NPRA 107th NPRA ANNUAL MEETING

Conference Daily
Published by *Hydrocarbon Processing*

Day Three, Wednesday
March 25, 2009

The quarreling couple entertains at luncheon

Tuesday's annual luncheon featured entertainment of the political variety. James Carville and Mary Matalin took to the stage, standing at podiums underneath the soft glow of the NPRA logo. The liberal/conservative husband and wife team then proceeded to take potshots at each other and roll out a constant stream of one liners and zingers over the course of their remarks. Somehow, in the midst of all the verbal sparring, Ms. Matalin (conservative) and Mr. Carville (liberal) were able to squeeze in some actual political analysis.

Of her husband, Ms. Matalin remarked, "He is the only snake oil salesman that looks like a snake." Mr. Carville countered with a tale of Ms. Matalin's angry side in which she encouraged a state trooper in Virginia to ticket Mr. Carville on a variety of infractions he may or may not have committed just because she was upset with him.

"You cannot have rational discourse with James because he starts heaving away like a Satanic chihuahua under a strobe light," Ms. Matalin said. And so it went. But there was some self-deprecating humor involved as well. Ms. Matalin indicated that Mr. Carville supported Hillary in the Democratic primary, and then said, " I was for Fred Thompson [in the Republican primary] who was unfortunately the only candidate who tested positive for Ambien."

James Carville and Mary Matalin talked politics at Tuesday's annual luncheon.

Ms. Matalin started to get serious when she pointed out her belief that George W. Bush facilitated the running start of Obama's transition by signing an executive order in October 2008 that gave Obama's team resources to work with. She thinks this will change how all future presidential changeovers of power are handled.

She also praised Hillary Clinton, calling her a hawk on the issue of national defense and said she and Dick Cheney like Larry Summers, the current Treasury Secretary.

Then Ms. Matalin got to the heart of a sensitive topic to attendees of this year's annual meeting.

"There is no support and increasing opposition at higher and higher levels to cap and trade," Ms. Matalin said. "In fact, I will make a bold prediction: there will be no cap and trade legislation."

Still, Ms. Matalin is praying for Obama to be successful and wants him to follow the lead of the country and "go where the country is and that is center-right" on the political spectrum.

"There are Democrats in the Senate who are going to stop cap and trade by not allowing budget reconciliation consideration of it. They are going to stop this," she said. "In the House, the Blue Dogs are the biggest proportion of new House members and they are eventually going to have to run again."

"There is national goodwill for Obama, this cool young man who is smart and hip and of course we all revel in the ascendance of an African American to the highest office in the land," Ms. Matalin said.

She went on to point out that Mr. Obama's

See Couple on page 6

Inside this issue . . .

Flexible solutions for producing more diesel

Even though demand for gasoline and diesel is relatively constant, over time, diesel consumption is predicted to overtake gasoline. During a Distillate Hydroprocessing technical session on Monday, Robert Karlin, a hydroprocessing specialist for Shell Global Solutions, argued that with this projection, North American refiners will have to produce less gasoline and more diesel in the future. Mr. Karlin believes that refiners will have to take the necessary steps to maximize diesel output.

The big question is how do refiners maximize diesel output in the volatility of the marketplace? "The answer is having each refinery have specific solutions for staying current and flexible so they can respond to market conditions," Mr. Karlin said.

Many are familiar with the trends in energy demand, crude availability and environmental concerns. But not many could have predicted the volatility that was seen in 2008—with crude prices rising over $140 a barrel and then dropping to nearly $40 a barrel.

Nor could one have predicted that North American refiners would switch from producing gasoline to producing diesel. "The reason for the switch is that the price differential between diesel and gasoline shows an extremely favorable situation in 2008 to produce diesel over gasoline," Mr. Karlin said.

Robert Karlin, Shell Global Solutions, talks diesel during the Distillate Hydroprocessing technical sessions.

Refiners have many options for producing more diesel while improving flexibility to prepare for market fluctuations. Distillation, high-capacity trays and modification in catalyst technologies can greatly improve diesel production.

"High-capacity trays, like Shell's, can improve capacity by at least 50% over conventional trays and 30% over other high capacity trays," according to Mr. Karlin.

Mixed in with adjustments in the crude unit operation and other modifications, such as the relocation of a side draw or an addition of a new column in a hydrocracking

See Flexible on page 6

Sunoco's CEO headlines breakfast

The final day of the NPRA Annual Meeting began with the CEO Breakfast. This year, Lynn Laverty Elsenhans, chairman, CEO and president of Sunoco, Inc., exhorted the members to get involved in the political debate over the major issues of the day. If the industry can influence the dialog, it will have credibility with customers. This then brings their issues to the attention of the political class.

Ms. Elsenhans related her experience at the *Wall Street Journal* (*WSJ*) CEO's Council in Washington, DC. At the opening reception, after fending off countless requests for interviews, a WSJ reporter thanked her for attending, but asked why other colleagues from industry hadn't attended, noting that she was the only representative. She explained that she and other CEOs don't care to give speeches at big events because they are largely introverts (which she readily acknowledged was a lame excuse).

When Ms. Elsenhans later attended the energy breakout session moderated by Daniel Yergin, she found it interesting that a person from an Internet company was selected to be the key spokesman. She wondered to herself about how much experience he would have in actually providing energy to customers (probably not much). Among the other companies in the session were car manufacturers, the power industry,

Lynn Laverty Elsenhans, CEO of Sunoco, was the featured speaker at the CEO Breakfast.

the aforementioned Internet representative and herself.

During the session, there were monologues from the auto companies on the need for massive spending on electric vehicles—to be subsidized; from the electric utilities on the need to spend large sums on smart grids; and natural gas producers in favor of new electric-generation capacity if natural gas were used to produce it, but they actually favored CNG as the fuel of choice.

This discussion, made Ms. Elsenhans understand why the complex issues of the day do not lend themselves to solution due

See Sunoco on page 5

renewables, refined

Ecofining™ from UOP and Eni integrates seamlessly with your operations to produce high-quality green diesel.

Together with Eni, UOP has developed a feedstock-flexible hydroprocessing technology that converts a wide range of vegetable oils and other biologically-derived feedstocks into green diesel fuel. With cetane values in the 70 to 90 range and excellent cold flow properties, green diesel fuel produced by our Ecofining process is superior to both petrodiesel and biodiesel and an excellent blending component. Ecofining blends right into your existing refinery infrastructure for a profitable processing option. UOP continues to refine technology, providing real renewable solutions for today and tomorrow.

UOP
A Honeywell Company

For more information about UOP Renewable Energy & Chemicals and Ecofining™, visit **www.uop.com/ecofining**

Biofuels begin to progress to the second generation

Tuesday's morning issues session, chaired by Ernie Cagle, vice president of manufacturing for Murphy Oil, presented technologies recently developed by four different companies with a focus on biodiesel.

The first presenter Neville Fernandes, business manager for renewable fuels with Nest Oil, discussed the development of NExBTL™, which produces a renewable diesel that is a paraffin not a an ester. NExBTL™ has been extensively tested and shows good engine performance and operability when compared with petroleum diesel and FAME. Helsinki bus trials show a 10% reduction in NOx and a 30% reduction particulate matter.

The market experiences of Neste show that it is a superior diesel blending component and can used as a blend or neat. It addition NExBTL™ is completely fungible, has no storage stability problems, offers excellent performance in cold climates and has a very high cetane of 80 to 100.

The current challenges facing biofuels were discussed such, "lack of sufficient feedstock," "increased GHG emissions," and "higher food costs." All three of these areas have had positive developments with cultivation improvements, feedstocks being produced on marginal lands, the development of algae technology, using all aspect of the carbon emissions in consideration of the GHG emissions and the realization that it wasn't just biofuels driving up food costs. Neste is developing a pilot project using waste biomass to fuels integrating a refinery with a pulp mill and a city to further test the viability of this technology.

The second presenter was Robert Ames, a vice president of Tyson Foods. Tyson had looked at its strengths and the generation of a large amount of animal fats and decided that the best approach was to develop partners with the correct technology and also have customer access to purchasers of motor fuels.

First, Tyson looked at current animal fat-based biodiesels and reviewed studies that showed that one-third of biodiesel samples pulled between November 2005 and July 2006 were out of spec. This and the performance problems in cold weather and the storage problems were issues that the industry wasn't capable of handling at this scale. This indicated that vegetable oils were the preferred feedstock for biodiesel while animal fat is the preferred feedstock for renewable diesel.

In addition, renewable diesel is chemically identical to conventional diesel and can help fulfill RFS requirements. The results let Tyson to pursue an alliance with ConocoPhillips which resulted in a pilot project which began producing 300 bpd in December of 2007. The results met expectations but then the tax credit was reduced on October 3, 2008, by Congress from $1 to .50 per gallon as part of the bank bailout bill, causing the project to be placed on hold.

