ON THE RISE

2016 ANNUAL REPORT

TECO
THERMAL ENERGY CORPORATION

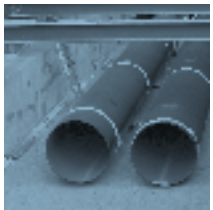
A TEXAS MEDICAL CENTER INSTITUTION

THE ENERGY BEHIND WHAT'S NEXT

Mission: Provide reliable and economical thermal services to the institutions of the Texas Medical Center.

2016 TECO ANNUAL REPORT

Table of Contents



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* Replaced David Dixon, November 2016.
** Replaced Weldon Gage, July 2016.
*** Retired January 2017.
**** Replaced retiring Dr. Clay Hanks, November 2016.
***** Added November 2016.

To our customers and friends in the Texas Medical Center and our energy industry colleagues

Houston has long been known as the "energy capital of the world." Just as we associate energy with Houston, so we associate Thermal Energy Corporation (TECO) with Paul Gervais Bell, Jr., who passed away in November 2016.

Mr. Bell helped found TECO in the late 1960s, becoming a board member in the late 1970s and ultimately board chairman from 1999 to 2013. His crowning achievement was guiding TECO's board of directors and staff through a master planning process that synchronized the company's expansion plans with the strategic growth of the Texas Medical Center (TMC) campus.

The result was TECO's 2007 to 2011 construction of a combined heat and power plant, thermal energy storage tank, additional chilled-water capacity and distribution system expansion – the largest project since its founding. The project made TECO one of the most reliable, cost-effective and energy-efficient district energy systems in the country.

Indeed Mr. Bell was one of TECO's strongest proponents, championing system innovation and growth. He also embraced collaboration, believing that when TECO and other institutions in the Texas Medical Center work together, the sum is exponentially greater than its parts. We are forever grateful for his foresight. He will be missed.

We humbly honor Mr. Bell's legacy by continuing to add customer buildings to our chilled-water and steam systems. This year's annual report, "On the Rise," profiles six new additions: Memorial Hermann-TMC's Hermann Pavilion 2, Houston Methodist Hospital North Tower, Ben Taub Hospital, Texas Children's Hospital Tower E, Harris County Forensic Science Center, and Houston Community College/Coleman College-Healthcare Educational Facility. Welcome aboard!

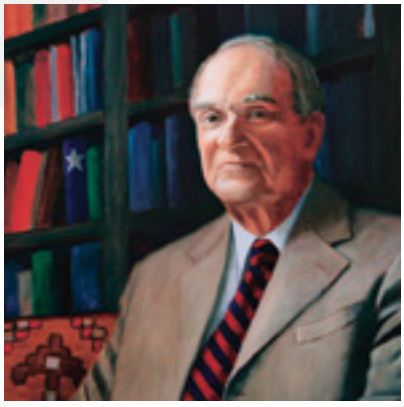
As the buildings have gone up, TECO has gone underground, tunneling to extend its piping distribution system to serve three of the facilities. In the pages that follow, we invite you to learn more about the intricate tunneling process and get to know our distribution engineering team members. Each and every one of them is dedicated to quality control and staying on budget, ensuring long-term system viability.

Overall, TECO held operating expenses 5.3% under budget in FY2016 and had operating revenues 1.2% over budget before issuing customers a total $2.962 million rebate. It was TECO's sixth straight year of customer rebates.

We extend our sincere gratitude to our board of directors, board committee members and our valuable employees who have made these achievements possible. TECO continues to be on the rise and committed to serving as a vital energy resource for the pacesetting healthcare, research and education programs on the campus of the world's largest medical center.

Stephen K. Swinson, PE
President and Chief Executive Officer

Bradley N. Howell
Chairman



Courtesy the family of Paul G. Bell, Jr.
Artist Dorothy Haase.

"As I look back over the past 40 years, I cannot avoid a sense of pride in being a part of this outstanding organization. Today we are most fortunate to have a dedicated board of directors and a first-class management team and staff. I am confident that these fine people are laying a firm foundation for our future."

Paul G. Bell, Jr., 2009

DIGGING IN FOR GROWTH

More and more buildings are rising on the Texas Medical Center campus, with a number of TECO customers adding new facilities and connecting to our chilled-water and steam systems. Given existing utilities beneath the streets and high building density on campus, TECO's goal is to extend our piping to new buildings with the least disruption possible. Our solution? Tunneling.

TECO is using the wood-box tunneling method to connect three buildings to our system. We brought Tellepsen on board to use their unique experience to handle construction and ensure two-way traffic flow and clear pedestrian walkways around the work site. TECO's specially trained crews oversee the projects and provide strict quality control, carefully inspecting all work performed.

One of the projects – three 563-ft, 5-ft x 5-ft tunnels to Memorial Hermann-TMC's Hermann Pavilion 2 – is our longest ever. All work is on schedule and on budget. Here's a generic inside look at TECO's tunneling process.

1

Install and excavate 50-ft x 30-ft bore pit (entry) and receiving (exit) pits to approximately 40 ft below grade.

2

Excavate first of three tunnels using small, handheld jackhammers with shovel-shaped bits to remove soil.

View tunneling process online: https://tinyurl.com/TECOtunnel

Install 4-inch- x 12-inch-wide oak boards inside 5-ft- x 5-ft-diameter tunnel, adding contiguous ring of boards every foot.

3

Lay small set of tracks inside the tunnel for electric locomotive and carts to move excavated soils out of tunnel into bore pit.

4

Use crane to lift filled carts to grade and dump excavated soil into trucks, which haul it away for disposal.

5

Begin second and third tunnels when first (middle) tunnel is 15 ft in.

6

Install TECO's chilled-water and steam pipes inside casings.

8

Inject cellular grout to fill void around casing inside each tunnel and seal ends of tunnels.

9

Install pipe casing inside each tunnel once all have been excavated through to receiving pit.

7

Modify receiving pit into permanent valve-access pit.

10

Backfill bore pit to grade with select soils.

