

# TEXAS SUSTAINABLE ENERGY RESEARCH INSTITUTE



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## ADVISORY COUNCIL

The Texas Sustainable Energy Research Institute (i.e. Institute) established the UTSA Faculty Fellows Advisory Council (i.e. Council) to enrich our future strategic impact by enhancing communication and interaction between the Institute and each of the Colleges that comprise the University. The Council helps formulate strategic objectives that build on the strengths of the entire university and our key partners to have meaningful impact on trans-disciplinary problems associated with energy, water, sustainability and climate change. Members serve as an internal advisory council providing input and advice on all elements of the Institute including research direction, Institute management, business systems, student involvement, endowment development, industry associations, professional development, curriculum, and more.

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## A MESSAGE FROM THE DIRECTOR



It was more than a year ago that the Texas Sustainable Energy Research Institute (i.e. Institute) was created by the University of Texas at San Antonio (UTSA) to partner with others from across the Alamo region to position San Antonio as a technology and innovation leader in the 21st century global energy economy. It was a year where I was routinely inspired by the “spirit of San Antonio” – a spirit that is pervasive throughout our region to make a profound difference in our future! The Institute is committed to nurturing this spirit and to serving the needs of our community as we establish San Antonio’s leadership position in the new energy economy.

Research at the Institute spans a continuum from discovery-based science and engineering to economic and system analyses and strives to provide pragmatic outcomes that serve our community best. To be successful we must connect with the local, regional, national and global innovation community to expand our user-inspired research capabilities and to accelerate technology innovation.

The long term strategic partnership between CPS Energy and UTSA, when coupled with other partners in our energy innovation ecosystem, will further elevate the stature of San Antonio as a recognized thought-leader in the next global energy transition. These partnerships allow us to become a magnet for national and global talent that further contribute to San Antonio’s potential for innovation and economic prosperity.

Over the course of the last year I have had the privilege to interact with many of our UTSA students who are a wonderful, diverse, enthusiastic group that represent tomorrow’s America. Our students fully understand the nature of the challenges before us, but more importantly, they understand the ramifications if we fail to act. Our future is bright and the leadership of tomorrow is fully capable of rising to the challenges they will face. I feel deeply privileged to be involved with the students of UTSA and to be a small part of their future.

Let me close by extending my personal thanks to the San Antonio community for their tremendous outpouring of support. We look forward to your ideas and input to help shape the Institute in the coming years to have a lasting impact on San Antonio, Texas and the nation!

Sincerely,

Les E. Shephard  
Director  
Texas Sustainable Energy Research Institute

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## OUR MISSION



The University of Texas at San Antonio created the Texas Sustainable Energy Research Institute to partner with our community and contribute to a new energy future that builds on a diverse resource base to position San Antonio as a significant contributor to the 21st century global energy economy.

The Institute integrates scientific discovery, engineering innovation and policy deliberations with pragmatic implementation and a commitment to our multicultural traditions to realize the promise of tomorrow's America as a global energy leader. The Institute also serves as a center of intellectual creativity that promotes socioeconomic development regionally, nationally and globally.

We provide systems solutions that pursue novel opportunities for technology insertion to reduce costs, improve reliability and assure responsible environmental

**Developing citizen leaders for a global community; Leaders committed to transforming the energy future of San Antonio, Texas, and the nation.**

stewardship that contributes to our energy future. Our impact will drive San Antonio's economic future, coalesce our intellectual capital, serve as a magnet for thought leaders from around the globe and help secure a foundation for enhanced prosperity for south Texas and the Alamo region for decades to come.



# ENERGY

Today, San Antonio is uniquely positioned as an energy leader in the 21st century energy economy. Few, if any, other cities in the world are making the level of commitment, supported by the level

Our challenge for San Antonio and south Texas is to lead in accelerating the third energy transition.

of investment necessary to create a sustainable energy future for a city the size and scale of San Antonio and that also

sits on the doorstep of what may become the largest producing oil and gas reserve in the continental United States. No one would have predicted the impact of the Eagle Ford Shale on San Antonio and south Texas three years ago - it is the most significant example of technology insertion and innovation impacting our energy future over the last several decades. Our city and our region must adopt a long term view on the Eagle Ford that culminates in the development of a strategic roadmap for energy, water, and economic development that guides our involvement and fully captures this opportunity!



The Institute has been working on a transition strategy for low carbon energy systems that is systems focused and balances the key imperatives of energy supply, economic prosperity, and responsible environmental stewardship. The strategy is intended to fully couple the electricity and transportation sectors - it is this intersection where we will have the most profound opportunities and it is this intersection where we are best able to reduce our dependence on foreign oil.

As part of the low carbon energy system strategy, we also address the energy, water, carbon trifecta for the electric generation sector. As we move from coal to gas, wind, and solar we continue to reduce both carbon emissions and water consumption. Future energy development will place significant new demands on water. The Texas Water Development Board projects water demands to increase substantially over the next 50 years - much of this new demand will come from growing metropolitan areas and increasing thermoelectric power production.

Energy and water are inextricably linked and an integral part of the future of Texas.

The complexity of the energy and water nexus provides great opportunities and challenges for San Antonio. We look forward to partnering across our community to create a future that positions San Antonio as a national leader in these areas.

For more information contact:  
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# THE CPS ENERGY-UTSA ENERGY RESEARCH ALLIANCE

The CPS Energy-UTSA Energy Research Alliance was created to support the CPS Energy 2020 goals and objectives related to developing a cost competitive, diverse and reliable generation portfolio that is fully coupled with initiatives to increase energy conservation and enhance energy efficiency. The CPS Energy-UTSA Energy Research Alliance will mitigate risks associated with advances in new technology deployed to improve grid reliability, enhance grid security and sustained performance, and will promote integration of innovation into the generation, transmission and distribution sectors in a mindful manner. Many of these advances can have significant meaningful impact on long-term grid performance, energy delivery and reliability. The CPS Energy-UTSA Energy Research Alliance will also actively engage across San Antonio and the Alamo Region to promote energy and sustainability education and awareness.

As part of the "Alliance", we are building a SMART, integrated renewable generation test bed intended to integrate solar PV systems from across the city, to test and evaluate the concept of a virtual photovoltaic power plant and to better understand the impacts of large scale solar penetration into the electric grid. Developing new protocols for cyber security is an integral component of this effort.

We are evaluating alternative approaches for the capture, storage, and reutilization of carbon dioxide; approaches that may uniquely benefit San Antonio and south Texas.

