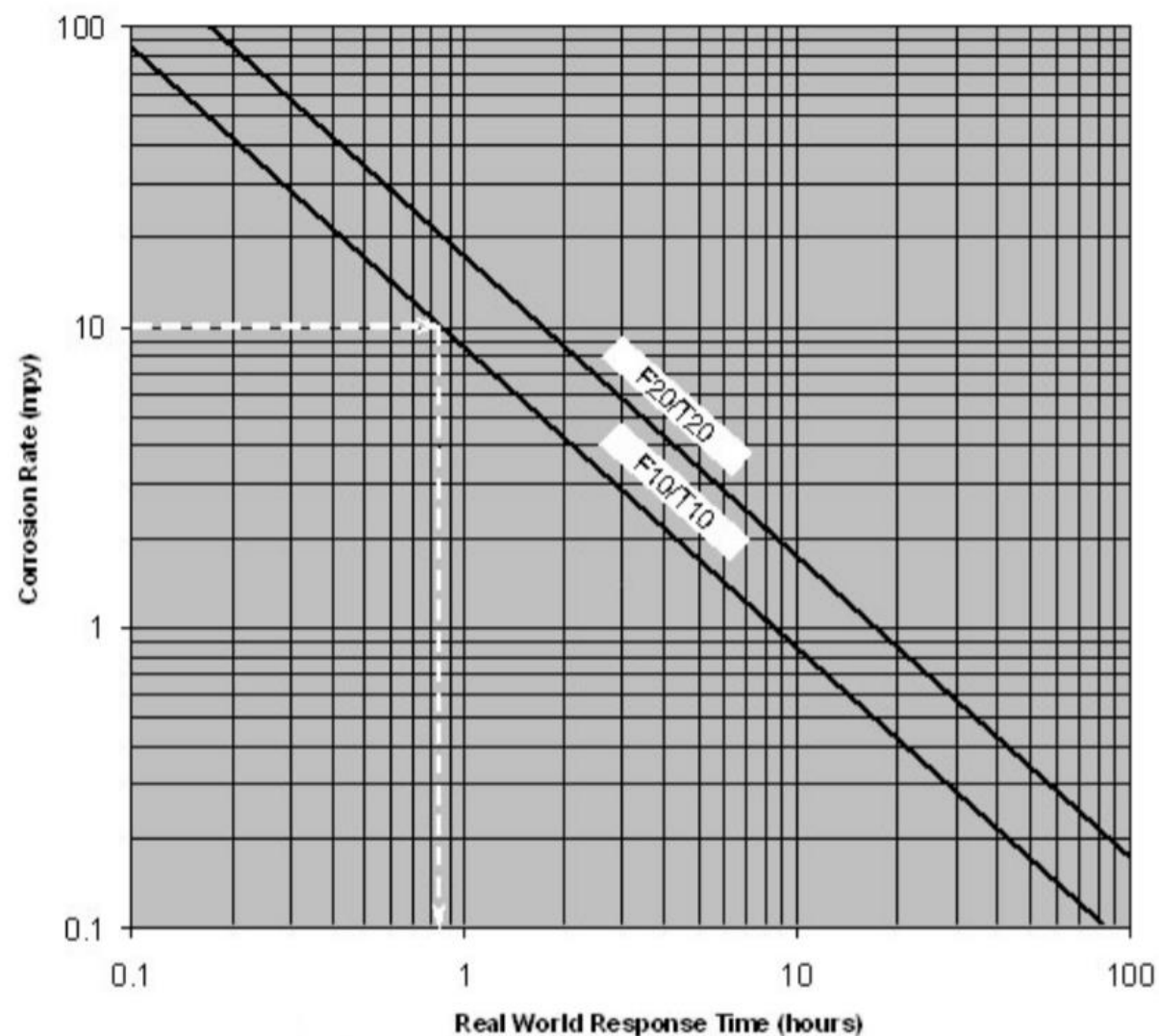
MONITORING OF NET WATER QUALITY

- ⊙ **Constant monitoring** - dissolved oxygen, water pH, electrical conductivity?
- ⊙ **Periodic measurements:**
 - Dissolved oxygen
 - pH
 - iron content
 - hardness
 - free carbon dioxide
 - petroleum products
 - suspended solids
 - oxidation
- ⊙ **Corrosion rate?**

