

Table of Contents

Foreword	3
Acknowledgements	5
Table of Contents	7
List of Figures and Tables	19
<i>Part 1</i>	19
<i>Part 2</i>	20
PART 1 - OVERVIEW	35
Introduction	37
Chapter 1: Renewables in IEA Energy Supply	41
<i>Renewables in Total Primary Energy Supply</i>	42
<i>Renewable Energy Supply – Overall Trends</i>	44
<i>Renewable Energy Supply – Trends: 1990 to 2001</i>	45
<i>The Mix of Renewables in Primary Energy Supply</i>	45
<i>Renewables in Electricity Supply</i>	48
Chapter 2: Research, Development and Demonstration Trends	53
<i>Government RD&D Expenditures in IEA Member Countries</i>	54
<i>Government Renewable Energy RD&D Budgets</i>	55
<i>Renewables RD&D and the Private Sector</i>	57
Chapter 3: Market and Policy Trends in Renewable Energy Technologies ...	61
<i>Market and Policy Trends: Hydropower</i>	62
Installed Capacity	63
Hydropower Electricity Production	63
Public Acceptance	64
Policy Trends	64
Technology and Cost Developments	65
<i>Market and Policy Trends: Bioenergy</i>	65
Potential	65
Production	65
Solid Biomass Electricity Production	67
Biomass Heat Production	69

Biogas Electricity Production	70
Biofuels	70
Technology and Cost Developments	70
<i>Market and Policy Trends: Geothermal Energy</i>	71
Installed Capacity	72
Geothermal Electricity Production	72
Policy Trends	72
Technology and Cost Developments	73
Geothermal Direct Use	73
<i>Market and Policy Trends: Solar Photovoltaic</i>	74
Installed Capacity	74
PV Electricity Production	75
Policy Trends	75
Technology and Cost Developments	76
<i>Market and Policy Trends: Solar Thermal Energy</i>	77
Solar Thermal Electricity	77
Technology and Costs Development	78
Solar Thermal Heating and Cooling	78
Technology and Costs Development	79
<i>Market and Policy Trends: Wind</i>	80
Installed Capacity	80
Policy Trends	81
Technology and Cost Developments	81
Challenges to Future Growth	84
Chapter 4: Market Deployment Policies	85
<i>Policy Types</i>	85
<i>Policies Addressing Supply and Capacity</i>	86
Investment Incentives	86
Tax Measures	86
Government Purchases	86
<i>Policies Addressing Supply and Generation</i>	86
Incentive Tariffs	86
Tax Measures	87
Obligations	88
Tradable Certificates	88
<i>Policies Addressing Demand and Generation</i>	89
Voluntary Programmes	89
Tax Measures	89

<i>Policies Addressing Demand and Capacity</i>	89
Investment Incentives	89
Tax Measures	90
<i>Regulatory and Administrative Rules</i>	90
<i>Public Awareness Programmes</i>	90
<i>Trends in IEA Renewable Energy Policies</i>	90
Annex 1: Total Primary Energy Supply and Share of Renewables	97
Annex 2: Renewable Energy Statistics – Definitions and Issues	99

PART 2 - COUNTRY PROFILES **105**

Australia	107
<i>Total Primary Energy Supply</i>	108
<i>Renewable Energy Supply</i>	110
Research and Development Trends	111
Market Deployment Trends	112
<i>Renewable Energy Markets</i>	115
Hydropower	115
Biomass Production	115
Biogas Electricity Production	116
Wind Power	117
Solar Thermal Electricity Production	118
Solar Photovoltaic	119
<i>Policy Chronology</i>	121
Austria	129
<i>Total Primary Energy Supply</i>	130
<i>Renewable Energy Supply</i>	132
Research and Development Trends	133
Market Deployment Trends	134
Energy Policy Context	136
<i>Renewable Energy Markets</i>	137
Biomass Electricity Production	137
Biomass Heat Production	138
Wind Power	139

Solar Thermal Production	140
Solar Photovoltaic	141
<i>Policy Chronology</i>	143
Belgium	155
<i>Total Primary Energy Supply</i>	156
<i>Renewable Energy Supply</i>	158
Research and Development Trends	159
Market Deployment Trends	160
<i>Renewable Energy Markets</i>	165
Hydropower	165
Biomass Production	166
Wind Power	167
Solar Thermal Production	168
<i>Policy Chronology</i>	170
Canada	179
<i>Total Primary Energy Supply</i>	180
<i>Renewable Energy Supply</i>	181
Research and Development Trends	182
Market Deployment Trends	184
Energy Policy Context	185
<i>Renewable Energy Markets</i>	188
Hydropower	188
Biomass Production	189
Liquid Biofuels Production.....	190
Wind Power	190
Solar Photovoltaic	191
Ocean Energy	192
<i>Policy Chronology</i>	193
Czech Republic	203
<i>Total Primary Energy Supply</i>	204
<i>Renewable Energy Supply</i>	206
Research and Development Trends	207
Market Deployment Trends	207
<i>Renewable Energy Markets</i>	211
Hydropower	211

