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FIFTY YEARS IN SYNTHETIC FUELS INFORMATION: HAVE WE LOST
A STRATEGIC NATIONAL RESOURCE?

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ABSTRACT

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ABSTRACT

The recent 50-year history of the synthetic fuels industry is a long saga of fluctuating national interest, funding, and precipitous world events. The goal of a unified information set has been seriously compromised by war and shortages, prosperity and apathy, economic conflict and OPEC, and a return to abundant supply. On the horizon looms the dismal prospect of a real and permanent energy shortage, a prospect that easily justifies the need for keeping important technical information for the future. This paper tells the tale of the research literature from the German experience during World War II through the disbanding of the Synthetic Fuels Corporation.

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INTRODUCTION

The recent 50-year history of the synthetic fuels industry is a long saga of fluctuating national interest and funding responding to precipitous world events. The goal of a unified information set has been seriously compromised by war and shortages, prosperity and apathy, economic conflict, OPEC, and abundant supply. On the horizon looms the dismal prospect of real and permanent energy shortage, a prospect that easily justifies the need for keeping important technical information for the future. The tale of the research literature begins with the German experience during WW II and rests now with the dissolution of the Synthetic Fuels Corporation.

HISTORY OF SYN FUELS INDUSTRY

The synthetic fuels industry is based on technologies which convert naturally occurring fossil fuels, including coal, oil, shale, peat and tar sands to conventional fuels for use in established distribution networks, energy systems, and industries; that is, plastics and chemical products.

The development of such a synthetic fuels industry was mandated in 1980 by the federal Energy Security Act to reduce the

U.S. dependence on foreign suppliers of liquid fuels and thereby decrease the vulnerability of the economic system. However, the history of coal conversion goes back much further.

Because of the vastness and relative accessibility of coal reserves throughout the world, coal was the earliest fossil fuel converted to gas and liquid fuels. Early basic research in England during the 17th century and in Scotland in the 19th century led to the production and widespread use of gas from coal for city lighting and home use. (1) During World War II, Germany developed a national industry for the conversion of coal and coke to gas and liquid fuels for use in the production of ammonia, methanol, and petroleum products. Large-scale production of synthetic fuels based on these early technologies continues today in South Africa, Japan, Czechoslovakia, Spain, Turkey, India, Korea, and China. In the past 50 years, over 100 commercial plants for the production of gas and liquids from coal have been in operation the world-wide. (1)

American interest in synthetic fuels resulted from shortages experienced during WWII. The U.S. Bureau of Mines in the Department of the Interior began a systematic investigation of coal liquefaction in 1936. This effort has evolved under the Office of Coal Research, the Federal Energy Administration, the Energy Research and Development Agency, the Synthetic Fuels Corporation, the Department of Energy, and the Treasury

Department. In most projects, the government agency acted as co-sponsor with oil companies and other federal governments.

Renewed interest in gasification and liquefaction of coal in the late 60s and 70s centered around bench scale and process development units (PDUs). Demonstration plants and pilot plants were the necessary next steps in the development of the industry. Eleven such plants, ranging in size from 2 to 120 tons of coal processed per day, were proposed. A maximum of eight became operational. (1)

The Energy Security Act of 1980 established the Synthetic Fuels Corporation (SFC) as an independent agency in the executive branch and gave it the responsibility to further the establishment of a commercial synthetic fuels industry in the United States. Until its dissolution in 1986, the SFC issued solicitations of interest to private industry and entered into financial support agreements in furtherance of its mission. Four commercial synthetic fuels projects were entered into by the SFC: (1) Cool Water Coal Gasification Program at Daggett, California, (2) DOW Syngas Project, Plaquemine, Louisiana, (3) Parachute Creek Shale Oil Program, Parachute, Colorado, and (4) Forest Hill Heavy Oil Project, Wood County, Texas. Oversight of these projects has been passed to the Treasury Department.

Conceptual design studies for commercial plants projected a daily

coal consumption in the 5,000 to 35,000 ton-per-day range. Only two commercial-scale synthetic fuel plants are in operation today -- SFC's Cool Water Gasification Program and DOE's Great Plains Coal Gasification Program (Beulah, North Dakota). Cool Water produces electricity used by Southern California Edison, and Great Plains produces high Btu gas for distribution via the Northern Border pipeline system.

ONE RESOURCE RECOVERED - GERMAN DOCUMENT RETRIEVAL PROJECT

In late 1944 a group of twenty-six (2) American oil technologists were selected to form the Technical Oil Mission (TOM) to go to Germany to collect data on German petroleum technology. A similar British team was formed by the Combined Intelligence Objectives Subcommittee (CIOS). As soon as German plants fell into allied hands, TOM teams inspected the confiscated plant and research records and debriefed German scientists and engineers. Tons of documents were shipped to England where the CIOS first tried to translate and abstract them, but then turned to microfilming them and shipping them to the United States. In this country the documents were stored wherever there was space. The British mounted a major information effort that issued more than 1400 reports, consisting of field interviews of German personnel and subjective factory site evaluations. Many of these reports became part of the 309 microfilm reels sent to the United States.

