

Index

- Accounting systems, 7-8, 69
- Adjustable-speed drives, 71-72, 127-128
- Advanced technologies. See Technology and practice improvements
- Advertising programs, 27, 126-127
- Air quality concerns. See Environmental concerns
- An Alternative Energy Future*, 56, 59-60
- Alternative pricing programs, 126
- Alumina refining, 106
- Aluminum production
 - corporate context of energy, 120
 - energy consumption and intensity, 7, 49, 51
 - smelting, 106-108
 - technology and practice improvements, 102, 106-108
- America's Energy Choices: Investing in a Strong Economy and a Clean Environment: Technical Appendixes*, 56-57, 60-62
- Anode production, 106-108
- ASDs. See Adjustable-speed drives
- Basic oxygen furnaces, 103-104
- Batch preparation stage of glass production, 112
- Bauxite ore, 106
- Bayer refining process, 106
- Bleaching process, 94
- Boilers, 74-75
- Bonneville Power Administration, 14, 126-127
- British thermal unit (Btu) tax proposal, 28-30
- Capital available for efficiency improvements, 8-9, 23-24, 122-124
- Carbon and energy taxes, 27-30
- Catalytic processes, 79, 84-85
- Cement production, 49, 52, 108-112, 120
- Ceramics and glass production, 49, 52, 112-116
- Changing by Degrees: Steps to Reduce Greenhouse Gases*, 57, 62-63
- Chemical industry
 - energy consumption and intensity, 7, 45-48,
 - energy efficiency improvements, 90
 - energy intensive processes, 86-87
 - technology and practice improvements, 73, 86-90
- Chemical processes, 89, 93-94
- Clean Air Act of 1990, 9, 98
- Clinker production, 109
- Clinton tax proposal, 28-30
- CO₂ emissions. See Emission standards
- Coal-based iron production, 102-103
- Cogeneration
 - advantages and growth of, 75-77
 - chemical industry and, 86
 - energy efficiency improvements, 77-78
 - energy policy goals, 20, 24-27
 - EPACT provisions, 16, 19
 - generic technology and practice improvements, 73-78
 - industrial companies as energy producers, 125
 - sources of energy, 40-42
- Cokemaking, 98
- Combined cycle cogeneration sets, 74-75
- Combustion turbine cogeneration sets, 74-75
- Competitiveness
 - corporate investment in energy efficiency and, 118, 124
 - cost-effectiveness of technologies and, 22
 - DSM and, 125-126
 - NICE3 program and, 19
 - policy background and context, 9, 12, 14, 20-21
 - policy options, 23-24, 30

- Component oversizing, 73
- Computerized process controls and sensors, 78, 80
- Conservation audits. See Energy audits
- Conservation of energy. See Demand-side management; Energy saving features of improved technologies and practices; Federal energy initiatives; Policy context; Policy options
- Consumption and intensity. See *also* Demand-side management
 - categories of consumption, 35-36
 - consumption by fuel, 5, 9, 10
 - consumption by functional uses, industry, and energy source, 42
 - consumption by sector, 4, 8
 - energy intensity and industry consumption, 1-2, 53-56
 - energy sources used by industry, 37-43
 - industrial processes consuming much energy, 67-68
 - industries and their energy use, 7, **42-53**
 - international** comparisons, 5-6, 55-56
 - materials production, 46, 49-52
 - metals fabrication, 47, 52
 - nonmanufacturing, 47, 53
 - nonmetals fabrication, 47, 52-53
 - outlook for industry energy use, 56-63
 - overall energy consumption, 3, 7-8, 23, 35-37
 - primary metals production, 49, 51-52
 - process industries, 45-49
 - steam production and cogeneration, 73-75
- Container glass production, 116
- Continuous casting process, 104-105
- Conversion processes, 84
- Corporate context of energy
 - cost-effectiveness of technologies and, 22
 - DSM and, 125-131
 - economic efficiency of industry, 22
