

# **Early Entrance Coproduction Plant**

## **Phase I**

# **Preliminary Project Financing Plan**

**March 21, 2000**

**DOE Cooperative Agreement**

**No. DE-FC26-99FT40658**

# **Early Entrance Coproduction Plant Preliminary Project Financing Plan**

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## ABSTRACT

As part of the Department of Energy's (DOE) Gasification Technologies and Transportation Fuels and Chemicals programs, DOE and Texaco are partners through Cooperative Agreement DE-FC26-99FT40658 to determine the feasibility of developing, constructing and operating an Early Entrance Coproduction Plant (EECP). The overall objective of the project is the three-phase development of an EECP that produces at least one product from at least two of the following three categories:

- Electric power (or heat)
- Fuels
- Chemicals

The objective is to have these products produced by technologies capable of using synthesis gas derived from coal and/or some other carbonaceous feedstock, such as petroleum coke.

The objective of Phase I was to determine the feasibility and define the concept for the EECP located at a specific site and to develop a Research, Development, and Testing (RD&T) Plan for implementation in Phase II. This objective has now been accomplished. A specific site, Motiva Refinery in Port Arthur, Texas, has been selected as the location best suited for the EECP.

The specific work requirements of Phase I included:

- Prepare an EECP Preliminary Concept Report covering Tasks 2-8 specified in the Cooperative Agreement.
- Develop a Research, Development, and Testing (RD&T) Plan as specified in Task 9 of the Cooperative Agreement for implementation in Phase II.
- Develop a Preliminary Project Financing Plan for the EECP Project as specified in Task 10 of the Cooperative Agreement.

This document is the Preliminary Project Financing Plan for the design, construction, and operation of the EECP at the Motiva Port Arthur Refinery.

The objective of Phase II is to implement the research, development, and testing work as outlined in the RD&T Plan to enhance the development and commercial acceptance of coproduction technology that produces high-value products, particularly those that are critical to our domestic fuel and power requirements. The project will resolve critical knowledge and technology gaps on the integration of gasification and down-stream processing to coproduce some combination of power, fuels, and chemicals from synthesis gas derived from coal and other feedstocks.

The objective of Phase III is to develop an engineering design package and a financing plan for an EECP located in conjunction with the Motiva Refinery in Port Arthur, Texas.

The project's intended result is to provide the necessary technical, economic, and environmental information that will be needed to move the EECP forward to detailed design, construction, and operation by industry.

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## **EXPERIMENTAL**

There were no requirements for using experimental methods to accomplish the work required in Phase I. However, the Phase I work effort describes processes that will require further study and probable experimentation during Phase II. Some of this experimental work will be accomplished as part of the actions specified in the Research, Development, and Testing (RD&T) Plan.

## **1.0 RESULTS AND DISCUSSION**

### **1.1 Introduction**

This document is the Preliminary Project Financing Plan for Phase I of the Early Entrance Coproduction Plant (EECP) Project that is required by Task 10 of Cooperative Agreement No. DE-FC26-99FT40658 and is part of the Department of Energy's (DOE) "Vision 21" initiative. The objective of this project is the three-phase development of a coproduction plant that produces at least one product from at least two of the following three categories: (1) electric power (or heat), (2) fuels, and (3) chemicals. The goal is to make these products from synthesis gas derived from coal and/or some other carbonaceous feedstock, such as petroleum coke.

A consortium, comprised of representatives from Texaco, Inc.; Kellogg Brown & Root, Inc.; General Electric Power Systems; Praxair, Inc.; and Rentech, Inc., was formed to undertake the work to develop and meet the objectives of the Cooperative Agreement. Texaco provided the overall project management as well as conceptual design for the Gasification, Acid Gas Removal, Sulfur Recovery, and the Tail Gas Treating Units of the facility. Kellogg Brown & Root provided engineering/technical services; General Electric provided combined cycle technology; Praxair provided air separation technology; and Rentech provided Fischer-Tropsch (F-T) synthesis technology.

The objective of Phase I was to determine the feasibility and define the concept for the EECP located at a specific site. As a result of work performed in Tasks 2-8, the Motiva Refinery in Port Arthur, Texas, was selected as the location best suited for the EECP.

Task 10 of the Statement of Objectives in the Cooperative Agreement for Phase I requires the development of a Preliminary Project Financing Plan for the design, construction, and operation of the EECP. The Task 10 activity has been performed mainly by Texaco personnel based on their knowledge and experience in obtaining financing for international integrated gasification and combined cycle power projects.

