

INDEX

- ABB oil (Europe), 256
acid rain, 14, 160
Aeroseal (for duct repair), 102
affluence as factor in savings formula, 178, 179
Agfa Gaevert, 17
agriculture, 190–212; Asian and African traditions, 210–211; bio-intensive, 209–212; and climate, 197–198, 204–207; genetic base of, 194–195, 197–198, 203–204; grain crop, 206–207, 215; hydroponic, 152; innovations, 198–203; intensive, 190–196; livestock, 205–207, (grazing) 207–208; Natural Systems, 211; organic farming, 85, 196–197, 205–210 *passim*; pesticides, 163, 190, 193, 196, 197; residues from, 188; single-crop mentality, 194–196, 197; soil biology, 203–204; subsidized, 58, 162–163, 192, 206, 215; synthetic fertilizers, 190, 191, 197, 205; topsoil lost, 192–193; topsoil replacement, 212; urban, 200; water pollution by, 197; water use by, 191, 193–194, 214–216, 217–219. *See also* eco-systems; forests
air-conditioning: equipment, 91–92, 135–136, (leakage) 101–102, (leasing of) 17; need reduced, 95, 97–99, 103, 108; new design mentality and, 122–123. *See also* climate control (indoor)
air pollution, 45, 160; automobiles and, 23, 159; cost of, 57, 58; trees and, 107–108
air travel, 126–127; tax on, 167
Alberts, Ton, 83
Alexander, Christopher, 124
Alpha-Fry Group (Germany), 79
aluminum production, 49–50, 76
Amazon Basin, fires in, 149
Amsterdam, Netherlands, 43, 108; bank, 82–83, 90
Anderson, Ray, 133, 139, 168
Anheuser-Busch, 76
antibiotics, 151
appliances: design of, 104–106, 220–223; efficiency standards, 105, 275–276, 277; leasing or sharing, 17, 107, 138
Arava R&D (Israel), 219
Arbokem (Canadian firm), 188
Arkwright, Sir Richard, 170
Arlington, VA, Metro stations, 45
Armco (GST) Steel Plant, 225
Army Corps of Engineers, U.S., 215
Asubel, Kenny, 209
AT&T (American Telephone & Telegraph), 220
Atomic Energy Commission, 163
Audin, Lindsay, 271
Audubon House, 99, 100, 101
Australia, 42, 43, 49; water supply, 226, 228, 230, 232
Austria, and Factors Four and Ten, 12
automobiles: accidents, 23, 43, (cost) 41, 57; Brazil, 295; commuting by, 41–42, 43–44; cost of, 24, (hidden) 161, 281, (social cost) 22–23, 41, 42, 46, 57; durability of, 19, 25; effect of, in U.S., 22–23, 41; electrically propelled, 25, 32, 33; “hybrid-electric,” *see* Hypercar; inefficiency/efficiency of, 24, 27–29, 38–39, 40, (light-vehicle standards) 57; innovations in design, 23, 24–27, (steel vs. carbon-fiber) 29–32, 37–38; insurance, 281; leased or rented, 27, 136; organic waste as fuel for, 201–202;

- automobiles (*continued*)
 ownership of, 40; parking, 41-42;
 pollution by, 23, 159; rebate system,
 19, 38; "regenerative braking" for,
 25; and resource productivity, 22,
 27, 40; taxes and other limitations
 on, 42-43; ultralight, 29-32; wind-
 shields for, 127-128
- Automotive News*, 26
- aviation industry subsidized, 40
- Ayres, Robert, 145, 165
- Baldwin, J., 77, 112
- Balkanization, effect of, 19
- Ballard (Canadian automotive firm), 26
- bamboo (in construction), 187
- bananas grown indoors, 103, 200. *See*
also climate control (indoor)
- Bangkok, Thailand, 42-43, 103, 161
- Bangladesh, 163, 238
- BankAmerica Securities, 175
- Bank of America study, 46
- BASF (German chemical company),
 171
- "batch and queue" thinking, 127, 129,
 132, 134
- battery-powered vehicles, disadvan-
 tages of, 25, 32-33, 35
- bauxite mining, 49
- Bellcomb structural design, 183
- Benyus, Janine, 15, 70, 73, 195, 210,
 211-212
- Berlin, Germany, carsharing plan, 44
- Berry, Wendell, 86, 123, 190, 319
- Bibo plastics (Italy), 78
- bicycles, 37, 43, 44, 295, 298
- Big City Forest (Bronx, NY), 184
- Bigelow, Perry, 104
- "biofuels," 33
- Biomass Institute (Winnipeg), 70
- biomimicry, 10, 14-16
- biosphere, changes in, 4
- Biosphere 2 project, 5, 146-147, 153
- "Blues," worldview of, 310-311, 312, 313
- BMW (Bavarian Motor Works), 79
- Boeing Corporation, 89, 142, 264
- Böge, Stephanie, 200
- Boonyatikarn, Soontorn, 103
- Borneo, DDT effects in, 285-286
- Boston, MA, conservation practices,
 231, 248
- Boulding, Kenneth, 271
- Brand, Stewart, 100
- Brasília, Brazil, 295
- Braungart, Michael, 16, 17
- Brazil, 181, 230, 268; Curitiba, 288-308;
 Summit conference (1992), 14, 322
- Britain, 39, 50, 53, 160; automobile
 taxes and fees, 42, 43; tax reforms,
 14, 168; textile industry, 170
- British Columbia Building Corpora-
 tion, 100
- British Columbia Hydro, 277
- British Petroleum (BP), 241, 247, 256
- British Rail (BR), British railways, 69,
 118
- British Royal Air Force, 286
- Brower, David, 234, 313
- Browne, Sir John, 241-242
- "brownfield" sites, 101
- Brundtland Report, 322
- Buchmann, Steven, 151
- Buffet, Warren, 264
- building design, 82-105; climate
 control in, *see* climate control
 (indoor); commercial buildings,
 94-99; costs, 111, 114; flexibility, 98,
 100, 182; green buildings, 86, 87-
 106; office buildings, 89-90; passive,
 97-99, 102-104; recycled buildings,
 99-101, 104, 167; renovated build-
 ings, 119-121; tenant choices, 92-93,
 98; traditional, 90-92; wood-saving,
 183-189
- building-related illnesses, 88
- Bulgaria, energy waste, 160
- Bush, George, 280
- business: attitude toward ecosystem,
 157, 159; corporate culture, 68-69;
 disregard/misunderstanding of
 energy efficiency, 266-268, 270-272,
 (informational failures) 275-276,
 (organizational failures) 270-273,
 (regulatory failures) 273-275; indi-

