LITHUANIAN DISTRICT HEATING ASSOCIATION

BSAM Baltic Smart Asset Management

Interreg South Baltic

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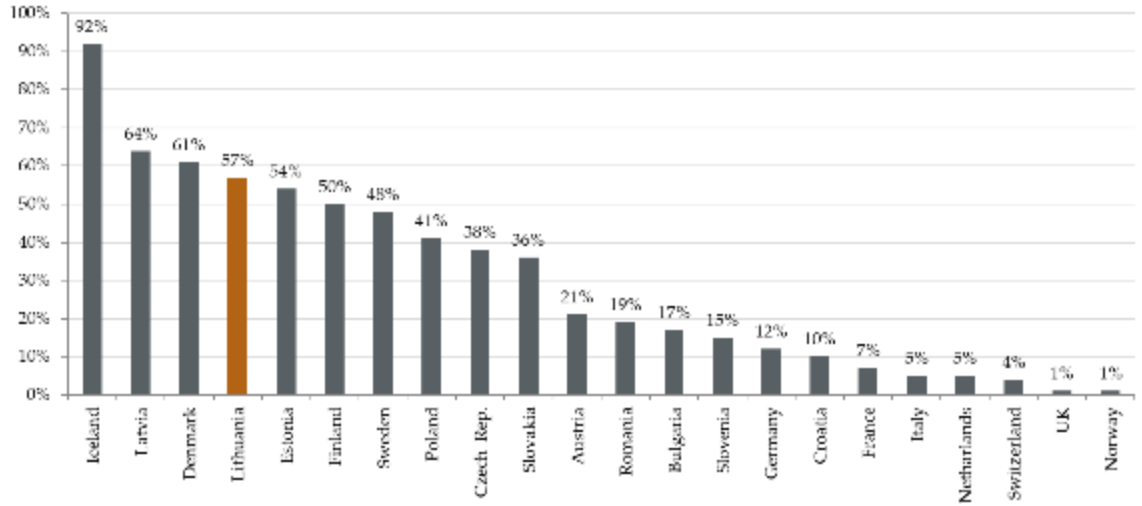
Challenges to modernize DH networks