To accelerate the transition to demand side energy management, we are actively involved in assessing how we can more effectively couple technology and people.

Finally, we are actively focused on education and developing a kindergarten through 12th grade teachers program to find more effective ways to bring sustainability into the classroom at the earliest possible stage.

In addition to these ongoing activities we are also initiating activities in the following areas:

- Smart, Secure and Distributed Grid
- Carbon Capture, Storage, Sequestration and Reutilization
- Sustainability Education and Outreach Program
- Augmented Reality - Sustainability Program
- Electrification of Transportation
- Large Scale Photovoltaic Penetration into the Electric Grid (in collaboration with NREL)
- Energy Efficiency (in collaboration with NREL)



Our projects can have significant and meaningful impact on long-term grid performance, energy delivery and reliability.





# KEY RESEARCH CONTRIBUTIONS

Over the course of nearly 150 years we have experienced two major global energy transitions; the first from wood to coal and the second from coal to hydrocarbons. Each of these transitions required significant investments in capital, infrastructure and people, and each required multiple decades to occur. The challenge and the opportunity for San Antonio, in collaboration with the Institute and others, is to lead in accelerating the third global energy transition through technology innovation.

Innovation sits at the heart of long-term economic prosperity, serves as a magnet to attract the “best and brightest” from across the globe to San Antonio and enables a cost-competitive, reliable energy portfolio to fuel our economy for decades to come.

The Institute emphasizes a holistic approach to research that spans a continuum from discovery-based research, to engineering innovation, to policy and systems analyses.

Ongoing activities in several key areas are highlighted below with the appropriate points of contact for additional information.

## **BUILDING KNOWLEDGE FOR ENERGY CONSERVATION: UNDERSTANDING RESIDENTIAL CONSUMPTION PATTERNS BY COUPLING BEHAVIORAL SCIENCES AND TECHNOLOGY**

Greatly improving residential energy consumption behaviors begins with developing a clear and well-defined picture of current energy usage. By identifying the types of houses and

households that have the most potential to conserve energy, we can deliver cost effective approaches toward energy consumption. The goal is to target specific types of houses with tailored and cost-effective retrofit strategies.

In collaboration with CPS Energy and the National Renewable Energy Research Laboratory (NREL), faculty and staff members at UTSA have been working to model residential energy consumption by examining characteristics of houses and households that are associated with higher and lower levels of energy consumption.

The team has coalesced information about housing structures, such as year built and square footage and about residents, such as income, education, number of people, and age. Analysis of these data will allow for identification of neighborhoods and types of energy customers that hold the most potential for adjusting conservation efforts.

Additionally, using modeling capabilities developed by NREL, the team is building models for all of the major groupings of housing types in San Antonio. With these models, “virtual” retrofits are simulated to determine how much energy could be conserved with the retrofit. Assuming similar gains can be made by applying the same retrofit to other similar structures, a retrofit strategy can be developed for larger scale energy conservation across neighborhoods.

By exploring household characteristics associated with the different types of housing structures and with higher and lower levels of energy consumption, strategies will be developed and targeted to encourage energy customers to engage in energy conservation related

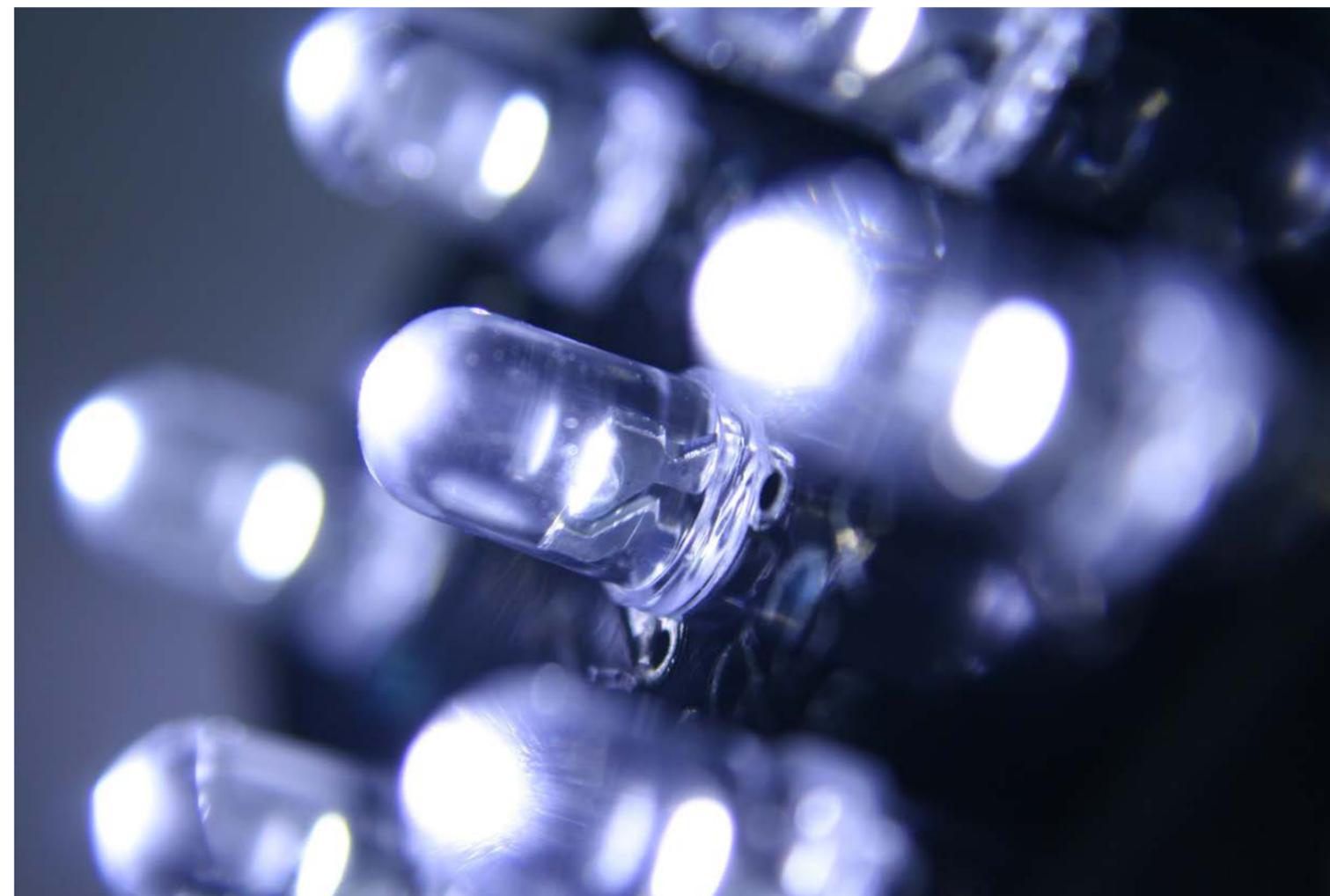


behaviors. Behaviors such as patterns and levels of thermostat setting, decisions about participating in retrofit and rebate programs, and decisions about energy efficiency of appliance purchases, among others are those that might be targeted to advance energy conservation.

