Index

Aarhus Convention, 160-165, 169-170 ACER, 21-22 adaptation, 87, 198, 234, 240, 299 administrative authority, 194, 272 affordable, 87 airship, 1 alternative fuel infrastructure, 265, See also infrastructure Alternative Fuels Infrastructure Regulation (AFIR), 267-268, 274-276 Aotearoa, 201-214 arid, 75 artificial energy islands, 182-183 Association of Southeast Asian Nations (ASEAN), 98-111, 308 Australia, 65-82, 154, 307 Authority for Consumer and Markets (ACM), 254, 294, 297, 300-302 balancing, 89, 241, 244, 278 barrier, 88-94, 193, 259, 270-275, 280, 309-310 benefit, 26, 33, 38, 41, 70, 72, 134, 139, 170, 197, 281 biodiesel, 99-100, 103 bioenergy, 103, 147-155, 308 biofuels, 98-111, 147-155, 308 biogas, 103-107, 142, 153, 236 blending, 7, 34-35, 42, 56, 69, 184, 297, 299 Brazil, 57-61, 63, 307 burden, 41, 90, 122, 150, 213 bureaucracy, 194-196, 220

cap-and-trade emissions scheme, 122, 125 carbon capture and storage, 19, 102–103, 121, 256 carbon footprint, 236 carbon-neutral, 173 Chile, 51–54, 63, 154, 307 China, 14 circular economy, 194, 198 citizen, 137, 160, 308 clean hydrogen, 31–33, 47, 72, 96, 137 climate change, 87, 105, 197, 233, 307 CO₂, 3, 32, 37, 59, 121, 175, 233, 236, 292 collaboration, 47, 96, 164, 249, 307 Colombia, 54-57, 63, 307 commercial, 35-36, 50, 119 communities, 33, 41, 70, 100, 308 comparative, 47, 49, 70, 138-141, 178-186, 303 concern, 40-44 Connecting Europe Facility (CEF), 268-269 consenting, 201-214, 309 construction, 229-231 consumer preference, 126, 274 protection, 14, 297, 300 continent. See Oceania, Middle East and North Africa, Latin America, Western Europe, European Union contract, 28, 70, 90, 93, 107, 224, 231 conversion, 99, 103-105, 109-111, 282 cooling, 147, 149, 175 cost-benefit, 26, 118 court, 81, 161, 197, 209, 212, 227, 252, 290 dangerous, 134, 238-240 decarbonisation, 14, 19, 74, 155, 202, 251, 268, 273 decentral, 207, 300, 308 decision-making chain, 164, 170, 207, 213, 267, 311 demand, 21, 26, 35, 38, 67, 86, 91, 109, 119, 121, 131, 174, 177, 249, 281, 291, 308 democracy, 158, 170 Denmark, 173-187, 250, 265, 309 distribution system operator, 137, 164, 242, 282, 299 diversification lease, 75-78, 81, 307 driver, 86-88, 307 Dutch government, 168, 182, 247-248, 250, 294 economics, 115-127 Electricity Directive, 275, 282-283 electrolyser, 134, 178-187, 189-199, 201-214, 271, 309 emergence, 42, 65, 267, 274-275 end-user market, 126-127, 263-304 energy efficiency, 269-270, 274 Energy Industry Act BE 2550 (2007), 109-110 energy justice, 33, 154-155, 267

energy law, 106-107, 160, 280, 302

energy mix, 85, 95, 277 energy regulation, 253 energy transition, 13, 109, 220, 234, 247, 274, 292-293 enforcement, 235, 301-302 ENTSO-E, 20 ENTSO-G, 20 Environmental Impact Assessment, 105-106, 108-109, 111, 227–228, 230, 271 equitable, 75, 95, 295 equity, 6, 24, 33, 119 European Commission, 148, 150, 156, 163, 176-177, 246, 252-259, 292 European legislation, 29, 295-297, See also legislation European Network of Network Operators for Hydrogen (ENNOH), 20 European Network of Transmission System Operators. See ENTSO European Parliament, 19, 148, 152, 253, 257, 259 European Union, 13-29, 153, 158-162, 176-178, 263-276, 279 evidence, 159, 284 Exclusive Economic Zone (EEZ), 173, 185 exemption, 258-259, 285-289 exploration, 103 explore, 103, 107 explosion, 1 export, 43, 46, 49, 65, 68, 70, 85, 143, 203 externalities, 118-122, 309 Fast-Track Resource Consent, 211–213 final, 13, 119, 148, 151, 259, 282 final consumption. See end-user market final energy use, 15, 292 financial support, 31, 147, 149, 268, 285 financing, 91-93, 197 Finland, 189-199, 309 Fleming, 1-2, 142-156, 291, 308 flexible, 4, 22, 61, 63 foreign, 52, 89, 189 forest, 153, 223 fossil fuels, 3, 20, 47, 87, 101-102, 110, 175, 233 France, 94, 233-244, 293, 310 Francesco La Camera, 1, 8 fuel cell, 38, 91, 104, 125, 274, 308 fuelling infrastructure, 267, 269, 275, 310 Gas Directive, 152-156, 177, 184, 251-260, 287, 295-297, See also EU Gas Directive Gas Package, 19-22, 279, 287 Gas Regulation. See Gas Package Gasunie, 138, 168-169, 247-256 geothermal, 79 Germany, 94, 126, 217-232, 246-250, 258, 265, 293, 309 global, 34, 63, 91, 143, 238, 292 global leader, 49, 71, 85, 88 goal-setting, 80, 233-244 governance, 94-97, 135, 277-290, 307

