

# Index

---

- adaptation 20, 21
  - actual 90
  - barriers to 22
  - environmental impacts of 22
  - of infrastructure 5
  - see also* adaptive tensions
- adaptive tensions 16, 20, 31, 36, 45–6, 53–4, 73, 74, 76, 101, 184
- ageing 120–21
- climate change 119
- within NEI 90
- population 117–18
- within water infrastructure systems 116–17
- ageing 120–21
- Agénor, P.R. 17
- air connectivity 38
- airport infrastructure 43, 51
- animal waste 99
- aviation infrastructure 33, 38, 41, 53
  
- 'big data' economy 67–8
- biodiversity 115
- biofuels 87, 112
- blue infrastructure 123
- 'bottom-up' strategies 10
- broadband
  - access 182
  - infrastructure 67, 70, 180
  - penetration 64–5, 70–71
  - technologies 179
  - users 64–6
  
- capitalist strategies 3
- capital transport systems 46
- centralisation 2, 87, 97
- centralised grid 96–8
- circulatory water infrastructure system 106–7, 181
  
- territoriality and water infrastructure 110–16
- waste water management systems 109–10
- water supply system 107–9
- civic infrastructure 186
- provision of 161
- civil disobedience/discontent 74
- civil society 43–4
- climate change 119
  - consequences of 184
  - threat of 123–4
- colocation centres 68
- communal centres 68
- communal facilities 154
- communication
  - infrastructures 178, 180
  - systems 182
  - technologies 61–2
- community
  - activities 156
  - cohesion 155
  - interaction and integration of 159
  - resilience 155, 158, 164–5, 186
  - resources, erosion of 155
- competitive tendering, use of 71
- conceptualisation 130
- contemporary international system 1, 9
- contemporary territorial strategy 31
- cooking fuels 94–5
- co-operation, levels of 159
- corporate connectivity 43–4
- corruption-free planning system 135
- critical infrastructure systems 155
- criticality 8, 12, 15, 140, 173
  - and policy support 143–5
- cyber sovereignty, methods for asserting 74, 75

- cyber territory 74
- data hubs 68, 69
- decentralised generation 98
- decentralised systems 123
- dedicated infrastructure 61
- demographic changes 20–21
- de-territorialisation 178
- digital divide 71
- distinct systems 61–2
- distributed generation 89, 96–8
- distribution systems 87, 107–8, 115
- diverse funding 140–42
- domestic air infrastructure 38–9
- domestic cable infrastructure 182
- domestic demand, oscillations of 181
- domestic energy supply 82
- domestic systems 37
- economic activity, agglomerations of 181
- economic development 16
- economic growth 17, 20, 38, 67, 94, 112, 159, 163
- economic inclusion 66
- economic infrastructure 11, 152, 154–5, 172, 178
- economic security 138
- economic systems 136
- ecosystems 115
- electricity 88, 95
  - infrastructure 96
  - production of 113
  - supply 88–9
  - system 87, 97
  - universality in 96
  - urban access to 95–6
- electric vehicles 20
- embedded globality of NEI 82
- embedded infrastructure 5–6
- emergent water security,
  - infrastructural challenges of 121–4
- employment, forms of 113
- enabling infrastructures 11
- endogenous growth theory 17
- end-to-end connections 178
- energy
  - equity 95
  - flows, global system of 181
  - independence 83
  - production, global system of 82
  - secondary form of 89
  - security 91–4
  - socio-technical infrastructures of 179
  - storage, large-scale 93–4
  - supply 100
  - sustainability 98–101
  - sustainable forms of 94
  - systems, disaggregation of 100–101
  - trilemma 89–91
  - and water systems, territorial
    - extensiveness in 182
- energy infrastructure 184
  - downstream systems of 83
  - form and nature of 90
- energy poverty 94–8
- entrepreneurship 159
- environmental degradation 19–20
- environmental impacts of adaptation 22
- environmental injustice 120
- environmental sensitivity 49
- environmental threat 109
- equity, issues of 111
- exceptionalism of infrastructure 6
- extensity 181
- extensive territorial systems,
  - development of 183
- extraterritorial systems 181
- fixed broadband access 64–5
- fixed line access 63
- fixed line networks 64
- flood prevention 106
- flow stimulation 185
- food products 121–2
- Foucauldian governmentality 35
- fragmentation 76
  - process of 74, 76
- freshwater resources, depletion of 121
- fuel territorial insecurity 116

