



# IS YOUR CASH GOING UP IN SMOKE?

See Carmagen's  
Energy Management Program



*Carmagen Engineering – Where Experience Counts*

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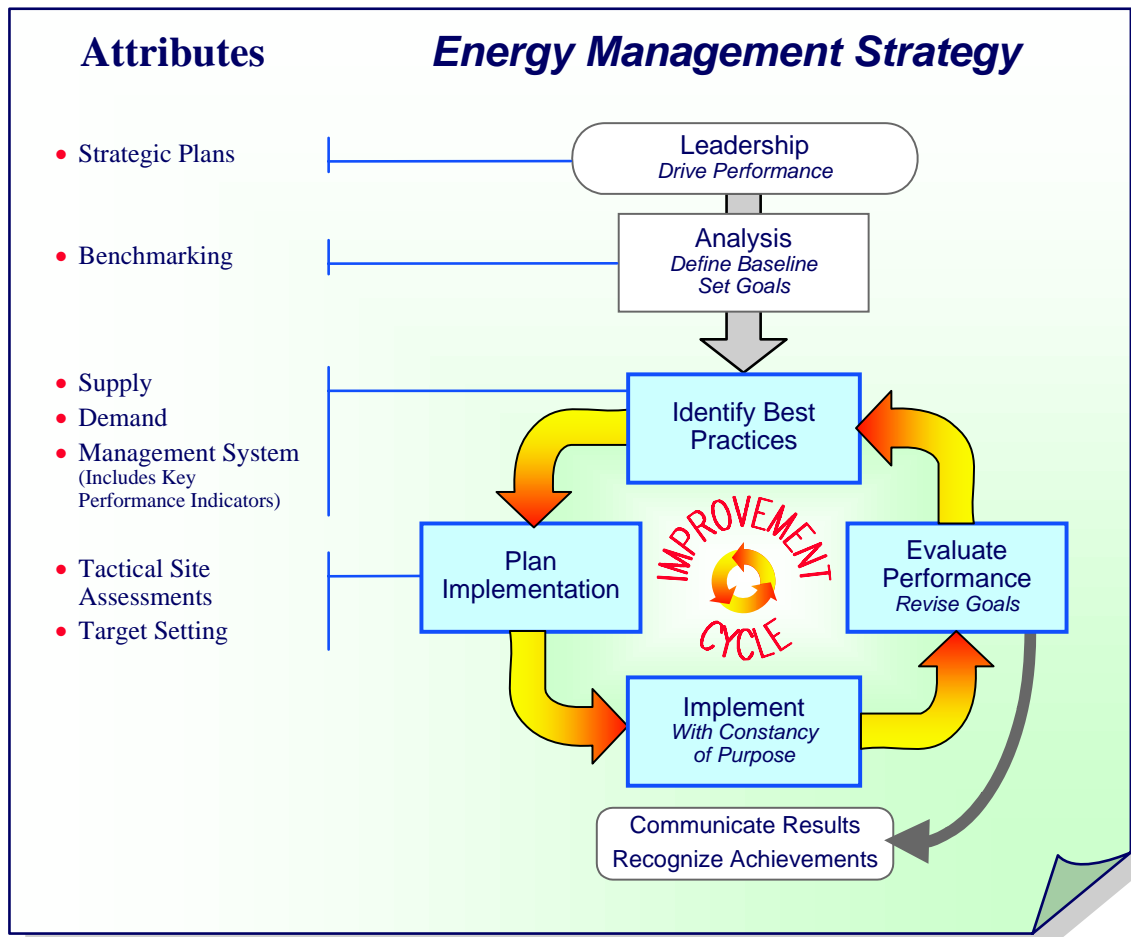
# IS YOUR CASH GOING UP IN SMOKE?

## Carmagen's Energy Management Program

With energy consuming 30 – 50% of a petroleum refinery's operating costs, it should not be surprising to find a proliferation of consultants touting million dollar assessments. Carmagen Engineering, Inc. (CEI) helps clients avoid the disappointment of investing in resource-intensive programs by focusing attention on the vital few major opportunity areas based on experience.

