Index

Aatola, H. 5
Abbot, K. 32, 33, 411, 422
Abramovay, R. 89
advanced biofuels
  Brazil, consideration of 99–100
  Canada see Canada, development and commercialization of advanced biofuels
cconcerns, and biofuel complexities 325, 328
  EU, energy content calculation 179–80
  intellectual property 386–7
  network governance 379–80
  see also miscanthus; switchgrass; wood pellets
Agoramoorthy, G. 60
agrofuel law and policy, East Africa see East Africa, agrofuel law and policy
Ahlgren, S. 183
air pollution concerns 24–6, 40, 51, 52, 94, 95
  see also climate change issues; environmental impact concerns; greenhouse gas emissions
algae use 8–9, 179, 325
Amigun, B. 265, 286
Andrade, P. 81–101
Andrade, R. 87–8
Andrews, A. 122
animal feed concerns 12, 15–16, 182, 302, 305, 307
Argentina 3, 48, 49, 50, 51, 52, 53
  and WTO–EU biofuel dispute see under WTO–EU biofuel dispute
Arima, E. 12
Ariza-Montobbio P. 60
Arndt, C. 60
Aronsen, G. 354
Arundo donax 14, 27
Asikainen, A. 414
Australia 15, 23, 28, 318
aviation and biofuels 123–6, 236
Babcock, B. 147, 151
Bacovsky, D. 361
Balleisen, E. 412
Banet, C. 170
Barbose, G. 160
Bartley, T. 406, 415
Barton, J. 389
Bastos Lima, M. 86
Beer, T. 24, 25
Behles, D. 388
Belgium 418, 420, 431
  WTO–EU biofuel dispute see under WTO–EU biofuel dispute, Subsidies and Countervailing Measures (SCM)
Berger, K. 417
Bergius, M. 275
Berndes, G. 19, 22, 24, 30–58
Bhat, M. 344
biodiesel
  air pollutant emissions 25–6
  Brazil 3, 12, 84–9, 91, 93, 94–8, 99
  China 222, 225–7, 234, 236, 242
  Colombia 256–8, 261
  as industrial good 399
  Kenya 269, 271
  Philippines, unproductive uplands 62
  production increase 318
  trans-esterification production 5, 7
biodiversity concerns 23, 26–8
  Brazil 94–5
  and deforestation, Tanzania 276, 277
  and fossil fuels 4
  Kenya 272, 273
  and nature conservation, EU 177
  Philippines, unproductive uplands 65
  public and private governance roles 40, 50, 51, 52
  see also environmental impact concerns
bioethanol see ethanol
biofuel complexities 315–38
  biofuel subsidies and mandates, distorting effect 324
  competing interests 321, 322, 324
  corporate control 319
  economic uncertainty concerns 334, 335
  food security 324–5
  governance challenge 317–23
  governance cocktail, need for 328–32, 335, 338
  incentive mechanisms 336
  industry codes and regulatory standards 326
  information asymmetry concerns 326–7, 332, 334, 336
  legal challenges 321, 328–9
  life cycle impact analyses 322–3
  path dependence theory 331–2
  political risks 335, 336–7
  private sector involvement and information exchange 326–7
  public policy goals, lack of clear 320, 322–3
  risk management 318, 322, 323–5, 326–7
  sales increase 318
  second-generation biofuels concerns 325, 328
  specialized subsystems 320, 321–2
  technology and business process innovations 320, 321–2
  weeds risk of biofuel crops 327–37
  weeds risk of biofuel crops, proposed innovation responses 333–7
  see also individual countries
biogas plants and GHG emissions, EU 181
biodiesel
  Biomass Action Plan (BAP), EU 409, 419–20
  Biomass Crop Assistance Program (BCAP), US 117, 118
  Biomass Research and Development Initiative, US, 344, 350
  combustion effects 26
  energy crops, South Africa 286, 288
  for heat and electricity generation, EU 180, 181
  imports 178, 184, 185, 186–7, 291–2, 398, 402
  lignocellulosic 5, 15, 22, 23, see also advanced biofuels
  nutrient loss from biomass removal 21–2
  promotion, Colombia 247
  Sustainable Biomass Partnership (SBP) certification system, EU 420, 422, 428, 430–32, 434, 435
  see also canola; cassava; corn; jatropha; land use; maize; miscanthus; oil; soybean; switchgrass; wood pellets
Blakeley, K. 121, 122
Blanco-Canqui H. 21
Bonan, G. 20
Bonilla Madriñan, M. 251
Borges, A. 87
Brandão, M. 3–29
Brandt, A. 4
Bransby, D. 24
Brass, L. 132
Brazil, biofuels’ legal and political framework 81–101
  Agro-ecological Zoning of Palm Oil 97, 99
  air pollution concerns 94, 95
  biodiesel 3, 12, 84–9, 96–8
  biodiversity concerns 94–5
  bioenergy legislation 48, 49, 50, 51, 52, 53, 54–5, 87, 90
blend levels 366, 389–90
climate change effects 87
deforestation and land management mechanisms 94, 95, 97
ey early ethanol promotion strategy 85–8
economic perspective 83
energy security driver 86
environmental protection perspective 83, 93–6, 97, 98
ethanol and biodiesel 3, 12, 84–9, 91, 93, 94–8, 99
flex-fuel technology effects 87, 366, 389–90
food versus fuel concerns 91, 99
greenhouse gas emissions and land use change 99, 100
international trade law considerations 101
National Agro-energy Plan 87
national alcohol program (Proalcool) 86
National Biodiesel Production and Use Program (PNPB) 88–9, 96–7
National Environmental Policy and sustainable development 86–7, 89, 94
National Program of Incentive for Alternative Electricity Sources (PROINFA) 100
National Program for Sustainable Palm Oil Production 97
public–private partnerships 96
second-generation biofuels consideration 99–100
Social Fuel Seal and Label 89, 97, 98, 282
social perspective 83, 88–9, 90–93, 97–8, 99, 282
soybean and biodiesel 85, 97
sugarcane and ethanol production 84–8, 90–97, 99–100, 344
sustainable development concerns and unbalanced regulation 86–7, 89–100
Briens, C. 26
Bright, R. 19, 20
Bringezu, S. 318
Brittaine, R. 60
Brown, J. 121
Brown, T. 128
Bruun, T. 65
Buchholz, T. 395, 406
Bull, S. 344
Burke, I. 113
Burleson, E. 388
Burton, E. 142
Büthe, T. 31
Buytaert, V. 57
Cackette, L. 111
Cafaggi, F. 411, 412, 414–16, 419
Cahoy, D. 387, 388
Calfucoy, P. 82
Canada
Agricultural Bioproducts Innovation Program (ABIP) 386
