The original documents are located in Box 62, folder "1976/10/28 - Energy Resources Council" of the James M. Cannon Files at the Gerald R. Ford Presidential Library.

THE WHITE HOUSE
WASHINGTON

I WILL ATTEND ✓
w/Schleede

HAVE SCHLEEDE ATTEND ✓

Schedule permitting

FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

October 26, 1976

1976 OCT 26 PM 3 43
OFFICE OF THE ADMINISTRATOR

MEMORANDUM TO THE ENERGY RESOURCES COUNCIL

FROM: FRANK ZARB, EXECUTIVE DIRECTOR

SUBJECT: ENERGY RESOURCES COUNCIL MEETING, OCTOBER 28, 1976

This memorandum confirms that the Energy Resources Council will meet on Thursday, October 28, at 10:15 a.m. in the Roosevelt Room.

The agenda items are:

Mid-Term Technologies Update	ERDA
Energy Program Update	FEA

Background papers are attached.

Attachments

102618

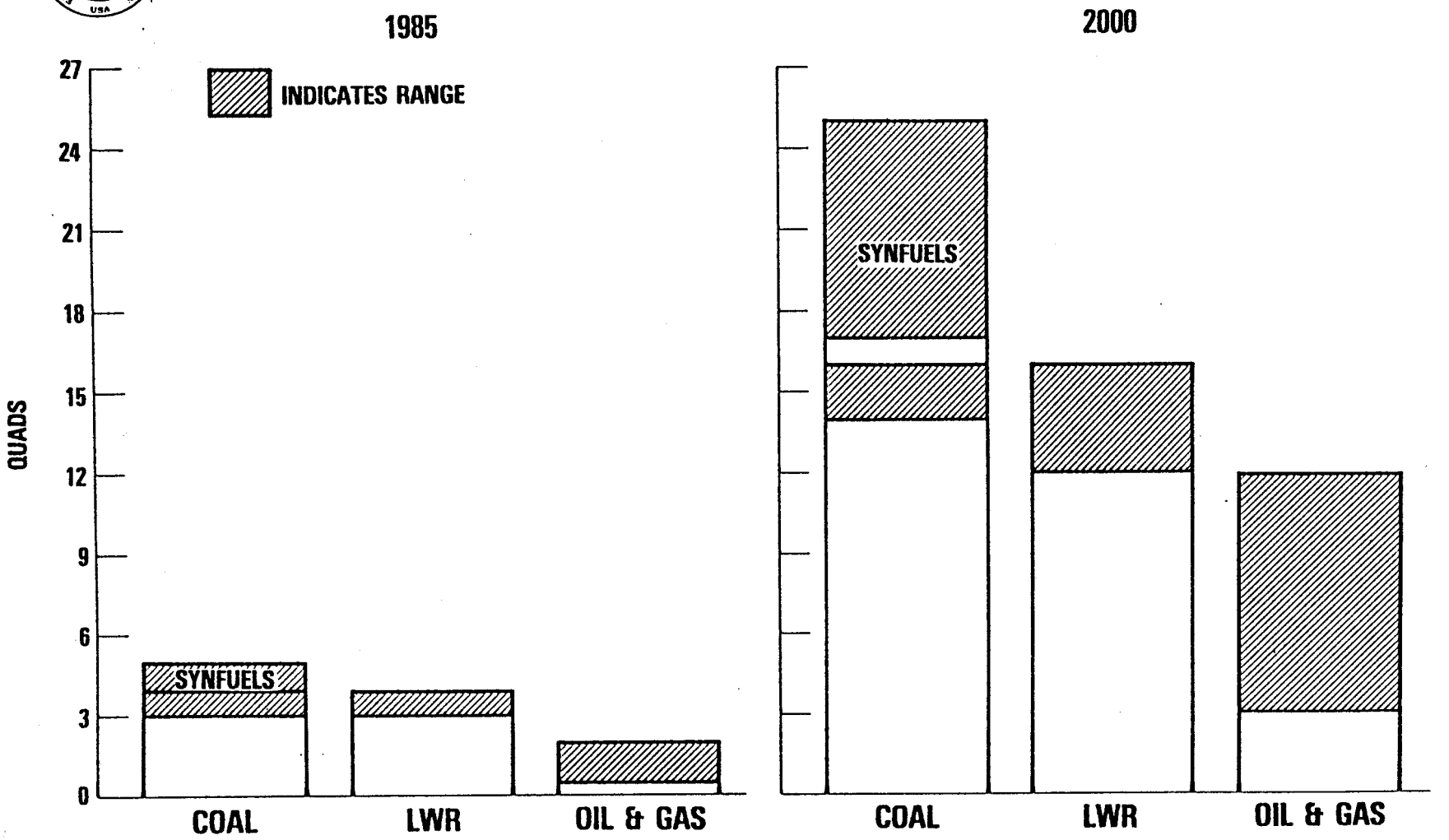
ERC BRIEFING

POST 1985
ENERGY TECHNOLOGY IMPACTS

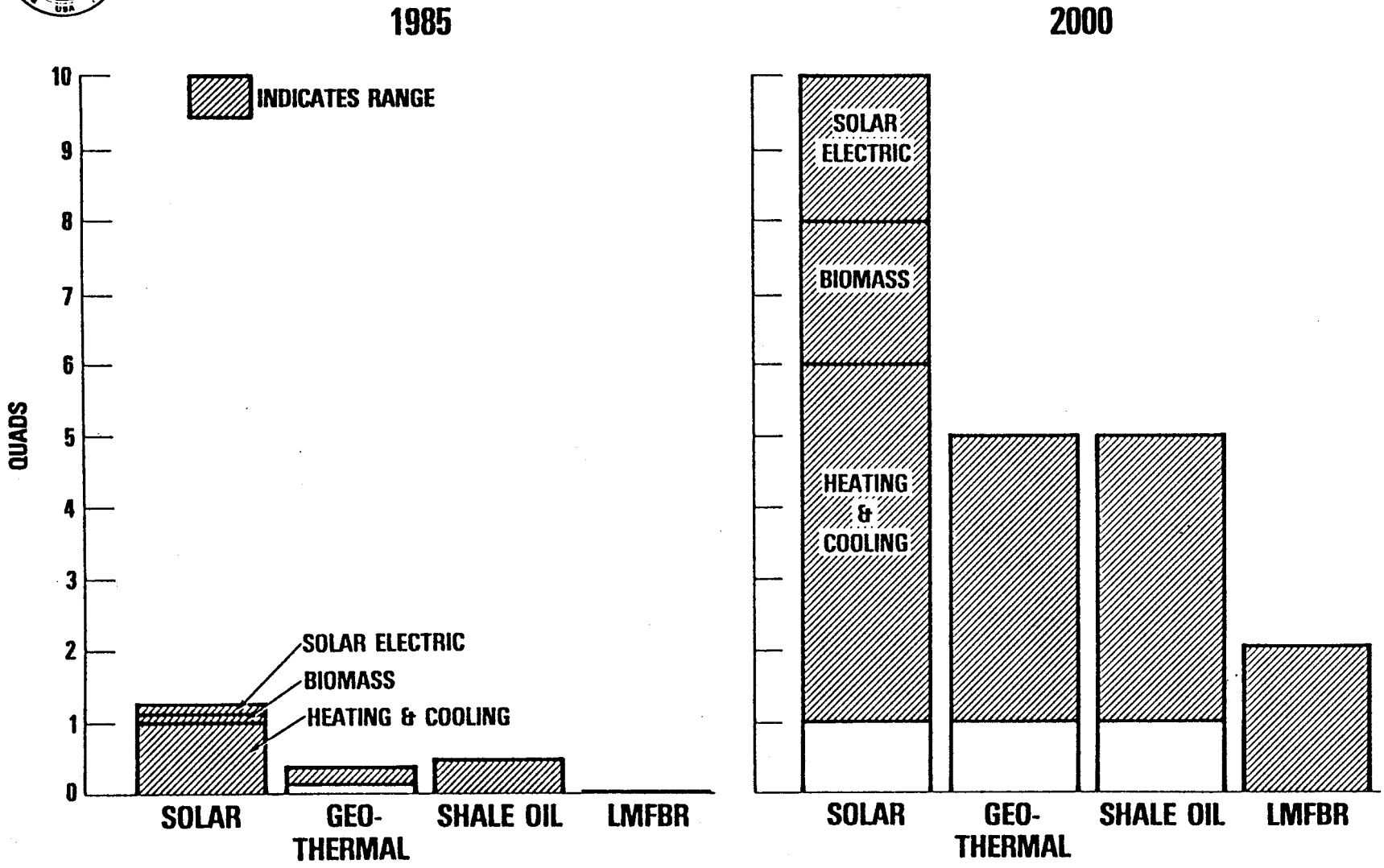
PRESENTATION OUTLINE

- POTENTIAL IMPACT OF
  - EXPANSION EXISTING FUELS
  - NEW FUELS
  - CONSERVATION
- ELECTRIC COST COMPARISONS IN YEAR 2000
- ERDA EXPENDITURES IN FUEL CATEGORIES
  - 1975 OUTLAYS
  - INCREASES 1975 TO 1977

