

COMMERCIALIZATION STATUS - DOE PROGRAMS

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Significant progress in the commercialization of synthetic fuels has been made in the past year, largely in response to two events. The first concerns the solicitations by the Department of Energy to sponsor feasibility studies and cooperative agreements for commercial synthetic fuels facilities. Twenty-one such coal synthetics projects have been sponsored, representing a DOE outlay of some \$107 million. These projects include:

Ten coal liquids projects--all indirect liquefaction, with two planning to produce gasoline from coal, seven planning to make methanol, and one a Fischer-Tropsch or SASOL-like facility producing a variety of fuels and chemicals;

Four high-Btu gasification projects;

Seven Low/medium-Btu gasification projects.

The second event was the solicitation from the Synthetic Fuels Corporation, to which there were 63 responses. (A list of the projects that were selected for DOE awards, and/or had applied to the Synthetic Fuels Corporation is included as Tables 1 and 2, and Figures 1 and 2). In all, some 25 coal gasification projects and 27 coal liquefaction projects have been identified as a result of these two events.

Our work with the feasibility studies and cooperative agreements has given us an overview of this developing industry. We believe this overview can be useful in helping all projects move forward from the planning stages to construction and operation. I would like to touch on some of the issues common to all projects in the hope that those of you who are project sponsors, or who are working with project sponsors, may carry away some ideas that will be helpful to your own situations.

Financing

Perhaps the overriding issue involved in a synthetic fuels plant is the question of financing. While it is still too early for us to talk about any specific estimates of capital investment or product costs, preliminary estimates that we have seen for many projects range from \$2 to \$6 billion. Obviously, this size risk must be spread among a number of venture partners. Another way to spread the risk, however, is to "unbundle" the project. An oxygen plant, a typical component of a coal-to-methanol or coal-to-gasoline plant, might comprise 15% of the capital investment. The mine and its supporting facilities might require 25% of the total project capital. These are multi-billion dollar components of the project. By having these components separately owned with lease-back or feedstock purchase arrangements, the total capital requirement for the major portion of the project can be reduced. Some of our projects are actively searching for these kinds of arrangements to reduce the total capital they would be required to invest in a project.

Other mechanisms that could potentially help to finance a synthetic fuels facility include:

State agencies, such as those in Virginia, Kentucky, North Dakota, and perhaps others;

Arrangements with foreign trading companies involving equipment supply combined with project financing and product offtake.

Again, some of the projects we are sponsoring are examining these kinds of alternatives.

Product Marketing

Another major issue is the marketing of the plant's output. If the product of the synfuels facility is gasoline, or electricity, or natural gas, the marketing is not a major problem. However, if methanol is the product, a strategy must be adopted which assumes a reasonable rate of penetration as well as flexibility to enter different potential markets.

We have seen the beginnings of a number of different strategic approaches to marketing methanol. A major interest for the use of methanol is as a mobility fuel for automobile use. Until the acceptance for automotive application, there are several approaches. One approach, for example, calls for targeting utilities as the primary user of fuel quality methanol. A second strategy would

start with a one-tenth size facility and market the methanol for automobile fleet use in the metropolitan area nearest to the plant. Some of the different potential fleet users include farm cooperatives, police forces, city, county and state vehicles and industrial fleets. A third strategy involves the coproduction of methanol with electricity in an industrial park to broaden the customer base. The manufacture of more than one product also allows some manufacturing flexibility. Altering the relative ratio of each product permits response to temporarily changing demand -- such as seasonal demand.

One project sponsor is already in the methanol business and is investigating retrofitting two of its plants from natural gas to coal feed. In their case, the product purity is not an issue. In the other cases, however, the question of methanol purity or grade is an issue. The resolution of this issue will depend on the marketing strategy selected and the market flexibility required.