environmental impact concerns 372–3, 381–2, 391, 394
first-generation biofuels 368–9, 370
import tariffs 342, 383
legal regulation of production and distribution, Canada 381–2, 383
public legal action over nuisances from biofuel production facilities 382
wood pellets use 432, 434
WTO Canada–electricity FIT dispute 213–17
Canada, development and commercialization of advanced biofuels 359–74
Accelerated Cost Capital Allowance for Clean Energy Generation 370
angel investors 368
biofuel value chain 371–2
blend levels 365–7, 390
British Columbia Low Carbon Fuels Standard (LCFS) 365, 371, 392
capital programs 367–9
carbon reduction value 370–71
Corporate Average Fuel Economy (CAFE) standards 366
ecoENERGY for Biofuels Program 348, 349, 353, 369
employment opportunities 362, 372
integrated North American biofuels market 370, 371
private equity investors 368
production and funding 342–3, 349–50, 357
Renewable Fuels Standards (RFS) 342, 362–7, 391–3
Sustainable Development Technology Canada (SDTC) involvement 345, 368, 369
tax exemption considerations 344–5, 370, 384
technology innovation and feedstock diversity 361–2
technology transfer opportunities 372–3
waste products, benefits of use of 373
Canada, government incentives for biofuels 339–58
advanced biofuel production and funding 342–3, 349–50, 357
Agricultural Bioproducts Innovation Program (ABIP) 348
BioFuelNet research group 354
Biomass Innovation Network (CBIN) 348
Climate Change Action Plan and GHG reduction 346
Energy Policy Act 352
Ethanol Expansion Program (EEP) 346, 349, 353, 368
ethanol industry 3, 341, 342, 344–5
food versus fuel discussions 350
future for biofuels 353, 354, 356
Growing Forward 2 (GF2) 354
National Biomass Ethanol Program 345
NextGen Biofuels Fund 350, 354
operating and fiscal incentives 369–70
Renewable Fuels Regulation (RFR) and GHG emissions 342–3, 351–2, 353, 356
Canaday, H. 122
Cannady, C. 389
canola 5, 15, 146–7, 306, 378, 379, 399, 403
carbon footprint 4, 8–9, 17–18
see also environmental impact concerns
carbon stock 14, 17, 18, 40, 51, 52, 54
Carolan, M. 324, 325
Cartagena Protocol on Biosafety (CPB) 299, 405
Casier, L. 216
Casler, M. 328
cassava 61, 64, 221, 222, 231, 234
Cassuto, D. 85
certification
EU national certification and licensing procedure, EU 174–5, 187–9
EU Sustainable Biomass Partnership (SBP) system 420, 422, 428, 430–32, 434, 435
network governance of biofuels 395–7, 404–5
private regulation in bioenergy sector 32, 33, 414, 417–20, 428–9, 432, 433, 435–6
South Africa 309
US 123–4, 125, 403
voluntary certification schemes 187–9, 251–3, 255, 256, 258, 261–2
Charles, M. 380
Charnovitz, S. 395, 404
Chen, X. 11, 350
China, biofuels legal framework 221–43
administrative regulations 227–34
advanced biofuels 222, 231, 232, 233, 234, 237, 239, 240–41, 242
aviation-use biodiesel 236
Biodiesel Industry Development Policy 236–7
biodiesel production 222, 225–7, 234, 236, 242
Bioenergy Development (2011–15) Plan 236
compensation penalties 224
c consumer incentive mechanisms 238–9
electricity generation from renewable energy sources 223–4, 237–8
environmental impact concerns 241–3
ethanol production 3, 221–2, 224–5, 228–9, 230, 234, 235, 236
financial incentives 231–3, 238–9, 240–41
first-generation biofuels 231, 234, 235
future long-term biofuel development strategy suggestion 243
“green credits” suggestion 240
land use impact assessment 242–3
local government administrative regulations 234
market mechanism considerations 239–43
National Development and Reform Commission (NDRC) 227, 231, 235–6, 238
National Energy Administration (NEA) 227–8, 235–6, 237, 238
national plans and policy initiatives 235–7
Pilot Testing Program of Bioethanol Gasoline for Automobiles 228–9
private biofuel companies, need for encouragement of 240
regulatory documents 228–34
Renewable Energy Development Fund 232–3, 241
research and development in renewable energy sources 222–3, 239, 240, 242
rural development focus 242–3
social impact of biofuel developments 241–3
subsidies 229–30, 231–2
sugarcane 234
sustainable development encouragement 231–2, 236, 241
taxation policy 230, 233, 234, 241
Chiu, Y. 4
Chum, H. 36
civil society involvement 396, 433–4
Clark, L. 387
climate change issues 4–5, 11, 16–20, 69, 87, 166, 167–9, 346, 364–5
see also air pollution concerns; environmental impact concerns; greenhouse gas emissions
Colchester, M. 74
Colombia, biofuels policy 244–62
biomass promotion, fiscal incentives 247
economic and energy policy 245–7
environmental and social concerns 247–53, 254, 257, 261
financial credit incentives 247
Global Bioenergy Partnership (GBEP) 251–2, 253, 256, 261
Inter-American Development Bank (IADB) life cycle study 249–50, 254, 256–7, 259–60
land use change and GHG emissions 249, 250–51, 254–5, 256–7, 260
mandatory biofuel blending targets 246–7
monitoring requirements 260–61
renewable energy promotion 247
Roundtable on Sustainable Palm Oil (RSPO) 251, 252, 258, 261
socio-economic criteria 251
stakeholder involvement 249, 251–2
sugarcane bioethanol industry 244–5, 246, 248–52, 253–6, 259–60
sustainability assessment 249–50, 251–2
sustainability issues for biodiesel expansion 256–8, 261
sustainability issues for bioethanol expansion 253–6, 261
voluntary certification standards 251–3, 255, 256, 258, 261–2
water use and runoff impacts 255–6, 257, 260
corn 6, 12, 17, 105, 107, 115–16, 141–2, 144, 148–9, 151–2, 154–7, 161–2, 340, 342, 348–9, 378
Cotula, L. 60, 265
Cowie, Alan 3–29
Cowie, Annette 3–29
Creutzig, F. 4, 11, 13, 318
Crutzen, P. 17, 19
cultural issues, Philippines 66–7, 74, 75
Curran, M. 10, 17