11

Use 18-inch pumps (red) to flush and passivate inside of new pipes inside tunnels before connecting to existing TECO chilled-water distribution piping.

12

RISING TO THE CHALLENGE

Whether preparing a budget or overseeing a backfill, Steve Lehr and Jess Harper work in tandem to ensure no one misses a beat when it comes to engineering and constructing TECO's piping distribution system.

Yet the two men are not alone, supported by a talented team that manages three major tunnel projects and two piping system extensions to reach new customer buildings on the TMC campus. Steve brings decades of institutional knowledge to the table; Jess started at TECO after serving as a consulting engineer for the distribution portion of its 2007 to 2011 expansion.

"We realize that every decision we make affects reliability, longevity, safety and cost-effectiveness," says Lehr. "We provide feedback to system designers on what works and what doesn't, helping specify equipment and procedures. We established a customized protocol for wall penetration seals where the pipes enter a customer's facility, and we use a pre-installation valve testing method that works better than standard applications."

Focusing on the future is key. "TECO's leaders have always had vision," says Harper. "They installed a 60-inch chilled-water transmission pipe when the plant was built in the late 1960s. It was larger than needed, but they knew it would enable growth without replacing transmission pipes. They were right."

But the company's vision isn't limited to construction projects. It's also dedicated to succession planning to ensure that knowledge is passed along from one generation to the next. "Jess and I work together well and learn from each other and our crew," says Lehr. "We're well-positioned to manage customer additions to the system well into the future." ■

Steve Lehr
Supervising Senior Project Coordinator
Joined TECO: June 1980

Jess Harper, PE, CEM, LEED AP
Supervising Senior Project Engineer
Joined TECO: July 2010

Bruce Turner, PE, CPE
Vice President, Engineering
Joined TECO: December 1989

"When installing a piping distribution system, you must think long term. It should be designed to last 75-plus years, so it's imperative to use the best materials and procedures and inspect, inspect, inspect every step of the way. I monitor our distribution team's progress, assist in problem-solving and meet with customers as needed. Today's tunneling is more complex than the open-cutting we used more in the past, but that doesn't faze our crew. They are a group of outstanding individuals who can take any project from inception to a working system in the largest medical center in the world. I respect that."

Todd Gryseels

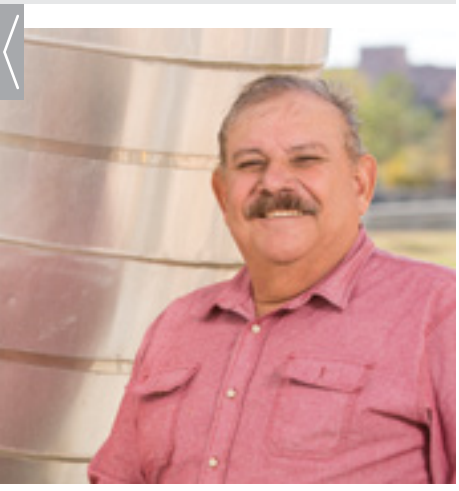
Project Coordinator
Joined TECO: September 2001

"Recently my main focus has been the work extending service to Houston Methodist Hospital. The planning, design and construction of these projects requires lots of attention to detail and sometimes spans several years. The best part of each job, though, is making the actual customer building connection. We coordinate with our plant and stand by at the customer's site as the chilled water and/or steam are mobilized to flow through pipes into the building. We continue to fine-tune service once we're live. There's great satisfaction in ensuring all is working smoothly, and the customer is happy."

Mike Thamm

Senior Project Coordinator
Joined TECO: July 2006

"I worked on my first distribution project for TECO in 1990 while working for a contractor. In 2003 TECO brought me on to help coordinate and inspect the Central Plant and South Main Plant interconnection project. So when I came onboard as a TECO employee, I knew a lot about the distribution system. We're busier now than we've been since I started, so it's critical to stay on top of coordinating contractors and inspecting sites. We're burying these pipes, so everything must be installed exactly per specifications. We take pride in what we do, and it's satisfying to look back on all we've accomplished."



Isauro Salinas

Project Coordinator
Joined TECO: November 2014

"We spend a lot of time near heavy machinery and large pipes at construction sites, which means safety is extremely important. There are risks all around us. As project coordinator, I help make sure everyone is adhering to safe construction practices. I was previously with a contractor for five years and that experience helps. Whether I'm out in the field or in the office, though, I've got a great team to work with. We've developed good relationships with our contractors and customers, and my TECO colleagues are like family. I think my proudest achievement is just being part of a terrific company like TECO."

Juan Jimenez

Project Coordinator
Joined TECO: September 2004

"One of the best parts of my job is that I'm always learning more about distribution system engineering. In addition, I'm busy with onsite scheduling, design and coordination with customers and contractors. I started at TECO as a mechanic I in distribution maintenance, then moved into distribution engineering in 2008. We're all committed to having a 'can-do' attitude. We realize that we need to stay flexible to ensure each project's success. I also like being out on campus, where we can stay visually connected to what our customers do. There's no question the medical center is a special place."

Shane Janki

Senior Project Assistant
Joined TECO: May 2015

"I came to TECO as an intern in the distribution department, but it turned into a fulltime opportunity even though I'm still going to school fulltime. My major is Construction Management focusing on industrial construction, so working at TECO is a perfect fit. It helps me understand how theory compares to reality – sometimes they're really different! I mostly handle contractor contracts, requisitions and purchase orders; track submittals; review invoices; and help track project budgets. They also let me see what's going on in the field, so I'm learning a lot from the other guys on the distribution team."

"One of the primary reasons we use TECO is that we don't want to devote any more mission-critical hospital space than we have to for functions not related to patient care. What makes it even better is that TECO is an extremely reliable resource that's essentially set up as a cooperative. So we have input on its services and growth and are kept informed about how it is fulfilling its mission. TECO has a long track record of reliable performance that gives us a high level of confidence in its expertise and the equipment redundancy it maintains."

Peter R. Dawson, AIA
Senior Vice President
Facilities Services
Texas Children's Hospital

TEXAS CHILDREN'S HOSPITAL

Courtesy Texas Children's Hospital.

