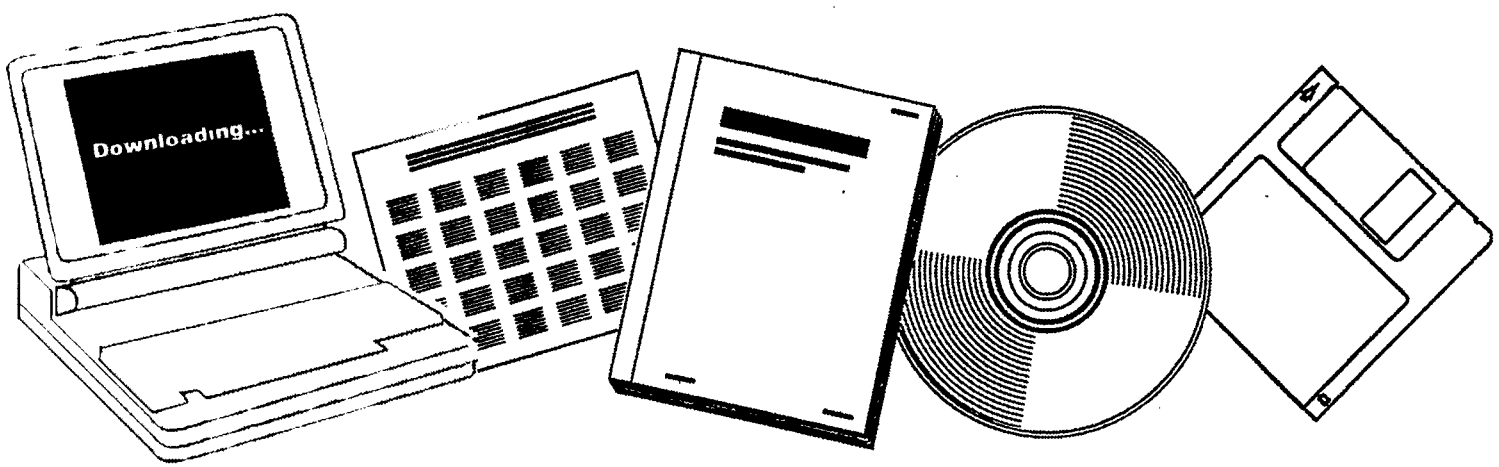
RECOMMENDATIONS FOR A SYNTHETIC FUELS COMMERCIALIZATION PROGRAM.

NOV 1975



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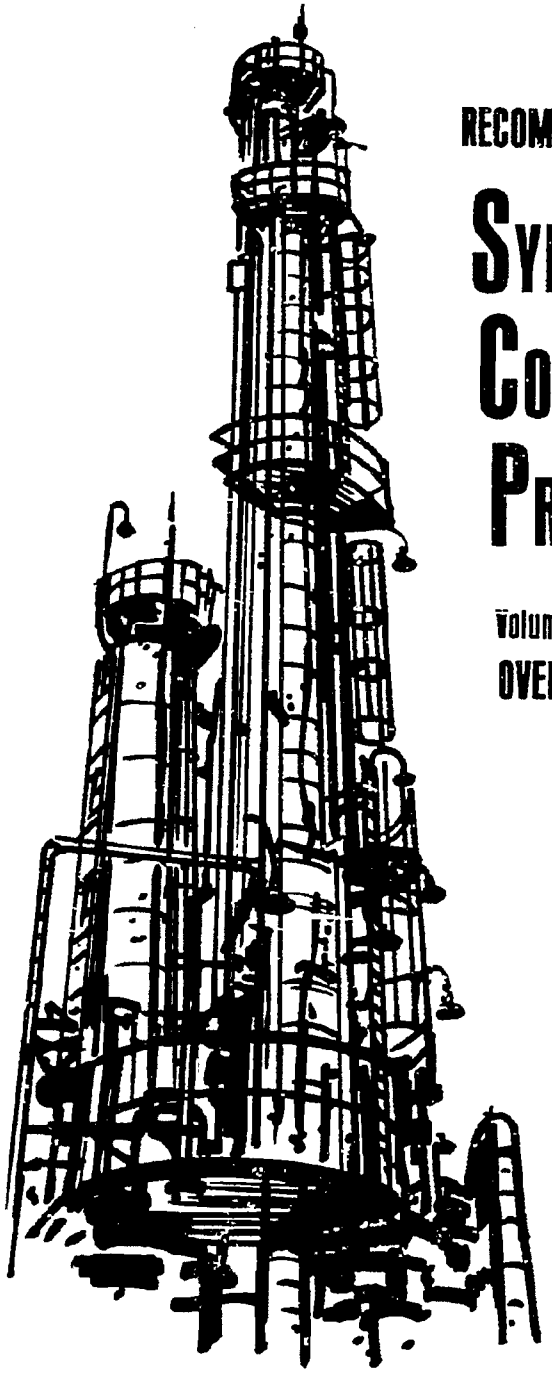

