Acronyms, Abbreviations, and Units

APEC: Asia-Pacific Economic Cooperation: members are Australia, Brunei, Canada, Chile, China, Hong Kong Special Administrative Region (SAR), Indonesia, Japan, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, the Republic of Korea, Russia, Singapore, Taiwan, Thailand, the United States, and Vietnam
APM: Administered Pricing Mechanism (India)
APSA: ASEAN Petroleum Security Agreement
ASEAN: Association of Southeast Asian Nations: members are Brunei, Cambodia, Indonesia, Lao People’s Democratic Republic, Malaysia, Myanmar, the Philippines, Thailand, Singapore, and Vietnam
ASEAN+3: ASEAN members plus China, Japan, and the Republic of Korea
b/d: barrels per day
boe: barrels of oil equivalent
boe/a: barrels of oil equivalent per annum
boe/d: barrels of oil equivalent per day
BPCL: Bharat Petroleum Corporation, Limited (India)
Btu: British thermal unit
C: centigrade
CAA: Commercial Agreement Area (between Malaysia and Vietnam)
CDM: Clean Development Mechanism (provision of the Kyoto Protocol)
CH₄: methane
Chinaoil: Petrochina International Company, Limited
CIF: cost, insurance, and freight
CIL: Coal India, Limited
CITIC: China International Trust and Investment Company
CNG: compressed natural gas
CNOOC: China National Offshore Oil Corporation (CNOOC Ltd. is its listed subsidiary)
CNPC: China National Petroleum Corporation (PetroChina is its listed subsidiary)
CO: carbon monoxide
CO₂: carbon dioxide
DMCC: Dubai Metals and Commodities Centre
DME: Dubai Mercantile Exchange
EIA: Energy Information Administration (United States Department of Energy)
EPA: Environmental Protection Agency (United States)
F: Fahrenheit
FERC: Federal Energy Regulatory Commission (United States)
FIPB: Foreign Investment Promotion Board (India)
FOB: free on board
FPC: Formosa Petrochemical Corporation (Taiwan)
PEC: primary energy consumption
PGU: Peninsular Gas Utilization project (Malaysia)
pH: a measure of the activity of hydrogen ions in a solution, indicating its acidity or alkalinity
PM_{10}: particulate matter
ppm: parts per million
PPP: purchasing power parity
PRB: Population Reference Bureau
PV: photovoltaic
RIL: Reliance Industries, Limited (India)
R/P: Reserve-to-production ratio, calculated as the reserves remaining at the end of a year divided by production in that year, resulting in the number of years that the remaining reserves will last if production continues at the same level
SAR: Special Administrative Region (Hong Kong)
scf: standard cubic feet
scf/d: standard cubic feet per day
SDPC: formerly State Development Planning Commission (China)
Sinopec: China Petrochemical Corporation (Sinopec Corp is its listed subsidiary)
SO_2: sulfur dioxide
SPV: Special Purpose Vehicle (India)
t: tonne or metric ton, equivalent to 1,000 kilograms or 2,205 pounds
t/a: tonnes per annum
TAGP: Trans-ASEAN Gas Pipeline
TEPCO: Tokyo Electric Power Company (Japan)
TOCOM: Tokyo Commodity Exchange (Japan)
TWh: terawatt (1 trillion watts) hours
UNEP: United Nations Environment Program
UNFCCC: United Nations Framework Convention on Climate Change
Unipec: United Petroleum and Chemicals Company, Limited (China)
U.S.: United States
WHO: World Health Organization
WMO: World Meteorological Organization
WTI: West Texas Intermediate crude oil
WTO: World Trade Organization
References

Foreword


Chapter One: The Asia-Pacific Energy Dilemma


Chapter Two: The Environmental Context of Energy


Chapter Six: Policy Priorities


Appendix: Forecasting Methodology


Contributors

Dr. Jeffrey G. Brown, Managing Director, East-West Consultants International Private Limited; Group Chief Economist, FACTS Global Energy, Singapore

