



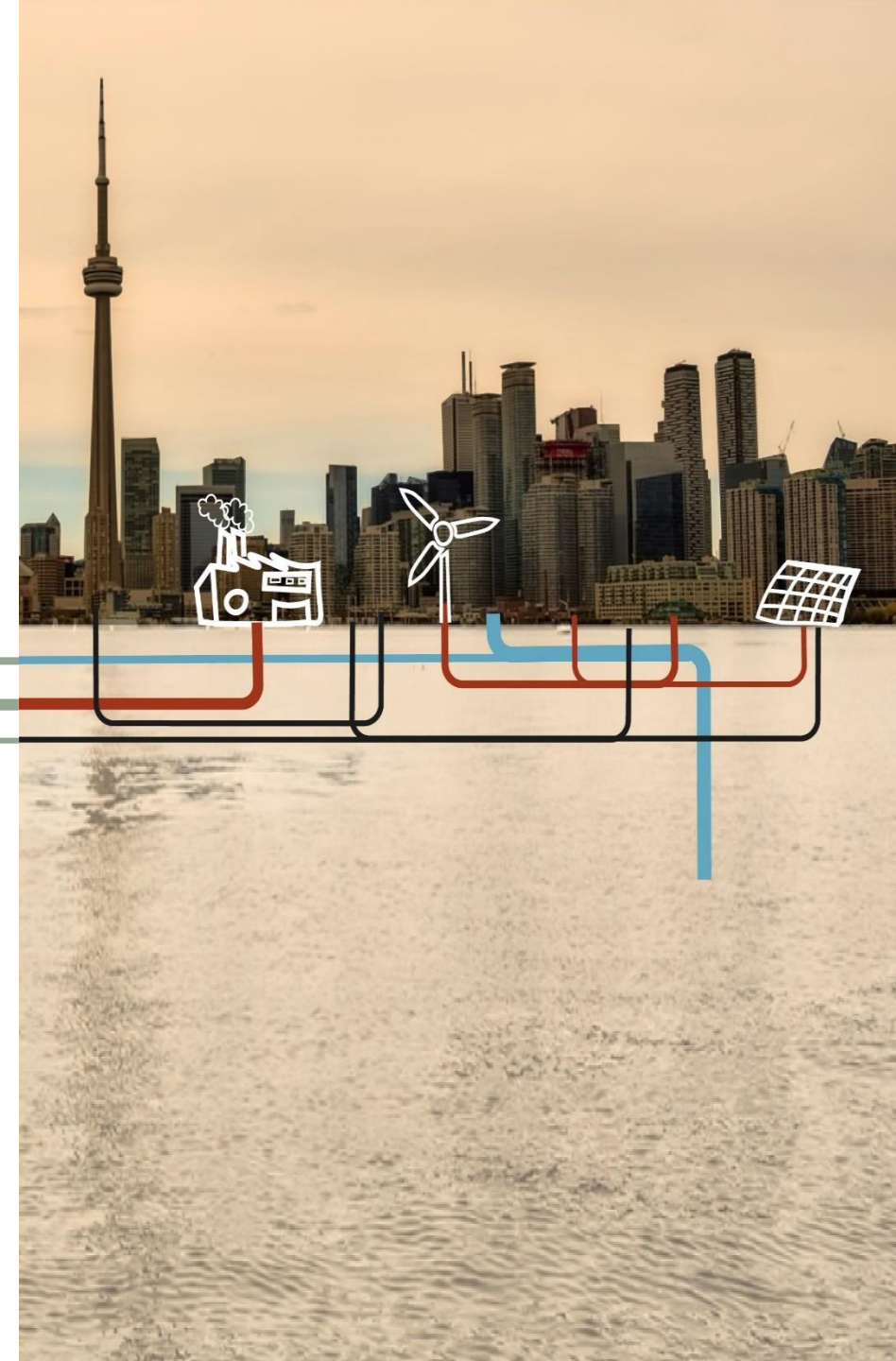
MINISTRY OF FOREIGN AFFAIRS
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The Trade Council

Danish District Energy Advisory

Moving District Energy Projects from Concept to
Completion -
DE Handbook As a Tool



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The Danish District Energy Advisory (DDEA)

- often work in **Alliances** – a group of Danish companies within same system technologies
 - E.g. from district energy produktion to distribution to end consumers
- Represent all aspects of district energy from planning, feasibility, design, production, distribution, implementation, commissioning and equipment supply
- work individually with Danish companies solely or within the Alliances – also competitors!



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District Energy Handbook As a Tool

Support the development of district heating, cooling and energy distribution in the North American market



Challenges to be addressed

Intimidation

Technical language

Clear understanding of benefits



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Target Audience

High level decision makers



Process

Scan of existing district energy handbooks and guidelines

Feedback from facilities management

Feedback from decision makers

Feedback from district energy companies (North American and European)



District Energy in Denmark vs NA

Why is it 3-5 times more expensive to bury 1 foot of pre-insulated pipe 3-4 feet down in the ground in US than in Denmark?

- Lack of knowledge of the technologies and especially best practices
- Contractors and sub-contractors tend to put high contingency on the price estimates due to uncertainty of the technologies and best practices
- The advantages with the thin walled pre-insulated steel pipes is not utilized in full
- The cost of not spending enough money up front on proper education, training, site supervision and QA/QC procedures is underestimated





District Energy in Denmark/EU vs NA

European standards in NA

- general standards and regulations is measured to avoid fatal system and design failures, accidents, design mistakes etc. and to give guidelines for best practices and good design praxis.
- If you dive down in the difference between the standards it can actually be filtered down to not too many major differences.

ASME B31.1 vs. EN13941 ...

Regulation: ASME B31.1 – Power Piping

- **X-Ray not required**
- **Alignment to be within 2mm**
- **Hydrostatic pressure test to be 1.5 times the design pressure, held for 10 minutes, then reduced to design for leak test**

Project class A	— Small and medium diameter pipes with low axial stresses
	— pipes with low risk of personal damage or damage to the surroundings
	— pipes with low risk of economic losses
Project class B	— High axial stresses, small and medium diameter pipes
	— Large diameter pipes and/or high pressures
Project class C	— pipes with higher risk of personal damage or damage to the surroundings
	— special or complex constructions

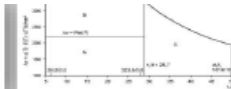


Figure 2	EN 13941
A	≤ 8%
B	≤ 12%
C	≤ 20%

Standard: EN 13941 – Design and installation of pre-insulated bonded pipe systems for district heating

- **X-Ray required on 10% of welds**
(X-ray % depends on project class)
- **Alignment to be within 1 mm**
- **Pressure test is not required, but weld leak tightness test of all welds is mandatory**



Case Studies

Sheridan College, ON, Canada

- Complete steam to hot water conversion
- Danish pre-insulated pipes and Danish unit based ETS
- Proper planning and phasing
- Proper training of contractors, welders and site supervisors
- Heat loss will most probably be reduced from 65% down to 15-25 %

City of Aarhus, Denmark - Carbon Neutral by 2030

- The backbone of carbon neutrality is low carbon district energy (heating and cooling)
 - Enabling a carbon emission reduction of 50 % in 10 years!
 - Heating and cooling production from biomass, municipal waste, straw, surplus heat, sea water heat pumps, electricity and geothermal heating to come
 - Danish pre-insulated pipes



Case studies

District Energy St. Paul

- NA largest low carbon district heating system
- Danish pre-insulated pipes
- Have been in operation since the late 80's!



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