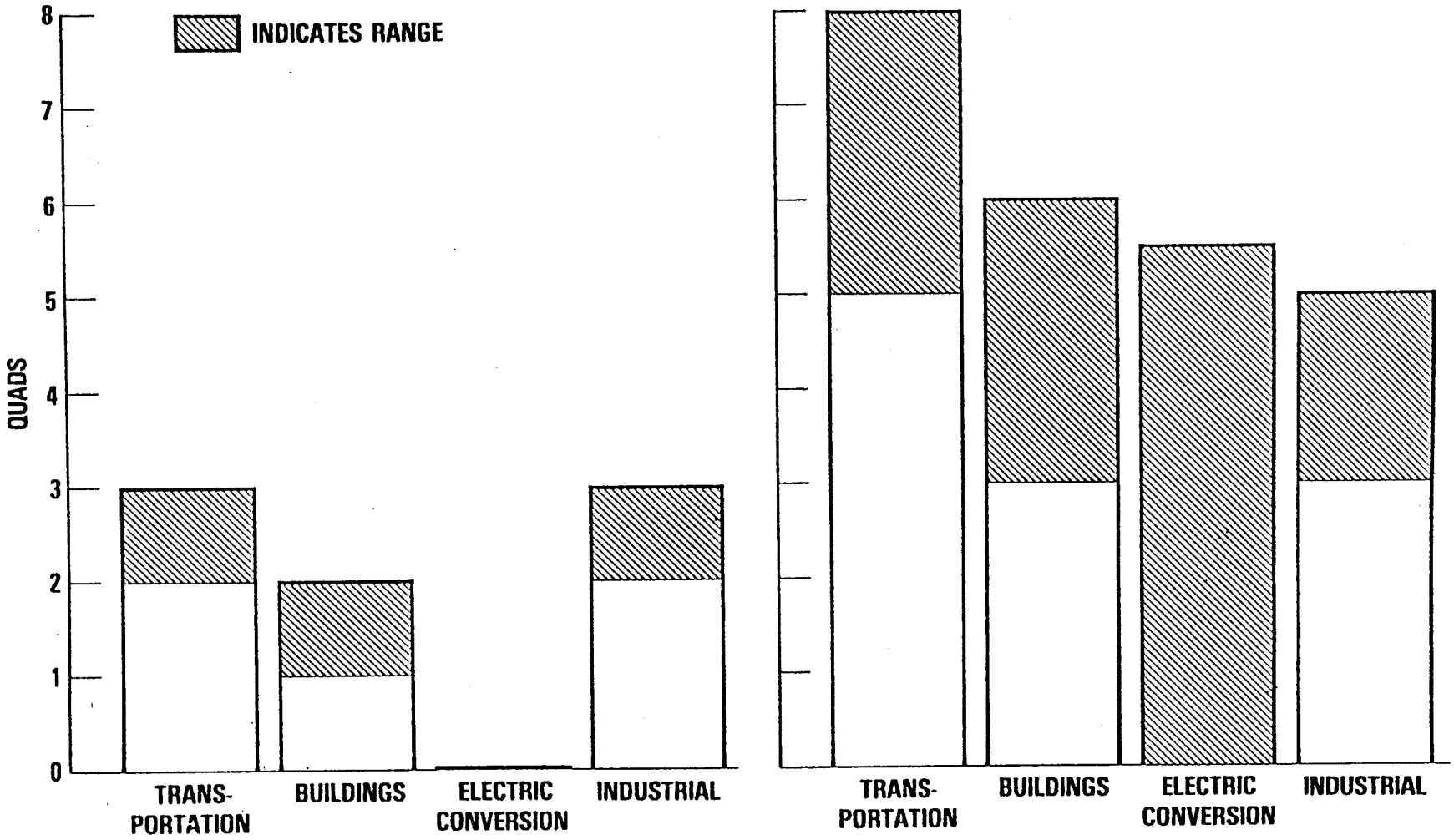
IMPACTS OF EXPANSION OF EXISTING FUEL TYPES



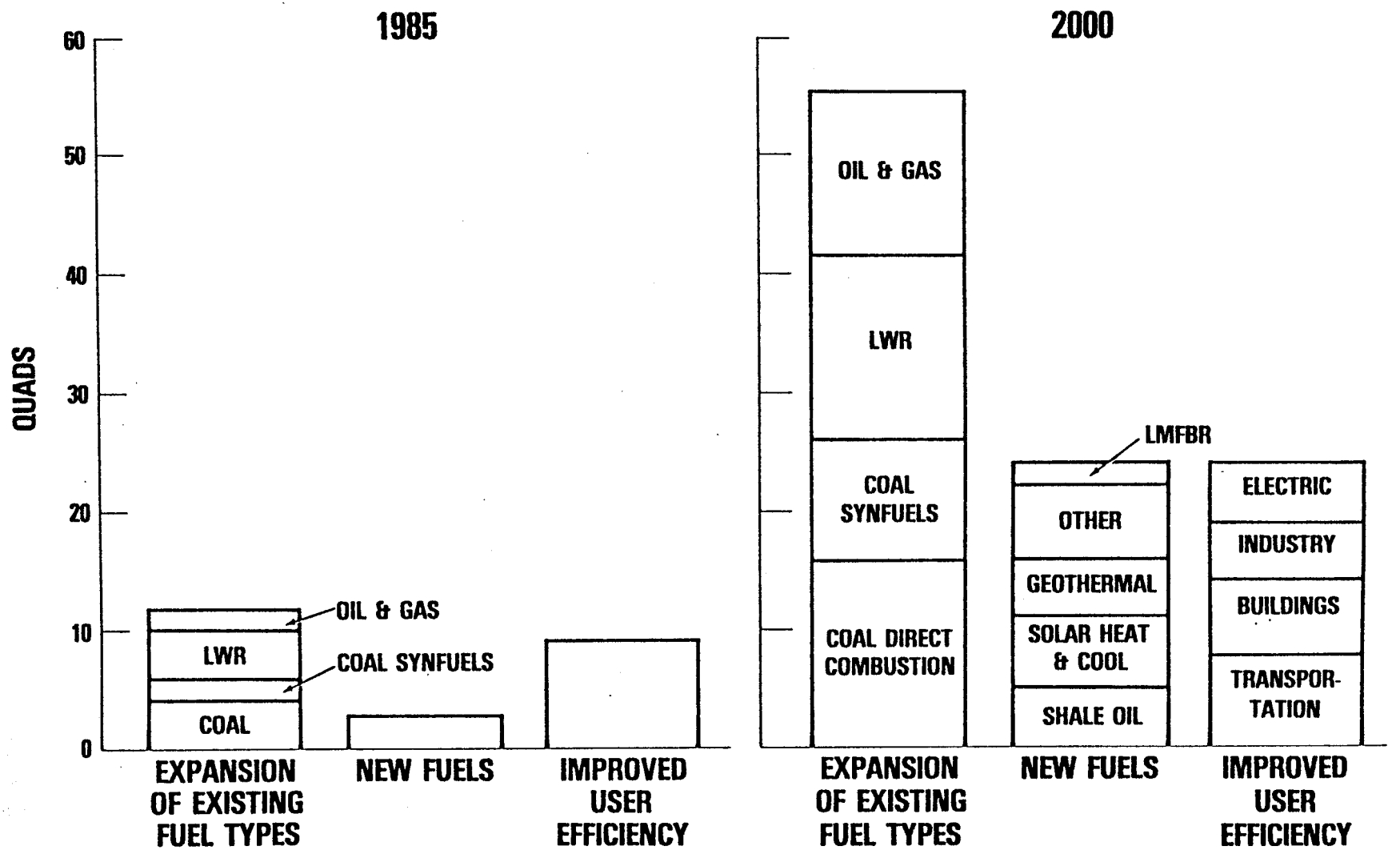
IMPACTS OF NEW FUELS



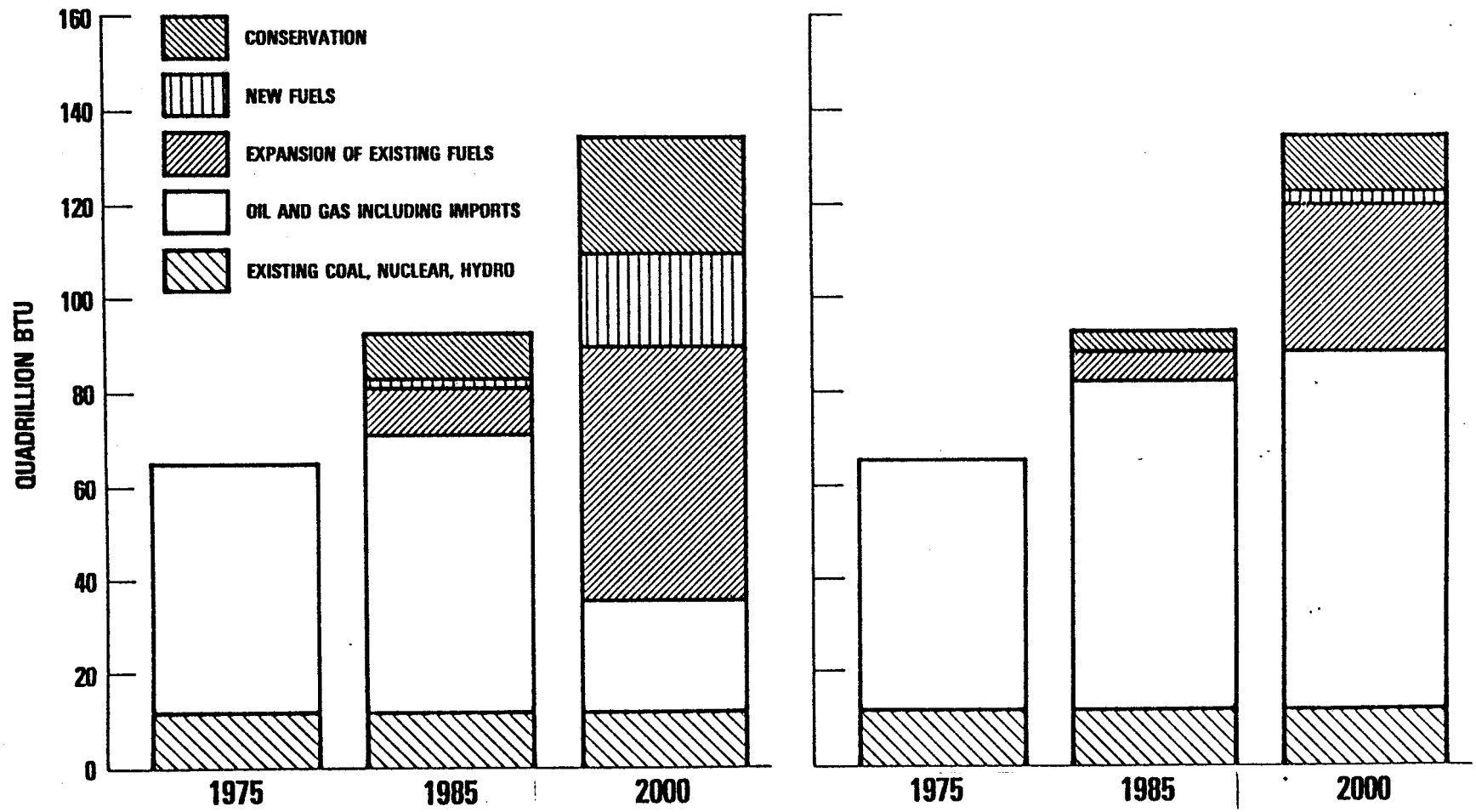
IMPACTS OF END-USE EFFICIENCY IMPROVEMENTS



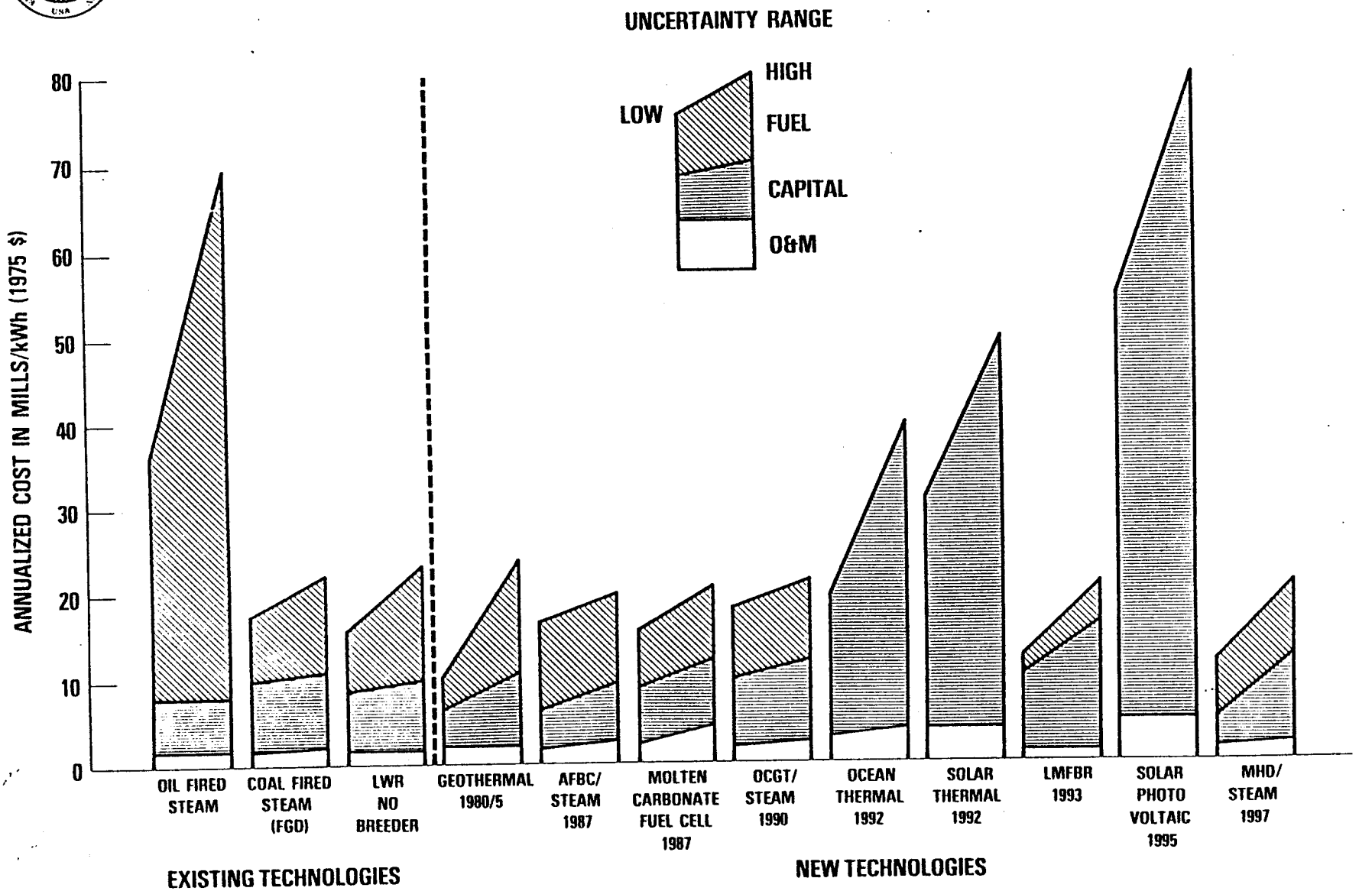
MAXIMUM IMPACTS OF ENERGY RD&D EFFORTS



ENERGY FLOWS AT POINT OF FINAL DISTRIBUTION



COMPARISON OF ANNUALIZED COST OF BASELOAD TECHNOLOGIES IN YEAR 2000

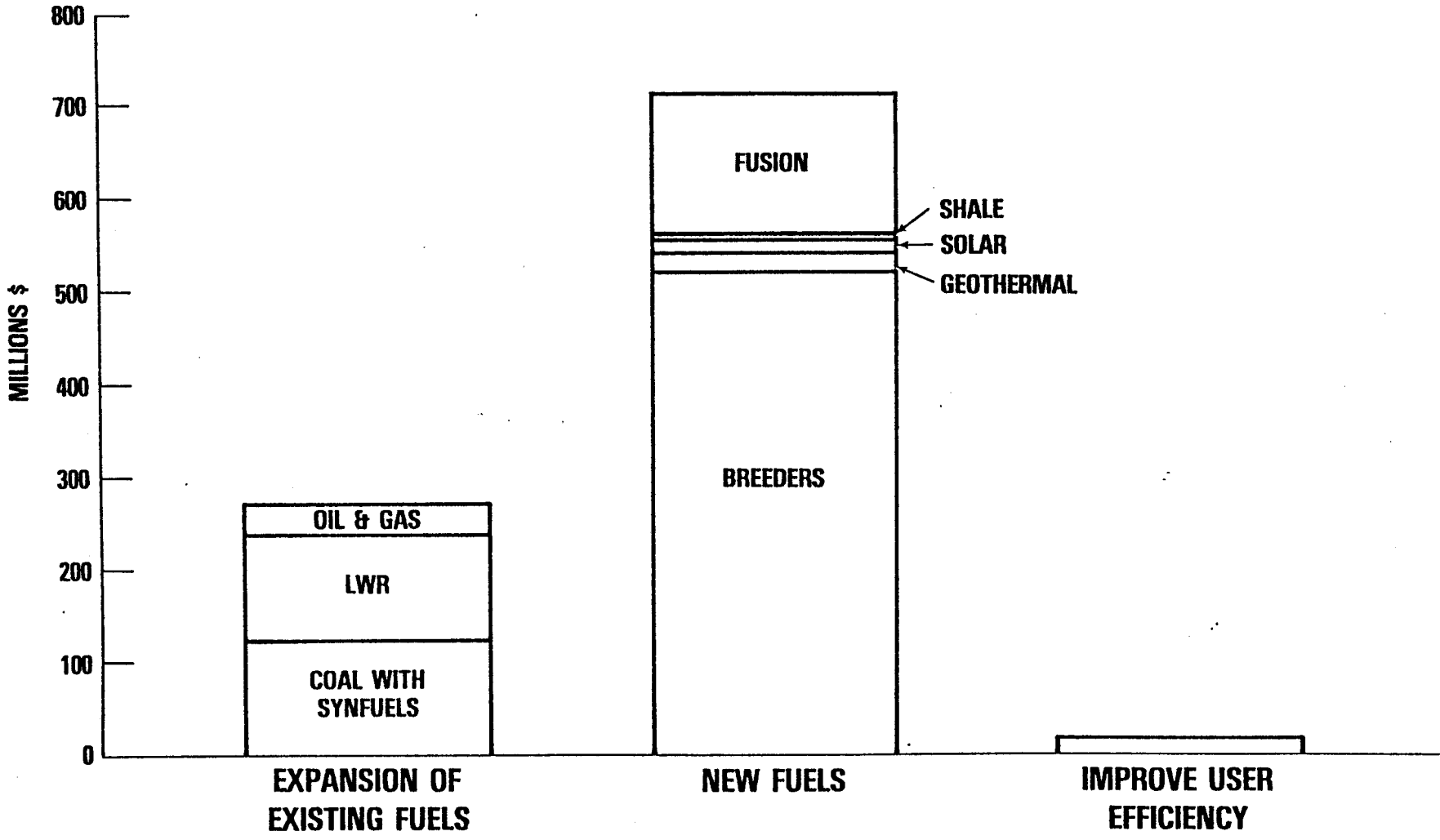


STRATEGIC APPROACH FOR ENERGY RD&D

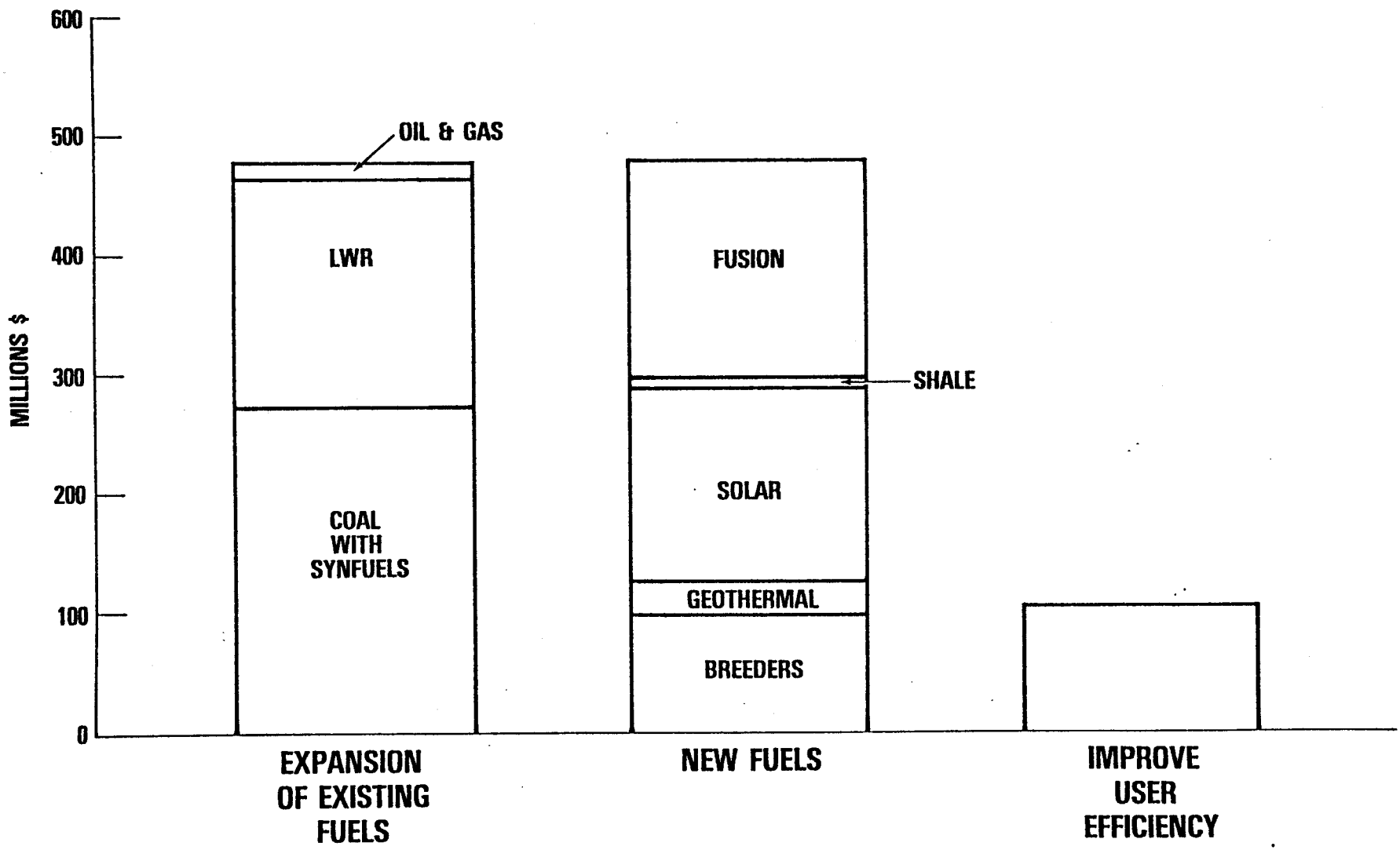
BASIC STRATEGIC APPROACH IS TO:

- BUY TIME FOR RD&D BY CONSERVATION MEASURES
- INCREASE RECOVERABLE AMOUNTS OF DOMESTIC OIL AND GAS
- OVERCOME PROBLEMS TO PERMIT INCREASED USE OF COAL AND LWR'S
- EXTEND USE OF EXISTING ENERGY SYSTEMS BY DEVELOPMENT OF SYNTHETIC REPLACEMENTS FOR NATURAL RESOURCES
- PROVIDE MARGIN FOR FAILURE BY BROAD-BASED RATHER THAN SINGLE ENERGY SOURCE APPROACH
- REACH FOR EVENTUAL ENERGY SYSTEM DEPENDENCE ON INEXHAUSTIBLE AND RENEWABLE DOMESTIC RESOURCES

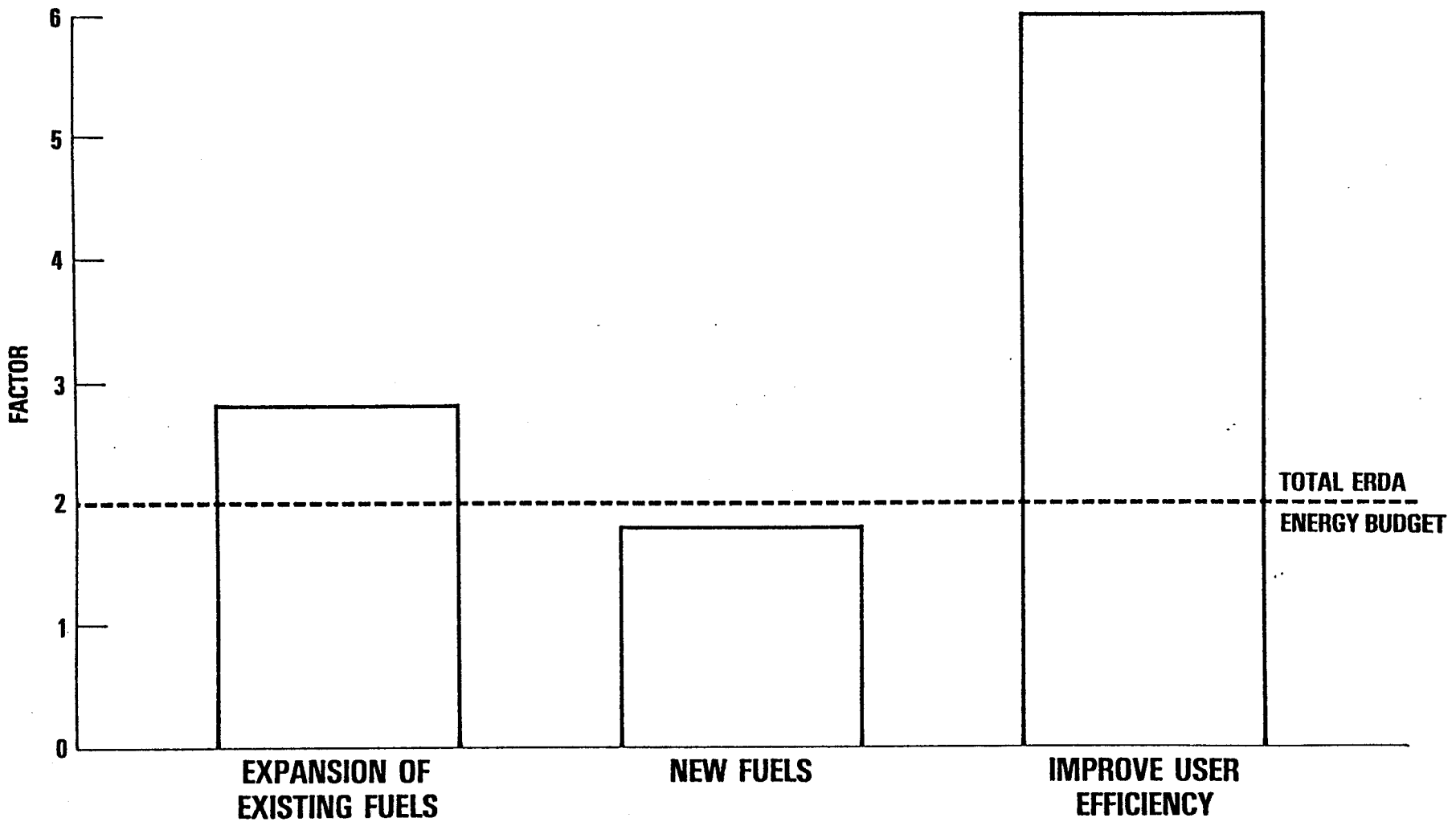
ACTUAL OUTLAYS (MILLIONS $) IN 1975



ABSOLUTE INCREASE (MILLIONS $ -OUTLAY)
1977 OVER 1975 BASE



FACTOR OF INCREASE IN 1977 OUTLAYS OVER 1975 BASE



DEVELOPMENT STRATEGIES MAY FAIL

- PUBLIC REJECTION OF NUCLEAR POWER
- RECOGNITION OF A CATASTROPHIC CO_2 PROBLEM