- gas storage infrastructure 92–3
- global electricity production 87–8
- global energy 87, 91, 93, 99, 101
  - consumption 87–8
  - system 91
- global financial crisis 45–6, 52
- global information architecture 184
- globalisation 4, 8, 17, 36, 46–7
- globality 16, 21, 54, 74, 175
- global logistical channels 37
- global system of states 172
- governmentality 35, 156
- green infrastructure 20, 123
- grey infrastructure 122–3
- grid infrastructure 89, 98
- groundwater 116, 119, 121–2
  - extraction with Libya 121
- hard infrastructure systems 136, 137
- ‘hiding’ infrastructure 6
- high-density road systems 42
- high-speed rail 41, 43
- households
  - penetration for 66
  - systems 182–3
- human capability, development of 155
- human capital 162, 186
  - conduits of 155–6
  - narrative of 163
  - in resilience 165
  - salience of 162
  - and social infrastructure 155, 161–3
  - strategies 165
- human welfare 163–4
- hydrocarbons 83, 100
- hyper-connectivity 67
- immature circulatory systems of water 181
- individual sanitary units 109
- industrialisation 18
- informal collection 111
- informal insurance 164
- informal learning process 186
- information economy 67–9
- information infrastructure 61–3, 68, 138, 180, 182, 184
- information society 70–72
- information socio-economy 67–72
- infrastructural capacity 179–81
  - themes of 180
- infrastructural enablement 185–6
- infrastructural innovation 67
- infrastructural mandate 2, 5, 12, 64–5, 132, 134, 136
  - components of 12
  - elements of 131
  - and soft infrastructure 133
- infrastructural penetration 181–3
  - notion of 181–2
- infrastructural power 181
- infrastructural pressures 119
- infrastructural reliability 175–9
- infrastructural resilience 186
- infrastructural violence 111, 154
  - themes of 181–2
- infrastructure
  - access to 13–14
  - adaptability 183–5
  - hydrocarbons 172
  - criticality of 173
  - death spiral 120–21
  - development, life cycle of 142
  - finance 141
  - forms of 184
  - gap 51–4
  - highlights, systemic nature of 6
  - importance of 172
  - planning for 135
  - process of 1
  - projects 140
  - quality 178
  - sharing 69
  - socio-economic benefits of 182
  - vs. suprastructure 7
  - ‘taken for grantedness’ of 132
  - and territoriality 2–3
- infrastructured state 172
  - territorial state and 172–5
- infrastructure investment 45–6, 69
  - political institutions to 134
- infrastructure mandate 117
  - integrative aspect of 16–17
- infrastructure planning 134–5

- infrastructure systems 19, 120, 123, 132, 179
  - barriers to 22, 23
  - challenges upon 183
  - development of 134
  - facets of 5
  - interaction with 132–3
  - inter-territorial nature of 135–6
  - ‘invisibility’ of 132
  - localised 123–4
  - ‘mature’ and highly developed 172
  - ownership and control of 8
  - potential for 175
- inland transport infrastructure 35–6
- inland waterway systems 36
- innovation 159
- innovation, risk and costs of 22
- institutional checks and balances 131
- institutional framework 131
- institutional systems 131–2
- internal energy resources 122
- internal gas infrastructure system 86
- internal (domestic) oil pipelines 85
- internal security 14, 131, 138
- international aquifer systems 116
- international connectivity 37
- international freight 36–7
- international labour flows 138
- international political economy 3–4
- international resilience systems 165
- international river systems 116
- international transit routes 36
- internet balkanisation 74
- internet of things (IoT) 67, 70
- internet users 76
- inter-state flows, governance of 136–9
- intra-community trust 156
- intra-territorial connectivity 31–2
- intra-territorial interconnection 180
- investment, financial pressure for 88
- investment, simple cost of 22
- IoT *see* internet of things (IoT)
- large-scale-based water 182
- large-scale technical systems 182
- Legatum Institute’s Prosperity Index 160
- linking social capital 157
- Liquid Natural Gas (LNG) 86, 87, 93, 101
- ‘manufactured’ infrastructures 109
- maritime infrastructure 37, 43, 54
- market-based systems of delivery 184
- McKinsey Global Institute (MGI) 53
- mega ships 41, 50
- MGI *see* McKinsey Global Institute (MGI)
- micro grid 97
- mini grid 97–8
- mobile access technologies 182
- mobile broadband 64–5
- mobile telephony 64
- modernity 82–3
- modern renewables 99
  - spread of 100
- modular infrastructure 97
- monitoring system 138
- ‘more is better’ approach 179
- multi-scalar filtering 138
- multi-scalar transportation
  - infrastructure system 32, 33
- national broadband strategies 65–6, 71
- national economy, changes to 20
- national electricity systems 95
- national energy grids 93
- national energy infrastructure (NEI)
  - system 82
    - adaptive tensions within 89–90
    - aspects of 83
    - development of 82–3
    - diagrammatic representation of 83–4
    - embeddedness of 91–2
    - energy poverty 94–8
    - energy security 91–4
    - energy sustainability 98–101
    - and energy trilemma 89–91
    - nature of energy infrastructure 82–4
    - primary 84–7
    - resilience 93
    - secondary 87–9
    - ‘sustainable’ 100