The marketing of byproducts is important for a project's success. Carbon dioxide, for example, is a large byproduct of the indirect liquefaction of coal. Nitrogen is a byproduct of the air separation plant. The use of CO₂ and potentially nitrogen, for enhanced oil recovery (EOR) operations is being investigated -- in some cases extremely actively and in others only casually or not at all. Yet, this can provide an important source of revenue to the project. One project sponsor stated that if all of the CO₂ is sold for EOR operations, it would be the equivalent of getting their coal supply for free. And this project is located a long distance from any oil and gas operations and it would require a pipeline to move the CO₂ to where it is needed. Needless to say, this type of application should be examined carefully for each project.

For a synthetic fuels project employing the Fischer-Tropsch technology, there are many chemical byproducts which must be sold. In this case, a marketing strategy must be developed which takes into account the local chemical market, and compares this potential end-use with alternatives such as additional upgrading or use as fuel.

Regulatory Issues: Permits, New Legislation, and Conflicts with Other Projects

While the details of securing project permits may vary from state to state, the overall regulatory framework that a synthetic fuels project faces is similar. A range of Federal and state permits and consultations, under a variety of environmental and other laws may be required. Examples include a PSD (Prevention of Significant Deterioration) Permit under the Clean Air Act; an NPDES

(National Pollutant Discharge Elimination System) Permit under the Clean Water Act; a Hazardous Waste Permit under the Resource Conservation and Recovery Act, etc. In some states, such as Illinois, a state coordinator may be appointed to assist in obtaining the approvals of the various state agencies involved in permitting actions or the consultations. While helpful, this does not necessarily provide a close working relationship needed between the different levels of governments: Federal, state and local.

A unique situation, however, exists in Colorado, which has a "Joint Review Process," coordinating Federal, state and local permitting actions. The result is a coordinated schedule in which these different levels of government work together to eliminate overlap and delay. The W. R. Grace and Company coal-to-methanol project in Colorado, which received a DOE feasibility study grant, has entered into the Joint Review Process. Our experiences thus far have been highly encouraging. In addition to participation by all three levels of Government, the Joint Review Process has resulted in public meetings at which local citizens can learn about the proposed project, and provide their views for consideration. We have been told by Colorado officials that other states are interested in Colorado's experiences with the Joint Review Process. We believe that other states would find it helpful to emulate Colorado's example.

The preparation of an environmental impact statement is another aspect of the regulatory framework a synthetic fuels project faces. Since several Federal agencies will likely have permitting roles, the environmental impact statement or EIS could be prepared by any of a number of agencies. Environmental permits, for example, may be issued by the Federal EPA; if a dredge and fill permit is needed to construct a dock for feedstock or product loading or unloading, the Army Corps of Engineers would be involved.

Some of our projects have been faced with the issue of the designation of a lead agency for the preparation of an environmental impact statement. Of course, a project sponsor does not have the authority to designate a lead agency. But through prior working relationships, a sponsor may feel more comfortable working primarily with one agency rather than another. In some cases, the project sponsors are trying to interest a particular agency in requesting that they be designated as the lead agency for preparing the EIS.

The potential changes in the Clean Air Act and the uncertain nature of pollution control regulations in general is something

which could cause problems later on. Preliminary designs are being prepared for those projects which received DOE grants. Detailed engineering designs will begin soon. Early definition of the regulatory framework with respect to the Clean Air Act will help prevent costly retrofits during or after construction.

In some of these projects, potential land use conflicts with other non-synthetic fuels projects have been identified. For example, a local utility wishes to obtain an easement for a transmission line right-of-way across one project's coal acreage. The granting of this easement would interfere with the mining plan and cause hundreds of thousands of tons of coal to be lost.

In another case, the coal rights in the area selected for the synfuels plant site may be put up for lease by the Bureau of Land Management. The underlying coal, however, is of marginal economic value because the seam is thick and deep. In cases like these, DOE can support the synthetic fuels projects. We can do this by recommending alternative actions for the conflicting project through comments on their EISs.

Initiating and Maintaining Good Community Relations

Even before a project has been totally defined, evaluated and approved by the project sponsors, it must be "sold" to the local community. This is an aspect of a project that needs attention from the very beginning. One of our projects, the Tri-State Synfuels Project, has been giving this aspect a great deal of attention. An office has been opened in the local community. Tri-State Synfuels has prepared a short videotape describing the project. This tape was shown to the community by the local cable TV company. I would like to present this short tape today to show you an example of a communications tool that helps present a complex project to a lay audience.