- INTRACTABLE CARCINOGEN PROBLEMS IN SYNFUEL PLANTS
- RADICAL CHANGE IN WORLD OIL PRICE AND TRADE POLICY
- CONSERVATION PROGRAMS FAIL TO ATTRACT PUBLIC SUPPORT
- COAL PRODUCTION RETARDED BY ENVIRONMENTAL PROBLEMS
- MAJOR ECONOMIC PROBLEMS WITH NEW TECHNOLOGIES (CAPITAL INTENSIVITY, TOTAL COST)
- EXISTING RESOURCE BECOMES ECONOMICALLY AVAILABLE UNEXPECTEDLY (GEOPRESSURIZED GAS, TIGHT GAS)
- TECHNOLOGY TO GUARANTEE ACCESS TO NUCLEAR FUSSION AND SOLAR NOT AVAILABLE

ERDA's UNIQUE MISSION

MANHATTAN PROJECT AND APOLLO PROGRAM ARE NOT COMPARABLE

- DOD AND NASA WERE THEIR OWN CUSTOMERS
- TECHNOLOGICALLY COMPLEX MISSIONS (SINGLE GOAL)
- MANAGEMENT SIMPLIFIED—FEDERAL DIRECTION AND FEDERAL USE

ERDA's MISSION CHARACTERIZED BY:

- TECHNOLOGICALLY COMPLEX PRODUCTS FOR EXTERNAL CUSTOMERS
- DIVERSE INTERESTS INVOLVED IN DEVELOPMENT AND APPLICATION
- HARDER TO AGREE ON GOALS AND DIRECT MULTIPLE EFFORTS

TECHNOLOGIES AND PROGRAMS MUST MEET PUBLIC TESTS

- SOCIAL AND ENVIRONMENTAL ACCEPTABILITY
- PUBLIC USERS DETERMINE MARKET VIABILITY

APPENDIX

DETAILED IMPACTS OF TECHNOLOGIES

COAL, DIRECT COMBUSTION

I. KEY ATTRACTIONS:
- AVOIDS COSTLY COAL CONVERSION PROCESSES
- DEVELOP PREFERABLE WAYS OF MEETING COAL'S ENVIRONMENTAL PROBLEMS
- USES MOST ABUNDANT FOSSIL FUEL RESOURCE
- PROVIDE FOR MORE ENERGY-EFFICIENT USE OF COAL