From treating rare congenital heart diseases to conducting neurological research or fighting infectious diseases, Texas Children's Hospital is committed to ensuring the best-possible outcome for the nation's youngest patients and their unique needs.

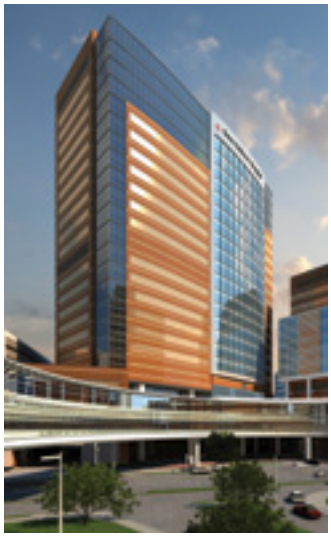
That's why Texas Children's is building a new pediatric critical care tower – Tower E – that will house 160 beds for pediatric and cardiovascular intensive care and new larger operating rooms with the latest technology. It will also become home to Texas Children's Heart Center plus a new rooftop helipad that will expedite access to care for severely ill and injured children.

"The demand for pediatric critical care is exceeding our capacity to provide it," says Peter R. Dawson, AIA, senior vice president, Facilities Services, at Texas Children's. "We've been focused on expanding as swiftly as possible. Vertical expansion was the answer allowing us to add on to the base of a building that was previously designed to accommodate more floors. This will make lifesaving treatment available more quickly than constructing an all-new building. It supports our hospital-wide commitment to increasing access and providing the right care at the right time and place."

Texas Children's left no stone unturned as it planned and designed Tower E. It mocked up the proposed design of the cardiovascular and pediatric intensive care rooms and operating rooms in a large warehouse allowing a multidisciplinary team of medical professionals to conduct pre-construction simulation-based tests. Surgeons, nurses, intensivists, patients' parents and many other staff members participated in 32 hours of simulated scenarios over a four-day period to identify design changes that would enhance efficiencies, safety and patient care.

"The feedback we received was invaluable," says Dawson. "Participants fully engaged in the process and provided more than 3,500 comments about space use. It was particularly insightful to hear from parents whose children have been patients at Texas Children's. Overall, we incorporated nearly 70% of participants' comments into the final design. We'll likely do another run-through with an updated mockup as construction progresses to be sure we've addressed everything."

Courtesy FKP Architects.



Courtesy Texas Children's Hospital.

TECO's steam and chilled water will cool and heat the new space. TECO has served the base building since its construction in 2011 when TECO installed piping sized large enough to serve future building space in preparation for hospital growth.

"In the medical field we frequently share best practices." says Dawson. "We've been able to learn from TECO, too. We toured TECO's plant expansion and renovation back in 2011 and were impressed with the control room. It's like a mission control that consolidates important operation information. We saw how we could translate this concept to Texas Children's, which allowed us to incorporate a similar design in one of our buildings."

PROJECT FACTS
6651 Main Street

Build 19-floor pediatric critical-care tower atop existing six-story base next to the Texas Children's Pavilion for Women, adding operating rooms, larger intensive care rooms and helipad to meet growing patient needs.

Size: 640,000 sq ft, with buildout of 480,000 sq ft

Budget: $506 million

Architects: FKP Architects

MEP engineer: Smith Seckman Reid

Structural engineer: Walter P Moore

Contractor: W.S. Bellows Construction Corp.

Total Texas Children's TMC presence at completion:
5.4 million sq ft

January
2014
PROJECT PLANNING BEGAN

November
2015
CONSTRUCTION BEGAN

April
2017
TECO SERVICE STARTUP

April
2018
PROJECTED COMPLETION

"We've been master planning our campus in the Texas Medical Center campus for a number of years and acquired the real estate for the eventual replacement of our original hospital, Main, about 12 years ago. Our central utility plant that serves the rest of our buildings here was at capacity and couldn't supply a new building. That posed a challenge since we didn't have real estate to construct a new plant, plus it would have been capital-intensive. We concluded that using chilled water and steam from TECO would make the most sense, both for the North Tower and future expansion."

Sidney L. Sanders
Senior Vice President
Construction, Facilities Design & Real Estate
Houston Methodist Hospital

HOUSTON METHODIST HOSPITAL

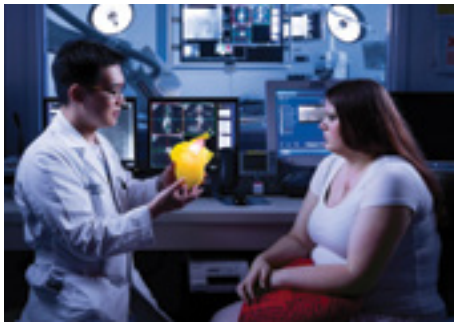
Courtesy WHR Architects.

The inspiring work of Dr. Michael DeBakey, renowned heart surgeon, lives on at Houston Methodist Hospital as it embraces a passion for excellence and continued innovation.

As one of the founding members of Texas Medical Center, the world-class hospital has a robust history and plans a phased move from its original building to the new, high-tech North Tower. Now nearing completion, North Tower will not just replace the older building, but also allow for service expansion.

Located adjacent to Dunn Tower, the new tower will become the epicenter for Houston Methodist's cardiovascular and neurological programs. Its 18 highly advanced operating rooms will include four hybrid operating rooms and an intraoperative magnetic resonance surgical suite. With an entire floor devoted to interventional cardiology as well as a gamma knife, the building will increase patient access to minimally invasive, image-guided heart and brain procedures.

"North Tower gives us a phenomenal platform to perform even the most complex surgeries and provide the highest-possible care," says Sid Sanders, senior vice president, Construction, Facilities Design & Real Estate.



Courtesy Houston Methodist Hospital.

"We're connecting North Tower's third floor to the third floors in the Dunn Tower and Fondren-Brown Building, creating a continuous floor plate of surgical suites. Adjacent floors in North Tower will serve as cardiovascular and neurological intensive- and acute-care units."

