

TABLE OF CONTENTS

Executive summary	11
1. Recent trends in demand and supply	15
Highlights	15
Demand	15
Supply	32
References	40
2. Recent trends in international coal trade	43
Highlights	43
Market volumes and trade flows.....	43
Regional analysis.....	46
Prices	55
Coal supply costs	61
References	69
3. Medium-term demand and supply forecast	71
Highlights	71
Methodology	72
Assumptions	72
Global coal demand forecast, 2018-23.....	73
Global coal supply forecast, 2018-23	94
References	103
4. Medium-term international coal trade forecast	105
Highlights	105
Methodology and assumptions.....	105
Seaborne coal trade forecast, 2018-23	107
References	118
5. Capacity investment outlook	119
Highlights	119
Investment overview	119
Investment in export mining capacity	121
Investment in export infrastructure capacity.....	122
Regional analyses	124
References	131
Annex A. Data Tables	132
Annex B. Current Coal Mining Projects	137
Glossary	141
Definitions.....	141

Regional and country groupings.....	143
List of acronyms, abbreviations and units of measure	145
Acronyms and abbreviations	145
Currency codes	148
Units of measure	148

LIST OF FIGURES

Figure 1.1	Thermal coal price markers and French power prices and imports, 2016.....	18
Figure 1.2	LNG prices and imports in Europe and China, 2017-18.....	19
Figure 1.3	Increase in electricity generation by source in China, 2016-17.....	20
Figure 1.4	Installed capacity and load factors of China's coal-fired power plants, 2011-17.....	20
Figure 1.5	Effect of improved Chinese coal-fired power plant efficiency on CO ₂ emissions	21
Figure 1.6	Air pollutant reductions from China's coal-fired power plants.....	22
Figure 1.7	Increase in electricity generation by source in India, 2016-17.....	22
Figure 1.8	Installed capacity and load factors of coal-fired power plants in South Africa, 2011-17.....	31
Figure 1.9	Chinese coal production by province, 2016 and 2017.....	32
Figure 1.10	Annual coal production differences by province, 2015-17.....	33
Figure 2.1	Trade development of seaborne thermal (<i>left</i>) and met coal (<i>right</i>), 2012-17.....	44
Figure 2.2	Indonesian thermal coal exports, 2007-17.....	46
Figure 2.3	Australian exports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17	47
Figure 2.4	Russian exports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2008-17.....	48
Figure 2.5	US exports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17.....	49
Figure 2.6	Colombian exports of thermal coal, 2007-17.....	49
Figure 2.7	South African exports of thermal coal, 2007-17.....	50
Figure 2.8	Chinese imports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17.....	51
Figure 2.9	Indian imports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17	52
Figure 2.10	Japanese imports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17.....	53
Figure 2.11	Korean imports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17.....	53
Figure 2.12	EU imports of thermal coal (<i>left</i>) and met coal (<i>right</i>), 2007-17	54
Figure 2.13	Marker prices for different types of coal, 2016-18.....	55
Figure 2.14	Thermal coal price markers (6 000 kcal/kg) in the Atlantic and Pacific basins, 2017-18.....	56
Figure 2.15	Price markers for different thermal coal qualities in South Africa and Australia.....	57
Figure 2.16	Relationship between the prices of South African and Australian thermal coal with calorific values of 5 500 kcal/kg (<i>left</i>) and 6 000 kcal/kg (<i>right</i>).....	57
Figure 2.17	Evolution of coal prices in China.....	58
Figure 2.18	Coking coal price and monthly year-on-year BFI production growth, 2015-18	60
Figure 2.19	Forward curves of API 2 (<i>left</i>) and API 4 (<i>right</i>), 2016-18.....	60
Figure 2.20	Trade volumes for coal derivatives, 2000-17.....	61
Figure 2.21	Indexed nominal prices of selected commodities used in coal mining	62
Figure 2.22	Average fuel costs (<i>left axis</i>) and their share in total thermal coal mining costs (<i>right axis</i>), 2015-17.....	63

