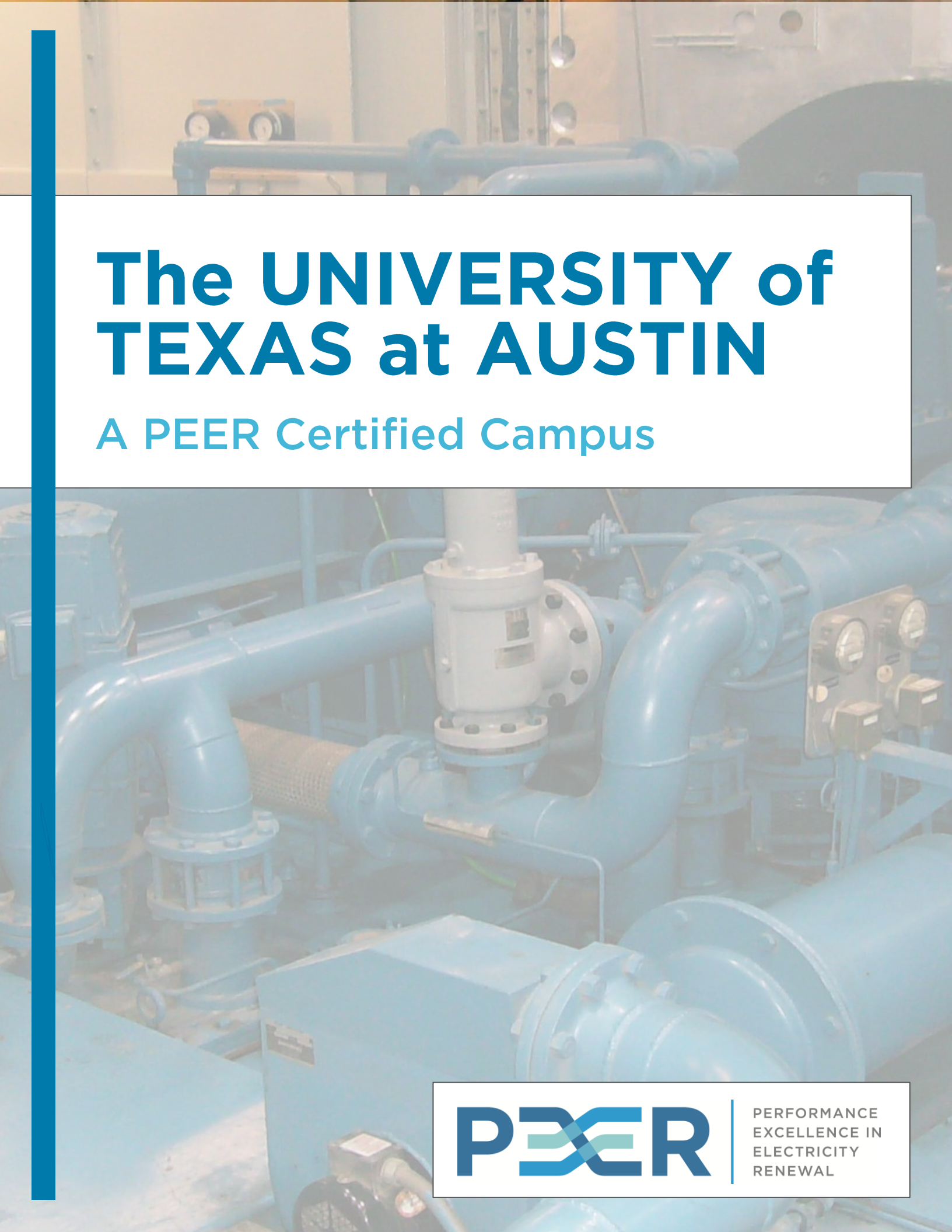


The UNIVERSITY of TEXAS at AUSTIN

A PEER Certified Campus

PERFORMANCE EXCELLENCE IN ELECTRICITY RENEWAL

In 2014, the University of Texas at Austin became the first PEER certified campus in the world.