- vidual risk-taking, 271-272; and revolution in resource productivity, 317-320, (cooperation with competitors) 317, 318. *See also* industrial metabolism; industrial process; industrial revolution
- Cabus, Marcello, 199
- California: air-conditioning equipment, 101-102, (Central Valley temperature control) 108; bike commuters, 44; clustering studies, 45; efficiency standards (appliances), 105; electricity, (energy savings) 269, 274, (sources) 247, 248; "parking cash-out" concept law, 42; Plumbing Code, 227; property values, 109; suburban sprawl, 46; Title 24 building code, 94; water use, 215, 218, 219, 224-228 *passim*, 231, 232, 233, 279; Zero Emission Vehicle requirement, 33
- California Rice Industry Association, 202
- California State Automobile Association (CSAA) regional office building, 94
- Canada, 26, 44, 188, 217; agriculture, 200, 202; "ecological footprint" concept, 51; insulation techniques, 102, 104; "virtual company" in, 45
- Canberra, waste exchange in, 79
- capital: flow of, 266, (misallocated) 268, 270; four types, 4; "income" concept, 158; traditional definition, 4. *See also* natural capital
- capitalism: conventional, 6-9, 266; industrial, 5, 286, 287. *See also* natural capitalism
- carbon dioxide "sequestered," 36
- carbon dioxide emission, 4, 152, 204-205, 206; carbon trading, *see* Kyoto Protocol (1997); energy source and, 243; by industry, 52; limits on, oil industry fight against, 318; from ocean, 237-238; opportunities for cutting, 246-247, 248, 249-250, 269, (U.S. target) 244; present level of, 316; reversed, 205, 211; tax on, 242, 318, (excluded from government policy) 257; transportation sector and, 37, 40; trees and, 107-108, 187; zero emissions, 15, 25, 33. *See also* climate change
- carbon fiber, 184; in auto bodies, 29-32, 37-38; cost of, 30, 31-32, 38
- Carnot's Law, 66
- "Carnoules Declaration" (1994), 11
- Car of the Year Awards, 26
- carpet industry. *See* Interface Corporation
- Carrier Corporation, 17, 135-136, 141
- carsharing, 44. *See also* automobiles
- Carson, Rachel, 196
- "CATNAP" (Cheapest Available Technology Narrowly Avoiding Prosecution), 275
- Cato Institute, 309
- Caulfield, Dan, 174
- CD-ROMs, 175-176, 297. *See also* computers
- Central Maine Power Company, 280
- Central Platte Natural Resource District, 222
- CERES Principles, 314, 322
- CFCs (chlorofluorocarbons). *See* greenhouse gases
- "charrette" process, 90-91, 300
- chemical industry, 171, 172, 197; savings by, 63, 64, 71-72, 79, 137. *See also* DuPont
- chemicals, 16, 71, 167, 192; petrochemicals, 193, (fiber made from) 172. *See also* pesticides
- Chicago, IL, 54, 254; Board of Trade, 182
- China, 53, 54, 251, 268; agriculture, 210, (urban) 200; water shortage, 213; wood fiber value, 187, 188
- Christopher, Warren, 20
- Chrysler Motors, 26
- Churchill, Winston, 109, 243, 260
- Ciba Pigment Division, 137

- Clarke, Arthur, 86
- climate change, 4, 23, 152; and agriculture, 197-198, (soil and) 204-207; avoidance of, 259; business attitude toward, 157, 242; climatically benign production of hydrogen, 36-37; debate over, 241-247, 257, 310; and fires, 149; Framework Convention on, 322; global warming, 147-148, 160, 236-238, 316; greenhouse gases causing, *see* greenhouse gases; studies funded, 256; volatility of weather, 283. *See also* Kyoto Protocol (1997)
- climate control (indoor), 88; air-conditioning need reduced, 95, 97-99, 103, 108; cooling, 94, 135-136; "displacement ventilation," 98; heating, 94, 97-99, 101-104 *passim*, 134-135; insulation, 102, 103, 104, 167, 182; service and flow system, 134-136
- Clinton, Bill, administration, 257, 269
- Club of Rome, 144
- clustering (of housing). *See* land use
- coal companies. *See* mining industry
- Coca-Cola, 225
- cola and cola cans, 49-50, 129, 225
- Cold War, end of, 5, 316
- Colorado River, 215
- Columbia University, 271
- community: automobiles/commuting and, 22, 41, 46; concept revived, 45, 46-47; and crime, 84, 107; redesign of, 46-47, 106-110; village-style layouts, 107; walkways in, *see* pedestrian space
- commuting: bicycle, 43, 44; community vs., 45-47; commuting allowance suggested, 41-42; costs, 46; Curitiba compared to New York, 295; entry fees, 43
- Compaq Computer Corporation, 175
- competition, 6, 253, 254; cooperation with, 317, 318; efficiency and, 63, 67; in energy production or conservation, 26, 280; in free-market theory, 263, 264; green buildings and, 87, 89; and hydrogen vs. gasoline prices, 36; against perfection, 133; regulation of, 282; in resource productivity, 15; between transportation systems, 41
- computers, 34, 95; design by, 74-76; industrial use of, 67-68, 98; information superhighway, 44-45; and nanotechnology, 73; recycled, 78; replacing paper, 174-176; and Y2K, 69. *See also* Internet, the
- Congress, U.S., 42, 242, 257-258, 259, 276; disregards energy efficiency, 272; Joint Committee on Taxation, 162
- Conservation Law Foundation of New England, 281
- Conservation Reserve Program, 163
- controls (information technology), 66-68
- Convention on Biological Diversity, 322
- Cookson (England), 137
- "coolth," 17, 135. *See also* climate control (indoor)
- Copper Development Association, 275
- Corbett, Michael and Judy, 83, 123-124
- corporate culture, 68-69. *See also* business
- Costanza, Robert, 154, 157
- costs: air pollution, 57, 58, (sulfur reduction) 257-258, 259, 279; automobile accidents, 41, 57; building design, 111, 114; carbon fiber, 30, 31-32, 38; cost barrier, tunneling through, 111-124; crime, 58; energy, company disregard of, 278; fuel cells, 34; gasoline prices, 36, 37, 40; health care, 58, 301; hydrogen prices, 36; Hypercar production, 25, 30-32, 38; inefficiency, 13; of losing natural capital, 59; oil prices, 26, 37, 57, 145, 146; pavement, 22; road congestion, 57; social costs, 166, (automobile commuting) 22-24, 41, 42, 46, 57, (unemployment),