Figure 2.23	Average labour costs (<i>left axis</i>) and their share in total thermal coal mining costs (<i>right axis</i>), 2015-17.....	63
Figure 2.24	Year-on-year development of selected currencies against the USD.....	64
Figure 2.25	FOB steam coal prices in USD and local currencies.....	65
Figure 2.26	Bulk carrier fleet, 2011-18.....	65
Figure 2.27	Selected freight rates and fuel oil price, 2015-18.....	66
Figure 2.28	FOB supply costs and average December price for 5 500-kcal/kg-equivalent thermal coal at ports around the Bohai Economic Rim.....	68
Figure 2.29	Indicative hard coking coal FOB supply curve and annual average FOB marker price.....	69
Figure 2.30	Indicative SSCC and PCI FOB supply curve and annual average FOB marker price.....	69
Figure 3.1	Chinese power demand compared with other economies.....	75
Figure 3.2	China's share in global output of selected energy-intensive products.....	75
Figure 3.3	Relationship between GDP and power generation in China, 2001-17.....	76
Figure 3.4	Global coal demand growth in relation to hydropower production and power demand in China.....	76
Figure 3.5	Total floor space under construction in China, 2010-16.....	78
Figure 3.6	Distribution of technologies in the new clean-heating area of northern China.....	79
Figure 3.7	Crude steel, pig iron and direct reduced iron production in India, 2010-23.....	81
Figure 3.8	Planned annual coal-fired capacity additions in Viet Nam to 2023.....	84
Figure 3.9	Marginal East Coast US coal- and gas-fired power generation costs over the outlook period.....	86
Figure 3.10	Marginal EU hard coal- and gas-fired power generation costs over the outlook period.....	88
Figure 3.11	Shares of lignite-generated electricity in Balkan countries.....	91
Figure 3.12	Global coal production development, 2017-23.....	95
Figure 3.13	Thermal coal supply costs, China, 2017 and 2023.....	96
Figure 4.1	Changes in global seaborne thermal coal imports, 2017 to 2018 (Mt).....	107
Figure 4.2	Projected seaborne exports of thermal coal (<i>left</i>) and met coal (<i>right</i>).....	108
Figure 4.3	Projected seaborne thermal coal imports.....	108
Figure 4.4	Power generation in Korea, 1990-2017.....	110
Figure 4.5	Coal and gas power generation cost comparison in Korea.....	111
Figure 4.6	Projected seaborne thermal coal exports.....	113
Figure 4.7	Indonesian thermal coal supply curve (FOB), 2018 and 2023.....	114
Figure 4.8	Projected seaborne met coal imports.....	116
Figure 4.9	Projected seaborne met coal exports.....	117
Figure 5.1	The path to zero-emissions coal.....	121

LIST OF MAPS

Map 1.1	Location and ownership of major coal mines and projects in South Africa (2017).....	39
Map 2.1	Main trade flows in the seaborne thermal coal market, 2017 (Mt).....	44
Map 2.2	Main trade flows in the seaborne met coal market, 2017 (Mt).....	45
Map 2.3	Coal-fired power plants on the Rhine river.....	67
Map 3.1	EU coal-fired power generation phase-out.....	89
Map 4.1	Coal-fired power plants under development in Bangladesh.....	112
Map 4.2	Coal basins and coal export capacity in Australia.....	115
Map 5.1	Cumulative capacity of hard coal export mining projects (Mtpa), 2019-23.....	122

LIST OF TABLES

Table 1.1	Total coal consumption (Mt), 2017	16
Table 1.2	Hard coal and lignite consumption in selected Asia Pacific countries (Mt)	17
Table 1.3	New coal-fired power plant blocks in Japan	24
Table 1.4	New coal-fired power plant blocks in Korea	24
Table 1.5	Hard coal and lignite consumption in selected European countries (Mt)	28
Table 1.6	Coal-fired capacity retirements in Germany	29
Table 2.1	Thermal coal exports in 2017 (Mt) and net changes from 2016 (colour-coded)	45
Table 3.1	Coal-to-liquids plants in China, 2017 and 2023	80
Table 3.2	New coal-fired power stations in Japan, 2018-23	82
Table 3.3	Commissioning and retirements of coal-fired power plants in Korea, 2018-23	83
Table 3.4	Select ultra-supercritical coal plants under development in Indonesia	84
Table 3.5	New coal-fired power stations in Pakistan, 2018-23	85
Table 3.6	Coal-fired power stations to be decommissioned in Germany	90
Table 3.7	Key differences between the 2010 Mining Charter and the 2018 draft	102
Table 4.1	Tax scheme for coal and gas in Korea	110
Table A.1.	Coal demand (Mtce), 2016-23	132
Table A.2.	Thermal coal and lignite demand (Mtce), 2016-23	132
Table A.3.	Metallurgical (met) coal demand (Mtce), 2016-23	133
Table A.4.	Coal production (Mtce), 2016-23	133
Table A.5.	Thermal coal and lignite production (Mtce), 2016-23	134
Table A.6.	Met coal production (Mtce), 2016-23	134
Table A.7.	Seaborne steam coal imports (Mtce), 2016-23	135
Table A.8.	Seaborne thermal coal exports (Mtce), 2016-23	135
Table A.9.	Seaborne met coal imports (Mtce), 2016-23	135
Table A.10.	Seaborne met coal exports (Mtce), 2016-23	136

LIST OF BOXES

Box 1.1	Tips for readers	16
Box 1.2	Energy interlinkages	17
Box 1.3	China's coal-fired power plants make significant strides	21
Box 2.1	The hard task of price control	58
Box 2.2	The strategic value of the Rhine river	66
Box 3.1	The importance of Chinese power generation in global coal demand	74
Box 3.2	Cleaning up China's heating system	78
Box 3.3	Lignite-based electricity in the Balkans	91
Box 3.4	The end of Coal India's monopoly	97
Box 3.5	South Africa's 2018 Draft Mining Charter	101
Box 4.1	The 1-billion-tonne market?	106
Box 4.2	Korea accelerates its energy transition	109
Box 4.3	Bangladesh boosting coal power	111
Box 5.1	Will technological advances boost coal demand?	120
Box 5.2	CCUS: Positive but insufficient momentum continues to build	123