Dahmann, K. 102–40
Dale, V. 406, 435
Dallemand, J.-F. 245, 251–2, 260, 326, 395, 396
Danish, K. 104
Dasgupta, A. 60
data credibility concerns, EU 187–9
Daughbjerg, C. 184
Dauvergne P. 60
Davis, P. 336
Davis, S. 15
de Baan, L. 28
de Beer, J. 375–405
De Fruiture, C. 23
De Gorler, H. 11
De La Torre Ugarte, D. 142
De Ryhove, S. 309
De Schutter, O. 12
De Vera, E. 376
DeDecker, J. 143
deforestation concerns 14–15, 20–21, 26–7, 94, 95, 97, 266–7, 276, 277
Forest Stewardship Council (FSC) certification system 415, 417, 421
see also land use
Dehue, B. 265, 280
Denmark 412, 420–21, 422, 431
Deshpande, R. 376, 405
Di Lucia, L. 182, 183
Dickmann, D. 21
Dillon, H. 281
Dixon, R. 273
Doornbosch, D. 81
Drabik, D. 11
Dressler, W. 68, 75
drop-in biofuel, US 121, 123–4, 355
Drumbl, M. 265
Dufey, A. 3
Duncan, M. 339
Dutra, C. 99
Dutzik, T. 143, 148, 155

East Africa, agrofuel law and policy 263–84
Burundi, large-scale agrofuel investments, lack of 268
environmental impact control 264–5
EU biofuel sustainability schemes as benchmarks 278–9
food versus fuel competition debate and North/South mismatch of priorities 264
future direction for sustainability criteria 280–83
Global Environment Facility (GEF) and traffic light risk assessment 282–3
Mozambique 48, 50, 52, 53, 279, 280, 283
regulatory gap 278–9
Rwanda, land scarcity for biofuel production 267
sugarcane 266, 276, 278
technological transfer concerns 264
Uganda 48, 49, 50, 52, 53, 266–7
UK Nuffield Council on Bioethics, core moral values 279, 281–2

East Africa, agrofuel law and policy, Kenya 268–73, 278
biodiesel production 269, 271
biodiversity concerns 272, 273
bioethanol production 268–9, 271
Energy Act 269–70
Environmental Management and Co-ordination Act 270
foreign investment and “agrofuel land grabs” 272–3, 278
jatropha crop 272–3, 276, 278
sustainability concerns 271–3
water resource concerns 272, 278

East Africa, agrofuel law and policy, Tanzania 273–7
agrofuel investment and sustainability concerns 275–6
bioenergy legislation 48, 49, 50, 52, 53
Biofuel One Stop Centre 277
deforestation and biodiversity concerns 276, 277
environmental and societal impact assessment (ESIA) 277