By coupling behavioral sciences and technology, our research is creating an intelligent framework to accelerate effective deployment of energy efficiency programs.

This research is making a unique and significant contribution to the field of energy conservation. The findings show where and how cost-effective opportunities can make significant advances in residential energy conservation.

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## SECURE, SMART GRID OF TOMORROW

The smart, secure, distributed grid key research themes include home area network simulations, cyber security, test bed research and emulation, large-scale photovoltaic penetration and smart campus technology deployment.

Our laboratory offers a research platform to test the reliability and optimize the integration of power generation, storage and demand response.

Current research projects include:

- Investigating new inverter technologies for energy storage integration.
- Developing management tools associated with modeling, control and optimization of smart grid.
- Assessing wireless Control System approaches with novel communication architecture for AMI.
- Performing research on large scale penetration of PV into the current grid in cooperation with the National Renewable Energy Laboratory (NREL) and in response to the needs of CPS Energy's long-term goals.
- Utilizing solar data from instrumented PV projects of South Texas to enhance mathematical models for solar forecasting approaches.
- Developing superfast Electric Vehicle charging stations, EV's storage devices, and renewable sources that offer most grid functionalities.

- Examining cyber-security and vulnerability of the grid by exploring techniques to mitigate the risk of command center compromise by employing distributed management of the AMI network.

## Catching The Sun

UTSA unveiled the 1604 Campus new solar system at an electronic ribbon cutting Monday, November 28, 2011 and a comparable system on the downtown campus. These solar photovoltaic projects are a collaborative effort that can save the university in annual energy costs and move UTSA towards a more sustainable campus.

The 1604 Campus project includes a 140 kW solar grid on University Center South and a 30 kW solar grid on the campus' Engineering Building. The Downtown Campus project includes a 140kW solar grid on the Durango Building.

Also installed are 10 electric vehicle charging stations, eight in the South Parking Garage on the 1604 Campus and two at the Downtown Campus Visitor Parking.

The UTSA 1604 Campus solar systems are connected to a real-time monitoring system that allows researchers and students to study solar power, irradiance and variability.

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UTSA has deployed microgrids that can benefit from the state-of-the-art wireless communication, internet and cloud data centers.



## TEXAS SUSTAINABILITY EDUCATION PROJECT

The Institute established the Texas Sustainability Education Project, a network that brings together a broad range of stakeholders from across the state of Texas to support a systematic change toward education for sustainable development.

Changing minds is the first step to implementing change for a sustainable future. This is one of the main goals of the Texas Sustainability Education Project (i.e. TSEP). One of the TSEP's main goals is promoting sustainability education from K-12 in addition to merging that seed interest in children to college age citizens. The first key project was identifying curriculum matches and best practices to implement in the Texas Essential Knowledge and Skills (i.e. TEKS) program that is essential in facilitating sustainability education in our local grade schools.

TSEP has created a number of different tools to support teachers as part of this effort including:

- *GreenSources*, a database that allows teachers to easily identify relevant community resources that can be used in sustainability education. Although there are many resources available, identifying what's appropriate for the classroom can be a daunting task for teachers eager to take advantage of them. GreenSources is a searchable and filterable database of community resources that was launched in Spring 2012. It is uniquely structured to allow teachers to identify relevant community resources by type, subject, grade, topic and even educational standard.

## GREENSOURCES

Sample text  
FILTER BY:

ORGANIZATION >	RESOURCE TYPE >	GRADE LEVEL >
SUBJECT AREA >	TOPIC >	STRAND >
Power to the Plug: An Introduction to Energy, Electricity, Consumption, and Efficiency	Get Current: Switch to Clean Energy Coloring Book	Get Current: Switch on Clean Energy Activity Book
Comparing Light Bulbs	Cell Wall Recipe: A Lesson on Biofuels	Cell Wall Chemistry of Biofuel
Build a Pizza Box Solar Oven	An Exploration of Wind Energy and Wind Turbines	Alternative Fuels Used in Transportation
		Draft-O-Meter
		Building the Basic PVC Wind Turbine
		Alternative Energy Sources - An Interdisciplinary Module For Energy Education

The purpose is to make community-based sustainability educational resources easily accessible to support student achievement.

GreenSources is an easy access, filterable database of sustainability education community resources.

- *The Standards Crosswalk*, an alignment matrix that provides educators with a connection to local issues of sustainability that has been recognized by the North American Association for Environmental Education as one of the most comprehensive and is Texas Essential Knowledge and Skills (TEKS) approved.
- *The Summer Sustainability Teacher Institute*, a program that provides professional development and ongoing support to master teachers and establishes a model for effective environmental education.