A second project, a joint venture with Syntroleum called Dynamic Fuels, which leverages GTL/CTL technologies and uses refining steps, started in construction in 2008 with is expected to produce 75 million gallons/yr in 2010.

Chris Peters, a vice president for Choren Industries, covered his companies approach to biodiesel. Choren was founded in 1990 by Dr. Bodo Wolf in Freiberg, Germany. In 1997 the company decided to focus on biomass gasification as a core competency and built a pilot plant. The favorite feedstock is wood but has been demonstrated to use agricultural waste, forest residues and construction/demolition timbers. Choren is currently working with Shell as a partner on biomass-to-liquids (BTL).

The final presentation was by Dr. Patrick Gruber , CEO of GEVO. His definition of advanced biofuels was any biofuel other than ethanol made from any biofeedstock which can help with the following refinery challenges: regulatory pressure; RFS mandates; the global economy and changing market demands from gasoline to diesel.

The GEVO solution is to produce a clean, renewable low RVP blendstock from an existing ethanol plant which is converted to handle biocatalyst, process unit, chemistry unit and a biomass converting unit allowing the production of butanols. T he advantage of this approach is a low capital expenditure and speed to market. Currently there is a pilot scale which started up in 2008, a demonstration plant is planned for this summer and a commercial scale plant is slated to startup in January of 2011.

The first question to the panel concerned at what price of crude oil would these biofuels not need subsidies. The answer was that the current price level makes it difficult for all biofuels without subsidies. ■

The Beyond Ethanol panelists (left to right): Robert Ames, Tyson Foods; Patrick Gruber, GEVO; Christopher Peters, Choren Industries; Neville Fernandes, Neste Oil and moderator Ernie Cagle of Murphy Oil.

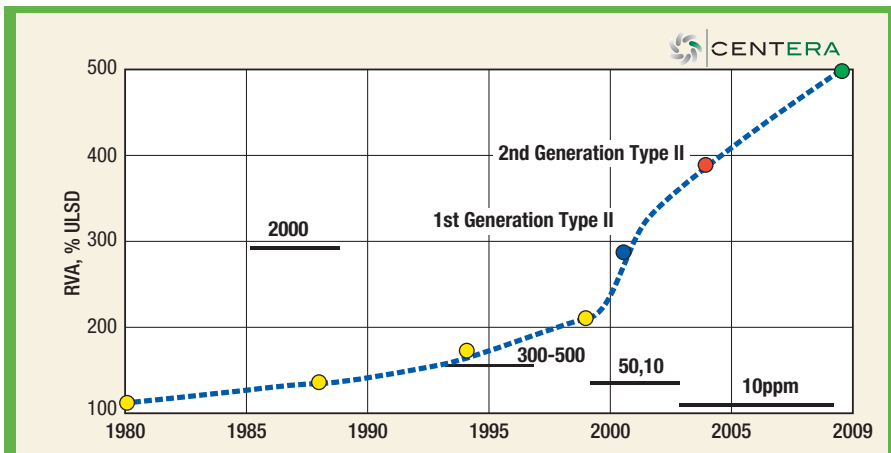


FIG. 1. A historical comparison of Type II ULSD catalyst developments.

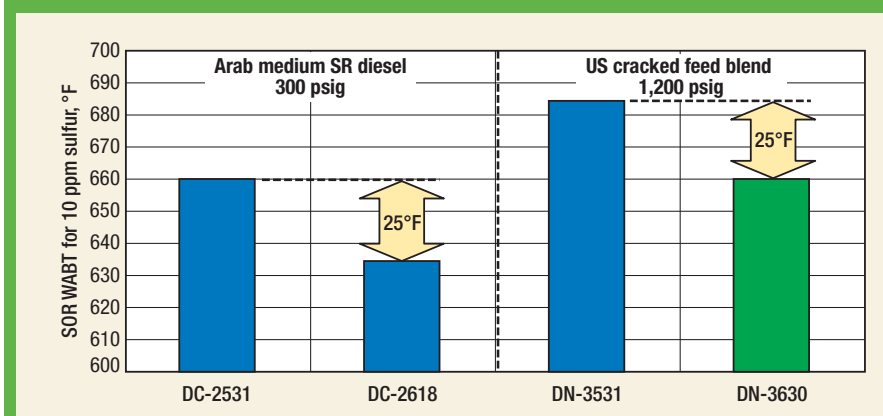


FIG. 2. A ULSD catalyst performance comparison.

Correction

On page 4 of yesterday's show daily newspaper, several errors were made. The first is that the name of Criterion Catalysts & Technologies' new technology was misspelled in the title of the article. The correct spelling is CENTERA. The following two errors relate to the accompanying figures in the article. In Fig. 1, the word CENTERA should have been at the top point of the graph to help illustrate that this technology is at the top of the development curve. In Fig. 2, the label for the activity increase with the CENTERA Technology should have indicated a 25°F activity increase rather than 25% increase as the label indicates. This 25°F activity increase actually constitutes a 50% RVA activity improvement as compared to the previous generation products in the figure.

For the sake of clarity, corrected versions of the figures are printed here. *Hydrocarbon Processing* regrets the errors.

NPRA

107th Annual Meeting

Conference News

Published as three daiy editions, March 22/23 and 24 and an electronic edition March 25, by *Hydrocarbon Processing*. If you wish to advertise in this newspaper, or to submit a press release, please contact the editor via e-mail (billy.thinnes@gulfpub.com) or by phone (832-656-5341).

Publisher
Mark Peters
mark.peters@gulfpub.com

NPRA Contacts
Bill Holbrook
Steve Higley

Editor
Billy Thinnes

Production Manager
Chris Valdez

Photographer
Lee Nichols

Hydrocarbon Processing
2 Greenway Plaza,
Suite 1020
Houston, TX 77252-77046
713-529-4301

Process simulation for green engineering

J. McMULLEN, Invensys Process Systems (IPS)

The rising costs of energy coupled with margins deflated by globalization and the weakening global economy have made green engineering more important than ever, not only from a corporate culture standpoint, but also from a business economic standpoint. Green engineering projects are now measured in terms of return on investment (ROI), regulatory compliance and energy cost minimization. Green engineering projects that enhance efficiency, achieve regulatory compliance and reduce costs are no longer executed just to support arbitrary statements in corporate sustainability policies; green engineering projects are critical to staying relevant and competitive in the marketplace.

Of the many tools that are becoming available to facilitate green engineering, simulation software is one of the most effective. Simulation software gives engineers the ability to work with a process in the virtual world without the expense and time delays of testing it in the real world. The three types of simulation software—steady state simulation, dynamic simulation, and online optimization—all have their places in making the entire plant lifecycle more environmentally friendly. They help make the process as efficient as possible during the design phase and minimize its environmental impact during operation.

Steady-state simulation. Steady-state simulation software is used in the conceptual and basic design phases of the plant life cycle, which is the ideal time to commit to green engineering because it can have the greatest impact on the long-term environmental impact of the process. Steady state simulation is essential to understanding the process, as well as the environmental and business ramifications of different configurations.

In biodiesel production there are several areas that are important to proper environmentally friendly design. The distillation columns in biodiesel fuel production separate the valuable biodiesel from the rest of the secondary products and waste. As such, they constitute one of the most important pieces of equipment to design properly. Since modern heat integrated distillation columns often require multiple heating and cooling sources, efficient operation can have a huge impact on profitability. Steady state simulation software aids in the proper design of a distillation column, which is crucial to efficient operation, regulatory compliance, and reducing emissions.

Another important aspect in the simulation is accurate modeling of the proprietary reactions or correlations. In the case of biodiesel production, which is substantially thermally catalytic at elevated pressures and temperatures, many processes cannot be modeled accurately with traditional unit operations. SimSci-Esscor PRO/II simulation software from IPS enables the addition of custom unit operations calculations via a Microsoft Excel spreadsheet. This provides the flexibility to model any proprietary or specialized process that can't be modeled using standard unit operations. Since engineers often develop the initial proprietary correlations for the process in Excel, using the Excel unit operation in the simulation package allows the user to capitalize on the initial work in Excel.

Dynamic simulation. Dynamic simulation software is another tool that facilitates green engineering. Dynamic simulation can demonstrate that a green engineered process can start and operate as expected, that it is safe and can operate under a variety of conditions, including start-up, shut-down and abnormal conditions. Dynamic simulation can also be used to study process control and operating strategies that reduce waste. Operators can also be trained on operator training simulators based on dynamic simulation models, which teach them how to operate the plant correctly and safely to reduce accidents that result in the release of hazardous material. Just as a flight simulator is used to train jet pilots to take off and land, operator training simulators train operators to startup and shutdown plants, preventing unnecessary waste in the process.