- 54, 55, 58, 164; suburban sprawl, 108; waste, 55, 59
- Costs of Sprawl, The* (Real Estate Research Corporation), 108
- cotton growing and manufacture, 170, 171-172
- “couch potato,” industrial system as, 14
- Council of Economic Advisers, 255
- Cousteau, Jacques, 234
- “cradle to cradle” concept, 17, 134
- Crapper, Thomas, 220
- crime, 8, 53, 54-55, 56; cost, 58; reduction of, 84, 107
- crop-drying, 199. *See also* agriculture
- Csikzentmihalyi, Mihaly, 134
- CTSI Corporation (East Los Angeles), 231-232
- Curitiba, Brazil, 288-308, 319; achievements, 307; children in, 300-301, 302-303, (PIA program for) 303-304; GDP, 298, 307; green space in, 297; Industrial City, 297-298; Research and Planning Institute (IPPUC), 290, 292, 293, 300; social programs, 292, 299, 300-306
- customer pull, 127, 131-32
- cybernetics, 284
- “cycle thinking,” 71
- Daily, Gretchen, 150, 154, 157
- Daimler-Benz, 26
- Daly, Herman, 7, 156, 157, 158
- Danaher Corporation, 133
- Darwin, Charles, and Darwinian principles, 67, 151, 198
- David, George, 255
- Davis House. *See* Village Homes (Davis, CA)
- DDT. *See* pesticides
- DeCanio, Steve, 255
- Decopier Technologies, 185
- Defense Department, U.S., 78, 160
- Dell computers, 39
- DeLors, Jacques, 168
- Delphi Group (London), 247
- DeMontfort University (Leicester, England), 99
- Denmark: bans export of obsolete technologies, 251; conservation measures, 43, 44, 106, 247; taxes, 14, 167
- desertification, 149, 172, 205
- Desert Research Institute (Arizona), 219
- design: appliance, 104-106, 222-223; building, *see* building design; changes, 64-65, 72-73, 81, (new mentality) 111-113, 118, 122-123; community redesign, 46-47, 106-110; computer-aided, 74-76; ecological redesign, 10, 14-16; whole-system, 113-124, 131, (social form) 287-288
- de Tocqueville, Alexis, 157
- Detroit Motor Show (1998), 26
- developing nations: accounting methods, 156; agriculture, 209, 210-211; carbon savings, 251; new power systems, 270; soil degradation/water loss, 194; standard of living, 309-310; subsidies paid by, 163; waste generated by, 53
- Diablo Canyon nuclear power plant, 69
- Diamond, Jared, 194
- Dieldrin, 16. *See also* pesticides
- diminishing returns, 114, 245
- “displacement ventilation,” 98
- Dow Chemical Company, 76, 79, 137, 245; Dow Europe, 12, 175
- Dow Jones Industrial Average, 149
- downstream savings. *See* saving materials and energy
- drainage. *See* water
- Dubos, René, 290
- DuPont, 77, 254, 256, 283; emissions cut, 258; Petretec process, 80
- durability: of hybrid-drive autos, 25; manufacturers’ view of, 19
- Durning, Alan, 47
- Earth Summit (Brazil, 1992), 14, 322
- “ecological footprint,” 51
- ecological redesign, 10, 14-16

- “ecological rucksack,” 50
 “ecological thinking,” 141
Ecology of Commerce, The, 133
 economic system: “economic efficiency,” 12–13, 262; economic fundamentalism, 261; “economic growth” (building of prisons), 54, 55; economic progress, 6, (limiting factors) 9, 156–159; environment (natural capital) valuation, 150, 154–156; externalities in, 277–278; fallacy of economic theory, 7; forecasting, 316–317; free-market, 254, 256, 310–311, (theoretical model) 263–265; GDP (gross domestic product), *see* GDP; homebuilding as part of, 102; income, concept and definition, 158; income decline, 56; income inequities, 9, 19, 53; market barriers, 275, 276; market economics, 262; market regulations, 282–283; Nepali, 173; poverty, 8, 53, 54, (and burden of environmental degradation) 167; return on investment (ROI), *see* energy efficiency; service and flow, 10–11, 16–19, 134–137; U.S., 41, 58, 59–61, 266, (“growth” of) 59–61, (inefficiency of) 14–15, (unemployment/employment) 53–54, 255–256, (waste ratio in) 14–15, 58, 266; volatility of, 142–143; wasting resources and, 321; worldviews on (Blues, Reds, Greens, Whites), 310–313. *See also* capital; capitalism; costs; unemployment or underemployment; waste
 economies-of-scale thinking, 127
Economist, The, 97, 161, 249, 310
 ecosystems: agriculture and, 204; artificial (Biosphere 2), failure of, 5, 146–147, 153; business attitude toward, 157, 159; damage to/loss of, 3, 4, 8–9, 19, 20, 151–156, 159–160; design and, 112–113; freshwater and marine, 4; “Greens” and, 311–312; industrial, 16, 67–68; resource productivity and, 18; scientific view, 153–154; soil, 150–151, (biological farming and) 16; Type Three, 73; value of services, 5, 146–148, 154–156. *See also* environment
 Ecotrust (Portland, OR), 320
 efficiency: auto industry search for, 27–29, 38, (government and) 57, (offset by more cars and driving) 40; of buildings, 82–105; and competition, 63, 67; in converting raw material to finished product, 75; economic definition of, 12–13; energy, *see* energy efficiency; engineers’ definition of, 12, 13; Factor efficiencies, 140–141, 180–181, (Four and Ten) 11–12, 13, 22, 40, 246; of green buildings, 87–90; Hypercar, 25, 28, 34; lean approach and, 129–130; in paper production (field, conversion, end-use, functional), 179, 180–181; resource efficiency, 13, 109. *See also* inefficiency
 efficiency revolution, 64
 Ehrlich, Paul, 157
 Einstein, Albert, 6, 272, 310
 Eisenberg, Evan, 150, 193, 203
 Eitel, Charlie, 133, 141
 electricity: automobiles propelled by, 25, 32, 33; hydrogen produced by, 36–37; motors’ use of, 115, 246; phosphorus-mining use of, 50; production of, 244–245, (fuel cells) 25, 34, 248, (renewable sources) 97, 247–248; saving, (“Negawatts”) 279, (technologies for) 95, 106, 250; tax on, 167. *See also* power plants
 Electrolux (Sweden), 138
 electrolysis, 33
 electronic communication, 174–176.
 See also computers
 El-Gasseir, Mohamed, 280–281
 Eliot, T. S., 47
 El Niño, 237. *See also* climate change
 Emerson, Ralph Waldo, 17
 employment, 10; service paradigm, 18.
 See also unemployment or underemployment

- energy: competition in producing and saving, 26; crisis, 145, 146; and “feebates,” 93–94, 274; food sector use of, 192; Hypercar use of, 25, 28, 34; pricing of, 278; renewable, 247–248, 252; reused vs. primary materials and, 18, 78 (*see also* recycling); saving, at low cost, 118–119, 176, 244–247; “soft energy path” (U.S.), 251–252; and standard of living, 251; waste of, 42, 57, 58, 160. *See also* electricity; energy-efficiency; power plants
- Energy Department, U.S., 268
- energy efficiency, 57, 58, 62–64, 81, 244–245; appliances and office equipment, 104–106, 277, (labeling) 275–276; buildings, 89, 94, 98–99, 102; business disregard/misunderstanding of, 266–268, 270–272; congressional disregard of, 272; economic value of, 256–257, 265, 268–270, (return on investment [ROI]), 245–246, 276; manufacturing, 62–64, (“golden carrot” programs) 276, 277, (risk-taking) 276–277; potential, 107, (unmet) 81; stagnation of, 253–254; Swedish and Indian analyses of, 250–251
- Energy Service Company (ESCO) concept, 269
- Energy Star standards, 104, 276
- “engineered” wood. *See* wood
- engineering: education, 111–113; financial education, 267; genetic, of forests, 186–187; “value,” 120; whole-system, 113–124
- Enron Company, 247
- “Environ” biocomposite, 80
- environment: economic value, 154; future of, 316–317; global security linked with, 20; human destruction of, 148–149, (protests against) 319; human-made, variability in, 88; natural capitalist view of, 9–10; organizations concerned with, 314–315; present capitalist concern for, 6; pollution of, 315; as source of quality, 148–150. *See also* ecosystems
- environmental feedback, 49
- EPA (Environmental Protection Agency), 88, 101, 104, 231, 257, 275–276, 277; suit against, 197
- “ephemeralization,” 77
- EpiCenter research facility (Bozeman, MT), 99
- Ernst & Young Center for Business Innovation, 139
- Eugster, C. H., 71
- Europe: agriculture and climate, 160, 207, 238; central-city density, 46; containers redesigned, 76; “green” roof concept, 108; “individual mass transit,” 43–44; insurance industry, 283; service and flow heating, 134–135; subsidies, 13–14; tax reforms, 14, 168; “traffic-calming,” 43; unemployment, 14, 53
- European Commission, 168
- European Union, and Factor Four, 12
- Expo 2000 (Hannover, Germany), 103
- extinction, of fish, 149
- Exxon Valdez* oil spill, 70–71
- Factor efficiencies. *See* efficiency
- Factor Ten Club, 11
- Fannie Mae (Federal National Mortgage Association), 46
- Federal Aviation Administration (FAA), 69, 264, 282
- Federal Trade Commission, 282
- “feebates,” 3, 93–94, 274
- feedback: environmental, 49; industrial, 66, 67, 164–165; informative, 283–284
- Feist, Wolfgang, 103
- fertilizer. *See* agriculture
- fibers and fiber products, 171–174, 189; “fiber farms,” 186; nonwood, 187–188; wood, 178–179, 181, 186. *See also* carbon fiber
- financial innovations, 100, 284, 319–320. *See also* economic system

