Agenda

• District cooling development
• LOGSTOR value proposition
• CAPEX savings
• OPEX savings
• LOGSTOR Services
• Facts about LOGSTOR
“To make the World’s energy supply more efficient and globally reduce energy consumption by providing the best insulation solutions, thereby improving the environment for the populations in all continents.”
Flexibility, provided by DHC networks

- District energy distribution systems for heating and cooling are connecting various energy sources with its consumers.

2017 Global District Climate Energy awards, LOGSTOR were involved in 4 of 5 awards, inter connecting good sustainable initiatives.
• Cooling of premises has become state of art in ME region and also required globally
• District Cooling demand is growing in urban areas in ME, Europe, NA and Asia
• Combination of DC and DH can be used to increase the efficiency of CHP
District Cooling, trends and development

• Residential as well as commercial buildings – where outdoor temperature is high. In colder areas new and higher building standards cause an increased demand for district cooling in office buildings, shopping centers, hospitals, hotels etc.

• Global – more people live and work in cities. This means growing demand for convenient and controlled indoor temperature.
Our Value Propositions

The LOGSTOR Group
Insulation quality

- A question of OPEX as well as CAPEX
- Minimizing operating expenses with high quality insulation which reduces heat loss in the pipe system
- Insulation value expressed as lambda value (at 50°C) is as low as 0.0207 W/mK for flexible systems and 0.0223 W/mK for steel pipe systems

<table>
<thead>
<tr>
<th>Total cost of ownership 100 %</th>
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<tr>
<td><strong>CAPEX 30 %</strong></td>
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<td><strong>OPEX 70 %</strong></td>
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**Investment year one**
- Pipe system
- Installation
- Planning & commissioning

**Operational costs year two and forward (min. 30 years)**
- Heat loss from plant to end-user
- Energy from pumping
- Maintenance and repair
- Poor quality
Integrated solutions for every need

• Complete systems for transmission, distribution and house connection
• Based on standard components and optimal design for your project
• Sustainable system with a lifetime beyond 50 years, provided suitable water quality and proper installation
• Ensures sustainable and comfortable heating and cooling

Product range
• Straight pipes with carrier pipe from DN 20 to DN 1600 • Flexible pipes with carrier pipe from 16 mm to 110 mm • Complete range of prefab details, joints and accessories • More than 200,000 km of pre-insulated pipes supplied over more than 50 years
Low CAPEX

- Standardized industrial products, development based on +50 years of experience
- Established and proven EN standards, products, design & install, EN253, EN488, EN13941 et al, one system of standards also introduced by Marafeq, Qatar for Lusail DC projects
- Simplification and optimization of design and installation
- Integrated fittings & joint solutions, savings by pipe & joint philosophy
- Robust and durable solutions, less steel => reduced axial forces & displacements
- Reduced installation costs,
- Shallow trenching
- Quick & easy pipe installation
A joint system for every need, protecting your investment

- Shrinkable joint system made of cross linked polyethylene (PEX) with exceptionally strong shrink ability
- Fusion welded joints of same material as the outer casing (PE) and with full documentation on installation parameters in dimension range ø200 – ø1800 casing

Weldmaster for fusion welding

Welding process controlled automatically • Traceable documentation of each joint • Geographic location of each joint via GPS • Web based documentation • all installation equipment required
Flexible and cost reducing jointing system

• The SX-WP system includes straight joints, bends and t-branches casing dimensions ø90 – ø450
• Substitutes pre-fabricated bends and t-fittings
• Reduces number of joints
• High flexibility during installation

Cross linked polyethylene (PEX) • Unique molecular structure • Exceptionally strong shrink ability • Withstands all impacts during entire service life of the pipe system
Preinsulated valves to replace manholes, lowering installation costs

- LOGSTOR provides preinsulated valves for DC in cooperation with high quality European valve producers
- Preinsulated ball valves in dimension range Dn50-dn500
- Preinsulated butterfly valves in dimension range dn300 – dn1600
- Shut off valves or valves with integrated service valves, by-pass, vents and drains

- High value products must be stored, handled and installed properly
OPEX and environmental savings

