UNIVERSITY of HOUSTON

UH ENERGY

Highlights from the Texas Industrial Energy Efficiency Program
Newsletter Volume 5, Number 3, June 2024

Greetings, from the Texas Industrial Energy Efficiency Program!

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Event Recaps

TIEEP has presented three events since our last (February) Highlights Bulletin:

TIEEP Water Forum
Date and Time: Thursday, March 7, 2024, 4:00-6:00 pm
Theme: *Water: The Big Picture*.
Venue: Hybrid event – in-person at Silver Sycamore Event Venue, 5111 Pine Ave, Pasadena, TX 77503, and online.

Upcoming TIEEP Events

Save These Dates!

Please check "Upcoming Events" on the TIEEP webpage for updates as they become available.

TIEEP Fall Energy Forum

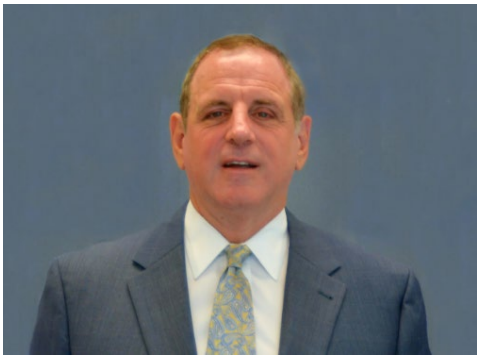
Thursday, October 10, 2024, 4:00-6:00 pm
Theme: tba
Venue: Houston area, tba
PDH certificates available.

Energy Day

Saturday, October 19, 2024, 11:00 am-6:00 pm
Theme: K-12 STEM Outreach
Venue: Downtown Houston.
TIEEP will have a table in the UH Energy tent at this city-wide STEM outreach. Come by and visit our interactive exhibit!

TIEEP Spring Energy Forum
Date and Time: Wednesday, May 1, 2024, 4:00-6:00
Theme: *Energy and Decarbonization: The Big Picture*.
Venue: Hybrid event – in-person at the University of Houston's Elizabeth D. Rockwell Pavilion, and online.

TIEEP Refinery & Chemical Plant Steam System Workshop



Dates and Time: April 30 & May 1, 8:20 am - 3:30 pm
Venue: The University of Houston
Presenter: Jim Risko, CEM, PEM, MBA. Retired president of TLV Corporation.

Additional details of all of these events, including recordings and pdfs for the Water Forum and the Energy Forum, and the syllabus for the Steam System Workshop, are available in TIEEP's online archive.

TIEEP also co-presented two events with UH Energy:
The Gulf Coast Hydrogen Ecosystem: Opportunities and Solutions. Symposium, April 17. 2024, 9:00 am – 5:00 pm. Event details are available here.

Energy Careers and Leadership Webinar Series. Six (6) webinars, February 9 – March 29, 2024. Event details are available here.

Co-presented events provide additional material of interest and relevance to TIEEP stakeholders, through agreements with the event organizer.

From the Casebook: Why Do You Do That?

My jaw dropped and I broke into a cold sweat as I stared in shock and disbelief. When I finally regained the power speech I stammered to the young process engineer beside me, "Why do you do THAT!"

She looked a little startled, but then shrugged her shoulders and said, "That's the way we have always done it. It was built that way."

Reviewing process flow diagrams isn't usually such an exciting exercise, but this was an exception. The drawing showed a distillation column – one of the largest on a very big chemical complex – with a steam reboiler. It was impressive, but not particularly unusual. What astonished me was the air cooler on the feed stream (Figure 1). Why on earth…