#### **1.1.1 EECP Concept Description**

The EECP concept process description is summarized in the following paragraphs.

Petroleum coke from the Motiva Port Arthur Refinery (PAR) Delayed Coking Unit (DCU) is crushed, mixed with water and pumped to the Gasification Unit. This coke slurry is mixed with high-pressure oxygen from the Praxair Air Separation Unit (ASU). It is further mixed with a small quantity of high-pressure steam in a specially designed feed injector mounted on the gasifier. The resulting reactions take place very rapidly to produce synthesis gas, also known as syngas, which is composed primarily of hydrogen, carbon monoxide, water vapor, and carbon dioxide (CO<sub>2</sub>) with small amounts of hydrogen sulfide (H<sub>2</sub>S), methane, argon, nitrogen (N<sub>2</sub>), and carbonyl sulfide. The raw syngas is scrubbed with water to remove solids, cooled, then forwarded to the Acid Gas Removal Unit (AGR), where the stream is split. One of the streams is treated to remove CO<sub>2</sub> and H<sub>2</sub>S and then forwarded to the F-T Synthesis Unit. The other stream is treated primarily to remove the bulk of the H<sub>2</sub>S with minimal CO<sub>2</sub> removal. This CO<sub>2</sub>-rich sweetened syngas is then forwarded as fuel to a General Electric frame 6FA gas turbine. The CO<sub>2</sub>-rich stream is desired because it increases mass flow through the gas turbine, which increases power production and helps

reduce nitrogen oxide emissions from the gas turbine. Some nitrogen from the ASU is used as a stripping medium in the AGR, and the resulting CO<sub>2</sub>+N<sub>2</sub> mixture is sent to the gas turbine mixed with sweetened syngas. The bulk of the nitrogen, however, is sent directly to the gas turbine where its mass flow also helps increase power production and reduce nitrogen oxide emissions.

Overall, approximately 75% of the sweetened syngas is sent to the gas turbine as fuel. The remaining 25% is first passed through a zinc oxide bed arrangement to remove the remaining traces of sulfur and then forwarded to the F-T Synthesis Unit. In the F-T reactor, carbon monoxide and hydrogen react, aided by an iron-based catalyst, to form mainly heavy straight-chain hydrocarbons. Since the reactions are highly exothermic, cooling coils are placed inside the reactor to remove the heat released by the reactions. Three hydrocarbon product streams; heavy F-T liquid, medium F-T liquid, and light F-T liquid are sent to the F-T Product Upgrading Unit while F-T water, a reaction byproduct, is returned to the Gasification Unit and injected into the gasifier. The F-T tail gas is also sent to the gas turbine as fuel for incrementally more power production.

In the F-T Product Upgrading Unit (F-TPU), the three F-T liquids are combined and processed as a single feed. The unit consists of a Bechtel Hy-Finishing™ reactor, product separators, an atmospheric fractionator, naphtha stabilizer, a vacuum distillation tower, feed preheaters, hydrogen compression facilities, and product coolers. The reaction is carried out at elevated pressure and temperature. A mixture of feed hydrocarbons and hydrogen-rich gas is fed to the top of the fixed bed reactor. In the presence of a hydrotreating catalyst, hydrogen reacts slightly exothermally with the feed to produce saturated hydrocarbons, water, and some hydrocracked light ends. The resulting four liquid product streams are naphtha, diesel, low melt wax, and high melt wax. Each of these streams is sent to segregated product storage tanks. The wax tanks are insulated and equipped with steam coils to maintain the storage temperature above the wax melting point. All of the products leave the EECP facility via tank truck. Transfer pumps and truck loading facilities are provided adjacent to the storage tanks.