II. ENERGY CONTRIBUTIONS IN YR. 2000 23 TO 25 QUADS

III. STATUS: APPLIED DEVELOPMENT
- 30 MW ATMOSPHERIC FLUIDIZED BED IN OPERATION
- 1 MW PRESSURIZED FLUIDIZED BED IN DESIGN
- 13 MW PRESSURIZED FLUIDIZED BED UNDER STUDY
- JOINT COMBUSTION PROGRAM WITH I.E.A. UNDER WAY

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 5 YEARS

V. KEY ISSUES:
- NEED TO DEMONSTRATE PREFERABLE ENVIRONMENTAL AND ECONOMIC RESULTS
- FLUIDIZED BED COMBUSTION FACES MATERIALS AND TECHNICAL PROBLEMS

VI. ERDA BUDGET (B.O.) FOR FY 1977 $52 MILLION

HIGH-BTU COAL GASIFICATION

I. KEY ATTRACTIONS:
- SUBSTITUTE FOR DECLINING NATURAL GAS SUPPLY
- PRODUCES CLEAN, CONVENIENT FUEL
- USES MOST ABUNDANT FOSSIL FUEL RESOURCE

II. ENERGY CONTRIBUTIONS IN YR. 2000 1 TO 7 QUADS

III. STATUS: APPLIED DEVELOPMENT
- 5 GOVERNMENT-INDUSTRY FUNDED PILOT PLANTS NOW OPERATIONAL
  - 2 OPERATING FOR SEVERAL YEARS
  - 3 BEGAN OPERATION RECENTLY
- 2 PHASE I DEMONSTRATION PLANT CONTRACTS AWARDED

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 5 YEARS

V. KEY ISSUES:
- CAPITAL INTENSIVE AND HIGH COST RELATIVE TO CONVENTIONAL SOURCES
- REGULATORY METHODS AND CONTROLS INHIBIT COMMERCIAL PARTICIPATION
- ENVIRONMENTAL PROBLEMS WITH LARGE-SCALE OPERATIONS

VI. ERDA BUDGET (B.O.) FOR FY 1977 $79 MILLION

SYNTHETIC LIQUID FUELS FROM COAL

I. KEY ATTRACTIONS:
- SUBSTITUTES FOR IMPORTED OIL
- PROVIDES FUEL FORM NEEDED FOR PRESENT MARKETS
- USES MOST ABUNDANT FOSSIL FUEL RESOURCE

II. ENERGY CONTRIBUTIONS IN YR. 2000 0 TO 1 QUAD

III. STATUS: INITIAL DEMONSTRATION
- 11 PROCESS DEVELOPMENT UNITS OPERATING OR IN DESIGN
- 6 PILOT PLANTS:
  - 1 COMPLETED OPERATIONAL TESTING (COED)
  - 2 OPERATING (SRC, CRESAP)
  - 2 UNDER CONSTRUCTION (SYNTHOIL & H-COAL)
  - 1 PLANNED (DONER SOLVENT)
- DEMONSTRATION OF CLEAN BOILER FUEL (COALCON) IN DETAIL DESIGN

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 5 YEARS

V. KEY ISSUES:
- EXTENT OF FEDERAL COST-SHARING WITH INDUSTRY
- RELIABILITY OF HIGH-PRESSURE, HIGH-TEMPERATURE SYSTEMS
- NEED TO DEMONSTRATE LONG-TERM PERFORMANCE
- ENVIRONMENTAL PROBLEMS WITH LARGE-SCALE OPERATIONS

VI. ERDA BUDGET (B.O.) FOR FY 1977 $109 MILLION

LOW-BTU COAL GASIFICATION

I. KEY ATTRACTIONS:
- PROVIDES A CLEAN CONVENIENT FUEL
- CHEAPER THAN HIGH-BTU GAS IN MANY APPLICATIONS
- USES MOST ABUNDANT FOSSIL FUEL RESOURCE

II. ENERGY CONTRIBUTIONS IN YR. 2000 0 TO 1 QUAD

III. STATUS: APPLIED DEVELOPMENT
- 6 PROCESS DEMONSTRATION UNITS IN VARIOUS STAGES OF DESIGN, CONSTRUCTION AND OPERATION
- 2 PILOT PLANTS IN NEGOTIATION
- 3 DEMONSTRATION PLANTS IN NEGOTIATION

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 5 YEARS

V. KEY ISSUES:
- NEED TO DEVELOP CRITICAL COMPONENTS TO WITHSTAND CORROSION AND HIGH TEMPERATURES AND PRESSURES
- NEED TO RETROFIT EXISTING FACILITIES TO PROMOTE USE
- LOW-BTU GAS NOT ECONOMICALLY TRANSPORTED OVER LONG DISTANCES

VI. ERDA BUDGET (B.O.) FOR FY 1977 $47 MILLION

LWR TECHNOLOGY AND FUEL CYCLE

I. KEY ATTRACTIONS:
- DOMESTIC SOURCE EXPLOITABLE IN NEAR-TERM
- REDUCE USE OF OIL AND GAS FOR ELECTRIC POWER GENERATION
- PROVIDE ECONOMIC ENERGY SOURCE

II. ENERGY CONTRIBUTIONS IN YR. 2000 13 TO 17 QUADS

III. STATUS: MARKET PENETRATION
- ERDA OPERATES THREE URANIUM ENRICHMENT PLANTS AND IS DESIGNING ADD-ON CAPACITY FOR THE PORTSMOUTH PLANT
- FEDERALLY FINANCED DEMONSTRATION PROJECT OF REPROCESSING BEING PLANNED TO ASSURE SAFETY, ENVIRONMENTAL ACCEPTABILITY, AND ADEQUATE SAFEGUARDS
- DEMONSTRATION WASTE REPOSITORY BY 1984

IV. KEY ISSUES:
- RESOLUTION OF SOCIETAL CONCERNS ABOUT NUCLEAR POWER
- RESOLUTION OF REGULATORY ISSUES
- DEMONSTRATION OF WASTE MANAGEMENT AND STORAGE CAPABILITY

V. ERDA BUDGET (B.O.) FOR FY 1977 $162 MILLION

TERTIARY OIL RECOVERY

I. KEY ATTRACTIONS:
- OF 440 BILLION BARRELS ORIGINAL OIL-IN-PLACE, ONLY SOME 110 BILLION HAS BEEN PRODUCED
- TERTIARY METHODS MAY RECOVER UP TO 60 BILLION BARRELS AFTER PRIMARY AND SECONDARY OPERATIONS

II. ENERGY CONTRIBUTIONS IN YR. 2000 **3 TO 11 QUADS**

III. STATUS: COMMERCIAL DEMONSTRATION
- 20 JOINTLY FUNDED PROJECTS IN 10 STATES
- 19 CONTRACTORS USING 5 TECHNOLOGIES

IV. KEY ISSUES:
- PROCUREMENT POLICIES INVOLVING REVENUE SHARING WITH INDUSTRY
- INDUSTRY RELUCTANT TO PARTICIPATE IN COST-SHARING CONTRACTS

V. ERDA BUDGET (B.O.) FOR FY 1977 **$24 MILLION**

STIMULATION OF NATURAL GAS PRODUCTION

I. KEY ATTRACTIONS:
- HUGE VOLUMES OF NATURAL GAS IN UNRECOVERABLE DEPOSITS
- STIMULATION METHODS HAVE PROVEN WORKABLE

II. ENERGY CONTRIBUTIONS IN YR. 2000 0 TO 1 QUAD

III. STATUS: APPLIED DEVELOPMENT
- 18 JOINTLY FUNDED PROJECTS IN 7 STATES
- 13 CONTRACTORS USING 3 TECHNOLOGIES

IV. KEY ISSUES:
- INADEQUATE DATA ON RESERVOIR CHARACTERISTICS
- STIMULATION TECHNOLOGIES NOT READILY ADAPTABLE TO ALL MARGINAL GAS-PRODUCING AREAS

V. ERDA BUDGET (B.O.) FOR FY 1977 $11 MILLION

SOLAR: HEATING AND COOLING OF BUILDINGS

I. KEY ATTRACTIONS:
- NEAREST TERM COMMERCIAL SOLAR TECHNOLOGY
- ESSENTIAL ELEMENTS OF TECHNOLOGY DELIVERY SYSTEM EXIST
- SMALL BUSINESS CAPABLE OF COMPETING; INDUSTRY ALREADY OPERATING
- GOVERNMENTAL INCENTIVES CAN DIRECTLY STIMULATE COMMERCIALIZATION

II. ENERGY CONTRIBUTIONS IN YR. 2000 1 TO 6 QUADS

III. STATUS: DEMONSTRATION
- 1554 RESIDENTIAL BUILDINGS NOW UNDER CONTRACT
- 59 COMMERCIAL BUILDINGS NOW UNDER CONTRACT
- SOME OF EACH ALREADY OPERATIONAL

IV. KEY ISSUES:
- INITIAL COST: LIFE CYCLE COST ASSUMPTIONS, LOAN AVAILABILITY
- PREMISE THAT FEDERAL DEMO. PROGRAM CAN STIMULATE PRIVATE MARKET REMAINS TO BE PROVED
- PERFORMANCE: DEVELOP STANDARDS, ABILITY TO PREDICT REPAIR AND MAINTENANCE NEEDS
- INTERFACING WITH UTILITY OR OTHER EXISTING SYSTEMS

V. ERDA BUDGET (B.O.) FOR FY 1977 $60.0 MILLION

BIOMASS CONVERSION

I. KEY ATTRACTIONS:
- RENEWABLE ENERGY RESOURCE
- MAIN SOURCES – CROP, LUMBERING, AND FOOD PROCESS RESIDUES; ANIMAL WASTES, ETC.
- PRODUCTS METHANE, HYDROGEN, AMMONIA, ETC. HAVE HIGH VALUES
- EXPANDED KNOWLEDGE OF ECOSPHERE AND LIFE PROCESSES OFFER SPINOFF POTENTIALS

II. ENERGY CONTRIBUTIONS IN YR. 2000 0 TO 2 QUADS

III. STATUS: APPLIED DEVELOPMENT
- FEEDLOT AND OTHER AGRICULTURE RESIDUES ARE IN LIMITED COMMERCIAL USE
- TERRESTRIAL BIOMASS PRODUCTION AND CONVERSION WILL ENTER PILOT PLANT STAGE IN FISCAL YEAR 1978
- SYSTEM STUDIES IN MARINE BIOMASS ARE UNDER WAY

IV. KEY ISSUES:
- TERRESTRIAL PROGRAMS MAY AFFECT FOOD PRODUCTION AND COMPETITIVE LAND USES
- AQUATIC BARRIERS: PLANT ANCHORING, SEEDING, HARVESTING, TRANSPORTATION, ETC.

V. ERDA BUDGET (B.O.) FOR FY 1977 $4.5 MILLION

SOLAR THERMAL ELECTRIC

I. KEY ATTRACTIONS:
- INEXHAUSTIBLE SOURCE
- BASIC TECHNOLOGY IS HERE, PILOT PLANTS ARE BEING BUILT AND TESTED IN FRANCE

II. ENERGY CONTRIBUTIONS IN YR. 2000 [< 1 QUAD]

III. STATUS: APPLIED DEVELOPMENT
- 5 MW TEST PROJECT IS CURRENTLY IN DESIGN
- PILOT PROJECT RECENTLY TESTED IN FRANCE
- 10 MW PILOT PLANT PROGRAM IN RFP/PROPOSAL STAGE
- HELIOSTAT COST REDUCTION R&D INITIATED

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED [10 YEARS]

V. KEY ISSUES:
- COST HIGH, 10 x REDUCTION NEEDED ESPECIALLY FOR HELIOSTATS
- LOCAL HEAT REJECTION
- AESTHETICS
- EFFECT OF SHIELDING OF LARGE LAND AREAS
- AVAILABILITY OF ADEQUATE STORAGE

VI. ERDA BUDGET (B.O.) FOR FY 1977 [$38 MILLION]

WIND ENERGY CONVERSION SYSTEMS

I. KEY ATTRACTIONS:
- INEXHAUSTIBLE SOURCE
- MODULAR NATURE LEADS TO BOTH DISPERSED AND CENTRAL APPLICATIONS
- ESSENTIALLY BENIGN ENVIRONMENTALLY

II. ENERGY CONTRIBUTIONS IN YR. 2000 < 1 QUAD

III. STATUS: INITIAL DEMONSTRATION
- 1ST 100 KW EXPERIMENTAL UNIT UNDER TEST AT SANDUSKY, OHIO; 2ND 100 KW COMPONENTS BEING ASSEMBLED
- 200 KW EXPERIMENTAL MACHINES IN DESIGN
- 1.5 MW DEMONSTRATION DESIGN TO COMMENCE FY 1977

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 6 YEARS FOR LARGER SYSTEMS

V. KEY ISSUES:
- LIFETIME OF LARGE ROTORS UNCERTAIN
- STRUCTURAL DYNAMICS CONTROL
- ENERGY VALUE/UTILIZATION OF INTERMITTANT/VARIABLE SOURCE
- ECONOMIC COMPETITIVENESS
- TECHNOLOGY FOR ADEQUATE STORAGE MUST BE DEVELOPED
- WIND RESOURCE AND SITING INFORMATION ADEQUACY