Liquid Biofuel Sustainability Guidelines 277
moratorium on new projects 276
National Biofuels Task Force (NBTF) 274
village land grabbing concerns 275–6, 277
Eaves, J. and S. 378
Eberhard, A. 285
Echols, M. 376
economic perspective 83, 158–9, 245–7, 293–7, 334, 335
see also social perspective
Edenhofer, O. 12, 27
Eisenthal, J. 389
Eisner, M. 412
Elbehri, A. 84, 280
electric vehicle use effects, US 156, 158–9
electricity generation 19, 100, 170, 180, 181, 223–4, 237–8, 409–10
Elliott, D. 9
Else, D. 121
emissions see greenhouse gas emissions
employment conditions in sugarcane industry, Brazil 90–91, 92–3, 99
employment opportunities 108, 346, 362, 372, 379
Endres, J. 119
energy, Brazil bioenergy legislation 48, 49, 50, 51, 52, 53, 54–5, 87, 90
Englund, O. 30–58
environmental impact concerns
biodiversity effects 23, 26–8
biofuel production systems 5–9
biofuels as supplement to fossil fuels, and rebound effects 11, 19
biomass combustion effects 26
Canada 372–3, 381–2, 391, 394
carbon footprint 4, 8–9, 17–18
China 241–3
co-products as substitutes for displaced agricultural products 15–16
Colombia 247–53, 254, 257, 261
conversion technology improvements 17–18
cooking oil recycling benefits 24
deforestation see deforestation concerns
East Africa 264–5, 277
EU Environmental Protection and Energy Guidelines 173–4
future directions 29
indirect land use change (ILUC) see indirect land use change (ILUC)
life cycle assessment (LCA) 9–11
NGO community campaigns 433–4
nutrient loss from biomass removal 21–2
perennial plant benefits 22, 24, 28
Philippines, unproductive uplands 65, 69
risks and opportunities 3–29
soil impacts 17, 18, 20–22
South Africa 304–5
surface albedo and radiation absorption 19–20
water resource concerns see water resource concerns
see also air pollution concerns; biodiversity concerns; climate change issues; greenhouse gas emissions; renewables; sustainability
Erixon, F. 185
Ernsting, A. 263
ethanol production
air pollution emissions 25
blend wall, network governance of biofuels, domestic policies and regulations 389–91
Brazil 3, 12, 84–9, 91, 93, 94–8, 99
Canada 3, 346, 349, 353, 368
China 221–2, 224–5, 228–9, 230, 231, 234, 235, 236
Colombia 244–5
East Africa 268–9, 271
fermentation production 5, 6, 8
production increase 318
sustainability issues for bioethanol expansion, Colombia, biofuels policy 253–6, 261
US 340, 341, 343–4
US, “blend wall” 3, 12, 14, 102, 115–16, 144–5, 154–7, 158, 354, 355–6, 366, 387, 390, 393, 408–9
WTO–EU biofuel dispute 194, 195–6
Ethiopia 48, 50, 52, 53
EU
biofuel imports 398
Biomass Action Plan (BAP) 409, 419–20
blending targets 197, 407–8
land set-aside for non-food crops 385
national renewable energy action plans (NREAPs) 409
R&D initiatives 386
renewable fuel mandates 391
sugarcane 55–6
sustainability focus 82, 427, 434
Sustainable Biomass Partnership (SBP) certification system 420, 422, 428, 430–32, 434, 435
taxation policies 384, 408
wood pellets or wood chips as a fuel 410, 412, 418, 420, 422–32
WTO–EU biofuel dispute see WTO–EU biofuel dispute
EU legal regime for biofuels 164–90
advanced biofuels, energy content calculation 179–80
agro-environmental practices in biofuel feedstock production 178
biofuel feedstock imports 178, 184, 185, 186–7, 398, 402
Biofuels Directive 164, 166, 170, 394, 407–8
biofuels policy 165–72
biogas plants and GHG emissions 181
biomass for heat and electricity generation 180, 181
carbon-related concerns and non-carbon-related concerns, distinction between 176–7
climate change Green Paper and energy policy targets for 2030 167–9
Climate and Energy Package and 20-20-20 targets 166, 364–5
data credibility concerns 187–9
“energy from renewable sources” definition 169
Environmental Protection and Energy Guidelines 173–4
financial supporting schemes, harmonization calls 167
food production displacement concerns 182–4
GHG emissions reduction 167, 168, 170, 174, 175, 176, 177, 178, 181, 183–4, 364, 393–4, 419, 420
indirect land use change (ILUC) factors 168, 172, 175, 176–7, 180, 182–4, 186–7
international trade law regime 184–7
national authorization, certification and licensing procedure 174–5
national renewable energy action plans 171–2, 173, 180–81, 187
nature conservation and biodiversity issues 177
regulatory challenges 181–9
renewable energy consumption targets 165–6, 167, 168, 171, 174, 175, 179–80, 364
support schemes 173–4, 175
sustainability schemes 175–81, 184–5, 187–9, 404, 418
voluntary certification schemes 187–9
waste and residue use 176, 178–9
WTO GATT and sustainability issues 184–6
export products 35–7, 43, 44

Faaïj, A. 395
Fader, M. 37
Fargione, J. 18
Farrell, A. 16
Faure, M. 331
feedstock see biomass
Ferrari, M. 74
financial incentives see incentives
Fingerman, K. 22
Fischer, R. 295
Fischer-Tropsch process 8, 15
Fitzherbert, E. 27, 325
Fletcher, K. 353
Fletcher, R. 27
flex-fuel technology 87, 366, 389–90
Foley, J. 28
Follett, R. 22
food security 69–70, 378–9
  food versus fuel concerns 36, 91, 99, 182–4, 264, 350, 353
  South Africa see South Africa, legal and policy framework, food security
forests see deforestation concerns
Fowler, L. 102–40
France
  biofuel production 3
  WTO–EU biofuel dispute see under WTO–EU biofuel dispute,
  Subsidies and Countervailing Measures (SCM)
Franke, B. 282
fuel consumption decline effects, US 143, 148, 154–6, 158
funding see incentives
future for biofuels 29, 58, 243, 280–83, 353–6
Galbraith, K. 160
Gamborg, C. 182
Gasore, B. 267
Gawel, E. 183
Gemson, S.-C. 272
Genest, A. 191–220
genetic engineering
  GM crops as feedstock see South Africa, legal and policy framework, GM crops as feedstock
  international trade governance 405
George, B. 21
George, R. 123
Gerasimchuk, I. 242
Gereffi, G. 31
Germany 3
GHG emissions see greenhouse gas emissions
Gibbs, H. 18
Gibeson, G. 103
Gifford, R. 21
Glass, D. 137
Glazewski, I. 285
Glenna, L. 387, 388
Global Bioenergy Partnership (GBEP) 251–2, 253, 256, 396
Global Environment Facility (GEF) 282–3
global warming see climate change issues
Godfray, H. 14
Goh, C. 418
Goldemberg, J. 27, 325
Gooch, R. 130
Goovaerts, L. 56
Gordon-Maclean A. 275
governance challenges 317–23, 328–32, 335, 338
government incentives see incentives
Grahl, B. 9
grassland conversion 14, 21, 26–7, 40, 49, 50, 51, 53, 54, 256–7
see also land use
Green Corridor Project, US 130–31, 139
“green credits” suggestion, China 240
greenhouse gas emissions 16–17, 18–19
  Brazil, and land use change 99, 100
  Canada, reduction targets 365, 366–7, 370–71, 373, 392–3, 394
  Canada, Renewable Fuels Regulation (RFR) 342–3, 351–2, 353, 356
  Colombia, and land use change 249, 250–51, 254–5, 256–7, 260
  EU Emissions Trading Scheme 174
  EU legal regime for biofuels 167, 168, 170, 174, 175, 176, 177, 178, 181, 183–4, 364, 393–4, 419, 420
  GHGs, Canada, Climate Change Action Plan 346
  international trade governance 403–4
  public and private governance roles 39, 40, 51, 52, 54
The law and policy of biofuels