TECO's chilled water and steam will meet the building's space heating, air conditioning, sterilization and domestic hot water needs. Anticipating Houston Methodist's upcoming development, TECO installed steam and chilled-water piping under John Freeman Boulevard in 2009. In coordination with North Tower's construction, TECO recently tunneled to reach the building, installing pipelines in its basement that will not only serve the tower but can be tapped for future hospital expansion.

"We've been able to meet an aggressive schedule because we embraced virtual design," says Sanders. "All of our teams – architects, contractors, engineers and subcontractors – integrated their expertise, and we worked out every last detail in 3-D object-based software. That enabled us to model and prefabricate assemblies such as bathrooms and headwalls with such precision that they could be built offsite while the rest of the building was under construction. It has worked incredibly well, and the quality we're getting is superb."

When the building is fully operational, patients and their families will not only experience exceptional care, but also have extraordinary surroundings. North Tower's light-filled atrium will be a social hub for patients, visitors, staff and physicians and prominently feature the beloved 1963 mosaic called "Healing Arms of Christ." Originally fabricated in Florence, Italy, it will be carefully relocated to the new atrium from its current exterior location.

March 2014
DESIGN STARTED

May 2015
GROUNDBREAKING HELD

March 2017
TECO SERVICE STARTUP

December 2017
PROJECTED COMPLETION

Courtesy WHR Architects.

PROJECT FACTS

6551 Bertner Street

Build new inpatient healthcare facility to replace beds in the original main building, add advanced heart and neurosurgery operating rooms, add a VIP acute-care floor and create a dedicated floor with interventional cardiology suites.

Size: 22 levels; 925,000 sq ft; 366 acute-care patient beds

Project manager: Jacobs

Contractor: Hunt Construction Group

Architect: WHR Architects

Mechanical engineer: AEI

Structural engineer: Walter P Moore

Total Houston Methodist TMC presence at completion:
5.6 million sq ft

BEN TAUB HOSPITAL

"With building renovations and upgrades ahead at Ben Taub Hospital, we knew that we needed more electrical capacity. We evaluated our options and determined that eliminating our chillers and boilers would dramatically decrease our electrical consumption. By moving chilled water and steam service to TECO, we're not only freeing up electrical capacity for other critical needs, we're also gaining chilled-water and steam service quality and reliability. With a million different responsibilities on our plate, it's nice to have one less concern on the table."

David L. Attard, PMP, PgMP, Associate Administrator
Healthcare Systems Engineering Administration
Harris Health System

Courtesy Harris Health System.

An elderly man hit by a speeding car. A pregnant woman suffering a severe stroke. A young man injured in a drive-by shooting. All could find themselves at the Ginni and Richard Mithoff Trauma Center at Ben Taub Hospital on the campus of the Texas Medical Center. And all would receive top-level care by a team of onsite specially trained medical professionals ready to treat their life-threatening conditions.

Level I trauma centers can be pivotal to a patient's survival, offering a 25% lower death risk than standard emergency rooms. That's why Ben Taub is dedicated to maintaining its Level I status and continuing to update its facilities to serve those in need. In 2016, Ben Taub logged nearly 4,000 trauma patients or nearly 11 per day, and cases are steadily on the rise.

One of the keys to trauma center success is operating rooms. As part of a $70 million renovation, Harris Health System is adding seven new operating rooms with state-of-the-art technology adjacent to Ben Taub's trauma center. It is also renovating the Ben Taub Tower to accommodate its specialty clinics and plans to redesign and redevelop the rest of the emergency center as well.

But along with technological upgrades comes a greater need for electricity, and the area's electrical capacity is tight. So Harris Health System is connecting to TECO's chilled-water and steam service to reduce electricity use. TECO is extending its chilled-water and steam lines underground, partially through specially constructed tunnels, to reach Ben Taub's existing energy plant.

"The transition to TECO is enabling us to get our specialty clinics running and our new ORs online," says David L. Attard, PMP, PgMP, associate administrator, Healthcare Systems Engineering Administration. "We'll be taking our existing chillers and boilers offline one by one and sending TECO's chilled water and steam through the pipes to serve our buildings instead."

Ben Taub will use TECO's chilled water for air conditioning, equipment cooling and dehumidification and steam for heating and sterilization.

As part of the project, Ben Taub's existing plant will undergo a transformation. Once TECO's service is secured, contractors will remove the hospital's 1980s-era chillers, cooling towers, boilers and emergency generators before installing new emergency generators and dryproofing the facility to withstand natural disasters.

"Our energy consumption is going to go down, and we're going to have more confidence in our chilled-water and steam service," says Attard. "Since we no longer need electricity for boilers or chillers, we'll be less affected by power outages. Our backup generators can now be dedicated to patient care concerns. I don't know if you can beat that, especially when you need to maintain a cost-effective yet high-quality Level I trauma center in the third-most populous county in the nation. It's a great step forward."

2013-2014
DESIGN DEVELOPMENT

2016
CONSTRUCTION STARTED

November 2015
APPROVAL TO PROCEED

December 2017
PROJECTED OPERATING ROOM, TECO CONNECTION COMPLETION

Courtesy Harris Health System.

PROJECT FACTS

1504 Taub Loop

Redesign trauma center: increase adjacent operating room count from 11 to 18 to accommodate large cases, add new pre-op and post-anesthesia care units, provide new and expanded central sterile processing and blood bank units.

Build out and renovate clinic space.

Transition to TECO's chilled-water and steam services.

Project cost: $91.6 million

Owner:
Harris Health System

Contractor:
Vaughn Construction

Architects:
Johnston LLC,
Page Southerland Page

Total Ben Taub presence at TMC:
1.3 million sq ft

Courtesy Harris Health System.

HARRIS COUNTY INSTITUTE OF FORENSIC SCIENCES

"Reliability is the main reason we chose TECO to provide the new HCIFS building with chilled water and steam. TECO's business is energy and ours is not, so it ensures that we get the services we need exactly when we need them. Also, we evaluated life-cycle costs, and TECO looks to be the most economical choice. That's critical, especially when you're a government entity. Plus, we like the fact that we didn't have to install and run our own chillers and boilers, so we're reducing administrative responsibility and saving space that can be put to better use related to our mission."