- national energy strategies 93–4
- national information infrastructure
  - (NII) 61, 62
  - broadband/internet users 64–6
  - development of 61–3
  - fixed line access 63
  - form and nature of 61–2
  - information economy 67–9
  - information society 70–72
  - and information socio-economy 67–72
  - mobile telephony 64
  - state power and 72–6
- national infrastructure systems (NISs)
  - 2, 9, 10, 130, 131, 136, 156, 165, 181
  - ability of 22
  - academic examination of 152
  - analysis 173
  - ‘black box’ of 132
  - changes to national economy 20
  - characteristics to 175
  - complexity of 175
  - components of 11, 134, 145, 172–4, 176–8
  - contemporary analysis of 17
  - control 173
  - core facets of 12–13
  - demographic changes 20–21
  - development of 18, 132, 135, 140, 161–2, 175, 185
  - economic component of 155
  - elements of 139
  - globality 21
  - ‘human’ dimensions of 155–6
  - institutional systems at 136–7
  - interactions within 156, 173
  - market failure in 140
  - natural environmental changes 21
  - operation of 131, 132
  - passive element in 153
  - political consensus for 135
  - polycentric 134
  - public policy/state strategy 21–2
  - role in 186
  - security 173
  - shifting context of 20–22
  - socio-economic impact of 186
  - soft infrastructural component of 132, 135
  - specific components of 183
  - sustainability 175
  - territorial functions 173
  - utilisation of 178
- national pipeline systems 86
- national rail systems 36
- national road network 42
- national transportation infrastructure (NTI) 31–3
  - component of 33
  - development and maturity of 33
  - environment 49–50
  - external facing 36–9
  - globalisation 46–7
  - growth 45–6
  - infrastructure 51–4
  - inland transport infrastructure 35–6
  - notion of quality 39–42
  - quantity 42–3
  - technology 50–51
  - universality 43–4
  - urbanisation 47–8
- national water infrastructure system (NWIS) 106, 120
  - adaptive tensions, within water infrastructure systems *see* adaptive tensions
  - ageing of 120
  - circular nature of 110
  - circulatory 107–17
  - components of 34–5, 107, 108
  - conceptualising 110–11
  - effective circular 113–14
  - effective use of 112
  - enablement of 123
  - function of 34–5, 112
  - infrastructural challenges of emergent water security 121–4
  - role of state and 111
  - state power in 111
  - sustainability within 114–15
  - sustenance of 110–11
  - territorial dimensions of 106
- nationhood 82–3
- natural environmental changes 21
- natural gas, development of 86

- natural resource extraction 18
- natural systems 123
- NEI system *see* national energy infrastructure (NEI) system
- networked infrastructures, totality of 173
- NII *see* national information infrastructure (NII)
- NISs *see* national infrastructure systems (NISs)
- NTI *see* national transportation infrastructure (NTI)
- NWIS *see* national water infrastructure system (NWIS)
  
- off-grid infrastructure 98
- oil infrastructure, interconnectivity of 92
- oil pipeline infrastructure 85
- oil production 84–5
- oil-product pipelines 89
- over-supplied infrastructure deteriorates 179
  