Corrosion RATE MEASUREMENT simplest - most popular method



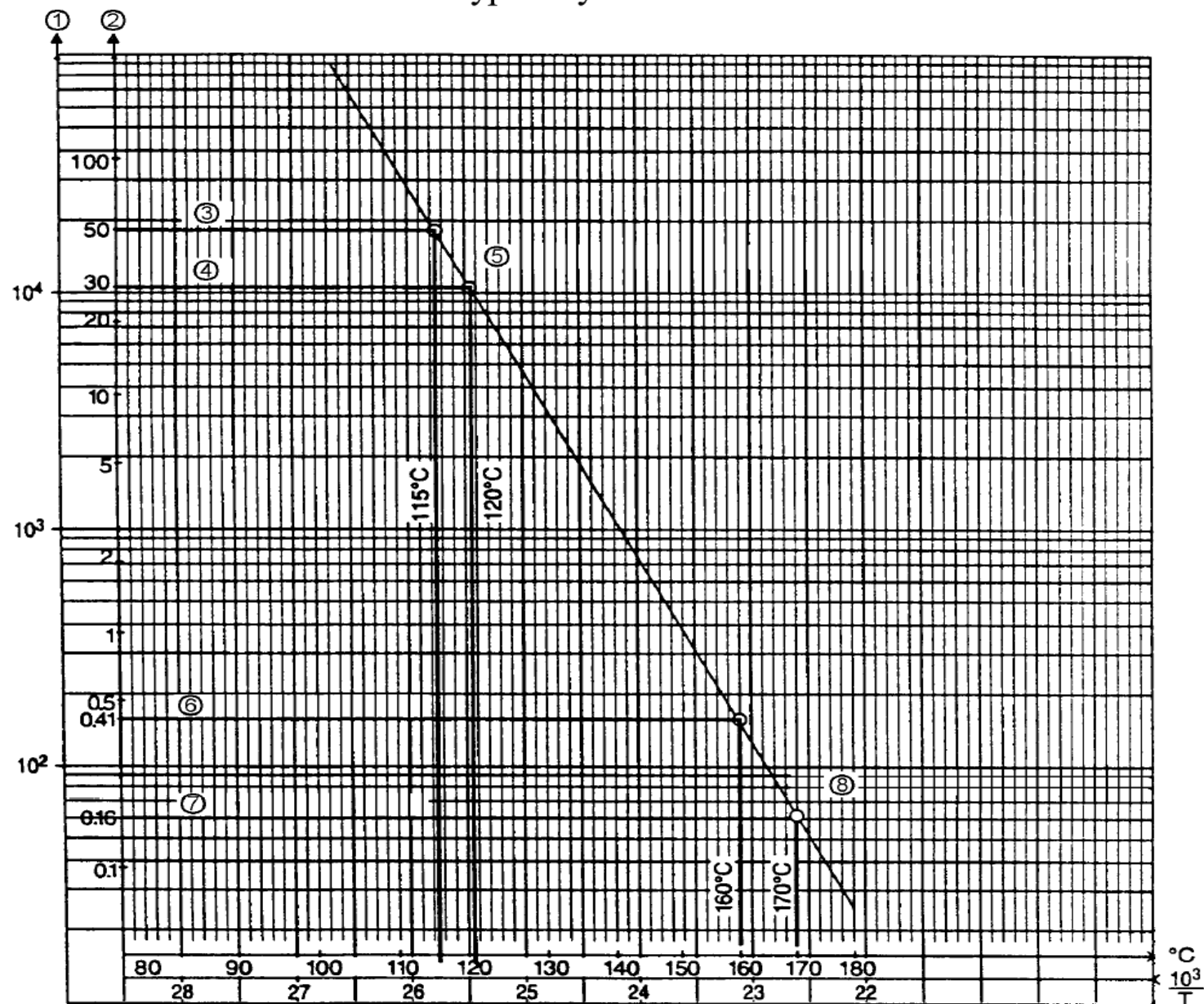
Continuous measurement on-line of steel corrosion rate



