

DEREGULATION PROVIDES INCENTIVE TO CONSERVE

New Meters at LCRA Offer a Closer Look at Facility Costs

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ABSTRACT:

Prior to Texas' electric utility deregulation, the Lower Colorado River Authority's (LCRA's) facilities and plant station service energy use was considered a cost of business — power consumed and never sold. Preparation for competition under Senate Bill 7 meant meters had to be placed at all of LCRA's generation facilities; electric bills followed for the first time in 2001. Plant managers now must include the metered cost for station service in their operating budgets. This change provided an important incentive to conserve. Senate Bill 5 set goals to reduce energy use by political entities such as LCRA. LCRA's in-house energy auditor had previously performed energy audits for LCRA's wholesale customers whose retail customers needed help to improve energy efficiency. LCRA energy services developed experience in contracting to install interval data recorder meters for its customers. Now this department is helping facility managers monitor their own energy use as they begin paying bills for the first time. Impacts of metering; case studies of plant and administrative facilities that requested audits; and implementation of recommended measures follow.

INTRODUCTION

Recent legislation impacting utilities in Texas related to Electric Restructuring and Emissions Reduction caused the Lower Colorado River Authority (LCRA) to take a fresh look at how it uses energy in its own facilities. Energy efficiency in building operations and metering go hand in hand. New electric metering spurred by legislative requirements along with subsequent energy audits provided information that gave the utility more incentive to invest in energy conservation measures in its plants and administrative buildings.

This paper will discuss how, without an energy bill at certain LCRA facilities, it was difficult to justify energy efficiency improvements at the LCRA.

In its role as an environmental steward, LCRA has always met or exceeded pollution prevention requirements for generation.

However, without meters in place, it was impossible to know whether facility operations were energy efficient. Energy use in LCRA facilities was considered merely a cost of doing business. The parasitic loads at plants were regarded as power LCRA could not sell, but that has changed.

First, a little background on the company's mission and purpose. The Colorado River LCRA manages is not the famous one whose Hoover Dam powers Las Vegas, Nevada. Texas' Colorado River begins in eastern New Mexico and flows southeast to the Gulf of Mexico at Matagorda Bay.

The Texas Legislature created the Lower Colorado River Authority by an act signed into law by Governor Miriam A. "Ma" Ferguson in 1934. A conservation and reclamation district operating with no taxing authority, LCRA's mission is to provide reliable, low-cost utility and public services in partnership with its customers and communities. LCRA is to use its leadership role and environmental authority to ensure the protection and constructive use of the area's natural resources.

Clearly, electric power production implies use of the area's natural resources. LCRA's mission statement also implies it must reduce the environmental impacts of that power production. Providing those utility services at a low cost implies a third critical challenge.

LCRA generates electricity at a coal-fired power plant (three units at Fayette Power Project in Fayette County), two natural gas-fired plants (Thomas C. Ferguson at Marble Falls, Sim Gideon at Bastrop), and one combined-cycle gas-fired plant (Lost Pines 1 at Bastrop). LCRA also generates hydroelectric power at its dams — Buchanan, Inks, Wirtz, Starcke, Mansfield and Tom Miller — and purchases wind power from three West Texas wind projects — Texas Wind Power Project and Delaware Mountain Wind Farm in Culberson County, and Indian Mesa Wind Farm in Pecos County.

LCRA and its customer base, eight rural electric cooperatives and 33 municipal utilities, are public entities not subject to the competitive

retail electric market in Texas. The elected governing boards of cooperatives and municipalities may vote to join the competitive market (referred to as “opting in”). One of LCRA’s customers has “opted in.” Cap Rock Energy, whose McCulloch Division buys power wholesale from LCRA, entered the market in the summer of 2003. De-regulation, however, has forced LCRA to prepare for a changed market.

Two laws related to electric utilities, Senate Bill 7 and Senate Bill 5 in Texas have impacted facilities operations at LCRA. They required new metering at LCRA’s power plants and spurred a fresh look at energy efficiency measures for administrative and office buildings. Unbundling meant that generation and transmission services were separated by law. It increased separation between different services within the company, and yet required them to work together to meet the new rules.

