Index

A
A*STAR, 20, 21
A Century of War, 9
Abdullah Badawi, 8
ACD, 11
ADM-Wilmar, 17
advanced reservoir imaging, 124
Africa, 220–27
African oil
transportation to China, 221
air pollution, 53
air quality
emission data, 54
Alberta, 255
Alexander’s Gas & Oil Connections, 183
Al Furat Production Company, 153
alternative fuel
Thailand, 258
alternative energy generation, 264
alternative energy use
couraging, 16, 17
alternative energy sources, 43
Amoco, 98, 99
passive shareholder in SPC, 100
Amsterdam, 32
Angola, 210
annual growth rate
global, 178

Antwerp, 32
APEC, 11
APEC Energy Working Group (EWG), 174
APEC Science and Technology Ministers, 20
Arab oil embargo, 99
arbitrage opportunities, 37
A.S. Ardekani, 139
ASEAN+3, 11
ASEAN+3 Oil Stockpiling Forum, 162
ASEAN
energy cooperation, 162–63
gross domestic product, 169
ASEAN Anti-Terrorism pact, 166
ASEAN-China Free Trade Area (ACFTA), 168
ASEAN for Central Asia, 169
ASEAN Ministers of Energy Meetings+3 (AMEM+3), 162
ASEAN Security Community Plan of Action, 175
ASEAN Way, 169
ASEAN-Russia Joint Cooperation Committee, 174
ASEAN-Russia Joint Cooperation Committee (ARJCC), 165
ASEAN-Russia Summit, 166
ASEAN-SCO Energy Partnership, 156–75
benefits, 168–70
Asia
energy security vulnerability, 158–59
growing energy demand, 159
regional energy cooperation, 161–62
reliance on imports, 38
scramble for oil, 249–65
Asia Energy Forum, 170
Asia Pacific, 266
Asia Pacific region
demand for natural gas, 126
dependence on oil, 151
Asia-Pacific Partnership Group, 190
Asian Carbon Exchange, 13
Asian countries
affiliation with ASEAN and SCO, 167
Asian Economic Community, 161
Asian Energy Partnership, 161
Asian financial crisis, 41, 48
Asian oil companies
cooperation, 262
Asian oil industry, 31
Asian premium, 159
Asian Spot Market
development of, 37–40
Asian economies
annual growth rate of real GDP, 145
conventional per capita GDP, 145
PPP-based GDP, 144
PPP-based GDP per capita, 146
real conventional GDP, 144
Asian financial crisis, 100
Asset Based Storage, 111
Association of Southeast Asian Nations (ASEAN), 157
Atomic Energy Commission of Japan, 233
Australia, 28, 103, 153
impact of China's demand for oil, 153
exporter of crude, 154
LNG exports, 274
LNG projects, 275
Azadegan project, 243
Azeri-Chirag-Guneshli fields, 242
B
backwardation, 39
Baker Marine design, 84
Baker Marine Pacific Class 375 Jack-up rig, 76
Baku-Tbilisi-Ceyhan pipeline, 242
Bahrain, 245
Balakrishnan, Vivian, 19
Bangkok Declaration, 169
Bangkok Metropolitan Area, 50
Bangkok Metropolitan Region, 51
Bangladesh-India pipeline, 140–41
Beibu Gulf, 179
Beijing Energy Efficiency Centre, 192
Bethlehem, 67
Bethlehem Steel, 81, 82
bio-diesel
FAMEs for, 299
second generation, 296
bio-fuels, 17, 285–91
advantages, 288
compared with carbon emissions, 304
cooporation between governments, 165
determining utility of, 300
global trend in usage, 298
options for diesel, 297
overview, 289
production paths, 289
second generation, 292, 296, 298
sustainable types, 306
types, 288
bio-mass fuel, 332
bio-mass-to-liquids, 295
Index

Bohai Bay, 179
Bolivia, 8
Boreh International, 37
BP, 35, 99, 102
BP Statistical Review of World Energy, 308
Bracken, Rob, 251
breaking of bulk, 107
British naval power
  importance of oil, 9
Brent crude, 31
Brent crude oil, 204, 214
British Nuclear Fuels, 237
British Petroleum Group, 12
Browse project, 276
Brunei, 152
BTL fuel
  advantages, 296
Building Energy Efficiency Label, 18
Building Energy Efficiency Label system, 16
Bukom Island, 5
bunker fuel, 33
bunkering port
  Singapore, 2
Bush, George W., 215, 247, 256