Shannon Watson, PE
Director, Right of Way Division
Harris County Engineering Department

Courtesy Harris County Institute of Forensic Sciences. Photo Dustin Hatfield.

Courtesy Harris County Institute of Forensic Sciences. Photo Desmond Bostick.

When Harris County first established a Medical Examiner's Office in 1957, officials never could have imagined the high-tech organization it has become today.

Indeed, forensic technology has changed by leaps and bounds over the decades, facilitating exceedingly thorough investigations into untimely or violent deaths. With its forensic caseload growing in the early 2000s, Harris County knew it would soon need a new home for its Medical Examiner and Crime Laboratory services. A 2007 bond referendum made that possible, and planning in earnest began.

The new Harris County Institute of Forensic Sciences (HCIFS) building is the outcome of concerted input from law enforcement, business, medical, laboratory and scientific experts, including the HCIFS employees themselves.

The building features space that flows seamlessly from department to department and includes more room to accommodate a greater number of decedents and more evidence. It also has improved access for law enforcement, a new histology lab, a firearm examination area, an auditorium for training, media equipment for teaching and viewing procedures, family visitation rooms to provide a private environment for discussion, and more. Approximately three floors in the tower have been left vacant to allow for future expansion and new technology applications.

"We coordinated a land swap with the Texas Medical Center to obtain the property where the new building stands," says Shannon Watson, PE, Harris County Engineering Department. "We made sure its exterior design complements the aesthetics of neighboring institutions on the TMC campus and adopted a landscape design that preserves existing trees and incorporates native grass. Plus, we constructed the building to meet a LEED Silver rating."

TECO's chilled water and steam provide the new tower with air conditioning and space heating, plus are tapped for special uses: It super-cools the morgue and evidence storage areas and furnishes steam for specialized equipment used to accomplish the mission of HCIFS.

2007-2014
CONCEPTUALIZED

October
2014
GROUNDBREAKING HELD

June
2016
TECO SERVICE STARTUP

March
2017
MOVE IN

PROJECT FACTS
1861 Old Spainish Trail

Construct new forensic sciences center housing the Medical Examiner Service and the Crime Laboratory Service, accommodating a growing need and installing the latest technology.

Size: 9 stories: 207,700 sq ft on 3.2-acre site

Budget: $83.8 million

Project manager: Harris County Construction Programs Division

Architect: Page Southerland Page

Structural engineer: Cardno

General contractor: Vaughn Construction

For health and safety purposes, HCIFS uses sophisticated energy-efficient ventilation systems that separate airflow from the morgue and the toxicology labs from the rest of the building. Security protocol is also vitally important, with special gates and access codes needed both outside and inside the facility to safeguard evidence and test results.

"More than 250 people work for HCIFS, all of them highly trained and specialized in their fields," says Watson. "It takes a special group of people to conduct forensic analysis, provide expert testimony and try to provide closure to families who have lost a loved one. The people at HCIFS are genuinely good people with a calling to compassionately help others at their time of greatest need."

Courtesy Harris County Institute of Forensic Sciences. Photo Dustin Hatfield.

"The immediate value of using TECO's chilled water is that it allows us to use our capital dollars for instructional projects rather than for infrastructure. The secondary value is that for roughly the same cost as operating our own chillers, we get a much more robust infrastructure because TECO's assets are constructed to support mission-critical facilities. TECO is far less likely to have outages and far more likely to continue running when individual building chillers may be down. We feel like we'll get good or better service from TECO than we could provide for ourselves."

Charles D. Smith, PE, Chief Facilities Officer
Houston Community College

HOUSTON COMMUNITY COLLEGE–COLEMAN COLLEGE

Courtesy HDR.

Courtesy Houston Community College. Photo Jorge Luna.

PROJECT FACTS
1919 Pressler Street

Expand Houston Community College's Coleman College by constructing new building that includes classrooms, simulation labs that mimic real healthcare settings, auditorium, reception area, bookstore and student services center.

Size: 10 stories, 250,889 sq ft on 1.5-acre site

Budget: $120 million

Program manager: Jacobs Program Management

Project manager: Heery International

Architect: HDR Architecture,
with Autoarch Architecture, Walter P Moore

Contractor: Tellepsen Builders

Total HCC TMC presence at completion:
390,889 sq ft

2011-2012
CONCEPTUALIZED

2012-2013
FUNDED VIA BONDS

October
2015
GROUNDBREAKING HELD

Spring
2017
TECO SERVICE STARTUP

August
2017
PROJECTED COMPLETION

Thousands of local healthcare jobs – many within the Texas Medical Center – go unfilled each day. The healthcare industry is still growing at a rapid pace and is expected to add more jobs than any other industry between 2012 and 2022. Houston Community College (HCC) is determined to help by expanding its Health Sciences Center of Excellence – Coleman College – on the TMC campus.

Offering training and degrees in more than 20 of the fastest-growing careers in medicine, the college has found itself needing not just more space but different kinds of space for its more than 2,400 students.

"Just as medical technology changes, so does the education process," says Charles Smith, HCC's chief facilities officer. "And as the process changes, so does space use. Millennials learn by exploration and interaction, so we have to adapt and provide more collaborative space. We also need to look down the road. We're halfway through the millennial generation. Soon they'll be the instructors. How will they want their space to work?"

HCC responded by building its new Healthcare Educational Facility to reflect the latest in learning space design. The facility features simulation laboratories for nursing stations, clean and soiled utility rooms, patient care rooms, geriatric and pediatric facilities, and an intensive care unit. The new building is connected by skybridge to Coleman's original building on campus.

The Healthcare Educational Facility will use TECO's chilled water for air conditioning and is being constructed to meet a LEED Silver rating per the U.S. Green Building Council. Its numerous energy and environmental design features include

- a heat wheel to reclaim energy from the building exhaust to pretreat outside air supply,
- variable-speed pumping for chilled water and hot water space-conditioning systems to save pumping energy,
- variable-air-flow systems on each floor to save fan horsepower,
- light dimming with daylight harvesting in many spaces, and more.