VI. ERDA BUDGET (B.O.) FOR FY 1977 $15 MILLION

PHOTOVOLTAICS - SOLAR ELECTRIC

I. KEY ATTRACTIONS:
- INEXHAUSTIBLE SOURCE
- ENVIRONMENTALLY SAFE/CLEAN
- PROGRESS IN SPACE PROGRAM
- SOLID STATE, NO MOVING PARTS

II. ENERGY CONTRIBUTIONS IN YR. 2000 $<$1 QUAD

III. STATUS: TECHNICAL DEVELOPMENT
- DEVELOPMENT OF LOW COST/HIGH EFFICIENCY CELL MATERIALS AND MANUFACTURING TECHNIQUES
- DEMONSTRATION OF REMOTE (HIGH COST) APPLICATION ENTERING DESIGN PHASE
- MISSION ANALYSIS AND MARKETING STUDIES UNDER WAY

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 20 YEARS

V. KEY ISSUES:
- PRESENT COST OF MATERIALS AND PROCESSING FOR PHOTOVOLTAIC ARRAYS ARE A FACTOR OF 50 TO 100 x TOO HIGH
- PERFORMANCE STANDARDS, RELIABILITY AND TEST DATA ARE LACKING FOR TERRESTRIAL ARRAYS
- TECHNOLOGY REQUIRED FOR ADEQUATE STORAGE

VI. ERDA BUDGET (B.O.) FOR FY 1977 $38 MILLION

OCEAN THERMAL ELECTRICAL CONVERSION (OTEC)

I. KEY ATTRACTIONS:
- BASE LOAD SOURCE OF ELECTRICITY
- CAPABLE OF PRODUCING ENERGY-INTENSIVE PRODUCTS AT SEA

II. ENERGY CONTRIBUTIONS IN YR. 2000 <1 QUAD

III. STATUS: TECHNICAL DEVELOPMENT
- FEASIBILITY STUDIES FOR HEAT EXCHANGERS AND BIOFOULING PREVENTION TECHNOLOGIES ARE UNDER WAY
- CRITICAL COMPONENT TESTING TO BEGIN FY 1977

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 15 YEARS

V. KEY ISSUES:
- COST REDUCTIONS REQUIRED
- REDISTRIBUTING LARGE QUANTITIES OF WARM AND COOL WATER MAY BE ENVIRONMENTAL PROBLEM
- SITES MOSTLY IN TROPICS AND SUBTROPICS REMOTE FROM U.S. LOAD CENTERS; ANCHORING, STORMS, ETC. PRESENT DIFFICULTIES
- COOPERATIVE AGREEMENTS, LAW OF THE SEA PRESENT INTERNATIONAL LEGAL PROBLEMS
- PROOF OF HEAT EXCHANGERS AND BIOFOULING PREVENTION TECHNOLOGIES

VI. ERDA BUDGET (B.O.) FOR FY 1977 $10 MILLION

GEOTHERMAL: HYDROTHERMAL SYSTEMS

I. KEY ATTRACTIONS:
- INCREASES UTILIZATION OF DOMESTIC ENERGY RESOURCES
- CAPABLE OF NEAR-TERM DEVELOPMENT

II. ENERGY CONTRIBUTIONS IN YR. 2000 1 TO 4 QUADS

III. STATUS: APPLIED DEVELOPMENT
- VAPOR DOMINATED IS NOW COMMERCIAL AT GEYSERS IN CALIFORNIA
- LIQUID DOMINATED IS UNDER DEVELOPMENT IN WEST
  - 4 HOLES DRILLED IN 1976, 1 DEEP HOLE STARTED
  - 1 THERMAL LOOP OPERATING AT NILAND, CALIFORNIA
  - 2ND THERMAL LOOP TO BE INITIATED IN 1977
  - SYSTEM TEST FACILITY TO START OPERATION LATE 1976

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED 5 YEARS

V. KEY ISSUES:
- RELIABLE INFORMATION ABOUT THE LOCATION, MAGNITUDE, AND PRODUCTIVE LIFE OF EXPLOITABLE RESOURCES
- NEED FOR VERIFICATION OF COMMERCIAL VIABILITY OF FULL-SCALE SYSTEMS
- COMPLEXITIES OF ADMINISTRATIVE AND REGULATORY REQUIREMENTS ON GEOTHERMAL DEVELOPMENT

VI. ERDA BUDGET (B.O.) FOR FY 1977 $26 MILLION

GEOTHERMAL: GEOPRESSURED*SYSTEMS (U.S. GULF COAST)

I. KEY ATTRACTIONS:
- ENERGY FROM HEAT AND DISSOLVED METHANE AVAILABLE
- PRESSURE ENERGY EXCEEDS HYDROSTATIC HEAD BY AS MUCH AS 100% (NO VAPOR SYSTEMS EXPECTED)
- LARGE IDENTIFIED RESOURCE BASE
- PROXIMITY OF RESOURCE BASE AND ENERGY INTENSIVE INDUSTRIAL AREA

II. ENERGY CONTRIBUTIONS IN YR. 2000 **0 TO 1 QUAD**

III. STATUS: RESEARCH AND TECHNICAL DEVELOPMENT

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED **5-10 YEARS**

V. KEY ISSUES:
- ABILITY OF AQUIFER TO SUPPORT SUSTAINED HIGH VOLUME PRODUCTION
- DISPOSAL OF PRODUCED BRINES
- POTENTIAL SUBSIDENCE PROBLEMS

VI. ERDA BUDGET (B.O.) FOR FY 1977 **$6 MILLION**

*WATER CONTAINING DISSOLVED METHANE IN SEALED AQUIFERS AT VERY HIGH PRESSURES

LMFBR PROGRAM

I. KEY ATTRACTIONS: OFFERS A NEARLY INEXHAUSTIBLE SOURCE OF ENERGY

II. ENERGY CONTRIBUTIONS IN YR. 2000 [0 TO 2 QUADS]

III. STATUS: APPLIED DEVELOPMENT
- FAST FLUX TEST FACILITY UNDER CONSTRUCTION AND TO BE OPERATIONAL 1980 FOR FUELS AND MATERIALS TESTING
- CLINCH RIVER BREEDER REACTOR DEMONSTRATION PLANT TO BE OPERATIONAL 1983

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED [7 YEARS]

V. KEY ISSUES:
- RESOLVE ENVIRONMENTAL, SAFETY AND SAFEGUARDS ISSUES
- ESTABLISH ACCEPTABLE LICENSING PROCEDURES AND DEVELOP OPERATING EXPERIENCE
- RESOLVE FUEL CYCLE PROBLEMS
- HIGH CAPITAL COSTS, INDUSTRIAL ACCEPTABILITY IS NEEDED TO ALLOW RAPID MARKET PENETRATION

VI. ERDA BUDGET (B.O.) FOR FY 1977 [$594 MILLION]

SHALE OIL

I. KEY ATTRACTIONS:
- POTENTIAL EXPLOITATION OF LARGE DOMESTIC DEPOSITS
- PROSPECTIVE NEW TECHNIQUES, E.G., IN-SITU, COULD REDUCE ECONOMIC AND ENVIRONMENTAL OBSTACLES

II. ENERGY CONTRIBUTIONS IN YR. 2000 1 TO 5 QUADS

III. STATUS: TECHNICAL DEVELOPMENT
- 1 OIL-FROM-SHALE PROTOTYPE (PARAHO) OPERATING WITH OFA FUNDS
- UP TO 4 IN-SITU OIL RECOVERY CONTRACTS ANTICIPATED SHORTLY OF WHICH 1 IS ADVANCED TECHNOLOGY DEVELOPMENT (OCCIDENTAL) AND 3 ARE APPLIED RESEARCH
- 1 MAJOR IN-SITU GASIFICATION OF EASTERN SHALE IS UNDER WAY

IV. KEY ISSUES:
- LOW QUALITY (ENERGY CONTENT) OF MATERIAL RAISES QUESTION OF FEASIBILITY
- REGIONAL ISSUES IMPEDE DEVELOPMENT

V. ERDA BUDGET (B.O.) FOR FY 1977 $14.3 MILLION

MAGNETIC FUSION ENERGY

I. KEY ATTRACTIONS:
- EFFECTIVELY INEXHAUSTIBLE SUPPLY OF FUEL AT NOMINAL COST FROM OCEANS, NOT INTERRUPTIBLE
- INHERENTLY SAFER THAN FISSION
- NO COMBUSTION PRODUCTS
- SITING FLEXIBILITY RELATIVE TO FISSION PLANTS
- LOW FUEL RADIOACTIVITY WITH SHORT HALF-LIFE

II. ENERGY CONTRIBUTIONS IN YR. 2000 0 QUADS

III. STATUS: RESEARCH AND TECHNICAL DEVELOPMENT BEING CONDUCTED IN PARALLEL AT
- NATIONAL LABS – OAK RIDGE, LIVERMORE, LOS ALAMOS
- UNIVERSITIES – PRINCETON, MIT, OTHERS
- INDUSTRY – GENERAL ATOMICS

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED: AT LEAST 22 YEARS TO COMMERCIAL DEMONSTRATION

INTERIM GOALS:
- 1982 DEUTERIUM-TRITIUM (DT) BURNING IN REACTOR LEVEL POWER DENSITY
- 1985 OPERATION OF PROTOTYPE EXPERIMENTAL POWER REACTOR
- 1991 GENERATION OF TENS OF MWe NET POWER IN EXPERIMENTAL POWER REACTOR
- 1998 GENERATION OF HUNDREDS OF MWe IN COMMERCIAL DEMONSTRATION REACTOR

V. KEY ISSUES: PACE AND COST OF A DIFFICULT AND PROTRACTED RESEARCH AND TECHNOLOGICAL DEVELOPMENT PROGRAM

VI. ERDA BUDGET (B.O.) FOR FY 1977 $234.5 MILLION

LASER FUSION ENERGY

I. KEY ATTRACTIONS:
- EFFECTIVELY INEXHAUSTIBLE SUPPLY OF FUEL AT NOMINAL COST FROM OCEANS, NOT INTERRUPTIBLE
- INHERENT SAFETY
- NO COMBUSTION PRODUCTS
- SITING FLEXIBILITY
- LOW FUEL RADIOACTIVITY WITH SHORT HALF-LIFE

II. ENERGY CONTRIBUTIONS IN YR. 2000 0 QUADS

III. STATUS: RESEARCH AND TECHNICAL DEVELOPMENT BEING CONDUCTED IN PARALLEL AT
- NATIONAL LABS – LIVERMORE, LOS ALAMOS, SANDIA
- UNIVERSITIES – ROCHESTER
- INDUSTRY – KMS FUSION

IV. YEARS UNTIL COMMERCIAL DEMO. PLANT COMPLETED: AT LEAST 25-30 YEARS TO COMMERCIAL DEMONSTRATION

V. KEY ISSUES:
- PACE AND COST OF A DIFFICULT AND PROTRACTED RESEARCH AND TECHNOLOGICAL DEVELOPMENT PROGRAM
- NATIONAL SECURITY IMPLICATIONS; TECHNOLOGY CLASSIFIED SECRET

VI. ERDA BUDGET (B.O.) FOR FY 1977 $98 MILLION

TRANSPORTATION ENERGY CONSERVATION

I. KEY ATTRACTIONS:
- MAJOR PROSPECTS TO CONSERVE PETROLEUM AND REDUCE IMPORTS
- OPPORTUNITIES TO IMPROVE EFFICIENCY OF CURRENT SYSTEMS
- TECHNICAL PROSPECTS TO SHIFT TO NEW FUELS AND/OR ELECTRICITY

II. ENERGY CONTRIBUTIONS IN YR. 2000 5 TO 8 QUADS

III. STATUS: TECHNICAL AND APPLIED DEVELOPMENT
- TURBINE ENGINE
  - CHRYSLER, FORD & GM ACTIVE ON ERDA PROJECTS
  - CHRYSLER UPGRADED TURBINE NOW ON TEST FOR ECONOMICS/EMISSIONS
  - ERDA/NASA ADVANCED TURBINE PROGRAM NOW UNDER WAY
- STIRLING ENGINE
  - FORD – COST-SHARED CONTRACT UNDER NEGOTIATION
- ELECTRIC VEHICLE
  - ELECTRIC & HYBRID RD&D ACT PASSED ON SEPTEMBER 17, 1976
  - REQUIRES FIRST 2500 DEMO. VEHICLES MOSTLY CURRENT TECHNOLOGY
  - NEXT 5000 DEMO'S. INVOLVE ADVANCED TECHNOLOGY

IV. YEARS UNTIL COMMERCIAL APPLICATION: 10 YEARS OR LESS

V. KEY ISSUES:
- TECHNICAL PROBLEMS WITH COMPONENTS FOR ADVANCED HEAT ENGINES
- ELECTRICAL AND HYBRID VEHICLES REQUIRE BETTER BATTERIES AND DRIVE SYSTEMS
- LEGISLATIVE AND REGULATORY MEASURES AFFECT DEVELOPMENT

VI. ERDA BUDGET (B.O.) FOR FY 1977 $24 MILLION

CONSERVATION IN BUILDINGS

I. KEY ATTRACTIONS:
- MAJOR OPPORTUNITIES EXIST TO CONSERVE ENERGY
- ASSISTS HOMEOWNERS AND OTHERS TO MAKE ECONOMIC SAVINGS
- LONG-RUN BENEFITS FROM INTRODUCTION OF ENERGY-EFFICIENT STRUCTURES

II. ENERGY CONTRIBUTIONS IN YR. 2000 3 TO 6 QUADS

III. STATUS: MARKET PENETRATION AND DEMONSTRATION
- GSA ENERGY CONSERVATION DEMONSTRATION BUILDING, MANCHESTER, NEW HAMPSHIRE
- MINIMUM ENERGY DWELLING (MED) CONSERVATION DATA GATHERING AND DEMONSTRATION JOINTLY SPONSORED WITH A UTILITY AND RESIDENTIAL BUILDING DEVELOPER, SOUTHERN CALIFORNIA
- ANNUAL CYCLE ENERGY SYSTEM (ACES) DEMONSTRATION HOUSE, KNOXVILLE, TENNESSEE
- VA 60-BED NURSING HOME UNDER CONSTRUCTION USING ACES CONCEPT, WILMINGTON, DELAWARE

IV. KEY ISSUES:
- EXTENT OF PROMOTIONAL EFFORTS TO GAIN ACCEPTANCE
- USE OF TAXES AND SUBSIDIES
- REGULATORY MEASURES (CHANGES IN BUILDING CODES, ETC.)