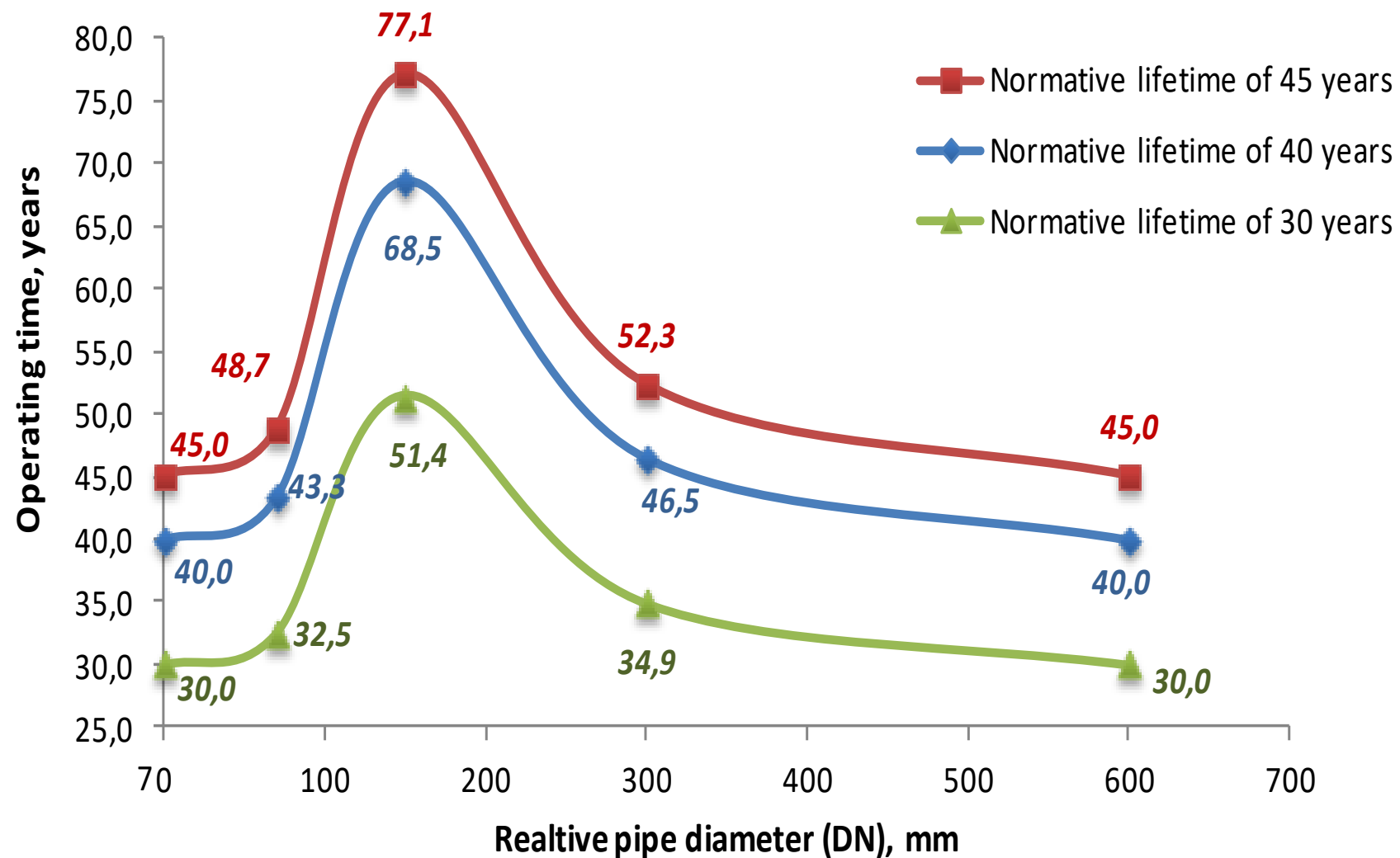
Reduction of water temperature regimes –
typically 90°C/65°C

Relation between operational temperature and ageing of steeltubes

- 1 - Expected thermal life (L), days;
- 2 - Expected thermal life (L), years;
- 3 - 50 years;
- 4 - 30 years;
- 5 - Actual operation conditions;
- 6 - 3 600 h;
- 7 - 1 450 h;
- 8 - Ageing test conditions;
- 9 - Continuous operating temperature (Θ)



EXPECTED LIFE TIME OF OLD TUBES AT PN16



INNER TUBES CORROSION INTENSITY

Corrosion rate	Corrosion intensity, mm/year
None	0-0,02
Low	0,02-0,04
Medium	0,04-0,05
High	0,05-0,2
Emergency	>0,2

MONITORING OF REALIABILITY AND LIFETIME OF TUBES

- Technology applied for water treatment
- Parameters of water maintained in the DH network
- Heat supply regime (temperature, interruptions)
- Inner corrosion velocity
- Annual volume of filled make-up water (dynamic)
- Statistics on ruptures in the tube system
- Typical life time of pipelines
- Statistics on tubes failure reasons
- Share of renewed pipelines in the DH network
- Other related information

IMPROVEMENTS REQUIRED

- ⦿ Monitoring of DH networks
- ⦿ Fast identification of leaking tubes
- ⦿ Prevention of leakages due to external reasons
- ⦿ Water treatment program and minimization of inner corrosion risk
- ⦿ Diagnostic, forecast and planning of tube replacement
- ⦿ Lowering of temperature regimes in the DH networks
- ⦿ Innovative technologies, new type devices and materials

UNINTERRUPTED SUPPLY OF HEAT AND HOT WATER

Thank you...

Valdas