To ensure reliability, the building's mechanical equipment is elevated aboveground to protect against flooding.

But the project's accomplishments go beyond learning spaces and responsible design. "Our board of trustees set a goal that 35% of the project's vendors should be small, minority-owned, women-owned or disadvantaged businesses," says Smith. "We've actually hit 37%, so we're proud that we've surpassed our goal. In a way it reflects Coleman's student population: 75% are female; 30%, African-American; 30%, Hispanic; and about 10% are Asian.

"It's our students and faculty who have made this project so fulfilling. Our construction and design teams have interacted with them to produce spaces that will have a significant impact on their success and those who come after them. They'll likely be training in career fields that aren't even on our radar yet, but our goal is to be ready."

Courtesy Houston Community College.

"As part of the services TECO provides to Memorial Hermann, including chilled water and steam services, it also offers an expertise in central plant operations. This particular service is valuable as a healthcare system would not typically in-source plant operations of this kind, especially in today's healthcare market."

Michael Hatton, Vice President
System Facilities Engineering

MEMORIAL HERMANN-TEXAS MEDICAL CENTER

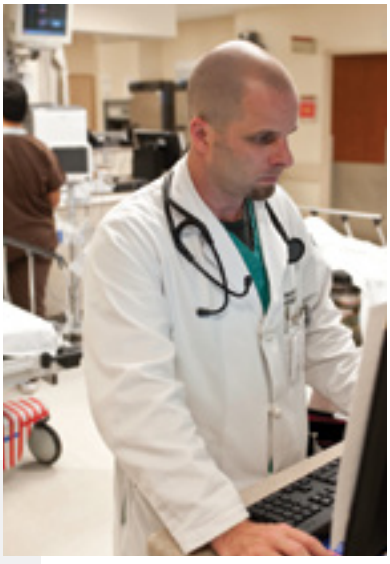
Courtesy WHR Architects.

2012
PLANNING BEGAN

May
2015
GROUNDBREAKING HELD

November
2019
TECO SERVICE STARTUP

2021
PROJECTED COMPLETION



Courtesy Memorial Hermann.

Courtesy Memorial Hermann

It is impossible to miss Memorial Hermann-Texas Medical Center. As the first hospital in the renowned TMC, its gateway presence and trademark rooftop lighting help guide patients and visitors to the historic campus.

Memorial Hermann-TMC is internationally recognized for treating patients with highly acute needs and the demand for its services, including its Level 1 trauma center, continues to grow. In response, Memorial Hermann-TMC is building a new patient care tower and a parking facility as part of the Memorial Hermann's Breaking New Ground initiative, its largest-ever multisite construction program.

"In many ways, Memorial Hermann-TMC has always been breaking new ground, from adding the renowned Memorial Hermann Life Flight® service more than 40 years ago to opening up the region's only burn center verified by the American Burn Association," says Michael Hatton, vice president, System Facilities Engineering. "But breaking ground for this project posed a new challenge: constructing complex buildings on an extremely small footprint immediately adjacent to patient-care facilities. A lot had to happen before we could start. We had to relocate the existing loading dock and emergency entrance and more. But we made it work."

The new tower will house the Memorial Hermann Red Duke Trauma Institute, John S. Dunn Burn Center, 24 operating rooms (19 replacement and five new), 160 additional beds and 16 additional emergency room bays. The roof will include an expanded helipad for Life Flight® that can hold four helicopters or one military transport helicopter.

"Given the tight location, construction efforts are requiring near surgical precision," says Hatton. "For instance, there's not enough room for contractors to lay down materials, so we have to off-load materials at night yet not disturb patients' sleep or the public's access to the emergency room. And we certainly don't have room for chillers or boilers, so we're pleased to be using TECO's chilled-water and steam service."

TECO has been preparing to serve the area for more than a decade, deciding the best approach was construction of three 563-ft tunnels under streets and sidewalks – TECO's longest ever. Its chilled water will be used to air condition the new building and the steam, for heating, humidification and sterilization.

"TECO coordinated with multiple facilities in the TMC to accomplish the tunnel's buildout. When all of us work together, Memorial Hermann becomes an even stronger hospital that is helping to save lives, teach future practitioners and support groundbreaking research," says Hatton.

PROJECT FACTS
6400 Fannin Street

Expand by constructing a state-of-the-art patient care tower, and a parking and infrastructure facility.

Size: 17-story, 523 parking spaces, 335-seat cafe on 2-acre site

Budget: $700 million

Project manager: Broaddus & Associates

Architect: WHR Architects

Civil Engineer of Record: Walter P Moore

Contractor: Vaughn Construction

Total Memorial Hermann-Texas Medical Center presence at completion:
4.84 million sq ft

ON THE JOB

FY2016 ACCOMPLISHMENTS

Finance and Administration

- Refunded $2,962,465 to customers from FY2016* net income, which reduced FY2016 customer rates by 3.8% compared to FY2015*.
- Completed FY2016 financial audit. There were no notable comments regarding FY2016 financial results, accounting methods, process or internal controls.
- Exceeded budget expectations for FY2016 and presented FY2017 budget that was approved by board of directors.
- Maintained TECO's financial closing on third business day of the month.
- Produced and distributed TECO's 2015 Annual Report, "Focused."
- Conducted customer satisfaction survey. Sample response: "The uptime of the chilled-water/steam system has been outstanding!"
- Prepared accurate forward-year rate forecasts for institutions that need them for early-in-the-year budgeting.
- Conducted employee survey for 2016.