dr. Valdas Lukoševičius

District heating in Lithuania

- ***DH networks have been installed in all cities and towns***



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

Annual replacement and expansion of DH networks, km

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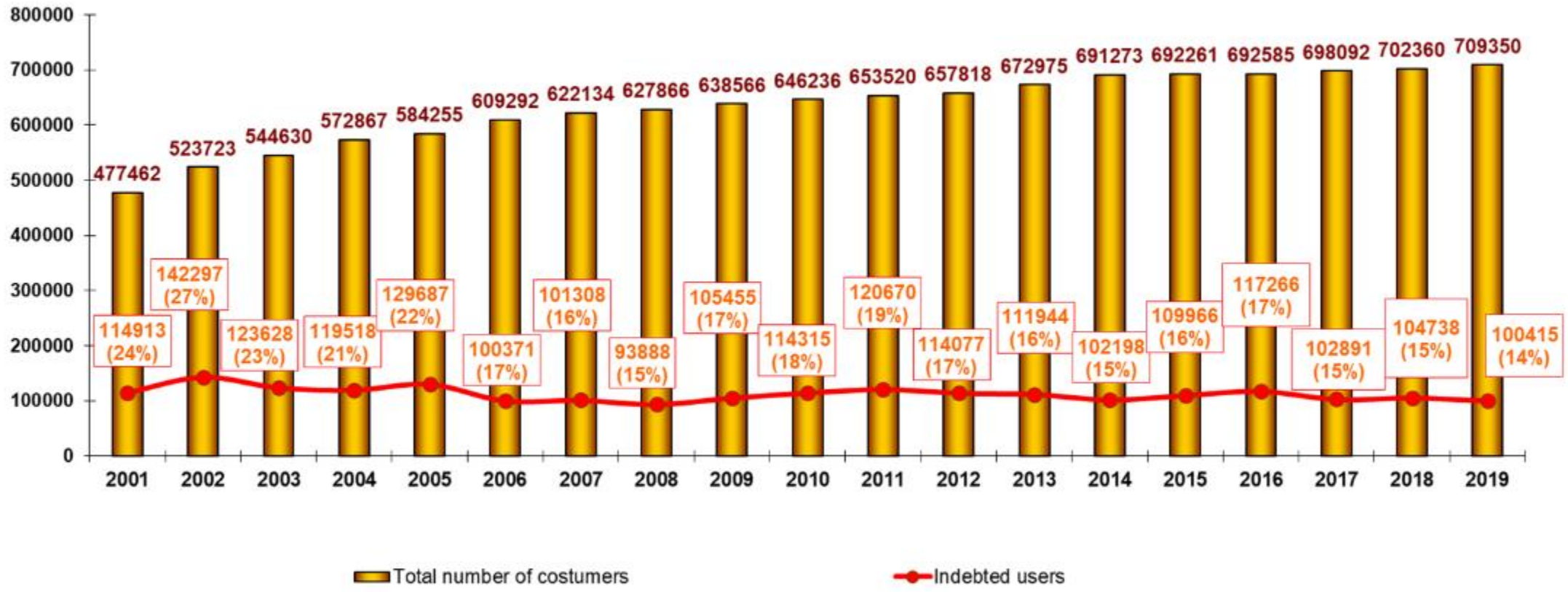
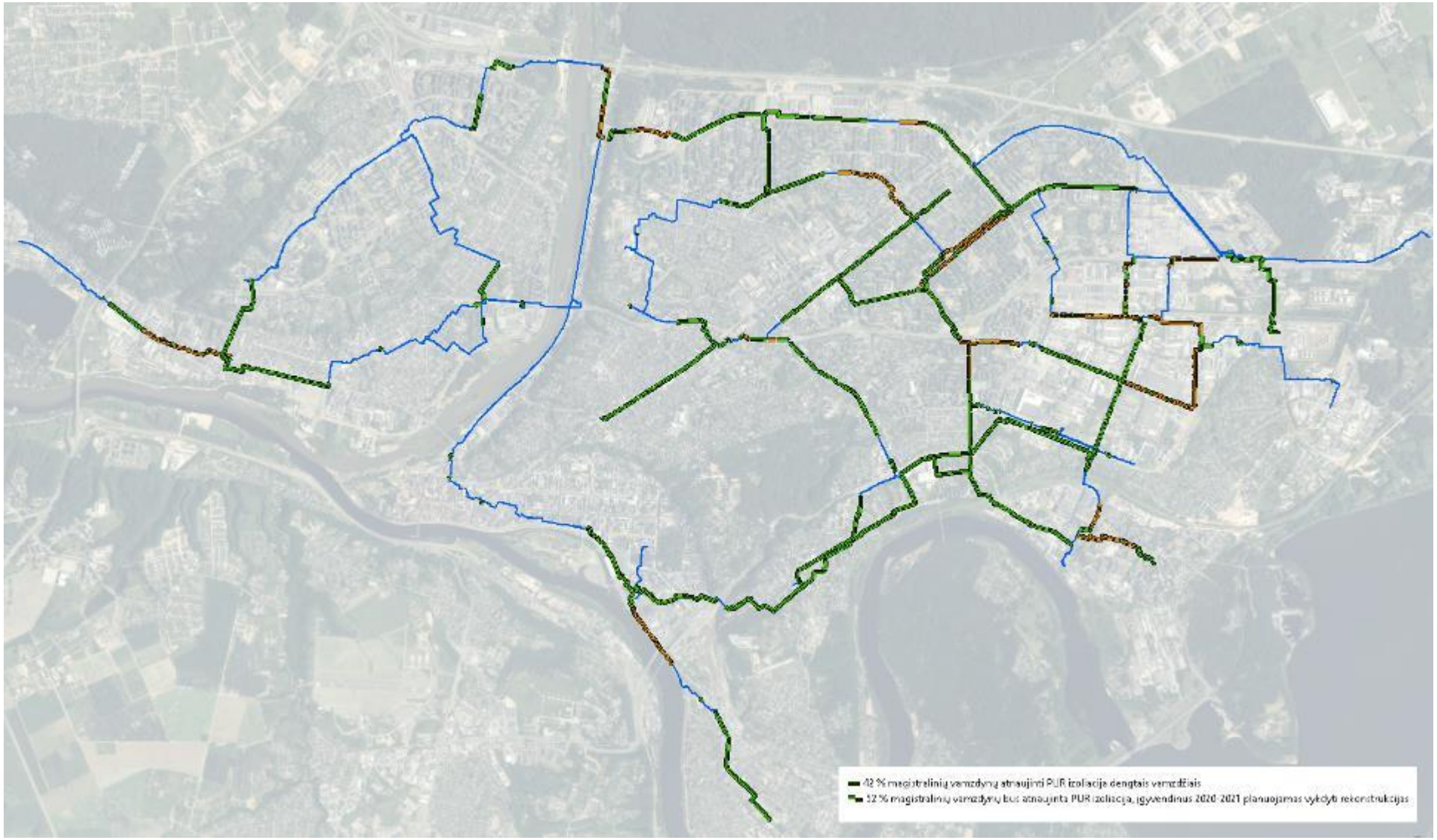
Number of DH consumers