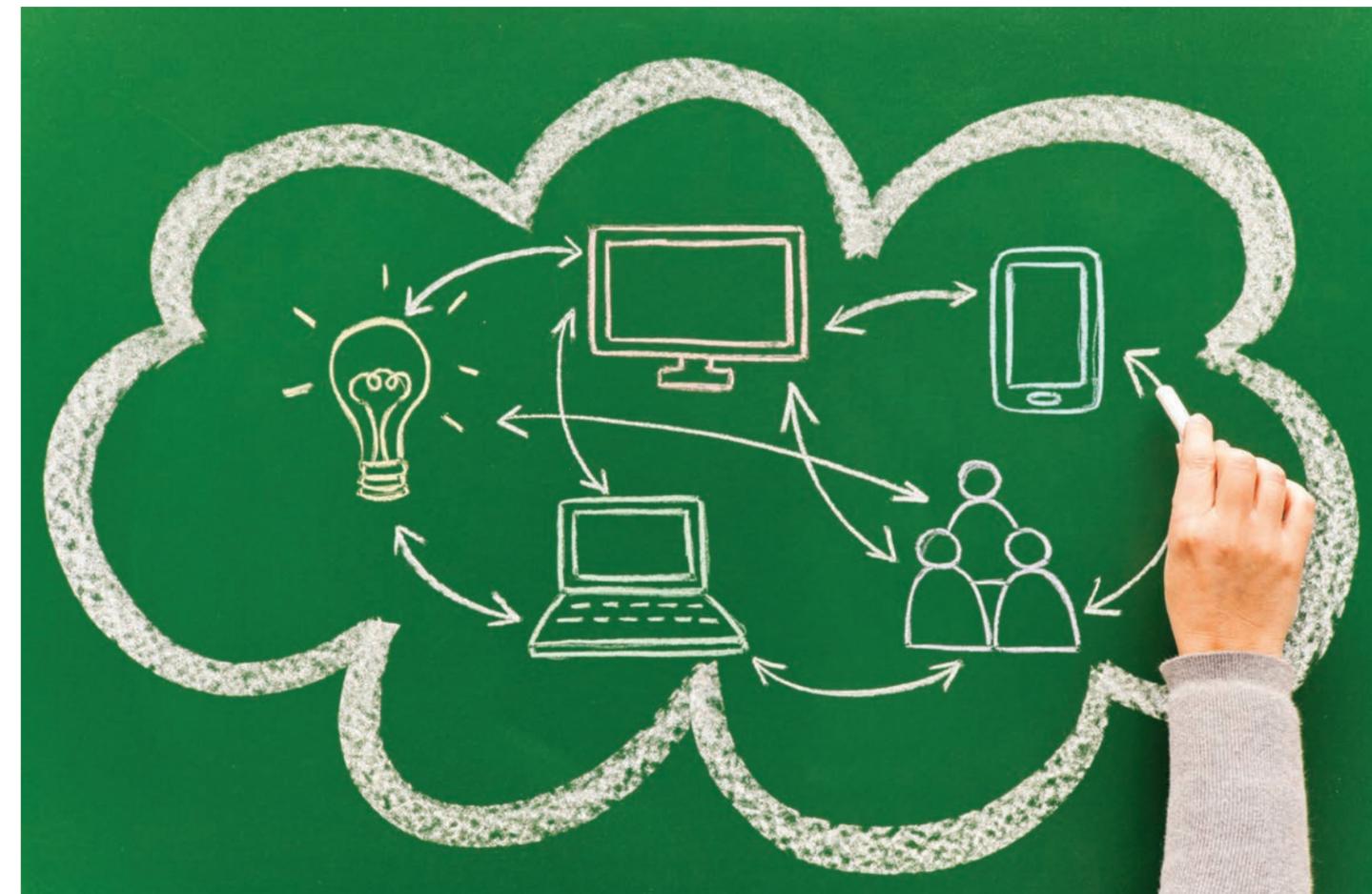


- *The Environmental Literacy Plan for the state of Texas*, a framework for organizations and communities to promote public awareness of issues related to sustainable development statewide.

These tools and more are being assessed by inviting local teachers over the summer break to the TSEP Summer Teacher Institute. Through sustained support for green education, teacher training across all grades, and consistent alignment and development of local, community-based sustainability curriculum, TSEP will continue to cultivate environmentally literate students who are life-long learners that value our natural resources, practice environmental stewardship and live sustainably.

The Texas Sustainability Education Project is promoting sustainability education from K-12 by facilitating access to sustainability resources and providing tools to teachers.

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## STEM LEARNING THROUGH GAMING: ENERGY EDUCATION

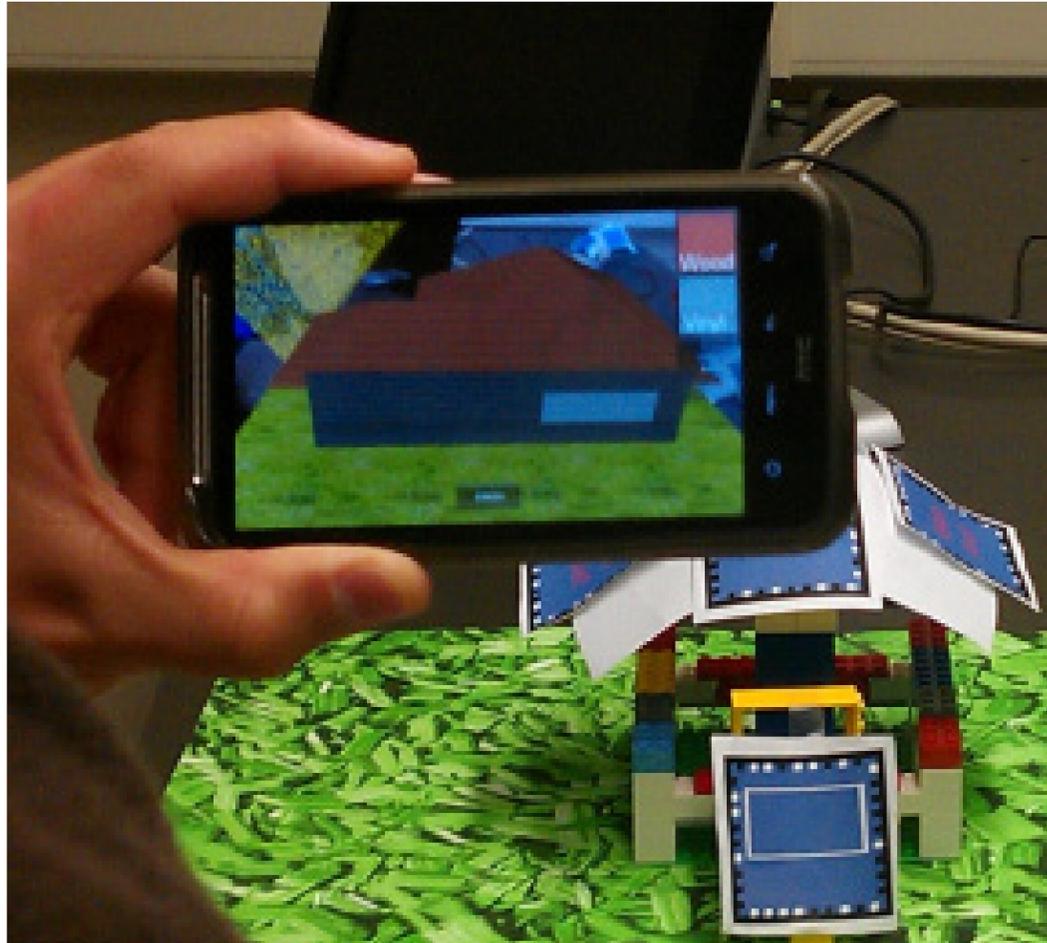
To advance education in secondary and public schools, a mobile and interactive Augmented Reality (AR) computer program was developed that allows energy conservation to be taught in a real world environment. Research shows that learners who are highly engaged in a task will be intrinsically motivated to problem solve.

