CHAPTER 1: INTRODUCTION

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1.1 Role of Synthetic Fuels

Energy consumption in the U.S. has become increasingly dependent upon foreign sources, especially in the liquid fuels area. Transportation energy usage is a dominant user of foreign petroleum. Motor gasoline alone accounts for over 35% of all petroleum products consumed in the Us. (Reference No. 1) ; petroleum itself accounting for over 43% of all the energy consumed in the U.S. (Reference No. 2).

Unfortunately, over the past 35 years, the ratio of U.S. oil reserves to total U.S. oil consumption has declined, even with Alaskan North Slope oil discoveries. On the other hand, oil imports have been increasingly filling the gap in petroleum supply-demand imbalances. From 1950 to 1977, domestic petroleum production fell from an average 85% of total domestic petroleum consumption to 47% in 1977 (Reference No. 3)* This trend has been somewhat slowed down recently by increased energy conservation measures--especially in the transportation sector--but it has not stopped. The impacts of this increasing dependence on foreign crude oil and refined products have been staggering. In addition to the increased and continual exposure to supply interruptions, and subsequent national security vulnerability, the direct costs of these imports have increased enormously (Reference No. 4). From a modest plateu of 1-2 billion/year in the 1958-68 time period, the direct costs have mushroomed to 25 billion in the embargo period (1973-74) , and are heading for 90-100 billion in 1980 (Reference No. 5). The impacts of this capital drain in domestic investments, subsequent jobs, and consumer inflation has been notable. In the third quarter of 1979 alone, domestic prices for energy, housing; food, and medical care rose at an annual 17.6% rate--with energy prices escalating at a 50.1% annual rate. Adverse impacts have not been confined to the U.S. domestic economy. Oil bills, being raised by OPEC faster than inflation--not only account for 25-50% of total inflation rates around the world, but also pose a global inflationary problem, apparently without end--unless alternate or substitute fuel supplies are found\developed in sufficient quantities and at competitive prices to put the lid on world crude price escalation in a timely fashion.

Alternate Synthetic Fuels

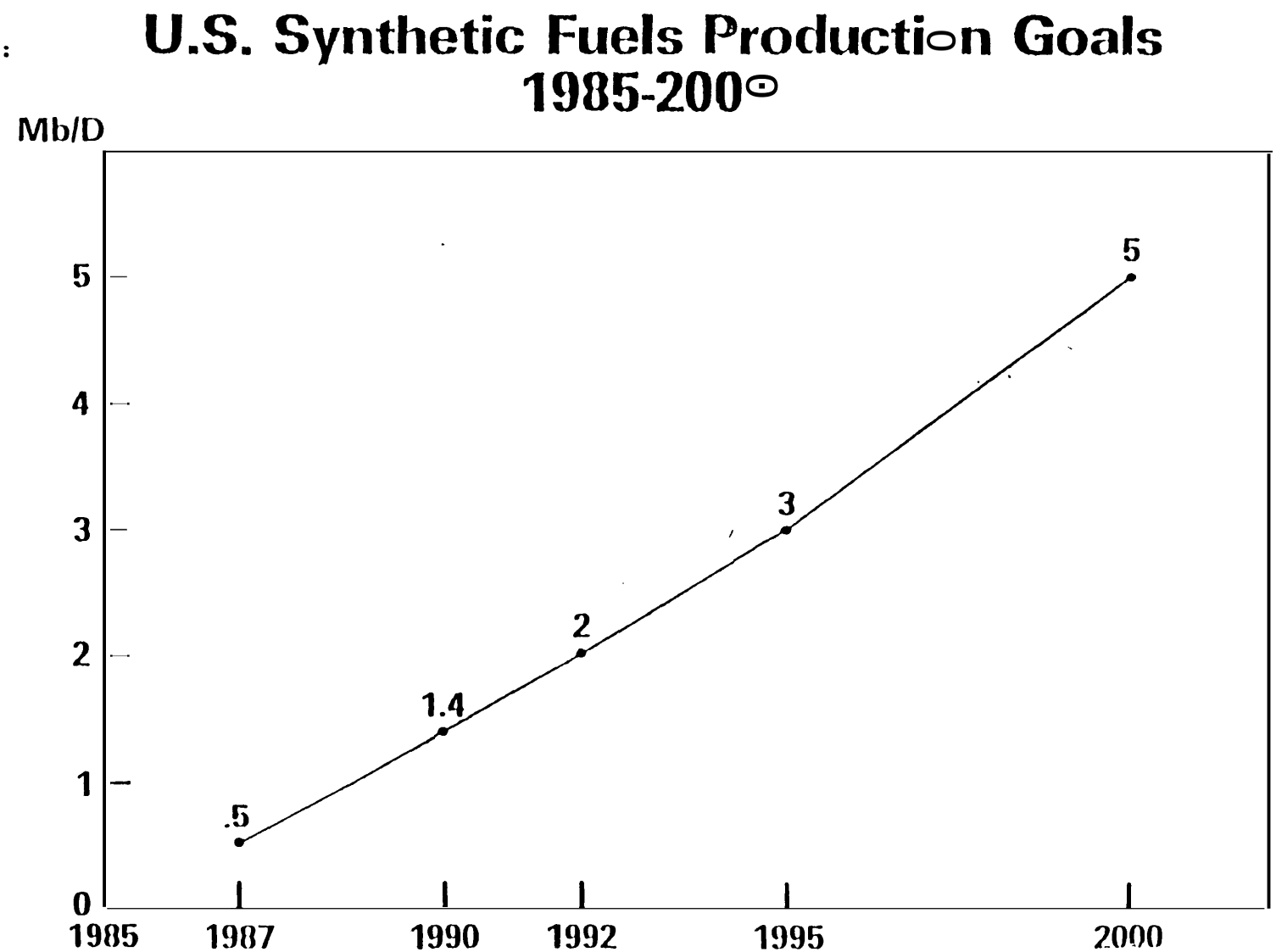
Many recent studies (Reference No. 6) have estimated the domestic energy and petroleum supply-demand imbalances. Most have credited conservation with decreasing petroleum demand from its historical rates of growth, and most have nonetheless projected a need for alternate domestic liquid fuels to fill the increasing domestic petroleum supply-demand imbalances.