Dr. Fereidun Fesharaki, Senior Fellow and Leader, Energy Economics Group, Research Program, East-West Center; President and CEO, FACTS Global Energy, Honolulu, Hawaii, USA

Mr. Shariar Fesharaki, Senior Consultant, FACTS Global Energy, Honolulu, Hawaii, USA

Ms. Tomoko Hosoe, Project Specialist, Energy Economics Group, Research Program, East-West Center, Honolulu, Hawaii, USA

Dr. Charles E. Morrison, President, East-West Center, Honolulu, Hawaii, USA

Dr. Widhyawan Prawiraatmadja, Senior Assistant to CEO, PT Pertamina (Indonesian State Oil Company), Jakarta, Indonesia

Dr. Toufiq Siddiqi, Adjunct Senior Fellow, Research Program, East-West Center; President, Global Environment and Energy in the 21st Century, Honolulu, Hawaii, USA

Ms. Aarti Uplenchwar, Consultant, KPMG Advisory Services Private Limited, India

Mr. Hassaan Vahidy, Senior Project Analyst, Supply Optimization Group, Asia Pacific, Chevron USA Inc. (Singapore Branch)

Ms. Sidney B. Westley, Communications Specialist, Research Program, East-West Center, Honolulu, Hawaii, USA

Dr. Kang Wu, Senior Fellow, Energy Economics Group, Research Program, East-West Center, Honolulu, Hawaii, USA
Index

Abu Dhabi, 53–54
acid precipitation (acid rain), 20, 22
air pollution, 17–23, 26, 77
Angarsk oil field, Lake Baikal (Russia), 47
Asia-Pacific region, 1–2
  energy, 12
  natural gas, 49–61
  oil, 35–47
  population, 3
  regional cooperation, 90–93
Atlantic Basin, 45, 56
Bangalore (India), 18–19, 77
Bangkok (Thailand), 18–19
Bangladesh, 6, 8, 11, 23, 31, 43, 45, 92, 112
Beijing (China), 18–19, 77
biomass and biofuels, 17, 21, 31–32, 101
Brunei Darussalam, 6, 9, 11, 35, 45, 53, 103, 107–108, 112
carbon dioxide (CO₂), 23–26
Central Asia, ix, 46, 109
China, 63–85
  alternative energy sources, 29–30, 101–102
  coal, 11, 68–69
  energy, 5–6, 32, 64–67, 110–111
  environmental issues, 22–23, 33
  hydropower, 10, 27, 79–80
  natural gas, 8, 11, 12, 50, 53, 58–60, 76, 78–79
  nuclear power, 10, 28, 80, 82–84, 101
  oil, vi, 8, 11, 35–37, 40–43, 45–47, 70–72, 80, 88–89
  overseas investments, 80, 83, 94
  policies, 82–85, 92, 96, 98–101
climate change, 23–26, 102–104
coal, 9, 11–12, 17, 20, 68–70, 103–104
compressed natural gas (CNG), 21, 56, 77–79, 103
Delhi (India), 18–19, 56, 77–78, 103
diesel (gasoil), 38, 40–41
electricity, v, 7, 10, 17, 20, 25, 27–31, 40–41, 56–57, 63, 68–70, 76, 78–82, 100–104
emission standards, 77, 102–104
energy
  alternative sources, 29–32, 101–102
  consumption, 1–6, 64–67

