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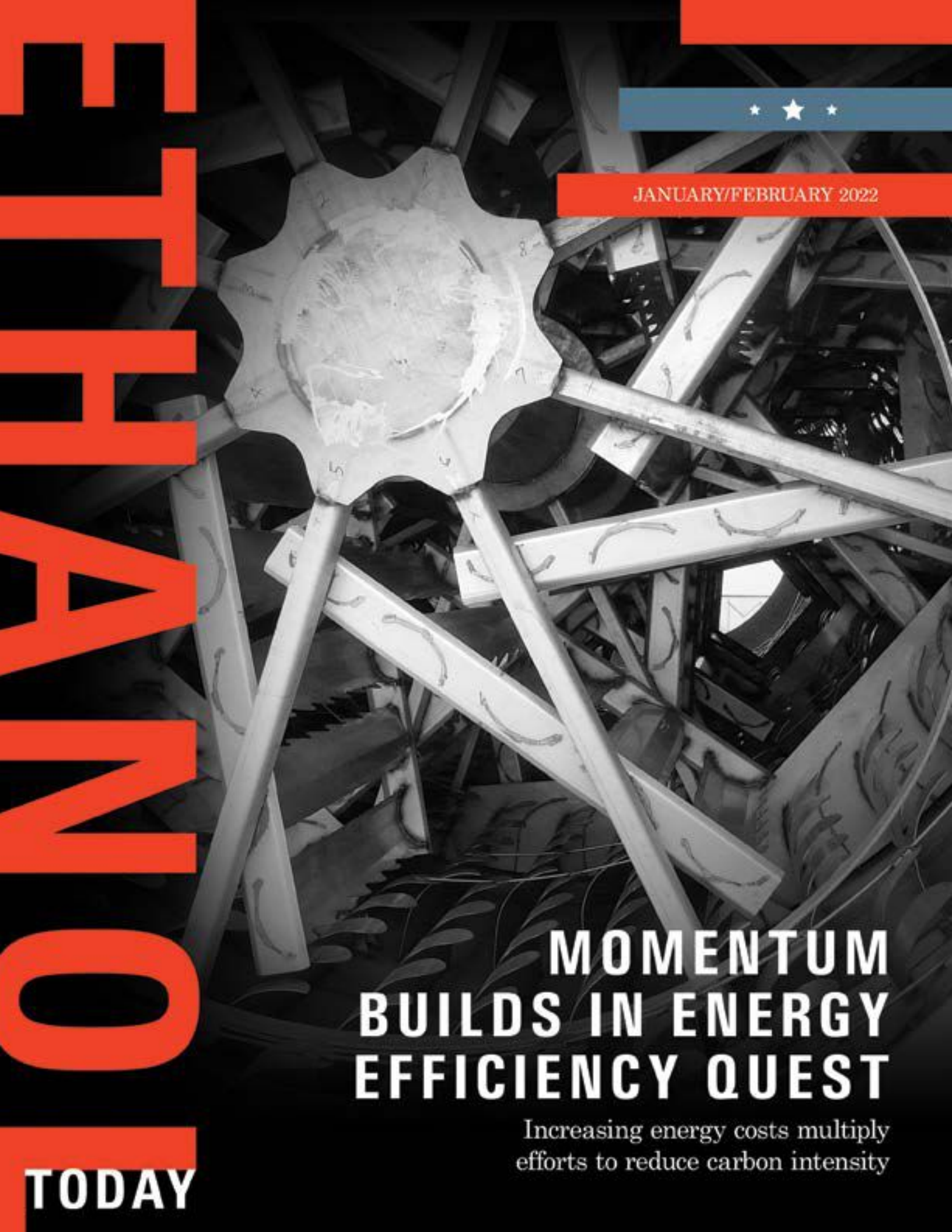

