



OCTOBER 2015

FISCAL NOTES

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The (Long, Long) History of the Texas Property Tax by Josh Haney

A CONTROVERSIAL LEVY

Texas has had property taxes as long as it's been, well, Texas. In fact, the Mexican government's elimination of a generous property tax exemption for settlers, as part of anti-immigrant laws put into place in 1830, helped spur the fight for Texas independence.

The property tax has seen many changes over time. And nearly two centuries later, it remains an essential revenue source for local governments in Texas, from cities and counties to mosquito control districts.

THE RISE AND FALL OF THE STATE PROPERTY TAX

For the first century after Texas' independence, the property tax supported not just local governments but the state as well, supplying 50 to 75 percent of all state tax receipts.

While the state relied heavily on property tax revenue, however, the tax itself was notorious for chaotic and disorganized administration, particularly during Reconstruction. This has often been attributed to Texas' uniquely decentralized system, in which local officials were responsible for much of the state tax's administration with little guidance or oversight.

Shortly after the Civil War, nearly a third of Texas' counties didn't even *have* a tax assessor-collector, the official charged with valuing property and collecting the tax for the state. An 1868 Comptroller report found that many local tax assessor-collectors were corrupt or incompetent. Other reports from the period cited widespread underreporting of property values; the 1880 U.S. Census estimated the value of all taxable property in Texas at \$725 million, more than twice the total on the state's tax rolls.

Texas lawmakers began tightening tax policies and improving collections at the end of the 19th century. Much of this progress, however, was undone by the Great Depression. In 1933, more than 20 percent of the



state's property tax levy was marked as delinquent. Delinquency rates didn't return to pre-Depression levels of around 6 percent until the mid-1940s.

The problem of property undervaluation would prove to be a lasting one, as it was built into the decentralized structure of the property tax at the time. A 1945 report from the Texas state auditor found that only seven counties were complying with the statutory requirement that property be assessed at 100 percent of its market value. On average, assessed value only accounted for 47 percent of the true value of real property in the state. Uneven assessments sapped a considerable portion of the tax's potential returns.

Throughout the early 20th century, moreover, the Legislature approved numerous laws permitting the remission of portions of the state's general revenue property tax collections to various local governments. At the time, the state levied three property taxes, one dedicated to general revenue, one for the Available School Fund (ASF) and another to pay the pensions of

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A Message from the Comptroller

In the last legislative session, when testifying before the Senate Finance Committee, I was asked: Which taxes do people like to pay? My response was to show the members a



blank piece of paper. In other words, none! A case in point is Texas' property tax, levied by a variety of local governments throughout the state.

In this issue of *Fiscal Notes*, we take a look at Texas' local property tax, as well as the long-deceased state property tax, and the changes and challenges they've seen over the years. The property tax is no stranger to legal challenges, and the courts are currently considering at least two more. Yet the tax is absolutely vital to cities, counties and in particular our public schools, which rely on it for nearly half of their funding.

We also examine the rise of "advanced industries" in our state — industries relying heavily on research and development and employing workers with advanced knowledge in the science, technology, engineering and mathematics (STEM) fields. According to the Brookings Institution, advanced industries "anchor the U.S. economy, support opportunity in other sectors and have led the post-recession employment recovery." In Texas, employment in advanced industries is rising faster than general employment.

Finally, we focus on exciting new techniques that recycle the water used in oil and natural gas "fracking" operations, greatly reducing the use of precious fresh water supplies in energy production.

As always, I hope you enjoy this issue!

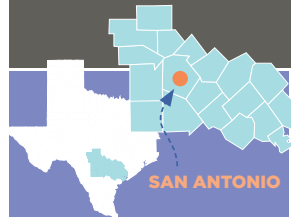

GLENN HEGAR
 Texas Comptroller of Public Accounts

REGIONAL SNAPSHOT: ALAMO REGION

As the state's chief financial officer, I'm charged with monitoring the state's economic health. Therefore, it's vitally important that my office studies factors related to our regional economies.

The 19 counties comprising the Alamo Region have helped boost Texas' remarkable growth and resiliency over the past 10 years.

