

WiTe

INTERNATIONAL ENERGY AGENCY

DISTRICT HEATING AND COMBINED HEAT AND POWER SYSTEMS

A TECHNOLOGY REVIEW

WiTe

Technische Hochschule Darmstadt
Fachbereich Rechts- und Wirtschaftswissenschaften
Fachgebiet Wirtschaftspolitik (VWL VI)

P 874

INTERNATIONAL ENERGY AGENCY
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

VB TU Darmstadt



51664167

CONTENTS

INTRODUCTION	7
1. Executive Summary and Recommendations	9
1.1 Executive Summary	9
1.2 Recommendations	24
2. General Mandate of the Review	29
3. Review Objectives and Procedures	31
3.1 Review Objectives	31
3.2 Review Procedures	31
4. Energy Perspectives	33
4.1 The Current Energy Supply/Demand Position	33
4.2 Prospects for the Rest of the Century and their Implications ...	36
5. Description of District Heating and Combined Heat and Power Systems	43
5.1 Introduction	43
5.2 Heat Production Units	45
5.3 Environmental Control Technologies	47
5.4 Heat Transmission Systems	47
5.5 Heat Distribution Systems	48
5.6 Heat Distribution Media	49
5.7 Piping and Insulation Materials	50
5.8 Leakage	51
5.9 Consumer Installations	52
5.10 System Comparison for Individual Countries	53
6. Factors which Influence the Impact of District Heating and Combined Heat and Power Systems	57
6.1 Economic Criteria	57
6.2 Competing Systems	62
6.3 Climatic Conditions	63
6.4 Energy Considerations	64
6.5 Building Factors	65
6.6 Utility Considerations	66
6.7 Consumer Perspectives	67
6.8 Industrial Perspectives	68
6.9 Environmental Considerations	69
6.10 Other Aspects	71
6.11 Summary of Advantages and Disadvantages	71

7.	✓ Research and Development Activities, Standards, Nomenclature and Data Considerations	73
7.1	Research and Development Activities	73
7.2	Standards, Nomenclature and Data Considerations	73
8.	District Heating and Combined Heat and Power in Individual Countries	75
8.1	Austria	75
8.2	Denmark	77
8.3	Finland	82
8.4	Germany	86
8.5	The Netherlands	89
8.6	Sweden	92
8.7	United Kingdom	100
8.8	United States	101
8.9	Other IEA Countries	108
9.	Cross-Country Discussions	111
9.1	Energy Features	111
9.2	The Impact of District Heating and Combined Heat and Power Systems	113