### **1.1.2 EECP Concept Demonstration Project**

The consortium of Texaco, Kellogg Brown & Root, General Electric, Praxair and Rentech agreed to develop an EECP design that would have the greatest opportunity of satisfying commercial criteria to ensure that the EECP would actually be built. Conceptual process design, capital and operating cost estimates, and economic analyses were carried out for an EECP at the Motiva Port Arthur, Texas, refinery location. Under normal operating conditions the proposed EECP will process approximately 1,235 short tons per day (STPD) of petroleum coke. The estimated quantities of saleable products are: 55 Mega Watts (MW) of net electrical power; 130,000 kg/hr of 4,272 kPa (286,588 lb/hr of 620 psia) steam; 104,000 kg/hr of 1,171 kPa (229,209 lb/hr of 170 psia) steam; 2,025 kg/hr (360 BPD) of finished high-melt wax; 509 kg/hr (97 BPD) of finished low-melt wax; 125 BPD of F-T diesel; 35 BPD of F-T naphtha; and 95 metric tons per day (MTPD) of sulfur; 170 STPD of high purity nitrogen; and 70 STPD of 95% purity oxygen. The EECP in this configuration has an overall thermal efficiency of 66.5% (gross heating value basis).

## **1.2 Project Sponsors**

Preliminary discussions have been held with prospective equity participants. The typical engineering, procurement, and construction (EPC) contractor has shown no interest in



equity participation mainly from the position that the EPC contracting industry is a very low capitalized industry with main investments in buildings and construction equipment. Contacts with electrical power markets have resulted in some interest; however, the size of the project at 55 MW places it at a low priority under the current level of new power projects being developed. General Electric (GE) has advised that they normally market equipment and provide long-term service agreements but do not take equity positions in projects for power generation. Praxair has expressed interest from the beginning of the project in taking an equity position in the EECF project and is considered a most likely equity participant. Motiva personnel have expressed interest in equity participation; however, no commitment will be made until the project is approved. Texaco Energy Systems Inc. (TESI) is committed to assume the remaining equity participation required for the project to go forward.

The following is the proposed project sponsorship:

- TESI: 60%
- Praxair: 20%
- Motiva: 20%

### 1.3 Feedstock Supply

The Motiva Port Arthur Refinery, which produces 2,750 MTPD, will supply the petroleum coke. The EECF will require only 1,235 MTPD of petroleum coke. This allows for a very flexible supply and delivery arrangement. Detailed below are indicative terms that would be typically included in a Feedstock Supply Agreement (FSA) for a project of this type.

#### 1.3.1 Feedstock Supply Agreement

|                           |  |
|---------------------------|--|
| Definition:               | Feedstock and petroleum coke shall be synonymous terms unless otherwise indicated.   |
| Type of Feedstock:        | Petroleum coke.  |
| Suppliers of Feedstock:   | Motiva Port Arthur Refinery.   |
| Petroleum Coke Price:     | At zero or negative cost potentially with annual escalators indexed to inflation or electrical power price.  |
| Term of Feedstock Supply: | Will mirror term of project loans with renewable option.   |
| Quantities Delivered:     | (a) Total quantity of feedstock to be delivered under contract terms will be sufficient to operate facility at anticipated levels of operation.<br>(b) Delivery schedules will accommodate the facilities' consumption and storage capacity.<br>(c) Lenders and facility owners will have flexibility to adjust delivery schedules according to consumption patterns.<br>(d) Motiva will measure quantities of feedstock delivered. Facility owners will have right to inspect measuring devices used. |

|                       |  |
|-----------------------|--|
| Quality of Feedstock: | Motiva will provide feedstock that conforms to:<br>(a) The requirements of the Gasification Facility.<br>(b) Petroleum coke that yields synthesis gas that reduces the efficiency and output of the power generation facility and/or F-T facility may be accepted at a reduced price, however, lenders must be compensated for loss of revenues or increased costs.<br>(c) Petroleum coke that yields synthesis gas produced that cannot be used or that will damage the power generation facility and/or F-T facility shall be subject to rejection (technical, environmental or economic reasons shall all apply).<br>(d) Petroleum coke containing sulfur, nitrogen, metals and other inorganics in excess of agreed maximum values may be accepted at a reduced price or rejected, however, lenders must be compensated for loss of revenues or increased costs.<br>(e) Regular petroleum coke and synthesis gas samples shall be taken and analyzed on a regular basis. |
| Force Majeure:        | Force majeure provisions shall allocate risks for unforeseen events. Facility owners shall have the right to purchase feedstock supplies from alternative sources until force majeure events are cured.  |
| Indemnification:      | Usual and customary.   |
| Events of Default:    | Usual and customary.   |
| Security/Assignment:  | Assignment provisions shall allow collateral assignment to actual and potential lenders. Lenders shall be notified of any defaults and given right to cure such defaults with extended cure periods, if required. Third-party assignments shall be permitted.  |
| Penalty Provision:    | Per discussions between sponsors, lenders, and facility owner, appropriate penalties shall be developed, if deemed necessary, to cover the failure of the suppliers to provide adequately the quality and quantity of feed.  |

