

The 12th International Symposium on District Heating and Cooling

September 5th – September 7th, 2010
Tallinn, ESTONIA



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PREFACE

The 12th International Symposium on District Heating and Cooling is now held for the first time in Tallinn, Estonia.

District heating systems are dominant to heat the buildings in Estonia. Estonian district heating systems are with small, average and big loadings – annual thermal loading from less than 5000 MWh to over 100 000 MWh. The largest district heating networks are situated in Tallinn, Tartu, Narva and Pärnu. The district heating is organized by municipalities. The development and implementation of the energy policy is organized by the Ministry of Economic Affairs and Communications and the energy market is supervised by Energy Market inspectorate.

Preservation of district heating system in working order is the basic precondition for combined heat and power generation, accordingly for fuel consumption and environment pollution reduction.

Additionally to Tallinn and Narva the heat produced with combined production is used for district heating in Kohtla-Järve and Ahtme and also in some plants with remarkable lower capacity.

New green-field bio fuel and peat fired combined heat and power plants nearby Tallinn and Tartu in Luunja. The capacities of theirs plants are as follows: 25 MW_{el} and 50 MW_{th} (in Tallinn CHP with condenser to 70 MW_{th}). The construction new Fortum bio fuel and peat fired CHP in Pärnu. Plant will start the operation in the end of 2010.

CHP power plants can also be an efficient source to supply district cooling. This is very promising concept for conditions where both low winter temperatures and high summer temperatures prevail. Even in Estonia, with just a few weeks of hot weather in normal summer (not, as this year's summer), large shopping centres and office buildings seem to be a good application area.

The research in the district heating and cooling field is very important and at this symposium we will hear forty five technical presentations, divided into ten sessions: conceptions and studies in district heating and cooling, efficiency issues of district heating and cooling, district heating in areas for low density, district heating systems-pipes properties, renewable district heating and cooling, the aspects of district heating-CHP, district heating-case studies and optimisation and stimulation in district heating. Two plenary speakers cover the activities on district heating and cooling in the European Union: the prospects for district heating and cooling seen from the EU commission point of view and the prospect of district heating and district heating research in Germany.

This symposium is organized at the Tallinn University of Technology in cooperation with the Scientific Committee consisting of members of a Nordic Research group called Primary Energy Efficiency (PEE), one member from Tallinn University of Technology and Riga Technical University.

On behalf of the organizers we want to express our sincere thanks to the members of the Scientific Committee, the Local Organizing Committee and the members of the Advisory Committee who gave us valuable support. We also thank Nordic Energy Research and Tallinn University of Technology for financial support. We would like to thank the individual authors for their submitted papers and the reviewers for their time and help.

We hope that you will experience an enjoyable stay in our sweet old Tallinn and also that this conference will improve further cooperation in the field of district heating and cooling research and development.

Aadu Paist, professor

Andres Siirde, professor

PROGRAMME

Time	Sunday, September 5th, 2010	
19:00–21:00	Registration, Welcome, Clarion Hotel Euroopa, <i>Lääne-Euroopa</i> room	
	Monday, September 6th	
08:00–09:00	Registration	
09:00–10:40	OPENING SESSION (<i>Lääne-Euroopa</i> room) Chair: Aadu Paist, Andres Siirde	
1.	Opening Minister Juhan Parts, Ministry of Economic Affairs and Communication	
2.	The prospects for DH&C seen from the EU Commission point of view Eva Hoos, European Commission, Directorate-General for Energy	
3.	The prospect of district heating and district heating research in Germany Heiko Huther, German Heat and Power Association	
4.	District heating in Estonia Tiit Rahkema, Estonian Power and Heat Association	
10:40–11:00	Coffee break	
11:00–12:30	SESSION 2 Conceptions and studies in District Heating and Cooling <i>Lääne-Euroopa</i> room Chair: Dagnija Blumberga	SESSION 3 Efficiency issues of District Heating and cooling <i>Põhja-Euroopa</i> room Chair: Carl-Johan Fogelholm
1.	Integration of an IP based low-power sensor network in district heating substations <i>J. Gustafsson, H. Mäkitaavola, J. Delsing, J. van Deventer</i>	Primary energy efficiency and systems engineering <i>M. Berner, R. Ulseth, J. Stang</i>
2.	On the radial contact pressure of parallel buried pipes for district heating <i>I. Weidlich, M. Achmus</i>	Enhanced district heating and cooling systems – realisation of the low-ex concept <i>S. Bargel, C. Pollerberg, A. Knels, L. Huang, D. Müller, C. Dötsch</i>
3.	Analysis on flat station concept. Preparing DHW decentralised in flats <i>J. E. Thorsen</i>	Application of exergoeconomics to the optimization of building heating systems connected to district heating networks <i>C. Snoek, S. C. Kluiters</i>
4.	Improved temperature performance of radiator heating system connected to district heating by using add-on-fan blowers <i>P.-O. Johansson, J. Wollerstrand</i>	SlimNet: an innovative integral approach for improving efficiencies of district heating networks <i>M. W. P. van Lier</i>
12:30–13:30	Lunch	