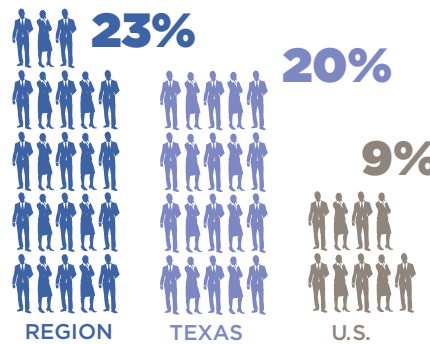
-GLENN HEGAR
 Texas Comptroller of Public Accounts



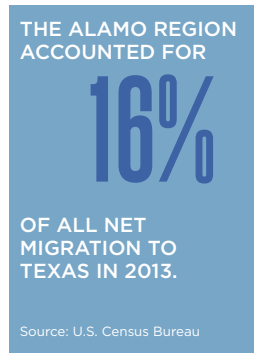
ALAMO REGION COUNTIES:

ATASCOSA	DEWITT	GUADALUPE	LAVACA
BANDERA	FRIO	JACKSON	MEDINA
BEXAR	GILLESPIE	KARNES	VICTORIA
CALHOUN	GOLIAD	KENDALL	WILSON
COMAL	GONZALES	KERR	

POPULATION GROWTH



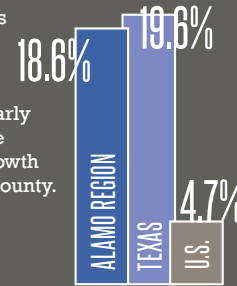
ALAMO REGION VS. TEXAS AND U.S. / 2003-2013



JOBS & WAGES

JOB GROWTH 2003-2013

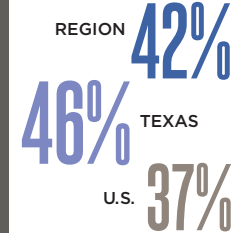
In 2013, Texas wages were \$7,300 (or 17 percent) higher than the Alamo Region average. Nearly three-quarters of the region's total job growth occurred in Bexar County.



FIESTA CELEBRATIONS IN SAN ANTONIO LAST 11 DAYS AND GENERATE \$300 MILLION IN ECONOMIC IMPACT.

Source: San Antonio Convention and Visitors Bureau

PER CAPITA PERSONAL INCOME GROWTH 2003-2013

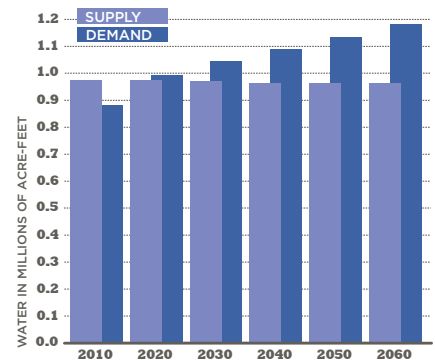


WATER

The Alamo Region may face water shortages in the near future. To address this challenge, areas such as Bexar County strive to curb consumption through water conservation. San Antonio has reduced its per capita water consumption by 40 percent in the past 30 years, despite having one of the nation's fastest-growing populations.

Source: San Antonio Water System

PROJECTED WATER SUPPLY VS. DEMAND / 2010-2060



FOR A COMPLETE LIST OF REGIONAL SNAPSHOTS, VISIT: TEXASAHEAD.ORG/REGIONALRPTS

Confederate veterans. Due to large wartime revenue surpluses and restrictions on state spending in the mid-1940s, the state didn't even collect the property tax supporting general revenue in 1946.

Two years later, voters approved a repeal of the general revenue portion of the tax altogether. The notoriously difficult-to-administer property tax, in short, had become more trouble than it was worth, at least so far as the health of the state's General Revenue Fund was concerned. Voters at the time were embracing more fiscally conservative policies, approving the well-known "pay-as-you-go" constitutional spending limit just a few years earlier in 1942.

The school portion of the state's property tax saw a similar development a few decades later. Revenue from other taxes supporting the ASF began to increase, eventually overtaking the state property tax. Texas voters subsequently nixed that tax in 1968.

In the 1950s, Texas voters approved a constitutional amendment allowing the Confederate veterans' portion of the tax to be used to finance the construction of new state buildings, as the number of beneficiaries had fallen significantly. It was finally repealed in 1979.

In 1982, Texas abolished all forms of state property taxation.

LOCAL PROPERTY TAXES

Local property taxes have a long history in Texas, and are levied by local governments such as school districts, cities and counties, as well as special-purpose districts providing a wide variety of public services.

In 1979, Texas lawmakers approved some long-needed reforms that did much to standardize the administration of local property taxes. These reforms were largely the project of one particularly persistent legislator, Rep. Wayne Peveto from Orange, who described the problem in the August 1995 issue of *Fiscal Notes*:

Some districts had not reappraised their property since their inception; others had reappraised more recently, and thus appeared richer than they actually were when compared with districts that had not reappraised. There was no uniformity in how appraisals were carried out [or] in the appraisers' qualifications. There was not even uniformity as to what types of property were placed on the tax roll[s]. Some school districts taxed chickens; others taxed cars; others taxed only real property

The "Peveto bill," passed in 1979 after several failed attempts in previous sessions, essentially formed the basis of the property tax system in place today. First, in an attempt to professionalize and depoliticize the appraisal process, it separated appraisals from tax collection by creating a system of countywide central appraisal districts (CADs). Additionally, property now had to be assessed at full market value and reassessed at least once every three years.