Replacement of tubes in Kaunas DH system



AB KAUNO ENERGIJA

Kaunas jungiasi!

TOP 2017

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TYPICAL CONSTRUCTION OF OLD PIPELINES

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INSTALLATION OF PREINSULATED TUBES IN AN OLD TRENCH

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REPLACEMENT OF TUBES

FACTORS AFFECTING LIFETIME OF TUBES. FORECAST OF REPLACEMENT

- Water accured into thermal insulation of tubes: Net water leakage, damaged or blocked drain lines
- Pure construction of DH tranches, supports, compensators etc.
- Parameters of water maintained in the DH network
- Inner corrosion velocity of steel
- Heat supply regime (temperature, pressure, interruptions)
- Typical life-time of pipelines
- Statistics on ruptures in the pipelines...

When certain tube expected to be replaced ?

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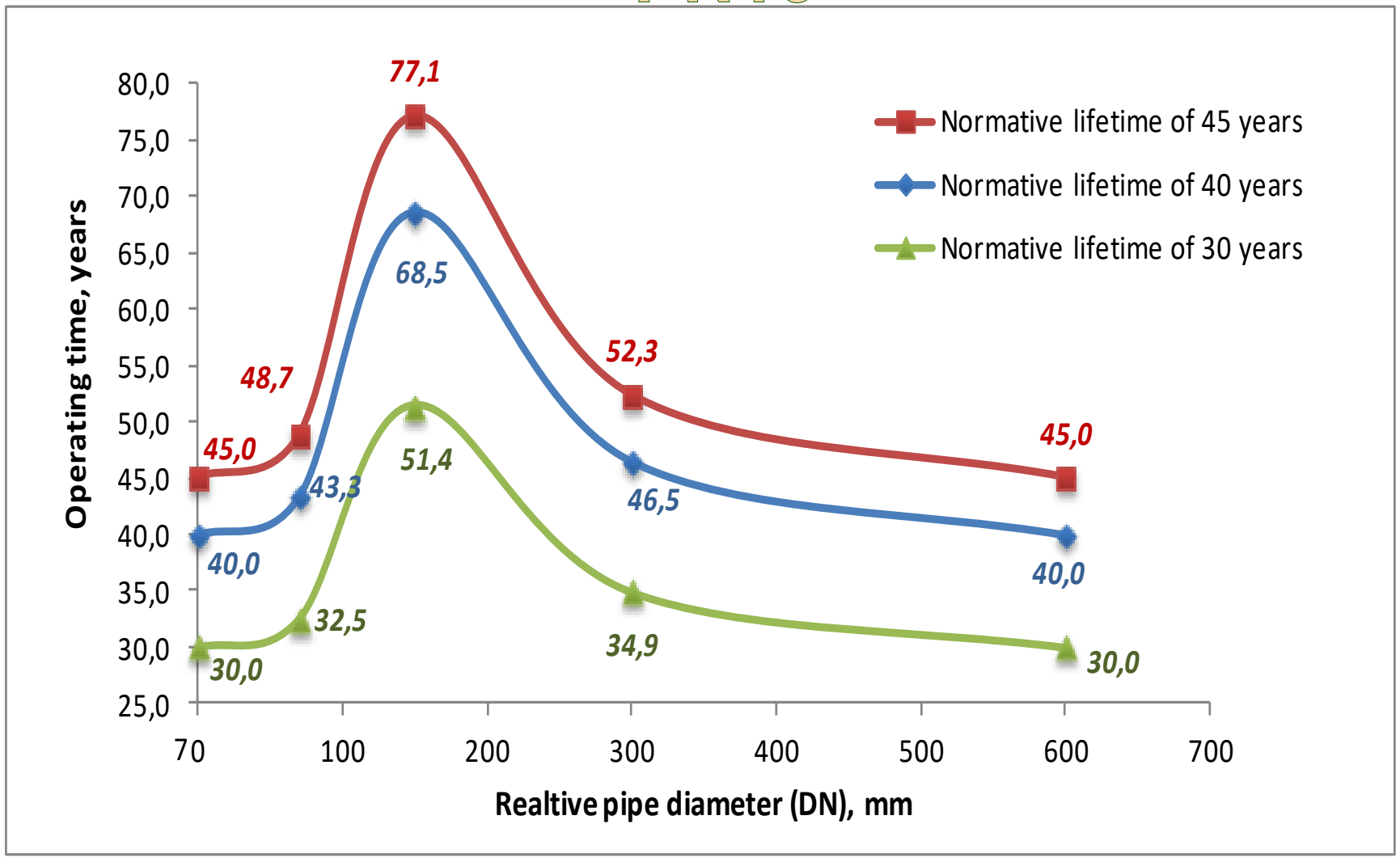
EXPECTED LIFETIME OF OLD TUBES AT PN16