One new process that clearly supports green engineering is Integrated Gasification Combined Cycle (IGCC). IGCC plants are highly heat integrated. Steady state simulations show that the process is capable of achieving heat and mass balance at typical operating conditions, but they are unable to model the process at changing conditions. Dynamic simulation products, such as Dynsim software from IPS, can show how a complex plant behaves when the unexpected happens and how a high level of heat integration causes a chain reaction of disturbances throughout multiple heat integrated process units.

As advanced as control systems have become, their exact behavior is always in question until tested. Dynamic simulation helps engineers perform response tests before commissioning in the plant. Engineers can see if it maintains adequate control during events such as loss of power, loss of cooling, and can do so without the release of plant inventory to the flares system. They can also test alternate control configurations. This ability to test control systems in the virtual world of a dynamic simulation environment prevents unneeded testing on the actual process and prevents waste, helping the both environment and the bottom line. Dynamic simulation also allows the study of different start-up sequences to reveal the quickest path to bring a plant to normal operation. Minimizing the start-up time in turn minimizes product waste, minimizes wasted material and energy consumption, and enhances profitability and sustainability.

Online performance monitoring and optimization. Once a process has been properly designed, the control systems have been tested, the operators trained and the process has started up, the plant must be operated optimally. Simulation software can make operational process more environmentally friendly. Optimization software reviews plant operating status by bringing data from the IT infrastructure, reconciling that data, and optimizing performance based on the limits provided by the operator. SimSci-Esscor ROMeo optimization software helps manage the entire process, from scheduling the interface with the IT infrastructure, reconciling the data, and optimizing the process. Optimization software even accounts for changes in the price of raw materials, process utilities and products, resulting in increased profit and increased environmental friendliness.

Advanced process control software reduces the variability in a signal from the process. A more stable signal gives an operator more flexibility in operating the process since the operator does not have to create a buffer to account for signal spikes from the process. This added flexibility allows the process to be run more efficiently because the reduced variance allows a plant to be operated closer to a given operating limit. Online optimization combined with advanced process control software can continuously optimize, control and stabilize a process, which helps minimize energy consumption, reduce waste and increase throughput and product quality. Online optimization software and advance process control systems allow a process to be run at optimal levels 24 hours a day, seven days a week.

Staying green. Steady state simulation, dynamic simulation and online performance optimization are but three of the types of software that can be used to keep your company both green and profitable. This includes efficient upfront design and operation with reduced waste, now and in the future.

Waste is a product of bad design or poor operation. Today's engineers are being called on to secure a greener tomorrow by implementing all the techniques and tools at their disposal. The world's growing population continues to demand more from our hydrocarbon processing, chemical, pharmaceutical and petrochemical industries. Engineers need to take a leading role in developing efficient, environmentally friendly processes to secure our future, positively impact the bottom line and secure a greener future. ■

Joseph McMullen is a Product Manager for Invensys Process Systems. He is the PES/Portal Product manager responsible for development, positioning and global marketing of SimSci-Esscor's Process Engineering Suite (PES) and SIM4ME Portal.

Greenhouse gas regulation under existing laws

The greenhouse gas (GHG) regulation technical session on Monday was packed with information. Chet Thompson (Crowell Moring) summarized some of the important regulations involving GHG emissions. There was a Supreme Court ruling in the case Massachusetts vs. EPA that declared the EPA must determine if GHG emissions from automobiles endanger public health and welfare under the Clean Air Act (CAA). If the emissions do pose a threat, then GHGs should be regulated.

Chet Thompson (Crowell Moring) and Roger Martella (Sidley Austin) field questions from the audience.

Mr. Thompson then analyzed section 202 of the CAA, as it is the relevant section to this particular court case. The section states that the administrator "shall" regulate GHG emissions from motor vehicles that endanger human health or public welfare.

According to Mr. Thompson, the aftermath of Massachusetts vs. EPA was that the state of California was denied a request to regulate GHGs from new motor vehicles. Additionally, in March 2008, 18 states plus Washington, DC, Baltimore and New York City brought a mandamus action to seek the court's help when a government official refused to take a required action. The court, however, declined to act on the writ, denying the petition without comment.

The EPA responded by publishing the advanced Notice of Proposed Rulemaking (ANPR) regulating GHG emissions in July 2008—this found that the state of California's problem was not unique, so the petition was denied.

Mr. Thompson then discussed of the Environmental Appeals Board's prevention of significant deterioration, otherwise known as the "Bonanza memo." In the memo, Administrator Johnson stated that the EPA does not consider pollutants to be "subject to regulation" until the EPA can come up with a regulation that requires emission controls. This memo reversed the decision for Deseret Power Electric, which would not be subjected to GHG emissions.

Most recently, the EPA said it would reconsider the denial of the state of California waiver for regulating GHGs.

Mr. Thompson's main point was showing that the regulations are open to interpretation of the new administration. His prediction for the near future is that CAA section 202's proposed endangerment finding is now in a formal draft form and has been sent to the White House. He believes that the EPA will grant the state of California its waiver request—that it will be reversed, and the state can now mandate GHG emissions.

Roger Martella (Sidley Austin LLC) discussed the Endangered Species Act and how GHG emissions threaten particular species. The main point of the Polar Bear Decision was that GHG emissions have no connection with any harm to the polar bear. The Solicitors memo states the same thing, that an increase in GHGs does not affect endangered species.

One important question was asked: "Could the EPA develop its own GHG legislation given Massachusetts vs EPA?"

Mr. Thompson remarked that it could if the EPA can illustrate an endangerment finding from GHGs. However, he feels that the EPA is not interested in pursuing this route, but they could use their authority. ■

Continued Sunoco from page 1

to the self-interest of the companies and participants involved. In the case of the automotive transport, if the refining industry doesn't participate in the dialogue than it will have no influence on the outcome, and other industries "will take business with an inferior product." A need to be seen as "part of the solution and not the problem," means that policymakers need to be educated on the scale of energy use, the economics involved and the need for sustainability. A three-prong approach should be followed by all refiners:

1. Promote energy efficiency.
2. Promote changes in vehicle technology.
3. Promote greater diversity in energy supply.

Other areas that Ms. Elsenhans felt refiners should be active in was a support for an increase in the federal gasoline tax, support incentives for consumers to buy energy-efficient cars, support all forms of energy conservation, support climate-change legislation, continue to invest in lowering the impact on the local environment, support development of sustainable biofuels and not to be seen as being against wind and solar power.

During the Q&A, Ms. Elsenhans was asked for her statement about the need to answer the debate in a united way. She clarified her remarks by saying, "It is the debate with others that is a part of this; that's a self-interest. And so if we don't come forth with a unified voice, we won't be able to influence the outcomes about policy. If we are fragmented in that voice, we won't have much impact." Her experience in the industry has shown how difficult it is for the industry to come forward with that single voice so she said, "My plea to us is to think about this in terms of the long-term, if we have no voice, we have no impact." ■

Methods for decreasing energy consumption at refineries

An in-house energy integration strategy can be one of the best means to reduce energy consumption and thus reduce cost at refineries. Alan Ryder, technology manager for Energy and Separations at M.W. Kellogg, Ltd., expressed the need for change in the evaluation of a refinery's energy consumption during his presentation Tuesday morning. In essence, Mr. Ryder said the days are long gone from when we had energy to spare.

"The average cost for energy in plants and refineries has gone up considerably," said Mr. Ryder. "Having a strategy to maintain energy usage can dramatically reduce cost. Since the price of oil has plunged from $140 a barrel and settled to 2004 numbers at a little over $40 a barrel, its effect is really starting to hurt the bottom line."

Ryder stressed the need for refineries to find ways to decrease energy consumption by having more efficient engines, drivers, power cycles, state-of-the-art technology, flare gas recovery and the need for an analysis to track their energy usage.

Alan Ryder of M.W. Kellogg encouraged efficient energy management at refineries during his remarks Tuesday morning.

An in-house energy analysis can help a refinery better understand its position in respect to energy usage and to develop practical projects for a reduction in energy consumption. An energy analysis allows the processors to make process changes to see if the change in utility consumption was for the betterment of the refinery or not.

"You will need people that can ask the right questions and have the skills to know which process changes might be best for your company's needs," said Mr. Ryder. "You would then develop total and stored cost on the assumptions and see if the change in process meets your company's economic criteria in terms of payback, incremental return and so on."

Many steps can be taken to reduce energy consumption in a refinery. One such example that Mr. Ryder pointed out is the use of a dividing wall column. A dividing wall column has the ability to produce three purified products by effectively combining two distillation columns into one. This process has been shown to be 30% more efficient in reducing energy consumption and has been labeled by Mr. Ryder as "thermodynamically efficient." Introducing a heat pump can also dramatically reduce energy costs.

Mr. Ryder believes that refinery energy consumption and cost can be decreased significantly if operators can analyze and understand where the energy is being produced and the processes needed to save as much energy as possible. He explained that an energy-integrated strategy, especially an energy analysis report, is necessary in analyzing energy output and ultimately reducing cost.

