

# Contents

|                                                                                                                                            |    |
|--------------------------------------------------------------------------------------------------------------------------------------------|----|
| Preface .....                                                                                                                              | V  |
| Production and Reserves .....                                                                                                              | 5  |
| Exponential Growth or the Logistic Curve? .....                                                                                            | 11 |
| Energy .....                                                                                                                               | 15 |
| Fossil Fuels .....                                                                                                                         | 19 |
| Coal .....                                                                                                                                 | 19 |
| Origin of coal 19, Types of coal 20, Occurrence of coal 21                                                                                 |    |
| Europe .....                                                                                                                               | 23 |
| United Kingdom 23, Continental Western Europe 26, Central Europe 28, Other Europe 30                                                       |    |
| North America .....                                                                                                                        | 30 |
| United States 30, Canada 34                                                                                                                |    |
| USSR .....                                                                                                                                 | 35 |
| Donbass 35, Kuzbass 35, Other fields 36                                                                                                    |    |
| Asia .....                                                                                                                                 | 36 |
| China 36, Japan 37, Other Asia 38                                                                                                          |    |
| Southern Hemisphere .....                                                                                                                  | 38 |
| Australia 38, South Africa 39, Rhodesia 40, Latin America 40                                                                               |    |
| Outlook for the Coal Industry .....                                                                                                        | 40 |
| Petroleum — Oil and Natural Gas .....                                                                                                      | 41 |
| Oil .....                                                                                                                                  | 43 |
| Oil refining 45, Transportation 46, Location of oil refineries 46                                                                          |    |
| North America .....                                                                                                                        | 47 |
| United States 47, Canada 49, Mexico 50                                                                                                     |    |
| South America .....                                                                                                                        | 52 |
| Trinidad 52, Venezuela 52, Colombia 54, Peru 55, Ecuador 55, Argentina 55                                                                  |    |
| Europe .....                                                                                                                               | 55 |
| Romania 56, Germany 56, Norway 56, United Kingdom 56                                                                                       |    |
| The Soviet Union .....                                                                                                                     | 57 |
| Baku 57, The North Caucasus fields 57, The Volga-Urals-region 58, Northwestern Siberia 58, Scattered fields 60, Pipelines 60, Prospects 61 |    |
| The Gulf .....                                                                                                                             | 61 |
| Iran 61, Iraq 62, Bahrain 63, Saudi Arabia 63, Kuwait 64, The United Arab Emirates 65, Company-State relations 65, Oil and Geopolitics 65  |    |
| Africa .....                                                                                                                               | 66 |
| Algeria 66, Libya 66, Nigeria 67, Other Africa 67                                                                                          |    |
| Other Asia .....                                                                                                                           | 67 |
| Indonesia 67, China 68, India 69, Burma 69                                                                                                 |    |
| Oceania .....                                                                                                                              | 69 |
| Australia 69                                                                                                                               |    |
| Prospects of the Oil Industry .....                                                                                                        | 70 |
| Natural Gas .....                                                                                                                          | 70 |
| North America .....                                                                                                                        | 73 |
| United States 73, Canada 75                                                                                                                |    |
| Western Europe .....                                                                                                                       | 75 |
| Soviet Union .....                                                                                                                         | 77 |

## 2 Contents

|                                                                                  |     |
|----------------------------------------------------------------------------------|-----|
| Nuclear Power .....                                                              | 80  |
| History 80, The atom 81                                                          |     |
| Fission Energy .....                                                             | 82  |
| Light Water Reactors .....                                                       | 83  |
| Enrichment plants 85, Fuel recovery plants 86, The future of nuclear power 86,   |     |
| Great Britain 87, Germany (W) 89, France 89, United States 90, Sweden 90,        |     |
| USSR 91, India 91                                                                |     |
| Breeder Reactors .....                                                           | 92  |
| Fusion Energy .....                                                              | 93  |
| Water Power .....                                                                | 94  |
| Hydroelectric power stations 95                                                  |     |
| Electric Energy .....                                                            | 97  |
| Waste heat 103, Radioactivity 104, Other environmental deterioration 104         |     |
| Metals and Other Minerals .....                                                  | 107 |
| Geology .....                                                                    | 107 |
| Iron Ore .....                                                                   | 108 |
| Ore types 108, Iron and steel making 109                                         |     |
| North America .....                                                              | 111 |
| United States 111, Canada 114                                                    |     |
| Latin America .....                                                              | 115 |
| Brazil 115, Venezuela 115, Chile 115, Peru 116, Cuba 116                         |     |
| Western Europe .....                                                             | 116 |
| Sweden 116, Norway 117, Finland 117, France 117, Germany 117, United             |     |
| Kingdom 118, Austria 119, Spain 120                                              |     |
| Central Europe .....                                                             | 120 |
| Yugoslavia 120                                                                   |     |
| USSR .....                                                                       | 120 |
| The Ukraine 120, Kursk Magnetic Anomaly 122, The Urals 122, Scattered Fields 123 |     |
| Asia .....                                                                       | 123 |
| Japan 123, China 123, India 123, Other Asia 124                                  |     |
| Australia .....                                                                  | 125 |
| Africa .....                                                                     | 125 |
| South Africa 125, Liberia 126, Mauritania 126, Central African Republic 126      |     |
| Alloy Metals .....                                                               | 127 |
| Manganese .....                                                                  | 127 |
| Chromium .....                                                                   | 129 |
| Nickel .....                                                                     | 129 |
| Tungsten .....                                                                   | 131 |
| Antimony .....                                                                   | 132 |
| Molybdenum .....                                                                 | 133 |
| Vanadium .....                                                                   | 134 |
| Cobalt .....                                                                     | 134 |
| Columbium .....                                                                  | 135 |
| Tantalum .....                                                                   | 135 |
| Rare Earth Metals .....                                                          | 135 |
| Base Metals .....                                                                | 136 |
| Copper .....                                                                     | 137 |
| North America .....                                                              | 138 |
| United States 138, Canada 140                                                    |     |