As the information work reached completion in late 1945, many members of the TOM teams and their organizer, Dr. William C. Schroeder, moved to the Synthetic Liquid Fuels Division of the Bureau of Mines. Under the Synthetic Liquid Fuels Act of 1944, the Bureau constructed two synthetic fuels demonstration plants. These operated until they were closed in 1953. (3)

After the oil embargo of 1973, the oil supply crises experienced in the United States made both government and private industry anxious to ease the burden and ensure that dependency on foreign suppliers never again made us so vulnerable in the energy arena. Dr. R. Wainerdi, then Associate Vice President for Academic Affairs at Texas A&M University, recalled conversations with South African colleagues about the existence of the German documents and thought they might speed up U.S. emergence from its crippling foreign oil dependency. (4)

In 1975, the Center for Energy and Mineral Resources at Texas A&M University initiated the German Document Retrieval Project (GDRP). The GDRP had as its goals to locate the German synthetic fuels records, to determine if they could be copied, to ascertain whether they had been reviewed and, if so, at what depth, to find out whether or not abstracts and indices existed, and to establish whether potential users could have access to the original records.

The GRDP found the German synthetic fuels records in many places, including the National Archives, the Library of Congress, military installations, private collections, the Imperial War Museum in London, and the German Archives in Koblenz. As little as five percent of the documents had been abstracted or translated (2). The existing index to the titles of the documents on the 309 reels of microfilm was so general as to be useless. The information was available but inaccessible. In 1976 the German Document Retrieval Project was expanded and financial support and expertise was sought from about 40 petroleum, gas, and chemical companies. By late 1978, 8,000 of the collected 600,000 papers had been abstracted and indexed, entered in DOE's Energy Data Bank (EDB) (2), and published in *fossil energy update*.

The documents were collected, the staff was assembled, and the recovery system developed and demonstrated, when funding to follow through was denied by DOE due to changing priorities. Dr. Kurt Irgolic, former GDRP staffer sums up the information restoration goals of the project with the statement, "The survivability is good. The retrievability is nonexistent." (4)

SOURCES OF SYNTHETIC FUELS INFORMATION

Considering the experience of the German synfuels

information, where and in what condition is the new body of knowledge gained in the years following the 1973 Oil Embargo? The synthetic fuels information base can be found in three main places: private corporate libraries, open literature publications, and government report literature.

Private oil company libraries contain much of the process research done at the bench scale and PDU levels. Corporations in cosponsoring roles with the government on demonstration, pilot, and commercial plants retain proprietary ownership of most engineering, materials, process operation, and worker health and safety data. The available primary process and engineering data is from work performed at the Energy Technology Centers at Morgantown, West Virginia (METC) and Pittsburgh, Pennsylvania (PETC). METC and PETC maintain technical computer databases on coal gasification and liquefaction, respectively.

A respectable body of open literature publications has been produced by academic and national laboratory research. This can be found in such journals as Fuel, Mutation Research, Nature, Analytical Chemistry, Environmental Science Technology, Mining Engineering, Journal of Water Pollution Control Federation, and many others.

The bulk of the publicly available information is from the government report literature, which includes project progress

reports, topical reports, program reviews, topical conference proceedings, and others. Report series from the Environmental Protection Agency, the Department of Energy, Oak Ridge National Laboratory, and Pacific Northwest Laboratories are extensive. The Department of Energy's Office of Scientific and Technical Information maintains a large bibliographic database, the Energy Data Base, for the express purpose of making this body of data available.

SUMMARY

The Eastern Hemisphere has the bulk of conventional oil resources. The Middle East alone has oil reserves that could last more than 100 years at current consumption rates. United States dependence on that energy supply does not represent a secure energy resource. The Western Hemisphere has most of the unconventional oil sources. Eighty percent of the U.S.'s known fossil fuel resource is coal, making it our most secure strategic energy resource for the future. Development of this coal, the technology to utilize it safely, and securing the information gathered in the process is essential. Considering the volatility of world events, our growing awareness of our increasing inability to direct the outcome of these events, and the reality that there is a finite world oil supply, the synthetic fuels information base is undeniably a strategic national resource.

It would seem that the survivability of this resource depends solely on the will and dedication of government agencies to continue to preserve AND facilitate access to this body of information.

The modern synfuels resource is not lost, probably not even immediately in danger. However, synfuels development funding is drying up, oil is cheap, and apathy is rampant. Information collection and analysis projects are receiving their traditionally low priority in funding. Like the German Document Retrieval Project, the work is being left only partially completed. Systems are being abandoned right when they are poised to receive the data they were designed to coordinate. This lack of follow through is tragic, expensive, and short sighted.

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