- Financial Times*, 133
 Fischer, Hanns, 71
 fish, 149, 151
 food: contaminated fish, 151; dependent on energy, 192; overfishing and, 149. *See also* agriculture
 Food and Drug Administration, 282
 Ford, Henry, 27, 29, 80, 184
 Fordham University “index of social health,” 53
 Ford Motor Company, 26, 36, 39, 80, 256
 forestry subsidized, 58
 forests: dying, 160; genetically engineered, 186–187; harvesting, 172, 173, (productivity loss) 194, (saving in) 177–184, 186, 189. *See also* wood
 Forest Service, U.S., 164
Forgotten Pollinators (Nabhan and Buchmann), 151
 Forrester, Jay, 144
 Fortune 100 companies, 266
 Fortune 500 companies, 55
 Four Times Square (New York), 97
 Foy, Douglas, 281
 Framework Convention on Climate Change, 322
 France, nuclear power in, 249
 Franklin, Carol, 233
 Freddie Mac (Federal Home Loan Mortgage Corporation), 46
 free market. *See* economic system
 Freeport-McMoRan gold mine (Indonesia), 52
 Fresh Kills (Staten Island, New York), 51
 Freudenberg-NOK General Partnership, 132
 friction in pumping system, 115–118
 fuel cells, 26, 32–36, 66; cost, 34; organization start-up process, 35–36; producing electricity, 25, 34, 248
 Fuji cameras, 78
 Fukuoka, Masanobu, 210
 Fuller, Buckminster, 77
 future, forecasting of, 316–317, 322
 garbage. *See* waste
 gasoline: cut in consumption, 45; prices, 36, 37, 40; tax, 167. *See also* oil
 GDP (gross domestic product), 6, 149, 160, 161; Curitiba, Brazil, 298, 307; Sweden, 250; Thailand, street congestion and, 43; U.S., 59–61, (farmers represented in) 191, (social cost of driving) 41, (waste) 58, 266, (water-use efficiency) 216–217. *See also* economic system
 Generally Accepted Accounting Practice, 9
 General Motors (GM), 26, 27, 39, 264
 Georgia Power Company, 66
 Georgia Tech, 66
 Germany: businesses eliminate free parking, 42; conservation practices, 44, 79, 80, 178, 184, 225, 318; “ecological rucksack,” 50; environmental protests, 319; “green” roof concept, 108; subsidizes coal regions, 160; tax reforms, 14, 164, 168
 gigantism, cult of, 130–131
 Gillette Company, 225
 glass industry, 65
 glass windshields, 127–128
 Global Climate Coalition, 242
 globalization, effect of, 19
 global warming. *See* climate change
 Glulam beams, 183
 Golder Associates (Canada), 45
 Goldstein, David, 46, 277
 Göteborg Energi (Sweden), 135
 government subsidies. *See* subsidies
 Gram (Danish firm), 106
 “granny” flats, 107
 Great Lakes region, fish from, 151
 Great Plains, 192, 211
 Green Bay (Wisconsin) Packaging Company, 185
 green buildings, 86, 87–110; climate variability in, 88; “green” roofs, 108; homes, 101–106; and productivity, 88–90; recycled, 99–101
 “Green Exchange” project (Curitiba, Brazil), 301–302

- greenhouse gases, 14, 23, 235–241, 255, 283; CFCs, 16, 240, 244, 258; methane, 204, 206–207, 211, 243; nitrous oxide, 204, 211, 235, 243; sulfur dioxide, 235, (reduction costs) 257–258, 259, 279; tax on, 167, 242, 318, (excluded) 257. *See also* carbon dioxide emission
- green investment, 284
- Green Lights, 276
- Greenpeace International, 65, 283, 317
- “Green Revolution,” 191
- “Greens,” worldview of, 311–312, 313
- green taxes (Holland), 167
- Gridcore construction firm, 183
- gridlock. *See* road congestion
- gross domestic product. *See* GDP
- gross world product, 154
- Guam, winds in, 152
- Gulf Stream, 238
- Haiti, ecological destruction in, 20
- Hall, Mrs. Rozella, 226
- “halophytes,” 219. *See also* agriculture
- Hannover Principles, 322
- Hardin, Garrett, 285
- Hargreaves, James, 170
- Hart, Stuart, 317
- Hartzfeld, Jim, 141
- health care costs, 58; Curitiba, Brazil, 301
- heating. *See* climate control (indoor)
- Heinlein, Robert, 263
- hemp, nonpsychoactive, 188
- Hicks, J. R., 158
- High Plains, 215, 216
- High Plains Underground Water Conservation District (Lubbock, TX), 217
- highways. *See* road construction; transportation sector
- Hindenburg* disaster, 35
- Hire Quality (job placement service), 174
- Holland. *See* Netherlands
- homebuilding, revolution in, 101–104, 108–109
- Honda, hybrid car of, 27
- “hoop houses,” 202
- hotels, 84–85, 97
- housing developments, 83–84, 108–109; village-style layouts, 107
- How Buildings Learn* (Brand), 100
- Hubble Space Telescope, 69
- Hungary, hemp fiber produced in, 188
- Hunt Brothers, 264
- Hurricane Mitch, 19
- hydrocarbons, 15, 35, 171
- hydrogen: as automobile fuel, 33, 35; climatically benign production of, 36–37; in fuel cells, 26, 33, 34, 36; prices, 36; safety concerns misplaced, 35
- hydrology. *See* water
- hydroponics, 152. *See also* agriculture
- Hypercar (hybrid-electric), 23, 24–41, 47, 64; advantages of, 38–39; choice of fuel for, 33; energy efficiency of, 28, 34, (mileage) 25; green buildings compared to, 87; power plant compared to, 121, 122; as power station on wheels, 35; private sector investment in, 26; production of, 26–27, 39, (costs) 25, 30–32, 38; and road congestion, 40–42; safety of, 29–30
- IBM (International Business Machines), 78, 101
- illnesses: building-related, 88; and health-care costs, 58, 301; pollution and, 160
- Imation DryView, 137
- income. *See* economic system
- India, 170, 194, 250, 251, 268
- Indonesia, 52, 149, 163
- industrial metabolism, 49–53, 61; coiner of term, 145. *See also* waste
- industrial process: improvement in, 62–81, (biological principles applied) 67–68, (lean thinking) 127, 130, 132–134; improvement in quality, 75, 76; innovations, 69–73 (*see also* technology); mistakes in, 68–69;