AR superimposes computer graphics seamlessly into the real world and thus provides users with opportunities to access information that is not readily obtainable through observations of the real world.

This technology makes use of standard hardware, such as computers, mobile phones, or tablets.

We are taking the classroom to the community by coupling technology and education.

Traditionally, energy concepts are taught through lectures, textbooks, or hands-on experimentation, but the relationship between these concepts, especially abstract concepts, is not effectively visualized. This project consists of the design, development, and field testing of a novel mobile phone-based AR application. AR blends the virtual with reality



in a playful and engaging environment to effectively bridge the cognitive gap.

Our future emphasis in energy education is focused on mechanical cooling systems, renewable energy and the energy-water nexus. These topics address regional needs and are also national interests.

A smart tool to simulate passive solar dynamics is currently available for download.

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## CARBON CAPTURE, STORAGE, SEQUESTRATION, AND REUTILIZATION: A DYNAMIC APPROACH

As the seventh largest city in the nation, carbon emissions, air quality and attainment are a concern. A significant portion of carbon emissions come from electricity generation and transportation within the San Antonio area. The Institute has developed a framework to design a model that dynamically simulates emissions profiles for CPS Energy service area. The model enables multi-factor cost-benefit analyses of various technology applications across multiple dimensions.

This dynamic model will integrate outputs of models from various stakeholders as well as modeling outputs from CPS Energy to include alternative transportation systems, energy efficiency and conservation efforts and evaluate other what-if scenarios.

The Institute developed The Integrated Carbon Solutions Index Library and Technology Market Assessment Report. The report provides an up to date, comprehensive literature and technology review defined in the following five categories: management, capture, storage, reutilization, and sequestration.

The next phase is to conduct a market assessment of technologies being offered under the five categories: management, capture, storage, reutilization and sequestration. The assessment will include a summary of the technology, costs (capital and operating) as well as regulatory implications and water and energy intensiveness associated with their implementation within the CPS Energy service area.

For more information, contact:  
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## TRANSFORMING TRANSPORTATION: A COMPREHENSIVE APPROACH

This project initiative launched with an Institute sponsored information gathering and idea generating session. This session included researchers from the Electric Power Research Institute, Southwest Research Institute, City of San Antonio, the Alamo Area Council of Governments, and UTSA. This session yielded many opportunities in this area.

We are developing a comprehensive transportation solution that addresses the long-term challenges associated with providing reliable, secure, and clean transportation alternatives for our citizens.

The consensus was to explore the ability of using UTSA Campuses for showcasing innovative technologies. The Institute continues to work with our partners to develop implementable research plans. This includes models for adoption, deployment, and policy implications.

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## ENERGY/WATER NEXUS

The Institute is conducting research to understand the interrelationships between energy and water.

As a first step, the Institute established "Nexus" a laboratory created to evaluate the interrelationships between energy and water and to assess the complex interdependencies of energy systems including energy and water supply, responsible environmental stewardship and economic prosperity.

Water used for power generation in the South Central Texas area is estimated to grow to about 130,000 Acre Feet per Year (AFY) by 2060, which is a significant increase from the 35,000 AFY used

in 2000. Water needs for oil and gas exploration activities associated with the developing Eagle Ford Shale have not been included in traditional regional water planning efforts. While the impact might be minimal to non-existent at the state level, the effect on smaller communities within the Eagle Ford area could be significant.

The Institute is working with local stakeholders to develop a multi-disciplinary regional approach for long-term sustainable energy and water supply for the South Central Texas region.

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Deputy Director, Texas Sustainable Energy  
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Ample opportunity exists to implement a new paradigm that is truly multi-disciplinary and based on real-world experience to:

- Promote sustainable water use in energy generation, and
- Reduce energy demand in water supply, water and waste water treatment.



## THE SAN ANTONIO CLEAN ENERGY INCUBATOR

In May 2011, the San Antonio Clean Energy Incubator (i.e. SACEI) was created as a collaborative partnership between multiple entities including the Texas State Energy Conservation Office, the Institute, UTSA's Institute for Economic Development, the San Antonio Clean Tech Forum, the Mission Verde Alliance, Southwest Research Institute, Texas A&M University, and the University of Texas' Austin Technology Incubator.

The primary mission for the Incubator is to assist promising local clean-technology startups to form business models, teams and staff; prepare sales

itches to investors and customers; be the gateway to connect them to investors and customers; and to strike partnerships to progress research and development for their products. The goals of SACEI align cohesively with the mission of CPS Energy, UTSA and the Institute. Early efforts of the Incubator have created a formal network of Incubators between the University of Texas at Austin's Austin Technology Incubator and the University of Texas at El Paso's Clean Energy Incubator as well as partnering with initial members to acquire seed funding and build prototypes. The Incubator is also strengthening and widening the base of industry partners that can serve as mentors, clients, and strategic investors for the Incubator member startups.

### SERVICES OFFERED

SACEI has an extensive network of relationships with industry, funding sources, government agencies, and many other entities and individuals that can help an emerging cleantech company to become a market leader and a successful enterprise.