US 82, 110, 111, 134–8, 141–2, 144, 148–9, 151–2, 162, 393, 408
see also air pollution concerns; climate change issues; environmental impact concerns
Greve, N. 290
Grierson, S. 8
Grosjean, D. 25
Guatemala 48, 49, 50, 52, 53
Guayo, I. del 170
Gueiron, C. 85
Guerrero, M. 195, 197
Gullet, W. 283
Guo, L. 21, 221–43
Gupta, J. 30
Hajer, M. 67
Hansson, J. 35
Harnett, T. 376–7, 400, 402
Harrison, J. 406, 409
Hartley, M. 28
Häskel, G. 195, 197
Hastings, A. 328
Heimlich, R. 109
Herth, A. 207
Hess, P. 25
Hochman, G. 11
Hodson, P. 171
Hogle, D. 387
Holzinger, K. 436
Hooijer, A. 21
Howse, R. 377, 398–9, 401, 402, 403, 404
Hsu, A. 38
Huerteler, J. 422
Huertas, D. 32
Huggins, C. 267
Hughes, S. 324
Hunsberger, C. 278
Idígoras, G. 195
Ikonen, T. 433
import tariffs
Canada 342, 383
EU 178, 184, 185, 186–7, 398, 402
and network governance of biofuels 382–3, 397–9
South Africa 291–2
US 156, 343–4, 398–9, 402
incentives
Brazil 100
Canada see Canada, government incentives for biofuels; US, government incentives for biofuels
China 231–3, 238–9, 240–41
Colombia, biomass promotion 247
mechanisms, and biofuel complexities 336
US DOE Loan Guarantee program 347
see also subsidies; taxation
India 48, 49, 50, 52, 53
indirect land use change (ILUC) 12–16, 17, 18, 21, 26
Brazil 99
EU 168, 172, 175, 176–7, 180, 182–4, 186–7
see also land use
Indonesia 3, 14, 18, 48, 50, 52, 53
information asymmetry concerns 326–7, 332, 334, 336
innovation 320, 321–2, 333–7, 361–2
see also technology
intellectual property rights 386–9, 401–2
see also licensing
Inter-American Development Bank (IADB) 249–50, 254, 256–7, 259–60, 396
International Energy Agency 310, 361
international organization involvement 396, 402–5
see also network governance of biofuels
International Organization for Standardization (ISO) 9–10, 82, 189, 396, 418–19, 431
international private sustainability governance 32–3, 43, 45–7, 55
see also sustainability
international trade governance
Brazil 101
EU 184–7
network governance see network governance of biofuels, international trade governance
Isaac, G. 404
Ismail, M. 98
Japan 213–14
jatropha 14, 62, 64, 69, 272–3, 276, 278, 306, 328
Jeremiah, L. 127
Jiliberto Herrera, R. 251
Johnson, J. 159
Jongschaap, R. 14
Josol, M. 66
Jull, C. 264, 377
Jumbe, C. 306
Jung, A. 384, 394
Junginger, M. 56, 57, 344, 395, 408, 409, 418
Kaditi, E. 377
Kamanga, K. 273
Kaufmann, D. 39
Kenya see East Africa, agrofuel law and policy, Kenya
Kenya, A. 273
Kerr, W. 377, 399, 403, 404, 405
Khan, M. 159
Khanna, M. 11, 350
Kidd, M. 285
Kizito, M. 267
Klippen, K. 103
Kloppener, W. 9
Kockelman, K. 159
Koellner, T. 28
Kojima, M. 403
Koplow, D. 281, 384
Koponen, K. 25
Kotba, R. 198
Krey, V. 11
Kulovesi, K. 166
Kutas, G. 322
Kyoto Protocol 347, 405, 407, 408
Laan, T. 345, 384
labelling initiatives 395–7, 404–5
Laborde, D. 183
Labrie, M. 359–74
Lambin, E. 12
Lamers, P. 344, 408, 409, 422
land price effects, South Africa 308–10
land use
change and GHG emissions,
Colombia, biofuels policy 249, 250–51, 254–5, 256–7, 260
deforestation see deforestation concerns
grassland conversion 14, 21, 26–7, 40, 49, 50, 51, 53, 54, 256–7
greenhouse gas emissions and land use change, Brazil, biofuels’ legal and political framework 99, 100
impact assessment, China, biofuels legal framework 242–3
indirect land use change (ILUC) see indirect land use change (ILUC)
land grabbing, East Africa 272–3, 275–6, 277, 278
land requirements increase 318
land set-aside for non-food crops, EU 385
peatlands drainage 18, 21, 40, 49, 50, 51, 53, 54
soil impacts 17, 18, 20–22, 40, 51, 52
swidden 61, 65, 66, 68–9, 74, 75, 76, 77–8
unproductive uplands see
Philippines, unproductive uplands
wetlands conversion 40, 49, 50, 51, 53–4, 182, 266
see also biomass

Langeveld, J. 13
Le Gal, E. 315–38
Le Roy, D. 383
Leeuwis, C. 77
legal challenges, biofuel complexities 321, 328–9
Lemley, M. 388
Lendle, A. 185
Levidow, L. 333
Lewandowski, I. 395
Li, P. 222
Li, X. 357
Li, Y. 227
licensing 174–5, 290, 388
see also intellectual property rights
life cycle assessment (LCA) 9–11, 322–3, 403–4
Lihongm M. 113
Lim Tung, O. 285–312
Lima, M. 30
Lin, A. 223

Yves Le Bouthillier, Annette Cowie, Paul Martin and Heather McLeod-Kilmurray - 9781782544555
Downloaded from Elgar Online at 08/18/2019 03:05:35AM
via free access
Index

451

cross-licensing and patent pooling 388
demand-side measures 389–94
etanol blend wall 389–91
flex-fuel engines 389–90
import tariffs on foreign biofuels, 
OECD countries 382–3
intellectual property rights 386–9, 
401–2
renewable fuel mandates 391–4
storage and distribution issues 
385–6
subsidies, tax preferences and related 
supports 382–6, 400–401
supply-side measures 381–9
volumetric production subsidies and/ 
or consumption mandates 384
network governance of biofuels,
international trade governance 
397–405
feedstocks, biotechnology and 
genetic engineering use 405
import tariffs and biofuel 
classification 397–9
life cycle performance requirements 
and GHG emissions 403–4
subsidies 400–402
Neville, K. 60
Ngo, A. 377, 385, 392
Nigeria 48, 49, 50, 52, 53
Nixon, R. 105
Nodari, R. 90
Nylund, N.-O. 25
Oades, J. 21
O’Connell, D. 56
off-take agreements, South Africa 291
oil
cooking oil recycling benefits 24
palm oil production see palm oil 
production
O’Kray, C. 222
Olsen, B. 164–90
Ottinger, R. 261
Owino, R. 263–84
Pakistan 48, 49, 50, 52, 53
Pal, R. 216
palm oil production 5, 14, 18, 21, 22,
27, 59, 97, 99, 324–5