#### **1.4 Off-Take Agreements**

There will be five products that will require off-take agreements for the EECP Project:

- Electrical power
- Fischer-Tropsch (F-T) fuels
- F-T waxes
- Oxygen and nitrogen
- Sulfur

The electrical power is planned to have two purchasers with the Motiva Port Arthur Refinery being the primary purchaser and an electrical power marketer being the secondary purchaser. In today's environment this project has generated little interest with the electrical power marketers mainly because of the size and that the project is four to five years into the future. However, we believe there will be opportunities to explore this further at the time of project commencement. Preliminary off-take agreement term sheets (indicative only) follow:

#### 1.4.1 Power Purchase Agreement (PPA)

|                                    |   |
|------------------------------------|---|
| Type of Power Generation Facility: | Base Load/TEXACO/GE/PRAXAIR IGCC design.  |
| Facilities Owners:                 | Texaco (60%), Praxair (20%), and Motiva (20%).  |
| Power Purchasers:                  | Motiva Refinery- (20 mega watts (MW) and Power Marketers-(55MW).  |
| Power Price:                       | To be developed, but will be based on "avoided" costs with annual escalators. Further, PPA pricing will have both an energy and capacity charge component sufficient to cover fixed costs, including debt service and equity returns, and variable costs, including both fuel and operating and maintenance (O&M) expenses. Energy pricing will closely correlate with cost of natural gas fuel and will include lender step-in rights.   |
| Penalties (Power):                 | Power capacity reductions will result in penalty payments to power purchasers.  |
| Term (Power):                      | Approximately 15 years with Motiva, and 15 to 20 years with Power Marketers under a fixed price arrangement in an effort to "sell-off" merchant risk associated with pricing pool.  |
| Default Under PPA:                 | If there is a default under the terms of the PPA, lenders shall have the right to step in to cure any such defaults prior to any termination of the PPA.  |
| Conditions Precedent:              | (a) Commencement of construction of both power island and gasification facility by a specified date.<br>(b) Achievement of certain construction milestones by specified dates.<br>(c) Commencement of initial operations by specified dates.<br>(d) Obtaining permits by a specified date;<br>(e) Execution of fuel supply contracts that conform to pre-agreed criteria.<br>(f) Construction of both power island and gasification facilities in accordance with design approved by Motiva and other off-take participants, if applicable. |

(g) Initial synchronization of power island with Motiva's system and those of other power purchaser participants.

Conditions Precedents will be extended in the event of force majeure, however, a "Cut-Off Date" for Conditions Precedents to be met will be instituted.

Force Majeure: Usual and customary.

Curtailment of Electricity Deliveries: The PPA will be structured so that capacity payments will be sufficient to satisfy fixed operating costs and debt service payments. The right of Motiva and other power purchasers to curtail their purchase of electricity will be strictly limited.

Electricity Interconnection: The project sponsors will have the sole responsibility to deliver power to Motiva and other power purchasers.

Events of Default: Usual and customary.

Security/Assignment: The PPA will allow collateral assignment to lenders with the right to receive notice of any default and to cure any defaults.

#### **1.4.2 Off-Take Agreement for Diesel, Naphtha, and Waxes**

The F-T diesel and naphtha products may have several off-take agreements depending on the current market conditions for a clean burning diesel fuel during the operation of the EECF facility. Therefore, we believe that the structure of the off-take agreements will be crafted on an as-available basis to allow for the flexibility to obtain maximum value for F-T fuels. The off-take agreements for the various F-T waxes will be crafted on a take-or-pay basis due to the niche markets and high prices that F-T waxes typically command.

Steam will be sold to the refinery based on the equivalent natural gas heating value cost. The only other product sales will be oxygen and nitrogen to the refinery, and sulfur to a third party that is expected to contribute only about 3-5% of the total facility revenue. The pricing for steam, oxygen, and nitrogen will be escalated based on natural gas price. The pricing for sulfur will be linked to the published US Gulf Coast sulfur price. No separate off-take agreements are presented for these products.

Since term sheets are expected to be similar for the F-T products, a common preliminary term sheet has been developed. All terms delineated for the following off-take agreements are indicative only and subject to change as the EECF Project develops commercially.

