Index

ABCD see asset-based community development (ABCD)
adjacency matrix, 204
amplified intelligence, 173
analogue decisions, 171
anticipatory experiences (AEs), 64
Architecture, Engineering and Construction (AEC)
   analogue decisions, 171
   big data, 167
   transformational potential, 165
   artificial intelligence, 172
asset-based community development (ABCD), 23–24
attitudes and beliefs, sustainability
   beliefs, values and attitudes, 338–339
   Christian view, 339–340
   ethical aspects, 336–337
   pistic aspects, 337–338
   second proposal, 341
automate the planning process, 168
BEQUEST see Building Environmental Quality Evaluation for Sustainability through Time (BEQUEST)
BIM see building information modelling (BIM)
Building Act 1984, 216
Building Architect by 2050, 112
Building Emission Rate (BER), 131, 145
Building Environmental Quality Evaluation for Sustainability through Time (BEQUEST)
   elements of, 255
   establishing network of, 70
   framework, 73
   PICABUE, 70–71
   sustainable development, 71–72
   Toolkit, 73–74
building information modelling (BIM), 50–51, 166
   in 2050, 115–116
   invisible 2050, 120–122
   role and impact, 119–120
   smart technologies, 111
Building Research Establishment, 131
buildings
   OC vs. EC, 128–129
   regulations, 145
   resilient cities
      interactive risk assessment, 159–160
      multi-agency collaboration, 158–159
      risk assessment process, 156–158
      theoretical framework, 156
   buildings in 2050, 115–117
   built environment, 2
Built Environment Information Modelling (BEIM), 121
CarbonBuzz, 132, 145, 170
carbon dioxide (CO₂) emissions
   buildings in 2050, 115
   mobility, 117
   predicted vs. actual performance, 170
carbon emissions
   barriers for, 146–147
   construction, 144, 148–149
   low carbon trajectory, 143
   managing drivers, 144–146
   methods, 136
   type of stages, 129–130
carbon hotspots
   defined, 137
   EC
      case study buildings, 138, 140

Future Challenges in Evaluating and Managing Sustainable Development in the Built Environment,
© 2017 John Wiley & Sons Ltd. Published 2017 by John Wiley & Sons Ltd.
components, 138
office buildings, 138–139
heuristics-based rules, 137
carbon, sustainable development
construction, carbon emissions
barriers for, 146–147
drivers for, 144–146
EC estimating, 132–137
embodied carbon, construction, 126–129
focus shifting
dual currency approach, 141–143
low carbon trajectory, 143
zero carbon policy, 140–141
future trends, 149–150
hotspots of, 137–140
management of, 148–149
OC estimating, 131–132
system boundaries, 129–130
CIM see city information modelling (CIM)
cities
climate change role of, 57
competitiveness
clusters as catalysts, 25
creative milieu, 24
entrepreneur encouraging, 25
global infrastructure crisis, 25
knowledge village concept, 24–25
connectivity
big data, digital city, 32
intelligent cities, 31
smart development, 30–31
transit-oriented development, 32
exordium
city dilemma, 18
city planning futures thinking, 18–20
disquisition, 20–21
foresight sense of, 20
global context, 17–18
governance
city governance challenges, 33
city leadership, 35
doing more with less, 34–35
mayors, global parliament, 35–36
values and vision, 33–34
propositum, 36–39
quality of life
ABCD, 23–24
authenticity distinctiveness, 22–23
decent affordable housing, 23
exclusion culture, 22
social cohesion, 21–22
resilient cities, 58
sustainable cities
de-design urban planning, 28
integrate environmental thinking, 27
promote corporate urban responsibility, 29–30
rediscover the city, 26–27
redistribute urban decision-making, 27–28
sustainable development, 60–65
City Car Club Nottingham, 189
City Entrance Integrated Programme (PIEC), 232
city information modelling (CIM)
future city in 2050, 111
ICT, 118
smart technologies, 111
A City in History, 256
Climate Change Act 2008, 269
Code for Sustainable Homes (CSH), 81, 140, 269
competitiveness, city
clusters as catalysts, 25
creative milieu, 24
entrepreneur encouraging, 25
global infrastructure crisis, 25
knowledge village concept, 24–25
Comprehensive Assessment System for Built Environment Efficiency (CASBEE) City, 74
connectivity, city
big data, digital city, 32
intelligent cities, 31
smart development, 30–31
transit-oriented development, 32
construction contracts role, sustainability
contract conditions, 273–275
environmental considerations, 277
framework objectives, 276
future, 281–282
JCT
consultation, 271–273
standard form, 276
legally binding provisions, 278–281
provider’s supply chain, 276–277
construction industry
carbon estimating, 148–149
emissions from, 127
GHG, 126
Contract for Difference (CfD), 228
cost of construction, 147
creative cities, 24
decent affordable housing, 23
decision analysis (DA), 295, 300
Index