- penetration, notion of 181
- penetrative infrastructure system, development of 182
- personal connectivity 43–4
- personal infrastructure 162
- petroleum products 85–6
- petrol products 89
- physiography 35–6
- pipelines 84–5
- planning system, corruption-free 135
- point of investment 141
- policy debates 66
- policy narratives 131
- policy prescription 131
- policy strategy 164
- policy support, criticality and 143–5
- political behaviour, parameters of 3
- political inclusiveness 16
- political infrastructure investment risks 142
- political interference 141
- political risks 141
- political uncertainty 140
  
- politics 159
- polycentric infrastructure system 8
- polycentrism 139–40, 173
  - competitive advantages from 143
  - criticality and policy support 143–5
  - degrees of 186
  - diverse funding 140–42
  - measures to facilitate resilience 145–6
  - regulation of provision 142–3
  - systems 9, 15, 16
- population 117–18
  - growth 117
- port infrastructure 37–8, 50
- port quality 41
- post-industrial economy 66
- poverty reduction 18
- power generation 88
- PPPs *see* public-private partnerships
- primary energy 83
  - sources 84
  - systems 84
- proactivism 47–8, 61
- production capacity 94
- productivity 163
- property rights 131
- provision, regulation of 142–3
- public health systems 115
- public policy/state strategy 21–2
- public-private partnerships (PPPs) 140, 141
- public sector budgets 140
- public sector performance 131
- public transport 48
  - provision of 50
  
- RAI *see* Rural Access Index (RAI)
- rail infrastructure 35–6, 43, 49, 53
  - quality 40
- rail networks 41, 180, 182
- rainwater harvesting 123
- rapidity 145
- reactivism 61
- recycling/reuse systems 123
- refinery capacity 85
- regional hubs 86
- regional strategies 17

- regulatory infrastructure investment
  - risks 142
- relational infrastructure systems 14–15
- reliability, issue of 179
- renewables 21, 28, 98–101, 104
  - ‘modern’ forms of 99
  - off-grid 97
- resilience 145
  - community 155, 164
  - of component 183
  - human capital in 165
  - infrastructural 186
  - of infrastructure 186
  - soft side of 146
  - systemic nature of 145
- resourcefulness 145
- re-territorialisation 178
- road infrastructures 35, 40, 42, 44, 49, 53, 54
- road network 33, 40, 42, 54, 182
- road systems 35, 40, 42–3, 49, 183
  - capacity of 183
- robustness 145
- Rural Access Index (RAI) 44
- rural sanitation 110
- sanitation 110
  - infrastructure improvement 110
- secondary energy 83, 87, 180
- self-sufficiency 83
- self-sustaining system 18–19
- semi-natural systems 123
- small-scale water and energy systems 182–3
- social assets/facilities 152–3
- social capital 159–61, 164, 165
  - centrality of 156
  - concept of 165
  - conduits of 155–6
  - cost of 160
  - determinant of 160–61
  - development of 154, 157–61, 186
  - education 160
  - focal point of 161–2
  - importance of 159
  - pre-existing 158
  - social infrastructure and 156–61
- social cohesion 16
- social entrapment 44
- social exclusion 44, 158
  - limit 157
- social housing 161
- social inclusion 66
- social infrastructure 152–5, 159–62, 186
  - broad categories of 153
  - community-specific nature of 157
  - conceptualisation of 152
  - development of 154
  - effect of 155
  - existence of 157
    - and human capital 161–3
    - and infrastructure resilience 163–6
  - maintenance of 159–60
  - nature of 152–6
    - provision of 154, 159–60
    - and social capital 156–61
    - upon human capital 186
- social infrastructures system 185
- social injustice 44
- social interaction 156
- social needs 155
- social norms 160
- social relationships 152
- social rental housing 161
- social transgressions 154
- social wellbeing 19
- socio-economic transformation 71
- socio-environmental impacts 122
- socio-technical infrastructure of
  - energy and water 180
- soft/hard infrastructure interface 130
- soft infrastructure 51, 123, 132, 137, 138, 185, 186
  - of borders 137
  - broader access 133–4
  - component of hard infrastructure systems 136
  - decentralisation 133
  - development of 163
  - diverse ownership 134
  - governance of inter-state flows 136–9
  - infrastructural mandate and 133