Biomass Production	212
Wind Power	213
<i>Policy Chronology</i>	214
Denmark	219
<i>Total Primary Energy Supply</i>	220
<i>Renewable Energy Supply</i>	222
Research and Development Trends	223
Market Deployment Trends	224
Energy Policy Context	225
<i>Renewable Energy Markets</i>	226
Biomass Production	226
Biomass Electricity Production	227
Biomass Heat Production	228
Biogas Electricity Production	229
Wind Power	230
Solar Thermal Production	233
<i>Policy Chronology</i>	235
European Union	243
<i>Renewable Energy Policy Context</i>	244
Background to Activities at a European Union Level	244
EU Renewable Energy Programmes	244
EU Renewable Energy Policies	245
Renewable Energy Legislation.....	245
Finland	249
<i>Total Primary Energy Supply</i>	250
<i>Renewable Energy Supply</i>	252
Research and Development Trends	252
Market Deployment Trends	254
Energy Policy Context	254
<i>Renewable Energy Markets</i>	256
Hydropower	256
Biomass Electricity Production	256
Wind Power	257
<i>Policy Chronology</i>	259

France	267
<i>Total Primary Energy Supply</i>	268
<i>Renewable Energy Supply</i>	269
Research and Development Trends	270
Market Deployment Trends	272
Energy Policy Context	273
<i>Renewable Energy Markets</i>	274
Hydropower	274
Biomass Heat Production	274
Wind Power	275
Solar Thermal Production	276
Solar Photovoltaic	277
<i>Policy Chronology</i>	279
Germany	289
<i>Total Primary Energy Supply</i>	290
<i>Renewable Energy Supply</i>	292
Research and Development Trends	294
Market Deployment Trends	295
<i>Renewable Energy Markets</i>	300
Hydropower	300
Biomass Electricity Production	301
Biomass Heat Production	302
Wind Power	303
Solar Thermal Production	305
Solar Photovoltaic	306
<i>Policy Chronology</i>	308
Greece	321
<i>Total Primary Energy Supply</i>	322
<i>Renewable Energy Supply</i>	323
Research and Development Trends	324
Market Deployment Trends	325
<i>Renewable Energy Markets</i>	327
Hydropower	327
Wind Power	328
Solar Thermal Production	329
<i>Policy Chronology</i>	331

Hungary	339
<i>Total Primary Energy Supply</i>	340
<i>Renewable Energy Supply</i>	342
Research and Development Trends	343
Market Deployment Trends	344
Energy Policy Context	346
<i>Renewable Energy Markets</i>	347
Hydropower	347
Biomass Heat Production.....	347
Biogas Electricity Production.....	349
Geothermal Production.....	350
Wind Power	351
<i>Policy Chronology</i>	352
Ireland	361
<i>Total Primary Energy Supply</i>	362
<i>Renewable Energy Supply</i>	364
Research and Development Trends	365
Market Deployment Trends	367
Energy Policy Context	368
<i>Renewable Energy Markets</i>	370
Hydropower	370
Biogas Electricity Production.....	371
Wind Power	372
<i>Policy Chronology</i>	374
Italy	381
<i>Total Primary Energy Supply</i>	382
<i>Renewable Energy Supply</i>	384
Research and Development Trends	385
Market Deployment Trends	386
Energy Policy Context	390
<i>Renewable Energy Markets</i>	391
Hydropower	391
Biomass Electricity Production	392
Liquid Biofuels Production.....	393
Geothermal Electricity Production	394

Wind Power	395
Solar Photovoltaic	396
<i>Policy Chronology</i>	399
Japan	409
<i>Total Primary Energy Supply</i>	410
<i>Renewable Energy Supply</i>	412
Research and Development Trends	413
Market Deployment Trends	416
<i>Renewable Energy Markets</i>	417
Hydropower	417
Geothermal Electricity Production	418
Wind Power	419
Solar Photovoltaic	420
<i>Policy Chronology</i>	423
Korea	433
<i>Total Primary Energy Supply</i>	434
<i>Renewable Energy Supply</i>	436
Research and Development Trends	437
Market Deployment Trends	438
<i>Renewable Energy Markets</i>	440
Hydropower	440
Biomass Production	441
Wind Power	442
Solar Thermal Production	444
Solar Photovoltaic	445
<i>Policy Chronology</i>	447
Luxembourg	455
<i>Total Primary Energy Supply</i>	456
<i>Renewable Energy Supply</i>	458
Research and Development Trends	459
Market Deployment Trends	460
<i>Renewable Energy Markets</i>	462
Hydropower	462
Wind Power	463
<i>Policy Chronology</i>	464