- Minimizing of heat loss, and Carbon footprint by selection of type of pipe and insulation series based on Total Cost of Ownership
- Assistance in the evaluation of alternatives by LOGSTOR Calculator
- Once the system is properly installed, and provided proper water quality then the maintenance costs are close to zero
- Leak detection system is monitoring the conditions and functionality of the pipe system, enables timely maintenance & repairs
- We provide durable systems with proven long technical lifetime; f.ex. Copenhagen transmission system in operation for +30 years
OPEX savings

- Provided proper installation energy loss makes up for the major part of the operating costs
- Considerable financial and environmental savings are available by optimizing the insulation properties and thickness
- Hence improving the quality of the DC service provided to the consumers at lower temperatures
OPEX savings
Monitoring and surveillance

• 24/7 surveillance ensures efficient and flawless energy supply
• Digital monitoring of complete network
• Any leakages or breaks reported instantly, incl. location
• Any changes in parameters registered and preventive repair can be initiated
• Access to all data on any digital platform
• 3DC warning wire incl. X4 detector, suitable for DC applications
• Stand alone or hosted solutions

LOGSTOR full service solution
Installation and commissioning of complete surveillance system • Hosting of data • Ongoing analysis of data • Monthly status report • Repair service
Monitoring and surveillance
LOGSTOR Design Services

• The shortest way from energy plant to consumer
• Optimal design is beneficial in all aspects
• Optimal design means less excavation and reduction of the total investment
• LOGSTOR provides documentation, tools and support to optimize your project

Optimal design

Design manual to find the best solution for the specific project • Tools to calculate all details • Curved pipes to ensure shortest pipe run • TwinPipe to reduce excavation and number of joints
Documentation and Certification

- Technical requirements as stated in European standards
- LOGSTOR complies or does better
- Expected real life time beyond 50 years
- Documentation on each single component available
- External tests of properties
- Ongoing internal tests
- Weldings on jobsite of fusion welded joints documented via Weldmaster

Third party certifications

Quality – ISO 9001 and Euroheat & Power • Environmental – ISO 14001 • Health & Safety – OHSAS 18001 on selected plants • Energy – ISO 50001 on selected plants
LOGSTOR Calculator

- The tool for correct decision on optimal type of pipe – single, TwinPipe and insulation series
- Optimization in relation to minimizing the heat loss and operational costs, energy efficiency and environmental impact in form of CO2
- Choice of pipe system with lowest total costs of ownership
- Based on the actual parameters for each project
- Comparable calculations for different type of pipes
- Based on the very latest know how about aging of the PUR-insulation foam
- LOGSTOR Design Tool – a new online calculation tool for design of pre-insulated pipe systems

LOGSTOR Calculator
Web based and easy to use tool  • Results shown in numerical form and easy-to-read graphs
• Aging processes in PUR insulation foam shown in graph form  • Any calculation result can be downloaded for your personal use
On time project execution

- Customer dialogue creates the basis for an on time project execution
- Delivery plan according to installation progress
- Flexibility when on-site conditions change
- Broad product range ensures solutions to any change

Physically closer to the customer

Presence via LOGSTOR company or distributor • Regional centers supporting technical and logistic issues • Regional factories and distribution centers
Our solutions

• Transport in pipe systems of hot and cold water for district energy, of oil, gas, and fluids for industry must be done in the right way

• Loss of precious energy during transport shall be avoided

• Constant development of insulation materials and technology

• Top score on insulation properties
Global presence

LOGSTOR Group
- Headquarters in Denmark
- 1,150 employees
- Annual turnover > 220 MEUR
- Owner: Triton Fund III

Facts:
- 9 plants and 2 mobile production units
- 13 Sales Units
- Joint Venture in Dubai
- Distributors in more than 30 countries
- More than 4,000 km pre-insulated pipes every year
- More than 200,000 km LOGSTOR pipes supplied to data
- Since February 2017 Powerpipe/Sweden belongs to the LOGSTOR Group
Thank you for your attention

Questions?

Documentation on logstor.com
Follow us on LinkedIn
Contact: jae@logstor.com
Make sure nothing goes to waste – use nature’s resources thoughtfully