- industrial process (*continued*)
 net-shape production, 75; recycling
 in, 18, 78–81, 138, 140, 187; system as
 “couch potato,” 14
- industrial research, 15–16
- industrial revolution, 53, 62, 157; ide-
 ology of, 6–9, 144; price of (decline
 of natural capital), 2; next, 170
- Indy 500 races, 30
- inefficiency: in air travel, 127; of auto-
 mobiles, 24; cost of, 13, 271; energy,
 57; entrepreneurial exploitation of,
 280; thermal, of U.S. houses, 119; of
 U.S. economy, 14–15; waste as sign
 of, 13. *See also* efficiency
- informational failures, 275–276
- information services, service concept
 in, 137
- information superhighway, 44–45
- ING (Netherlands bank), 83
- Inn of the Anasazi (Santa Fe), 84–85,
 100
- InPart Design, Inc., 176
- insulation. *See* climate control
 (indoor)
- insurance industry, 283–284
- Integrated Pest Management
 (Indonesia), 163
- Intel, 39
- Intelligent Product System, 17
- Interface Corporation, 17, 77, 133,
 139–141, 168, 169, 170; Chinese
 factory, 116, 177; *Sustainability*
Report, 168–169
- Intermodal Surface Transportation
 Efficiency Act (1991), 280
- International Fruit Container Orga-
 nization, 80
- International Labor Organization, 53
- International Performance Measure-
 ment and Verification Protocol, 268
- International Union for the Conser-
 vation of Nature, 322
- Internet, the, 24, 44, 176, 299; regional
 exchange, 79, 100–101
- IPPUC. *See* Curitiba, Brazil
- irrigation. *See* water
- IRS (Internal Revenue Service), 58;
 Internal Revenue Code, 166, 264
- Israel, water use in, 218, 219, 228
- Issues in Ecology* (journal), 153
- Jackson, Wes, 198, 212
- Jacobs Vehicle Manufacturing
 Company, 133
- Japan, 125, 279, 318; agriculture, 210;
 car purchases based on parking
 availability, 42; climate, 238; energy
 use, 57, 247; landfills excavated, 167;
 package and paper recycling, 80,
 185; paper production, 173; state-of-
 the-art buildings, 88
- Johnson, S.C., Worldwide Professional
 Headquarters (Racine, WI), 94
- Jones, Christine, 211
- Jones, Daniel, 49, 125, 126, 127, 132, 133,
 134
- Jordan, ecological destruction in, 20
- Kazakhstan, 172
- Kelly, Kevin, 67
- kelp, disappearance of, 152
- kenaf (wood substitute), 187–188
- Kevlar (polyaramid), 15, 29, 31, 70
- Kodak, 76, 78
- Korea, 53, 199; industrialization of, 53
- Korten, David, 311
- Kronsberg Siedlung (exposition city),
 103
- Kruger National Park (South Africa),
 224
- Kuroshio Current, 238
- Kyoto Protocol (1997), 36, 244, 245,
 246, 250, 257, 258–259
- labor productivity: building-related
 illnesses and, 88; engineering edu-
 cation and, 111–112; farm, 194; green
 buildings and, 88–90; lean thinking
 and, 132; “nega-information” and,
 175; overproductivity, 56; social
 cost, 157–158
- Land, Edwin, 64, 117
- landfill, 185; tax on, 167. *See also* waste
- Land Institute (Salina, Kansas), 198, 212

- land use: choices, 44; clustering, 45, 106, 108 (*see also* community); physical mobility vs., 41; recycled, 101; standard of living and, 51; suburban sprawl, 46
- Lantech (Kentucky firm), 132
- Lao-tzu, 257
- Las Vegas, NV, water supply, 216
- Law of Conservation of Matter and Energy, 118
- Lawrence Berkeley National Laboratory, 271
- Leadership in Energy and Environmental Design (LEED) rating system, 93
- “lean thinking,” 127, 130; in action, 132–134
- Lean Thinking* (Womack and Jones), 49, 125
- leasing, 134–143; automobile, 27, 136; “cradle to cradle” concept, 17; service and flow model, 16–19, 134–137
- Lee, Eng Lock, 91, 111, 116, 123
- Leggett, Jeremy, 283
- Leopold, Aldo, 147, 198
- Lerner, Jaime, 289–293 *passim*, 296, 297, 298, 300, 305, 308
- Levi Strauss, 172
- lighting, 95
- Limits to Growth, The* (Club of Rome), 144–146
- Linden, Eugene, 238
- livestock. *See* agriculture
- Living Technologies, Inc., and Living Machines, 229–230
- Lockheed Building 157 (Sunnyvale, CA), 88–89
- London, England, automobile entry fee, 43
- loop-closing design integration, 201–204, 227
- Los Angeles, CA, 107, 227, 232; loss of defense jobs in, 316
- Los Angeles County landfill, 185
- Louisiana, “dead zone” off coast of, 149
- Lubchenco, Jane, 157
- MacCready, Paul, 49
- McCrary, Philip, 70–71
- McDonald’s, 80
- McDonough, William A., 72
- McElveen, Mike, 226
- MacEwan, Malcolm, 109
- McKibben, Bill, 297, 298, 302, 306, 307, 308, 314
- McLarney, Bill, 110
- Malden Mills warehouse retrofit, 95
- Manchester *Guardian*, 294
- Mariefriske (Swedish publisher), 283
- market. *See* economic system
- Mars Company, 230
- Marx, Karl, 171
- Mauna Lani Bay Hotel (Hawaii), 97
- Meadows, Donella, 16, 53, 310, 312
- Mediterranean region, environmental damage, 148
- Merck Manual*, 176
- metal-casting industry, 76
- methane. *See* greenhouse gases
- Metro stations (Washington area), 45
- Mexico, 79, 268
- microchips and microchip industry, 63, 67, 225
- Microsoft, 264
- Miller, Herman, furniture, 78
- Mining Act (1872), 264
- mining industry, 49–50, 52, 145, 162, 167; coal companies, 255, 256
- MIRG (management-intensive rotational grazing), 208. *See also* agriculture (livestock)
- Mississippi River, 149, 192
- Missouri Botanic Garden, 156
- MIT Sloan School of Management, 144
- Mitsubishi Electric, 12, 271, 273, 317
- Mitsubishi Motors, 39, 80
- mobility, physical: automobiles as restriction on, 22, 40; carsharing and, 44; and choice of transport, 47; land use vs., 41; “virtual,” 44–45
- “monocoques,” 31
- monopolies and monopsonies, 263, 264
- Montana State University, 99