 - economic feasibility of improvements, 122
 - efficiency gap and, 124
 - energy awareness and, 12-14, 119-120
 - energy prices and, 7, 23, 124-125
 - energy-saving mechanisms, 7-9
 - information role, 12, 24-27, 120, 126-127
 - investment in energy efficiency, 117-124, 127-128, 130
 - technological feasibility of improvements, 120-122
 - utilities relationship with corporations, 125-131
- Corporate income tax provisions, 30
- Costs of energy, 1-2, 20, 69-73, 122-124. See *also* Price of energy; Production costs
- Cracking processes, 84, 89
- Cryogenic distillation process, 88-89
- Customer education and advertising programs, 126-127
- Cylinder machine, 94-95
- Demand-side management
 - corporate context of energy, 27, 125-131
 - industrial programs, 19, 128-131
 - policy considerations, 11-12
 - policy options, 31
 - public utility commissions and, 13
 - rate and equity concerns, 128
- Demonstration programs. See Research, development, and demonstration
- Direct process heat, 42-43
- Direct steelmaking, 104
- Distillation processes, 79-80, 82-84, 88-89
- DOE. See U.S. Department of Energy
- Dow Chemical Co., 120-121
- Drive control, 71-72
- Dry cement process, 108-109
- DSM. See Demand-side management
- Dual- and multi-fuel steam systems, 74
- Economic competitiveness. See Competitiveness
- Economic efficiency, 1-2
- Economic issues. See *also* Costs of energy; Financial incentives; Price of energy; Production costs
 - corporate investment in energy efficiency, 117-124, 127-128, 130
 - cost-effectiveness of technologies, 5-6, 22
 - feasibility of technology improvements, 120-124
 - market-based approaches to policy, 12
 - RD&D costs and benefits, 18-19
- Education programs, 27, 126-127
- Electric arc furnaces, 103-104
- Electric melters, 112, 115
- Electric motor drive, 42-43, 69-73
- Electric utilities. See Utilities
- Electricity. See *also* Cogeneration; Sources of energy
 - DSM and, 125
 - energy policy goals, 21, 24-27
 - growth in use of, 9, 39
 - transmission access, 16, 19
- Electrolysis, 107-108
- Emission standards, 20, 31-32, 85-86
- End-use energy consumption, 35-37
- Energy and carbon taxes, 27-30
- Energy audits, 16, 24-27, 127-128
- Energy Consumption and Conservation Potential: Supporting Analysis for the National Energy Strategy*, 56-59
- Energy control management systems, 69
- Energy costs. See Costs of energy
- Energy efficiency improvements. See Corporate context of energy; Technology and practice improvements
- Energy intensity. See **also** Consumption and intensity; Technology and practice improvements
 - chemical industry, 86-87
 - decline in industrial energy intensity, 6-7, 11
 - energy efficiency and intensity, 1-2, 54-55
 - industries and their energy use, 43-45
- Energy Policy Act of 1992, 2, 14-20, 27, 31-32, 71
- Energy Policy and Conservation Act, 14
- Energy prices. See Price of energy
- Energy saving features of improved technologies and practices
 - aluminum production, 106-107
 - cement production, 109, 111

- glass production, 112, 115
 - petroleum refining industry, 81-83
 - pulp and paper industry, 90, 92
 - steel production, 98, 100
- Energy security. See Market security
- Energy sources. See Sources of energy
- Energy Tax Act of 1978, 14
- Engineering efficiency, 1-2
- Environmental concerns
 - advocate roles in industrial energy use, 13
 - energy policy goals, 20-22
 - permits, 31-32
 - petroleum refining industry, 85-86
 - policy background and context, 9, 12
 - steel production, 98
- Environmental Protection Agency, 14, 17, 27, 96-97
- EPACT. See Energy Policy Act of 1992
- EPCA. See Energy Policy and Conservation Act
- Equipment changes and upgrades, 8, 69,73, 128-129.