|                                                                                                |     |
|------------------------------------------------------------------------------------------------|-----|
| South America .....                                                                            | 140 |
| Chile 140, Peru 142                                                                            |     |
| Africa .....                                                                                   | 142 |
| Zaire 142, Zambia 143                                                                          |     |
| USSR .....                                                                                     | 143 |
| Mongolia 145                                                                                   |     |
| Australia .....                                                                                | 145 |
| Europe .....                                                                                   | 145 |
| Tin .....                                                                                      | 146 |
| Southeast Asia 147, Bolivia 147, Africa 149, USSR 149                                          |     |
| Zinc .....                                                                                     | 149 |
| United States 150, Canada 150, Australia 150, Other producing regions 152                      |     |
| Lead .....                                                                                     | 153 |
| United States 154, Canada 154, Mexico 154, Australia 154, USSR 156, Europe 156                 |     |
| Mercury .....                                                                                  | 156 |
| Italy and Spain 156, USSR 156, North America 156, Pollution of the environment 156             |     |
| Precious Metals .....                                                                          | 157 |
| Gold .....                                                                                     | 158 |
| South Africa 159, USSR 160, Canada 160, United States 161                                      |     |
| Silver .....                                                                                   | 161 |
| The Western Hemisphere 162, USSR 162                                                           |     |
| Platinum .....                                                                                 | 162 |
| Light Metals .....                                                                             | 163 |
| Aluminum .....                                                                                 | 163 |
| History 163, Bauxite 164, Alumina 164, Aluminum 165, Economics 165, Uses 165, Corporations 166 |     |
| Europe .....                                                                                   | 166 |
| USSR .....                                                                                     | 168 |
| North America .....                                                                            | 170 |
| Latin America .....                                                                            | 171 |
| Africa and Asia .....                                                                          | 174 |
| Australia .....                                                                                | 174 |
| Magnesium .....                                                                                | 175 |
| Titanium .....                                                                                 | 176 |
| Nonmetallic Minerals .....                                                                     | 177 |
| Stone .....                                                                                    | 178 |
| Cement .....                                                                                   | 179 |
| Technique 180, Location 181, The cement industry and economic theory 183                       |     |
| Asbestos .....                                                                                 | 184 |
| Clay .....                                                                                     | 185 |
| Sand and Gravel .....                                                                          | 185 |
| Glass .....                                                                                    | 185 |
| The flat-glass industry 186, Glass containers 187, Special glass 187                           |     |
| Porcelain .....                                                                                | 188 |
| Ball clay .....                                                                                | 189 |
| Fire clay .....                                                                                | 189 |
| Bentonite .....                                                                                | 189 |
| Fuller's earth .....                                                                           | 190 |

## 4 Contents

|                                                                                                                  |     |
|------------------------------------------------------------------------------------------------------------------|-----|
| Diatomite .....                                                                                                  | 190 |
| Graphite .....                                                                                                   | 190 |
| Sulfur .....                                                                                                     | 190 |
| Fertilizers .....                                                                                                | 192 |
| Nitrogen .....                                                                                                   | 194 |
| Chile saltpeter 195, Norwegian saltpeter 196, Ammonia 196                                                        |     |
| Phosphorus .....                                                                                                 | 197 |
| United States 198, North Africa 199, Soviet Union 200, Asia 200, Oceania 200, Latin America 200                  |     |
| Potash .....                                                                                                     | 201 |
| Europe 201, North America 202, USSR 202                                                                          |     |
| Calcium .....                                                                                                    | 203 |
| Abrasives .....                                                                                                  | 203 |
| Industrial Diamonds .....                                                                                        | 203 |
| Aluminum Oxide and Other Natural Abrasives .....                                                                 | 205 |
| Corundum 205, Emery 205, Garnet 205, Tripoli 205, Rottenstone 205                                                |     |
| Boron .....                                                                                                      | 205 |
| Mineral Raw Materials in International Trade .....                                                               | 207 |
| Raw materials and political geography 208, Petroleum and other minerals 210, International trade in minerals 213 |     |
| Notes .....                                                                                                      | 219 |
| Measure Prefixes .....                                                                                           | 225 |
| Capacity .....                                                                                                   | 225 |
| Energy .....                                                                                                     | 225 |
| Short Bibliography .....                                                                                         | 227 |
| Statistical Sources .....                                                                                        | 229 |
| Index .....                                                                                                      | 231 |