- Montreal Treaty (1988), 244
 mortgages, 46, 270
 Mothers of East LA Santa Isabel
 (MELA-SI), 232
muda (wasteful activity), 125–143, 287
 Multilateral Investment Agreement,
 282
 Mumford, Lewis, 260, 308
 Murrow, Edward R., 115
 Myers, J. Peterson, 157
 Myers, Norman, 157, 160, 161
- Nabhan, Gary Paul, 151
 nanotechnology, 73. *See also*
 technology
 NASA (National Aeronautics and
 Space Administration), 71
 National Audubon Society, 99, 100, 101
 National Electrical Code (NEC),
 274–275
 natural capital, 150–152; and agricul-
 ture, 198; cost of losing, 49; disre-
 gard of, 144, 149; economic value,
 150, 154–156; investing in, 11, 19–20,
 158, 159–169; as limiting factor, 158;
 present supply of, 3; resources
 included in, 2, 4; as “subsidy” to
 production, 156; substitutes for,
 152–156; valuation of, 5, 61. *See also*
 ecosystems
 natural capitalism: broad appeal of,
 20; in Curitiba, Brazil, 306–307;
 four principles of, 10–11; four
 worldviews of, 313; fundamental
 assumptions, 9–11; goal of, 261;
 Hypercars as embodiment of, 27;
 innovations resulting from, 20;
 and interdependence between
 human-made and natural capital,
 3–4; leasing and, 137–143; potential
 outcome, 322
 natural gas, 33, 34, 36, 37, 145, 244
 natural resources: loss of, 8, 9 (*see also*
 waste); “resource” defined, 146; tax
 on depletion of, 167
 Natural Resources Defense Council,
 46, 100, 277
- Natural Step, The, 314
 “natural wealth,” 4
 nature, scarcity of, 8
Nature (British journal), 154, 156
Nature’s Services (Daily, ed.), 154
 Navy, U.S., 283
 Nelson, Ken, 245
 Nepali economy, 173
 Netherlands, 12, 43, 44, 185, 200, 319;
 taxes and tax reforms, 14, 167, 168
 net-shape production, 75. *See also*
 industrial process
 New Alchemy Institute, 110, 200
 Newcomen, Thomas, 62
 New Jersey, suburban sprawl in, 46
Newsweek magazine, 242
 New Urbanist design, 46–47, 106
 New York City, 51, 54, 97, 307; com-
 muters, 295; green space, 297; water
 supply, 223, 224, 231
New York Times, 176
 Nigeria, environmental protests in,
 318–319
Nightline (TV program), 310
 Nike, 172
 Nilsson, Hans, 276
 Nissan Motors, 130
 nitrous oxide. *See* greenhouse gases
 noise, automobiles and, 23
 Nordhaus, William, 61
 Norsk Hydro, 256
 North American Water and Power
 Alliance, 215
 North Atlantic Current, 147–148
 Northwest Environment Watch, 47
 Norway, 12, 168
 nuclear cleanup and waste, 58. *See also*
 power plants
 NUTEK (Swedish agency), 276
 nutrient flows, 16, 17–18; soil fertility
 and, 150; technical, 18
- Oberlin College Environmental
 Studies Center, 230
 ocean: depletion, 149; shift in currents,
 238, 240; warming, 237–238, 239
 Odum, Howard, 192

- OECD (Organization for Economic Cooperation and Development), 12, 162
- office buildings and equipment, 89-90, 95-99; leasing, 142
- Ogallala Aquifer, 215
- Ohno, Taiichi, 125-126, 132, 133
- oil: access subsidized, 161; consumption, 23, (saving in) 37; demand for, 145-146; embargoes, 145, 249, 253; industry environmental policies, 318, 319; prices, 26, 37, 57, 145, 146, (consumption relationship) 253-254; tax on, 167
- OK Petroleum (Sweden), 318
- OPEC (Organization of Petroleum Exporting Countries), 37, 255
- Operation Cat Drop, 286
- Opitz, Charles, 209
- organic farming. *See* agriculture
- organizational failures. *See* business
- organizations dealing with environmental issues, 314-315
- Orr, David, 315
- Oticon (Danish firm), 175
- Out of Control* (Kelly), 67
- Owens-Corning, 98
- ozone, 235; depletion of, 239, 240. *See also* climate change
- Pacific Gas and Electric, 69, 103, 274, 277
- Pacific Northwest homes, 101
- packaging: overdesigned or needless, 177-178; and pallet use, 184; recycled, 79, 80
- pallets, 184. *See also* wood
- paper: production and use, 172-174, 176; recycled, 184-186, 188; reducing waste, 179-181; substitute for, 174-176; tree-free, 188
- Pará, Brazil, 181
- Parallam ("engineered" wood), 181
- Paris Auto Show (1998), 39
- passive design, 97-99, 102-104
- "Passivhaus" (Darmstadt, Germany), 103
- Patagonia clothing company, 172
- Pattern Language, A* (Alexander), 124
- pavement, area and cost of in U.S., 22; reducing, 108
- PCB (polychlorinated biphenyl), 16
- Peanut Marketing Board, 264
- pedestrian space, 43, 44, 47, 107; in Curitiba, Brazil, 289, 292
- people as resource. *See* population
- Persian Gulf Forces, 161, 167
- pesticides, 16, 163, 166, 190, 193, 196, 197; DDT, 16, 285-286; tax on, 167
- petrochemicals. *See* chemicals
- Pew Scholars, 154
- pharmaceutical companies, 16, 272
- photovoltaic power. *See* solar power
- phylloxera, 196
- Physician's Desk Reference*, 176
- Piëch, Ferdinand, 26
- Pitney Bowes, 137
- Poll, Eric, 175
- pollution, 315; "polluter pays" principle, 278. *See also* air pollution; water
- polymers, 30-31, 37. *See also* carbon fiber
- population: as factor in savings formula, 178, 179; growth of, 8, 9; prison, 54-55 refugee, 19-20; as resource, 8, 54; wasted lives, 53-57
- Porsche, Ferdinand, 26
- poverty. *See* economic system
- power plants, 16; economies of scale, 131; Hypercars as/compared to, 35, 121, 122; inefficiency of, 246-247; and "negative technology transfer," 251; nuclear, 69, 248-249, (tax on) 167; operating costs vs. fuel cells, 34; plant losses vs. savings, 121-122; pollution by, 160; subsidized, 268. *See also* utility industry
- Prairie Crossing (Illinois), 108
- Pratt & Whitney aircraft, 75, 126, 129, 133
- prison population, 54-55
- production. *See* industrial process
- productivity. *See* labor productivity; resource productivity