"Energy output needs to be analyzed in a world where you have got to control your energy cost and where you have to think about limiting your carbon emissions," according to Mr. Ryder, "especially with intense global pressure to 'go green,' the US will have to follow suit.

"The goal is to retrieve the greatest content of usable fuels from a barrel of oil while using the smallest amount of energy possible," concluded Mr. Ryder. "Since the US relies heavily on imported oil, oil becomes not just a commodity but one of the world's greatest, most precious resources." ■

Continued Couple from page 1

sky high approval ratings have fallen back to normal levels and declared that Mr. Obama is just a President in tumultuous times and this is not the end of days or the Great Depression.

"All elections are about change. Change is certain, progress is not. Progress is change to what? And as soon as Mr. Obama started answering the question and stopped defying gravity, now he is coming back down to earth and people are starting to look at him in a different way, like a normal person," Ms. Matalin said.

For an example of this she rattled off a joke from the election trail last year, which was something to the effect of the Senator from New York was born in Illinois and the Senator from Illinois was born in a manger.

Ms. Matalin then yielded the floor to Mr. Carville for his remarks.

"I feel like a fireplug at a dog show," he said, in reference to what he assumed was a strong Republican presence in the room. This remark was met with much laughter.

Mr. Carville, who is now teaching a class on the 2008 election at Tulane University in New Orleans, went into some very scholarly analysis. He shared the fact that Clinton and Bush were the last back to back two term presidents since Madison and Monroe. He then encouraged the audience to pay attention to election demographic trends.

"The composition of the country is changing dramatically," Mr. Carville said. 90% of people who voted in the 1976 presidential election were white. When George H.W. Bush won in 1988, 85% of voters were white. When Obama won in 2008, 74% of voters were white. These trends are continuing and Mr. Carville believes that to not understand the underlying demographics that are taking place in the country is to miss the future point of what is going to happen.

Talking about President Obama, Mr. Carville noted that when he came into office he had three things to deal with: a collapse in demand, a housing mess and a financial crisis. Mr. Carville then ridiculed the argument that some are making that Obama has lost his edge as a communicator.

" The problem is that when you got to the banking crisis people were spending money on something they can't understand," he said. "I am writing a story called "Daddy, What's a Derivative?" TARP goes to buy toxic assets, and that doesn't seem like a very good deal. I don't know about you but I don't want a toxic asset, I'd rather have a performing asset."

Mr. Carville continued by saying," And now with this insurance thing, the people that bought and insured them don't even understand what they are. Now the interesting thing is that they are getting eviscerated on the intellectual battle on this but the administration in this instance is kind of standing alone. In their favor is this: If the toxic assets are worth more than people think they are and if they are right then they are going to look good."

Mr. Carville thinks that Mr. Obama and his administration will get better at some of these complicated matters.

He said, "If it does work out, Geithner and Summers et. al are all going to look a lot smarter." ■

Continued Flexible from page 1

unit, this can significantly improve flexibility and diesel production.

"With these options in place, the steps to maximizing diesel comes in three stages," Mr. Karlin said.

The first stage is to convert from a recycle operation to a once-through operation. This is a conversion from a two-stage recycle unit to a single stage.

Next is to find a conversion level that meets the diesel production requirements, while taking into account the loss of naphtha production. The third step to improve diesel product quality and diesel yield is to change the catalyst.

"The ultimate goal," Mr. Karlin said, "is to convert from a naphtha-mode catalyst to a flexible catalyst to improve diesel quality and diesel yield."

Replacing and revamping reactor internals is also vital to overall improvement of distillate yield.

Improvements in catalyst technology can allow for increase throughput and processing of more typical feeds.

"In hydrocracker units, the focus is on selectivity and quality when choosing a specific hydrocracker catalyst for the unit," Mr. Karlin said.

Each of these modifications, either separate or combined, is the basis for flexible solutions and ultimately improved diesel production. Each solution will be specific to each refinery, as the primary configurations will vary.

Modifications in design, utilization of reactor internal technology and improved catalyst performance are combined to reveal the ultimate solutions to improved diesel production. Refiners must rely on new technology and experience to serve as a solution platform for producing more diesel, especially with demand for diesel increasing in the future. ■

SMART inspection and maintenance technologies—doing more with less

S.A. ANDERSON, Intertek Aptech, Houston, Texas

What a difference a year makes. This time last year we were all struggling to find qualified personnel, resources and materials to complete our many global projects. Now projects are being cancelled and staff laid off. As crude prices fall and the recession bites, refiners have to come up with innovative ways of improving refinery economics. Once again the industry needs to reevaluate maintenance, inspection and turnaround practices.

A successful program should:

- Maximize equipment reliability, availability and maintainability
- Maximize run times and on stream inspections
- Set priorities and minimize risk
- Extend equipment life
- Minimize associated costs
- Achieve all of this with limited resources.

Intertek Aptech has developed a systematic management of assets using risk/reliability tools, (SMART*) system. This system integrates design, maintenance, inspection, operations and process parameters into a comprehensive asset integrity management program that maximizes available resources and minimizes associated costs. Risk, reliability and an evidence-based approach are key to the successful implementation of such a program.

Risk assessments. Not all equipment items are created equal. By using risk and reliability techniques, we can prioritize equipment, focus inspections, better apply our resources and determine realistic inspection and maintenance strategies. By understanding equipment types, materials, process streams, contaminants and corrosion/damage mechanisms, we can identify nondestructive examination (NDE) techniques and set realistic inspection/maintenance intervals.

Using a risk-based approach, inspection intervals can now be set beyond 10 years if certain criteria are met. Also, decisions can be made relating to comprehensive external inspection in lieu of internal inspections. Today we use a range of advanced NDE techniques, software tools and industry programs, such as reliability-centered maintenance (RCM), root cause analysis, risk-based inspection (RBI) and fitness-for-service (FFS) evaluations to confirm equipment integrity.

Operating envelopes. Risk-based programs rely on certain operating and process parameters to identify damage mechanisms, and to determine corrosion rates and the remaining useful life of equipment. Operations have a big impact on these parameters. Excursions, introduction of contaminants, process creep and operating outside certain limits or boundaries can seriously impact the life of equipment. One way to prevent this is the development of operational integrity windows or envelopes that describe "safe" operating limits to prevent or limit damage to equipment, thus extending equipment life and reducing turnaround discovery work. Operational integrity studies are a natural extension of risk-based evaluations, since this is typically where potential damage mechanisms are identified.

Reliability modeling. Every hour of unplanned and planned downtime can result in significant lost revenue. The application of relatively inexpensive but powerful RAM (reliability, availability and maintainability) forecasting tools can provide many benefits to the owners and operators of refineries, gas plants, chemical plants and other processing facilities.

The development of sophisticated RAM simulation applications coupled with ever increasing (and less expensive) computing power, has provided the means to undertake RAM assessments quickly and cost effectively. Current state-of-the-art RAM applications provide the framework that allows analysts to quickly develop and evaluate complex systems. Experience has shown that RAM analyses applications that use Monte Carlo, discrete event simulation techniques are preferred because they have the capability to address RAM behavior through time, accounting for the effects of aging and repair effectiveness on equipment and plant availability. Output from a RAM analysis is shown in Fig. 1.

Benefits of RAM analysis include the following:

- Reducing maintenance and sparing costs while maintaining and/or increasing production levels
- Optimizing capital investment for reducing the cost of production
- Decreasing unplanned and planned outage durations
- Alignment of maintenance resources based on the criticality of equipment to production revenue
- Accurate forecasts of equipment lifecycle costs that reflect equipment age, duty cycle, and maintenance effectiveness
- Optimization of capital improvement options within a plant or within an enterprise when improvement budgets are constrained.

Evidence-based approach. An evidence-based approach greatly reduces the costs and resources required to implement such programs. Using available industry data, proprietary databases as well as specific plant evidence minimizes the need to go gather or collect additional data. Much data related to risk and reliability studies already exist in proprietary databases and can be applied directly to any new or existing facility.

Software tools. The management and implementation of such programs requires that data be collected, analyzed, and stored. Many software programs exist for these tasks. The current industry best practices utilize various software tools to manage the planning, execution, data storage, and analysis of inspection and maintenance data. These programs are becoming powerful integrated tools that enable facility personnel to successfully manage their infrastructure and equipment with limited resources.

Conclusion. The current economic climate has necessitated that we reevaluate maintenance, inspection and turnaround practices. Comprehensive asset integrity management programs maximize available resources and minimize associated costs. Risk and reliability assessments are key to the successful implementation of such programs. Intertek Aptech's SMART* system pertains to the management of infrastructure and equipment and is aimed at providing our clients with a comprehensive, fully integrated, strategy, process, and culture directed at gaining greater lifetime effectiveness, value, availability, profitability and return from their production and manufacturing assets.