CEI is committed to the cause of improving energy efficiency in refineries. This commitment is more than simply a matter of good engineering; it is a dedication to sound public policy. This philosophy is delivered through a streamlined four-step process utilizing a team led by CEI experts with client participation:

SCOPE                      ASSESS                      PLAN                      IMPLEMENT



Profit Improvement

Energy Management

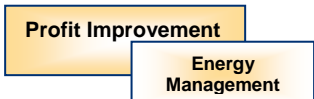
# Carmagen's Energy Management Program Steps

√	<b>SCOPE:</b>	<p>This first step sets the stage by quantifying expected results, and then defining the scope, objectives, boundaries, plans and schedule for the next steps.</p> <ul style="list-style-type: none"> <li>• Review performance history, understand current operations</li> <li>• Compare performance to Benchmarks</li> <li>• Quantify challenging yet realistic goals and targets</li> <li>• Define cost-effective opportunity areas within the plant</li> <li>• Identify team members, estimate costs, and develop schedules for subsequent steps</li> </ul>
√	<b>ASSESS:</b>	<p>Identification and sharing Best Practices and Key Performance Indicators (KPI's) represent the heart of both the four-step process and the crucial Assessment Step. CEI will help the client to focus attention on areas identified in Step One that represent the greatest opportunities, which typically include:</p> <ul style="list-style-type: none"> <li>• Improve operating efficiency of fired heaters, distillation units, and steam systems</li> <li>• Maximize use of heat at the lowest cost-effective levels</li> </ul>
√	<b>PLAN:</b>	<p>In Step Three, CEI engineers assist the plant in the preparation of a high-yield implementation plan that is built on the portfolio of attractive opportunities identified in the Assessment Step.</p> <ul style="list-style-type: none"> <li>• Set priorities by comparing savings to estimated costs for each opportunity identified in Step Two</li> <li>• Package results, review with management, and gain approval to proceed with the implementation of operational improvements and facilities modifications</li> </ul>
√	<b>IMPLEMENT:</b>	<p>While consulting assistance may continue through implementation, CEI engineers turn over leadership to the client's organization at the beginning of Step Four, when they:</p> <ul style="list-style-type: none"> <li>• Support plant management to develop performance metrics, targets, and milestones against which to gauge implementation progress</li> </ul>

## Typical Application

The scope, team composition, duration, cost and benefit vary to match the client's needs and opportunities. An example application for a medium-size refinery might be characterized as follows:

<b>TEAM COMPOSITION:</b>	Up to five CEI practitioners paired with client organization counterparts to assure buy-in and to hand over responsibility for implementation. The CEI side of the team would be led by an Energy Management expert and likely include discipline specialists for areas such as Utility Systems, Fired Heaters, Heat Exchangers, and Distillation Units.
<b>DURATION:</b>	Scope: ~ 1 week Assess: ~ 2 weeks Plan: ~ 1 week
<b>COST:</b>	~ \$100K (exclusive of travel expenses) for CEI Team
<b>TYPICAL BENEFITS:</b>	Immediate savings from easy-to-implement operating improvements worth ~\$1M/year, plus ~\$2M/year of efficiency improvements yielded through equipment and system modifications that carry one-time implementation costs totaling < \$3M.





For clients interested in a more focused, lower cost procedure, CEI has developed **Fast-Scope™** to rapidly identify opportunities to improve large, complex heat recovery systems.

This novel methodology can achieve strong alignment between energy efficiency and debottlenecking. Many refineries have implemented debottlenecking projects but are then limited by furnace constraints. These constraints can be overcome without costly and impractical improvements. This is accomplished by improving heat recovery to preheat the feed.