Next year, we will be in a position to discuss in greater detail project investment requirements, estimated product costs, and environmental and socioeconomic impacts. The final reports for the feasibility studies and cooperative agreements will begin to be submitted to the Department of Energy during fiscal year 1982, and we expect that by the end of 1982 most of the projects will be finished.

IDENTIFIED COAL LIQUIDS PROJECTS

MAP KEY	PROJECT NAME	PROJECT SPONSORS	LOCATION	MAJOR PRODUCTS	SIZE, IN BARRELS OF OIL EQUIVALENTS	STATUS
1	Beluga Methanol Project	Placer Amex Cook Inlet Region, Inc.	Cook Inlet, Alaska	Methanol	22,900 BOE/D	A, C
2	Chokecherry Methanol Project	W. R. Grace & Co., ETCO	Moffatt County, Colorado	Methanol	1,600	A, C
3	Clark Oil & Refining Corp.	Same	New Athens, Illinois	Gasoline	11,600	A, C
4	MAPCO Synfuels, Inc.	Same	White County, Illinois (near Carmi)	Methanol	16,000	C
5	W. R. Grace & Co.	Same	Baskett, Kentucky (Henderson County)	Gasoline	50,000	C
6	Tri-State Synfuels	Texas Eastern Corp. & Texas Gas Transmission	Henderson, Kentucky	Liquid Fuels, SNG, and Chemicals	56,000	A
7	Breckinridge Project	Ashland Oil, Airco Energy	Breckinridge County, Kentucky (near Addison)	Liquid Fuels & SNG	50,000	C
8	Convent Methanol Project	Texaco & Houston Natural Gas	Convent, Louisiana	Methanol	16,600	A, C
9	Occidental Petroleum	Same	Taft, Louisiana	Gasoline, MEG, Electricity & Steam	16,000	B
10	EG&G	Same	Fall River, Mass.	Methanol & Electricity	8,100	A, C
11	AMAX	Same	Duluth, Minnesota	Methanol	6,800	A, D
12	Grants Project	ETCO	Grants, New Mexico	Methanol	1,600	C
13	First Colony Farms	ETCO	Creswell, North Carolina	Methanol	1,600	C
14	Nokota	Same	Dunn Center, N.D.	Methanol	40,000	A
15	American Natural Services	Same	Mercer County, N.D.	Gasoline & SNG	20,000	B
16	Northern Natural Gas	Same	Oliver County, N.D.	Methanol & SNG	43,100	B
17	A-C Valley Corporation	Same	Near Franklin, Penn. (Allegheny-Clarion Valley Region)	Gasoline	8,600	C
18	Keystone Project	Westinghouse Electric Corp.	Cambria County/ Somerset County, Pa.	Methanol	5,000	B, C
19	Tennessee Synfuels Assoc.	Koppers Co. and Cities Service Co.	Oak Ridge, Tenn.	Gasoline	8,500	B, C
20	Celanese	Same	Bishop, Texas	Methanol	10,000	A
21	Celanese	Same	Clear Lake, Texas	Methanol	15,000	A
22	Emery Synfuels	Mountain Fuel Resources, Conoco Coal Development Co., and Mono Power Co.	Emery County, Utah	Methanol & SNG	21,500	B, C
23	Whitehorse Project	Hercules, Inc., Norfolk & Western Railway, & United Coal Co.	Montgomery County, Va. (near Radford)	Gasoline	21,000	C
24	ITET	Same	Nitro, West Va.	Gasoline	9,700	B
25	CNG Energy Co.	Same	Point Pleasant, W. Va. (Mason County)	Methanol & SNG	86,200	B, C
26	Hampshire Energy	Northwest Mutual Life Insurance Co., Metropolitan Life Insurance Co., Koppers Co., and Kaneb Services	Gillette, Wyoming	Gasoline	18,000	A, C
27	Mobil Oil	Same	Buffalo, Wyoming	Gasoline	34,000	B

- * A: Awarded Feasibility Study or Cooperative Agreement by DOE under P.L. 96-126.
 B: Selected by DOE for award of Feasibility Study or Cooperative Agreement under P.L. 96-304--but not funded.
 C: Applied to SFC for financial support.
 D: Withdrew application for Feasibility Study.