C
Caltex, 99, 106
Cambodia, 8, 104, 317
Canada, 207
Canadian oil sands, 27
cantilever, 77
carbon dioxide emissions, 51, 59, 62
  non-OECD countries, 129
Carter, Jimmy, 189
Caspian Sea, 139, 161, 171
Cedigaz World LNG Trade Outlook, 270
Central Asia, 164
  energy supplies, 242
  preoccupation with domestic politics, 170
Centre of Offshore Research in
  Engineering, 12
Chepu oil field, 257
chaebols, 35
Chang, 61, 63
Chang, Benety, 84
Changi Airport, 100
Chavez, Hugo, 240
Chemoil, 11, 95
Chernobyl incident, 237
Chevron, 34, 259, 263
Chiangmai, 51
Chiles, 67
China, 27, 34, 35, 103, 161, 166, 250
  abundant supplies of coal, 221
  alternative energy, 217, 218
  choice of CTL technology, 226
  coal, 220–27
  coal into transport fuel, 220
  coal reserves, 226
  coal to oil projects, 187
  demand for oil, 148
  domestic petroleum exploration, 176
  domestic pressures for energy sustainability, 183, 186, 187–88
  drilling licences in Nigeria, 240
  economy, 143–46
  exporter of oil, 154
  foreign trade, 143
  fuel for transportation, 251
  energy conservation law, 14
  energy demand, 200–09
  energy security, 176–96
  energy SLOCs, 213
Five-Year Plans see Five-Year Plans
gasoline from, 94
global energy supply, 197–218
greater energy cooperation, 188–90
growing demand, 177–82
growing economy, 85
gross domestic product, 143
impact on regional demand, 150
leading oil supplier, 208
LNG, 142
local production, 177
low-cost labour supply, 143
loss of energy self-sufficiency, 176
Ministry of Energy, 192
Ministry of Science and Technology, 217
moderating destabilizing tendencies, 188
National Development & Reform Commission (NDRC), 225
natural gas, 142
need to import, 177
net exporter of oil, 212, 221
offshore oil exploration, 179
oil contracts with Saddam Hussein, 252
oil demand, 142, 146, 151–52
oil diplomacy, 176, 182, 183, 253–54
oil diplomacy with Philippines, 254
oil production, 221
outlook for oil demand, 147
overall GDP growth, 147
overseas equity purchases, 176
overseas energy investments, 254
petrochemical sector, 146
phenomenal rise of, 48
population, 145
potential oil reserves, 254
production of major oil fields, 180, 181
regional impact of oil demand, 149–51
regional oil imports and energy situation, 150
stagnating supplies, 177–82
State Economic and Trade Commission (SETC), 192
State Environmental Protection Agency, 222
supply side, 182
support for certain regimes, 207
top suppliers to, 209, 210
value added tax exemption, 189
wind power, 187
China Aviation Oil, 4
China National Petroleum Corp (CNPC), 162, 254
China National Offshore Oil Company (CNOOC), 254, 239, 252, 259, 500
China National Oil & Gas Exploration and Development Corporation (CNPC), 184, 211
China Oil and Gas Exploration and Development Cooperation (CNOODC), 164
China National Petroleum Corp, 240
China/Taiwan Cross Straits flow, 97
China-US Energy Policy Dialogue, 189
China-Uzbek cooperation, 164
Chinese Academy of Science, 217
Chinese refineries expansion, 215, 216
Chinese State Oil companies projects and contracts, 184
Chongqing, 215
Churchill, Winston, 9
CISS Energy Conference, 12
clean coal, 332
Clean Fuels Project, 104
clean coal, 332
clean coal, 332
clean coal, 332
clean coal, 332
climate change, 60
CNOCC International Limited, 185
CNOOC-Unocal saga, 206
clean coal, 28, 29, 319
China, in, 220–27
demand for, 127, 128
India, in, 133
pollution from, 222
clean coal, 217
clean coal, 220, 225
clean coal, 224
clean coal, 223
coal to liquids technology (CTL), 187
clean coal-to-liquids, 296
Coastal, 109
cocoanut, 17
cocoanut oil
as source of bio-fuel, 288
Combined Cycle Gas Turbines (CCGT), 25, 26
communist insurgency, 33
complementary storage, 107
Concorde Energy, 91
Conference on Confidence-Building Measures in Asia, 162
conservation efforts, 59
collection for, 65
consumer practices, 54–56
consumer preferences
irrational, 54
contango, 39, 95
Cremer, Peter, 17
crude oil
benchmark price, 39
oil prices, 102, 136
production and imports, 136
top class, 204
crude refining
Singapore, 2
Daimler Chrysler, 16
Dalian, 215
Daqing oil field, 148, 179
Darfur region
genocide, 211
Deng Xiaoping, 189, 192
derricks, 76
Development Bank of Singapore, 79, 98
dimethyl ether, 225
diesel
FAME in, 293
diesel subsidy
Thailand, in, 258
Dirks, Gary, 12
distribution
role of independent oil terminals, 107
draw-works, 76
drill floor, 77
drill string, 77
drill-pipe, 77
drillships, 68, 74
Dubai, 10, 214, 307–16
Dubai Crude oil, 32
prices, 250
Dubai Mercantile Exchange (DME), 316
E
EAS, 11
East Asia
energy consumption, 156
energy outlook, 157
East Africa, 10
East Asian Summit, 21
East China Sea, 161
Sino-Japanese tensions, 241
East Timor
Greater Sunrise project, 261
economic development, 15
Economic Development Board, 5, 79
economies of scale, 160
Eleventh FYP, 186
emergency stocks
construction of, 160
electricity
from renewable energy, 63–65
electricity, sharing of excess, 21
electricity prices
rising, 23
electric power generation
growth in demand, 117
Emirates National Oil Company, 4, 11, 37
emissions costs, 287
energy
increasing efficiency of using, 59
Index