Colombia 244, 246, 248, 250–51, 
252, 256–8, 259–60
Philippines 62, 64, 65, 66, 69, 72
Roundtable on Sustainable Palm Oil 
(RSPO) 251, 252, 258, 261, 417
Papendieck, S. 195
Patzek, T. 16
Pavlovskaia, E. 187
Pearce, F. 266
peatlands drainage 18, 21, 40, 49, 50,
51, 53, 54
see also land use
Peck, P. 435
Pelkmans, L. 33
Peplow, M. 355
perennial plant benefits 22, 24, 28
Pernick, R. 318
Perrot-Maitre, D. 336
Pottie, J. 291
Philippines, unproductive uplands 
59–78
alcogas programme 63
biodiesel production 62
biodiversity impact 65
biofuels development 63–4, 74
climate change issues and swidden 
cultivation 69
corruption concerns 74
cultural issues 66–7, 74, 75
environmental concerns 65, 69
fallow land decline 65–6, 68, 73–4,
75, 77–8
feedstock from coconuts and 
sugarcane 63, 64
food security and lowland food 
production emphasis 69–70
future research 78
government-driven production 
regimes 64, 67, 76
Indigenous Peoples Rights Act 
(IPRA) 73, 74
inequity concerns 65–70
institutional weaknesses 67
jatropha production 62, 64, 69
market elites’ perception of upland 
environments and “idle lands” 
67–9, 75–8
media opinions 68
multi-stakeholder consultation 
recommendation 73–4
The law and policy of biofuels

- palm oil production 62, 64, 65, 66, 69, 72
- participatory policy analysis (PPA) 70, 77–8
- Philippine Development Plan 2011–2016 69
- policy or institutional intervention suggestions 70–72, 76–7
- private firm involvement 64, 67, 69, 76
- public participation requirements 71, 72–3, 74, 77
- rubber development concerns 74
- swidden cultivation 61, 65, 66, 68–9, 74, 75, 76, 77–8
- upland environments as target locations 64
- Pimentel, D. 12, 16, 324, 325
- Plevin, R. 11
- Podkul, C. 355
- Poignant, S. 207
- policies see individual countries
- political risks, biofuel complexities 335, 336–7
- Powers, M. 141–63
- pricing framework, South Africa 294–5
- private equity investors, Canada 368
- private regulation in bioenergy sector 406–38
- bioenergy market policies 407–10
- certification systems 32, 33, 417–20, 428–9, 432, 433, 435–6
- certified bioenergy supply chains 414
- cost efficiency factors 430–31, 435
- deforestation concerns 417
- enforcement system strengths 413–14
- environmental NGO community campaigns, effects of 433–4
- governance triangle 411–12
- macro- and micro-level impact 422–36
- “naming and shaming” campaigns, effects of 416
- private governance initiatives, reasons for emergence 414–16
- regulation types 412–13
- sustainable system development 423–6, 430–33, 434, 435–6
- trust building 428–30, 433–4
- wood pellet trade 426–36
- private sector involvement
  - information exchange and biofuel complexities 326–7
  - involvement, and network governance 396
- involvement, Philippines 64, 67, 69, 76
- need for encouragement of, China 240
- public–private partnerships, Brazil 96
- public opposition to ethanol-based fuels, US 157, 159–60, 163
- public participation requirements, Philippines 71, 72–3, 74, 77
- public policy goals, lack of clear, and biofuel complexities 320, 322–3
- public policy objectives, network governance of biofuels 377–80
- public and private governance roles in promoting sustainable bioenergy 30–58
- air quality effects 40, 51, 52
- biodiversity effects 40, 50, 51, 52
- carbon stock 40, 51, 52, 54
- certification standards 32, 33
- domestic demand for sustainable bioenergy products 37, 43
- environmental legislation and enforcement 38–9, 42
- export products potential 35–7, 43, 44
- feedstock production 40, 49
- food first principle and biomass supply 36
- future direction 58
- GHG emissions 39, 40, 51, 52, 54
- international private sustainability governance 32–3, 43, 45–7, 55
- international supply chains 34
- land use 51, 52
- nation-state’s role 33–4
- national legislation, sustainability coverage assessment 39–53
- social sustainability 40, 51, 52
- soil quality effects 40, 51, 52
- water quality effects 33–4, 40, 51, 52
- Pulhin, J. 75
Purnhagen, K. 411, 413, 416
Puthiyaparambil, J. 327
Qi, B. 18
Qian, Y. 426
Qiu, H. 230

Raheman, H. 328
Rai, A. 386
Rajagopal, D. 11
Rakasem, K. 65
Rapier, R. 325
Rascoe, A. 114
Rathman, R. 60
Redick, T. 297
Reilly, J. 339
Ren, D. 240
Renda, A. 411, 414–16

**renewables**
- China 223–7, 231, 232–3, 235–6, 241
- EU 165–6, 167, 168, 171–2, 173, 174, 175, 179–81, 187, 364, 391
- network governance 391–4
- promotion, Colombia 247
- South Africa 287–8, 295–6

*see also* environmental impact concerns

**research and development**
- China 222–3, 239, 240, 242
- EU 386
- funding, US 116–19, 120, 122–3, 132, 133, 139–40
- network governance of biofuels 386, 401–2
- Rio+20 316, 327, 338, 415

**risk management**
- biofuel complexities 318, 322, 323–5, 326–7
- environmental *see* environmental risks and opportunities
- risk fund, China 231–2
- traffic light risk assessment, East Africa 282–3