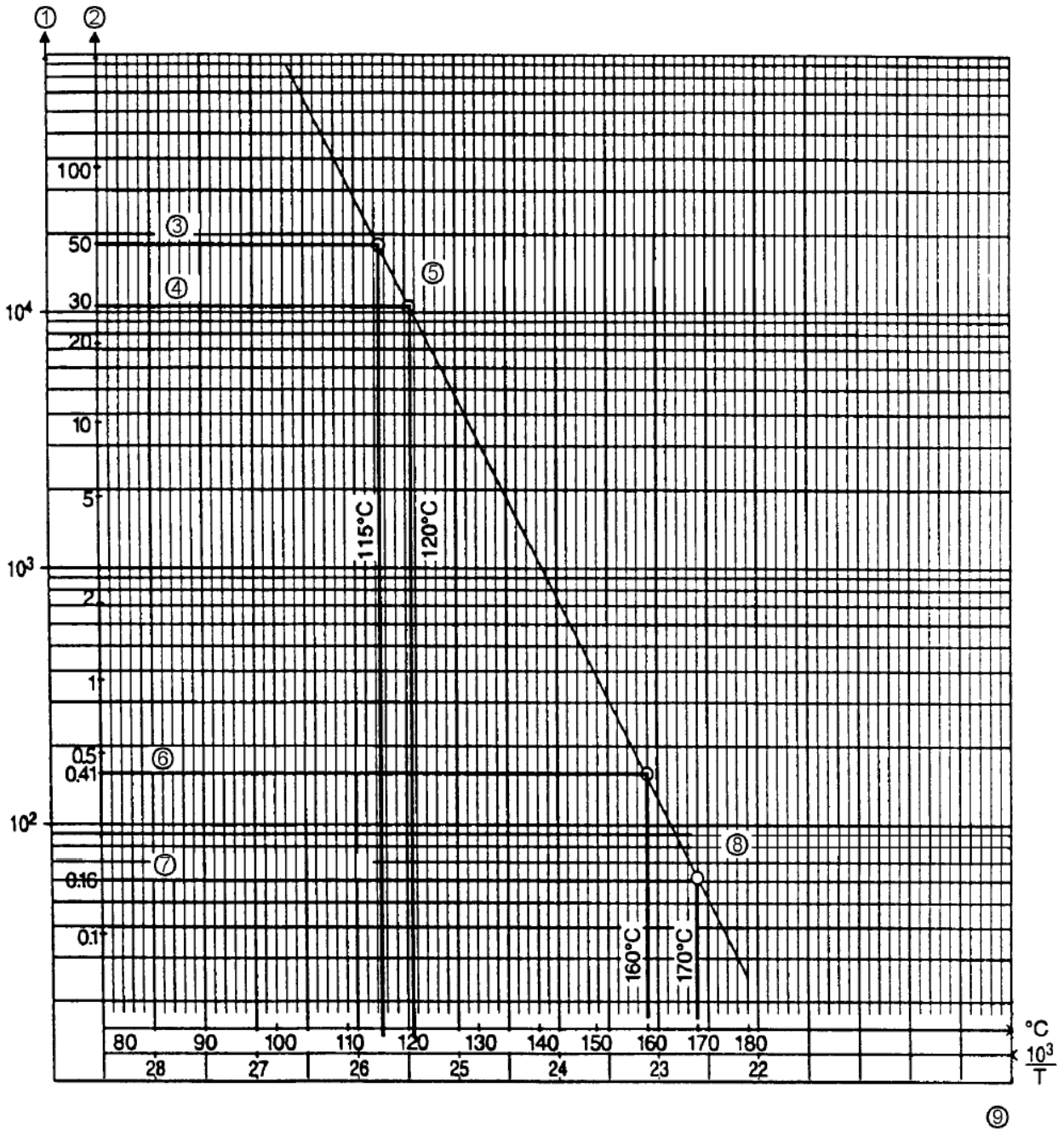


INDICATIVE COST FOR NEW DISTRICT HEATING PIPELINES

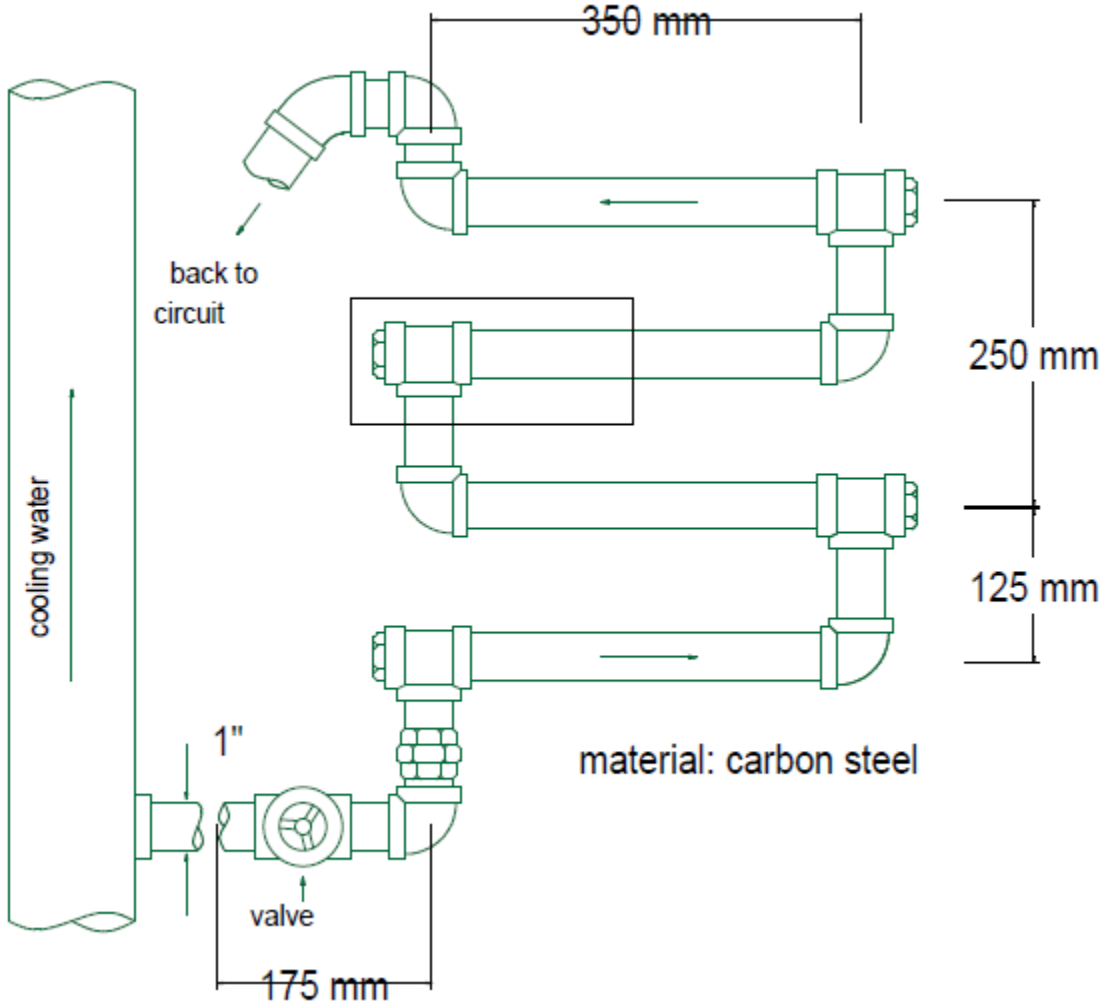
Group of diameter, mm	Cost of 1 km, thous. EUR
DN≤70	250
70<DN≤150	425
150<DN≤300	680
300<DN≤600	1595
DN>600	2330