outlook to, 130–31, 2030
relationship environment, 58–61
energy conservation, 14–17
Energy Conservation Law of China, 14
energy consumption
global primary, 42
increment, 178
energy demand
growth in, 117–19, 118
world, 179
energy development
Singapore, of, 6, 7
energy diplomacy
challenges for, 201
energy efficiency
increasing, 117
Energy Efficiency Improvement Assistance Scheme, 15
Energy Forum, 1
energy infrastructure
need to safeguard, 161
Energy Institute, 11
energy intensity
declining trend, 118
Energy Market Authority, 24, 25
Energy Market Authority (EMA), 29
Energy Market Company, 25
Energy Marketing Authority (EMA), 6
energy outlook, 114
energy resources
impact on economy, 157
energy security
challenges, 159
definition, 160
importance, 157
network in Asia, 160–61
energy situation, 151
energy supplies
collective initiatives to stabilise, 163
endogenous substitution, 61
Energy System Review Committee, 6
energy use, 116
energy-importing countries, 158
Engdahl, William, 9
enhanced recovery techniques, 124
ENOC, 11
evironment
protection of, 59, 60, 61–63
environmental pollution
global trend to reduce, 104
environmental protection, 61–63
Environmental Sustainability Index (ESI), 13
Erdos City, 225
ESCAP, 11
Esso, 99, 106
ethanol, 290
from non-food sources, 294
GHG emission from production, 301
promotion of, 216, 217
ethanol-blended gasoline, 217
Euro 4 standards
Euro 4 Emissions Standards, 16, 104
Europe, 34
bio-fuels directive, 298
growth in natural gas use, 129
light duty fuel demand, 122
production decline, 126
extended reach drilling, 124
European Union, 156, 189
Exclusive Economic Zones (EEZ), 158, 241
Exxon, 3, 162
ExxonMobil, 5, 34, 91, 113, 114, 124, 215, 257
demand forecast, 130
F
Falcon, 67
Far East Levingston Shipbuilding, 67
Far East Levingston Shipyard, 81
Far Western Basin, 191
fatty acid methyl esters (FAME), 288, 290
Index

Federation of Electric Power Companies of Japan, 234
Financing Energy Projects in Asia Conference, 1, 2006
Fischer-Tropsch, 224
first oil crisis, 106
Five-Year Plans
   eleventh, 186
   emphasis on energy sustainability, 187
Ford, Henry, 216
fossil fuels, 59
   supplying energy needs, 119
fossil-fuel generation plants
   types, 64
free market mechanisms
   Singapore, 7, 8
Friede Goldman Halter, 68
fuel
   global competition for, 27
fuel costs
   comparisons, 302
fuel demand
   projection of, 287
fuel design
   FAME in diesel, 293
fuel types
   development of, 286
Fujian, 215
futures contracts, 314
fulfilment of, 316
futures exchanges, 314

G
gas
   affordability, 325–26
   barriers to usage, 331
cross border trade, 324
demand for, 321–23
driver of change, as, 26, 27
environmental impacts, 328–29
factors driving growth, 330
investment in, 329, 330
outlook for, 319, 320
   policy issues, 326–28
   supply, 323–25
technical progress, 329
gas demand
   regional, 125, 126
gas grids, 335–36
gas-to-liquids, 295
capacity and emissions, 297
gaseous fuels, 286
general circulation models (GCM), 61
geo-thermal energy, 332
geo-thermal power, 319
Germany, 45
global competition, 27
global economy
   sustained growth, 116
global mean surface temperature, 61
Global Nuclear Energy Partnership (GNEP), 247
global population, 114
Gorgon project, 276
governments
   long-term commitments, 161
   strategic roles, 8, 9
Great Depression, 33
Greater Jakarta, 50
Greater Sunrise project
   East Timor, 261
green buildings, 55
green cars, 55
greenhouse effect, 302
greenhouse gases
   life cycle of, 305
gross domestic product
   effect on, 62
Guangdong Province, 190
Guangzhou, 35, 215
Gulf of Mexico, 199, 204
Gulf of Thailand, 261
Gulf of Thailand Agreement, 262
Gulf Oil, 109
   transportation of, 221
Gulf states, 245–46, 308
H
Hainan, 215
Heglig oil field, 211
Heilongjiang, 217
helipad, 77
high carbon approach, 15
Hin Leong, 11, 95, 111
Hinomaru oil
Japan, 238–39
Hitachi Zosen Robin Dockyard, 80
historical animosity, 157
Hokuriku Electric Power’s Shika nuclear plant, 236
Honda Civic, 16
Hong Kong, 100
Horizon, 95
Horizon Research Group, 190
Horizon Terminal project, 37
Houston, 31
Hu Jintao, 240, 252
Huabei oil production, 148
Hubbert, M.K., 7
Huizhou, 215
hull, 77
Hurricane Katrina effect on energy prices, 47
hybrids, 55, 121
hybrid/fuel cell cars, 16
hydro-cracker, 100
hydro-electric power, 332
cooperation between governments, 165
hydro-power, potential, 120
hydrogen fuel, 217