13:30–15:20	SESSION 4 District Heating in areas of low density <i>Lääne-Euroopa room</i> Chair: Svend Frederiksen	SESSION 5 District Heating Systems: Pipes properties <i>Põhja-Euroopa room</i> Chair: Aleksandr Hlebnikov
1.	A direct heat exchanger unit used for domestic hot water supply in a single-family house supplied by low energy district heating <i>M. Brand, J. E. Thorsen, S. Svendsen, C. Holm Christiansen</i>	District heating pipes 200 mm below surface in a street with heavy traffic <i>A. Fransson, S.-E. Sällberg</i>
2.	Challenges on low heat density district heating network design <i>M. Rämä, K. Sipilä</i>	Study on the heat loss reduction method from the secondary pipelines in the apartment complex <i>B.-S. Park, Y.-E. Kim, S.-H. Park, Y.-H. Im, H.-J. Kim, D.-H. Chung, M. Chung</i>
3.	Design of low temperature district heating network with supply water recirculation <i>H. Li, A. Dalla Rosa, S. Svendsen</i>	Heat loss of flexible plastic pipe systems, analysis and optimization <i>EJ. H. M. van der Ven, R. J. van Arendonk</i>
4.	Steady state heat losses in pre-insulated pipes for low-energy district heating <i>A. Dalla Rosa, H. Li, S. Svendsen</i>	Comparison of competitive (semi) flexible piping systems by means of heat loss measurement <i>I. M. Smits, J. Korsman, J. T. van Wijnkoop, E. J.H.M. van der Ven</i>
5.	Transient thermal conductivity of flexible district heating twin pipes <i>C. Reidhav, J. Claesson</i>	Effective width - the relative demand for district heating pipe lengths in city areas <i>U. Persson, S. Werner</i>
15:20–15:40 Coffee break		
15:40–17:10	SESSION 6 Renewable district heating and cooling <i>Lääne-Euroopa room</i> Chair: Andres Siirde	SESSION 7 The aspects of district heating – CHP <i>Põhja-Euroopa room</i> Chair: Lars Gullev
1.	Integrating renewable energy into large-scale district heating systems <i>P. Begerow, S. Holler</i>	Analysis for the operation behaviour and optimization of CHP system in district heating and cooling network <i>Y.H. Im, H.-C. Park, B.-S. Park and M. Chung</i>
2.	Solar district heating (SDH): technologies used in large scale SDH plants in Graz – operational experiences and further developments <i>M. Schubert, C. Holter, R. Soell</i>	Improved primary energy efficiency of district heating networks by integration of communal biomass-fired combined heat and power plants with biomass pyrolysis <i>T. Kohl, N. A. Pambudi, T. Laukkanen and C.-J. Fogelholm</i>
3.	Bioenergy combines in district heating systems: prospects for a future growth - industry? <i>E. Axelsson, A. Sandoff, C. Overland</i>	CHP or power station?: question for Latvia <i>D. Blumberga, G. Kuplais, F. Romagnoli, E. Vigants</i>
4.	Sea water district cooling feasibility analysis for Tallinn <i>A. Hani, I. Britikovski, H. Voll, T.-A. Kõiv</i>	LCA of combined heat and power production at Hellisheiði geothermal power plant with focus on primary energy efficiency <i>M. R. Karlsdottir, O. P. Palsson, H. Palsson</i>
19:00–22:00 Symposium Dinner <i>Mustpeade Maja</i> (The House of Brotherhood of Blackheads)		