V. ERDA BUDGET (B.O.) FOR FY 1977 $22.6 MILLION

ELECTRIC CONVERSION EFFICIENCY

I. KEY ATTRACTIONS:
- REDUCED COSTS AND ENVIRONMENTAL IMPACTS THROUGH LOWER CAPITAL AND FUEL REQUIREMENTS
- REDUCED SECONDARY IMPACTS IN MINING, TRANSPORTATION AND OTHER FUEL SUPPLY ACTIVITIES
- INCREASINGLY IMPORTANT WITH GROWING ELECTRIFICATION OF THE ECONOMY.

II. ENERGY CONTRIBUTIONS IN THE YR. 2000 [0 TO 5 QUADS]

III. STATUS: RESEARCH AND TECHNICAL DEVELOPMENT
- DESIGN OF 4.6 MW FUEL CELL UNDER CONTRACT USING FIRST GENERATION TECHNOLOGY
- COMBINED CYCLE POWER SYSTEMS USING ADVANCED OPEN CYCLE GAS TURBINES ENTERING TEST PHASE
- ULTRA HIGH VOLTAGE (UHV) AND CRYOGENIC TRANSMISSION TECHNOLOGIES UNDER TEST

IV. KEY ISSUES:
- INSTITUTIONAL CONSERVATISM IN ACCEPTANCE OF NEW TECHNOLOGIES
- COMPLEXITY AND COST OF IMPLEMENTATION
- RELUCTANCE TO ACCEPT TECHNOLOGIES IN COMBINATION UNTIL EACH ELEMENT IS FULLY DEMONSTRATED

V. ERDA BUDGET (B.O.) FOR FY 1977 [$34 MILLION]

CONSERVATION IN INDUSTRY

I. KEY ATTRACTIONS:
- CHANGES IN INDUSTRIAL PROCESSES AND PRACTICES CAN SAVE ENERGY
- INDUSTRY USES NEARLY 40% OF TOTAL ENERGY CONSUMED

II. ENERGY CONTRIBUTIONS IN YR. 2000 3 TO 5 QUADS

III. STATUS: DEMONSTRATION

CONTRACTS AWARDED FOR ENERGY SAVING DEMOS. ON
- BOILER FUEL/AIR RATIO CONTROL SYSTEM
- MICROWAVE VACUUM GRAIN DRYING
- PAINT CURING SYSTEM USING PAINT VAPORS FOR FUEL
- HIGH TEMPERATURE WASTE HEAT RECOVERY SYSTEMS DIRECTED AT SIX MAJOR INDUSTRIAL PROCESSES

IV. KEY ISSUES:
- FEDERAL ROLE IN PROMOTION, REGULATION AND CONTROL
- APPROPRIATE INCENTIVES TO ENCOURAGE INDUSTRY

V. ERDA BUDGET (B.O.) FOR FY 1977 $12 MILLION

Federal Energy News
Federal Energy Administration
Washington D.C. 20461

FOR IMMEDIATE RELEASE

OCTOBER 1, 1976

ENERGY PROGRAM IS NOW HALF COMPLETED AFTER MORE THAN 500 VISITS TO 94TH CONGRESS

After more than 500 appearances by Administration officials before 28 different Congressional Committees and 79 different subcommittees during the past 21 months of the 94th Congress, the President's national energy program is "about halfway home" FEA Administrator Frank G. Zarb said today as the nation approaches the third anniversary of the Arab oil embargo.

"Since the President presented his energy program in January of 1975, the Congress has enacted three key energy bills, but more needs to be done," Zarb said, "and if we have to, we are willing to make 1,000 more visits to Congress next year to complete the job we started.

"It is important to note that the U.S. does have an energy program, however, unless the entire program is enacted, the Nation will keep paying foreign governments more than $35 billion per year for oil imports of about 7 million barrels per day (mmb/d) by 1985, which will have a continued negative effect on our balance of payments," Zarb stressed. Complete enactment of the President's national energy program will cut imports to about 4 mmb/d, or the amount we were importing in 1971.

"I fully appreciate the cooperation Congress has given in completing some of the President's programs, but partly because of the nature of the Congressional committee structure the process has been slower than we would like," Zarb noted.

To date this Congress has passed and the President has signed into law three major pieces of energy legislation: The Energy Policy and Conservation Act, the Naval Petroleum Reserves Production Act, and the Energy Conservation and Production Act.

With these programs, the Federal Government in the supply area now has:

- Initiated the phaseout of crude oil price controls which should be completed no later than 1979, and removed price and allocation controls on half of the volume of petroleum products;

- Continued to convert oil and gas fired utility and industrial boilers to coal;

- Begun full development of the three Naval Petroleum Reserves in the lower-48 States, and ultimate production of NPR-4 in Alaska.

On the conservation side, the Federal Government now is in the process of:

- Requiring appliance manufacturers to provide energy efficiency information to consumers on major appliances and setting voluntary energy efficiency targets for the industry;

- Implementing automobile efficiency standards for 1980 of not less than 20 miles per gallon (mpg) and 27.5 mpg for 1985;

- Establishing industrial energy conservation targets for the ten leading energy consuming industries;

- Developing a conservation grant program for the States;

- Tightening mandatory conservation standards for Federal agencies to further improve the energy practices of the Federal Government;

- Developing mandatory thermal efficiency standards for all new residential and commercial buildings;

- Implementing a 3 year, $200 million weatherization grant program for the insulation of homes of low-income, elderly, and handicapped persons;

- Establishing a demonstration program to test various mechanisms for encouraging energy conservation improvements or use of renewable resources, such as solar heating or cooling, in existing residential buildings;

- Providing grants to states for testing innovative utility rate structure designs to achieve a higher degree of conservation.

In the area of emergency measures to reduce our vulnerability to embargoes, the Federal Government is in the process of:

- Building a strategic petroleum reserve of at least 150 million barrels of petroleum by 1978 and up to a billion barrels by 1982;

- Establishing standby measures to deal with severe energy emergencies that may arise in the future;

- Developing cooperative contingency and planning programs with the International Energy Agency.

-more-

In the area of Research and Development, the President has increased spending requests for:

- Overall R&D spending, up from $2.2 billion in fiscal '76 to $2.9 billion in fiscal '77;
- Overall spending request for solar up 35 percent for fiscal '77;
- Overall spending request for geothermal up 44 percent for fiscal '77;
- Overall spending request for energy conservation up 63 percent for fiscal '77.

When fully operational these programs, coupled with increased domestic production,would keep oil import levels to about 7 million barrels per day by 1985. Zarb reiterated vulnerability to economic disruption can be ended by 1985 only if the rest of the President's energy program is enacted and implemented.

These additional programs include: Natural Gas Deregulation; Synthetic Fuels Commercialization; Insulation Tax Credit; Alaskan Gas Transportation; Nuclear Fuel Assurance; Clean Air Act Amendments; and Energy Impact Assistance.

Zarb further stated, "If these additional programs are enacted and operational they will bring oil imports down to about 4 million barrels per day by 1985 and,combined with our Strategic Reserve Program,all these efforts will make our country virtually embargo proof."

-FEA-

Media Inquiries: 964-4781
(Until 5:30 p.m. today)

Media Contact:
J. Gene Curella

Media Inquiries after 5:30 p.m.
New FEA Number (202) 566-9833

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94TH CONGRESS ENERGY SCORECARD

PRESIDENT'S BILLS PASSED & CONGRESSIONAL ADDITIONS

EPCA :
- STRATEGIC RESERVES
- STANDBY AUTHORITIES
- COAL CONVERSION
- APPLIANCE LABELING
- AUTO EFFICIENCY STANDARDS
- PRICE CONTROL PHASEOUT
- COAL LOAN GUARANTEES
- STATE CONSERVATION PROGRAMS

ECPA :
- BUILDING STANDARDS
- WEATHERIZATION
- CONSERVATION LOAN GUARANTEES
- UTILITY RATE STRUCTURE DEMO.
- INSULATION DEMO. PROGRAM
- GREATER PRICING FLEXIBIILTY

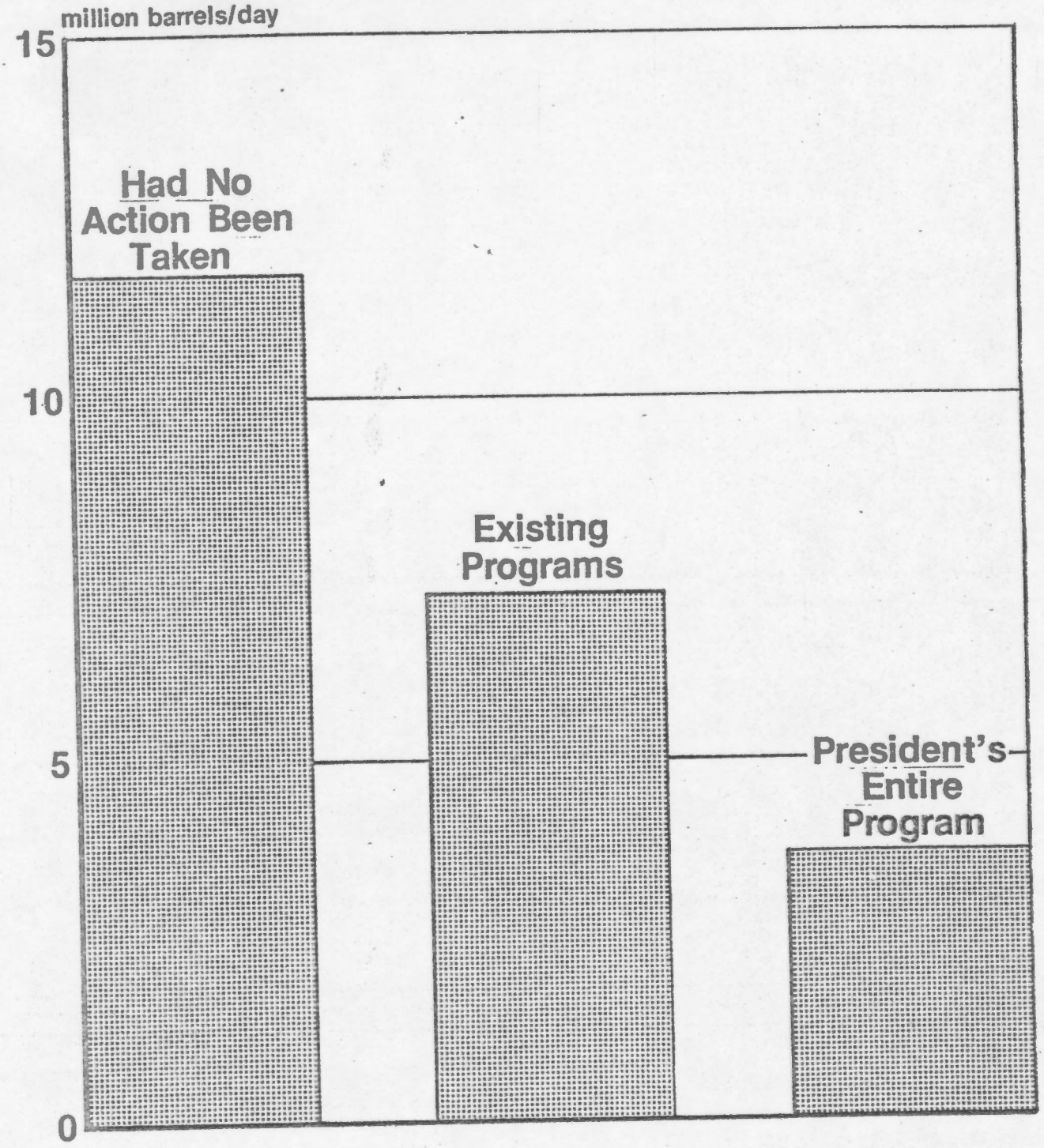
OTHER:
- NAVAL PETROLEUM RESERVES
- COASTAL IMPACT ASSISTANCE
- ERDA ORGANIZATION

BILLS REMAINING

- NATURAL GAS DEREGULATION
- NATURAL GAS EMERGENCY AUTHORITY
- SYNTHETIC FUELS COMMERCIALIZATION
- INSULATION TAX CREDIT
- *ALASKAN GAS TRANSPORTATION
- NUCLEAR LICENSING
- NUCLEAR FUEL ASSURANCE
- *CLEAN AIR ACT
- ENERGY INDEPENDENCE AUTHORITY
- ENERGY FACILITIES SITING
- UTILITY TAX INCENTIVES
- UTILITY REGULATORY REFORM
- OIL SPILL LIABILITY
- *URANIUM ENRICHMENT
- IMPACT ASSISTANCE

*Still under consideration by the 94th Congress

New FEA Import Outlook: 1985



Oct. 1, 1976

cc: Schleede

Reading

FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

1976 NOV 1 AM 9 05

OCT 22 1976

OFFICE OF THE ADMINISTRATOR

MEMORANDUM FOR MEMBERS OF THE TASK FORCE ON ELECTRICITY:

MICHAEL F. BUTLER
MARTIN D. HOWELL
BRUCE A. PASTERNACK
SAMUEL J. TUTHILL
GORMAN C. SMITH
JOHN D. CHRISTIE
THOMAS E. NOEL
PAUL CYR
MICHAEL F. STARR

FROM: FRANK ZARB

SUBJECT: FEA TASK FORCE ON ELECTRICITY

Attached is a copy of my memorandum to the members of the Energy Resources Council announcing the formation of a subcommittee on electricity under the direction of FEA. To coordinate our interaction with this subcommittee, I am establishing an FEA Task Force with Bill Rosenberg as Chairman. As members of this group, you should work with him to develop and articulate FEA's role.