UT Austin has a longstanding reputation for innovation when it comes to energy efficiency and reliability. This reputation was independently validated when UT Austin successfully completed the rigorous PEER review process, demonstrating its dedication to sustainable power and continuous improvement.

A History of Innovation

Since 1929, UT Austin has generated 100% of its own electric power and thermal energy. From 1976 to 2013, the campus nearly doubled in size from 9 million to 17 million square feet. To support that growth, the energy produced by UT Austin's district energy system also doubled from 184 million kWh to 372 million kWh.

Despite this incredible growth in demand, however, UT Austin managed to keep fuel consumption flat by increasing annual energy production efficiency by 30%; the campus uses the same amount of fuel today as it did in 1976, essentially achieving carbon-neutral growth.

Over the last decade, UT Austin has continuously reinvested back into its system, using money from energy savings and reduced fuel costs to pay for nearly $150 million in energy efficiency and capacity upgrades.

Verified Performance

PEER is a certification program that measures and improves power system performance and electricity delivery systems. The PEER rating system includes four credit categories:

- Reliability and Resiliency
- Energy Efficiency and Environment
- Operational Effectiveness
- Customer Contribution

Out of a possible 400 points, UT Austin earned 304, comfortably above the 260 point minimum required for certification under Version 1 of the PEER rating system. Additionally, UT Austin met all prerequisites, including having a communications backbone, advanced metering infrastructure, emergency response plan, and improvement plan.

PEER Certification
for Campus Projects

Certified 21 October 2014

Total Points Achieved*	**304**
Reliability and Resiliency	**90**
Energy Efficiency and Environment	**76**
Operational Effectiveness	**63**
Customer Contribution	**75**
Total Possible Points*	**400**

* Including core and bonus criteria
* At least 260 points required for certification

RELIABILITY

UT Austin is served by Austin Energy, one of the more reliable utilities in the country. Nonetheless, the UT Austin microgrid, which includes chilled water storage, is able to independently ensure reliable power to its buildings with an exceptional degree of self-sufficiency and control.

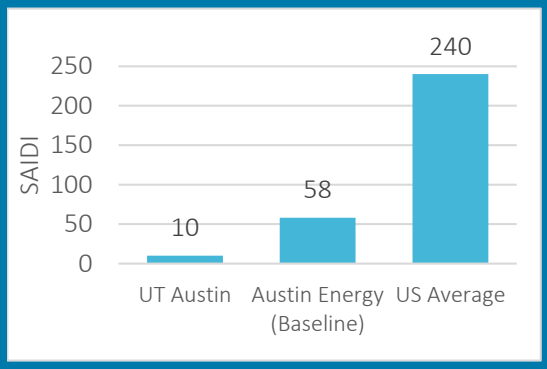
UT Austin's islanding capabilities can keep the campus's lights on if the surrounding area were to experience a widespread outage. Additionally, the campus's excess generation capacity and rapid load shedding capability ensure power to UT Austin's critical facilities should one of the campus's own primary generators go offline.

In terms of performance metrics, UT Austin has an Average Service Availability Index (ASAI) of 99.998% compared to Austin Energy's ASAI of 99.989%, itself far better than the US average of 99.955%. These values translate to System Average Interruption Duration Index (SAIDI) values of 10, 58, 240 outage minutes per year, respectively. UT Austin's System Average Interruption Frequency Index (SAIFI), 0.11, also compares very favorably to the US average, 1.5 events/year. (See sidebar *Key Performance Metrics: Reliability*)

Key Performance Metrics: Reliability

Average Service Availability Index (ASAI) is a measure of the amount of time that a customer has power over the course of a year. An ASAI of "four-nines", or 99.99% reliability, translates to a SAIDI of 52 outage minutes per year.

System Average Interruption Duration Index (SAIDI) is a measure of the amount of time (minutes) that the average customer is without power over the course of a year.



