



How To Reduce Energy Costs

Seven Simple Steps May Save You Millions in Chromatographic Separation in Syrup Processing

The Challenge – Rising Energy Costs for Syrup Processing

After a period of relative stability in the 1990s, U.S. natural gas prices increased dramatically during the first few years of the new millennium (see Figure 1). U.S. coal prices have also risen quickly over the same period (see Figure 2). These increased energy costs are having a negative impact on the profitability of syrup processing operations, as energy use is the largest variable cost of chromatographic separation.

The only way to reduce this negative impact is to increase the efficiency of your plant. In fact, by running your plant more efficiently, you could capture big savings in energy costs – easily as much as **\$1 million per year** for an average size U.S. corn wet milling plant.

Figure 1. U.S. Natural Gas Prices

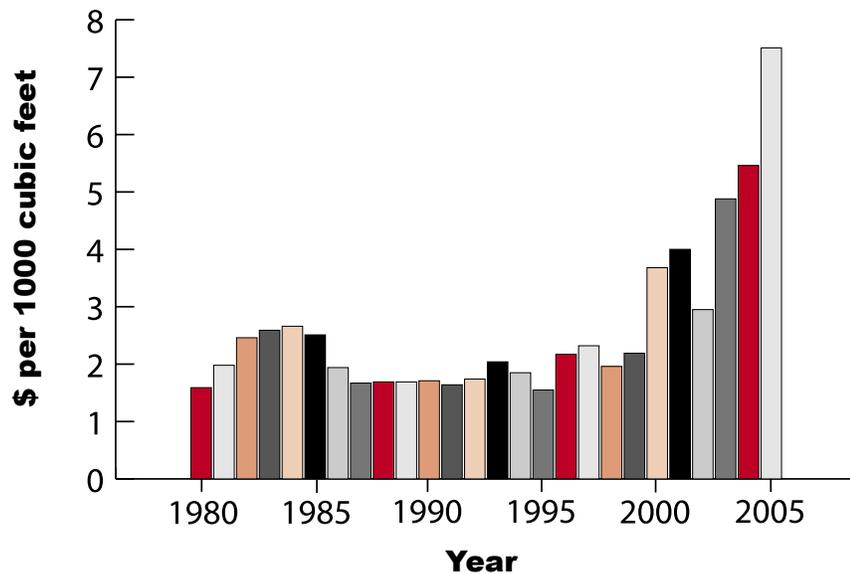


Figure 2. Food Industry Coal Prices

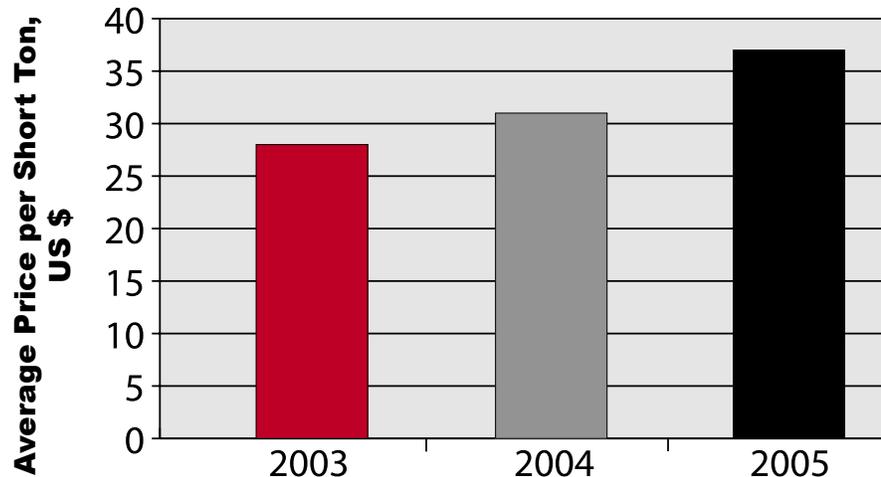
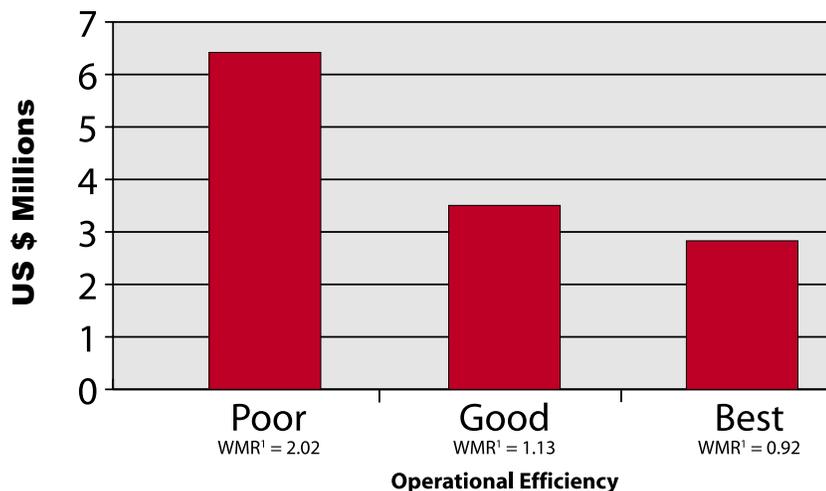


Figure 3. Annual Energy Costs for Evaporating Water



As Figure 3 shows, poor chromatographic separation process performance could be adding more than \$3 million per year to energy costs. Of course, most chromatographic separation systems in the U.S. do not operate at the “poor” end of the spectrum, however, very few perform at the “best” level either. Most systems fall somewhere in between, but even small increases in recovery and purity can yield very large economic savings in evaporation costs at most plants – easily adding up to millions of dollars over several years.