Rizzi, M. 195
Robinson, N. 22
Roggenkamp, M. 170

Romppanen, S. 175, 182, 187
Ronne, A. 164–90
Rossi, A. 98
Roundtable on Sustainable Biofuels (RSB) certification 55–6, 396
Roundtable on Sustainable Palm Oil (RSPO) 251, 252, 258, 261, 417
Roy, P. 282
Rubin, E. 380
Rubini, L. 196, 212–13, 217, 219
Runge, C. 378–9
Ryckmans, Y. 410

sales increase, biofuel complexities 318
Sanders, B. 129
Savilaakso, S. 27
Scarlat, N. 245, 251–2, 260, 326, 395, 396
Schaus, M. 185
Schill S. 355
Schneplf, R. 104, 117, 340
Schroeder, C. 337
Schroeder, J. 131
Schuman, S. 223
Schut, M. 30, 272
Schwaiger, H. 20
Scott, J. 189
Scott-Brown M. 326–7
Searchinger, T. 12, 109
second-generation biofuels *see* advanced biofuels
Selfa, T. 244, 246, 248, 251, 253, 255, 256, 261
Senauer, B. 378–9
Shapouri, H. 17
Sheehan, J. 17, 376
Siellhorst, S. 275
Sierra Leone 56
Silva, J. 387
Silva, S. 99
Sims, B. 354
Sims, R. 319
Sindel, B. 330
Singh, A. 325
Slade, R. 17–18
Smeets, E. 19
Smith, P. 102–40
Smith, T. 406–38
Smyth, S. 376, 394, 403, 405
The law and policy of biofuels

Snidal, D. 411, 422
Snider, A. 123
social perspective 40, 51, 52
  Brazil 83, 88–9, 90–93, 97–8, 99, 282
  Canada 372–3
  Colombia 251
  EU 180
  network governance 396–7, 404
  South Africa 289–93
  Tanzania 277
  US 158–9
  see also economic perspective
Snöderbaum, P. 328
soil impacts 17, 18, 20–22, 40, 51, 52
  see also land use
Soimakallio, S. 3–29
Sommerer, T. 436
Sonnenfeld, D. 63
Sorda, G. 281, 323–4, 377, 382, 391
sorghum 59, 64, 222, 234, 294, 298–9, 306
South Africa, legal and policy framework 285–312
  biofuel as economic fuel 293–7
  biofuel as social fuel 289–93
  Biofuel Task Force (BTF) 288
  Biofuels Industrial Strategy (BIS) 288–9, 290, 291, 302, 306, 307, 310
  biofuels regulatory framework 287–9
  blending targets 288–90, 293–4, 306
  energy crops to obtain biomass 286, 288
  environmental monitoring 304–5
  feedstock imports 291–2
  food security effects 286–7
  fuel levy exemption for biodiesel 295
  historically disadvantaged South Africans, part sourcing of biofuels feedstock from 290–92, 298–302
  incentives and subsidies 295–7
  Land Restitution Programme 292–3
  licensing of biofuels manufacturers 290
  off-take agreements 291
  part sourcing of feedstock from designated areas 292–3
  Petroleum Products Act 288, 289, 293
  pricing framework 294–5
  Renewable Energy Capital Subsidy Scheme 295–6
  renewable energy targets 287–8
  sugarcane 287, 306
  South Africa, legal and policy framework, food security 305–10
  certification requirements 309
  land use and land price effects 308–10
  maize as biofuels crop 306–7
  non-feed and non-food sources as alternative 309–10
  water demand effects 308
  South Africa, legal and policy framework, GM crops as feedstock 286, 297–305, 308, 311
  coexistence issues 302–3
  reconsideration 303–5
  Syngenta maize import application 302–3
  unintended impacts of GM crops for food and feed 298–302
soybean 5, 12, 85, 97, 98, 105, 186, 193, 194–5, 298, 403
Spahr, C. 143
Spain 195, 196–7
Spatari, S. 17
Spittler, J. 324
splash-and-dash policy, US 402
Steenblik, R. 81, 322, 324, 345, 376, 382, 383, 384, 385, 386, 391, 399
storage and distribution issues 385–6
Strapasson, A. 13
Stubbs, M. 117
Stupak, I. 32, 56, 406–38
subsidies
  China 229–30, 231–2, 239
  distorting effect 324
  and network governance of biofuels 382–6, 400–402
  South Africa 295–7
  WTO–EU biofuel dispute see WTO–EU biofuel dispute, Subsidies and Countervailing Measures (SCM)
  see also incentives; taxation
  sugarcane 5, 15, 17, 20, 26, 27
  Brazil 84–8, 90–97, 99–100, 344
  China 234