- property values, 84, 109
Public Utilities Commission, 274
- quality of life: improvement in, 13,
107; suburban sprawl and, 46
- Queens Building (Leicester, England),
98-99
- Rabinovitch, J., 298, 300
- rail gauge, 118
- rail vehicles, ultralight, 37
- rainforest, 52, 207
- Rainforest Action Network, 184, 217
- Rasch, Folkmer, 103
- Raven, Peter, 156, 157
- Reagan, Ronald, administration, 57, 255
- recycling, 18, 78-81, 138; buildings,
materials, and land, 99-101, 104,
187; carpeting, 140; Curitiba, Brazil,
program, 301-302, 304; paper,
184-186, 188; restaurant food, 85
- Redefining Progress (policy group),
60
- "Reds," worldview of, 311, 312, 313
- Rees, William, 51
- refrigerators, 105-106, 277
- refugees, 19-20
- regulatory failures, 273-275
- Reno, NV, post office, 89
- renovated buildings, 119-121
- Repetto, Robert, 61
- research and development (R&D),
272. *See also* business
- resource, definition of, 146. *See also*
natural resources
- resource productivity: automobiles
and, 22, 27, 40; and employment,
56; importance of, 9, 10, 158, 320;
incentive for, 18, 19, 20, 159, 164-165;
increased by service and flow, 136;
industrial investigation of, 15-16;
meaning of, 12; present movement
toward, 11-14; reversal of trade
policies, 319; revolution in, 317;
success of, 318
- retrofitting. *See* saving materials and
energy
- return on investment (ROI). *See*
energy efficiency
- "reverse logistics," 78
- Rickover, Admiral Hyman, 283
- "Right Livelihood" agreement, 85
- Rio de Janeiro, Brazil, 294
- RiverPlace (Portland, Oregon), 101
- road congestion, 40-43, 161; cost, 57
- road construction, 161, 163, 164; street
width, 83, 107, 108, 109
- Robertson, Ernie, 70
- Rockefeller Foundation, 191
- Rocky Mountain Institute (RMI), 23,
92, 98, 102, 103, 119, 200, 314, 317
- Rocky Mountain Trench, 215
- Rome, ancient, 41, 118, 148
- Romm, Joseph, 111
- Roos, Daniel, 39
- Rose Garden Arena (Portland, OR), 101
- Rowe, Jonathan, 60
- Royal Dutch/Shell, 247
- Russia, 268, 282; otter hunters, 152. *See*
also Soviet Union
- Rutgers University Center for Urban
Studies, 46
- Sacramento, CA: Laguna West devel-
opment, 109; Municipal Utility
District, 248
- SafeChem (Germany), 137
- SafetyKleen chemicals, 137
- Samuelson, Robert J., 242, 243
- San Diego, CA, municipal building,
99-100
- Santa Barbara County, 275
- São Paulo, Brazil, 295, 298, 307
- Saro-Wiwa, Ken, 318-319
- saving materials and energy, 74-77,
176-189, 244-247; downstream
savings, 122, 177, 186; formula for,
178-179; influences other than
price, 254; market for, 279-280;
"net-shape" production, 75; retro-
fitting for, 95, 231, (in right order)
122; "whole lobster" approach,
118-119. *See also* recycling; tech-
nology; waste

- Savory, Allan, 207
- Scandinavian insulation techniques, 102, 104. *See also* Norway; Sweden
- Schilham, Jan, 116–117, 118, 119, 176
- Schindler elevators (Switzerland), 136–137
- Schipper, Lee, 39
- Schmidt-Bleek, Friedrich, 11
- Schumacher, E. F., 130
- Schwartz, Peter, 317
- Scottsdale, Arizona, drainage, 108
- Seattle City Light, 254
- Securities and Exchange Commission, 282
- security and protection industry, 89
- service and flow economy, 10–11, 16–19, 134–137; employment under, 18
- sewage, 228–230, 231. *See also* water
- Shell Oil Company, 244, 247, 256, 319
- Sheridon, Nick, 186
- Shimizu robotic system, 76
- Shorebank Pacific, 320
- showers and showerheads, 221–222
- Siena Declaration, 322
- Silent Spring* (Carson), 196
- Simon, Herbert, 273
- simplification, 123, 130–132
- Singapore, 42–43, 63, 116
- sinks, water-saving, 222
- Skanska (Swedish construction firm), 76
- slavery, 170–171
- Small Is Beautiful* (Schumacher), 130
- “smart” building, 96. *See also* building design
- social costs. *See* costs
- socialism, 311
- social responsibility, 55, 59; and annual return, 79
- Social Security. *See* taxes
- soil. *See* agriculture; ecosystems
- solar (photovoltaic) power, 94, 96–97, 102, 104, 221, 247–248; financing, 269–270
- Selenium carpeting, 140
- Somalia, ecological destruction in, 20
- South African water policy, 214
- Southern California Edison (SCE) Company, 269
- Southern California Gas Company Energy Resource Center, 100
- Southwest Airlines, 126
- Soviet Union, 42, 191; collapse of, 316. *See also* Russia
- species interactions, 16, 209
- Stahel, Walter, 16, 17, 134, 307
- standard of living, 309–310; conventional capitalism and, 6, 7; Curitiba, Brazil, 295; energy use and, 251; and land use, 51; over-productivity and, 56; resource productivity and, 14
- Stapleton Airport (Denver), 101
- Statskontoret (Swedish purchasing office), 276
- Steelcase office furniture, 72, 78
- street width. *See* road construction
- Strickland, Robert, 55
- subsidies, 13–14, 15, 58, 164, 168; to agriculture, 58, 162–163, 192, (irrigation) 163, 215, (livestock) 206; concealment of, 161; to industry, 160–162; on lamps, 269; natural capital as form of, 156; perverse, 160, 162; to power plants, 268; social cost of, 159–164; of suburbs, 46; taxes as form of, 14, 161, 162–163, 164; of transportation, 40, 161–162, 192; worldwide total, 264
- suburban sprawl, 46; *The Costs of* (federal study), 108
- sulfur dioxide. *See* greenhouse gases
- Sun Microsystems, 39
- Sun Power Electric (Boston), 248
- Superfund sites, 58
- superwindows, 96, 102, 121, 167, 200
- Supreme Court, U.S., 45
- Sweden, 42, 135, 221; efficiency, 12, 250, 276–277; forests, 160; “hyperinsulated” homes, 103; tax reforms, 14, 168, 318
- Switzerland transportation system, 44
- Sydney, Australia, 42, 97