#### **1.4.3 F-T Products Off-Take Agreement (F-TPOA)**

Type of Gasification Facility: Texaco propriety technology (to convert petroleum coke to synthetic gas) incorporating Fischer-Tropsch processes to produce liquid fuels (naphtha, diesel and waxes).

|                                   |   |
|-----------------------------------|---|
| Facilities Owners:                | Texaco (60%), Praxair (20%), and Motiva (20%).  |
| Liquids Fuels Price:              | To be developed, but sales are expected to produce up to 25% of Facility Owners' revenues.  |
| Term:                             | Approximately 15 years with Motiva in respect of diesel and naphtha sales, and a similar term with purchasers of waxes.   |
| Default Under F-TPOA:             | If there is a default under the terms of the F-TPOA, lenders shall have the right to step in to cure any such defaults prior to any termination of the F-TPOA.  |
| Conditions Precedent:             | <p>(a) Commencement of construction of both power island and gasification facility by a specified date.</p> <p>(b) Achievement of certain construction milestones by specified dates.</p> <p>(c) Commencement of initial operations by specified dates.</p> <p>(d) Obtaining permits by a specified date.</p> <p>(e) Execution of fuel supply contracts that conform to pre-agreed criteria.</p> <p>(f) Construction of both power island and gasification facilities in accordance with design approved by Motiva and other off-take participants, if applicable.</p> <p>Conditions Precedents will be extended in the event of force majeure, however, a "Cut-Off Date" for Conditions Precedents to be met will be instituted.</p> |
| Curtailment of Liquid Fuel Sales: | It is anticipated that long-term off-take contracts with purchasers of liquid fuel products will be structured on an "as- available basis" and the waxes on a "take or pay" basis so as to ensure uninterrupted streams in revenues from these sales;   |
| Events of Default:                | Usual and customary.  |
| Security/Assignment:              | The F-TFOA will allow collateral assignment to lenders with the right to receive notice of any default and to cure any defaults.  |

## 1.5 Operations and Maintenance

The EECF Project will be located within the Motiva Port Arthur Refinery. The unit operations of the EECF facility and the refinery are very similar and, therefore, we will have available necessary equipment and skilled personnel to provide operating and maintenance support. The project economics include the cost for a General Electric Long Term Service Agreement for the electrical power generation block.

## 1.6 Land Ownership

The site selected for the facility is within the Motiva Port Arthur Refinery complex located adjacent to the refinery delayed coking unit. The site has a rail siding and easy access and egress for trucking and personnel. Discussions have been held with Motiva personnel for leasing the site with annual lease payments for a 15- to 20-year period or obtaining a paid-up lease in exchange for a small equity percentage of the project.

## 1.7 Project Construction

We have reviewed the project developments with Kellogg Brown & Root and other engineering resources. They have advised that, at this time, they would not consider a turnkey type EPC contract because of the project being a first-of-a-kind project and that there are very limited resources with knowledge for the design and construction of the Fischer-Tropsch synthesis technology. The following is a summary of salient items concerning the EPC contract for the EECP Project that would be included in the contract.

|                                |   |
|--------------------------------|---|
| Performance Guarantees:        | Due to the new technology involved, performance guarantees by the EPC contractor will not be required or will be broad based, however guarantees by specific major equipment manufacturers or technology providers are anticipated. |
| Construction Financing:        | Construction financing will be handled as any similar project whose construction aspects are considered very low risk since it is within an existing refinery on a clean, cleared site with very open access.                       |
| Performance Penalties/Bonuses: | Based on prior experience regarding performance penalties or incentives, no performance penalties or incentives are anticipated at this time.   |
| EPC Contractor Liabilities:    | Standard EPC contract liabilities will apply, probably without liquidated damages.  |

## 1.8 Basic Assumptions and Conditions for Securing Funds

The Texaco Project and Structured Finance (TPSF) Group has provided an early assessment on the viability of financing the EECP Project. TPSF's view is indicative in nature and subject to change as the EECP Project develops commercially. The financing terms provided below are based on TPSF's experience in projects of a similar nature and were developed, in part, in consultation with potential third-party commercial lenders.

### 1.8.1 Leverage

Since project economics (i.e., the financial return on investment to the project sponsors) can be optimized by considering financing the EECP on a leveraged basis. From a lender's perspective, the amount of leverage appropriate in the EECP's case, given the risk characteristics of the project, will probably be in the 60%/40% or 55%/45% debt/equity

range. Adjustments in leverage will be a function of the EECP Project's ability (from a cash flow perspective) to service debt obligations given certain tenor, interest rate, and amortization schedules.