NOVEMBER 1975

RECOMMENDATIONS FOR A

SYNTHETIC FUELS COMMERCIALIZATION PROGRAM

Volume I

OVERVIEW REPORT

REPORT SUBMITTED
by
SYNFUELS INTERAGENCY TASK FORCE
to
THE PRESIDENT'S ENERGY RESOURCES COUNCIL

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $2.85
Stock Number 041-001-00112-3

November 15, 1975

FOREWORD

An Interagency Task Force was formed February 19, 1975 by Frank Zarb under the aegis of the Energy Resources Council to examine alternatives for implementing the President's goal, announced in his January 1975 State-of-the-Union Message, of assuring early commercialization of synthetic fuels in the United States. The results of the Task Force's efforts are summarized in this overview Volume and are described in detail in Volumes II, III and IV of the Task Force's report.

The analyses conducted by the Task Force included consideration of: the economic and environmental costs and benefits associated with alternative programs for accelerating synthetic fuels commercialization; alternative incentives which might be offered by the Federal Government including their effectiveness and cost; and finally, measures needed for expeditious implementation of a program assuming a decision is made to proceed. Recommendations were also provided in each of these areas.

The results of the Task Force's effort were based on a comprehensive set of analyses involving the participation of more than 50 Federal employees from more than 10 agencies and supported by an equal number of consultants or analysts from several major contractors. It should be emphasized that the recommendations presented in the report represented the views of the Task Force and do not necessarily represent the views of any particular Federal agency.

Finally, it should be noted that the recommendations of the Task Force and the analyses described herein form the basis for the President's proposed 350,000 barrel/day first phase of a Synthetic Fuels Commercialization Program. Final decisions on whether and how to proceed with this program must, of course, await Congressional authorization, completion of final environmental impact statements, and consultation with potentially affected states and regions, as well as securing necessary regulatory and other approvals.

William T. McCormick, Jr.
Chairman
Interagency Task Force on Synthetic Fuels

RECOMMENDATIONS FOR SYNTHETIC FUELS COMMERCIALIZATION

EXECUTIVE SUMMARY

I. INTRODUCTION

A. Purpose and Scope of Report

- This report evaluates alternatives for accelerating the commercialization of synthetic fuels technology in the U.S. and recommends a program of appropriate size and scope. Also provided are recommendations concerning measures needed for program initiation and implementation.

B. Background

- An incentive program for Synthetic Fuels Commercialization was proposed by the President in his 1975 State-of-the-Union Message to support a goal of developing an equivalent of one million barrels per day of synthetic fuels by 1985 from coal and oil shale.

- As contrasted with ERDA's energy R&D program which is aimed at developing new or improved technologies, this program would create, through Federal incentives, commercial demonstration of a limited amount of synthetic fuel production using technology that can be applied between now and 1985.

- In response to the President's goal, an Interagency Federal Task Force was established in February 1975 to:

  - evaluate economic and environmental costs and benefits of alternative-size programs from a National viewpoint and recommend an appropriate-size program;

  - develop detailed incentive program plans to ensure the recommended level of synthetic fuels capacity by 1985; and

  - formulate budgetary, legislative, organizational, management and other measures needed for expeditious implementation.