I
independent oil products storage first in Singapore, 109
independent oil terminals functions, 107
Independent Power, 319
independent power producers, 24
independent storage operators, 109
independent trading houses, 109
India, 27, 101, 103, 152, 256, 257
access to coal reserves, 132
commercial energy mix, 135
congestion of oil import sources, 137
dependence on hydrocarbons, 134
domestic oil market, 35
energy situation, 132–41
energy-securing strategies, 141
high energy-GDP elasticity, 133
hydrocarbon dependence, 133
Minister for Petroleum and Natural Gas, 161
managing risks and competition, 138–39
need for collaboration, 141
oil and gas sources, 137
perceptions of risk and competition, 134–38
Petroleum Minister, 141
petroleum usage, 133
refining capacity, 97
Reliance Petroleum Company, 3
significant economic presence, 132
transportation, 133
Indian Oil and Natural Gas Corporation, 256
Indonesia, 8, 103, 108, 152, 257–58, 318, 321
energy supplies, 244
LNG supply issues, 279
producer of natural gas, 2
infrastructure
reduction of wasteful energy consumption, 53
Inner Mongolia, 225
Inpex Corp, 228, 243
Inpex Holdings, 239
Institute of Chemical and Engineering Sciences (ICES), 21
Institute of Energy Economics of Japan, 170
Index

Inter-agency Committee on Energy Efficiency, 7
Inter-governmental Panel on Climate Change, 62
inter-state rivalry, 156
International Energy Agency (IEA), 113, 134, 222, 231
definition of East Asia, 170
forecast for LNG, 281
World Energy Outlook for 156, 2004
International Finance Corporation, 224
International Monetary Fund World Economic Outlook, 200
International Partnership for the Hydrogen Economy, 19
IOGEN, 292
IPG, 37
Iran, 210, 211, 242–44, 277
Iran-Pakistan pipeline, 139, 140
Iraq, 8
Iraq War, 249
ISEAS Energy Forum, 19
Ishikawajima-Harima Heavy Industries, 80
Islam Karimov
President of Uzbekistan 164, 166
Island Power Company, 30
Isthmus of Kra, 258
Itochu Oil Exploration, 242

J
Jabotabek, 50
jack-up rigs, 68, 74, 75
components, 76, 77
delivery against oil prices, 82
numbers delivered, 83
worldwide numbers, 86
Jakarta, 51
Jamaica, 8
Japan, 27, 34, 44, 45, 100, 156, 166, 255–56
Agency for Natural Resources and Energy, 232, 233, 239
Cool Biz campaign, 232
encouraging domestic producers, 238–39
energy competition with China, 239–41
Energy Conservation Law, 232
energy efficiency, 230
ethanol, 231, 232
free trade agreements, 228
free trade agreements drive, 244
gross domestic product, 230
helping other nations, 232–33
Ministry of Economy Trade and Industry (METI), 162, 228
negotiating FTAs with ASEAN members, 246
new energy strategy, 228–48
New National Energy Strategy, 228, 231, 233, 238, 246
nuclear energy, 233–37
oil crisis, 229–30
oil stockpiling, 159
securing stable energy supplies, 248
short-term flashpoints, 243
structural factors, 231
supplies from Brunei, 246
supplies from Indonesia, 244
Sustainable and Flexible Energy System (SAFE), 161
uranium supplies, 237–38
Japan Atomic Energy Agency, 233, 237
Japan Atomic Energy Research Institute, 233
Japan Bank for International Cooperation, 238
Japan Business Federation, 245
Japan National Oil Company, 255
Japan Nuclear Fuel Ltd, 234
Japan Nuclear Cycle Development Institute (JNC), 233

26 EnergyPersp Index 361 3/21/07, 9:05 AM
Japan Oil Development Co., 239
jatropha, 17
Jeruk field, 104
Johore, 41
Jones, Michael, 19
Junichiro Koizumi, 241
Jurong Island, 5, 11
Jurong Town Corporation (JTC), 11, 37

K
Kakap PSC, 101
Kashagan oil field, 242
Kazakhstan, 10, 164, 166, 260
Keppel, 4, 72
Keppel, 101
Keppel FELS, 67, 70, 71, 84, 90
Keppel Merlimau Cogen Pte Ltd, 30
Keppel Offshore & Marine, 71
Keppel Shipyard, 71, 79
Keppel Singmarine, 71
KOGAS, 279
Korea, 156, 257
  Action Plan for Rational Usage of
  Energy, 14
  Basic National Energy Plan, 14
Korea Gas (Kogas), 257
Korean National Oil Company
  (KNOC), 257
Korla, 191
Kuala Lumpur, 51
Kuwait, 245, 255
Kyoto Protocol, 13, 14, 42, 44–46,
  63, 64, 236
  importance of, 47
Kyoto standards, 14
Kyrgyzstan, 191

L
Lee Hsien Loong, 5, 6
legs
  oil rig, of, 77
less carbon-emitting resources
  switching to, 65
light duty vehicle fleet, 121
Lim, Raymond Lim, 1
Liaoning province, 217
Libya, 243, 255
light crude, 204
light sweet crude oil, competition for,
  214
living quarters
  on oil rigs, 77
liquefied natural gas (LNG), 8, 126,
  154, 266–84
Asia Pacific imports, 268, 270
Asia Pacific market, 283
Australia exports, 274, 275
competitive choice, 27
supplies with East Asian countries,
  244
expenditure on projects, 281
export capacity, 268
export capacity increased, 267
globalizing market, 282
growth in existing markets, 269
growth in imports, 267–68
import prices, 280
labour and capital requirements,
  280, 281
new regional markets, 271, 272
new sources, 278
outlook for regional exporters, 276–78
outlook for regional supply, 278,
  279
outlook for regional trade, 269
prices, 279, 280
shipping trends, 283
short-term trading, 282
uncontracted demand, 273, 274
liquid bio-fuels
  yields, 303
LNG Conference, 19
LNG export projects
  construction, 266
LNG Terminal, 3
London, 31
low sulphur crude oil, 204