The first meeting of the Task Force will be held on October 28, at 10:00 a.m. in Room 3000B. Two major items will be discussed: the Public Utility Commissioners/ Administration meeting held on October 18, and the agenda for the upcoming subcommittee meeting.

FEA has a major role in the formation and work of this ERC subcommittee. Our joint efforts and cooperation will determine, to a great extent, the success of its endeavors.

Attachment

cc: W. Rosenberg

Rec'd too late

110110

FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

OCT 22 1976

OFFICE OF THE ADMINISTRATOR

MEMORANDUM TO THE ENERGY RESOURCES COUNCIL

FROM: FRANK G. ZARB
EXECUTIVE DIRECTOR

SUBJECT: ERC SUBCOMMITTEE ON ELECTRICITY

At its October 6 meeting, the Executive Committee of the Energy Resources Council reviewed the recently prepared "White Paper on Electric Utilities" (see attached). The key recommendation of that paper was the formation of an ERC Subcommittee on Electricity. The Council agreed to the establishment of such a group under the direction of FEA. William G. Rosenberg, an Assistant Administrator for FEA, has been appointed Chairman. Mr. Rosenberg has named his Deputy, Robert I. Hanfling, Executive Director.

The subcommittee will be responsible for bringing together the Administration's efforts:

- to define the problems facing the electric utility industry that affect national energy policy
- to provide a coordinated Federal policy for electricity
- to review the rate structure study now being performed by FEA pursuant to Title II of the ECPA
- to develop new policy recommendations on utility rate structure, financial questions, fuel mix, the utility role in conservation, etc.
- to work with state regulatory commissions in developing and implementing the policies identified.

If your agency is interested in participating on this subcommittee, an Assistant Secretary (or the equivalent) and one alternate should be appointed to serve as your representative. Please contact Mr. Hanfling at 566-9613 with this information by October 28.

The first meeting is scheduled for November 2 at FEA Headquarters in Room 3000B, 12th and Pennsylvania Avenue, at 10:00 a.m. An agenda will be distributed prior to the meeting.

I am confident that this interagency effort will be successful in articulating a clear and consistent Federal approach to electricity policy. To be effective in this vital area, we must coordinate our efforts and recognize the need for cooperation on both the national and state levels.

Attachment

WHITE PAPER FOR THE ENERGY RESOURCES COUNCIL
ON ELECTRIC UTILITIES

INTRODUCTION

National energy policy focuses on the electricity industry for three main reasons:

- o maintenance of an adequate supply of power
- o reduction in the use of oil and gas in the production of power
- o a possible role for electricity in substitution for oil and gas in end use consumption.

Each of these is influenced by a specific set of utility operating conditions that may be affected by Federal policy. Adequate power supply involves:

- o power plant reliability
- o reserve margins
- o the ability to raise needed capital
- o the need for new plant additions
- o the ability to achieve timely approvals to construct new plants.

The fuel mix used in generating power involves:

- o authority to mandate changes to coal
- o ability to finance more capital intensive equipment that uses neither oil nor gas
- o environmental constraints.

The attractiveness of a program to accelerate the trend towards more intensive use of electricity must be measured in terms of both the costs of meeting the higher electric demand and of the costs of changing consumption patterns to use a greater percentage of electricity.

The Federal government has a direct role in most of these areas through the NRC, FPC, FEA, and EPA as regulators; GSA, ERDA, and the Department of Defense as major consumers, and ERDA through the direction of research. It also has an indirect role through

the formulation and enunciation of national energy policy. These roles are not always currently articulated in a consistent manner.

CHANGES IN THE INDUSTRY

The 1960's were a period of relative certainty and stability for the electric utility industry. The cost of power had been declining steadily while the industry's share of total energy consumption steadily increased. In the wake of the Northeast blackout of 1965, the dominant problem of the industry was that of system reliability. Reserve margins were generally raised to 20 percent with relatively little concern for the cost effectiveness of the added capacity. Concurrently, an increasingly pronounced peak demand pattern developed, with consequent reductions in capacity utilization efficiency. In an era of declining costs and (in retrospect) cheap capital, such changes were perceived as easily manageable.

However, the issues began to change in the early 1970's. Environmental requirements began to increase both operating costs and capital investment needs. Inflation drove up both the costs of plant and cost of capital. These changes led to increasing power costs for the first time in decades. However, it was not until the OAPEC embargo and the depressed capital market of 1974 that national attention focused on this industry.

The most immediately visible result was an increase in fuel costs of $5.7 billion or 15 percent of industry total 1973 revenues of $31.7 billion. During 1974, this cost surge plus the effects of inflation forced a revenue increase of $7.4 billion, or 23 percent despite the absence of any increase in total kilowatt hour consumption. A number of important changes resulted. First, consumer attention focused on utility rate setting procedures. Second, the long and stable trend of demand growth was interrupted by no growth in 1974 and by only a 2.5 percent increase in 1975, against a normal growth rate of over 7 percent. Third, increased price and energy conservation consciousness began to coincide with the environmentalist groups' desire to delay development of new generating plants.

The resulting marked deviation from long established trends of consumption and profitability growth was extremely disturbing to the capital markets. Investors were reluctant to commit additional capital to the industry in the midst of this new

uncertainty, and they demanded higher rates of return on both debt and equity investments. As a result, the investor-owned companies were forced to borrow unprecedented amounts of short-term debt to finance construction projects underway.

In 1975, market conditions improved and a record $3 billion of rate relief was granted in addition to the passthrough of other cost increases. The more immediate effects of the embargo and of tight capital markets were mitigated (see appendix A). However, the basic uncertainties facing the industry remain substantially greater than they were ten years ago. Financing costs are expected to remain well above the historical average, while new uncertainties have been introduced by changing environmental constraints and increasingly effective opposition to the siting of new plants. There is a long term trend for rising generating costs and electricity prices. The demands for external capital are expected to continue increasing.

This latter projection holds despite two years of abnormally high capacity reserves and a substantial reduction of growth projections to 5.4 percent from a preembargo 7 to 7.5 percent. Although capacity additions in the short run are expected to be relatively low, the mix of plants being built is growing more and more capital intensive, while construction lead times are extending. The combination means that dollar outflows are expected to rise at a compound rate of 10 percent or more after the small decline experienced last year.

These changes are important to national energy policy:

- If plant construction is delayed excessively because of financial pressures, siting difficulties, or underestimated demand, there could be capacity shortages leading to inadequate supply in the 1980's.

- Since coal and nuclear plants are the most capital intensive and take longer to construct, a tendency may develop to delay decisions to the point where the only way to meet demand will be to install oil burning cumbustion turbines.

- If electricity is desirable as a substitute for oil or gas, rising prices or supply uncertainties may slow down its penetration of such markets.

POLICIES PROPOSED

Since the embargo, the Administration has proposed a number of initiatives to deal with the industry's problems. These proposals fall into three main categories: general financial support, fuel specific support, and programs to increase the efficiency of equipment use.

General financial support is embodied in three pieces of legislation that have been sent to Congress, but that were not acted upon this session (brief summaries are attached in Appendix B):

- Titles VII and VIII of the Energy Independence Act of 1975
- Electric Power Facility Construction Incentive Act of 1975 (often called the Labor Management Bill)
- Energy Independence Authority Act.

The fuel specific proposals are embodied in both proposed legislation and existing programs (brief summaries are attached in Appendix C):

- Energy Supply and Environmental Coordination Act (ESECA) which mandates the conversion of oil and gas boilers to coal where practicable
- Administration proposed amendments to the Clean Air Act
- Nuclear Fuel Assurance Act.

In addition, the Administration has undertaken a number of programs which are directed towards the improvement of the efficient use of plant (brief summaries attached as Appendix D):

- FEA's load management program
- FEA's power plant productivity program
- Power Plant Acceleration Task Force
- rate making and regulatory guidelines (required by Title II of the Energy Conservation and Production Act of 1976)
- ERDA's research and development programs.

The programs currently in effect are showing positive results, and much of this success can be attributed to efforts directed towards local officials and companies. It is clear however, that a Federal override of state regulation has proven unworkable, so far. The programs that have had the most success have been those that have worked with the local authorities in a supportive way.

The difficulty in articulating national energy policy issues at the local level has been increased by activities of some branches of the Government acting as consumer. There have been occasions in which different Federal entities have appeared before state commissions on opposite sides of the same issues.

This discussion leads to two major conclusions. The first is that the Federal government has yet to develop a unified understanding of the role of electricity in national energy policy. The second is that the primary influences on the development of electricity focus at the state level.

RECOMMENDATION

It is proposed that the ERC create a special interagency task force under the direction of FEA to bring together the Administration's efforts on the following:

- to define the problems facing the electric utility industry that affect national energy policy
- to provide a coordinated Federal policy for electricity
- to review the rate structure study now being performed by FEA pursuant to Title II of the ECPA.
- to develop new policy recommendations on utility rate structure, financial questions, fuel mix, the utility role in conservation, etc.
- to work with state regulatory commissions in developing and implementing the policies identified.

The main thrust of this effort would be to recognize that to be effective, the Federal government must speak clearly and consistently, and that its most effective approach would be to work actively with the existing state regulatory structure, rather than seek to mandate change through legislation.

APPENDIX A

FINANCIAL CONDITION OF INVESTOR-OWNED ELECTRIC UTITITIES

A condition of continuing financial stress for electric utilities grows out of a rapid increase in the amount of investment being made by utilities from an asset base valued at relatively low historical cost, which does not reflect the increasing cost and complexity of generating and transmission equipment. For investor-owned companies:

- Capital expenditures have been rising faster than revenues. Between 1965 and 1974 annual capital expenditures almost quadrupled from $4.3 billion to $15.2, while annual revenues only multiplied 2 1/2 times from $15.4 billion to $35.2 billion.

- There was a pause in 1975, when revenues rose 19% to $41.5 billion, while cash plant capital expenditures declined temporarily to about $13.0 billion. Starting with 1976, however, cash plant expenditures are expected to resume growth and increase at a rate of about 10 percent per year.

- The percentage of capital expenditures furnished from internal sources declined from 40-50 percent ten years ago to less than 30 percent now.

By undertaking more external financing in a high cost capital market, utilities have weakened their financial condition:

- operating earnings coverage of interest has declined from over five times to about two times.

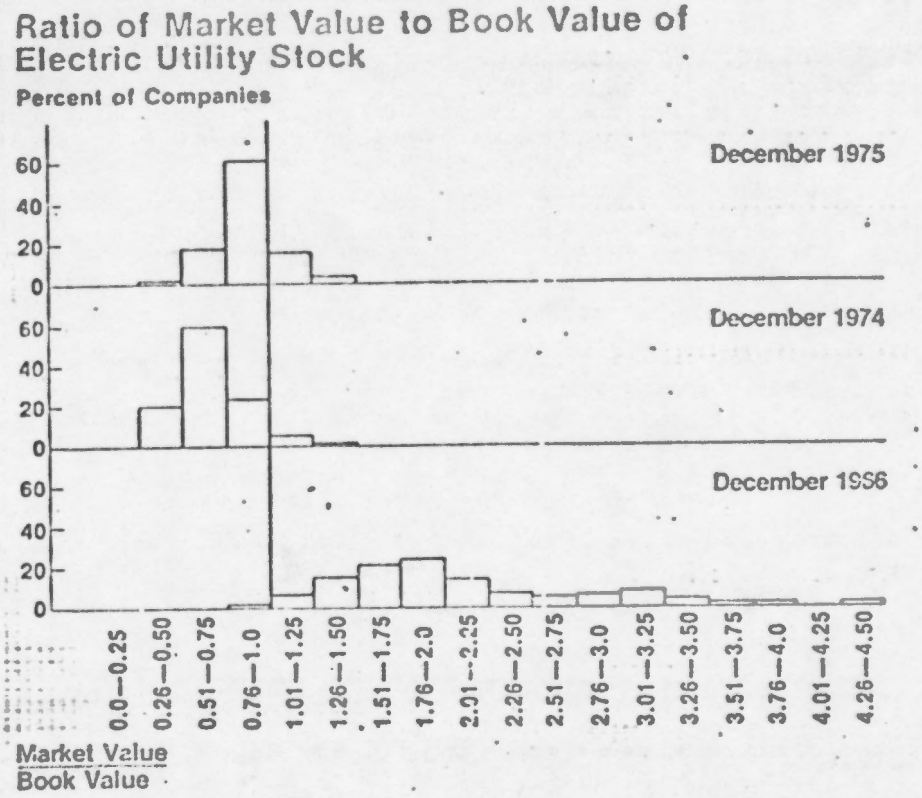
- About three quarters of the major companies have had their bond ratings reduced during the past ten years.