TABLE 2
IDENTIFIED COAL GASIFICATION PROJECTS

MAP KEY	PROJECT NAME	PROJECT SPONSORS	LOCATION	MAJOR PRODUCTS	SIZE, IN BARRELS OF OIL EQUIVALENTS	STATUS
1	North Alabama Coal Gasification Consortium	Consortium to be formed (private financing of TVA project)	Murphy Hill, Alabama	Electricity, MBG, HBG	27,000 to 29,000 BDE/D	
2	Arkansas Power and Light	Same	Redfield, Arkansas	MBG	20,000	A, C
3	Coolwater Cogeneration Project	Texaco, Southern Calif. Edison, Bechtel, GE	Doggett, California	Electricity and Steam	3,000	B, C
4	San Ardo Gasification & Cogeneration Project	Pacific Gas & Electric, Texaco	Monterey County, California	Electricity & Steam	14,860	B, C
5	Florida Power Corp.	Same	Pinellas County, Florida	Electricity	14,000	A
6	General Refractories	Same	Florence, Kentucky	MBG	1,000	A
7	Louisiana Gasification Associates	Airco Energy, Bechtel Petroleum, Cities Service, Conoco, PPG & United Energy Resources	Lake Charles, La.	MBG	21,000	C
8	Gulf States Utilities Project	Westinghouse Electric	Westlake, La.	Electricity	5,000 to 10,000	C
9	Central Maine	Central Maine Power Co.	Sears Island, Maine	Electricity	14,000	A
10	Massachusetts Municipal Wholesale Electric	Same	Ludlow, Mass.	Electricity	17,000	B
11	Minnesota Gas Co.	Same	Minnesota	MBG	13,000	A
12	Crow Tribe of Indians	Crow Tribe and Southern California Gas	Crow Reservation, Montana	MBG	22,000	A, C
13	Tenneco Coal Gasification Company	Same	Wibaux, Montana	MBG	48,400	B, C
14	Texas Eastern Synfuels	Same	San Juan County, New Mexico	MBG	43,000	A
15	Great Plains Gasification Associates	American Natural Resources Company, Peoples Energy Company, Tennessee Gas Pipeline, Transcontinental Gas Pipeline Corp.	Mercer County, N.D.	MBG	22,000	C, E
16	NICES	Northwest Pipeline Co.	Boardman, Oregon	MBG & Steam	44,000	C
17	Philadelphia Gas	Same	Philadelphia, Pa.	MBG Methanol	3,500 6,000	A B
18	Midrex	Korf Industries, Inc.	Georgetown, S.C.	MBG	4,300	B
19	Memphis Light, Gas & Water	City of Memphis	Memphis, Tennessee	MBG	10,000	C
20	Transco Energy	Same	Franklin, Texas	MBG	21,600	A, C
21	Union Carbide	Same	Houston, Texas Area	MBG	21,000	A
22	Mobay Chemical	Same	New Martinsville, W. Va.	MBG	3,400	B
23	Fairmont Coal Gasification Trigeneration Project	Westinghouse	Fairmont, W. Va.	MBG	2,560	B, C
24	Mycoal Gas, Inc.	Panhandle Eastern Pipeline Co. and Ruhrgas, AG	Converse County, Wyoming	MBG	26,000	A, C
25	Ohio Valley Synfuels	CNG Energy, SOMIO	Pt. Pleasant, W. Va.	MBG	82,000 (2 Plants)	B, C

* A: Awarded Feasibility Study or Cooperative Agreement by DOE under P.L. 96-125.