M
Malaysia, 29, 103, 152, 258, 321
  supplier of natural gas, 2
Malaysia-Thailand Joint Development Area, 322
Mani Shankar Aiyar, 141, 153, 161, 256
manpower challenges in, 89
MARKAL-MACRO (MM) model, 64
Marc Rich, 109
marine life protection measures in Sakhalin project, 347
Martank BV, 37
Marthon Letourneau, 67, 81, 82
Maruzen Oil, 99
Means Field Texas, in, 124
Mediterranean, 38, 108
mega-urban region, growth rate, 51
Memorandum of Understanding between ASEAN and SCO Secretariat, 174
Menninger, Dave, 252
Mercedes Benz, 16
Metro-Manila, 50, 51
methyl-tertiary-butyl ether, 216
Mexico, 207
  outlook for gas demand, 272
middle distillates, 108
Middle East, 27, 28, 92, 93, 99, 108, 123, 202, 256
  imports of gasoline, 309
LNG supplies from, 278
  outlook on refining business, 310
over dependence on, 158
products exports outlook, 310
refined products exports, 307–16
refined products price assessment, 308
reducing dependence on, 160
Middle East refining
  impact on Singapore, 315
  increased exports, 309–11
Middle Eastern crude, 92
Midland, Daniels, 17
Mihama Nuclear Power Plant, 236
Mitsui & Co, 71
Mobil, 99
Mobil Oil, 260
modern lube oil blending plant, 100
Monju FBR, 233
multilateral coordination, 160
Myanmar, 261, 318
Myanmar-Bangladesh-India pipeline, 140

N
Nahodka, 260
Naoki Kuroda, 239
Nanyang Technological University, 12
National Environment Agency, 15, 18
National University of Singapore, 12, 18, 46
Natunas, 4
natural gas, 25, 26, 59, 101
  importance to Singapore, 4
  preferred fuel, 1, 2
  regional initiatives, 333
Southeast Asia and Australasia, in, 325
  use in Singapore, 45
netback methodology, 309
netforward price, 315
New Exploration Licensing Policy (NELP)
  India, 138
New York, 31
New Zealand, 153, 154
Nigeria, 207
   civil unrest, 102
drilling licences in, 240
Ningxia region, 223
Nippon Steel, 71
nitrogen fertilizers
   use of, 302
Ng Weng Hoong, 6
non-OECD countries, 115
   demand for oil, 120
   demand for non-OECD, 116
   non-OPEC crude, 123
   non-OPEC oil sands, 123
   Non-Proliferation Treaty, 134
North America, 156
   gas for power generation, 129
   light duty vehicles, 122
North Sea, 32
North West Shelf Train, 274
Northeast Asia
   energy consumption, 156
   impact of Chinese oil demand, 151
Northern Palawan, 261
Norwegian investors, 68, 85
nuclear fuel cycle, 235
nuclear energy, 331, 332
   growth in, 125
   potential, 120
   nuclear Non-Proliferation Treaty, 236
   nuclear proliferation, 159
   nuclear technology, 28

O
Oceanic Petroleum, 98
oil, 59
   demand linked to GDP growth, 249
   oil and gas
   predominance, 119–23
Oil & Natural Gas Corp, 240
oil companies
   Asian, 262
   oil crisis, 108
   oil derivatives, 3, 4
   oil embargo, 82
   oil fields
   China, 180, 181
   oil futures
   trading of, 35
   oil majors
   role in Asia, 262–63
   oil markets
   extreme volatility, 102
   oil prices, 68
   decline in, 84
   freight considerations, 314
   high, 249–50
   risk management in period of
   volatility, 311, 312, 313
   speculation over, 29
   upward trend, 103
   world, 149, 150
   oil refining
   profit margins, 103
   oil rigs, 67–72
   design of, 86
   oil resources
   global conventional, 122
   oil to coal projects
   China, in, 187
   oil stockpiling, 159
   oil storage, 4, 106–12
   oil storage facilities
   capacity owned by oil companies, 109
   increase in, 10, 11
   oil trading, 32, 107
   prior to 1990s, 39
   Singapore, in, 33
   oil-fired steam generators, 23
   oil-fired steam plants, 26
   Oiltanking, 10, 37, 95, 111
   Oman, 209, 245, 257
   Oman crude oil, 214
   Organization of Petroleum Exporting
   Countries (OPEC), 231
Index

- crude production, 123
- dependence on, 134
- oil embargo, 82
- Organization for Economic Cooperation and Development (OECD), 115, 131, 222
decline in production, 134
- OTC FOB Singapore derivatives market, 40
- OVL Videsh Ltd, 139
- Oyong field, 104