When LCRA facilities and plant managers struggled with how to meet the legislative requirements, Energy Services Department staff shared their expertise for metering and energy efficiency to help them out.

Lack of appropriate metering and no billing had created an atmosphere at LCRA that “electricity was too cheap to meter.” LCRA plant and building managers have faced a special obstacle in trying to improve building efficiency. Since its inception, LCRA has operated closely in energy and water businesses with its neighbor, the City of Austin, whose public utility is Austin Energy (AE). The two utilities share ownership of the production from two generators at Fayette Power Project (FPP). For years, LCRA and Austin have made formal and casual agreements about power and water exchanges that have meant they net the dollar value of water and energy monthly instead of sending each other bills for discrete services or purchases. A result is that the electricity AE delivers to LCRA’s central office complex gets mixed in with the monthly netting calculations. With no bill, the facility managers have had difficulty justifying investments in improving energy efficiency.

LCRA plant managers received bills for station service for the first time in 2001. LCRA began receiving bills for the main service and operations centers in Austin, Texas, for the first time in April of 2003. LCRA’s General Office Complex in Austin, Texas still does not receive

an electrical bill. No date has been set for that to occur (due to factors explained in the previous paragraph).

IMPACT OF DEREGULATION

Who says you can’t legislate efficiency?

On January 1, 2002, the retail electric market in Texas was deregulated for all customers of investor-owned utilities. This means many consumers have a choice as to where their electric power comes from. However, public utilities such as co-ops and city-owned electric systems can decide whether to opt-in to competition. Each system will continue to evaluate the market and decide at the local level, based on the interests of its consumers. As LCRA prepares for the eventuality that its customers will opt into a deregulated market, LCRA’s concern in Wholesale Power Services has been to reduce the business costs of electric generation. The plant power bills are charged against operation and maintenance and therefore raise power costs.

Before deregulation, power plants received no billing for station service. Deregulation for electric utilities under Senate Bill 7 required unbundling, metering, preparation for competition¹. Before that a meter register was located some place at every plant. Operators would read and record hourly generation and consumption, rounding to megawatts.

New Metering Required.

The Texas Electric Grid was previously organized in 10 Control Areas. Now it has been consolidated into one, through the Electric Reliability Council of Texas (ERCOT). ERCOT wanted to be able to read all generation produced in the state at 15-minute intervals.

In January of 2001 LCRA began installing ERCOT Polled Settlement (EPS) meters. A year before the market opened, LCRA and the other electric generators in Texas scrambled to install the ERCOT-mandated metering on plants and plant services. The idea is simple: ERCOT collects data from all generators, receives data for all major users and profiles the minor ones. From the sum of energy produced, ERCOT subtracts the sum of measured and estimated energy used and arrives at a net called “Unaccounted For Energy,” UFE. It apportions the cost of UFE among the participants.

In practice, setting up the system was complex. Meters on plants – all generators a megawatt or larger – had to meet ERCOT specifications. Meter technicians who installed and check those meters (ERCOT-pollled settlement meters or “EPS meters”) had to complete special training. And the current transformers collecting the pulses for EPS meters on plants had to have the sensitivity to record megawatts or amperes.



Figure 1. LCRA Transmission Construction crew installing an optical current transformer on overhead 138KV lines at a Sim Gideon Generator.

Once advanced metering² was established with an optical Current Transformer (CT) reader on every line on each generator and each auxiliary transformer, a highly accurate current measurement was derived, and could be read remotely. Metering at the Fayette Power Project (FPP) in La Grange, LCRA’s three-unit coal-fired plant shared with Austin Energy, was the most complicated with 14 meters wired to panels in the control house. They are now read by ERCOT and LCRA.

It required that LCRA’s transmission group design and install full metering service for each measured point. Briefly, the work required the construction of stands to support the large current transformers, install new metering panels for plant meters in substation control houses, connect the CTs to the meter panels, and establish telecommunications with the meters.