### 1.8.2 Tenor

The maturity of any debt raised will be a function of certainty of project revenues as are driven by underlying contractual off-take obligations. For example, 10- to 15-year contracts will typically attract loan tenors in the 8- to 12-year range. The basis is that approximately 50% of revenues will be sourced by electricity sales (20 MW to Motiva, 35 MW outside the fence), and 50% will be sourced from sales of liquid fuels (naphtha, diesel, sulfur, and waxes) and steam. Due to project schedule for operation in 2005, off-take power and/or liquid fuel sales contracts with respect to these revenues are not fully developed. We have assumed, therefore, that there will be some combination of revenues that will be derived on a merchant market as well as on a contractual basis. In general, when a lender is exposed to some element of merchant risk, they typically require at least 60% to 70% of their debt service requirements covered contractually. Depending on other risks associated with the project, lenders may also require project sponsors to assume some responsibility for servicing the debt should shortfalls in revenue/cash flow available to service the debt occur.

### 1.8.3 Level of Risk Assumption and Mitigation

The following depicts the level of risks involved in the EECP Project and some assumptions and mitigation possibilities.

|                                   |   |
|-----------------------------------|---|
| Construction/Completion:          | Sponsors with recourse to EPC provider.   |
| Technology:                       | Sponsors to assume F-T, gasification and power generation risks.  |
| Fuel Supply:                      | Sponsors, but exposure is limited due to petroleum coke zero/negative cost and captive nature and abundance of supply.                                  |
| Off-Take/Market:                  | Lenders, with makeup by sponsors for any cash flow shortfalls. Pricing premium will be factored into interest rate due to element of merchant exposure. |
| Operations and Maintenance (O&M): | TESI is experienced and qualified and will be acceptable to lenders. F-T exposure covered by TESI through licensing agreement with provider.            |

### 1.8.4 Interest Rate

The interest rate on debt borrowed by the Project Company can be set on a fixed or floating rate basis. Fixed rate debt will be priced as a basis point spread over United States Treasury securities; floating rate debt will be priced as a basis point spread over the London Interbank Borrowing Rate (LIBOR). Typically, shorter tenors (less than three to five years) will be priced on a floating rate basis; longer tenors will be priced on a fixed rate basis.

“Floaters” often reflect debt sourced from commercial banks; “fixed” rate financing is typically seen in capital markets or private placement type financing. It is difficult to comment on a specific pricing scenario for the project since pricing is dependent on debt tenors, an assessment of overall project risks, and the level of direct or indirect sponsor support. Market receptivity to the project, lending institution exposure levels, and competing transactional business affect pricing as well.

### **1.8.5 Amortization**

Repayment of debt can take two forms – full payment of principal at maturity (“Bullet” repayment), which is usually associated with a capital market type financing, or full or partial amortization of principal during the time the financing is in place (more common with commercial bank type financing). Which form of debt repayment will be acceptable to lenders is a function of certainty of cash flows, risk assumption, and level of sponsor support. It is also difficult to comment on specifically what might be an appropriate amortization profile for the EECF, given all of the commercial uncertainties of the project at this time. However, a conservative view would be that lenders would probably want full pay out well in advance of any expiration of contractual obligations. Again, we don’t know what the tenor of the debt obligation would be, but TPSF would venture to say that any debt put into place would require full amortization of the principal.

### **1.8.6 Sponsor Support (Recourse versus Non-Recourse)**

Project economics can be maximized if the project were to be financed on a purely non-recourse basis. However, the realities of the project probably dictate some level of sponsor support, particularly during construction and early phases of commercial operation. TPSF’s early view of this is that the support should take the form of construction/completion and/or debt service shortfall guarantees. The pricing, therefore, of any project debt incurred during these periods should reflect the credit quality of sponsor support, and not those specific risks that would otherwise be assumed by lenders.