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C. Objectives of a Synthetic Fuels Commercialization Program

- To gain early information and develop industry infrastructure needed prior to a possible major expansion of synthetic fuels production capacity by:
  - investigating environmental, economic, institutional, technical, and other potential problems associated with large scale synthetic fuel plant operations; and
  - promoting accumulation of experience by the private sector in synthetic fuels production and utilization.
- To increase domestic energy production by supplementing existing and planned domestic energy production in 1985 and thereby:
  - reduce reliance on imports and thus enhancing national security in event of embargo; and
  - provide less expensive supplies in the event world oil prices continue to rise.
- To improve U.S. international position in energy matters by:
  - demonstrating to oil exporting nations U.S. capability to develop its vast coal and oil shale resources;
  - establishing U.S. leadership among consuming nations in international efforts to become less dependent on Middle East energy supplies.

D. Program Level Options Considered

- In conducting the analyses, three alternative-size synthetic fuels programs were considered:
  - a 350,000 bbl/d "information" program which would be designed primarily to gain technical, economic, environmental and other data on various generic fuel/resource types (e.g., gas from coal);
  - a 1,000,000 bbl/d program which, in addition to providing the information gained in the smaller program, would provide additional information on the cost of alternative processes in each generic fuel/resource area; and

- a 1,700,000 bbl/d "maximum" program which represents the largest synthetic fuels program in 1985 that could be anticipated with an intense National effort in the absence of major dislocations in the economy.

- In examining the 1,000,000 bbl/d program option, two approaches were considered: single phase, in which the full 1,000,000 barrels would be committed to at the outset; and, two-phased, in which an "information-type" program would be committed to immediately with the remainder of the 1,000,000 barrels to be decided upon later in the decade based on the results of the first phase and the then prevailing energy situation.

II. RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

A. *Industry Investment Without Federal Incentives*

- Based on present information including industry plans, it is concluded that, in the absence of Federal incentives and changes in regulatory policy with regard to synthetic gas or other policies creating a stable and favorable synthetic fuels investment environment, significant amounts of synthetic fuels are not likely to be produced in the U.S. by 1985.

  - This conclusion stems primarily from the anticipated cost of synthetics and from the risk associated with large synthetic fuel plant investments in light of the uncertainty of future world oil prices.

- Based on current estimates of long range domestic demand and supply, it is projected that synthetic fuels will need to be introduced in the 1985-1995 time frame. Estimates of 1995 U.S. demand for synthetics average 5 million bbl/day and vary between 1 and 9 million bbl/d depending primarily on the demand for energy and the supply and price of conventional oil and gas.

B. *Size of the Recommended Federal Program*

- In evaluating alternative-size programs the following costs and benefits to the Nation were explicitly considered in a quantitative analysis:

  - economic benefits (or costs) associated with having less expensive (or more expensive) synthetics as compared with alternatives such as imports, including the value of insurance, information, and decreases in foreign oil prices;

- environmental and socio-economic costs associated with accelerated development of shale and coal resources; and

- economic benefits associated with embargo protection.

- Not included in the quantitative analysis are the following potential benefits that could accrue to the U.S. as a result of undertaking a program:

  - international leverage (improved bargaining position) associated with positive U.S. leadership in developing alternative fuel sources;

  - resolution of industry uncertainty with regard to government support for synthetic fuel development which may speed private sector investment;

  - the value of a potential decrease in world oil prices paid by importing nations; and

  - possible weakening of the cartel strength (this was assessed as negligible).

- Based on a preliminary construction schedule, presently available information concerning future expected U.S. demand and domestic production, the expected cost of synthetic fuels, and assuming the cartel has a 50-50 chance of remaining strong, the expected costs of all three program level options considered exceed the expected benefits:

  - the 350,000 bbl/d program could result in a net negative benefit to the Nation of about $1.6 billion in discounted 1975 dollars.[1] However, there is a 10 percent chance the 350,000 bbl/d program could result in a net benefit to the Nation of more than $7 billion[2] while there is a 10 percent chance it could result in more than a $9 billion net negative benefit.

  - the 1,000 000 bbl/d program could result in a net negative benefit to the Nation of about $5.4 billion. However, there is a 10 percent chance the 1,000,000 bbl/d program could result in a net benefit of more than $15 billion or a 10 percent chance of a net negative benefit of more than $26 billion.

  - the 1,700,000 bbl/d program could result in a net negative benefit to the Nation of about $11.0 billion.

