TEXAS
The University of Texas at Austin

POWER OUTAGE NOTIFICATION AND RESPONSE SYSTEM

A SOLUTION DID NOT EXIST, SO WE BUILT ONE.

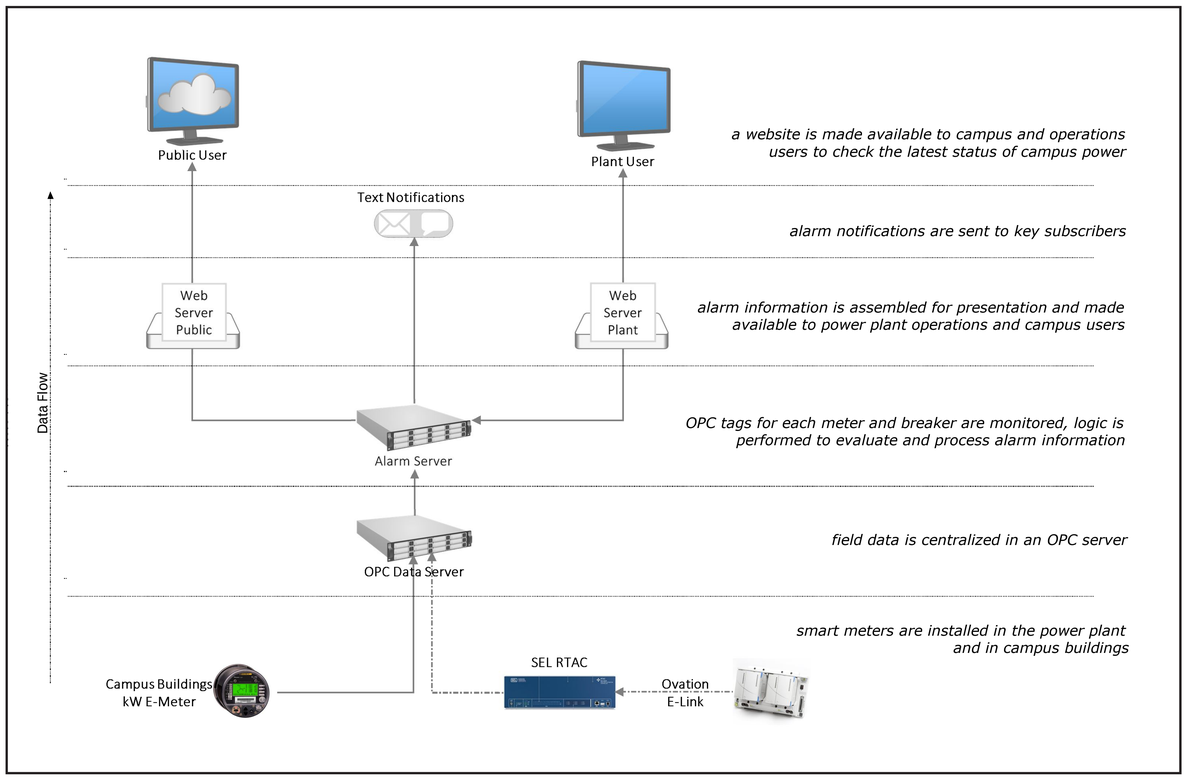
In the rare event of electrical outage - historically only four campus-wide events in the last forty years at UT Austin – our nearly 100,00 users are directly impacted with countless research outcomes at risk. Notifying stakeholders instantly is the most reliable way of ensuring effects of electrical outages are minimized.

After determining a market solution to this problem did not exist, UT Austin addressed this need by developing in-house software that directly couples SCADA breaker outputs with the existing metering infrastructure.