With every generator in ERCOT needing the same kinds of meters and CTs on the same deadline, planning, ordering, and installing was frantic.

LCRA Energy Services’ Tom Knutsen then became involved because of the need to help the LCRA’s customers turn power plants into customers. The idea of billing power plants was so new LCRA’s customers had to design a rate for it. The model for rate design was the Hays Energy-Power Plant Rate—Wholesale Power Bill plus \$1000. Fayette Electric Co-op didn’t have a rate for LCRA until February, 2002.

The impact of metering was fourfold: (1) loads were identified; (2) costs were identified. (3) LCRA’s role changed toward its customers as they now required help with billing LCRA. (4) Finally, it became more difficult for LCRA Wholesale Power to ignore the cost of station service.

Reduction in Facility Energy Use Required

Senate Bill 5 (SB 5) was passed by the 77th Texas Legislature. It went into effect in September of 2001. It required affected political subdivisions to do three things:

1. Undertake all cost-effective energy efficiency projects on existing facilities that will result in a reduction in the use of electricity.
2. Adopt a goal to reduce their electric consumption by 5% a year for five years beginning in 2002; and
3. Annually report to State Energy Conservation Office on their results and the progress of their efforts.

The legislation did not define clearly what a “facility” was or whether it would affect plant operations as well as administrative buildings. When it passed, LCRA was unclear whether it had to report all electrical energy usage at every facility.³ LCRA had just begun to install meters at its plant facilities. Most LCRA facilities are metered as a primary load tariff. There had been no previous attempt by LCRA to track consumption by facility; therefore, there was no baseline from which to begin. And if the requirement to report applied only to the “non-plant” energy use, LCRA could not break out the consumption of those particular facilities. No sub-metering was in place to measure LCRA’s energy consumption by individual buildings.

IMPACT OF ENERGY AUDITS FOR LCRA FACILITIES

An indirect consequence of the legislation contained in Senate Bill 7 made metering an important tool for LCRA to gain control of its energy costs. Similarly, new legislative requirements contained in Senate Bill 5 made metering and energy audits essential tools to establish baselines and to develop strategies to find energy reductions in its facilities.

1. General Office Complex (GOC) audited by an outside engineering firm in 2001.

Before Senate Bill 5 went into effect, and to demonstrate corporate responsibility for reduction of air emissions in its facilities an energy audit was requested by LCRA's Corporate Environmental Department managers in the Spring of 2001. The request was for the GOC to make sure LCRA's headquarters campus buildings were as energy-efficient as they could be. At the time of the audit, the GOC was not receiving an electric bill. LCRA's facilities' manager expected the power swap with Austin Energy—which went back a long way—would end soon (in response to requirements in SB7). That gave him an additional incentive to perform an audit.

LCRA's Wholesale Power Energy Services Department had negotiated a long term contract with Carter-Burgess Engineers to perform detailed commercial energy audits for LCRA's wholesale customers three years previously. The common view was that for a study to have credibility, even if much more expensive to obtain, it had to be done by an outside firm. When the decision was made to have them do the audit, it was rushed due to the fact that LCRA's long term contract with the vendor was due to expire. The Austin office of Carter-Burgess performed the audit in June and July of that year. They submitted a final written report in September, 2001.

They used a hypothetical rate to calculate paybacks, since no rate with Austin Energy was established and no bills received by LCRA. No improvement would be cost effective, except from the "air emissions reduction standpoint," until the swap ended.

The GOC (General Office Complex) Campus was designed with three new main headquarters buildings and two retrofitted existing buildings incorporating (in 1990) energy-efficiency under the direction of General

Manager David Freeman. However, facility operations had become inefficient due to lack of monitoring and feedback from facility management. Scope of work in the audit request included identification of loads, and detailed recommendations for improvements in central plant and lighting.