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[1] Unless otherwise stated, all dollars in this report are constant 1975 dollars. Appendix G of Volume III contains a sensitivity analysis of the effects of inflation.

[2] Net present value benefit discounted at 10 percent.

- These results are highly sensitive to four factors which have been examined in the analysis:

  - The assumed strength of the cartel and thus the future world oil price;

  - U.S. energy position in 1995 as defined by the difference between domestic demand and production;

  - the future costs of synthetic fuels; and

  - the effectiveness of the program in reducing synthetic fuels costs.

- If it is assumed that the cartel is strong and, therefore, world oil prices are high in 1985, then all three programs would be expected to result in net benefits to the Nation ($1.5 billion for 350,000 bbl/d, $3.5 billion for 1,000,000 bbl/d and $3.1 billion for 1,700,000 bbl/d); if the cartel is assumed to be weak in 1985, then the net negative benefits to the Nation would be $5 billion for 350,000 bbl/d, $14 billion for 1,000,000 bbl/d, and $25 billion for 1,700,000 bbl/d.

- The desirability of a large synthetic fuels program is high assuming imports are restricted, although it is not strongly influenced by the existence of a storage program:

  - if the government should adopt a six million barrel per day import restriction by price or quota, the 350,000 bbl/d program would have an expected positive net benefit of $5 billion and the 1,000,000 bbl/d program $9 billion; however, in this case the nation would incur a negative benefit (decrease in social surplus) due to such import restrictions on the order of $45 billion, and

  - a storage program of between 0.6 and 1.0 billion barrels would have almost no effect on the desirability of a synthetic fuels commercialization program; however, it is expected that such a storage program would increase the net benefit to the nation by about $9 billion.

- With regard to environmental impact, considerable uncertainty surrounds the commercialization of synthetic fuels. These uncertainties include choice of process, effluents from the processes chosen, pollutant transport mechanisms, site location, and others. Based on the environmental impact assessment it is judged that:

- the environmental impacts currently estimated to result from the 350,000 bbl/d, or from the first phase of a two-phase 1,000,000 bbl/d option, appear acceptable when considered in light of the environmental and economic information likely to be gained from the program;

- the environmental impacts likely to result from application of current conversion technologies and pollution abatement technologies on a large scale (1 million b/d or more) would be regional in scope and could be severe;

- it appears that pollution abatement technologies can be developed which will render synthetic fuels commercialization acceptable. The 350,000 bbl/d option, or a two-phased option, would provide the laboratory for rapid diagnosis and treatment of environmental problems of synfuels production at commercial scale.

- Based on the results of the cost/benefit and the environmental analyses, it is concluded that a fully committed synthetic fuels commercialization program at the 1.7 million bbl/d or 1 million bbl/d level is not justifiable at this time.

- In view of the relatively small risk and expected cost of the "information" option and the other potential benefits not quantified in the analysis, it is recommended that a program be undertaken with a budgetary authority to install immediately a capacity of approximately 350,000 bbl/d. This option does not preclude achieving the goal of 1,000,000 bbl/d by 1985 but defers the decision to commit firmly to that goal until later in the decade pending additional information on environmental factors, ongoing R&D programs, industry response, world oil price and domestic supply and demand.

  - this conditional two-phased approach could provide the opportunity to capture most of the potential benefits of a larger program without risking large potential costs.

C. *Recommended Incentives and Their Cost*

- Based on the extent of U.S. energy resources, the availability of technology and the classes of potential investors and users, the program scope included the following fuel/resource groups:

- Oil from shale
- Electric utility and industrial fuels (includes low Btu gas and clean fuels from coal as well as fuels derived from organic waste).
- High Btu (or pipeline quality) gas from coal
- Synthetic crude and refined products from coal

- Financial incentives evaluated in the analysis were: loans and loan guarantees; purchase agreements and price supports; tax changes including investment tax credit, construction expensing and accelerated depreciation; construction grants or subsidies; Government financed and owned plants; and, selected combinations of the above.

- Other incentives considered in the analysis include: availability of Federal lands; resolution of environmental constraints; and, changes in Federal regulations of high Btu gas from coal.