Green Deal, 13-19, 177

greenhouse gas (GHG), 18, 31, 37, 74, 147, 236

greenhouse gas emission. See greenhouse gas

grid, 34, 52, 54, 89, 117, 132, 135, 176, 240-242, 278, 280 Groningen, 135-141, 166-170 Gulf Cooperation Council (GCC), 84, 93 H2 system, 27-28 harmonising, 74-82 heating, 291-305, 310 heavy-duty vehicles, 34, 49, 267, 270, 272 holistic, 1, 73, 95, 310 household, 124, See also heating human, 101, 145, 211 human rights, 89, 145, 151, 155, 210, 226 hydro, 47, 79, 153 hydrogen blue, 31, 175, 236-237 economy, 65, 88-94, 129-141, 158-170, 189, 267, 307 green, 31, 175, 201 grey, 31, 237 grid, 21, 137, 168, 223, 273, 309 hub, 38-41, 72, 76, 92, 208, 238 import, 17, 28, 122, 144, 250 legislation, 3, See also legislation low-carbon, 13, 17-19, 27, 53-61, 99, 126, 175, 201, 236, 241, 296 pink, 31, 236-237 refuelling stations, 132, 238-240, 263-276, 310 renewable, 17-19, 175, 236 roadmap, 30-35, 47-50, 55, 67-70, 88, 100, 136, 165, 167, 203, 308 terminal, 20-21, 28, 40, 185, 250, 258-259 transport, 123, 183-187, 223-229, 238-244, 247-249, 253-256, 268-274 turquoise, 31, 237 value chain, 21, 23, 61 yellow, 236-237 Hydrogen and Decarbonised Gas Markets Package, 202 hydrogen market, 34, 49, 95, 115–127, 129–140, 257-258 indigenous, 151, 210, 309 industry, 38-40 infrastructure, 26-27, 129-131, 173-187, 267-269, 271, 273-276, 279-281 injustices, 155, 268 innovation, 1, 93, 118, 133, 136, 235, 244, 279, 311 institution, 22, 57, 93–94, 130, 134, 160 integration, 22, 89, 131-141, 177, 298 interconnection, 7, 22, 89, 184 interconnector, 20, 250 intermittency, 28, 175, 278, 310 intermittent, 34, 52, 140, 277 international law, 173-187 interpretation, 145, 153, 180, 198, 224, 228, 287 interstate, 41 investment, 36-37, 259, 286, 307 Japan, 70, 72, 91–93

joint, 22, 26, 71, 87, 117, 138, 211 just transition, 70, 276, 311 land use, 74-82, 103, 153, 191-194, 208, 224-225, 228-229, 307 land use agreements, 224-225, 228-229 large-scale, 71-72, 124, 182, 220, 256 Latin America, 46-64, 307 legislation, 30-45, 51, 55, 71, 74, 89-90, 98, 101, 105, 133-135, 137-138, 150, 161, 178, 191, 204-206, 225, 235, 252, 270, 307, 310, See also policy licence, 74, 78-82, 101, 103, 108, 178-181 limitations, 88-94 living, 95, 105, 145, 158 local authorities, 129-141, 169, 213, 308 local government, 38, 131, See also Groningen, Puglia, local authorities low-carbon, 202, 265, 278, 291, 310 manufacturing, 68, 105-106, 266 maritime, 7, 34 market failure, 116-118, 120 methanation, 233, 240 Middle East and North Africa (MENA), 84-97 Minister for Climate and Energy Policy, 254-255 movement, 50, 266, 307 national hydrogen strategy Australia, 70-82 France, 234 Germany, 217 New Zealand, 67-70 natural resource, 95, 104 Netherlands, 126, 158-170, 173-187, 245-259, 250, 201-305, 300-310 New Zealand, 201–214, 307, 309 non-pastoral, 76, 79 North Sea, 173-187, 250 Oceania, 65-82, 201-214, 307 offshore, 76, 173-187, 250, 309 offshore hydrogen production, 178-183, 250 offshore hydrogen transport, 183-186, 250 Oman, 85, 88, 90, 93, 96 one-stop shop, 94, 189, 220, 309 owner, 118, 228, 275 ownership, 20, 23, 90, 119, 138, 222, 224, 280 Paris Agreement, 13, 277 participation. See public participation pastoral lease, 75-82, 307 path, 13, 44, 50-51, 69, 84 permit, 40-41, 105-106, 201-214, 217-232, 270-274 building, 190, 192 pipeline, 40-44, 123, 183-186, 218-229, 240-242, 247-249, 253-256, 309 plan approval, 220-223, 225-227 planning approval decision, 220-221 policy, 13, 33-37, 47-63, 67-72, 131-133, 135-141, 145, 155, 160, 164-170, 208, 218, 268-269, 292-297, 307 politics, 302 power, 34-35, 52, 101, 178, 280 power purchase agreement, 110, 177