This enables SACEI to offer a wide array of high-impact services. SACEI will customize the package of services according to an individual company's needs and desires. These include, but are not limited to:

- Assistance with fundraising, including non-traditional sources of investment capital and sponsored R&D
- Networking into private and public sector entities for sales and strategic investment
- Intensive business planning, sales planning and mentoring
- Helping technical inventors team up with business leaders, to form well-rounded teams
- Helping entrepreneurs team up with experienced mentors
- Support in conducting both business and technical research
- Access to office and laboratory facilities
- Referrals to complementary business services provided by partners

For more information contact Andrew Trickett  
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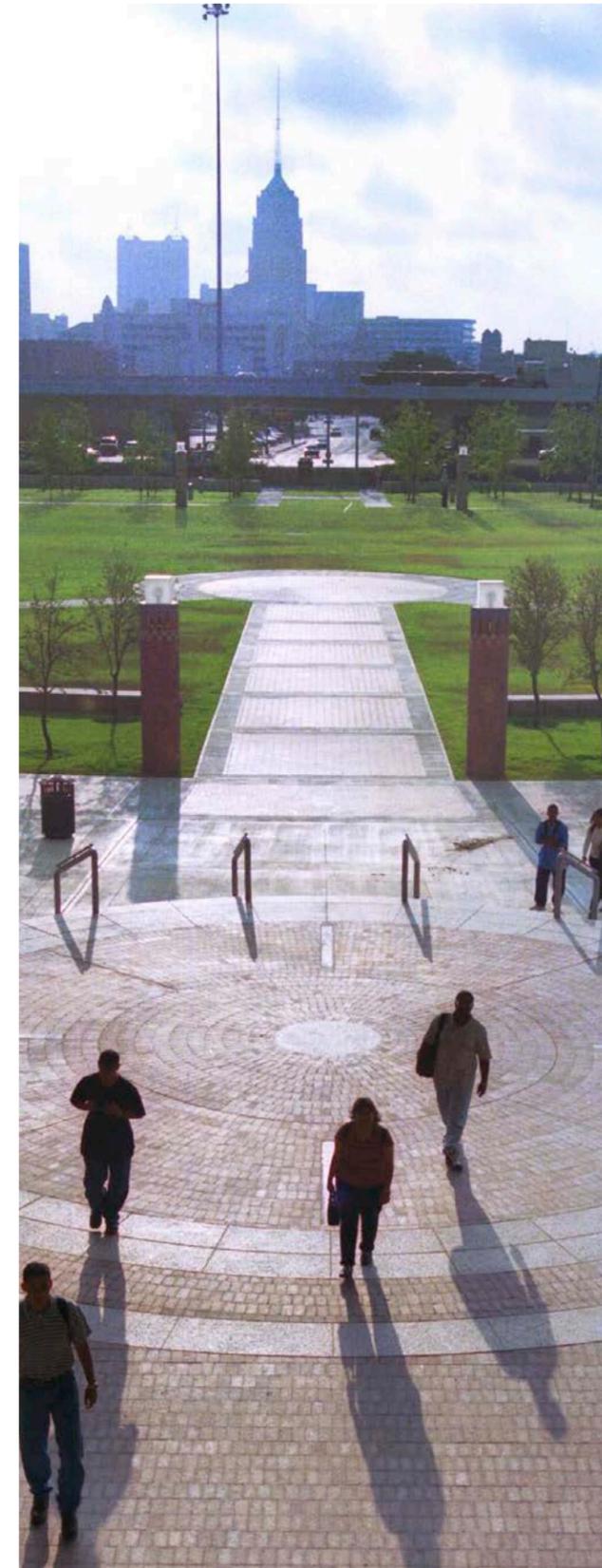
## BUILDING AN ENVIRONMENT OF LEADERSHIP EXCELLENCE

In alignment with UTSA's quest toward Tier One status and the Institute's goal to become a "partner of choice," we continue to develop strategic capabilities to: attract incredible people, manage our resources and capabilities to promote fiscal efficiency, optimize resources, inspire creative solutions and foster cooperation between our internal and external partners.

Among these efforts is the implementation of financial practices and reporting methods through which sound decisions can be made. Another is optimizing workspace to meet the challenge of UTSA and the Institute's rapid growth. As we diversify, our funding base is being built through partnerships with traditional academic channels as well as local clean energy businesses, public utilities, and regional research labs.

The Institute and its commitment to sustainability awareness continues to present challenges in the areas of capacity building, contracts and grants administration, procurement and facilities management. Through collaboration with professionals from these areas we are developing unique, creative solutions, which will set precedents for future growth initiatives to benefit the university community as well as the community at large.

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## REACHING OUT FOR A BETTER FUTURE

On July 14, 2011, the U.S. Department of Commerce's Economics and Statistics Administration (i.e. ESA) released a new report that outlines the USA standing in the Science, Technology, Engineering and Mathematics (STEM) fields.

STEM employment opportunities continue to be on the rise in the USA. In addition, STEM workers are estimated to earn approximately 26% more on average than non-STEM employees.

With this positive perspective in STEM employment, comes the challenge of developing STEM fields in education to ensure that our USA schools are ready to graduate diverse students to fulfill this projected demand. These jobs will lead our nation to innovation in technology and a more sustainable future both economically and environmentally.

The Institute is highly involved in local and national STEM initiatives. The Institute utilizes the multidisciplinary teams found with the breadth of the UTSA colleges to pursue energy and sustainability projects; improve emphasis on energy, water, sustainability and climate; and introduce our UTSA students to these projects. The key to a successful implementation of such projects is a holistic systems approach. The Institute has become a partner of choice with private, public and federal agencies to participate nationally and globally in STEM related initiatives.

### DEVELOPING CITIZEN LEADERS FOR A SUSTAINABLE GLOBAL COMMUNITY

Mentoring activities at the Institute are numerous and ongoing on a daily basis, starting with mentoring our student research assistants, to teaching in our classrooms as teaching faculty, to our involvement as Faculty Advisors to multiple student organizations, (e.g. Roadrunners



for Renewable Resources). In addition to our outreach activities at UTSA, the Institute partners in STEM initiatives with the Alamo Colleges, San Antonio Hispanic Chamber of

Commerce, and local high schools such as the Solar Car Challenge with James Madison High School.

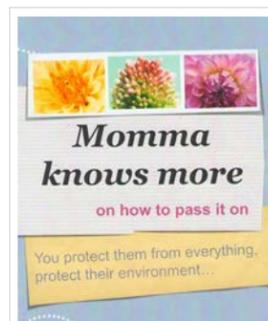
#### REACHING OUT TO DEVELOP:

- Citizens that Take Action
- Have the Capability and Background for Implementing Technology Innovations
- Diverse Citizens that Can Provide A Spectrum of Perspectives
- Curious Minds Driven to Discovery

### TECH TALKS: LET'S TALK TECH TALKS

Tech Talks are free technology lectures sponsored by the Institute to bring experts in the fields of water, energy, sustainability, economics, policy and development to the community. The wide range of topics facilitates sustainability education and promotes audience exposure to a variety of subjects. Over 30 technology focused talks and forums were sponsored by the Institute to date.

### TARGETED CAMPAIGNS FOR SUSTAINABLE LIVING



Some of the tools employed by the Institute to reach a wider audience include targeted campaign initiatives such as the Momma Knows More campaign initiative.