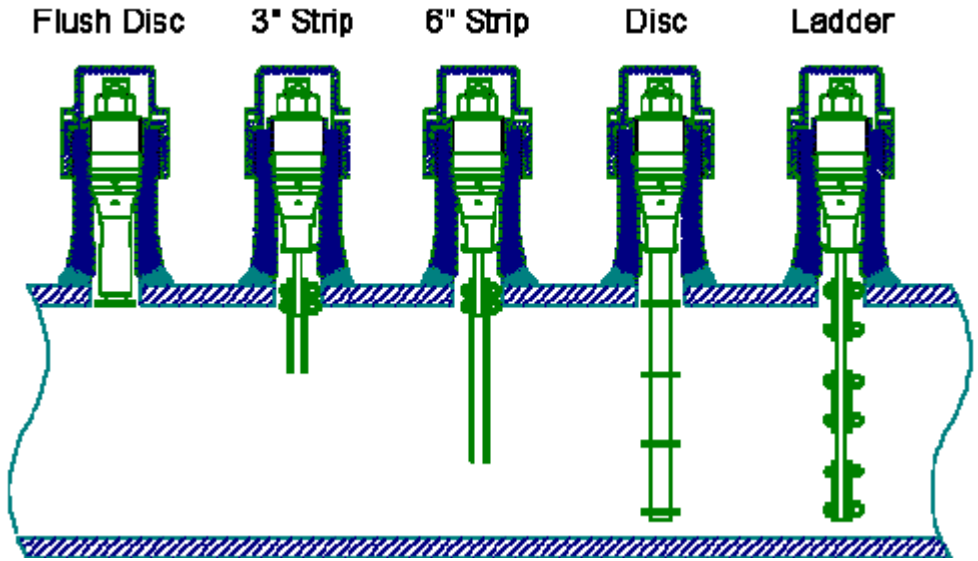
Relation between actual continuous operating conditions and accelerated ageing of steel pipelines

- Relation between actual continuous operating conditions and accelerated ageing. Where: 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)



Corrosion speed calculation
simplest - most popular method





INNER TUBES CORROSION INTENSITY

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

EVALUATION OF DISTRICT ENERGY DEMAND AND PERSPECTIVES OF DHC SERVICE (10 YEARS?)

- Forecast of heat and cold demand at the certain region (district)
- Forecast of future consumer characteristics, potential connections/disconnections etc.
- City and state tasks in decarboniztion, energy efficiency...
- Demand of electricity generated by CHP plants
- Municipal waste utilization plan
- Waste heat sources available
- Lifetime analysis of the main pipelines and assets
- Prioritization of **zones for district energy supply**, etc.

PROGRAM FOR DH C NETWORK REHABILITATION (10 YEARS?)