The Solution – Dow Experts Can Help You Optimize Your System’s Performance

Dow Offers Seven Steps for Optimizing Your System’s Performance

The major variable cost in operation of a chromatographic separation system is the cost of evaporating water. This can vary widely depending upon how efficiently your system is operating, as shown in Figure 3.

There are seven steps that you can take to optimize your system’s performance, and only Dow has both the expertise and the capabilities to help you with all of them.

1. Operating Parameters Optimization

A small imbalance in operating parameters can cause large performance deficiencies. Careful and proper tuning, including precise calibration of all flow meters and well-tuned flow control loops, can keep your plant’s performance at the optimum level. Dow offers this tuning service as part of our DIRECTORSM Services offering, which includes a variety of inspection, diagnostic and testing procedures.

2. Process Troubleshooting

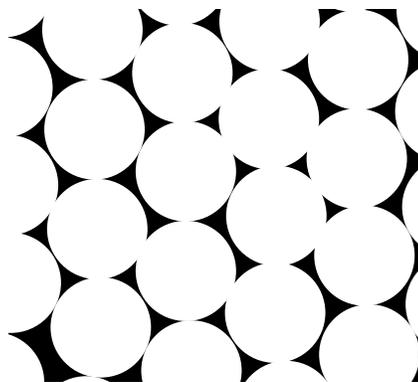
Dow experts have the knowledge and experience to help you troubleshoot your system and identify inefficiencies to deliver improved operating results.

¹Water Mass Ratio (WMR) is water that must be evaporated for chromatography; it is the mass of elution water per unit mass of HFCS-55.

3. Resin Replacement

Aging of the resin (typically due to oxidation) can reduce separation efficiency. If your system performance is not what it should be, it may be time to replace your resins. Dow offers a broad portfolio of chromatographic separation resin (see Table 1).

Table 1. Chromatographic Separation Resins From Dow



DOWEX™ MONOSPHERE™ UPS Resin

DOWEX™ MONOSPHERE™ 99 Ca/310 Chromatographic Separation Resin
DOWEX MONOSPHERE 99 Ca/320 Chromatographic Separation Resin
DOWEX MONOSPHERE 99 Ca/350 Chromatographic Separation Resin
DOWEX MONOSPHERE 99 K/310 Chromatographic Separation Resin
DOWEX MONOSPHERE 99 K/320 Chromatographic Separation Resin
DOWEX MONOSPHERE 99 K/350 Chromatographic Separation Resin
DOWEX MONOSPHERE N279 Ca Chromatographic Separation Resin
DOWEX N278 Cation Exchange Resin
DOWEX N279 Cation Exchange Resin

4. Resin Maintenance

Preservation of the resin's performance depends on keeping the pH in the proper range and minimizing iron and other metals. Dow offers training and advice to help you assure a regular resin maintenance program.

5. Resin Analysis and Recommendations

Resin analysis can help identify some causes of performance problems with your system. Dow offers a comprehensive range of tests through our DIRECTORSM Services offering.

6. Training

Training courses and operating recommendations are available for users of DOWEX™ chromatographic separation resins. Contact Dow for more information.

7. Benchmarking

A common problem in an inefficient operation is not knowing how much extra water is being evaporated, compared to what could be achieved. Benchmarking can help by establishing comparison ranges for water usage and productivity. See Table 2 for typical benchmarks.

Table 2. Benchmarks in Chromatographic Separation

Water Usage or WMR¹ Benchmark range: 0.9 – 2.0 Kg H ₂ O/Kg HFCS-55 (commercial weight)
Productivity Benchmark range: 90 – 300 lbs HFCS-55/ft ³ per day 1.4 – 4.8 MT HFCS-55/m ³ per day

By following all of the seven steps, you can optimize your system's performance, bringing your operational efficiency closer to that listed as "best" in Figure 3. If you're ready to see how much you could save, contact Dow today.

Backed by Decades of Separations Expertise

DOWEX™ and DOWEX™ MONOSPHERE™ resins are made by Dow, which has been an industry leader in separations technology since 1940. Dow provides a wide variety of services and resins designed specifically for corn wet milling applications. To find out more about how Dow expertise can improve your operation, please contact us.

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¹Water Mass Ratio (WMR) is water that must be evaporated for chromatography; it is the mass of elution water per unit mass of HFCS-55.

DOWEX™ Resins

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