The Momma Knows More initiative is a targeted campaign to promote change by empowering women's confidence and gender participation in sustainable living.

### THE SOLAR CAR CHALLENGE WITH JAMES MADISON HIGH SCHOOL

The Institute, in collaboration with James Madison High School and UTSA, sponsored two solar car design projects. This brought together high school and university students in a mentoring environment to learn valuable real-world skills, advanced application of electrical and mechanical concepts, and shared critical problem solving.

On August 23rd 2011, the MadSCI Team exhibited their car, Solaris, during the Institute's Solar Fair at UTSA.

Design of the second car, Nova, was completed in Spring 2012. Named after a cataclysmic nuclear explosion, the car was made from a modified go-kart retrofitted with bicycle parts to be solar powered.

NOVA was raced at the Shell Eco-Marathon competition held in Houston Texas,

where teams attended from all over the Americas. The team received the award for perseverance and a cash prize of \$1,000. Learning real life skills such as welding, circuitry, machining, and teamwork were all benefits of this program.

STEM education is most successful when it magnifies the fun of this field and reduces some of the fear of math and sciences.

These students are now better prepared for higher education in fields related to science and engineering. Many are now interested in pursuing advanced careers in science and engineering. Dr. Joseph Dungan, a Chemistry teacher at James Madison High School, has encouraged and motivated the students as their MadSCI advisor. Dr. Dungan was also recognized as a Trinity Distinguished Educator.

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# THE INSTITUTE: A PARTNER OF CHOICE

The Institute strives become a “partner of choice,” and to connect with centers of discovery and innovation across Texas, the nation, and the world.

Through its partnerships, the Institute is expanding local capabilities to better serve San Antonio.

The Institute is expanding local capabilities to better serve San Antonio’s vision to connect with the global energy economy.

- The development of a strategic relationship with the National Renewable Energy Laboratory (i.e. NREL) that includes a cooperative research and development agreement (CARDA) that has been finalized between UTSA and NREL
- Partnerships with several private sector energy technology companies with an emphasis on technology development, commercialization and education
- Mentoring community high school students and engaging them in the UTSA STEM Programs (Science, Technology, Engineering & Math)

## MISSION VERDE ALLIANCE AND SAN ANTONIO CLEAN TECHNOLOGY FORUM

The Mission Verde Alliance (MVA) with its partners, is now located at the Institute’s UTSA downtown offices with the SACEI, to provide opportunities for job creation and economic development from the clean tech energy sector.



The Texas Sustainable Energy Research Institute draws on expertise and capabilities from across the broader community to provide holistic sustainable energy solutions.

With its founding chair Mr. Mike Burke, MVA serves as a catalyst for the development and use of clean technology for a sustainable economy for the San Antonio region. As a non-profit, created by seed money from the San Antonio Clean Technology Forum (SACTF), city of San Antonio, and Bank of America, MVA will achieve this mission thru advocacy, education, and outreach.

To enact this transformation into a sustainable green economy, the MVA has four focus areas: (1) create, attract and grow new clean technology, (2) galvanize local leaders to prioritize the attraction of clean technology businesses, (3) transition to a community that operates on sustainable principles, and (4) build San Antonio into a leader in sustainability.

MVA will also foster industry collaboration and sharing best practices. One of the main collaboration efforts includes the integration of the San Antonio Clean Tech Forum efforts.

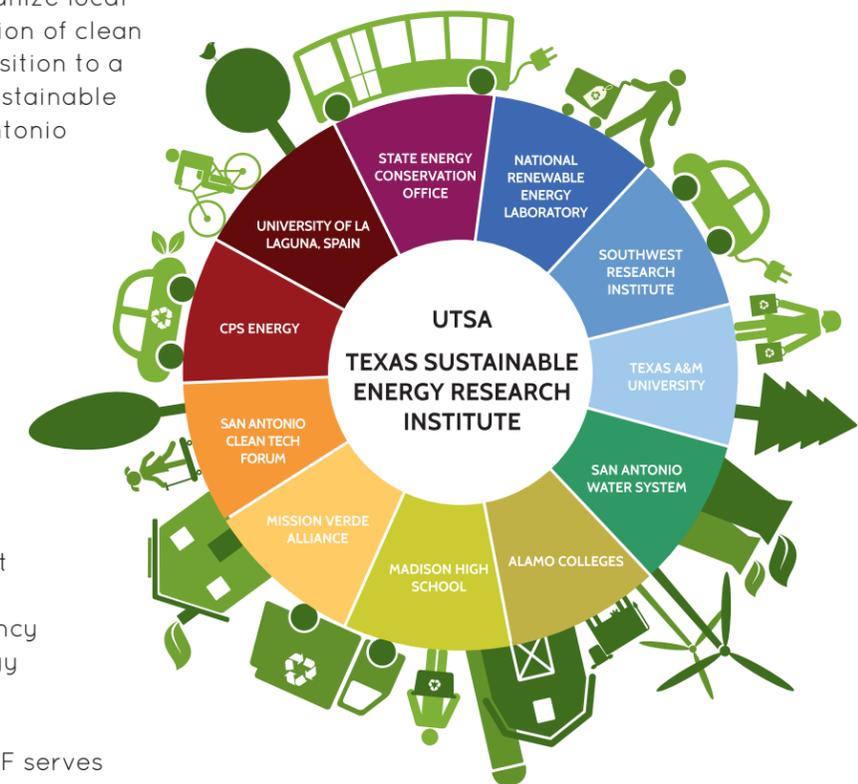
SACTF has a vision to significantly contribute to our region’s economic development and quality of life through the advancement of energy efficiency practices and alternative energy investments.

To accomplish this vision, SACTF serves as a gatherer, clearinghouse and provider of information in partnership with San Antonio’s major media.



## SAN ANTONIO CLEAN TECHNOLOGY FORUM

Since April 2008, SACTF has held 24 forums and panels. Major forums have been held on the San Antonio Mayor’s race, Nuclear Energy, Water Supply and Conservation, Energy Efficiency, the Smart Grid, CPS Energy’s decision to leverage its buying power to drive economic development, the Eagle Ford Shale, and a visit of Gregory Barker – UK Minister of Energy & Global Warming. Five Forums have been broadcasted in prime time throughout Texas by PBS.



# TIER 1 UNIVERSITY FOR A TIER 1 CITY



## SA2020

UTSA and the Institute, in collaboration with our external partners, are actively participating in reaching vision SA2020 for San Antonio.