To improve state oversight and provide guidance to local CADs, the legislation created the State Property Tax Board (subsequently eliminated in 1991, with its functions folded into the Comptroller's office) and required counties to establish appraisal review boards to allow taxpayers to contest their appraisals.

These reforms have done much to make the property tax system more consistent across the state. In 1979, most homesteads were being appraised at about 60 percent of their market value. According to the most recent Property Value Study — an annual report from the Comptroller's office — statewide appraisals of single-family homes were very consistent and near full market value, with an overall statewide residential appraised ratio of 98 percent of market value.

SCHOOL FUNDING AND COURT CHALLENGES

Peveto's 1979 bill itself was partly the result of a landmark court case, *San Antonio Independent School District v. Rodriguez*, decided in 1973. The U.S. Supreme Court found that Texas' school finance system, heavily dependent on property taxes, resulted in considerable inequities in the distribution of state aid to school districts. It did not, however, declare it in violation of the U.S. Constitution's equal protection clause, as in its view education was not a "fundamental" right granted by the Constitution.

CONTINUED ON PAGE 5



HOW TEXAS LOCAL PROPERTY TAXES WORK

YOUR PROPERTY TAX BILL IS DETERMINED AS FOLLOWS, FOR EACH TAXING ENTITY THAT SERVES YOUR PROPERTY:

$$\left(\frac{\text{APPRAISED PROPERTY VALUE - EXEMPTIONS OR SPECIAL APPRAISALS}}{100} \right) \times \text{PROPERTY TAX RATE}$$

Local taxing entities determine the rate at which the property is taxed. Usually, the property tax rate levied by a local government is made up of two parts: the maintenance and operations (M&O) rate, intended to support operating expenditures such as salaries, and the interest and sinking (I&S) rate), which generally supports bond debt incurred for facility construction.

Exemptions reduce the appraised value of property and, as a result, the overall tax bill. The state requires a

mandatory school property tax exemption for homeowners, currently \$15,000 but rising to \$25,000 if Texas voters approve a November constitutional amendment. Local governments can offer their own exemptions or other value reductions on certain types of property as well. **Exhibit 1** illustrates the maximum rates and homestead exemption amounts Texas local taxing entities are allowed to adopt.

EXHIBIT 1

MAXIMUM RATES AND HOMESTEAD EXEMPTIONS ALLOWED BY THE STATE

ENTITY	MAXIMUM RATES PER \$100 VALUATION	HOMESTEAD EXEMPTION
SCHOOL DISTRICTS	M&O: \$1.17 I&S: \$0.50	Up to 20%, with a minimum exemption of \$5,000 State mandated: \$15,000; rising to \$25,000 if voters approve in November
CITIES	Cities and towns with population ≤ 5,000: \$1.50 Cities and towns with population > 5,000: \$2.50	Up to 20%, with a minimum exemption of \$5,000
COUNTIES	General Fund: \$0.80 Farm-to-market roads/flood control: \$0.30 Special roads and bridges: \$0.15	Up to 20%, with a minimum exemption of \$5,000
SPECIAL-PURPOSE DISTRICTS*	Community colleges: \$1.00 w/ no more than \$0.50 applied to debt service Hospital districts: \$0.75	Up to 20%, with a minimum exemption of \$5,000*

*There are many other types of special-purpose districts. Community colleges and hospital districts usually are among those with the highest tax levies.

Note: Maximum rates represent the general restrictions applied to nearly all entities. There may be cases in which some entities can exceed this limit or are subject to a more restrictive tax rate limit.

Source: Texas Legislative Council and Texas Comptroller of Public Accounts

Property *values* are determined by each county's central appraisal district, which is led by a board appointed by all the taxing entities in the county. The Texas Constitution requires that all property be taxed equally and uniformly, and appraised at no more than its fair market value. Texas is one of only a handful of states that do not require sales price information to be reported to CADs, however, which sometimes makes determining fair market value more difficult.

In Texas, state law recognizes three common methods to value property:

1. Market Data Comparison Approach: Most appropriate for single-family residential properties, this approach compares a home's characteristics with those of similar homes recently sold.

2. Income Approach: Most appropriate for commercial properties, this approach relies on an estimate of what an investor would pay for the property in anticipation of future income that it may generate.

3. Cost Approach: Often used for types of property that are not frequently sold or are under construction, and in cases in which CADs cannot obtain sufficient data on sales and income, this approach relies on an estimate of the cost required to replace the property, as is, with one of equal utility.

A separate appraisal review board settles any disputes between a property owner and the appraisal district regarding the appraised property value.

State legislators attempting to address the system's inequality soon became bogged down in the widely varying appraisal practices used across the state. Peveto's reforms were a first step to addressing that issue.