Although most studies have agreed on the need for/and future role-of alternate domestic-fuels, they have differed in projecting their rate of growth in the marketplace, date of introduction, prospective cost, ease of usage, and "raw" resource availability--as well as their potential environmental, health, and safety impacts. The U.S. Department of Energy has recently targeted synthetic production goals to reach 5 million barrels/day of crude oil equivalent from all synthetic sources by the year 2000 (Figure 1.1), and the recently passed Energy Security Act (6/30/80) has targeted goals of .5 MMBD by 1987 and 2.0 MMBD by 2000. Although current forecasts vary, synthetics have generally been forecast to provide between 12-13% of total domestic energy by the year 2000, and even up to 30% of primary liquid fuel supplies. Although composition of those synthetic fuel targets and projections are varied (shale, unconventional gas, biomass, solar, . ..) , coal--as both a feedstock for synthetic fuels and as a direct combustion boiler fuel--generally has been projected to play a large and growing role. In many ways, this is a natural reflection of the abundant and regionally diverse U.S. coal resources and reserves. This is similarly true for shale as described in Chapter 2.

1.2 Scope of Study

The study design of this effort is, in a broad fashion, to provide for a technical and economic comparison of various selected synfuel technologies. As outlined in the contract study Scope of Work, the study team was directed to use existing published (and referenced) information and data. OTA staff and the Synfuels Advisory Group assisted in the acquisition of published data, as well as providing guidance and review. The study team was further directed to look solely at technical and economic aspects of selected synfuel technologies and specifically not at policy implications, interpretations, and concerns. These very

FIGURE 1.1:



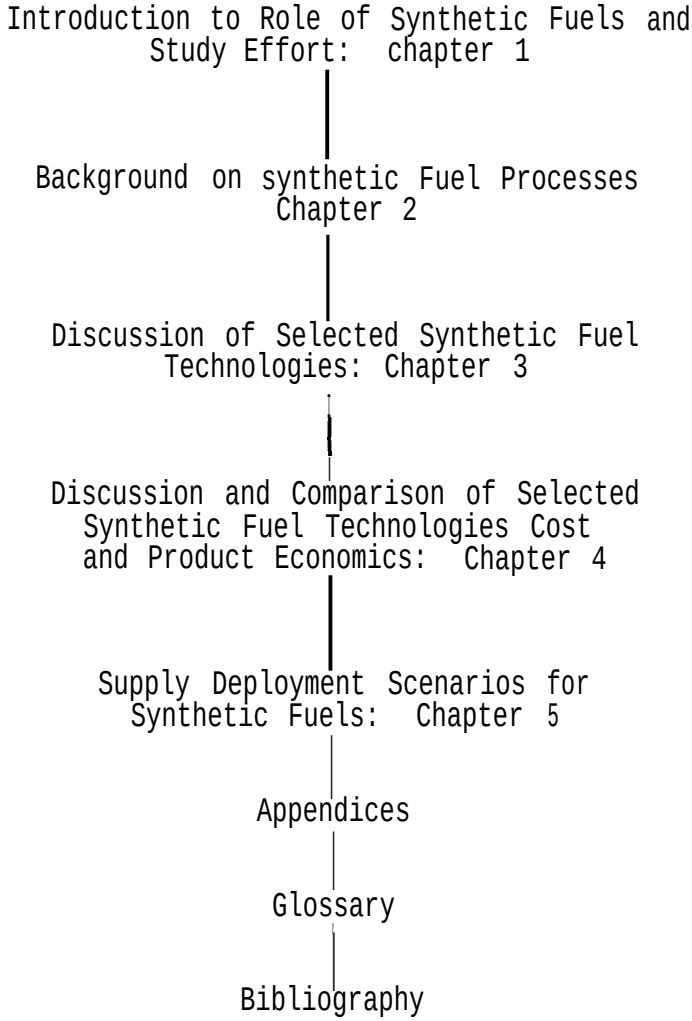
Source: DoE, 1980

ejb&a

real policy considerations are the stated prerogative of the OTA itself and its existing well-defined review procedures.

In consultation with the OTA staff, generic technology choices have been made (Chapters 3 and 4), and supply deployment scenarios developed (Chapter 5). Each chapter, and sub-section, specifically identifies the respective referenced sources and assumptions used. Where available in the literature, comparative estimates have been provided. Scope, timing, and budget greatly limited the degree of first-hand data verification. The recent ESCOE coal conversion study, as referenced in Chapter 4, was the scope directed starting point for the comparative economic analysis, with specific cost basis and assumptions provided in the addendum to Chapter 4.

The outline of the report is as follows:



Potential Next Steps

Potential next steps to the broad-based study effort could include site-specific, technology-specific detailed technical, economic, and socioeconomic evaluations. Site-specific supply transportation and product distribution needs and costs; assessments of facility-specific integration of synfuel facilities with existing refinery capacity; and site and region-specific socioeconomic and labor/skill mix needs. Case study assessment are sub-examples.

On the policy side, the OTA using this study, as well as other component study efforts, will be developing policy interpretations.

CHAPTER 2: BACKGROUND