- Evaluation of expected lifetime of the pipelines and the main assets
- Estimation of energy efficiency of the DH network
- DH network structure, parameters, configuration..
- Incorporation of tube replacement and expansion program into the plan of city or town energy complex
- Improvement of water treatment program, diagnostics and operational conditions
- Decision regarding DH system rehabillitation and expansion
- Digitilization of DH networks: better management

Evaluation of technical and financial perspectives of the entire DH rehabilitation program

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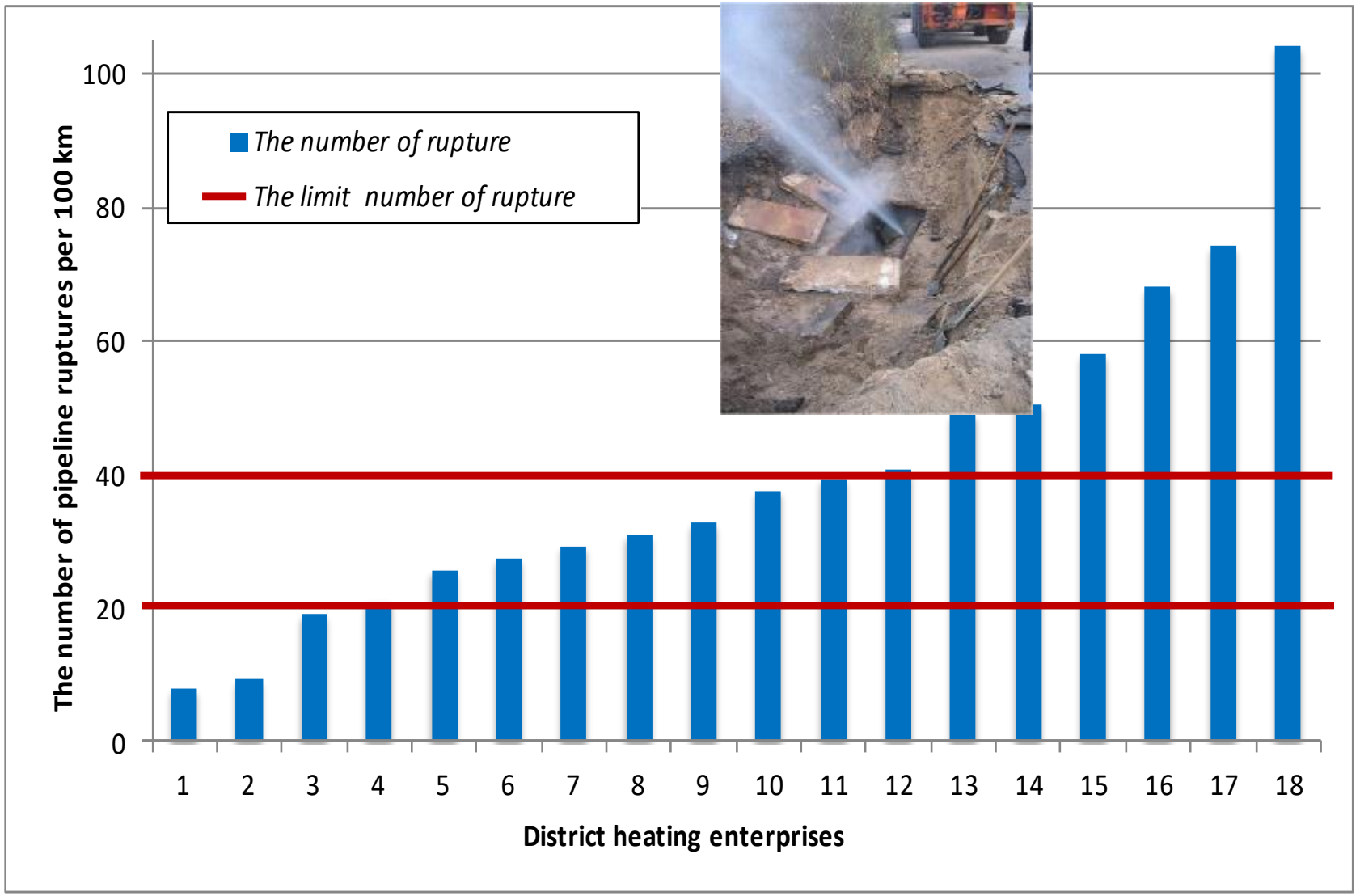
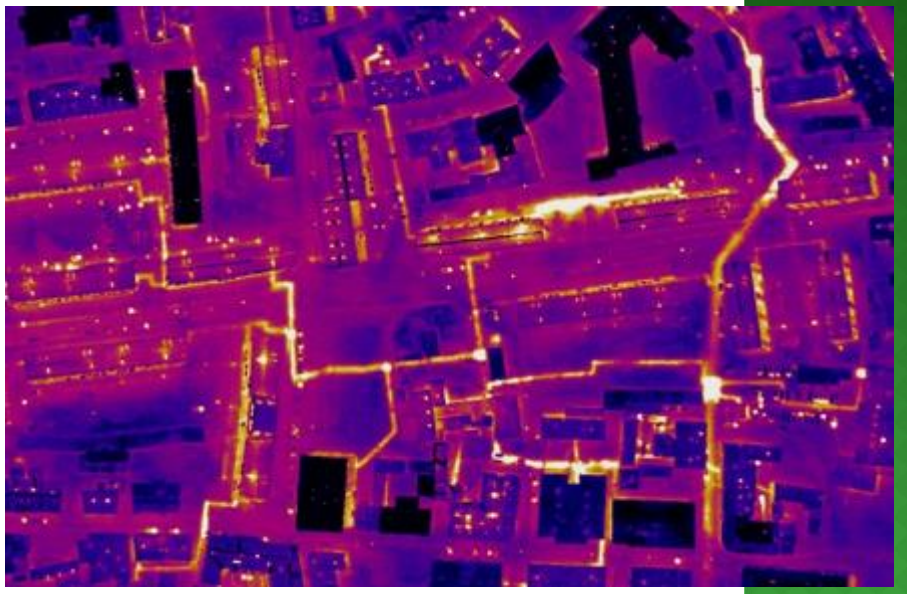
STATISTICS ON TUBE FAILURES (2010 Y.)