Netherlands	469
<i>Total Primary Energy Supply</i>	470
<i>Renewable Energy Supply</i>	472
Research and Development Trends	473
Market Deployment Trends	474
Energy Policy Context	476
<i>Renewable Energy Markets</i>	477
Biomass Electricity Production	477
Wind Power	478
Solar Thermal Production	479
Solar Photovoltaic	480
<i>Policy Chronology</i>	482
New Zealand	487
<i>Total Primary Energy Supply</i>	488
<i>Renewable Energy Supply</i>	490
Research and Development Trends	490
Market Deployment Trends	491
Energy Policy Context	493
<i>Renewable Energy Markets</i>	494
Hydropower	494
Biomass	494
Geothermal Electricity Production	495
Wind Power	496
<i>Policy Chronology</i>	498
Norway	503
<i>Total Primary Energy Supply</i>	504
<i>Renewable Energy Supply</i>	506
Research and Development Trends	507
Market Deployment Trends	508
Energy Policy Context	509
<i>Renewable Energy Markets</i>	510
Hydropower	510
Wind Power	511
Solar Photovoltaic	512
<i>Policy Chronology</i>	514

Portugal	521
<i>Total Primary Energy Supply</i>	522
<i>Renewable Energy Supply</i>	524
Research and Development Trends	524
Market Deployment Trends	526
<i>Renewable Energy Markets</i>	528
Hydropower	528
Wind Power	528
Solar Thermal Production	530
Solar Photovoltaic	531
<i>Policy Chronology</i>	533
Spain	541
<i>Total Primary Energy Supply</i>	542
<i>Renewable Energy Supply</i>	544
Research and Development Trends	545
Market Deployment Trends	546
<i>Renewable Energy Markets</i>	549
Hydropower	549
Biomass Electricity Production	550
Wind Power	551
Solar Photovoltaic	552
<i>Policy Chronology</i>	554
Sweden	563
<i>Total Primary Energy Supply</i>	564
<i>Renewable Energy Supply</i>	566
Research and Development Trends	567
Market Deployment Trends	569
Energy Policy Context	571
<i>Renewable Energy Markets</i>	572
Hydropower	572
Biomass Production	573
Biomass Electricity Production	574
Biomass Heat Production	574
Wind Power	576
<i>Policy Chronology</i>	577

Switzerland	585
<i>Total Primary Energy Supply</i>	586
<i>Renewable Energy Supply</i>	588
Research and Development Trends	589
Market Deployment Trends	590
Energy Policy Context	593
<i>Renewable Energy Markets</i>	594
Hydropower	594
Biomass Production	595
Wind Power	596
Solar Thermal Production	597
Solar Photovoltaic	598
<i>Policy Chronology</i>	599
Turkey	605
<i>Total Primary Energy Supply</i>	606
<i>Renewable Energy Supply</i>	608
Research and Development Trends	608
Market Deployment Trends	609
<i>Renewable Energy Markets</i>	612
Hydropower	612
Geothermal Production.....	613
Wind Power	614
<i>Policy Chronology</i>	615
United Kingdom	617
<i>Total Primary Energy Supply</i>	618
<i>Renewable Energy Supply</i>	620
Research and Development Trends	620
Market Deployment Trends	622
Energy Policy Context	623
<i>Renewable Energy Markets</i>	625
Hydropower	625
Biomass Electricity Production	625
Biomass Heat Production	626
Biogas Electricity Production.....	627
Wind Power	628
Solar Photovoltaic.....	630
<i>Policy Chronology</i>	631

United States	641
<i>Total Primary Energy Supply</i>	642
<i>Renewable Energy Supply</i>	644
Research and Development Trends	645
Market Deployment Trends	647
<i>Renewable Energy Markets</i>	649
Hydropower	649
Bioenergy Production	650
Liquid Biofuels Production.....	651
Geothermal Electricity Production	653
Wind Power	655
Solar Thermal Production.....	656
Solar Thermal Electricity Production.....	658
Solar Photovoltaic	658
<i>Policy Chronology</i>	661