 - See *also* Fuel-switching potential
- Equipment maintenance programs, 7-8,67-69
- Equipment standards, testing, and labeling, 15,17-18,27,31, 71
- Equity concerns, demand-side management and, 128
- Ethylene production, 89-90
- Federal energy initiatives
 - energy audits, 16
 - equipment standards, testing, and labeling, 17-18
 - introduction, 14-16
 - nonutility power generation, 19
 - public recognition of industry efforts, 17
 - reporting and targeting programs, 17
 - technical assistance programs, 16-17, 24-27
 - technology RD&D, 18-19
 - utility-industry programs, 19-20
- Feedstocks, fictional uses of energy, 42-43
- Fiberglass production, 116
- Financial incentives, 27, 76-77, 127
- Financial worth evaluations, 122-124
- Finish grinding process, 109-110
- Finishing processes, 85
- Flat glass production, 116
- Fluidized-bed reactors, 78
- Food industry energy consumption and intensity, 45,49,73
- Forecasting industry energy use, 56-63
- Foreign energy taxes, 28-30
- Forming process, 105-106
- Forming stage of glass production, 116
- Fossil fuels, policy context and, 9-10, 14,20,24-27. See *also*
 - Sources of energy
- Fourdrinier machine, 94-95
- Free market approach to energy use, 59-60
- Fuel switching potential
 - corporate context of energy and, 125
 - dual- and multi-fuel steam systems, 74
 - energy policy goals, 20, 21, 24-27
 - RD&D efforts and, 18-19
 - sources of energy, 40-41
- Fuel use. See Consumption and intensity; Sources of energy
- Functional uses of energy, 42-43
- Funding for energy efficiency improvements, 122-124
- Funding for research, development, and demonstration, 18-19
- Gas utilities. See Utilities
- Generic technology and practice improvements
 - catalysts and, 79
 - energy control management systems, 69
 - housekeeping, maintenance, and accounting, 65-69
 - motor drive equipment, 69-73
 - process controls and sensors, 78, 80
 - process integration, 79
 - separation processes, 79-80
 - steam production and cogeneration, 73-78
 - waste heat recovery, 78-79
 - yield improvements and recycling, 80-81
- Glass and ceramics production, 49, 52, 112-116
- Green Lights program, 17, 27
- Greenhouse policy planning, 16
- Grinding process, 109-110
- Hall-Heroult smelting process, 106-108
- Heat recovery, 78-79,94-96
- Heat treating process, 105-106
- High-efficiency motors, 69-71, 127-128
- Housekeeping programs, 7-8, 67
- Hydrocracking process, 84
- Hydrotreating process, 85
- Improved technologies and practice. See Technology and practice improvements
- Income taxes, 27-30
- Industrial competitiveness. See Competitiveness
- Industrial demand-side management. See Demand-side management
- Industrial energy consumption. See Consumption and intensity
- Industrial Energy Use, 8-9
- Industrial gas industry, 120
- Industrial structure, energy intensity and, 1-2,5-6, 11,54-56
- Industry output, 1-2, 11,43-45,53-56
- Information dissemination to corporations, 12, 120, 126-127
- Integrated resource planning, 11-12, 19,27
- International comparisons of energy intensity, 5-6,55-56
- International Iron and Steel Institute, 97-98
- Investment in energy efficiency
 - business climate and corporate culture, 118
 - capital investment, 8-9, 23-24, 122-124
 - corporate income tax provisions and, 30
 - manager's personalities and, 118-119
 - regulations and, 118
 - willingness to invest, 117-118
- Investor income tax provisions, 27
- Iron ore preparation, 98

- Ironmaking, 101-103
- IRP. See Integrated resource planning
- Kraft processes, 93-96
- Load management. See Demand-side management
- Loan assistance to corporations, 27, 127
- Maintenance programs, 7-8
- Managerial styles and corporate energy investment, 118-119
- Manufacturing Energy Consumption Survey (MECS), 17,31
- Market growth, corporate investment in energy
 - efficiency and, 118
- Market security, 9, 20-21. See *also* Supply of energy
- Marketable permits, 32
- Materials production