decision support systems (DSS)
aplications, 294–295
decision analysis, 295–296
platforms of, 296–298
de-design urban planning, 28
Department of Energy and Climate Change, 2012, 145, 228
digital city, 32
digital communications technologies, 96
digital economy, 109
digital ecosystem
amplified intelligence, 173
data-driven model, 165
energy intensity, 174–175
future value propositions, 176–177
display energy certificate (DEC), 145–146, 226, 227
Dooyeweerd’s philosophy
diversity and aspects, 324–326
human and non-human, 323
sustainability
as harmony, 326–327
thinking, 328–329
understanding sustainability, 326
values, 327
world views, 333
eco-efficiency, 62
economic growth
carbon emissions, 144, 146
EU cities, 179
mobility, 117
United Nations-Economic Commission, 77
ecosystem services, 65
electric buses, Nottingham, 187–188
electric grid, 190
embodied carbon (EC) estimation
building life cycle, 127
case study buildings, 138, 140
energy data, 128
estimating tools, 133–135
ICE, 132
lack of statutory requirements, 147
measurements of, 136–137
vs. OC, 128–129
office buildings, 138–139
RICS, 133
standard method, 147
system boundaries, 129–130
embodied energy (EE), 128, 129, 150
empirical knowledge-based method, 203
energy action plan, 58
energy company obligation (ECO), 145, 226
energy efficient buildings, 116
energy performance certificate (EPC), 145–146
Energy Savings Opportunity Scheme (ESOS), 227
energy transition, 64–65
enhance iterative design, 168
environmental challenges, 111
environmental education, 255
environmental protection, 308
environmental sustainability, 165
EU see European Union (EU) cities
EU post carbon cities of tomorrow (POCACITO) project, 56
European Commission, 2011, 58
European Sustainable Development Network (ESDN), 78–79
European Union (EU) cities
economic growth, 179
gross domestic product, 179
replication of, 181–182
EU urban policies, 315
exordium, city
city dilemma, 18
city planning futures thinking, 18–20
disquisition, 20–21
foresight sense of, 20
global context, 17–18
feed-in tariffs (FIT), 218, 222–223
future city in 2050 see also urban planning, future in 2050
CIM, 112
human development changes, 113
ICT, 112
gas grid, 190
GDP see gross domestic product (GDP)
GHG see greenhouse gas (GHG)
globalisation, 33, 113, 117, 256–257
governance city
challenges of, 33
doing more with less, 34–35
leadership of, 35
mayors, global parliament, 35–36
values and vision, 33–34
Greater Manchester Combined Authority, 261
greenhouse gas (GHG) emissions
construction industry, 126
EU, 179
PCC, 58
Green's windmill, Sneinton, 183–184
gross domestic product (GDP)
  EU cities, 179
  UK economy, 271

Harvest Information Modelling (HIM), 121
Herman Dooyeweerd philosophy, 312–314
hinterland city
  Durban, 259, 260
  Florence, 259, 260
  Phoenix, 257, 259
  river severn catchment, 260–261
  UK urban task force, 257–258
housing estates
  families in, 245–246
  housing retention rate, 245, 247
  post-occupancy evaluation, 247
  sample size for, 236

Information Communication Technology (ICT), 112
  design and evaluation, 12
  integrated infrastructures, 189
  information exchange, 171, 203, 208, 298, 300
  integrated sustainable urban development (ISUD), 77
  intelligent cities, 31
Intelligent Transportation Systems (ITS)
  cities in 2050, 112
  mobility in, 117–118
  interactive risk assessment, 159–160
Intergovernmental Panel on Climate Change (IPCC), 40, 125–126
The International Union for Conservation of Nature, 60
Inventory of Carbon and Energy (ICE)
  estimating EC, 132
  estimating method, 136

JCT see Joint Contracts Tribunal (JCT)
Joint Contracts Tribunal (JCT)
  consultation, 271–273
  contracts, sustainability, 276
  sustainability objectives, 280
  sustainability provisions, 274

knowledge society (KS)
  globalised society, 256
  life city residents, 257
Kyoto protocol, 144