At the beginning of the audit process, putting together metering and consumption data was harder to come by than for typical commercial facilities. Merely acquiring load shapes for the GOC was a challenge. Owing to the evolution of the relationship between the two utilities, LCRA owned the primary meter and separate data recorder for the GOC, but Austin Energy read the meters monthly and supplied the total kWh for the buildings for inclusion in the monthly netting. Because they never received a bill, the GOC's facility managers did not know where the site was metered. At last the audit team learned that LCRA's own Data Translation group, which reads the wholesale meters for billing, also read the GOC recorder and had years of historical interval data for the buildings. At last the auditors had load shapes; however, coming from a primary meter, the data included all five buildings in the complex.

Energy Services requested a monthly summary report. As part of the audit the team revisited the original submetering and controls installed when the facility was constructed. Outdated software, incompatible with new 32-bit computer systems meant no monitoring had occurred for 10 years at the General Office Complex. LCRA called in Cutler Hammer Engineering, responsible for the original installation. They recommended replacing hardware and software eventually deemed cost prohibitive. Also during the audit, Johnson Controls was in the process of updating the control systems.

2. New State Legislation (Senate Bill 5)⁴ required LCRA to report energy reductions in certain facilities.

Out of five facilities identified that must reduce energy use under the new legislation, three are in Bastrop County, two are in Travis. Three are associated with Wholesale Power Services; one is a gas-fired electric generation plant; one is a gas storage facility; one is a railcar maintenance facility that services railcars bringing coal to the Fayette Power Plant. Transmission services occupies the Service

Center, Wholesale Power Services manages the plant facilities, and Corporate Facilities Management is responsible for all LCRA facilities overall, including the Service Center.

Audit Reports Summary

1. The Sim Gideon Power Plant

The plant facility has been in operation at its location in Bastrop since 1965. The administration building, which has changed little in 40 years, consists of a steel structure with insulated curtain walls and single pane windows. Within the past year two new Trane split system heat pump units were installed, with electric resistance back-up. A flat metal roof was installed over minimal R-2 rigid insulation on top of the former built-up roof, over lightweight concrete on a steel deck.

The auditor reviewed the facility's electric consumption and bill history compared to the typical schedule of operations. Auditor estimated kilowatt-hour consumption from typical run times for equipment in the facility and compared that with annual consumption estimates using the week's recorded data for the administration building.

Findings:

Sim Gideon administration building has had only minor changes since 1965, and exhibits energy consumption characteristics of typical office building construction from that era. By controlling lighting and air conditioning loads and improving the thermal envelope of the building we estimate the facility can find savings of 25% during the five years of this project.

Cost-effective improvements are summarized below:

- Lighting improvements could provide as much as a 40% reduction in the building's annual energy usage for lighting. Higher efficiency lamps and ballasts, along with improved controls are recommended to reduce lighting energy usage. This would include a proposed decrease of 3KW connected lighting load with a simple payback of about three years.
- The two new split system Trane heat pump units, one at 10 tons and the other at 15 tons are oversized for the load. While the existing structure has minimal insulation in the roof, even so,

HVAC design with Ener-Win version 97.02⁵ models the load at 14 tons, 300 sq. ft. per ton. The current capacity at around 200 sq. ft. per ton is much higher than average for a typical office building in the region.

- Additional ceiling insulation would reduce the requirements for cooling to 12 tons. Staggered starts would cycle equipment for maximum efficiency.
- Replacing manual controls with locking programmable thermostats would facilitate a night setback in the office areas, and prevent users changing too high or low settings, which cause units to operate inefficiently.

2. LCRA Dalchau Service Center— Stores Building.

LCRA Stores Facility has been in operation at its location on Montopolis Boulevard in Austin, Texas since 1985. Total enclosed air conditioned area is approximately 71,000 square feet. Only office areas are air-conditioned. Unit heaters and Protective Equipment Testing Lab equipment are the largest energy users. Three split system air conditioning units serve the office areas and breakroom. Electric radiant heaters heat the warehouse space.

At the time of the audit LCRA Stores Facility had above average energy use per-square-foot compared the average warehouse storage facility in the southern United States. Meters had still not been installed for the facility. Meters were placed in early 2003. The Service Center began receiving bills from Austin Energy in April of 2003.