PRESENT MONITORING METHODS

- Hydraulic pressure tests
- Volume of filled make-up water (dynamic)
- Analysis of tubes failure reasons
- Thermography from drones or planes
- Mobile accoustic and ultrasonic devices
- Other

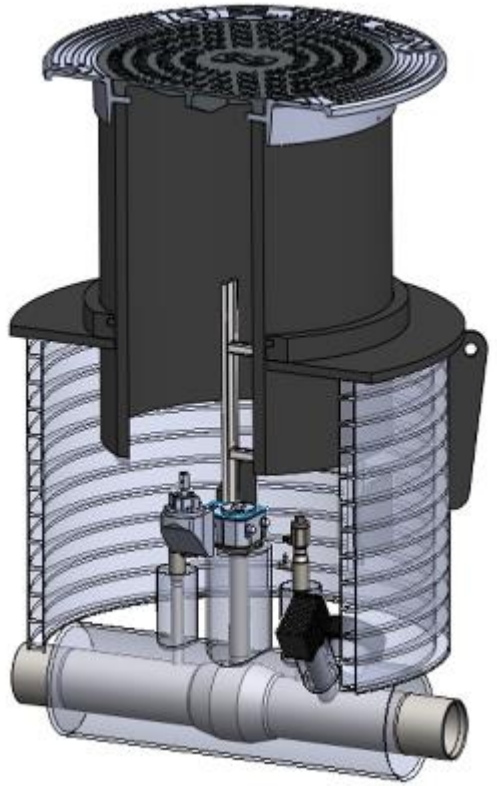


Main task: **to improve management of DH networks and to prolong operational time of tubes.**

New approach and technologies needed..

EFFECTIVE MANAGEMENT OF DH NETWORKS

- **Monitoring of water leakages and ground wter ingress. Wires & Sensors**
- **Ultrasonic „PIG“ technolgy?**
- **Thermography**
- **Geoinvestigations**
- **Wall thikness measurement?**
- **???**



Early prevention of failures

Replacement of tubes „just in time“

Thank you!

VALDAS Lukoševičius