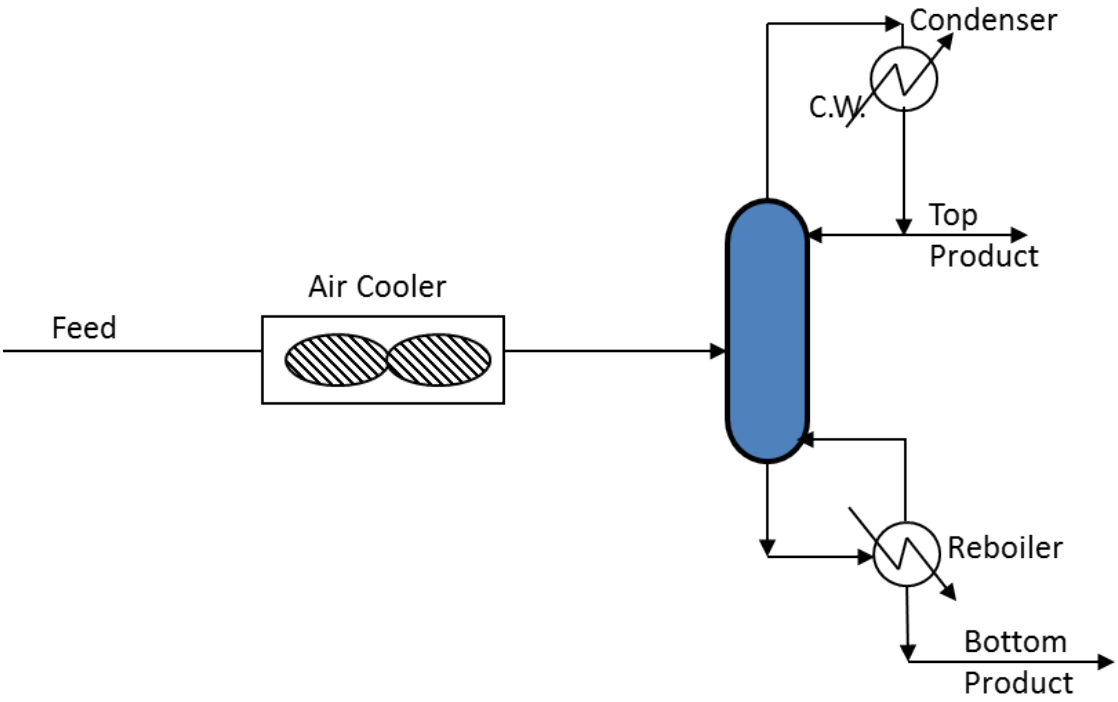


Figure 1: Distillation Column with Cooler on Feed Steam. Why on Earth…

Distillation is a separation process that uses heat to drive successive stages of vaporization and condensation. The heat for this process is supplied through the reboiler. However, if the feed entering the column is subcooled, which was true in this case, the reboiler must provide additional heat to raise the feed to its bubble point before it can start vaporizing. Cooling the feed stream ahead of the column increases the heat load of the reboiler, and this increases energy consumption unnecessarily.

After that mind-numbing lightbulb moment, I had several intense conversations with the managers and technical specialists on the site, trying to understand why the cooler was included in the design, and why it was running continuously. After much debate, the consensus was that the design basis included an abnormal

operating condition that would require the feed to be cooled on rare occasions. However, after the plant was commissioned, it became standard practice to run the fans continually. After all, the equipment was there; why not run it? So it ran, wasting energy for more than a decade, until we happened upon it in a PFD review.

The young process engineer ran simulations of the column, which confirmed and quantified the potential energy savings. After several weeks, we were able to persuade the unit manager to turn off the fan on the cooler. The steam demand for the reboiler promptly dropped by more than 30%, saving the plant $1,000,000/year without any investment.

Operating practices tend to become entrenched over time. Operators dutifully follow procedures that were developed when their plant was commissioned, even though throughput, feedstocks, product slates, and a host of other factors have changed. Also, they sometimes make changes because of short-term problems – for example, bypassing coolers during cold weather – and forget to revert when conditions change. As a result, many valves are closed when they should be open, or open when they should be closed; many pieces of equipment are in use when they should turned be off – or vice versa; and many process setpoints are chosen without proper consideration of their impact on energy utilization. I have encountered many of these scenarios over the years, and perhaps you have, too.

Improving process instrumentation, monitoring and control, together with real-time optimization and operator training, can eliminate many of these inefficiencies. However, we should always stay alert, and question design decisions and operating practices that adversely impact energy efficiency.

1. Rossiter, A. P., 'Back to the Basics', Hydrocarbon Engineering, Vol. 12, No. 9, pp. 69-73, September 2007
2. Alan Rossiter, "Why Continue to Do That?" Chemical Processing, Vol. 81, No. 2, p. 12, February 2019.

In Closing…

Thank you for taking the time to read along with us. We hope you found the information useful, and that you'll join us at our upcoming events.

If you would like to ensure that you receive all program updates and notices of upcoming events, please subscribe on our webpage. The subscribe button is at the bottom right-hand corner.

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UH Energy is an umbrella for efforts across the University of Houston system to position the university as a strategic partner to the energy industry by producing trained workforce, strategic and technical leadership, research and development for needed innovations and new technologies. That's why UH is The Energy University.