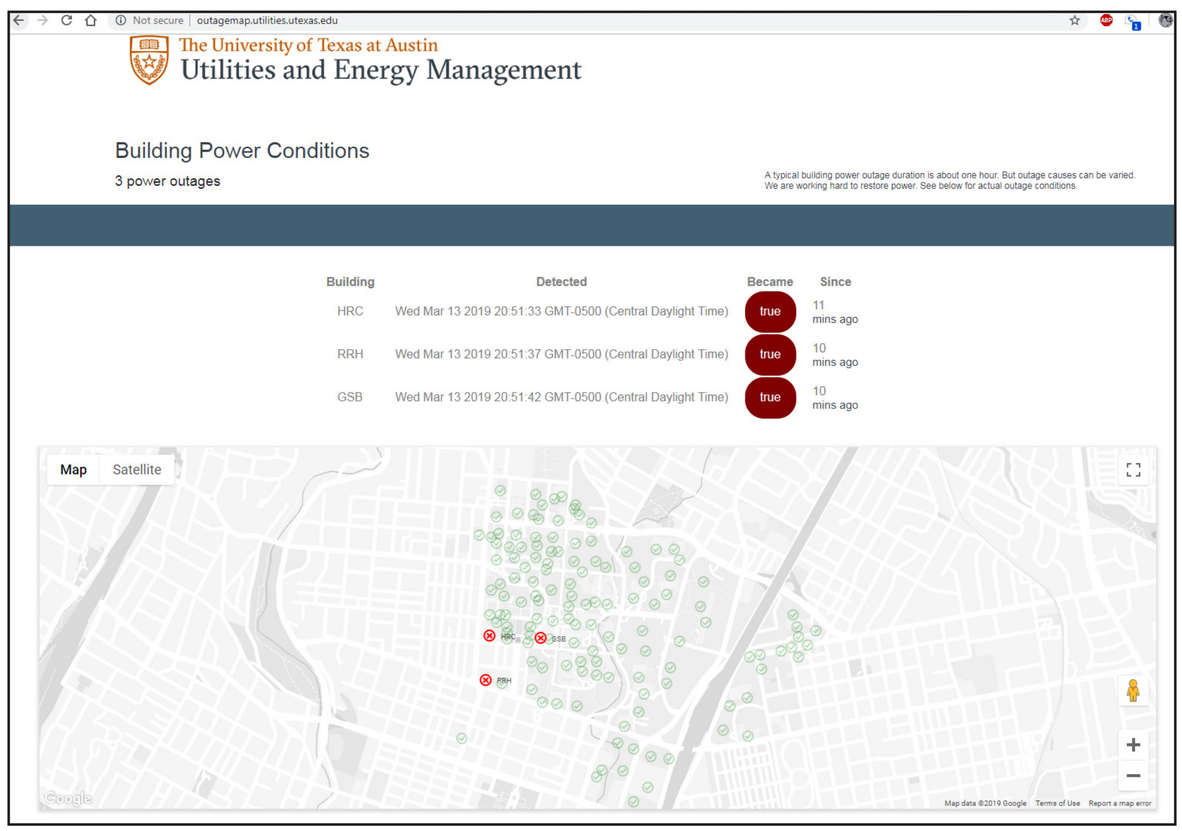
This logic provides both instantaneous and error-proof notification not only to campus users, but also to critical response personnel stationed on-campus 24/7/365.

From there, operators and other key personnel follow a detailed process flow chart to ensure the outage notification is carried out as planned and campus users are notified quickly. In addition, a web-based interactive outage map is available to on-campus viewers and updated in real-time.

Robust IT architecture is key to the success of the outage notification and response system.



Real-time Web-based Outage Map



Utilities and Energy Management's solution is highly unique in its abilities to self-diagnose false alarms and do so in real time in an isolated, secure data environment. Its robust internal/external user interfaces and notification deployment protocol ensure several key aspects not available to other systems:

- Outage alarm is conveyed instantly to an internal Operations control room manned 24/7/365.
- Alarm-generating software is proprietary and ensures false alarms are not possible.
- Operations staff has instant and direct lines of communication, i.e., "red phone" access to key university stakeholders.
- Operations staff is able to instantly deploy response crews, also staffed on-site 24/7.
- Detailed response plan ensures the campus community is notified via central UTPD.