Intertek Aptech is a full service engineering consulting company specializing in the life management of infrastructure, facilities and equipment. For more information, visit www.aptechtexas.com, email sanderson@aptechtexas.com or call (832) 593-0550. ■

Stephen A. Anderson is CEO of Intertek Aptech and a senior materials scientist Mr. Anderson has more than 20 years of industrial plant experience in refineries, petrochemical plants and chemical companies. He has specialized in the technical integrity, engineered safety, metallurgical and corrosion science of refinery and chemical plant equipment and the development of innovative inspection and maintenance programs.

* SMART is a registered trademark of Intertek Aptech.

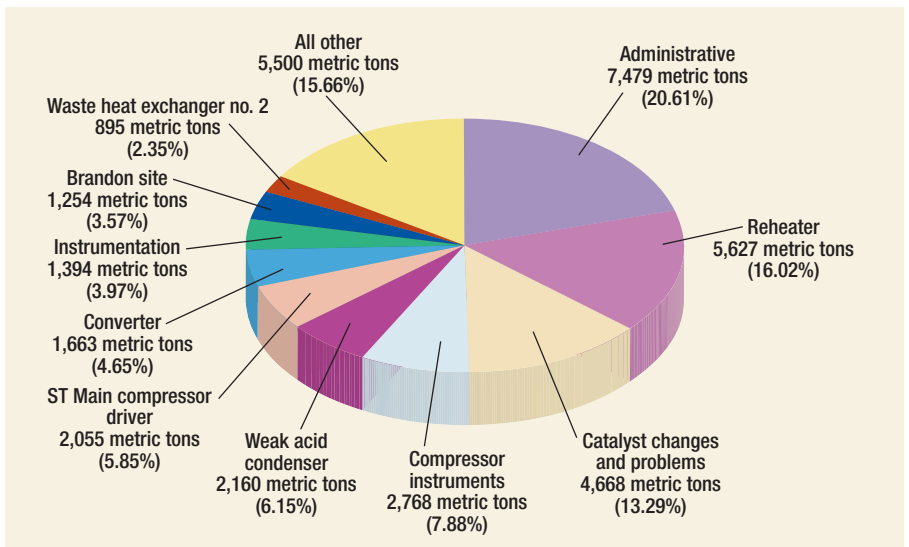


FIG. 1. Top 10 downtime drivers as measured by a RAM analysis.

Liquid drying by solid desiccant materials: experimental study and design method

F. AUGIER and **C. BOYER**, Institut Français du Petrole, Vernaison, France; **M. VASSIEU**, Newton's, Cavaillon, France

The use of consumable solid desiccant materials for organic liquid dehydration is very current in refinery or chemistry processes, especially when the water concentration is very low (<1000 ppm). In spite of its common use, the kinetics of liquid drying by solid desiccants is not well known, and scale-up of industrial drying processes using such materials is always problematic.

A current application of solid desiccants is the dehydration[1,2] and sweetening[3] of fuels or gas oils in the refinery. Dehydration of fuel is important because water phase demixion (called haze) is prohibited.

The outline of this study is the development of design procedures for hydrocarbon dryers. It focuses mainly on the measurement and analysis of dehydration kinetics, essential for industrial contactor modelling and scale-up.

Industrial dryers are fixed-bed columns filled with solid desiccant. The liquid phase flows through the fixed bed in an upward flow direction.[4] A brine phase is formed and settles at the bottom of the columns. The brine can also enhance the solvent dehydration by further extraction in counter-current flow.

Three kinds of classical solid desiccants are used in this study: calcium chloride ($CaCl_2$), sodium hydroxide or soda (NaOH) and potassium hydroxide or potash (KOH). The solids used in this study are mainly moulded pieces with a specific form of cushion. These solids are those commercialised by the company Newton's. Fig. 1 shows different kinds of solid shape available (flakes, and 9 g and 28 g moulded pieces, from left to right).

The interest in the moulded pieces used here is a higher specific contact area between solid and liquid compared with pearls of the same volume: the gain of specific area is around 20%, with a similar pressure drop. When very high specific areas are needed, other shapes and sizes can be used, such as small pellets or flakes, but in these cases, pressure drop through the bed can be much higher, and during operation the formation of chimneys or preferential paths is possible.

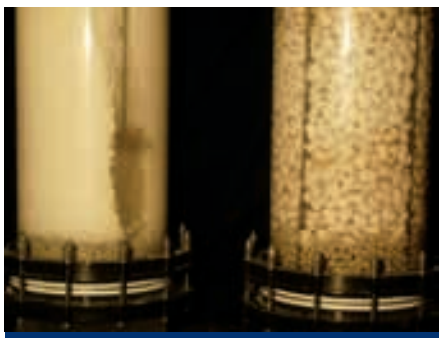


FIG. 2. Pearls (left) and moulded pieces (right) bed consumption.

This phenomenon can dramatically shorten the run time between two unit shutdowns and force the unloading of the desiccant charge, even if the residual volume of solid is theoretically still sufficient to treat the solvent. The moulded pieces have the ability to reorganise themselves when the bed is consumed, in a way that prevents the formation of chimneys. This phenomenon is illustrated in Fig. 2.

Mass transfer correlation for caustic desiccants. Dehydration is considered as an external mass transfer, and its coefficient depends on both the properties of the solvent and hydrodynamics in the column. The link between these phenomena is classically written in the non-dimensional form as a Sherwood number depending on the Reynolds and Schmidt numbers. Generally, the correlation form between these numbers is:

$$Sh = a + bRe^{c}Sc^{d}$$

A correlation for the Sherwood number has been developed to match the experimental data obtained with caustic desiccants and with both tested liquid phases. The optimal expression for the Sherwood number is the following:

$$Sh = \alpha Re^{\beta}.Sc^{0.333}$$

where α is a constant between 1 and 3 and β is a constant between 0.4 and 0.6 (not published for confidential reasons). This result is significant of an external mass transfer limitation since *Re* and *Sc* exponents are typically those of liquid/solid mass transfer expressions. Fig. 3 presents the comparison between experimental data and results obtained using correlation (1) in terms of dehydration efficiency. The dehydration efficiency, *Eff* is defined as:

$$Eff = (C_0 - Cs) / C_0$$

The mean prediction error of the correlation (4) is 14%.

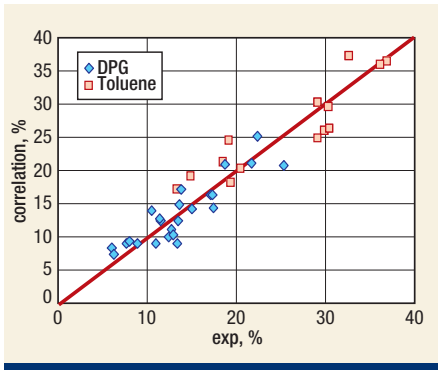


FIG. 3. Model/experiment comparison of dehydration efficiency of caustic desiccants.

Mass transfer correlation for calcium chloride desiccant. The same kind of analysis was performed with calcium chloride. A single external mass transfer limitation is not sufficient to explain and reproduce experimental results, and a diffusional limitation inside the salt is guessed.

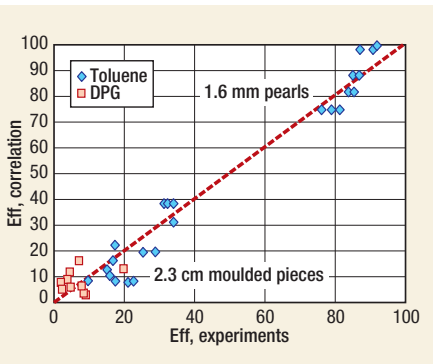


FIG. 4. Model/experiment comparison of dehydration efficiency of calcium chloride.

A comparison between experimental dehydration efficiencies and those calculated by model using a diffusional limitation is reported in Fig. 4. The model predicts experimental results with a relative dispersion (mean error ≈ 20%).

The model was compared with experimental data acquired on two bigger parallel columns.

Conclusion. Dehydration operations with solid desiccant can follow very different behaviors depending on the solvent to be treated, water concentration and also depending on the shape of desiccant. It was observed during this study that dehydration with caustic desiccant is limited by external mass transfer, and this phenomenon was successfully characterized through a correlation between adimensional numbers. This result is important for the design of industrial columns. Dehydration kinetics observed with calcium chloride is different, and is not only limited by external mass transfer, but also by the internal diffusion of water inside the desiccant.

When desiccants are used with a highly wetted solvent, dehydration generates formation of a brine phase, which can increase the dehydration efficiency at the bottom of the column, especially if the liquid-liquid contact surface is optimized.