With the integration of scientific discovery, engineering innovation and policy deliberations with pragmatic implementation and a commitment to our multicultural traditions, the Institute aspires to realize the promise of tomorrow's America as a global energy leader.

If we anchor the progress we've made so far, the students and employers of tomorrow will strive to either stay here or get here as fast as they can because they can't find another place like San Antonio. A place where the opportunity of the big city is matched by the small town flavor of the culture we call our own.

— Mayor Julián Castro

## BIG DREAMS FOR A GREAT CITY

The UTSA Downtown Campus hosted an historic event Monday, June 20, 2011, where San Antonio Mayor Julián Castro and CPS Energy President and CEO Doyle Beneby announced that five major clean-energy companies plan to move to San Antonio. UTSA and the Institute will serve as a center for new and renewable energy education and research as San Antonio's clean-energy industry grows.

As San Antonio's clean-energy industry grows, UTSA will serve as a center for new and renewable energy education and research. Initially UTSA will collaborate with:

- SunEdison
- UTSA and CPS Energy for clean energy research and development;
- GreenStar - pledge to give \$10 to the city for every LED light it manufactures in San Antonio to support local clean energy education
- Texas Instruments - will provide T.I. development tools for use in UTSA engineering laboratories
- Consort - will partner with UTSA and others in smart grid research and development

"This promises to be a big moment for our city which will position San Antonio as a national player in the New Energy Economy," Castro said when he invited people to the event in the Theater of the Buena Vista Building at the UTSA Downtown Campus. "By building a critical mass around research and development that will grow and attract the brainpower of the 21st century, San Antonio can be for the new energy economy what Silicon Valley is to software and what Boston is to biotech."

## TIER ONE UNIVERSITY

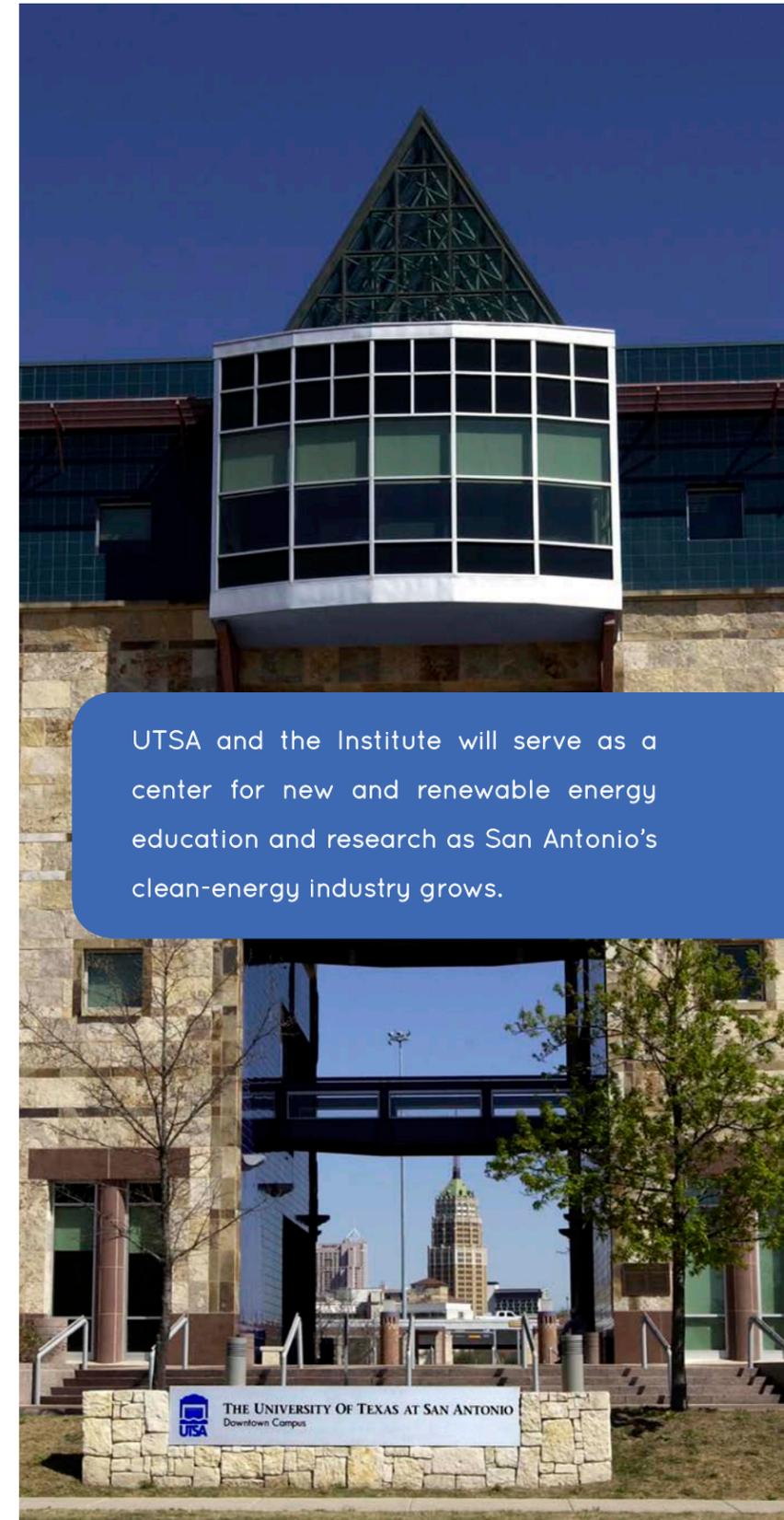
Tier One universities are known for outstanding research, quality education and generating major economic contributions to a region. UTSA has been recognized as one of the state's emerging research universities, the first step in becoming Tier One in Texas.

UTSA has created a 21st century vision for Tier One.

The Texas Sustainable Energy Research Institute supports this vision and recognizes that obtaining such status is important to the future of San Antonio. It will also mean attracting the best students, the most sought after teaching faculty and the world's best researchers. The Institute is very excited at the world of possibilities this can bring.

Tier One for UTSA will place San Antonio, the region and Texas on the global map of technology and industry, and that will have a direct benefit to all.

"Getting this university to Tier One status and research excellence is key to giving San Antonio an economic edge, particularly in bioscience and renewable energy," Castro says. "This is about creating a brainpower community that can generate jobs for the 21st Century."



UTSA and the Institute will serve as a center for new and renewable energy education and research as San Antonio's clean-energy industry grows.



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