



## ENERGY QUEENSLAND: USING DATA TO GO WITH THE FLOW

*Energy Queensland has been in business for more than a hundred years. In a century of delivering electrical power to a northeastern Australian territory two and a half times the size of Texas, the company has risen to every challenge of its harsh rural terrain. But lately, advances in renewable energy have begun to test Energy Queensland's capacity like never before. As solar power becomes cheaper and more feasible, large solar farms are emerging in the company's territory, seeking to feed electricity back into a grid designed for the one-way flow of power. At the same time, grid-independent home solar is becoming cost-competitive with electrical rates, putting downward pressure on the utility's operating costs.*

*A new energy market is demanding a new approach to managing power. Making the most efficient use of the grid's full capacity requires intelligent and dynamic data analysis. Energy Queensland is now using the PI System™ to bring together real-time data on grid infrastructure, weather, and geographic features and to create dynamic ratings for lines in the network, which engineers can use to manage power flows more economically.*

### UNDER PRESSURE

Fluctuating weather conditions affect how much power a section of the electrical grid can carry. "The network is extremely affected by the environment it's in," said Tim Lewsey, Senior Engineer at Energy Queensland, during PI World San Francisco 2019.

As current flows through a conductor, it generates heat, which causes the conductor to expand. Power lines sag as they heat up; if stretched too far, they can come into contact with buildings or become deformed. Cooler weather and wind help offset this expansion,

while hot weather accelerates it—a "double whammy" for Queensland on hot summer days, when power demand spikes because of air conditioning.

To keep power lines from overheating, Energy Queensland uses ratings for different sections of the grid as an upper limit on how much power each section can carry. That approach works, but in an ever-changing environment, a static rating means that there is unused potential capacity for power flow. With the network now being taxed more heavily by two-way power flows, it was becoming more and more critical to tap into that unused capacity.

### CHALLENGE

New market competition and need to provide two-way power flows in a system designed for one-way power flow.

### SOLUTION

Use dynamic ratings based on real-time data to take full advantage of any unused network capacity.

### BENEFIT

Demonstrated potential asset utilization improvements of over 20%.

## Bringing it All Together: Esri ArcGIS

Integration of the PI System with Esri ArcGIS reveals the dynamic load on a segment of power line in real time. Segments that are more parallel to the direction of the wind retain more heat and have less excess power-carrying capacity than more perpendicular segments.



Using [Asset Framework](#) (AF), a contextualization layer of the PI Server, Energy Queensland built a virtual model of its assets in the field. AF allowed engineers to combine technical information about each feeder line in the network with an array of real-time weather, geographic, and environmental data, creating a dynamic rating for each piece of the network. [PI Integrator for Esri ArcGIS](#) ensured that GIS data was integrated seamlessly with other asset data, and could be used to create real-time maps of dynamic ratings.

During times of high environmental stress on the system, the dynamic, real-time rating of a line is close to the old static rating. But depending on weather conditions, it can be much higher: in some scenarios, more than 40 percent higher. The difference between the two is a business opportunity Energy Queensland can capitalize on.

### FROM DATA TO INFORMATION

Before signing an Enterprise Agreement (EA) with OSIsoft, Energy Queensland's main access to data on assets in the field was through SCADA systems. The company was generating plenty of data, but engineers struggled to turn it into actionable insights.

"Data does not equal information," Lewsey said. "We wanted the platform to be able to produce information."

Today, Energy Queensland engineers use PI Vision to develop intuitive, easy-to-use custom dashboards and monitoring displays tailored to the specific needs of different system users.

The rural nature of Energy Queensland's territory means that one of the company's biggest challenges is keeping an eye on their extremely remote assets in real time.

With so much territory to cover, it's important to Energy Queensland to be able to rely on the accuracy of its data. To test the accuracy of their new dynamic rating system, Energy Queensland's engineers installed sensors in several sections of the network and compared the actual temperature of the lines under different conditions to the ratings generated by the new data-driven model. What they found gave them confidence in their new system.

"We don't need to deploy temperature sensors to every section on the network, if we're getting results like this," Lewsey said.

The system has already been deployed to 30 feeder lines, and demonstrated potential asset utilization improvements of more than 20 percent.

*For more information about Energy Queensland and the PI System, watch the full presentation [here](#).*

### PARTNERS:

Dimension Software  
and Esri



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— Tim Lewsey,  
Senior Engineer,  
Energy Queensland

Lewsey, Tim. "Bringing It All Together: Real Time Capacity Monitoring (Energy Queensland)"  
<<https://www.osisoft.com/Presentations/Bringing-It-All-Together--Real-Time-Capacity-Monitoring--Energy-Queenslandx/>>