Tuesday, September 7 th		
09:00–10:30	SESSION 8 District Heating: Management and Environment <i>Lääne-Euroopa room</i> Chair: Heiko Huther	SESSION 9 District Heating and Cooling: policy and legislation impact <i>Põhja-Euroopa room</i> Chair: Olafur Petur Palsson
	1. Flexibility from district heating to decrease wind power integration costs <i>J. Kiviluoma, P. Meibom</i>	Policies and barriers for district heating and cooling outside EU countries <i>A. Nuorkivi, B. Kalkum</i>
	2. Heat load variations in Swedish district heating systems <i>H. Gadd, S. Werner</i>	Barriers to district heating development in some European countries <i>D. Henning, O. Mårdsjö</i>
	3. District heating as part of the energy system: an environmental perspective on `passive houses` and heat replacing electricity use <i>M. Fröling, I. Nyström</i>	Impact of the price of CO₂ certificates on CHP and district heat in the EU27 <i>M. Blesl</i>
	4. Adaptive control of radiator systems for a lowest possible return temperature <i>P. Lauenburg, J. Wollerstrand</i>	Considerations and calculations on system efficiencies of heating systems in buildings connected to district heating <i>M. Justo Alonso, R. Ulseth, J. Stang</i>
10:30–11:00	Coffee break/Poster session	
1.	Heat load reductions and their effect on energy consumption <i>C. Johansson, F. Wernstedt</i>	
2.	Verification of heat loss measurements <i>J.T. van Wijnkoop, E. van der Ven</i>	
3.	District heating and cooling with large centrifugal chiller-heat pumps <i>U. Pietrucha</i>	
4.	New economical connection solution for flexible piping systems <i>C.Engel, G.-J. Baars</i>	
5.	Competitiveness of combined heat and power plant technologies in Estonian conditions <i>E. Latõšov, A. Siirde</i>	

11:00–12:30	SESSION 10 District Heating: Case Studies <i>Lääne-Euroopa room</i> Chair: Chris Snoek	SESSION 11 Optimisation and Simulation in district heating <i>Põhja-Euroopa room</i> Chair: Andres Siirde
1.	Distribution of heat use in Sweden <i>M. Borgström, S. Werner</i>	Cutting costs of district heating systems by using optimized laying techniques <i>A.Goebel, S. Holler</i>
2.	Damages of the Tallinn district heating networks and indicative parameters for an estimation of the networks general condition <i>Hlebnikov, A. Volkova, O. Džuba, A. Poobus, Ü. Kask</i>	Analysis of heat transfer in heat exchangers by using the NTU method and empirical relations <i>O. Gudmundsson, O. P. Palsson, H. Palsson</i>
3.	Efficiency of district heating water pumping in Finland <i>A. Hakulinen, J. Lampinen, J Lavanti</i>	Heat loss analysis and optimization of a flexible piping system <i>J. Korsman, I.M. Smits and E.J.H.M. van der Ven</i>
4.	Modelling district heating cooperations in Stockholm – an interdisciplinary study of a regional energy system <i>D. Magnusson, D. Djuric Ilic</i>	Free optimization tools for district heating systems <i>S. Gnüchtel, S. Groß</i>
12:30–13:30	Lunch	
13:30–14:45	PLENARY SESSION (Lääne-Euroopa room) Panel discussion District Heating and Cooling in the Future Sustainable World Moderator: Rolf Ulseth	
14:45–15:00	Closing remarks Rolf Ulseth, Chairman of the Nordic/Baltic PhD-project “Primary Energy Efficiency” (PEE) in Nordic Energy Research	
15:15–18:00	Sightseeing Tour to the Estonian Open Air Museum with programme	