### **1.8.7 Preliminary Financing Plan**

The preliminary financing plan in millions of dollars follows:

|                                 |  |
|---------------------------------|--|
| Project Capital Cost:           | \$260  |
| Debt Financed:                  | \$143-\$156  |
| Sponsor Equity:                 | \$117-\$104  |
| Sponsorship:                    | TESI 60%<br>Motiva 20%<br>Praxair 20%  |
| Form of Financing Contemplated: | Mini-term (construction period plus five to seven years of commercial operation).                          |
| Source of Financing:            | US commercial banks either “club” arranged (i.e., 3 to 5 lending institutions) or more broadly syndicated. |



|                              |   |
|------------------------------|---|
| Recourse to Sponsors:        | Limited through construction and in respect of debt service shortfalls during commercial operation. Sponsor support could fall away or be reduced subject to meeting certain operation and financial milestone after completions. |
| Debt Service Coverage:       | Earnings before income tax, depreciation, and amortization (EBITDA) minimum 1.85 to 2.00 times principal and interest.  |
| Tenor:                       | 7 to 8 years door-to-door (inclusive of 33- to 42-month construction period).   |
| Amortization:                | Mortgage style or back-ended depending on cash flow profile of project and acceptability to lenders.  |
| Interest:                    | Interest capitalized during construction. Semi-annual or quarterly pay after construction. Pricing to be determined.  |
| Funding During Construction: | Pro-rata third-party debt and sponsor equity.   |
| Fees:                        | To be Developed.  |
| Financial Close:             | 16 to 24 weeks.   |

### **1.8.8 Development of Financing During Phase III**

The following will be required to further develop views on how best to finance the project:

#### **Due Diligence**

- Develop and review all supply, off-take, O&M, licensing, and EPC contractual arrangements.
- Review F-T component of project to identify technological/operational elements that may be of concern to lenders.
- Examine terms and conditions of recent comparable projects/financing, if any.
- Commence dialogue with lenders to ascertain interest in financing project.
- Further develop base case financing assumptions and project economic model.

#### **Other Activities**

- Prepare draft of Preliminary Information Memoranda (PIM).
- Distribute PIM to lenders and request proposals for lead arranger role.
- Select arranger and commence financing dialogue.
- Detail the finance plan and develop (with lenders) transaction term sheet.
- Finalize PIM.
- Hold lenders meetings to present/discuss financing opportunity.

## **1.9 Government Assistance**

The evaluation from the preliminary financing review for the EECF Project indicates that an internal rate of return (IRR) of at least 15.0-15.5 % will be required to obtain interest from equity participants and the financial community. From a lender's perspective, this IRR will allow the project to be leveraged in the 60%/40% or 55%/45% debt/equity range, given the risk characteristics of the project. The EECF Project as presently designed will require an additional non-equity contribution including incentives such as tax credits and cost sharing as detailed below.

### **1.9.1 Tax Relief**

The DOE's assistance in terms of incentives or tax credits for the project would be acceptable. These tax items could take the form of the following:

- The DOE's support and assistance in proposing Federal legislation to exempt F-T fuels and blends from Section 4081 Federal Motor Fuel Excise Tax.
- The DOE's support for a grant to compensate for local and/or state sales and use tax actually paid by the EECF Project or its members for tangible personal property that is a component of the project.

The exemption of F-T motor fuels and motor fuel blends containing F-T fuels from Section 4081 Federal Motor Fuel Excise Tax would provide an incentive for the various state authorities to also eliminate state taxes. This combination of tax exemption would result in giving a margin advantage for the F-T fuel or fuel containing F-T fuels of approximately \$.23/gallon or \$9.66/Bbl. The DOE grant to compensate for local and/or state sales and use taxes would result in increasing the IRR of the EECF Project by .4%.

### **1.9.2 Energy Policy Act Alternative Fuels**

Two of Texaco's technology licensors, Rentech and Syntroleum, have applied to the DOE to have Fisher-Tropsch (F-T) synthesis products certified as "alternative fuels" under the Energy Policy Act (EPACT). The designation of fuel products containing at least 30% F-T synthesis products as "alternative fuels" under the EPACT would help to establish these fuels in the marketplace. The DOE's assistance in designating F-T diesel and blends containing F-T diesel as "alternative fuels" would be helpful in making the EECF a commercially feasible project.

This approach will allow the creation of small niche markets for F-T fuels in the order of magnitude of 500 to 2,000 Bbl/day as F-T synthesis plant capacity is increased over a period of three or more years. An example of a niche market would be the fuel supply for a mass transit bus system in a metropolitan area that may be in an Environmental Protection Agency (EPA) non-attainment classification. The F-T blended diesel would produce lower emissions and allow the mass transit system to make the conversion at a minimal cost since the same fueling infrastructure could be used and no engine conversion would be required.