lack of reporting standards, 147
life cycle assessment (LCA), 126, 129, 130
light house city, 180–181
Local Governments for Sustainability in 1990, 58
London's population growth, 257–258
low carbon society, 59, 66
low energy retrofitting, 185–186
materials in 2050, 118–119
MILESECURE-2050, 59
mobility in 2050, 117–118
multi-agency collaboration, 158–159
multi-criteria decision analysis (MCDA), 290, 295
Multi-dimensional urban regeneration model, 180–181
Nottingham City Council (NCC)
  demonstrator site, 183
  head of smart cities, 190
  Remourban, 191
  wider city urban area, 182
Nottingham smart city
  added value, 190–191
  background, 179–180
  built environment innovations
    district energy network, 186–187
    low energy retrofitting, 185–186
  City Car Club Nottingham, 189
  city of, 182–183
  demonstrator site, 183–184
  EU cities, 181–182
  EV, 189
  integrated infrastructures, 189–190
  last mile delivery, 188–189
  mobility action, 187–188
  objective, 180–181
  passive house retrofitting, 187
  Remourban, 180
operational carbon (OC) estimation
  vs. EC, 128–129
  energy data, 128
  estimating of, 131–132
  system boundaries, 128–129
peoples in 2050, 110
PICABUE, 70, 76
POE see post-occupancy evaluation (POE)
population growth, 57, 110, 144, 146
positive development, 46, 80
post carbon city (PCC)
  climate change of
    built environment, 58
post carbon city (PCC) (cont’d)
role of, 57
societal processes, 59
GHS, 56
POCACITO project, 56
sustainable development
eco-efficiency, 62
model of, 61–62
social–ecological systems, 63
post-occupancy evaluation (POE), 169, 236, 247
Post-occupancy Review of Buildings and their Engineering (PROBE), 170
predicted vs. actual performance
CO₂ emissions, 170
cycle waves in, 171–172
non-domestic building, 170–171
POE, 169
private finance initiatives (PFIs), 26
Programa Integrado Entrada da Cidade (PIEC) development process, 237
evaluation of, 243–244
housing types, 237, 239, 240
logical framework overview, 243–244
physical progress, 242
Porto Alegre, 237–238
project delivery system, 241
research method, 235–236
project stakeholders, 199, 204–206, 233
Property Tectonics
consultancy services, 215–216
lifespan software, 220
RSL, 222
waste recycling, 219
public participation
sustainable development, 97
technology-enabled, 96–98
urban planning, 101–103
public private partnerships (PPPs), 26, 34, 113, 293
quality of life, city
ABCD, 23–24
authenticity
‘authenticity’, 22–23
decent affordable housing, 23
exclusion culture, 22
social cohesion, 21–22
rebound effect, 62
regenerative design, 48, 81, 264
regenerative development, 42–45, 51, 53
Remourban, 180, 181, 187–189
remourban innovations, 183
Renewable Heat Incentive (RHI), 145
Residential Social Landlord (RSL)
Property Tectonics, 222
social housing, 221–222
resilience, 1, 5, 21, 26, 34, 43, 44, 53, 55–66, 81, 113, 155, 157, 161, 218, 321, 327, 330
resilient cities
interactive risk assessment, 159–160
multi-agency collaboration, 158–159
risk assessment process, 156–158
theoretical framework, 156
re-use project data, 168
risk assessment process
multi-agency collaboration, 158–159
six-step, 156–157
Roadmap for moving to a competitive low-carbon economy in 2050, 58
Royal Institute of British Architects (RIBA), 12, 168, 170
Simplified Building Energy Model (SBEM), 131
small to medium sized enterprise (SME), 214
small urban consolidation centre (SUCC), 188
smart cities see Nottingham smart city
SNA see social network analysis (SNA)
Sneinton demonstration site, 183–184
snowball sampling, 203, 208
social–ecological systems, 42, 43, 45, 63
social housing, energy management
FIT, 222–223
Internet of Things, 224–225
projects in Brazil, 231–232
RSL, 221
social network analysis (SNA), 200–201
actionable stakeholder relationships, 203
general process of, 201
interrelationships vs. stakeholders, 204
mega projects, 206–207
network data analysis, 205–206
network density, 205
project stakeholders, 204–205
social networks, 203
stakeholder analysis, 207
interrelationships, 202
theory of, 200
VM methodology, 196
societal process, 59, 60
spatial and environmental planning, 309
stakeholder analysis, 206–207
stakeholder engagement see also sustainable development
  challenges of, 196
  definition of, 196–197
  methods, 197–198
  post-workshop stage, 202
  potential applications, 208–209
  pre-workshop stage, 201
  SNA, 200–201
    actionable stakeholder relationships, 203
    interrelationships vs. stakeholders, 204
    mega projects, 206–207
    network data analysis, 205–206
    project stakeholders, 204–205
    social networks, 203
    stakeholder interrelationships, 202
    stakeholder theory, 198–199
  three perspectives, 196–197
  value-oriented, 198
  VM, 199–200
  workshop stage, 202
  stakeholder management, 292–293
  stakeholder theory, 198–199