<b>INFORMATION NEEDED:</b>	<ul style="list-style-type: none"> <li>• Flowsheet with all heat exchange services identified</li> <li>• Tuned simulation of the entire heat recovery system using Simulation Sciences' HEXTRAN or equivalent, OR a full set of flows, temperatures and areas for all heat exchange services. Pressure drop survey may also be needed.</li> <li>• Answers to a set of specific questions supplied by CEI. Normally a phone or on-site interview is also required.</li> </ul>
<b>DELIVERABLES:</b>	<ul style="list-style-type: none"> <li>• Scoping level identification of inefficient heat exchangers in the network</li> <li>• List of specific improvement possibilities. These may include operational changes, minor repiping changes or the addition of one or more heat exchanger shells.</li> <li>• Estimated economic benefit and cost</li> <li>• Recommended next step plan of action consistent with both the client's and CEI's energy management approach</li> </ul>
<b>TIME AND COST:</b>	Depending on the availability of information, the study can be accomplished in as little as a week, and at a cost to the client as low as ~\$10K (exclusive of travel expenses).
<b>TYPICAL EXAMPLE:</b>	Crude distillation unit consisting of a preflash tower, atmospheric distillation tower, and vacuum distillation tower, together with several sidestream strippers. The crude preheat train consists of 28 heat exchanger services (60 heat exchanger shells).

The **Fast-Scope™** approach took less than a week to complete and determined that six heat exchange services were responsible for 74% of total inefficiency. Specific piping changes were identified, as well as the addition of one heat exchanger shell. Inefficiencies ranged from inappropriate non-countercurrent positioning of heat exchangers, to inefficient use of exchangers due to excessive pumparound bypassing. Several exchangers also had low heat exchange coefficients. Estimated energy savings were 7%, and a 5% improvement in throughput was possible. Payback time was estimated at less than one year using energy credits alone. However, the credits are most compelling when debottlenecking credits complement energy credits.

**Fast-Scope™** has also been applied to FCC, lube, and catalytic reforming process units.

**INTERESTED?** Achieving World-Class performance does not need to cost millions of dollars in consulting fees. It just takes working with a company with the engineers who have done it before – worldwide. Contact us ... you will be glad you did.

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# ENERGY MANAGEMENT SURVEY

**It does not take a million-dollar effort to achieve a multi-million dollar profit improvement. What it takes is an experienced team of engineers who can quickly focus in on what can be achieved and is practical to implement – the *Carmagen Engineering Team*.**

<p><b>APPROACH:</b></p>	<ul style="list-style-type: none"> <li>• Conduct a high-level energy utilization review leading to identification of major gaps relative to best practices             <ul style="list-style-type: none"> <li>– Process Heat</li> <li>– Offsites/Utilities</li> </ul> </li> <li>• Identify potential corrective actions and resultant</li> <li>• Notional Cost Savings</li> <li>• If practical, define associated investment level             <ul style="list-style-type: none"> <li>– Process Changes</li> <li>– Heat Recovery Modifications and Exchanger cleaning schedule</li> <li>– Fouling Mitigation</li> <li>– Repiping Options</li> <li>– Pinch Analysis</li> </ul> </li> </ul>
<p><b>TYPICAL PARAMETERS:</b></p>	<ul style="list-style-type: none"> <li>• Duration (elapsed), Weeks      1 – 4</li> <li>• Cost, K \$                                10 – 50</li> <li>• Number of Consultants            1 – 2</li> </ul>
<p><b>CONSULTING TEAM MAKEUP:</b></p>	<ul style="list-style-type: none"> <li>• Energy Management (Lead)</li> <li>• Fired Heaters</li> </ul> <div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;"> <p><b>30 + YEARS OF EXPERIENCE WITH MAJOR INTEGRATED REFINERS</b></p> </div>
<p><b>EXPECTED BENEFITS (TYPICAL):</b></p>	<ul style="list-style-type: none"> <li>• Profit Improvement             <ul style="list-style-type: none"> <li>– Variable Location Specific</li> <li>– 5 – 15 + ¢/B Improvement very likely</li> </ul> </li> <li>• Very high benefit-to-cost ratio</li> </ul>

**INTERESTED?**

Carmagen's staff of over 180 skilled specialists in all Process, Non-Process (Equipment), and Project Management disciplines is available to support client's implementation plans.

Contact Jerry Lacatena at Carmagen Engineering, Inc. to discuss your needs.

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