Operation

- Provided 100% chilled-water and steam reliability to customers.
- Generated 100% of own power during peak power demand periods recorded by Electricity Reliability Council of Texas (ERCOT), so TECO had zero power demand during these periods. TECO's CHP system eliminated the risk that chilled-water and steam customers could be negatively affected by power grid failure.
- Successfully completed, on schedule and budget, capital projects to enhance performance, efficiency and reliability.
- Continued Operator Training and Certification Program on schedule. Five operators received or upgraded their City of Houston stationary engineer licenses.
- Conducted 10 monthly and several special-topic safety trainings for all departments and had no citations relating to environmental, safety or regulatory requirements.
- Completed FY2016 without a recordable or lost-time accident.
- Maintained Workers Compensation Experience Modifier of 1.25, well in line with industry's average.
- Continued to operate and maintain The University of Texas Health Science Center's Research Park Energy Plant, South Campus. TECO remotely monitors plant operations 24 hours a day, and operators visit the plant daily, bringing UT Health significant economic savings and improved operational benefits.
- Successfully followed Energy Policy initiated by Board of Directors in 2006, which helps TECO lock in fuel purchases at the lowest-possible cost.
- Continued to serve as point of contact for monitoring Metro Stray Current issues and their effect on institutions in Texas Medical Center.
- Recommended 10-year funding increase for Major Equipment Replacement Program (MERP) and the insurance reserve fund, which was approved by board of directors. MERP ensures funding will be available for future equipment replacement as needed assuming normal equipment life cycles. By regularly allocating money to insurance reserve fund, TECO can raise deductibles and reduce insurance premiums.

System Growth

Worked on nine service connection projects that will increase peak chilled-water load by more than 22,000 tons over next three years.

For example:

Finalized construction on pipeline extensions to Harris County Institute of Forensic Sciences and Michael E. DeBakey High School for Health Professions, and started up service on schedule and on budget.

Continued construction on pipeline extension to Houston Methodist Hospital, North Tower, including tunneling activities (see p. 4), on schedule and under budget.

Continued construction on pipeline projects, including tunneling, to serve Memorial Hermann Hospital's Hermann Pavilion 2 and Harris Health System's Ben Taub Hospital.

*Fiscal year September 1 - August 31

Dr. Ronald E. McNair reached for the stars as a NASA astronaut, so it's fitting that students pursue career dreams through the Houston-based DREME Science Literacy Foundation started in his honor. In July 2016, TECO hosted 28 DREME STEM** Youth Academy students and their leaders on a plant tour and presentation in coordination with GE Leadership Institute. Dr. McNair's widow Cheryl set up the foundation after he passed in the 1986 Challenger incident. DREME's vision is that every student, regardless of socioeconomic status, race or gender, receives exemplary science and technology instruction.

**Science-Technology-Engineering-Mathematics

ON SOLID GROUND

FY2016 METRICS

	CHILLED WATER	STEAM
CUSTOMERS		
Number of customers	18	18
Number of buildings served	46	36
Square feet served	19.6 million	15.4 million
Energy sales	291,157,770 ton-hr	789,401 Mlb
ENERGY SOURCES		
Paul G. Bell, Jr. Energy Plant – Central Plant		
Number of boilers, chillers/fuels	14 chillers electricity & natural gas	7 boilers natural gas & diesel
Thermal storage tank	8.8 million-gallon chilled-water storage tank	n/a
South Main Plant		
Number of boilers, chiller/fuels	13 chillers/electricity	2 boilers natural gas & diesel
OPERATIONS/DISTRIBUTION		
Capacity	120,170 (including thermal storage)	890,000 lb/hr (with heat-recovery steam generator & duct firing)
Supply temperature	40° - 43° F	450° F
Supply pressure	55-75 psi	400 psi plant, 250 psi distribution
Return temperature	52° - 55° F	150° F
Water volume in system	12.4 million gallons	n/a
Steam pressure	n/a	400 psi
Piping type	Welded steel coated with coal/tar epoxy	Welded steel, Schedule 40 with insulation
Piping diameter	6 to 60 inches	2 to 16 inches
Piping distribution trench length	7.7 miles	7.7 miles (portions of the line have three pipes)

POWER

PAUL G. BELL, JR. ENERGY PLANT – CENTRAL PLANT

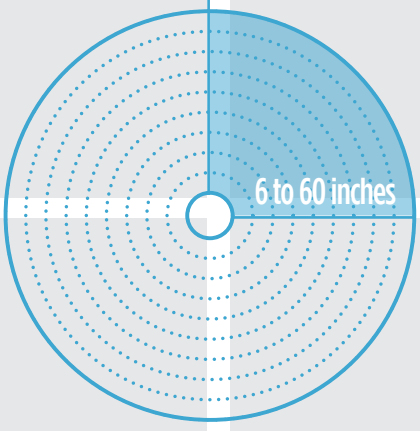
Combined heat and power system	48 MW
Standby generation	14 MW

SOUTH MAIN PLANT

Standby generation	2 MW

CHILLED-WATER PIPES

Pipe sizes range throughout the system, with more demand for chilled water than steam.



STEAM PIPES

ON THE MONEY

FINANCIALS **AND** OPERATING STATISTICS

Thermal Energy Corporation completed FY2016 with operating revenues 1.2% over budget (before a year-end customer rebate) and operating expenses 5.3% under budget. Compared with FY2015, FY2016 operating revenues (actual) were 1.5% higher and operating expenses were 2% higher.

Fuel costs were **4% below budget** due to operating efficiencies and favorable market conditions.

Personnel costs net of those capitalized to large projects finished **below budget by 6%**.

Water treatment chemicals were **below budget 9%** due to increased chilled-water distribution system efficiencies.

The FY2016 revenue variance is partly because weather differed from budgeted assumptions and partly because TECO collected demand revenue from two customers that were not part of the FY2016 budget. The majority of the FY2016 expense variance is because (1) fuel costs were 4% below budget due to operating efficiencies and favorable market conditions, (2) personnel costs net of those capitalized to large projects finished below budget by 6%, and (3) water treatment chemicals were below budget 9% due to increased chilled-water distribution system efficiencies.

The favorable revenue and expense variance allowed for a customer rebate of $2.962 million (3.6%) in August 2016. TECO realized its below-budget fuel cost without deviating from its energy policy, which provides fuel price stability so that high fuel costs do not affect the company's rates during a budget year.