Yves Le Bouthillier, Annette Cowie, Paul Martin and Heather McLeod-Kilmurray - 9781782544555
Downloaded from Elgar Online at 08/18/2019 03:05:35AM via free access
Colombia 244–5, 246, 248–52, 253–6, 259–60
East Africa 266, 276, 278
EU 55–6
Philippines 63, 64
South Africa 287, 306
US 156
Sulle, E. 274, 275
Sullivan, J. 132
sustainability focus 22
Brazil 86–7, 89–100
Canada 345, 368, 369
China 231–2, 236, 241
Colombia 249–50, 251–2, 253–6, 256–8, 261
East Africa 271–3
EU 82, 175–81, 184–9, 404, 418, 420, 422, 427, 428, 430–32, 434, 435
Clean Cities Program 108, 131
Clean Energy Investment Initiative 116
Clean Fuels Corridor 130–31, 134, 139
drop-in biofuel 121, 123–4, 355
Energy Conservation Policy Act 105–6
Energy Independence and Security Act 110, 363, 408
energy security 106–7, 108, 348, 378, 393
Energy Tax Act 105
Environmental Protection Agency (EPA) 25, 103, 112–13, 114, 116, 125, 129, 132, 145–7, 149–50, 152–3, 155, 156–7
ethanol integration and “blend wall” 3, 12, 14, 102, 115–16, 144–5, 154–7, 158, 354, 355–6, 366, 387, 390, 393, 408–9
Farm Bill 117, 118–19
federal policy 104–26
first-generation biofuels policy (1978 to 2004) 105–8
Forest Service (USFS) 119–20
Green Corridor Project 130–31, 139
greenhouse gas emission levels 82, 110, 111, 134–8, 141–2, 144, 148–9, 151–2, 162, 393, 408
import tariffs 156, 343–4, 398–9, 402
incentives and tax credits 107–8, 370, 384, 385
Jobs Creation Act 108
military demand for biofuel 121–3
Mississippi River sedimentation rates 23
New Hampshire experiment 128–9
Pacific Coast Collaborative and transportation issues 138–9
Public Utility Regulation Policies Act (PURPA) 106
regional approaches 137–40
research and development funding 116–19, 120, 122–3, 132, 133, 139–40
splash-and-dash policy 402
sugarcane 156
sustainable biofuels interpretation 82
Tennessee experiment 130–32
Virginia experiment 132–3
volume requirements 110, 111–16
woody biomass and cellulosic biofuels 119–20, 125, 432
Wyoming experiment 127–8
US biofuels policy, Renewable Fuel Standard mandates 141–63
advanced biofuels production 139, 144–6, 149, 152, 153, 157, 161–2
biofuels target limitations, recognition of 159–60
corn ethanol production 141–2, 144, 148–9, 151–2, 154–7, 161–2, 340, 348–9
delayed rule-making and problems of annual targets 149–50, 160–61
domestic oil supply factors 156
economic and social change effects 158–9
electric vehicle use effects 156, 158–9
fuel consumption decline effects 143, 148, 154–6, 158
market-based system and technology challenges 152–4, 160–61
measures to avoid pitfalls, suggested 157–62
public opposition to ethanol-based fuels 157, 159–60, 163
Renewable Fuels Infrastructure Investment Program 118
Renewed Identification Numbers (RINs) 113, 115, 146–7, 149, 151, 157, 355–6
second-generation biofuels renewable fuel standards 109–17
uncertainty over projected distribution rates, effects of 146, 148, 149–50, 159–61
volume control and equivalence values of biofuels 145–6, 148, 149–50
US, government incentives for biofuels 339–58
advanced biofuel production 340–42, 346–7, 349, 350, 353–6, 363–4, 393
Alternative Fuel Station Credit program 347
Bioenergy Program 118, 347, 350
Biomass Research and Development Initiative 344, 350
Biorefinery Project Grants 345, 350
current projects 353–4
DOE Loan Guarantee program 347
ethanol industry 340, 341, 343–4, 353
food versus fuel discussions 350, 353
future for biofuels 353–6
Small Ethanol Producer Credit 344
Volumetric Ethanol Excise Tax Credit (VEETC) 346, 349, 351, 353
US, legal cases
Am. Petroleum Inst. v. EPA 142, 143, 152–3
Grocery Manufacturers Ass’n v. EPA 154
Monroe Energy v. EPA 142, 150, 157
Nat’l Petrochemical & Refiners Ass’n v. EPA 144
POET v. California Air Res. Bd. 135
Rocky Mountain Farmers Union v. Corey 135–7
Vamvuka, D. 8
Van Dam, J. 56, 57, 395, 396, 436
Van Iersel, S. 436
Van Waarden, F. 436
Verbeek, M. 329
Verhoeest, C. 410
Vermeulen, S. 60
Versteeg, W. 67
Viteri, D. 355
Vogel, D. 411
volume control 110, 111–16, 145–6, 148, 149–50, 346, 349, 351, 353, 384
see also blending targets
voluntary certification schemes 187–9, 251–3, 255, 256, 258, 261–2
see also certification
Von Blottnitz, H. 17
Wald, M. 116
Wallington, T. 14
Wang, H. 224, 236
Wang, M. 339
Wang, Z. 221, 231, 237, 239
Warner, M. 103
waste products, use of 24, 176, 178–9, 222, 234, 236, 242, 373
water resource concerns 22–4, 33–4, 40, 51, 52, 255–7, 260, 272, 278, 308
Watson, R. 33
Wear, D. 127
weeds risk of biofuel crops 27, 327–37
Weiś, W. 196
Werling, B. 27
wetlands conversion 40, 49, 50, 51, 53–4, 182, 266
see also land use
White, B. 60
Wicke, B. 14, 21
Willms, J. 381, 382
Wolf, M.-A. 9
Wood, S. 19
wood pellets 119–20, 125, 410, 412, 418, 420, 422–36
Woods, J. 60
World Commission on Environment and Development, sustainable development 83
World Wildlife Fund 396, 415, 417
WTO
Agreement on Agriculture (AoA) 195–6, 399, 400, 401
Argentina – EU (biofuels) 186
Argentina – Spain (biofuels) 185–6
General Agreement on Tariffs and Trade (GATT) 184–6, 398–9, 404
Sanitary and Phytosanitary Measures (SPS) Agreement 402
Subsidies and Countervailing Measures (SCM) Agreement 400–401
Technical Barriers to Trade (TBT) Agreement 402, 404–5
WTO–EU biofuel dispute 191–220
Argentina’s biodiesel and soybean exports 194–5
Argentina’s Request for Consultations WT/DS459/1 192–4, 196–208
bioethanol classification 194, 195–6
biofuel subsidies challenge 194
EU anti-dumping measures on biodiesel imports 198, 199
EU Fuel Quality Directive sustainability criteria 191–2, 193, 194, 204–5
EU mandatory biofuel blending targets 197, 407–8
Japan, Ontario FIT Program violation claim 213–14
most-favoured-nation treatment 194, 197, 200, 213
Request for Consultations, National Implementation Measures of Belgium and France 200–208
WTO Canada–electricity FIT dispute and existence of a benefit 213–17
WTO–EU biofuel dispute, Subsidies and Countervailing Measures (SCM) 196, 197–219
Belgium, Biofuel Contract Awards 202–3
Belgium, mandatory biofuel blending targets 203–5, 212, 215, 218–19
Belgium, prohibited subsidies allegations 218–19
existence of benefit under Article 1.1(b) 213–18
France, prohibited subsidies allegations 218–19
France, tax credits and approvals 205–7
preliminary assessment 208–19
Wu, K. 222
Wu, M. 4, 22
Xiang, Q. 225
Xie, X. 240
Yacobucci, B. 104, 108, 340, 343
York, R. 19
Zhang, F. 238
Zhang, G. 228