The availability of small niche markets will accelerate the commercialization of the EECF concept since it will eliminate the market barrier required to enter a retail fuels market.

### 1.9.3 Cost Sharing

The approach of the concept design for the EECF was to develop a project that would have the greatest opportunity of satisfying commercial criteria to ensure that the EECF would actually be built. The consortium of Texaco, Kellogg Brown & Root, General Electric, Praxair and Rentech agreed to design the EECF around a GE PG6101 (FA) gas turbine and a F-T reactor of 8- to 10-foot diameter that would resolve any reactor scale-up issues for commercial applications. This design was based on a moderate-sized gas turbine for which there was reasonable data available to predict that the turbine combustion system could handle the lower heating value fuel gas that results from the integration of a cogeneration plant and a F-T synthesis process. The EECF concept study has confirmed that this approach is a reasonable path to reach the objective of a full-scale facility to demonstrate the EECF concept. For this size facility we have shifted the F-T product mix to more valuable products to increase the revenue, however, the projected IRR will not meet any of the planned participant's economic criteria hurdles. The evaluation from the preliminary financial plan review indicates that an IRR of at least 15.0-15.5 % will be required to obtain interest from the financial community. From a lender's perspective, this IRR will allow the project to be leveraged in the 60%/40% or 55%/45% debt/equity range given the risk characteristics of the project.

The EECF Project, as presently designed, will require an additional non-equity contribution equivalent to \$70 MM of capital, in addition to the tax incentives, to reach the economic hurdle of a 15.5% IRR. In addition to the incentives detailed in sections 1.9.1 and 1.9.2, the project participants are interested in pursuing opportunities with the DOE to obtain financial support for the construction of the project at a level of \$70 MM. We recommend that discussions begin midway through Phase II after several critical milestones of the Research, Development and Testing Plan have been reached.

## CONCLUSIONS

Based on the work to date the commercial viability of full-scale F-T/power/steam coproduction projects looks promising. The goals of the EECP Project; to develop and commercialize coproduction technology that produces high value products, particularly those that are critical to our domestic fuel and power requirements, are progressing. Resolution of critical knowledge and technology gaps on the integration of gasification and downstream processing are also moving forward. Further, there is high interest in the refining industry for this work because of its many synergistic benefits, such as use of a low-value feedstock, production of a variety of clean products, potential for lower overall plant emissions, and improved plant efficiency. The evaluation from the preliminary financing review for the EECP Project indicates that an IRR of at least 15.0-15.5% will be required to obtain interest from equity participants and the financial community. From a lender's perspective, this IRR will allow the project to be leveraged in the 60%/40% or 55%/45% debt/equity range, given the risk characteristics of the project.

The EECP Project, as presently designed, will require an additional non-equity contribution equivalent to \$70 MM of capital, in addition to tax incentives, to reach the economic hurdle of 15.5% IRR.

## REFERENCES

There was no requirement for references to accomplish the work required by Task 10 of Phase I.

## LIST OF ACRONYMS

|        |   |
|--------|---|
| AGR    | Acid Gas Removal  |
| ASU    | Air Separation Unit                                       |
| BPD    | Barrels Per Day   |
| DCU    | Delayed Coking Unit                                       |
| EBITDA | Earnings Before Income Tax, Depreciation and Amortization |
| EECP   | Early Entrance Coproduction Plant                         |
| EPA    | Environmental Protection Agency                           |
| EPACT  | Energy Policy Act   |
| EPC    | Engineering, Procurement, and Construction                |
| FSA    | Feedstock Supply Agreement                                |
| F-T    | Fischer-Tropsch   |
| F-TPOA | F-T Products Off-Take Agreement                           |
| GE     | General Electric  |
| IGCC   | Integrated Gas Combined Cycle                             |
| IRR    | Internal Rate of Return                                   |
| LIBOR  | London Interbank Borrowing Rate                           |
| MTPD   | Metric Tons Per Day                                       |
| MW     | mega watts  |
| O&M    | Operations and Maintenance                                |
| PAR    | Motiva Port Arthur Refinery                               |
| PIM    | Preliminary Information Memoranda                         |
| PPA    | Power Purchase Off-Take Agreement                         |
| RD&T   | Research, Development & Testing                           |
| STPD   | Short Tons Per Day  |
| TESI   | Texaco Energy Systems Inc.                                |
| TPSF   | Texaco Project and Structural Finance                     |