power-to-gas, 175-177, 244, 272, 279 pricing, 91-93, 95, See also tariffs private investments, 5, 36-37, 90, 307, See also investment private parties, 90, 150, 164, 296 procedural, 212, 221, 225-227, 309 procurement, 110, 140, 275, 308 profit, 15, 37, 97, 117, 120, 166, 252 proportion, 22, 71, 204, 285 proportionality, 225 public participation, 145, 158-170, 209, 221, 230, 268, 208 public participation procedure, 158-170, 222 public-private, 90, 249 Puglia, 131–135, 138–140 Qatar, 84, 86-87, 90 Queensland, 75 rail, 7, 34, 134, 138, 238-240, 273 rationale, 6, 22, 278, 303 raw materials, 104 RED III, 142-144, 149-156, 265, 283, 287 reform, 33, 99-106, 121, See also conversion, See also steam reforming regional planning, 219-222 regions, 70, 75, 129-144, 207-208, 308 regulating, 67, 201-214, 225-229 regulatory approach, 22, 25, 61, 66, 70-71, 78, 235 regulatory failure, 119–120 regulatory holidays, 20-22, 28 regulatory reform, 40-41, 71, 95, 211-214, 294 reliable, 100, 147 Renewable Energy Directive. See RED III renewable energy source, 15, 53-54, 59, 132, 175, 210, 236, 277, 300 repurposing, 26, 87, 183, 187, 225-229, 231 research, 35-36, 100, 311 resource consent. See consenting Resource Management Act, 206-213 reusing. See repurposing revolution, 86-88 road, 7, 134, 138, 238-240, 273, 310 roll-out, 1, 20, 255 rural, 75, 136 safety, 44–45, 50–60, 88, 105, 134, 138, 185, 201, 241, 280, 306, 310 salt cavern, 124-125, 165-170, 229-231, 288 Saudi Arabia, 86, 90, 96 security of supply, 28, 122 self-consumption, 236, 275 self-generated, 55 self-sufficient, 233, 308 shipping, 100, 134, 238-240, 268, 273 small-scale, 62, 272 social, 70, 89, 118, 308 social rights. See human rights social sustainability, 145-146, 151-152 society, 266-267 socio-economic, 75, 94, 140, 306

Index

soil, 147-150, 194 solar, 17, 47, 98, 142 solution, 21, 84, 120, 124, 154, 182, 202, 259, 270, 278, 293, 310 South Australia, 74, 78-82 Southeast Asia, 98-111, 308 state aid, 252, 285-287 steam reforming, 98-111, 233, 236, 308 storage, 102-103, 124-125, 165-170, 205, 229-232, 249-250, 256-259, 273-274, 277-290, 309-310 strategy, 16, 30-35, 49-50, 67, 70-82, 91, 102, 158, 167, 178, 217, 234, 263, 281, 295 subsidisation, 26-27, 109 sustainability, 142-156, 197, 308 sustainable development, 144-147, 150 tank, 51, 124, 134, 243, 278 tariffs, 117, 120, 253, 257, 273 tax credits, 31, 36-37, 97 tax incentive, 36-37 technology, 19, 31, 70, 86, 89, 175-177, 236, 270, 272, 279-281, 308 Ten Year Network Development Plan (TYNDP), 268, 275 TEN-E Regulation, 268 Thai. See Thailand Thailand, 106-111 theoretical, 116-118, 266-267 Trans-European Network for Energy (TEN-E), 268, 273-274 Trans-European Transport Network (TEN-T), 268-270, 273-274

transmission system operator, 27, 134, 138, 242, 247 transparency, 21, 25, 27, 35, 117-118 transparent, 147 transport, 309-310 Treaty on European Union, 160 Treaty on the Functioning of the European Union, 160 trend, 84-97, 146, 235 uncertainty, 30, 134, 193, 212-213, 255, 292, 307 United Arab Emirates (UAE), 88-89, 96 United Nations Sustainable Development Goals, 87 United States, 30-45, 90 usage, 57, 69, 104, 117, 123, 132, 137-138, 274, 293 utilisation, 98, 265 value chain, 270-275 waste, 62, 99, 130 water, 52-54, 62, 65-66, 77, 99, 108, 121-122, 148, 150, 175, 189–199, 206–211, 272, 308 Werner Franz, 1, 306 Western Australia, 74-78 Western Europe, 240, See also France, Germany, Netherlands wholesale market, 125–126 wind, 17, 47, 79, 98, 142, 174 World Trade Organization, 152

zoning, 194