- and polycentric NIS *see* polycentrism
- recognised 135–6
- regulatory component of 142–3
- role of 130
- salience of 130, 133, 186
- state of 132
- territoriality and 130–36
- usage-driven 136
- soil degradation 123
- solar power infrastructure 99
- sovereignty 1, 72–3, 82–3
- spatial complexity 9
- state and infrastructure system 1–2
  - control 12–14
  - development/growth 17–18
  - integration 15–17
  - national infrastructure system (NIS) 9–12
  - security 14–15
  - sustainability 18–20
  - territorial strategies 2–9
- state development 66
- state legitimisation 82–3
- state power
  - manifestations of 120
  - and national information infrastructure (NII) 72–6
  - physical extent of 136
- state security infrastructure 37
- state society 43–4
- state territoriality 73, 82
  - challenges to 74
  - exclusivity of 1
  - and transport infrastructure 31
- state territorial strategies 4, 110–11, 175, 185
  - infrastructural capacity for 179
- storage infrastructure system 92
- stranded assets 101
- suprastructures 173
- surface water 108
  - level of 122
- sustainability 101
- sustainable infrastructure 19
- sustaining reliability 178
- synchronisation 141
- system governance 162
- systemic nature of infrastructure 6
- telecommunication users 65–6
- territorial cohesion 17
- territorial control, confluence of 13
- territorial functioning 1
- territorial infrastructure system 6
- territorial integration 16
- territoriality 2, 3, 73, 116, 117, 172
  - concept of 14
  - domain of 132
  - infrastructure and 2–3, 6
- territorial strategy 2–4, 9–10, 19, 33, 61, 70, 83, 94
  - implementation of 172–3
  - notion of 3
  - objective of 38–9
  - role of 12
- territorial sustainability 18–19
- territorial vulnerabilities 8
- territorial waters 69
- trade facilitation 137–8
  - measures of 138
- transmission/distribution process 92
- transmission system 88
- transparency 131
- transport, environmental effects of 50
- transport/transportation
  - gap 54
  - infrastructure 43–4, 182
  - poverty 44
  - related energy 89
  - systems 39
  - technology 47
- trust systems 159
- UBI *see* universal basic infrastructure (UBI)
- universal accessibility 82
- universal basic infrastructure (UBI) 16
- universalism 154
  - attainment of 154
- UN's Millennium Development Goals 19
- urban de-population 117
- urban infrastructures 69



- urbanisation 47–8
  - degree of 109, 118
- urban population 108–9, 117–18, 122
- USA 91
- usage-based pricing systems 139
- user communities, creation of 156
  
- Venezuela 91
- violence 13–14
- virtual trade in water 121–2
- virtual transmission 20
- virtual water trade 122
  
- waste water 109–10, 118
  - management systems 109–10
  - treatment 111, 113
- water
  - availability of 115
  - courses 184
  - demand for 113
  - and energy, socio-technical systems of 184
  - inter-state conflict over 185
  - poverty 114
  - productivity, issues of 113
  - provision of 111
  - retention 123
  - salinity 122
  - socio-technical infrastructures of 179
  - supplies of 184–5
  - systems, element of control within 112
  - territorialising 111
  - usage, diversity of 118
- water infrastructure 111, 115–17, 123
  - absence/erosion of 112
  - ageing 120–21
  - circular 181
  - climate change 119
  - development of 184–5
  - efficiency and productivity of 111
  - heterogeneity of 106
  - investment in 120
  - population 117–18
  - quality of 118
  - senescence in 120
- water resources
  - quality of 110
  - territorial 114
- Water Resources Group (WRG) 121
- water security 185
  - infrastructural pressures for 121
- water supply 106
  - dry periods 119
  - infrastructure 108
  - issues of 112
  - production of 113
  - quality, resilience and reliability of 108
  - risk of flooding 119
  - sources 117
  - storage systems 119
  - system 107–9
    - and waste water treatment 111
- WEF *see* World Economic Forum (WEF)
- World Bank 17, 131
- World Economic Forum (WEF) 17, 39–40, 64, 122, 131, 141
- World Water Assessment Programme (WWAP) 112–14, 117–18
- WRG *see* Water Resources Group (WRG)
- WWAP *see* World Water Assessment Programme (WWAP)