The audit suggested a combination of architectural and mechanical solutions to address the major concerns of the business owner, building comfort and energy costs.

3. Hilbig Gas Storage Facility.

The Hilbig facility has been in operation at its location in Rockne since 1991. Total enclosed air conditioned area is approximately 10,000 square feet; about 3800 square feet of office areas and 1000 square feet of equipment control rooms are air-conditioned. Pumps associated with gas extraction and injection and air conditioning in the main offices and equipment control rooms are the largest energy users. Split-system heat pumps serve the office areas and

breakroom; large package units serve the compressor and switchgear control rooms.

Findings:

- The walk-through audit and bill history show that station service operations account for approximately 98% of kilowatt (kW) Demand, and about 93% of the kilowatt-hour energy usage. No improvements were identified for this heavy equipment, which included two-2500 horsepower gas compressors.
- Lighting improvements could provide as much as a 1% reduction in the facility's annual energy usage. The facility currently uses 36 kilowatts of lighting. Higher efficiency lamps and ballasts, along with improved controls are recommended to reduce lighting energy usage by approximately 75%. This would give a simple payback of less than two years.
- Improved control of HVAC units would reduce run-time on the equipment, which is currently 24-hours, 7 days a week. Replacing manual controls with locking programmable thermostats would facilitate a night setback in the office areas, and prevent users changing too high or low settings, which cause units to operate inefficiently. Heat pumps should not be set up or set back more than two or three degrees at a time.
- Consider improvements to shop air compressor system. Typical savings average 26% from leak detection and optimal pressure settings. Increased productivity results from higher quality air.
- Since the existing compressors are nearly 14 years old, and life expectancy is usually 15 years, premium high efficiency compressors should be investigated and replacements located now. Avoid the necessity for less-than-optimal purchase and delays at the critical point of burnout.

4. LCRA GOC (General Office Complex)

While the campus is relatively new and designed as a “state-of-the-art” for energy

efficiency and environmental sensitivity, due to lack of control system upgrades over time, the efficiency of the system had declined.

The consultants LCRA hired were a large firm, with offices world wide, and a good track record doing energy assessment. Lacking data from submetering and other factors, such as no billing for the site at the end left us with an incomplete picture of LCRA’s actual operations or potential savings.

LCRA asked Texas Energy Systems Laboratory to review the audit report. Their summary stated, “Apparently LCRA has done a good job with previous energy conservation projects at their office complex. The site energy consumption ... is on the low side for an all-electric facility. You have upgraded your lighting system, installed Variable Frequency Drives on pumps and air handlers and have a good controls system. Other than the thermal storage system, only relatively small projects were identified.”⁸

Findings.

- Energy Conservation Measures (ECMs) recommended from the energy audit included installing programmable thermostats and energy efficient HVAC units for smaller auxiliary buildings such as multipurpose center and print shop. Those units were running 24 hours with no setbacks.
- Energy Conservation Measure Number 2 called for implementing a chilled water temperature reset control sequence for the HVAC system when appropriate conditions exist to allow the set point temperature of the chilled water being supplied to the air handling units to be adjusted upwards.
- The Lighting control software for the four office buildings was supposed to turn lights off automatically at a certain time of day. Occupants could dial up for lighting once they were on the floor by entering a dial up code number. Currently this system is not working, and employees complain they find lights on all over the campus at all times of the night and on weekends.
- The biggest recommendation from Carter-Burgess was a thermal storage

system that would not have saved any kilowatt hours, but would have qualified for a \$100,000 rebate from the City of Austin. If LCRA were to be placed on a time-of use rate, the measure would have a 14.4 year simple payback. The prohibitively high costs for the measure had to do with siting of the storage tanks downhill and across the street and costs for piping uphill to the chillers.

In spite of some problems noted with calibration of the software, the independent review by the Energy Systems Laboratory stated the analysis done was thorough and suggested that the smaller measures should be implemented. "LCRA will have to determine if a 15-year investment in a thermal storage system makes sense to them. An alternative approach might be to optimize current HVAC system performance, i.e., making your current system operate more efficiently."