System Average Interruption Frequency Index (SAIFI) is a measure of the number of times that the average customer experiences an outage over the course of a year.

For PEER, these metrics include all outages longer than 5 minutes, including those caused by major events.

POWER QUALITY

Variable speed drives (VSDs) can be significant contributors to poor power quality, which can negatively impact reliability and performance and cause damage to the sensitive equipment found in laboratories and research facilities. To ensure the quality of the power that it is providing, UT Austin has specified that harmonic filters be used on a substantial portion of its VSDs. To further improve the life and performance of equipment, UT Austin also controls the power factor at its main substation buses.

CAMPUS-WIDE EFFICIENCY

UT Austin's combined heat and power system uses gas turbines with heat recovery steam generators and boilers to supply the campus's heating, cooling and electric needs. This system enables maximum heat recovery while minimizing fuel consumption; energy that might typically go to waste is instead used to heat buildings on campus.

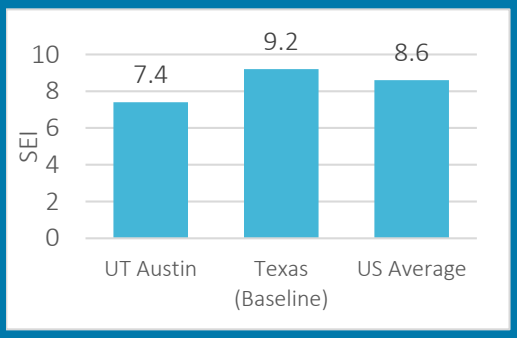
The campus's district energy system eliminates the need for separate equipment at each building and enables the use of larger, more efficient equipment. At UT Austin, the chillers consume 0.7 kW/ton, well below the 1 kW/ton rate typical of campus-scale systems.

Furthermore, with the support of storage for any excess generation, UT Austin is able to continuously run its chiller at its maximum efficiency point. This results in an overall System Energy Efficiency (SEE) of 87%. Because it runs on natural gas, UT Austin has an electricity Source Energy Intensity (SEI) of 7.4 MMBtu/MWh delivered – compared to a state baseline of 9.2 – and significantly lower CO_2 and SO_2 emission rates. (See sidebar *Key Performance Metrics: Energy*)

UT Austin also provides real time energy use data to its building occupants. The ability of occupants to see their consumption data lets them monitor and better understand their usage, and ultimately reduce demand.

Key Performance Metrics: Energy

Source Energy Intensity (SEI) is a measure of how much non-renewable energy (MMBtu) is required to deliver one unit of electricity (MWh). A lower SEI indicates more efficient conversion from fuel to electricity. For PEER, this metric accounts for transmission and distribution losses and thermal heat recovery.



System Energy Efficiency (SEE) is a measure of how much fuel energy (%) goes to serving the customer's energy needs for the overall energy system. A higher SEE indicates more efficient conversion from fuel to energy.

PEER: Enabling Continuous Improvement

As part of the PEER certification process, UT Austin underwent a rigorous analysis of the value achieved by the microgrid. This analysis quantified savings from reduced electricity and energy costs, distribution costs, and demand charges. Savings from improved operational efficiencies, reliability, and power quality were also considered. Additionally, UT Austin's processes for safety review of changes, risk mitigation, failure trending and analysis, and waste identification and elimination were reviewed against best practices.

UT Austin's PEER application identified possible sources for additional revenue, costs that could be avoided in the future, and estimates of the unrealized value of potential improvements. A list of opportunities for sustained improvement was also developed as part of the PEER process. Together, these strategies have the potential to help UT Austin further add value to their microgrid, raise awareness of their accomplishments to date, and serve as the basis for an improvement plan.

UT Austin's campus microgrid provides both hard and soft value to the university. PEER certification validates UT Austin's accomplishments, sets a benchmark for other campus facilities, and demonstrates UT Austin's commitment to sustainable power systems and continuous improvement.