MOMENTUM BUILDS IN ENERGY EFFICIENCY QUEST

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By Susanne Retka Schill

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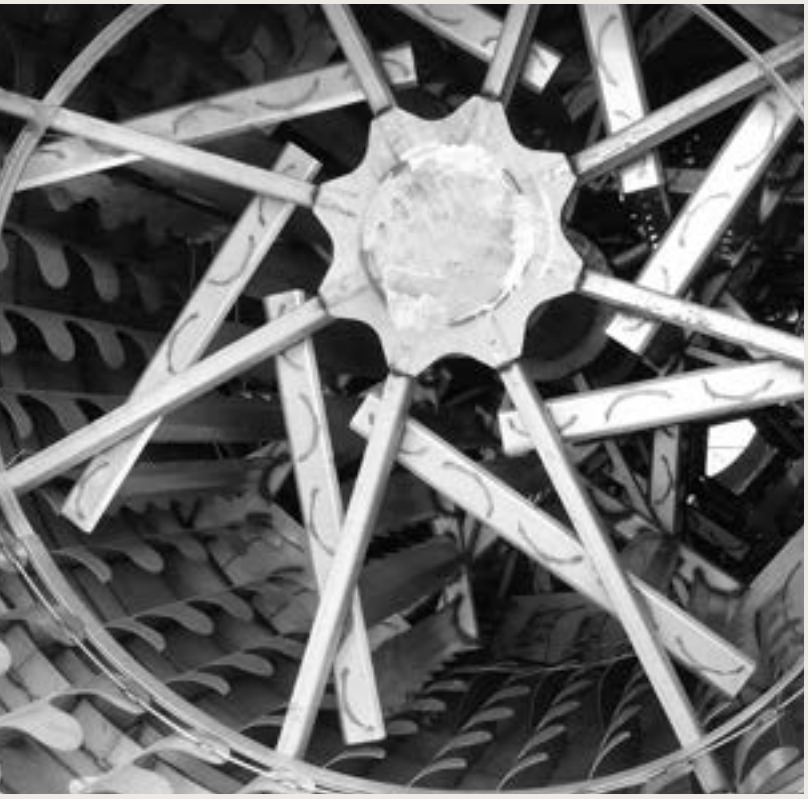
– Andy Huenefeld, World Kinect Energy Services

Energy efficiency efforts across the ethanol industry have been gaining as the focus on carbon intensity reduction heightens. This past year's natural gas price spikes are adding to that momentum.

"I'm thinking the days of $2.50 or less natural gas on a large-scale basis are behind us," says Andy Huenefeld, director of energy price risk at World Kinect Energy Services. "Right now, the forward market is pricing gas between $3 and $3.50 out to the middle of the decade, which seems

ICM's energy-efficient rotary dryer used for drying DDGs. Photo Credit: ICM, Inc.



like a healthier price point for producers." To prevent the price spikes that topped $6 this fall, he points out, producers need incentives to keep supplies growing.

For much of the past decade, the natural gas market was in a consistent state of oversupply as producers were ramping up output faster than demand was growing, keeping prices moderate, he explains. After the energy sector's price collapse last year, rigs were idled and drilling halted. But unlike other years, production didn't rebound when prices recovered.

On top of that, the geopolitical risk playing out in Europe and spilling over into Asia now impacts the North American market as liquid natural gas exports have increased, Huenefeld says. "We saw some of that bullish market sentiment spilling over into the U.S. ahead of winter, culminating in these 13-year highs for pricing."

"The recent run up in natural gas prices, now temporarily backed off a bit, demonstrates that efficiency upgrades to ethanol plants are even more important," says Bernie Hoffman, director of business development for P&E Solutions. "The recent natural gas price increase also demonstrates how vulnerable the ethanol industry is to commodity movements."

Hoffman adds, "I have talked to a few plants about the new technologies, and they often comment, 'we should have done these earlier,' especially in light of how the ethanol plants suffered during the COVID energy market collapse."

Many in the industry were cautious about embracing carbon lowering as a priority, Hoffman says. "That has changed and everyone is talking about it. Buzz words like carbon capture and sequestration, net-zero carbon or decarbonization have become common in the ethanol industry."

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Most of the low-hanging fruit upgrades with respect to energy reduction and efficiency have already been done, he adds. The technologies being considered now include membrane technologies such as Whitefox Technologies or dryer exhaust energy recover systems like Bioleap's DEER. Combined heat and power (CHP) should be on every plant's list of energy reducing technology considerations, Hoffman says, because of the substantial direct energy savings and impact on carbon scores. Depending upon the plant design, CHP delivers energy savings of between 35 and 60 percent and carbon intensity reductions between 8 and 14 percent.

Fundamental Shift

Jeff Scharping, director of ICM Inc. sales, remembers the 2008 price spikes in natural gas. Back then, interest in investing in energy-lowering technologies dissipated once gas prices dropped. Today, he says, there's little correlation with natural gas prices — it's all about lowering carbon intensity. That's true even for those plants who logistically can't ship to the West Coast's low carbon fuel standard markets.