A very simple model was developed to estimate the evolution of the performances in columns over time and to predict bed aging. The model is in good agreement with experimental results in the case of the use of moulded pieces. ■

LITERATURE CITED

[1] Barnett, J.W., "New salt products dries distillate streams, eliminates haze," *Oil Gas J.*, 15, pp. 68–70, 1996.
[2] De Hemptinne J.C., Dhima A. and H. Zou, "The importance of water-hydrocarbon phase equilibria during reservoir production and drilling operations," *Revue de l'Institut Français du Pétrole*, 53, 3, pp. 283–301, 1998.
[3] Mistrot, D. and R.H. Killgore, "Sweetening liquid propane with solid caustic," *Petr/Chem Engineer*, pp. 28–31, March 1966.
[4] Ruthven D.M., *Principles of Adsorption and Adsorption Processes*, Wiley& Sons, New York, 1984.

FIG 1. Different types of solid desiccant (scale in cm).

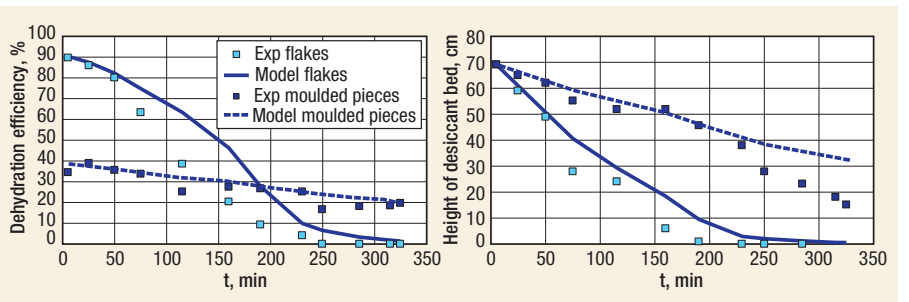


FIG. 5. Dehydration efficiency and height of solid time evolution.

Hydrogen management matters

S. RATAN and **M. PAGANO**, TECHNIP

The unprecedented demand for hydrogen in refineries driven by the growing "clean fuels" phenomenon has led to ever increasing impetus for finding advanced options and innovative schemes for optimizing the refinery hydrogen network. With today's refining landscape having expanded bottom-of-the-barrel strategies against emphatic CO_2 management and capital efficiency targets against volatile oil pricing, calls for developing and applying effective hydrogen management techniques in establishing the optimal hydrogen availability and its value for the refinery operations. Creative solutions are needed to address the increase in hydrogen demand in ways that increase the refinery's profitability, rather than simply looking at minimizing the negative impact of increased stringency of new fuels quality regulations.

Though hydrogen management has been practiced in refineries for several years, the modern-day high complexity refining and processing trends, coupled with the need for extensive (energy) integration and enhanced capital efficiency, it requires more advanced techniques, know-how and engineering expertise for meeting the overall objectives of economics, efficiency and environment, while also respecting the extensive requirements for safety, reliability and flexibility.

Traditionally, one of the significant routes for optimizing the refinery hydrogen network has been cost-effective hydrogen recovery from the refinery's various potential off-gases, which has accounted for as much as ⅓ of the total refinery hydrogen capacity. Such techniques and applications have been able to find up to 25% of daily H_2 requirements from vent, purge and fuel gas streams, providing an overall cost savings of 12% to 20% depending upon case-specific conditions.

The emerging trends in hydrogen management have been towards 'integrated ROG utilization' through their potential link to "on-purpose" hydrogen generation for achieving their full exploitation, as well as site-wide optimization of the end-use unit operations, involving purity and pressure cascading. The underlying criteria being that any hydrogen burnt is a loss of its 'asset' value above its fuel value.

Hydrogen utilization has a strong impact on refinery profitability because of its effect on throughput, product quality, conversion, yield and catalyst life. There are several possible ways for closing the hydrogen demand gap through on-purpose generation, either through a new hydrogen plant using a steam reformer or partial oxidation route, or importing it from a (near-by) pipeline system or an on-site "across-the-fence" purchase. Each source carries a different cost structure over time and battery-limits conditions including supply and reliability. Technip, with its extensive engineering expertise and realistic cost estimation capabilities, further amplified by its persistent leadership in hydrogen generation as well as its highly successful alliance with Air Products for their global over-the-fence high reliability H_2 supply plants, has established an effective approach and methodology for refinery hydrogen management

The methodology of hydrogen pinch analysis has been a more traditional technique for optimizing the way in which hydrogen is generated, used and recycled across the refinery at different levels of purity. It allows designers to find out the refinery configuration allowing zero surplus of hydrogen but by itself is not able to characterize and quantify the piping modifications, compression stations and related degrees of operating cost and capital investment for hydrogen production and recovery. Once hydrogen pinch analysis has set a target for minimum hydrogen consumption, the most obvious course of action is to optimize (and not minimize) the amount of hydrogen imported or generated.

Technip has developed a new approach to the H_2 network analysis and optimization combining a smart integration of a deep LP refinery modelling with a parametric investment and operating cost estimate, overcoming the limitations of a mere hydrogen pinch analysis. By combining hydrogen network analysis with an in-depth understanding of the hydrogen-consuming and producing processes, Technip can help open opportunities for increased refinery profitability far beyond the benefit realized by simply reducing hydrogen usage costs.

The refinery network analysis and its functionality is based on developing an overall network model, defining the current network flow scheme, establishing relevant operating cases, and reconciling H_2 balance for each (limiting) case. Refinery models can be either derived from PRO/II or HPI correlations or eventually from process or catalyst licensors. Decisions on how best to use excess hydrogen are best tackled using the refinery's existing LP model, which is typically created in Aspen PIMS. The combination of hydrogen pinch analysis with refinery optimization and hydrogen recovery and/or generation can save substantial capital and operating costs.

The overall refinery operations as well as individual process operations based on predefined operating conditions are simulated using PIMS. It reports appropriate cost information, process connections and detailed process operations, and identifies invalid user specifications. It provides two levels of optimization for overall refinery operation. The first level is to optimize overall refinery flow patterns. The second level is to integrate overall refinery flow patterns with detailed process operations.

The methodology analyzes the refinery hydrogen balance as a network, making use of hydrogen pinch analysis, coupled with refinery-wide LP or PIMS models for various hydro-processing operations based on minimum hydrogen consumption/ maximum utilization per pass as well as hydrogen recovery and generation process models for optimizing the hydrogen network. It systematically analyses the potential for re-using and/or recycling hydrogen across a refinery. Such methodology can address different types of refinery topology and environment, ranging from grassroots refineries to refinery expansions and revamps.

The targets for on-purpose hydrogen demand can be further optimized by applying the most befitting purification technology of either pressure-swing adsorption or membrane (and seldom cryogenic separation) for H_2 recovery. Based on their performance sensitivities (product purities v/s recoveries) as well as realistic installed cost data, the software allows the designer to determine their optimum operating conditions and most appropriate location, configuration and flow scheme integration. It also offers to optimize the ROG utilization by finding the governing interface between dedicated H_2 recovery versus direct utilization as feed for H_2 generation (Fig. 1).

The user is also able to select the best mix of supplies in order to satisfy the hydrogen shortfall with a minimum cost. POx of heavy residues and petroleum coke, while bearing their high investment, can produce hydrogen at a lower cost than steam reforming under certain conditions of their much discounted or subsidized feedstock compared to natural gas and economy of scale. The key factors in this evaluation are the relative costs of the feedstock, oxygen, and natural gas. It can also take into account any imminent future plans for additional processing integration or regulatory upgrades.

Ultimately, the program defines recommendations that balance overall costs with refinery benefits through implementing the best combination of recovery, expansion, efficiency improvements, purification and new supply options, covering the feasible routes for hydrogen production including residue gasification, steam-power synergy and CO_2 credits management.

Technip has recently performed such master plan studies for grass roots refineries and the methodology used is equally applicable to existing refineries. Simplified unit operation interfaces of the refinery units are utilized to build and converge the hydrogen network, followed by more rigorous model of the refinery using the PIMS software using in-house data on performance of the hydro-processing units, which can be supplemented with data from different licensors and catalyst suppliers. It considers trade-offs between hydrogen purity and system pressure, degree of cost effective hydrogen recovery using PSA or membrane units based on pressure cascading and/or different compression schemes and then determines the most appropriate capacity of a new "on-purpose" hydrogen generation plant. The hydrogen network is optimized without modifying the operating pressures and other conditions of the various hydro-processing units that are consumers of hydrogen. Various configurations are reviewed and cost estimates are carried out for each of the options, to allow short listing of the most cost effective option(s) for optimizing the hydrogen network for the refinery (Fig. 2).

The second phase considers modification of the operating conditions of the various hydrogen consumers to further optimize the hydrogen network and determine the break-even point between H2 recovery and generation (Fig. 3).