 - energy consumption and intensity, 46, 49-52, 73
 - policy background and context, 7, 12-13
 - technology and practice improvements, 97-116
- Materials recycling. See Recycling
- Mechanical pulping processes, 93
- Melting and refining stages of glass production, 112,115-116
- Membrane separation process, 89
- Metal Casting Competitiveness Research Act of 1990, 14
- Metals fabrication, 47, 52
- Moltex process, 89
- Motor drive equipment, 4243,69-73
- Motor programs, 127-128
- Motor standards, testing, and labeling, 15, 17-18,27,31,71
- Multi-fuel steam systems, 74
- National Energy Conservation Policy Act, 14, 17
- National Energy Strategy, First Edition, 1991/1992*, 56,58
- National Industrial Competitiveness through efficiency:
 - Energy, Environmental, and Economics program (NICE³), 19
- Natural gas use, policy context and, 10. See *also Sources of energy*
- NECPA. See National Energy Conservation Policy Act
- Niagara Mohawk, 128
- Nitrogen production, 88-89
- Nonmanufacturing sector, 47,53
- Nonmetals fabrication, 47,52-53
- Nonutility power generation. See Cogeneration
 - NUCOR, *Inc.*, 105, 122
- Oak Ridge National Laboratory, 104
- Office of Industrial Technologies, 18
- Ore-based steelmaking, 97, 104
- Ore-to-powder steelmaking, 104
- Output. See Industry output
- Oxygen production, 88-89
- Paper industry. See Pulp and paper industry
- Paperboard products, 96-97
- Papermaking process, 95-96
- Personnel available for efficiency improvements, 122-124
- Petroleum refining industry
 - energy consumption and intensity, 7, 45-48, 48
 - energy efficiency improvements, 85-86
 - increasing energy requirements, 66-67
 - technology and practice improvements, 73, 81-86
- Petroleum use, policy context and, 10, 20. See *also Sources of energy*
- Policy context
 - energy policy goals, 20-22
 - energy policy issues, 6, 22-23
 - Federal policy, 14-20
 - institutional trends, 11-12
 - political trends, 12
 - stakeholders and interested parties, 12-14
 - technical and economic trends, 10-11
- Policy findings
 - corporate energy-saving mechanisms, 7-9
 - introduction, 1-2
 - policy considerations for saving energy, 9-10
 - technical potential for saving energy, 3-7
- Policy options
 - financial incentives, 24-30
 - industrial policy strategies, 23-24
 - information programs, 24-27
 - product reuse and materials recycling, 32-33
 - regulations, 24-26, 30-32
 - studies forecasting energy use, 56-63
 - technology RD&D, 32
- Political issues influencing energy policy. See
 - Competitiveness; Environmental concerns; Market security
- Pollution permits, 31-32
- Portland cement, 108
- Postforming stage of glass production, 116
- Power conditioning, 71
- Powerplant and Industrial Fuel Use Act of 1978, 14
- Pressure swing adsorption process, 89
- Price of energy. See *also* Costs of energy
 - alternative pricing programs, 126
 - competitiveness and, 20
 - corporate context of energy, 7, 23, 124-125
 - DSM and, 126, 128
 - international comparisons, 5-6, 55-57
 - policy context, 23
 - sectoral and industrial energy prices, 10, 38-40
- Primary finishing process, 104-105
- Primary metals production, 7,49, 51-52, 73. See *also Aluminum production; Steel production*
- Process controls and sensors, 78, 80
- Process industries
 - energy consumption and intensity, 45-49
 - policy background and context, 7, 12-13
 - steam production and cogeneration in, 73
 - technology and practice improvements, 81-97
- Process materials use, 80-81
- Process refinements and changes, 8, 79, 80-81. See *also Cogeneration; Recycling; Waste heat recovery*
- Product reuse, 20, 32-33. See *also Recycling*
- Product shifts, 8
- Production costs, energy share of, 7,44-45, 119-120
- Production of energy-intensive products, 54-55

- Public recognition of industry efforts, 15-17, 27
- Public utilities. See Utilities
- Public Utility Regulatory Policies Act, 14, 19, 76-77
- Pulp and paper industry, 7, 45, 48-49, 73, 90-97
- Pulping processes, 93-94