Implementation of Audit Recommendations

1. Hilbig Facility Improvements

From Kevin Stark, Operations Manager:

"The shop overhead lights used to be left on almost 24 hours a day, but now are turned off at night or when not in use (about 8 hours a day now). Heaters are lowered as far as they will go (50 F) in most cases. The office printer will "sleep" after 3 hours of non use, but the power is not turned off just greatly reduced. The A/C located in the rear of the office is normally set to about 80 F."

A separate meter was installed on the administrative and shop buildings to get data valid for reporting to SECO under SB 5.

2. General Office Complex

The report filed with Texas State Energy Conservation Office in 2002 stated that LCRA had only reduced energy use by 2% in its administrative buildings in those affected counties. Reasons given: the GOC facility was already energy efficient; at other facilities metering was not in place or

From the GOC facility manager, the only measures implemented from the audit were as follows:

- Our current chilled water set point is 45 degrees. We have several areas (Gendesk,

ROCC, and BUCC) that need A/C 24-7. After hours we run the discharge air temps from 55 to 60 on all the AHU's we can.

- We currently purchased the latest version of software for the Lighting Control here at the GOC. We also purchased network modules that will improve reliability and will make the system more user friendly. We should have it installed within the next couple of months.
- The Multipurpose Center is on a timer which only lets the A/C run for a maximum of 6 hours. The restrooms A/C's are on a programmable timers."

Energy education for LCRA employees was discussed as a desired outcome when the outside audit was requested for the GOC. Two years have passed, and the momentum and impetus to educate employees has slowed. Partly due to the outside firm's audit report for the GOC which said the facility was already "very" energy efficient. Also, the GOC still does not receive an energy bill.

Following the GOC audit, Marcia Roberts wrote several articles about the energy use at LCRA facilities and quantified potential savings, highlighting measures that were in employee control. Certain measures such as upgrading task lighting and encouraging employees turn them off have yet to be implemented.

A company-wide newsletter, LCRA's Monday Morning, printed her short article, "Shut Down to Avoid Wasting Away." (It took a lot of doing to convince personnel in our information technology group that was a good idea for employees to shut down their PC's and other office equipment at night and on weekends.) Comments from numerous employees who read the article were noteworthy, "what good does it do to turn off my computer when I come to the campus late at night and on weekends and all the lights are burning in every building."

Other articles slated for LCRA website on dispelling energy myths have yet to be published

3. Sim Gideon Plant

Once sub-metering is in place the operations manager has agreed to try out several of the audit recommendations.

- LCRA's electrical supply house is in the process of locating samples for them to test in the plant facility — screw-in compact fluorescent lamps in place of incandescents.
- Disconnecting one of the new heat pumps for the administration building will also follow the new meter.

Employee initiative has recently made a difference at several LCRA facilities.

For instance, one of our maintenance staff at the GOC— who has worked here only a year or so — convinced his supervisor that compact fluorescents would work well in the lobby down lights and pendant fixtures that burn 24 hours a day, and save labor costs. He bought them from a local supply house and installed them himself. This was not one of Carter-Burgess audit measures studied in the report. But he knew these lamps would burn cooler and last longer, as well as saving energy.

At the Stores building at the Service Center, an electrician who accompanied the auditor on her walk-through became aware of the excessive energy consumption of the 88 electric radiant heaters in the warehouse area. Almost immediately following the audit, he disabled half of the units, halving the demand for electric heat in the warehouse.

Employees at Smithville Railcar Facility— which was already a retail customer of the City of Smithville—when faced with high demand bills, convinced upper management to switch out electric unit heaters to radiant gas heaters in the open shop area, reducing electric demand at the facility in half. That was before the audit.

CONCLUSION

Even though LCRA has had in-house expertise to develop metering and conservation programs for its own customers, it has not previously employed these experts to improve its own facilities. While the expertise was there to analyze costs and recommend energy-saving measures, the costs, thus the incentive to address these measures had not been great enough until deregulation forced LCRA to meter their facilities.