Several such refinery hydrogen management platform studies with advanced concepts have been conducted by Technip for successful implementation, and which have proven to be quite attractive in terms of the returns (IRR) in satisfying the imminent needs on refinery hydrogen management. ■

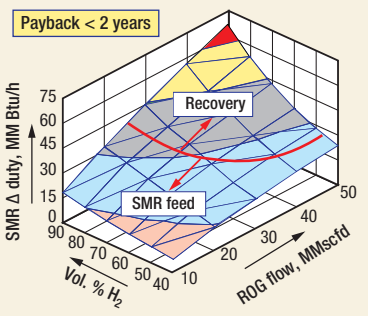


FIG. 1. ROG Integration: SMR feed vs. recovery PSA (SMR capacity is assumed high enough to use all available ROG as feed.

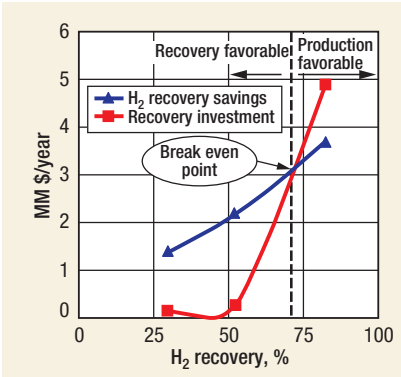


FIG. 3. Hydrogen recovery optimization analysis.

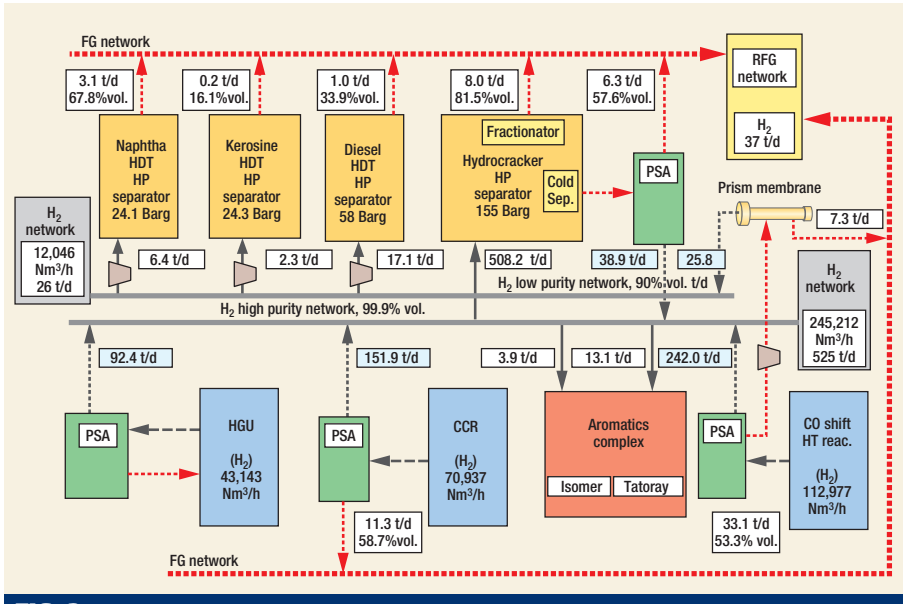


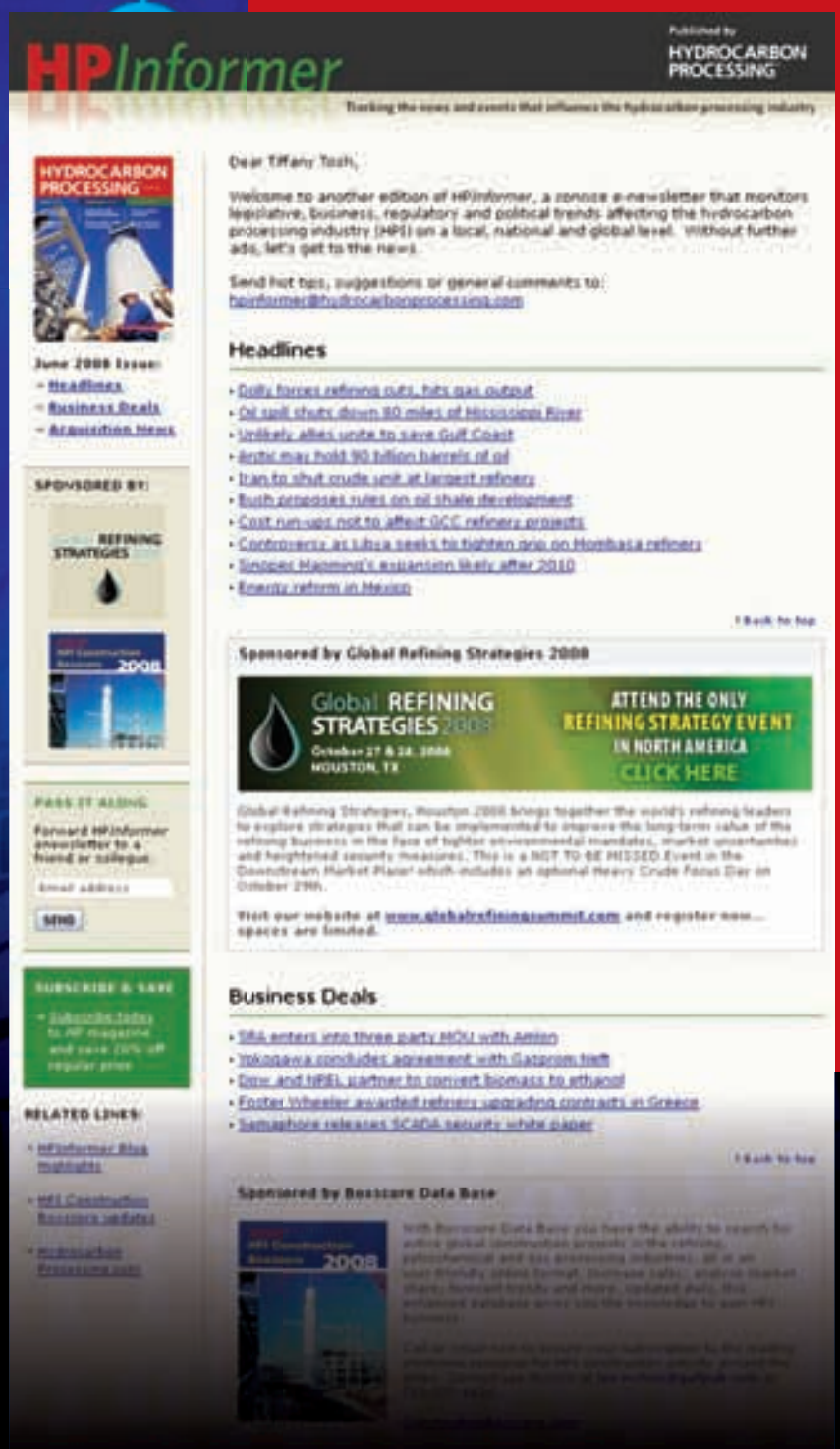
FIG. 2. A hydrogen network case analysis, with PSA combined with membranes (recovery level=70.8%).

HYDROCARBON PROCESSING®

HydrocarbonProcessing.com

E-NEWSLETTERS

Let *Hydrocarbon Processing's* e-newsletters work for you



REACH YOUR AUDIENCE

The ***Hydrocarbon Processing*** e-newsletters are a cost-effective means of reaching key decision makers and future leaders of the HPI industry. The e-newsletters are distributed three times a month to, on average, 38,630[1] ***Hydrocarbon Processing*** subscribers and registered users of **HydrocarbonProcessing.com.** E-newsletters are a great way to advertise your product or service, announce a new technology, recruit future employees or pique interest in an upcoming event through an exclusive sponsorship or banner placement.

STAY CONNECTED TO THE INDUSTRY

Register to have the ***Hydrocarbon Processing*** e-newsletters delivered right to your inbox. Keep up to date on the latest technology, news and events shaping the Hydrocarbon Processing Industry. Log onto HydrocarbonProcessing.com to register.

NPRA SHOW NEWSPAPERS ARE ONLINE

Visit www.HydrocarbonProcessing.com/HPInformer to read all three days' editions of the NPRA Show Newspaper in digital format. Each edition will be posted at 8 a.m. CST.

For more information, e-mail Billy.Thinnes@GulfPub.com or call +1 (713) 520-4431.

2009 DIGITAL MEDIA

[1]Source: Data is supplied by publisher's internal system, EMS, average of issues sent January 15, 2008, to August 15, 2008.

Scenes from the NPRA 2009 Annual Meeting . . .