- The incentives considered for the synthetic fuels program were comparatively evaluated with respect to the following criteria:
  - Expected cost to the Federal Government.
  - Effectiveness in assuring target synthetic fuel production levels
  - Breadth of industry participation including degree of competitiveness
  - Extent of Federal involvement needed in management and operations
  - Complexity in administering the incentives
  - Flexibility in limiting or changing the size and scope of program
  - Existence of necessary statutory authorities

- For shale oil, syncrude and unregulated electric utility or industrial fuels, the recommended incentive is a competitively bid combination of a non-recourse loan guarantee for up to 50 percent of the project cost plus a price guarantee. The strengths of this incentive are that it:

  - encourages competition and broad participation through its loan guarantee provision for firms needing risk sharing;

  - provides product price protection while reducing government costs as market prices approach the production prices of syncrude;

  - does not require government management or operation of plants thus minimizing Federal administrative involvement.

- For high Btu gas from coal, the recommended incentive is a competitively awarded non-recourse loan guarantee for up to 75 percent of the project cost. This incentive is suggested as a temporary measure pending either recommended changes to the Natural Gas Act to bring synthetic gas plants under jurisdiction or complete deregulation of gas. The strengths of this incentive are that it:

  - facilitates the acquisition of debt financing to the regulated industry;

  - entails modest administrative complexity and little direct government involvement;

  - entails no government liability in full life operation, and maturity of technology minimizes probability of high cost early termination; and

  - retains responsibility for cost recovery from plant amortization and operation with the consumer.

- For regulated utility/industrial fuels (i.e., low Btu gas, boiler fuels, etc.) the recommended incentive is a competitively bid construction grant. The major strengths of this incentive are that it:

  - overcomes loan financing restrictions on electric utilities by providing up-front capital to the participating regulated utility and reduces capital exposure which should attract broad participation;

- places responsibility for cost recovery from amortization and operation with the consumer;

- encourages broad participation and thus increases the prospects of achieving production targets; and,

- entails modest administrative requirements and government involvement.

- For production of liquids and gases from biomass, the recommended incentive is a competitively bid non-recourse loan guarantee for up to 75 percent of the project cost. The major strengths of this incentive are that it:

  - encourages competition and broad participation by providing access to capital by lowering capital exposure thereby increasing the prospects of achieving production targets;

  - reduces product prices significantly; and

  - entails modest administrative requirements.

- Tax incentives such as increased investment tax credits, accelerated depreciation and expensing were judged to be less desirable than the recommended incentives because they:

  - are non-selective in that the government cannot limit extent of industry participation;

  - tend to be permanent subsidies and difficult to remove once a vested interest is established; and

  - tend to favor large companies which have sizable profits against which deductions can be credited.

- If the recommended incentives were offered, the cost of the program to the Federal government would depend on the market price of oil, inflation rates and the cost of coal and other resources. Recommended budgetary requests have been formulated to cover most contingencies. The following authorization levels will allow execution of Phase I of the Synthetic Fuels Commercialization Program:

Loan Guaranty	$ 6.0 billion
Price Guaranty	4.5
Construction Grants	0.6
Total Budgetary Authority . .	$11.1 billion

D. Program Implementation

- Because of environmental considerations, the need for infrastructure development and the value of gaining experience from early plants, it is recommended that:
  - the first phase begin in FY 1976, not exceed 350,000 bbl/day, and contain a mix of technologies determined, in part, by their:
    - -- relative economic attractiveness
    - -- environmental impacts
    - -- attractiveness for commercialization to industry
    - -- sophistication relative to new technology being developed, and
    - -- need for producing a given type of synfuel.
  - a second phase of the program be considered about 1978 or 1979 depending on industry response to the first phase, any early results from ERDA's R&D program, and the current attractiveness of private investment in synthetic fuels.
- Most of the basic statutory authority necessary to implement the recommended information program exists under the Federal Nonnuclear Energy R&D Act of 1974. Because there will be no need for substantial new legislation, and because of the following additional reasons, it is recommended that ERDA administer at least the commercial demonstration phase of the Synthetic Fuels Incentive Program:
  - the program is consistent with and logically falls within ERDA's charter (under the Nonnuclear Act) for "commercial demonstration" of nonnuclear technologies;
  - ERDA has the needed technical expertise to oversee and monitor the progress of the program to ensure that the Federal government's interests are served; and
  - ERDA's R&D program and the Synthetic Fuels Program can mutually benefit one another if conducted in an environment permitting close contact.