Pacifc island nations, 153
Pakistan, 153
Paktank, 110
palm oil, 17
Papua New Guinea, 152
Pasir Gudang, 41
Pearl Energy, 263
Pearl River Delta, 179
Peninsular Gas Utilization grid, 318
Persian Gulf, 8, 34, 39, 152, 220
crude exports to Asia, 32
Pertamina, 257
Peru, 277
Petrochemical Corporation of Singapore, 36
petrochemical products
Singapore, 3, 4
PetroChina, 35, 37, 185
Petron, 259
Petronas 8, 259, 260
PetroKazakhstan, 239, 254
PetroVietnam, 261
Philbro, 109
Philips Petroleum, 191
Philippines, 152, 259, 322
hydro-electric power potential, 318
Philippines National Oil Company, 254, 259
Pilbara LNG project, 276
"plain vanilla" swap, 316
Platts, 31
new methodology, 40
role of, 39
Platts 2005c, 282
Platts’ FOB Singapore petroleum product price assessments, 39, 40
pluthermal plants, 235
policymakers
effect of high prices of crude oil, 205
problems facing, 204
political engagement
energy security, 157
pollution
use of coal, 159
power generation
natural gas for, 15
regional demand, 127, 128, 129
power grids, 333–35
Port of Sudan, 211
PowerGas, 26
PowerGrid, 25
Power Reactor and Nuclear Fuel Development Corp (Donen), 233
PPL Shipyard, 84
Premcor, 215
Promet, 84
Public Utilities Board, 7, 23
Pulau Bukom, 106
Pulau Busing, 110, 111
Pulau Merlimau, 99
Pulau Sebarok, 100, 109
purchase/maintenance costs, 287
Putin, Vladimir, 163, 241, 261
Putrajaya, 51
Qatar, 245, 257
Qingdao, 215
radio
wind up, 21
Rajaratnam, S., 8
rapeseed oil, 288
bio-diesel production, 285
Reading and Bates, 67
refineries
total refining capacity, 3
refining capacity
Singapore, of, 91–92
refining hub, 4
Reliance Petroleum Company, 3
remote microwave repeater stations, 44
renewable energy, 28, 58–66, 253–54, 332
switching to, 61–63
renewable energy industry
value added tax exemption, 188
Renewable Energy Sourced-Electricity (RES-E), 63
Renewables Portfolio Standard (RPS), 63
reports and government papers, 57
residue catalytic cracker, 100
rig building
boom period, 85
challenges, 89–90
challenges facing, 70
future of, 88–89
partners, 72
reasons for Singapore’s success, 87–89
rig building projects
time sensitive, 69
R.K. Pachauri, 139
RME
WTW analysis of, 301
Robin and Promet (PPL), 67
Rolls Royce, 21
Rotterdam, 32
Roumasset, 61, 63
Royal Dutch Shell PLC, 222
Russia, 10, 123, 156, 169, 210, 257, 260
breakthrough LNG sales, 344–45
energy supplies, 241
LNG projects, 276, 277
Yukos problem, 102
Russian energy, 163, 164
Russian oil, 259
S
S. Iswaran, 1, 2
Sadam Hussein
oil contracts with China, 252
Sampang Production Sharing Contract, 104
Sampang PSC, 101
Sakhalin, 277
Sakhalin Energy
export markets, 351
Sakhalin Energy Investment Company Ltd, 337
Sakhalin-2 Project, 337–51
achievements impact Asia-Pacific market, 350
birth of project, 338–39
challenges, 346–47
costs escalation, 349
engineering marvels, 341–43
phase 1, 339, 340, 341
pipelines across river crossings, 348
project benefits, 345
protection to marine life encountered, 347
role of Russian government, 349–50
Russian industrial and human resources, 346
salmon species protected, 348
salmon species, protection for, 348
Sasol, 223, 224
Saudi Arabia, 9, 207, 245
Crown Prince Abdullah’s visit to US, 208
Scanoil, 109
Science and Engineering Research Council, 20
SCO-Afghanistan Contact Group, 166
Index

Sea Lanes of Communications (SLOC)  
Asia, in, 158  
need to protect, 171  
SeaDrill, 70  
second oil crisis, 108  
Sedco, 67  
Sedco Forex, 84  
Sembawang Shipyard, 79, 80  
Sembcorp, 4  
SembCorp Gas, 25, 26  
SembCorp Marine, 90  
rig building, 84–85  
SembCorp Marine Ltd, 67  
semi-submersible rigs, 68, 70, 76  
SGX AsiaClear, 3  
Shah of Iran  
overthrow of, 99  
Shanghai Cooperation Organization Summit, 163  
Shanghai Cooperation Organization (SCO), 157  
Shanghai Futures Exchange, 35  
Shanghai Spirit, 169  
Shanhan, 191  
sharing mechanisms, 160  
first bunker oil tanker, 106  
Singapore, in, 108  
Shell Solar, 18  
Shengli oil field, 148  
Shenhua, 223  
Shenhua Group Corp, 222  
Shikoku Electric Power, 237  
Siberia  
oil from, 163  
simple processing, 107  
SINERGY programme, 20  
Singapore, 1–22, 48, 152, 322  
achievements in energy sector, 2–4  
American rig builders, 80, 81, 85  
Approved Oil Traders Scheme, 3  