[ 148 ]
efficiency/conservation, 32, 95–97
insecurity, 107–113
markets, vi, 89–91, 96–100
model, 116–117
policies, 82–85, 87–105
production, 10–12, 65–66
reserves, 11, 66
environment, 17–33, 77, 102–104
Europe, 36, 57, 109–110
fuel oil, 38, 40–41
gasoline, 38, 40–41
geothermal energy, 30–31
hydropower, 23–26
gross domestic product (GDP), 5, 15, 97, 117
Hong Kong, 49, 103, 112
hydropower, 10, 27, 70–81
India, 63–85
alternative energy sources, 30–31, 101–102
coal, 9, 69–70
energy, 5–6, 32, 65–67, 110–112
environmental issues, 23, 33
hydropower, 10, 27, 80–81
natural gas, 76, 78–79
nuclear power, 10, 28, 81–82, 101
oil, 11, 35–37, 42–44, 70–75, 80, 88–89
overseas investments, 80, 84, 94
petroleum products, 42–44, 74–75
policies, 83–85, 92, 96–101
Indonesia, 8–9, 11–12, 15, 31, 35–37, 42, 45, 51, 53, 102–103, 110–112
Jakarta (Indonesia), 18–19
joint ventures, 80, 93–94
Kazakhstan, 46, 78, 80, 94
kerosene/jet fuel, 38, 40–41
Kolkata (India), 18–19, 77
Kyoto Protocol, 25, 29, 100
liquefied natural gas (LNG), 49–50, 52–54, 57–61, 76, 78–79
liquefied petroleum gas (LPG), 38, 40–42
Malacca Strait, 46, 94–95
Middle East, xi, 1, 12, 35–36, 38–39, 43, 45–47, 53–54, 56, 58, 94, 107–109, 112
motor vehicles, 20–21, 40, 56–57, 70, 77, 102–103
Mumbai (India), 18–19, 77
Myanmar, 6, 31, 51, 112
naphtha, 38, 40–42
natural gas, 49–61
  consumption, 8–9, 53, 56–57, 76, 78–79, 104
  market, prices, vii–viii, 12–13, 50, 57–60
  measurement, 55
  pipelines, 49–52, 78–79
  production, 11–12, 53–54, 100
  reserves, 11–12, 53
Nepal, 6, 31, 42, 112
nitrogen dioxide (NO₂), 18–19, 21
Northwest Shelf (NWS) consortium (Australia), 58–60
nuclear power, 10, 28–29, 80–82, 100–101, 104
oil, 35–47
  consumption, vi, 6–8, 36–38, 70–75
  environmental impact, 17
  imports, 44–47
  market, prices, v–vii, xii–xiii, 12–13, 96–100
  pipelines, 46–47
  policies, 88–89, 96–100
  production, ix–xi, 11, 35–37, 39, 70–73, 80, 100
  refining, 38, 40–44, 74, 98
  reserves, ix, xi, 11, 35–37, 71, 73
Oman, 53–54, 60
Organization of the Petroleum Exporting Countries (OPEC), ix, xi–xiii, 35, 39, 112
ozone (O₃), 21, 23
Pakistan, 6, 9–11, 27–28, 30–31, 42–43, 45, 53, 92, 112
Papua New Guinea, 43, 45
particulate matter, 18–19, 21
petroleum products, 38, 40–44, 74–75, 92–93
Philippines, 8, 15, 31, 42, 45, 53, 98–100, 103, 112
pipelines, 46–47, 49–52, 94–95
Qatar, 53–54, 60
renewable energy, 29–32, 101–102
Russia, ix, 46–47, 50, 94, 109
Saudi Arabia, ix, 94
Seoul (Republic of Korea), 19, 56, 103
Shanghai (China), 18–19, 77
Sri Lanka, 6, 30–31
stockpiles, 82–84, 88–89, 91–92
sulfur dioxide (SO₂), 18–19, 21
Thailand, 8, 30, 35, 43, 45, 49, 51, 53, 88, 98–100, 103, 112
Three Gorges Dam (Yangtze River, China), 27, 80
United States, xi, 56–57, 60–61, 104, 109–110
Vietnam, 6, 8, 11, 31, 35–36, 42, 45, 101, 107–108
wind power, 29–30, 101–102
Below
Time-lapse photo taken during rush hour in a commuter train station, Mumbai, India. By 2025, India will have surpassed China to become the most populous nation in the world. © Raghu Rai/ Magnum Photos

Front cover
Shipyard worker repairs an oil tanker at Qili Port, Zhejiang Province, China. In 1993, China became a net oil importer, and imports of crude oil and petroleum products have risen steadily ever since. © Edward Burtynsky, courtesy Robert Koch Gallery, San Francisco, and Charles Cowles Gallery, New York