- It is recommended, however, that if implemented in ERDA, the program be managed as a distinct entity under a new Assistant Administrator so that it can be conducted in a financial/commercial rather than R&D environment.

- Realization of the environmental benefits of the two-phased approach and mitigation of the adverse impacts of any synfuels option will necessitate a strict environmental protection strategy. Such a strategy is recommended to include use of environmental protection criteria in evaluation of project proposals, Federal approval of detailed site development plans, extensive coordinated efforts to develop environmental data and an Environmental Advisory Board.

- It is likely that problems in financing public infrastructure in remote areas will develop because of the uncertainty associated with a plant's ultimate success which can hinder the bond markets from working efficiently. Therefore, it is recommended that ERDA be given the authority to guarantee an annual tax revenue stream from the plant up to an annual amount sufficient to amortize debt incurred to finance up to 75% of the basic needs of the related public infrastructure.

- To implement the recommended program in ERDA under the Nonnuclear Energy R&D Act, several changes to that act are recommended:

  - authorize the establishment of one additional Executive Level IV position in ERDA to head up the Synthetic Fuels Program;

  - clarify the EPA Administrator's project monitoring authority under the price support provision on an advisory, consultative basis; and

  - establish a loan guarantee authority for ERDA.

- In addition, changes to several other existing statutes appear needed as follows:

  - authority to authorize the Department of the Interior to grant Federal oil shale lease holders approval for off-lease site disposal of oil shale residue where such disposal is necessary for the efficient development of the resource, and

- changes to the Natural Gas Act that provide the FPC with clear regulatory jurisdiction over synthetic gas plants in the event that natural gas is not deregulated. These changes would provide a framework under which FPC would make rulings on proposed plants.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (continued)

LIST OF FIGURES

LIST OF TABLES AND EXHIBITS

LIST OF TABLES AND EXHIBITS (CONCLUDED)

LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
BAU	Business as Usual
b or bbl	barrels
b/d	barrels/day
Btu	British thermal unit
BuM	Bureau of Mines
CBE	Crude Barrel Equivalent
CY	Calendar Year
DOI	Department of Interior
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
ERDA	Energy Research and Development Administration
FEA	Federal Energy Administration
FPC	Federal Power Commission
FY	Fiscal Year
GOCO	Government Owned & Company Operated
ICC	Interstate Commerce Commission
IGT	Institute of Gas Technology
LNG	Liquified Natural Gas
mcf	Thousand Cubic Feet
mmscf	Million Standard Cubic Feet
MM or mm	Million
NPV	Net Present Value
NSF	National Science Foundation
OCR	Office of Coal Research
OMB	Office of Management & Budget
OCS	Outer Continental Shelf
PIB	Project Independence Blueprint
QUAD	Quadrillion (10^{15}) Btu

LIST OF ABBREVIATIONS (Continued)

R&D	Research & Development
scf	Standard Cubic Feet
SRC	Solvent Refined Coal
SRI	Stanford Research Institute
tcf	Trillion Cubic Feet
t/d	Tons/Day
TPD	Tons Per Day
USG	United States Government
USGS	United States Geological Survey

DEFINITIONS

- Net Present Value (NPV), or Discounted Dollars - NPV is the stream of costs discounted at 10 percent to the present time (1975). NPV reflects the "time value" of money, i.e., a dollar spent today has a higher cost than the same dollar spent at some point in the future, and in this respect NPV is used as an analytical technique to place the costs of various incentive and program alternatives on a common basis for comparative analysis.

- Undiscounted Dollars--Undiscounted Dollars is the stream of costs stated in terms of 1975 values, i.e., no inflation is assumed and the costs are not discounted. In effect, it measures the stream of costs (or receipts) "As Spent" or "As Received" and is thus a useful measure of the impact various program options would have on the Federal Budget.

- Inflated Dollars--Inflated dollars is the stream of costs assuming a 7 percent rate of inflation from 1975 base and not discounted. This measure is used to estimate the total budget request for the program.

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