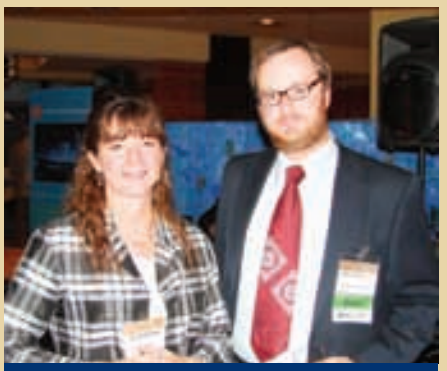
To see more, visit www.hydrocarbonprocessing.com/hpinformer

Hospitality roundup

Monday evening, the hospitality suites reached critical mass as everyone found their collective groove and hit their stride in a whirlwind of networking, laughter, serious business deals and moments of rejuvenation. **KBC's** suite was defined by a soft chatting murmur punctuated by the clarity of four choices for pristine martinis, which helped the conversation flow without effort. **CB&I** employed some three-dimensional theatrics with cameras and big screen TV's and protective sunglasses to project visitors to their suite into an alternate reality of dancing television heads. **Shaw's** suite was rocking late to the musical alchemy of the band known as the Texas Tide, who summoned forth the spirit of Otis Redding and unifying all in a sing-a-long version of "Sitting on the Dock of the Bay." **Criterion** took over the conveniently located second-floor restaurant Sazos and transformed it into an elegant and relaxing atmosphere for discussing business and reflecting on the day's events. **BASF Catalysts** offered a welcoming suite as the band was not afraid to jam off into tangents of a flamenco jazz-fusion style, the two guitarists plucking their acoustic axes with dexterity while the band's drummer mined the softly syncopated style of the Bill Evans Trio. It was Buffett overload at **Albemarle**, as the Jimmy Buffett songbook was cranked up to 10 on the stereo, and everyone was feeling fine. **Haldor Topsøe** welcomed guests and cornered the market on refined conversation punctuated with laughter. Good times with good folks, that's what the overriding theme of Monday night appeared to be. ■

The cards were flying fast and furious at KBC's blackjack table.

Mark Pennels, Equilibrium Catalyst, Philip Lane, Albemarle, and Donald Clawson, Equilibrium Catalyst, enjoy some laughs and drinks at Albemarle's tropical theme suite.



Zoe Stonebraker, Criterion Catalysts and Billy Thinnes, Hydrocarbon Processing enjoy the Criterion Suite.

Brent Schier, Shaw Energy and Chemicals Group, Mark Williams, Foster Wheeler, Peter Wisniewski, Foster Wheeler, and Doug Eberhart, Worley Parsons, end the night enjoying the view from Shaw's balcony suite overlooking the city of San Antonio.

Vassilis Vergopoulos, BASF, Larry Nemec, BP, and Deon Carter, BASF, are big fans of the Santana meets flamenco jazz stylings of the band in BASF's hospitality suite.

Albemarle's suite was a rowdy networking center fueled by a soundtrack of non-stop Jimmy Buffet tunes. Here, John Quanci, Sunoco, chats with John Steitz, Albemarle.

David Berglund, Technip, James Loughead, Technip, and Don Wright, Modern EPC, take some time to catch up in before moving on to the next suite.

Texas Tide brought the Shaw suite to a dancing frenzy with their full-on interpretation of Don McLean's "American Pie."

Christopher Horner, senior fellow, Competitive Enterprise Institute, addresses the fallacies and pitfalls of the climate change initiatives before the panel discussion.

Greg Martin of Emerson Process Management takes a break to get a shoeshine.

John Hofmeister, founder and chief executive of Citizens for Affordable Energy, presents his argument for controlling gaseous waste.

Christopher Horner, Competitive Enterprise Institute, Charlie Drevna, NPRA, and John Hofmeister, Citizens for Affordable Energy, participate in a panel discussion the policy and politics of global climate change.

Carter Martinez, S&B Engineers and Constructors, Deke Lincoln, KBR, Terry Doyle, S&B Engineers and Constructors, Timothy Stone, KBR, and Ron Gualy, KBR, all agreed...Albemarle does have the best koozies.

NPRA CONFERENCES

If You're Not Here, You're Just *Out* There.

NPRA Reliability & Maintenance Conference and Exhibition
May 19–22, 2009 « Gaylord Texan Resort & Convention Center « Grapevine, TX

Don't get locked out of NPRA's Reliability & Maintenance Conference.

In today's demanding economy, you want more value for your dollar. NPRA's Reliability & Maintenance Conference and Exhibition delivers it with an expanded program that includes **more than 40 workshops** in seven subject tracks, two keynote speakers, and several Q&A and discussion panels.

The Exhibition will showcase the latest technologies and services for you to see and evaluate. **More than 240 companies** will exhibit their equipment, materials, and special expertise in solving problems that are critical to your competitiveness.

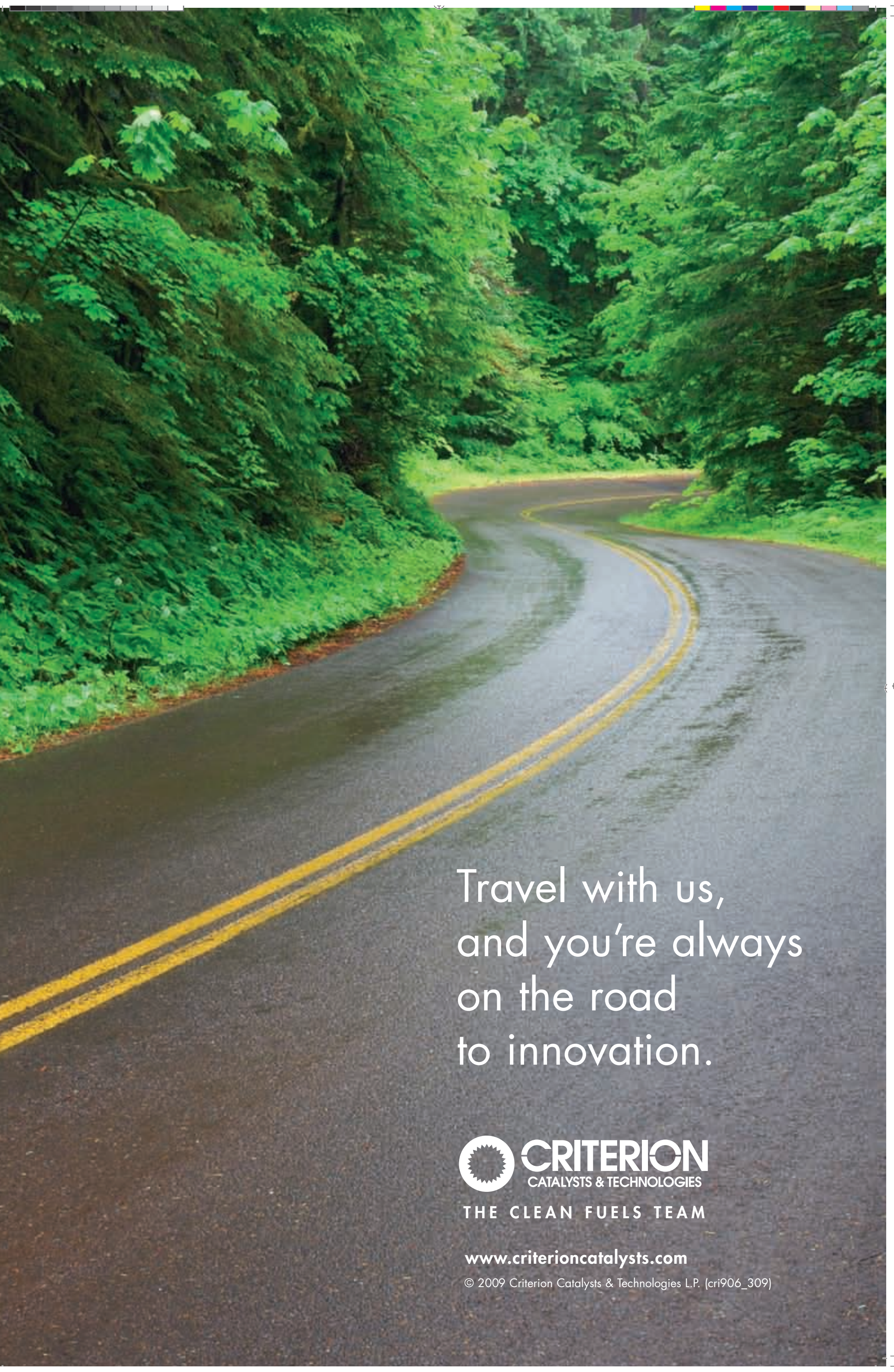
The 2009 RMC is **your best opportunity to see and hear about the latest in reliability, maintenance, and turnarounds** from noted experts and fellow practitioners.

Register today at **npra.org/rmc** or
call us at 202.457.0480 for more information.

NPRA

NATIONAL PETROCHEMICAL
& REFINERS ASSOCIATION

Today's refining and petrochemical businesses.
The more you know about us, the better we look.


Travel with us,
and you're always
on the road
to innovation.
CRITERION
CATALYSTS & TECHNOLOGIES
THE CLEAN FUELS TEAM
www.criterioncatalysts.com
© 2009 Criterion Catalysts & Technologies L.P. (cri906_309)