The company's net income from operations in FY2016 was approximately $4.7 million; total revenues in excess of expenses were approximately $3.9 million, with an unrealized loss of approximately $.8 million. The unrealized loss is the result of the required reporting of unrealized mark-to-market losses or (gains) associated with an interest rate swap on the company's 2012 bonds and on cash investments.

The company met all of its planned cash, internally set financial and debt covenant mandated requirements for FY2016.

In FY2016, TECO secured power and gas positions for FY2018 that will **reduce fuel costs by $3.367 million** compared to FY2017.

RATES AND UNITS

Fiscal year September 1 - August 31	FY2016	FY2015
CHILLED WATER		
Rate ($/ton-hr)	**$ 0.2229**	$ 0.2206
Rate ($/MMBtu)	**$ 18.57**	$ 18.38
Average Demand (tons)	**35,381**	33,156
Load Factor	**51%**	50%
Peak (sq ft/ton)	**286**	291
Production (sq ft/ton-hr)	**0.06**	0.07
Production (ton-hr)	**310,785,000**	290,450,607
Cooling Degree-Days (3,510 normal)	**3,249**	3,272
Fuel Consumption (natural gas and electricity) MWh	**228,955**	214,362
STEAM		
Rate ($/Mlb)	**$ 17.75**	$ 17.83
Rate ($/MMBtu)	**$ 14.78**	$ 14.85
Peak Demand (lb/hr)	**189,000**	225,000
Average Demand (lb/hr)	**127,672**	118,202
Load Factor	**68%**	53%
Peak (sq ft/lb)	**81.4**	67.4
Production (sq ft/Mlb)	**14**	15
Production (Mlb)	**1,121,470**	1,035,447
Heating Degree-Days (1,081 normal)	**967**	1,439
Fuel Consumption (natural gas) MMBtu	**1,292,715**	1,237,596

REVENUE AND EXPENSES

Fiscal year September 1 - August 31	FY2016	FY2015
OPERATING REVENUE		
Chilled Water	**$ 63,566,611**	$ 62,261,832
Steam	**$ 15,288,217**	$ 15,601,745
Other	**$ 3,268,597**	$ 3,035,429
Total Operating Revenue	**$ 82,123,425**	$ 80,899,006
OPERATING EXPENSES		
Fuel		
Electric	**$ 9,334,292**	$ 8,288,992
Gas	**$ 7,244,604**	$ 7,899,302
Fuel Oil	**$ 104,801**	$ 77,198
Other	**$ 57,786,799**	$ 56,777,240
Total Operating Expenses	**$ 74,470,496**	$ 73,042,732
Customer Rate Reduction	**$ (2,962,465)**	$ (3,166,000)
Net from Operations	**$ 4,690,464**	$ 4,690,274
Non-Operating Revenue (Expense)	**$ (815,323)**	$ (608,657)
Revenue in Excess of Expenses	**$ 3,875,141**	$ 4,081,617

Photos Bruce Bennett.
Photos © Nick de la Torre.
Photos Julian Brewster.

REACHING NEW HEIGHTS

THE TECO TEAM

Marsha Ackman
Craig Acree
Heleva Bacchus
Henry Barrios
Rohn Benfield
Chris Beroo
Clarissa Brewster
Julian Brewster
Patrick Brown
Randy Brown
Tim Brown
Javier Castillo
Milton Cowan
Jim Daniel, Jr.
Charles Darden
Ruth Davis
Steve Del Toro
Shawn Dennis
Ryan Doucet
Kerry Fischer
Dennis Foster
Kyle Fridley
Manuel Gamez
Jose Garcia
Joseph Garcia
Kevin Giblin
Phillip Gonzales
Vincent Gonzales
Ram Goonie
Todd Gryseels
Manny Guerra
Daryle Hall
Travis Hampton
Mike Handorf
Jess Harper
Ron Hendershott
Troy Hollin
Steve Hyde
Shane Janki
Juan Jimenez
Brandon Johnson
Barbara Johnston
Brady Jones
Austin Kelly
Zhanna Kogan
Nolan Lambert
Roger Lambert
Steve Lehr
Antonio Lopez
Jared Marish
Ronald Martens
Joel McCormick
Lamont McInnis
Edegar Mendoza
Charlie Michalak
Dan Mitten
Frederick Musil
Philip Muzar, Jr.
Stephen Nagy
Larry Null
Fidel Orizaba
Walter Pascua
Thomas Penzi, III
Shelly Pesak
Kelly Powell
Sean Price
Faustino Quiroz
Rey Regresado
Carl Richardson
Jenice Ricks
Juan Rodriguez
Brad Rogers
Johnny Runyan
Jake Ruttle
Tong Sahnon
Isauro Salinas
Jared Schneider
Donald Seay
Ernestine Shepard
Jeffrey Snover
Phyllis Sousley
Don Stowe
Katie Swinson
Steve Swinson
Ramon Tapia
Mike Thamm
Karen Thomas
Bruce Turner
Justin Underwood
Salomon Vega
Scotty Walker
Shane Williams

"If I were to share a best practice with another district energy system, it would be to maintain good relationships with your customers. You want to be sure to keep that as a priority, even when you're busy handling technical details. If you communicate well, it makes a difference."

Juan Jimenez
Project Coordinator, Distribution Engineering

KEY BUSINESS PARTNERS

TECO's key business partners understand the importance of our mission. They go beyond being a vendor, contractor or consultant, bringing significant value to TECO and the customers we serve.

Burns & McDonnell
CenterPoint Energy
ChemTreat
DaCott Energy Services
EDF Energy Services
Frost Bank
GE Power & Water - Distributed Power
HALO Branded Solutions Inc.
Jackson & Ryan Architects
Johnson Controls, Inc.
Lockton Companies, LLC
Soteica Visual MESA LLC
Stanley Consultants
Tellepsen
Toshiba International Corporation
Westerlund Communications Inc

THERMAL ENERGY CORPORATION

A TEXAS MEDICAL CENTER INSTITUTION