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THERMAL ENERGY STORAGE DISPATCH OPTIMIZATION

TWO TES TANKS EQUALS ONE RESILIENT UTILITES SYSTEM.

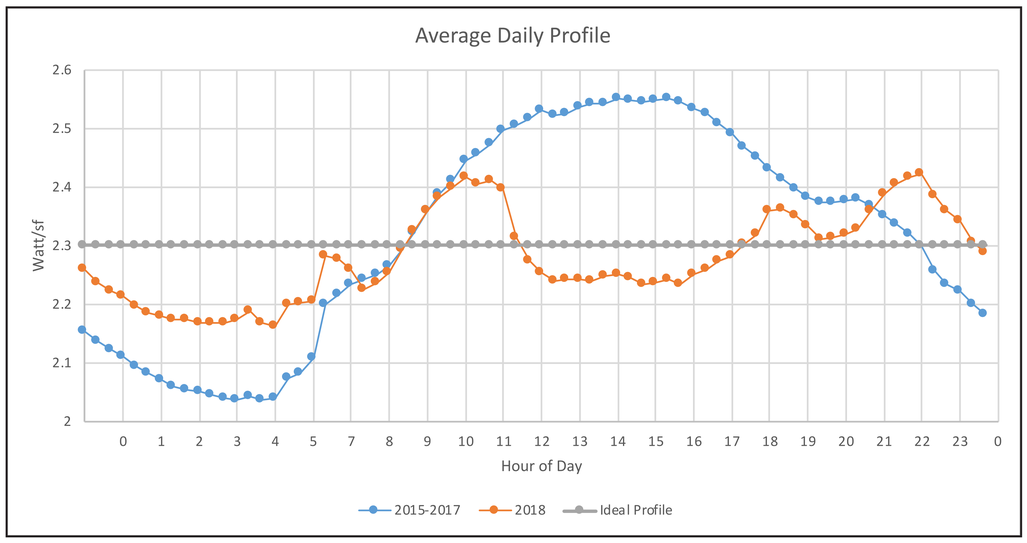
Thermal Energy Storage (TES) is the latest hallmark of any optimized district cooling system, especially those located in cooling-dominated climates. UT Austin operates not one, but two TES tanks, each sited at hydraulically diverse locations and different elevations, with a total capacity of nearly 10 million gallons.

TES technologies are especially critical for research institutions served entirely by on-site power generation, such is the case at UT Austin. The load-levelling also enabled by TES represents an order of magnitude cost savings when compared against added generation capacity. Last, the new Dell-Seton Medical Center at UT Austin requires especially resilient utilities given the critical nature of healthcare. TES tremendously enhances that resiliency.

UT Austin's clever PID controls algorithms, married with a dedicated, master-planned IT architecture, combines both chiller power consumption and generation data from spinning generation reserves, along with the campus chilled water requirements and chilled water production from buildings, chillers and TES resources. This architecture is protected on secure, isolated networks, and in the future will feature real-time predictive regression modeling.

Compared to the average of three years prior to the implementation of TES-2 in 2018, UT Austin's electrical load pattern approximates the typical sinusoidal pattern of most grids. Normalized for both weather and building square footage added over the years, the new dispatch strategy has proven extremely effective in flattening these daily loads to within an incredible 10% bandwidth.

Addition of TES-2 with Improved Dispatch Controls Strategy Flattens UT Austin's electrical load profile within a 10% bandwidth.



With effective TES dispatch, tanks are charged at night when chillers are more efficient and variable speed machines are available. Further, the efficiency benefits of operating two independent thus redundant CTG/STG pairs, each optimized by capacity to provide the most efficient seasonal operation, are realized. Peak shaving via TES dispatch extends the running season of the most efficient turbine pair by nearly two months. The resulting normalized energy use highlights the 6% reduction in campus fuel gas purchased since optimized TES dispatch began, an astounding achievement with nearly 2 million square feet of research and medical space also added over this period.

Normalized space energy use over similar occupancy and weather conditions highlight the reduction in fuel gas consumption.