- Average market to book ratios for common stock have declined from over two times in 1965 to less than .7 times near the lows in 1974, with a recovery to about .9 times currently. (See Figure I)

- There has been some recovery, but most common stocks still sell below book value.

- Almost as many bond ratings are still declining as are being improved.

Figure 1



Both technological development of new, cheaper generation and transmission equipment and load management have been suggested as solutions to financing problems of this industry. In the long run, both could reduce the industry's capital requirements to some extent, but neither will fully solve the problems of the next decade. An effective load management program could reduce new plant requirements by, at most, 20 percent over the next decade. Capital requirements for the industry between 1975 and 1985 are expected to be $277 billion; with load management and conservation, this total could be reduced by $62 billion to $215 billion or by 27 percent (see Table I). New generation and transmission technologies will take more than that timespan to achieve a significant savings, due to the long planning times for the industry. If not carefully implemented, an electricity conservation program could also have the undesirable side effect of stimulating the end use demand for oil and natural gas as a substitute for electricity generated by coal and nuclear.

Table I

CAPITAL REQUIREMENTS OF THE ELECTRIC UTILITY INDUSTRY
1975-84
(Billions of 1975 Dollars)

	Reference Case	Load Management With Conservation
Nuclear Generation	58.2	52.9
Other Generation	81.8	51.0
Transmission and Distribution	98.1	72.7
Increase in Work in Progress	38.5	38.5
Total	276.6	215.1

Current Position

Even reflecting a reduction in reserve generating capacity from 1975's 34 percent to the generally accepted planning target of 20 percent by 1985, capital expendites for the industry are expected to increase by 10 percent or more per year. The impact of higher cost of plants to be delivered in the 1980's will be increasingly reflected in disbursements in the 1970's and early 1980's. Over the next 10 years, unless cash earnings are improved markedly, 64 to 70 percent of cash for capital expenditures (excluding AFDC) will have to be raised externally. Due to the increasing percentage of reported earnings represented by AFDC which provides no cash income, dividend payouts now exceed cash earnings for the industry as a whole, and, on average, no internal funds from earnings have been available for capital expenditures from earnings since 1975. Deferrals of Federal tax have contributed substantially to cash, but unless taxable earnings levels rise, this source of funds is also reaching its limits.

Table II

EXTERNAL CAPITAL REQUIREMENTS OF THE ELECTRIC UTILITY INDUSTRY
1975-84
(Billions of 1975 Dollars)

	Cash Required for Capital Expenditures	Depreciation and Tax Deferrals	External Funds Needed	Percent Financed Externally
Reference	230	68	162	70
Load management	178	64	114	64

Internally generated funds for capital investment, now largely depreciation allowances, are increasingly inadequate sources of cash for capital investment, given continuing inflation in capacity expansion costs. Under current favorable conditions of improving financial markets and a short term generating capacity surplus, the industry's problems are masked. However, the amount of operating earnings must be increased, both to generate internal capital to meet expanding investment needs directly and to provide debt and other capital carrying cost coverage for the required massive additional external financing.

Improvements Since 1974

Triggered by accelerated rate relief ($3 billion in 1975), coupled with a cutback in new construction, 1975 electric utility earnings improved by about 19 percent from depressed 1974 levels. Cash flow increased about 18 percent during 1975. This improvement continued through the first quarter of 1976, which showed an approximate 20 percent increase in net income over the corresponding 1975 period and a 26 percent increase in cash flow. The quality of utility earnings also improved. Allowance for funds during construction (AFDC) decreased to 24.6 percent of net income in the first quarter of 1976 versus 27.4 percent for the first quarter 1975. Net income (including AFDC) as a percent of total electric operating revenues, increased from 14.0 percent to 15.1 percent from the corresponding 1975 period.

During 1975, about $2.9 billion in short-term debt was refunded, even though estimated total outside long term financing of $11.7 billion was about the same as the $11.5 billion raised in 1974. Another good indicator of the improved financial condition of the electric utilities is the pre-tax coverage ratio. The median coverage ratio (including some non-operating earnings) for lower rated utilities has increased from a low of 2.2 in December 1974, to 2.7 to 1. During the first quarter of 1976 there was some recovery from the downward trend in bond ratings.

In that period, ratings of eight companies were increased while those of five were decreased. For all of 1975 only nine were increased while 47 were decreased.

The general expectation of the financial community is for continued improvement through 1976, although possibly at a slower rate. The expectation is that there will be less rate relief this year. In the fiscal first quarter of 1976, relief of $750 million was granted, compared to $1.1 billion in the first quarter of 1975.

APPENDIX B

Title VII of the Administration's Energy Independence Act of 1975 included such provisions as:

- o increased investment tax credit
- o preferred stock dividend tax deductions
- o mandated reform of State Utility Commission processes
  - five month processing limit before implementation of rate findings
  - required fuel adjustment clause
  - CWIP in the rate base
  - encouragement of off peak pricing
  - guarantees that the cost of pollution control be in the rate base.

Title VIII called for:

- o Legislation which would require that states have a comprehensive and coordinated process for expeditious review and approval of energy facility applications; and state authorities which ensure that final State energy facility decisions cannot be nullified by actions of local governments.
- o Provision for owners of eligible facilities or citizens to sue States for inaction.
- o Provide no Federal role in making case by case siting decisions for the States.

Later in the year the President's Labor-Management Committee proposed the Electric Power Facility Construction Incentive Act of 1975 which was endorsed by the President and sent to Congress. This act included:

- o Increased investment tax credit
- o entension of five year write-off of pollution control equipment

- o depreciation of CWIP as expended
- o optional dividend reinvestment with deferred income taxation
- o the first three benefits are conditioned on inclusion of CWIP in the rate base and normalization of tax deferrals and credits.

Congress, in turn, offered a bill (H.R. 12461) that incorporates some of the Administration proposals and some that could cut capital requirements as well. This bill includes:

- o mandatory rate structure reforms
- o a limit on inclusion of CWIP in the rate base
- o a limit on automatic fuel adjustment clauses
- o siting procedure reform
- o amendments to strengthen power pooling.

The Energy Independence Authority was proposed to supplement and encourage private capital investment to meet the energy needs of the Nation. It would have financial resources of $100 billion.

The Energy Independence Authority will only support projects which meet the following criteria:

- -- Projects that will contribute directly and significantly to energy independence.
- -- Projects that would not be financed without government assistance.

The specific types of projects which the EIA could finance would be limited to projects entailing commercialization of:

- -- New technologies not yet in widespread domestic commercial operation either to support, produce directly, transport, or conserve energy.
- -- Technologies essential to the production and transmission of electric power generated by sources other than oil or gas.

-- Conventional or new technologies for production and transmission of electric power generated by sources other than oil or gas.

-- Conventional energy technologies for the production or transportation of energy that are of such size or scope that they would not otherwise be financed by the private sector or represent institutional or regulatory arrangements which are not in widespread use, or individual transportation or transmission facilities related to such energy projects.

EIA financial assistance will require as a condition of assistance to a regulated utility, sound and expedited regulatory response from regulatory rate commissions, including the regulatory commission's agreement to a rate covenant with EIA and the regulated firm that assures adequate earnings to protect EIA's investment.

APPENDIX C

The fuel specific objectives of proposed legislation and the existing ESECA program are to provide for the increased consumption of nuclear and coal fuel to reduce dependence on scarce oil and gas resources.

The proposed Nuclear Fuel Assurance Act of 1975 authorizes ERDA to encourage development of a competitive private uranium enrichment industry. The legislation would provide for technical assistance to the industry, for access to technology, materials and equipment on a cost recovery plus royalty basis, and for warranties and assurances on materials, equipment and facility performance. The legislation would also authorize ERDA to purchase enriching services from the industry, as well as to acquire assets and assume obligations where an industry facility cannot be completed or brought into commercial operation.

Clean Air Act Amendments were requested that would develop, among other things, a balance between environmental and energy goals. These include:

- Legislative clarification to resolve problems resulting from court decisions with respect to significant air quality deterioration in areas already meeting health and welfare standards.

- Extension of compliance dates through 1985 to implement a new policy regarding stack gas scrubbers -- to allow use of intermittent control systems in isolated power plants through 1985 and requiring other sources to achieve control as soon as possible.

Through the Energy Supply and Environmental Coordination Act of 1974 (ESECA), Congress has given FEA many of the regulatory tools it needs to make sure that cost effective utility economics and good policy are reflected in actual utility practice. ESECA provides FEA with authority to prohibit an existing power plant or a major industrial boiler from burning petroleum or natural gas, where coal is a practicable alternative and where the existing facility has coal-burning

capacity. It also allows FEA to order new power plants or major industrial boilers in their early planning process to be designed and constructed with a capability to use coal as a primary fuel and to require them to use this capability. In both cases the use of coal must meet applicable air quality regulations. To date, FEA has issued prohibition orders affecting 74 existing power plant units operated by 25 utilities. It has also issued 122 construction orders affecting companies in the early planning process, which require units to be fully capable of using coal.

APPENDIX D

A number of programs have been initiated to improve efficiency of utility generating plants through increased control of consumer demand patterns and of planned existing electricity production capacity.

The Federal Energy Administration's Office of Energy Conservation and Environment has developed three program initiatives to encourage utility load management practices. First, the Electric Utility Rate/Load Management Demonstration program is working to demonstrate the validity and effectiveness of time-of-use pricing and load management in ten demonstration projects operating in a wide variety of utility systems. Second, under the regulatory intervention program, FEA participates in utility regulatory hearings, at the request of responsible state authorities, for the purpose of advocating and assisting the adoption of time-of-use pricing. FEA has participated in generic rate hearings and specific rate application proceedings before 13 States and the Tennessee Valley Authority. Third, the Utilities Conservation Action Now (UCAN) program provides technical assistance to utility companies in designing and implementing load mangement and rate reform activities as key elements of an overall utility conservation program.

Time-of-use rates are now in effect on a limited basis, or are scheduled to become effective shortly, in at least 15 States. Future FEA load management programs call for extension of the demonstrations to an additional six to twelve projects, continued participation in State rate cases, and expansion of UCAN technical assistance efforts.

The Federal Energy Administration's Power Plant Acceleration Task Force has acted to expedite delivery of planned powerplants by reconciling regulatory differences which threaten to delay construction of needed facilities. The task force has identified 101 delayed generating units among the 437 units planned by the 110 utility companies contacted, and has expedited the regulatory review of 18 powerplants with total planned generating capacity in excess of 22,000 MWe.

FEA's Powerplant Productivity Improvement Program focuses on methods of increasing electricity production from existing baseload generating plants which are currently operating at less than rated capacity. The program has determined that these large nuclear and fossil-fired powerplants were being

forced out of service more than 15% of the time, and were operating at a capacity factor of less than 60%. The program has established goals which could reduce forced outages to 12%, increase availability to 80%, to increase the capacity factor to 70%.

To achieve these goals, the program has conducted three powerplant reliability consultant studies, conducted numerous regional meetings with utilities to review the studies and to discuss corrective actions, and has met with many state regulatory agencies to improve incentives to utilities for increasing powerplant productivity.

The Federal Energy Administration is currently finalizing plans for the rapid implementation of the Electric Utility Rate Design Proposals mandated in Sec. 203 of the Energy Conservation and Production Act signed into law on August 14, 1976. Section 203 provides:

a. The Administrator shall develop proposals to improve electric utility rate design. Such proposals shall be designed to encourage energy conservation, minimize the need for new electrical generating capacity, and minimize costs of electric energy to consumers, and shall include (but not be limited to) proposals which provide for the development and implementation of-

(1) load management techniques which are cost effective;

(2) rates which reflect marginal cost of service, or time of use of service, or both;

(3) ratemaking policies which discourage inefficient use of fuel and encourage economical purchases of fuel; and

(4) rates (or other regulatory policies) which encourage electric utility system reliability and reliability of major items of electric utility equipment.

b. The proposals prepared under subsection (a) shall be transmitted to each House of Congress not later than 6 months after the date of enactment of this Act, for review and for such further action as the Congress may direct by law. Such proposals shall be accompanied by an analysis of -

(1) the projected savings (if any) in consumption of petroleum products, natural gas, electric energy, and other energy resources,

(2) the reduction (if any) in the need for new electrical generating capacity, and of the demand for capital by the electric utility industry, and

(3) changes (if any) in the cost of electric energy to consumers which are likely to result from the implementation nationally of each of the proposals transmittted under this subsection.