"How do we produce a low carbon gallon of liquid fuel to compete in a low carbon market? What does each gallon look like competing in an electrified world?"
– Jeff Scharping, ICM Inc.

Scharping recalls conversations with two managers about capital investments in energy-saving technology. Although West Coast facing plants could quickly monetize carbon reductions, one manager said he wants to be ready to compete when the East Coast adopts low carbon policies, and the other said CI is part of the world now and they know it's the next step. "It is a fundamental shift in our industry," he says. Instead of short-term paybacks, plants are looking longer term at major capital investments and asking, he says, "How do we produce a low carbon gallon of liquid fuel to compete in a low carbon market? What does each gallon look like competing in an electrified world?"

A number of plants have installed smaller CHP units, Scharping says, utilizing step-down turbines that generate electricity from steam that might otherwise be wasted through pressure relief valves. He expects more plants, particularly those signing up for carbon sequestration, to deploy larger megawatt systems that first

Many producers have added combined-heat-and-power (CHP) to their plant operations for its high thermal efficiency, greater reliability, as well as its ability to lower carbon intensity and result in direct energy cost savings.

generate electricity and use the remaining steam for the process. Ethanol plants looking to capture their carbon dioxide for sequestration will need to liquefy the gas to ship it via pipeline, he says. “Every plant is going to need compression, which has a heavy energy consumption and may double the electrical usage of a plant. That brings in CHP as the potential source of electricity for that.”

“Yes, there’s low hanging fruit within the plant,” Scharping concurs, mentioning the positive impacts of advancements in yeast and enzymes. Paying attention to operations and striving to run consistently are important, too, he says.

Above: Selective Milling Technology™ or SMT™
Below: Fiber Separation Technology™ or FST™

ICM’s Advanced Processing Package™ suite of technologies is featured below.

Above: Feed Optimization Technology™ or FOT™
Below: Thin Stillage Solids Separation System™ or TS4™

"The labor crunch has pushed plants into thinking how to do plant activities with less available labor — can they automate processes for better control and less human inputs?"
– Keith Jakel, Fluid Quip Technologies

Above: Construction of FQT's MSC protein processing building, specifically the installation of a foundation pier, at an ethanol plant in Marcus, Iowa.

Below: York, Nebraska, ethanol plant with two distillation columns for a USP Grade alcohol system to make sanitizers and disinfectants.

FLUID QUIP TECHNOLOGIES

Fluid Quip Technologies has industrialized multiple patented technologies geared toward enhancing the base corn-to-ethanol dry grind process, creating new and novel alternative co-products, and supplying the growing need for carbohydrate building blocks in the biochemical market.

Above: Fluid Quip engineer in plant.

Below: The right side of the frame shows a ring dryer stack with wet pad in the foreground at a Marcus, Iowa, ethanol plant.

"Energy goes up and down pretty drastically if you've got swings. You want to run a pretty good consistent plant, which involves operational training. That can be tough these days with a lot of new employees."

An ICM team member walks through one of the company's energy efficient technologies.

"The other way to reduce energy is to spend capital and buy technologies that reduce energies within the plant," he says. "From an ICM perspective, all of our technology design is evaluated through the filters of increasing revenues with diversification while making sure we have low CI scores and low energy use." Scharping cites several energy-reducing projects in recent years, including retrofits of Delta-T distillation systems to reduce energy requirements and the biomass gasifier installed at Element in Colwich. "For those with feedstock available, that's a really good option," he says. The system gasifies chipped waste wood into syngas. "Then we take the syngas and we burn that in a boiler to create steam that produces electricity as well as steam for the process. We take the plant about 80 percent off the grid." He adds that the company's Advanced Processing Package, which integrates new feed products into plant operations, also results in an overall energy reduction primarily due to the removal of fiber and water in multiple locations, removing water before the dryers and leading to less natural gas use. "Every plant sees a benefit, but for plants that are currently drying distillers grains, that's where we get the highest Btu savings."

Engineered Optimization

The quest for energy efficiency solutions should not overlook engineering optimizations, suggests Keith Jakel, sales and marketing manager at Fluid Quip Technologies. "We have been conducting more of these optimization studies to help plants understand where they have some missed opportunities for energy/process/efficiency in their plants."

Automation strategies are another area gaining more attention, he adds. "The labor crunch has pushed plants into thinking how to do plant activities with less available labor — can they automate processes for better control and less human inputs? The answer is yes, and we have designed some very good results for operations."