Asia’s trading centre, 40, 41  
Biopolis building, 46  
Building and Construction Authority, 2  
bunker trade, 110  
bunkering centre, 33  
bunkering port, 94  
car ownership, 54  
case for higher prices, 30  
challenges, 6  
challenges in energy industry, 1  
changing landscape in energy, 23–30  
cooperation with neighbours, 29  
courting of energy sector investors, 5  
crude import, 92, 93  
curb on energy usage, 21  
dependence on natural gas, 4  
Deputy Minister for Trade and Industry and Foreign Affairs, 1  
diversification, 3  
Economic Development Board, 2, 5  
electricity industry, 24, 25  
electricity supply, 26  
encouraging renewable energy, 16  
energy consumption, 49  
energy demand growth, 2  
energy development and conservation, 21  
energy efficiency, 18  
Energy Smart Buildings, 18  
export of oil to China, 94  
factors affecting, 35–40  
factors affecting energy situation, 4–6  
financial capabilities, 97  
free market approach, 5  
Fuel Economy Labelling Scheme, 14  
future role of solar PV, 44  
gas industry, 25, 26  
gas supply, 318
good governance, 5
government intervention, 35, 36–37
Green Mark for buildings, 14
growth in energy demand, 42
history, 32–34
hydrogen as alternative fuel, 19–21
IEA data, 13
implications of energy competition, 9, 10
imports energy supplies, 9
integrated oil hub, 3
Inter-Agency Committee on Energy Efficiency (IACCE), 15
investment opportunities in energy sector, 10
Kyoto Protocol, 44–46
lack of state-owned oil companies, 36
Land Transport Authority, 2
leading oil trading centre, 34, 35
LNG terminal, 2
marine roots, 78, 79
maritime history, 78
Ministry of Manpower, 89
Minister for State for Trade and Industry, 2
Ministry of Trade and Industry, 6, 24
Ministry of Environment, Water and Resources, 7
National Climate Change Committee, 14
National Energy Efficiency Committee, 14
need for intellectual capacity, 11–14
nuclear energy not an option, 17
oil export data, 95
oil product balance, 94
oil refining hub, 103
oil stockpile, 11
oil storage facilities increased, 10, 11
oil trading, 31–41
outlook for, 96, 97
ownership of oil storage terminals, 38
Pearl Energy, 263
per capita electricity use, 13
petrochemical products, 3, 4
political stability, 5
power security, 29
price assessment of refined products from Middle East, 308
principles of energy development, 6, 7
product storage, 95
re-export of fuel, 38
refined petroleum products, 32
refining capacity, 91–92
regional oil storage hub, 4
regional refining hub, 4
reliance on free market mechanisms, 7, 8
restructuring of energy sector, 24, 25
role as trade centre, 32–34
sea port, 5
semiconductor industry, 17
sound financial system, 6
solar power, 42–46
strategic location, 2, 5
storage ownership, 38
strategic position, 92
strategic storage, 96
third largest oil trading centre, 2
threats to position, 40, 41
top bunkering port, 2
total area, 44
total product exports, 33
unique position, 56
use of solar power, 1, 19
Singapore Cooperation Enterprise, 10
Singapore government role of, 79, 80
Singapore Initiative in New Energy Technology, 20
Index

Singapore oil price, 4
Singapore Oil Report, 6
Singapore Petroleum Company, 8, 34, 36, 98–105
acquisitions, 101, 102
beginnings, 99
bunkering business, 100
diversifying market, 99
exploration and production initiatives, 104
first refinery, 99
jet fuel supplier at Changi Airport, 100
joint venture with Caltex and BP, 99
oil storage terminal, 100
ranked top-quartile refinery in Asia, 100
setting up SRC, 99
shareholder control, 101
Singapore Power, 7, 24, 25
Singapore Refining Company (SRC), 3, 99
Clean Fuels Project, 104
Singapore Stock Exchange, 3
Singapore Trade Statistics, 31
Singapore-based oil pricing, 315
SingPower
 use of natural gas, 45
Sino-American rapprochement, 188
Sino-Japan disputes, 152
Sino-Japanese tensions
 East China Sea, 241
Sino-US energy cooperation, 189
Sinochem, 185
Sinopec, 35, 185, 255
Singvest, 70
SK Corporation, 37
solar energy, 28
Solar Energy Power firm, 18
solar power, 16, 18, 19
solar photovoltaic (PV), 42
state of art, 43, 44
solar Photovoltaic (PV) panels, 64
solar power, 42–46
 potential for growth, 120
solar PV, 45, 64
enabler of commercial infrastructure, 44
solar PV market
 financial incentives offered, 45
growth in Singapore, 46
solar PV modules, 44
solar water heaters, 43
Solid Oxide Fuel Cell technology (SOFC), 64
Solomon Associates, 100
Sonat, 67
South Africa, 220, 224
South Asia, 35
impact of China's demand for oil, 153
South Caspian Sea, 242
South China Sea, 213
South Korea, 34, 100, 101, 103, 166
Minister of Commerce, Industry and Energy, 161
oil stockpiling, 150
Southeast Asia, 28
bio-fuel producer, 299
carbon emissions, 49
electricity use, 49
energy consumption, 48–50
gas reserves, 323
impact of China's demand for oil, 152, 153
outlook for gas, 317–36
population, 50
swing refiner 3
urban development, 47–57
urban economy, 50
urbanization, 48–50
soya
 as source of bio-fuel, 288
Soviet Union, 203, see also Russia
speculation, 107
spot market benchmarks, 39
spud can, 77
sugarcane
  as fuel source, 17
stabilization, 107
stable energy supplies
  collective initiatives, 163
State Economic and Trade
Commission (SETC)
  China, 192
State Planning Commission (SPC),
  192
Statoil’s Lufeng field, 182
Strait of Malacca, 97, 213, 220
strategic storage, 107
Sumatra, 4
Sudan, 139, 210, 211, 260
Sud Aramco, 215
Sumitomo and Kansai Electric Power,
  238
Sunrise project, 276
Susilo Bambang Yudhyono, 244
Sustainable and Flexible Energy
System (SAFE), 161
Sustainable Energy Association of
Singapore, 13
Swan Hunter Group, 79
swing refiner, 3
synthetic fuel
  derived from natural gas, 295
  from gas, coal and bio-mass, 294
synthetic fuels, 285–91
  advantages, 296
Syria, 153