- PURPA. See Public Utility Regulatory Policies Act
- Rates, demand-side management and, 126, 128
- Raw materials preparation, 109
- RD&D. See Research, development, and demonstration
- Rebates, 128-130
- Recovered waste heat, 78-79, 94-96
- Recovery processes, 94
- Recycling
 - aluminum production, 108
 - energy policy goals, 20, 21
 - policy options, 32-33
 - pulp and paper industry, 96-97
 - technology and practice improvements, 80-81
- Refineries. See Petroleum refining industry
- Refining processes, 106
- Refining stage of glass production, 112, 115-116
- Reforming processes, 85
- Regenerative furnaces, 112
- Regulation. See also Federal energy initiatives
 - corporate investment in energy efficiency and, 118
 - industrial behavior and, 24-26, 30-32
 - political issues and policy concerns, 12
- Reorganization processes, 85
- Reporting and targeting programs, 15-17, 31
- Research, development, and demonstration, 15, 18-19, 24-26, 32
- Research organizations of utilities, 13
- Rewound motors, 71
- Sales taxes, 28-30
- Scrap-based steelmaking, 97, 104
- Secondary finishing process, 105-106
- Semimechanical pulping process, 93
- Separation processes, 49, 79-80, 82-84, 89
- Smelting processes, 106-108
- Sources of energy. See also Fossil fuels
 - cogeneration, 40-42
 - electrification, 39
 - fuel switching potential, 40-41
 - fuel use trends, 10
 - functional uses of energy, 42-43
 - market security and, 20
 - mix of, 37-38
 - sectoral and industrial energy prices, 38-40
- State-of-the-art technologies. See Technology and practice improvements
- Steam-only boilers, 74-75
- Steam production, 42-43, 73-78. See *also* Cogeneration
- Steam turbine cogeneration sets, 74-75
- Steel and Aluminum Conservation and Technology
 - Competitiveness Act of 1988, 14
- Steel production
 - corporate context of energy, 120
 - energy consumption and intensity, 7, 49, 51-52
 - steelmaking, 103-104
 - technology and practice improvements, 97-106
- Studies forecasting industrial energy use, 56-63
- Sulfite processes, 93-94
- Sulfuric acid production, 86-88
- Supply of energy, 7, 9, 10, 20, 21
- Target programs, 15-17, 31
- Tax options, 27-30
- Technical assistance programs, 16-17, 24-27
- Technical personnel available for *efficiency* improvements, 122-124
- Technology and practice improvements
 - corporate context of energy, 119-124
 - energy efficiency improvements, 7-8, 11, 77-78, 85-86, 90
 - energy intensity and, 54-55, 65-67
 - generic improvements, 67-81
 - industrial DSM programs, 19, 128-131
 - industrial policy strategies, 23-24
 - materials production, 97-116
 - primary metals production, 97-108
 - process industries, 81-97
 - technical potential for saving energy, 3-7
- Technology research, development, and demonstration. See Research, development, and demonstration
- Tennessee Valley Authority, 126-127
- Textile industry energy consumption, 45
- Thermal cracking process, 84, 89
- Thermomechanical pulping process, 93
- Thin slab casting, 105
- Tobacco industry energy consumption, 45-48
- Trade ally cooperation programs, 127
- Trade associations, policy developments and, 13
- Treating processes, 85
- Twin-wire machines, 94-95
- U.S. Department of Energy
 - energy efficiency programs, 13-14
 - EPACT provisions, 14-20, 31-32
 - fuel switching surveys, 40
 - ironmaking technology research, 102-103
 - studies forecasting energy use, 56-59
- Utilities. See *also* Demand-side management
 - corporate context of energy, 125-131
 - industrial energy use role, 13, 19-20
 - information dissemination to corporations, 120, 126-127
 - policy considerations for saving energy, 9, 11-12
- Value of shipments. See Industry output
- Waste heat recovery, 78-79, 94-96
- Waste paper recycling, 96-97
- Waste reduction, 19, 80-81, 120-121
- Waste Reduction Innovative Technology Evaluation program, 19
- Wet cement process, 108-109
- Wood preparation process, 93
- WRITE program, 19
- Yield improvements, 80-81