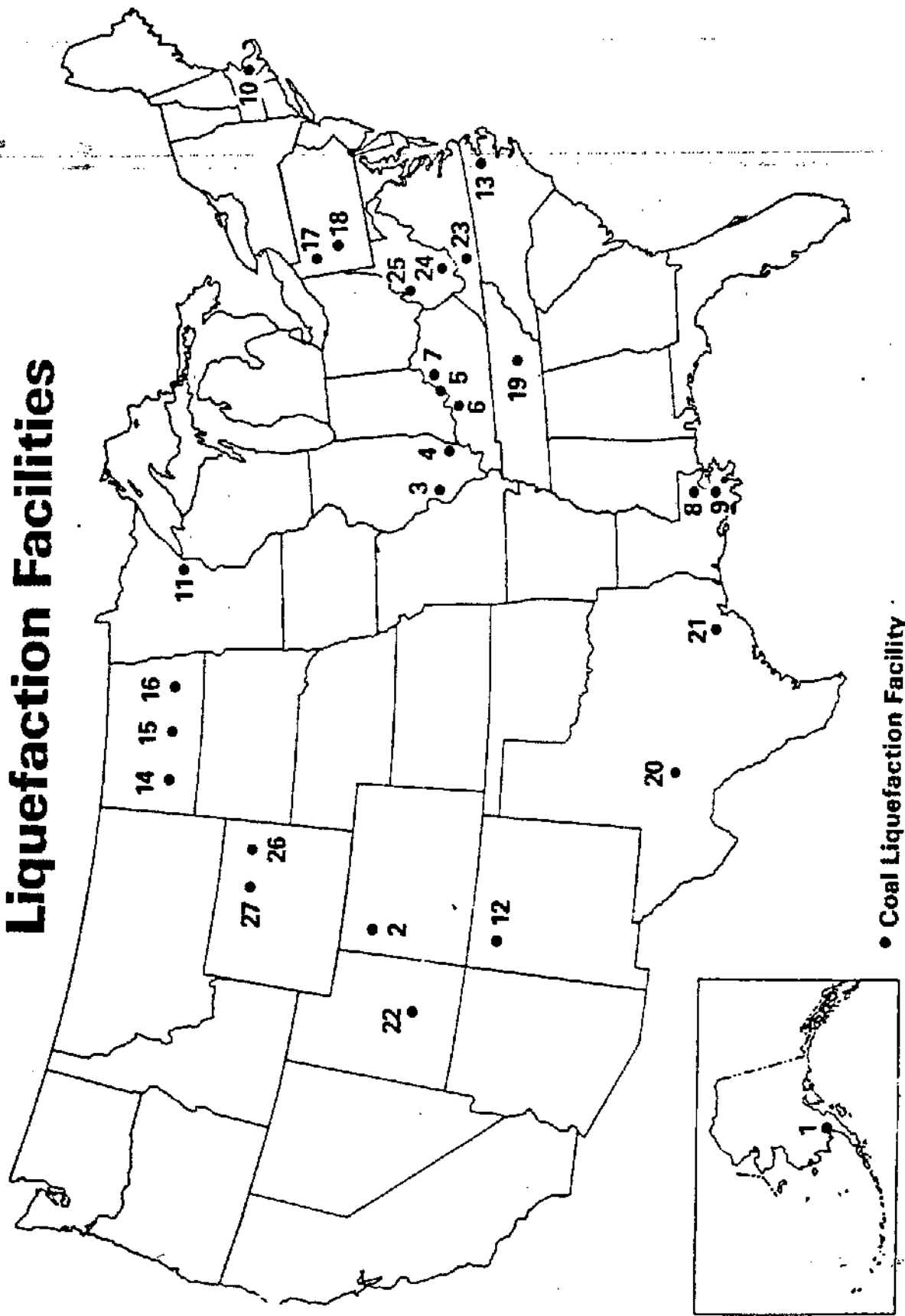
B: Selected by DOE for award of Feasibility Study or Cooperative Agreement under P.L. 96-304--but not funded.

C: Applied to SFC for financial support.

D: Withdrew application.

E: Applied to DOE for loan guarantee.

Locations Identified of Coal Liquefaction Facilities



Locations of Identified Coal Gasification Facilities

FIGURE 2

