

From silos to systems: Texas A&M study finds \$91 million opportunity in petrochemical corridor

By Mike Bacidore

Petrochemical plants have spent decades optimizing operations inside their own fence lines. Fedor Mikheev, a researcher with the Texas A&M University Energy Institute, believes the next major opportunity may lie on the other side of those fences.

During YNOW2026, A Yokogawa Users Conference & Exhibition, Mikheev presented research examining what could happen if large petrochemical facilities coordinated their energy flexibility across the Baytown-La Porte corridor near Houston. The Yokogawa-sponsored research identified 176 MW of flexible power and an estimated \$91 million in annual electricity savings among 12 major plants—without requiring construction of new assets.

“We’re very good at optimizing the fence line,” Mikheev told conference attendees. “We have never optimized across the fence line.”

The concept is not entirely theoretical. At the Port of Rotterdam, two grid operators and six petrochemical companies spent 10 months coordinating utility flows across their fence lines on paper. Published pre-feasibility work estimated potential savings of up to 5% of cluster energy costs, with additional opportunities possible if business models changed. Mikheev asked whether something similar could work in Texas without Europe’s regulatory framework.

His study focused on 12 of the largest facilities among roughly 130

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petrochemical plants along the Houston Ship Channel. Using publicly available federal facility-level emissions data, Mikheev calculated a combined 28 million metric tons of CO₂-equivalent emissions annually.

More important for coordination, however, is how concentrated the corridor is among a relatively small number of operators. That concentration could make forming a coalition considerably

easier than getting every plant in the region to participate.

The underlying opportunity comes from what Mikheev described as “latent flexible load,” which is industrial-electricity consumption capable of responding to grid conditions but not currently registered or monetized as such.

For individual plants, that flexibility may already exist in operating

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procedures, equipment and production schedules. The problem is that companies generally evaluate and manage it independently.

“The value here isn’t created; it’s discoverable,” Mikheev said. The first stage of coordination would not require companies to install batteries, generation or other major infrastructure. Instead, plants would identify flexibility they already possess and determine whether one facility’s ability to adjust consumption could complement another’s requirements.

Mikheev estimated cross-fence electricity coordination could capture \$91 million annually while providing 176 MW of dispatchable flexibility. Electricity represents only one of five utility streams considered in the broader research. Adding potential coordination of steam, hydrogen, carbon dioxide and industrial gases produces a preliminary opportunity of \$180 million to \$450 million annually, although Mikheev emphasized that this larger figure is a scoping range, not a modeled result.

The opportunity is becoming more important as Texas faces rapid growth in electricity demand, particularly from data centers. Mikheev cited 77.9 GW of requested new data-center load statewide by 2030, although ERCOT discounts that figure substantially in its adjusted forecast because there is little historical precedent for growth on that scale.

New industrial and data-center loads cannot necessarily move their electricity

consumption when the grid needs relief, but the existing petrochemical facilities potentially can. Coordination therefore offers benefits beyond lower energy costs. Mikheev identified four:

- Efficiency for participating industrial operators
- Reliability and dispatchable capacity for the grid
- Greater resilience during events such as hurricanes
- Emissions reductions that can result from more efficient dispatch.

If the opportunity is so large, why hasn’t it happened already? Mikheev compared Houston with the European model across physical and institutional dimensions. The biggest deficiencies were not plant capabilities or infrastructure, but governance, data sharing and regulation.

“This is not an engineering problem,” he said. “Institutions can be designed.”

His proposed first step is surprisingly simple. Plants would keep their existing power agreements but establish a settlement ledger, an agreed price reference and monthly netting among participating neighbors. Nothing would initially need to be filed or registered with a regulator. The European trial followed essentially that approach for 10 months.

Only in a second phase would the corridor potentially enter the electricity market as a single coordinated resource, using pooled purchasing, a portfolio

baseline and coordinated load ramps. Regulatory involvement becomes necessary at that point.

Mikheev also sees implications far beyond Houston. Large-load interconnection and grid reliability are emerging as issues throughout organized U.S. electricity markets, while Texas already has rulemaking underway following passage of Senate Bill 6, which addresses how Texas plans for, connects, and manages very large electricity users.

For plant operators, Mikheev recommended three actions:

- Calculate the flexibility within their own facilities using publicly available data.
- Identify neighboring operators that could become the seed of a coalition.
- Begin with Phase 1 and determine how a settlement ledger could work before worrying about a more complicated market structure.

“The flexibility is already yours,” Mikheev said. “The value was discovered. The price still has to be built.”

For an industry accustomed to solving problems with new equipment and increasingly sophisticated automation, Mikheev’s argument turns the challenge around. The next major optimization opportunity may not require another asset inside the fence. It may require a new way of working with the plant next door. ∞