T
Taishet
  Pacific-bound oil pipeline, 163
Taiwan, 100, 101
  gasoline from, 94
  oil stockpiling, 159
Tajikistan, 191
Tanjug Pelepas, 41
Tanjong Penjuru, 106
tar sands, 27
Tariq basin, 179
technology
  efficiency improvements, 129–30
  meeting supply challenges, 124–25
TechScan on Energy, 20
Teikoku Oil, 239, 243
Teikoku Oil Co., 228
Temasek Holdings, 79
temperature, global mean, 61
temperature profiles, 62
tender rigs, 68
Thailand, 34, 100, 103, 152, 258,
  318, 322
diesel subsidy, 258
  gasoline from, 94
  introduction of bio-ethanol, 291
  urban sprawl, 53
Third Asian Cooperation Dialogue
(ACD), 162
Three Mile Island incident, 237
top class crude oil, 204
Tokyo Commodity Exchange
(TOCOM), 34
Tokyo Gas Engineering, 4
Toyota Prius, 16
trading companies, 38
transport
  use for, 52
  Trans-Siberian pipeline, 164
Treaty of Amity and Cooperation
(TAC), 169
Tsinghua University, 217
Turkmenistan, 161
Turkmenistan-Pakistan-India pipeline,
  140
Turkmenistan-Afghanistan-Pakistan
(TAP) gas pipeline, 164
Turkmenistan-Afghanistan-Pakistan-
India (TAPI) gas pipeline project,
  164
turntable, 107
Index

U
UK White Paper (2003), 22
ultra-low sulphur diesel (ULSD), 104
undersea electricity cable connection, 17
UN Industrial Survey Mission, 79
UN Security Council, 263
United Arab Emirates, 32, 245
United Kingdom, 27
United States 8, 27, 34, 39, 45
emission rates from major electric power sources, 45
energy demand, 198–200
establishing clear supply cushion, 209
ethanol production capacity, 216
global energy supply, 197–218
leading oil supplier, 208
marginalizing of certain regimes, 207
notion of equity, 202
oil refineries, 215
suburban separatism, 51
University of Newcastle, 12
UNOCAL, 9, 252, 255
Universal Terminal project, 37
Uranium Resources, 238
uranium-plutonium mixed oxide fuel, 234
urban and industrial development delinking of, 15
urban development re-think, 51–53
urban development trends, 47
Urban Redevelopment Authority, 46
urban transportation high carbon emission, 53
US Department of Energy, 113, 198, 199
forecasts, 201
Freedom Car and Fuel Partnership, 130
US drilling contractors, 70
US Dollar impact of depreciation on oil prices, 150
US West Coast, 108
US-backed trade embargoes, 207
US-China relation, 10
US-led invasion of Iraq, 209
Uzbekistan, 166
Uzbekneftegaz, 164
V
Valero, 215
value added tax exemption China, 189
Van Ommeren, 109
competition against, 110
merger with Paktank, 111
Pulau Sebarok products storage, 112
vehicle impact of ethanol on performance, 291
Venezuela, 8, 9, 207
Very Large Crude Carriers (VLCCs), 94
Vietnam, 8, 97, 152, 261, 322
Vitol, 37, 111
Vopak, 10, 37, 95, 111
Fujairah storage, 111
W
Wal-Mart, 203
Watts, Phil, 20
Well-to-Wheel analysis assessment of FAMEs, 302, 303
Well-to-Wheel approach new focus of, 305
West Africa, 10, 139
West Natuna gas field, 26, 101
Western Gray Whales, 347
western hemisphere energy supplies from, 202
Western oil companies consolidation, 101
Westinghouse, 237
wind technology, 28
wind power
China, 187
potential, 120
World Bank, 13, 191, 224
World Competitiveness Yearbook, 14
World Economic Forum, 13
World Economic Outlook, 200
world energy order, 208
World Health Organization, 222
World Hydrogen Technologies, 20
World Petroleum Congress, 12
World War I
shift from coal to oil, 198
World War II, 33
WTI crude oil, 205

X
Xinjiang oil fields, 182
Xinjiang-Uighur Autonomous Region, 191
Xinoa Group, 224

Y
Yadavaran agreement, 212
Yadavaran oil field, 211, 240
Yemen, 277
Yom Kippur war, 82

Z
Zhenhai, 215
Zoellick, Robert, 190
Zukoski, Charles, 20