

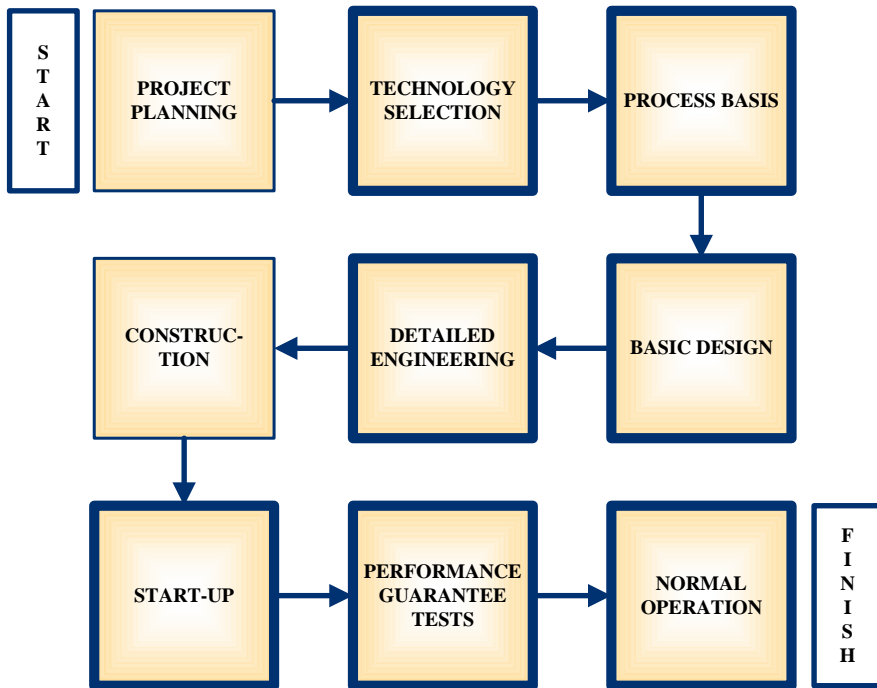


PROCESS SUPPORT OF CAPITAL PROJECTS

In recent years, the hydrocarbon industry has undergone major personnel changes. As a result, companies generally have lower manpower and average experience levels than they had ten years ago. This is true at owner companies, contractors, and equipment manufacturers.

This situation presents a major challenge to the refiners advancing major capital projects. Carmagen Engineering, Inc. (CEI), with its large pool of exceptionally experienced specialists, can provide expert process support to the clients in all phases of project development and implementation (see Figure).

Key CEI project-related process follow-up activities include, but are not limited to, the following:



- Preparation and/or review of the refinery inputs to process licensors
- Technology selection assistance
- Participation in the kick-off meeting with the licensor/engineering contractor
- Basic Design Review in contractor's office (mid-point review)
- Basic Design Review (final)
- HAZOP review of the Basic Design
- Preparation and/or review of the Operating Guides
- Review of the Operating Manuals
- Start-Up Assistance
- Performance and/or Guarantee Test participation

OUR EXPERIENCE: Carmagen Engineering has provided extensive process follow-up assistance for many capital projects worldwide. These include multiple projects in the USA and Europe.

4 West Main Street, Rockaway, NJ 07866
 Telephone: 973-627-4455 • Fax: 973-627-3133

Website: www.carmagen.com • E-mail: carmagen@carmagen.com





ULTRA-LOW SULFUR GASOLINE AND DIESEL FUELS FRONT-END ENGINEERING STUDIES AND TECHNOLOGY LICENSING SUPPORT

Achieving multi-million dollar results does not need to cost millions of dollars in consulting fees. It just takes a focused effort by experienced Carmagen engineers – engineers who have done this before and know how to achieve maximum results from your investment.

Front-End Engineering Studies

<p>OBJECTIVE:</p>	<p>The objective of front-end engineering studies is to help refineries screen various processing options and select a lead project case for producing ultra-low sulfur gasoline and diesel fuels. If desirable, Carmagen Engineering, Inc. also offers accompanying technology licensing support.</p>
<p>STUDY SCOPE:</p>	<p>The emphasis is on cost-effective re-use of existing equipment and integration of new equipment, if required, with existing facilities. An assessment of technology options, including in-house and third party technologies, is carried out to determine their applicability. Three types of information are developed jointly with the refineries for each processing option selected: product yields and qualities, investment and operating costs, and screening economics.</p>
<p>STUDY METHODOLOGY:</p>	<p>Carmagen Engineering, Inc. ultra-low sulfur technology and project planning specialists hold a kick-off meeting with refinery personnel. The purpose of the meeting is to understand the current operation, identify the various process options to be screened, and develop a work plan with an anticipated study schedule. The study builds on existing information such as past planning studies, equipment drawings, existing unit performance data, hydrogen balances, and additional information developed by Carmagen Engineering, Inc. or provided by ultra-low sulfur fuels technology licensors.</p>



Profit Improvement

Licensing Reviews

<p>STUDY RESULTS:</p>	<p>A close out presentation is made to refinery management for final acceptance of the study results. Final documentation of the results follows shortly thereafter and typically includes the following:</p> <ul style="list-style-type: none"> • Screening economics • Product yields and qualities • Investment and operating costs • Discussion of technology assessment • Critical interactions with the existing refinery facilities • Optimization opportunities for the lead case
<p>STUDY COST:</p>	<p>We will work within your budget to provide a study scope that will provide you with the maximum results with minimum investment.</p>

Technology Licensing Support



In conjunction with the above-described front-end engineering studies, Carmagen Engineering, Inc. also offers specialized technology licensing consulting. The range of services covers the following:

- Identification of preferred technology providers matching client's needs
- Assistance in the preparation of the technical inquiry leading towards prompt and responsive licensing proposal(s)
- Business terms-oriented evaluation of competing licensing proposals
- Advice on structuring and/or negotiating the license, engineering services, and guarantee agreements aimed at securing the most favorable outcome for the client

The above-described Carmagen Engineering, Inc. services (front-end engineering studies and technology licensing support) are offered on either a combined or stand-alone basis.



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