- Taniguchi, Cassio, 290
- Taoism, 312
- taxes: on automobiles, 43; Congressional Joint Committee on Taxation, 162; and energy choices, 278; as form of subsidy, 14, 161, 162-163, 164; in free-market theory, 263, 264; on greenhouse gases, 167, 242, 318, (excluded) 257; income, corporate and personal, 164, (elimination of) 166; on parking, 42; Social Security, 164, 165; tax code (IRS), 58; tax reforms, 14, 159, 164-168, (suggested new forms) 167
- Taylor, Jerry, 309
- Technical University of Denmark, 106
- technology: existing, use of, 64; future, 169; information (controls), 66-68; innovative, 20, 63, 65-66, (in building design) 86, (cellular) 97, (combined with financial innovations) 100, (energy-saving) 95, 106, 250, 272, ("pinch") 63 (*see also* Hypercar); investment in, 167; minimum compliance (CATNAP), 275; and nanotechnology, 73; "negative transfer" of, 251; root of word, 171; as substitute for ecosystem services, 152-154; water treatment, 229-230
- Texas Water Plan (1968), 214
- textile industry, 170-172
- Thailand, 42-43, 103, 161
- Thalidomide, 16
- Timberstrand ("engineered" wood), 182
- time-sharing, 106-107
- Tobias, Andrew, 281
- Tobin, James, 61
- Todd, John, 229
- toilet technology, 220-221
- Tokyo, Japan, car purchases based on parking availability, 42
- Tokyo Electric, 256
- Tokyo Motor Show (1997), 26
- Toronto, Ontario, cluster development, 45
- "torque services," 136
- Toyoda, Sakichi, 66
- Toyota, 26, 27, 66; Production System, 125
- traffic. *See* road congestion
- "traffic calming," 43
- transportation sector: Curitiba, Brazil, 291-295, 299-300, 305-306; interstate highways, 192; public transit system, 41-42, ("individual mass transit") 43-44, (paratransit and "dial-a-ride") 44; subsidized, 40, 161-162, 192
- Tree People project, 226
- trees, urban, 107-108, 296-297. *See also* forests
- Trigen turbines, 247
- TrusJoist MacMillan, 181
- Turner Construction (Oregon), 101
- Udall, Randy, 278
- Ukraine, 268
- unemployment or underemployment, 9, 14, 53-54, 56-57, 263, 264; vs. job creation (U.S.), 255-256; social cost, 54, 55, 58, 164
- United Nations: Development Program (UNDP), 317; Environment Program (UNEP), 12, 297, 314; World Charter for Nature, 322
- United States: agriculture, 190-194, 196-203 *passim*, 206-208 *passim*, 212, (organic) 85, 205, 210, (residues) 188; air-conditioning investment, 91-92; auto insurance costs, 281; carbon dioxide and sulfur emission targets, 244, 258, 279; economic conditions, *see* economic system; ecosystems lost, 155; effect of automobiles, 22-23, 41; energy use, 57, 58, (and competition) 318, ("soft energy path") 251-252; hemp fiber production, 188; industrialization, 53; inner cities, 54, 55; lacks understanding of development concept, 12; lawyers in, 58; market regulations by, 282; money wasted in, 57-58; paper production, 173;

- pavement area and cost, 22; recycles paper, 184-185; refrigerator standards, 105-106; subsidies by, *see* subsidies; suburban sprawl, 46; tax reform, 168; thermal inefficiency of houses, 119; unemployment or underemployment, 53-54; utility industry, 131; waste generated by, 8, 51-53, 62, 77, (agricultural residues) 188, (aluminum) 50, (and material saved) 76, (ratio of, in economy), 14-15, 266, (waste exchange) 79; water use/shortage, 213-219 *passim*, 223-225, 227-232 *passim*, 279; as world's largest penal colony, 54; zoning rules, 45
- U.S. Green Building Council, 93
- U.S. National Laboratories, 247-248
- United Technologies, 17, 255
- University of North Carolina, 78
- University of Zürich, 71
- utility industry, 131, 253, 269, 276; restructuring of, 273-274; rewarded, 281; and tariff structures, 278. *See also* power plants
- “value engineering,” 120
- van den Koogh, Professor (University of Delft), 32
- Vattenfall (Swedish State Power Board), 250
- Veja* (Brazilian newsmagazine), 308
- ventilation. *See* climate control (indoor)
- Verifone warehouse (California), 89
- Village Homes (Davis, CA), 83-84, 108, 119, 123
- Volkswagen, 26; Golf mirrors, 130
- Volvo, 293
- von Weizsäcker, Ernst, 322
- Wackernagel, Mathis, 51
- walkways. *See* pedestrian space
- Wall Street Journal*, 144, 157
- Walmart's “Eco-Store” (Kansas), 89, 93
- Ward, Bill, 199
- Warshall, Peter, 171, 172
- washers and dryers, 17, 105, 222, 223
- Washington State, 271
- waste, 48-61; construction, 100-101; cost; of, 59; disregarded, under conventional capitalism, 7; energy, 57, 58, (subsidized) 42, 160; industrial metabolism, 49-53, (auto industry) 23; nuclear, 58; Ohno's classification of (*muda*), 125-143, 287; organic, as automobile fuel, 201-202; people's lives, 53-57; processing and use of, 16, 66, 79 (*see also* recycling); reducing, 10, 71, (and innovation) 144; responsibility for (in service economy), 17; saving vs., *see* saving materials and energy; as sign of inefficiency, 13; social cost, 55; as system, 59-61; tax on landfill or incinerator, 167; toxic, 52, 101; U.S. production of, 8, 50, 51-53, 62, 77, 188, (ratio of, in economy) 14-15, 266; U.S. money wasted, 57-58; waste heat, use of, 99; of water, *see* water
- waste disposal industries, subsidized, 162
- water, 213-233; agricultural use, 191, 193-194, 214-216, 217-219, (biointensive) 209; in Curitiba, Brazil, 296; and drainage, 83, 108; house and commercial-building use, 220-224; industrial use, 50, 225; irrigation, 191, 216, 224, (drip system) 218-219, (subsidized) 163, 215; landscaping use, 219-220; pollution, 52, 159, 197, 213, 214; rain, 225-227, (acid rain) 160; saving (efficiency solutions), 216-233; shortage, 213-216, 231, 279; tax, 167, 224; urban hydrology reform, 108-109, 223; waste, 52-53, 131, 224, (graywater) 220, 227-228, (treatment systems) 228-230; western use-itor-lose-it laws, 192, 279
- wealth, lost. *See* waste
- Wealth Index* (World Bank), 5

- weather-related losses, 19, 237–238.
 See also climate change
- Weiss (German oil refinery), 65
- West Indies, colonization of, 171
- When Work Disappears* (Wilson), 54
- Whirlpool refrigerators, 106
- “Whites,” worldview of, 312, 313
- Whitney, Eli, 171
- Whole Earth Review*, 112
- Williams, Robert, 36
- Wilson, Doyle, 126
- Wilson, E. O., 151
- Wilson, W. Julius, 54
- windows. *See* superwindows
- windpower, 247
- Winnipeg Biomass Institute, 70
- Womack, James, 24, 49, 125, 127, 132, 133, 134, 139, 143
- wood: “engineered” or “synthetic,” 181–182; recycling, 184; substitutes for, 187–188; “waste,” 183, 185; wood fiber, 178–179, 181, 186; wood-saving developments, 183–189. *See also* forests
- World Bank, 5, 156, 163, 228, 313
- World Business Council for Sustainable Development (Switzerland), 12, 314
- World Conservation Strategy, 322
- World Health Organization, 221, 285–286
- World Resources Institute, 57, 314, 317
- World Trade Organization, 282
- Worldwatch Institute, 314; *State of the World* report, 309–310
- Worster, Donald, 204
- Wuertz, Howard, 218
- Wuppertal Institute for Climate, Environment and Energy in Germany, 11, 200, 314
- Wyatt, Wayne, 217
-
- xeno-estrogens, 16
- Xeriscape movement, 219
- Xerox, 137, 186; recyclable photocopier, 78, 138
-
- Yergin, Daniel, 145
-
- zero-emission industrial parks, 16
- Zero Emission Vehicle requirement (California), 33
- zoning, 45
- Zürich, Switzerland, transit system, 44