Lessons learned:

- 1) New Texas legislation focused attention of the operations and facilities management side of the company on considering energy conservation measures within LCRA.
- 2) The result of deregulation was the unbundling of the various parts of the company so that for the first time, the actual costs of electricity for facilities operation and station service became available.
- 3) Because sub-metering is currently in the process of being installed, not enough data has accumulated to prove out the argument for upgrades in specific administrative buildings.
- 4) Employee initiative is important. Besides the legislation, employees initiative has made a difference. Many people already knew that conservation was the right thing to do and convinced their managers to make needed changes.
- 5) Employee education is a key component of efficiency. Employees need to know when facilities personnel have initiated some measures to improve energy efficiency. Awareness and efficient operations go hand-in-hand. The bottom line will dictate what investments are made in new equipment; but where individuals have control, education will make a difference in consumption.

In the mind of some employees, no obvious improvement in energy efficiency has taken place at the GOC. Recently a colleague sent the authors an email titled “Energy Hogs.” It asked what had been done lately to educate LCRA employees about what they could do to save energy.

As we have outlined, at LCRA the mind-set of electricity being too cheap to meter has long been part of the company culture, and it won't change over night. At LCRA's power plants and administrative office buildings, as a result of combined pressure from legislation and the obligations of environmental stewardship, LCRA began to address ways to conserve energy. A process was identified and progress has been made. Knowing actual costs of energy use will make conservation easier to justify.

FOOTNOTES

¹Senate Bill 7 by Senator David Sibley and Representative Steve Wolens is landmark legislation that restructures the partially deregulated electric utility industry to allow retail competition and provide customer choice

in Texas on January 1, 2002. On the date of competition, rates from investor-owned utilities drop 6 percent and establishes a "Price to Beat" for competition. The bill was signed by Governor George W. Bush on June 18, 1999 and took effect September 1, 1999.

²This important innovation was initiated when the Texas Electric Restructuring Act was signed into law in 1999 to introduce a competitive state energy market on Jan. 1, 2002. The act obligated all transmission utilities to provide power plant settlement meter data to the Electric Reliability Council of Texas (ERCOT) ISO. Under the act, ERCOT operates a Meter Data Acquisition System (MDAS), which collects generation and consumption energy data on a 15-minute-interval basis from all transmission utility companies in the state.

§25.127. Generating Station Meters, Instruments, and Records.(a)

Generating station meters.

Instruments and meters shall be installed and maintained at each generating station as may be necessary to obtain a record of the output as required, and to show the character of service being rendered from the generating station.

- (b) **Record of station output and purchases of energy.** Each electric utility shall keep a daily record of the load and a monthly record of the output of its plants.

³ Legal opinion from Steve Burger, LCRA. Council Health and Safety Code Section 388.005 was enacted in 2001 as part of the Texas Emissions Reduction Plan, and requires political subdivisions in "affected counties" to establish a goal to reduce energy consumption by five percent per year for five years in existing facilities. The term "facilities" is not defined. However, it appears from the context in which the term is used that it is not intended to include industrial operating processes, such as power production and water and waste water equipment. There is no legislative history, nor any case law or Attorney General's Opinion that would suggest otherwise.

⁴ Senate Bill 5 (SB5), also known as the Texas Emissions Reduction Plan, applied to all political subdivisions within 38 designated counties, LCRA facilities are located in two of those counties..

⁵ Ener-Win 97.02 ENERCALC for Windows, Department of Architecture, Texas A&M University, College Station, TX 77843.

⁶ W. D. Turner, P.E., Ph.D., Director, Energy Systems Laboratory, Texas A&M University, letter dated October 1, 2001.

⁷Trane Trace 700 is an hourly building simulation and analysis program.

⁸ Joel Huggins, EI, Guanghua Wei, EI, W. D. Turner, P.E., Ph.D, Report on Review of LCRA General Office Complex General Audit by Texas Energy Systems Laboratory, September 28, 2001.

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