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# Around the Columns

## Brainpower to biofuels

Maetee Patana-Anake, BS '06, ME '09, uses mathematical models to help the MU Power Plant make biofuel decisions. Photo by Nicholas Benner

For decades, the MU Power Plant has been a remarkably efficient operation. Despite Mizzou's 33 percent growth in education and general space since 1990, energy use has shrunk by 14 percent per square foot. That's partly due to the facility's combined heat and power system that captures more energy from fuel to produce utilities at MU.

With a biomass boiler scheduled to go online this fall, Mizzou is now taking advantage of another resource: student brainpower.

Maetee Patana-Anake, a biological engineering doctoral student from Bangkok, Thailand, is helping to streamline the process by using mathematical models that determine the best biofuels. With Missouri's array of choices — wood residues, corn stover, switchgrass and miscanthus — lots of variables come into play. When also considering processing, storage costs, transportation and thermal output, matters get complicated quickly. The mathematical model employs a computer program that links several equations.

"When you have 15 to 20 lines of equations, it's not solvable by a human anymore," Patana-Anake says. "But you need a human brain to translate the real-world problem into an equation."

His brain came to the plant through biological engineering department chair Jinglu Tan and a paid internship that also provides college credit. Patana-Anake's research has helped the plant

in its decision to purchase wood byproducts from nearby Foster Brothers Wood Products in Auxvasse, Mo. But if the market shifts, his model is adaptable.

“We wanted a biomass boiler system that gave us flexibility because, while wood products are the most plentiful and lowest cost biofuel right now, that may change over time,” says Gregg Coffin, MU Power Plant superintendent.

Some fuels, such as switchgrass, require a densification process that can hike costs. Storage time also influences the decay of biofuel, so Patana-Anake’s models must hit multiple moving targets.

The internship gives him real-world experience, and the model gives the power plant real-world solutions.

“It models the fuel delivery system from the field all the way to our facility,” Coffin says. “If the model says something doesn’t make sense, we shouldn’t be investing a lot of resources exploring it further. It should narrow our options and help us make decisions.”

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