Strategic Management: A Stakeholder Approach, 198

sustainability changing ways
  changing self, 48–50
  changing views
    about building, 48
    context rules, 47
    development rethinking, 46
    embraced, 45–46
    impact, 47–48
  negative to positive shift, 45
  regenerative development, 41–44
  transforming practice
    collaboration to co-creation, 50–51
    practitioner, 51–52
    regenerative built environment, 52

sustainable built environment development
  context of, 94–96
  public participation
    technology-enabled, 96–98
    urban planning, 101–103
  VR potential
    3D visualisation technologies, 101, 102
    Urban Circus, 102, 103

sustainable cities
  de-design urban planning, 28
  integrate environmental thinking, 27
  promote corporate urban responsibility, 29–30

rediscover the city, 26–27
redistribute urban decision-making, 27–28
sustainable data-driven design futures
  big data, 167–168
  concepts, challenges and trends, 165–167
  new focus/metrics, 168–169
  predicted vs. actual performance, 169–172
  role of, 165

sustainable development see also stakeholder engagement
  challenges of, 196
  definition of, 195
  engaging with practice, 12
  environmental considerations, 277
  in future
    applications, 340–341
    attitudes and beliefs, 336–341
    built environment, 320
    challenge, 321
  longer view
    first proposal, 335–336
    humanity mandate, reality, 335
    time and progress, 333–334
    philosophical thinking, 321–322
    problems with, philosophy, 322–323
  ict design, evaluation, 12
  stakeholder engagement, 198, 209
  urban projects, 199
  world view, 11–12

Sustainable Energy Action Plan (SEAP), 182

sustainable renewal see urban transport infrastructure

sustainable urban development (SUD)
  BEQUEST
    establishing network of, 70
    legacy of, 73–75
    PICABUE, 70–72
  defined, 75–76
  diffusion of, 77–78
  economic conditions, 61
  Egan wheel, 263–264
  elaborating, not extending, 81–83
  expansion/dilution of, 80–81
  five-generation decision-making, 83–84
  framing and tools, 78–80, 84
  globalisation, 256–257
  governance structures, 261–263
  hinterland city, 257–261
  model of, 61–62
  PICABUE, 70, 76
  pillar of, 254–256
sustainable urban development (SUD) (cont’d)
realisation, 252–253
rebound effect, 62
research, 84–86
skills gap, 263–266
social–ecological systems, 63
time, 308
dimensions and horizons, 306
fundamental characteristics, human
experience, 307
gestalten, 310
glove of time, 314–316
grid mapping temporal diversity, 310
grounding concepts, urban planning, 307
linking factor, 312, 313
planing with, 308, 309
patterns, 310
trade-offs, 60
UDIA, 79–80
urban resilience, 63
virtualisation, 256–257
Sustainable Urban Development Network
(SUD-Net), 77
Target Emission Rate (TER), 131, 145
temporal modal order, 314
3D visualisation, 101, 102
track occupant behaviour, 168
transit-oriented development (TOD), 32
Tutzing Time Ecology Project, 310
UK Building Regulations, 2013, 145
United Kingdom (UK) sustainability
compliance, warranties, 226–229
ECO, 226
economics, investment and finance,
217–218
lifespan software, 220–221
method, 215
national grid pressures, 218
property tectonics, 215–216
reflective analysis, 215
social housing energy management,
221–225
waste recycling, 219
United Nations-Economic Commission for
Europe, 77
United Nations World Commission on Environment
and Development (WCED), 185
Urban Circus, 102, 103
Urban Development Institute of Australia (UDIA),
79–80
urban planning
digital communications technologies, 96
future in 2050
BIM, 120–122
BIM role, impact, 119–120
buildings, 115–117
CIM smart technologies, 111
constraints to vision, 122–123
environmental challenges, 111
future city in 2050, 112–115
materials, 118–119
mobility, 117–118
model of, 109–110
people, 110
present and future, 111
smart technologies, BIM, 111
worst case scenario, 108–109
public participation, 101–103
urban redevelopment projects
Cronbach’s Alpha test, 236
discussion, 248–250
Kano’s model, 234
management of, 232–233
Monroe’s model, 234
perceived value, 243–248
PIEC’s development process, 237–241
project delivery system, 241–243
research method, 235–236
social housing projects, 231–232
value generation, 233–235
urban resilience, 63, 65
urban transport infrastructure
aim, objectives, methods, 287–288
communication, decision-making,
291–292
decision support, 294–298
renewal of, 289–290
research on, 288–289
stakeholder management, 292–293
studies of, 298–300
sustainability assessment of, 290–291
urban renewal, 290
value methodology (VM)
conceptual framework, 208
pre-workshop stage, 201
techniques of, 199–200
workshop stage, 202
virtual reality (VR)
crowdsourcing, 98
game engine, 100
potential of, 98–101
urban planning, 101–103
VM see value methodology (VM)
VR see virtual reality (VR)
waste recycling, 214, 216, 219
World Commission on Environment and Development, 1987, 94, 195, 229
World Urban Campaign, 77
zero carbon buildings, 141–143, 150
zero carbon policy, 140–141, 150