While the Supreme Court stated that the U.S. Constitution does not grant public education as a fundamental right, the Texas Constitution states that Texans are entitled to a system of free public schools to ensure a "general diffusion of knowledge." As a result, efforts to reform the school finance system have turned to state courts since the *Rodriguez* case.

TAX RELIEF

Property tax relief has been a perennial public policy goal in Texas, and the subject of several blue-ribbon committees and appointed task forces.

Their efforts culminated in a 1997 amendment to the state constitution that increased the homestead exemption from \$5,000 to \$15,000 and authorized the Legislature to limit the amount by which homestead appraisals can increase each year.

Despite this limitation, local property tax levies began rising faster around 2000, reflecting the state's burgeoning growth. From 2000 to 2006, the total levy increased from about \$20 billion to \$35.6 billion. According to the U.S. Census Bureau, Texas' per capita

property tax collections as a share of personal income peaked around this time, reaching 4.4 percent in 2005 — the ninth-highest in the country that year.

This increase — along with a Texas Supreme Court finding that the school finance system was unconstitutional — sparked additional reforms in 2006, the most consequential since Peveto's legislation. Among other things, the 2006 legislation reduced school district maintenance and operations (M&O) tax rates by one-third over two years, and attempted to replace most of the lost revenue with a broader state franchise tax, increased rates for tobacco products and increased motor vehicle sales tax collections.

The success of those reforms, however, continues to be the subject of much public debate. Since 2007, property tax levies have increased by an estimated \$13.8 billion, to \$48.9 billion in fiscal 2014 (**Exhibit 2**). School districts accounted for about 58 percent of that growth, with cities, counties and special-purpose districts responsible for about 14 percent each.

In response to the continued rise in local property taxes, the 2015 Legislature increased the homestead exemption again, to \$25,000, subject to voter approval in November. The increase would cost the state an estimated \$3.8 billion annually, while providing the average homeowner around \$120 annually in tax relief.

LATEST CHALLENGES

Texas' property tax system for public schools currently faces two major legal challenges.

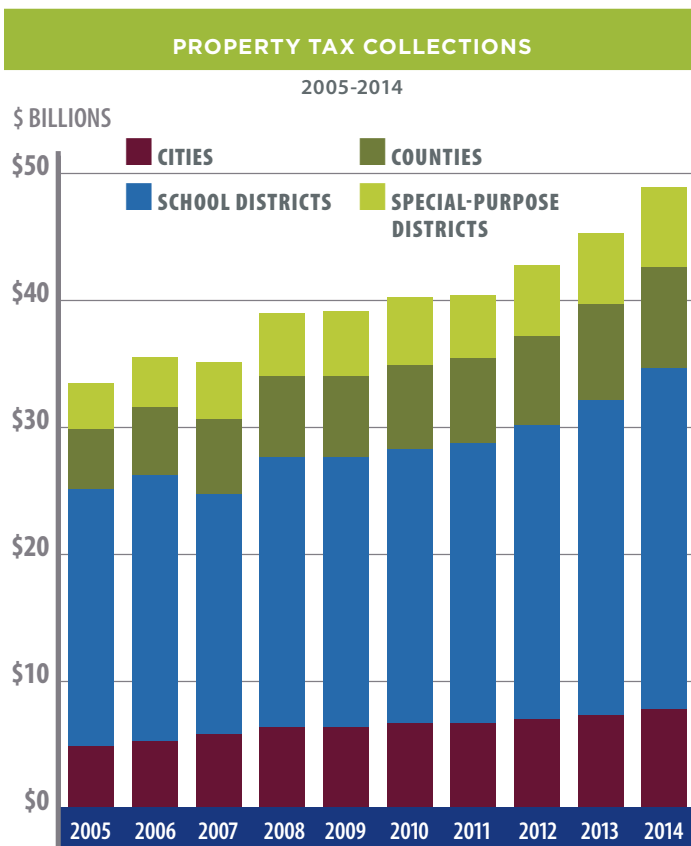
In August 2014, the Travis County District Court ruled (as others before it) that the current school finance system is unconstitutional. Among other issues, the court found that the statewide limit on property tax rates constitutes a *de facto* state tax, as many districts must levy the maximum tax rate to meet the state's educational requirements. The case has moved to the Texas Supreme Court, which heard oral arguments on Sept. 1. While the case primarily concerns the formulas that drive the distribution of state educational dollars, an unconstitutional finding from the court may prompt additional property tax reforms.

Another complaint concerns the property tax appraisal system and the methods by which appraisals may be challenged. A recently filed lawsuit by the city of Austin takes aim at these methods, arguing that they disproportionately benefit commercial property owners and, as a result, shift the tax burden to homeowners.

And so it goes with the property tax — frequently under fire, but essential to the functioning of local government. **FN**

For more information on Texas' property taxes, visit the Comptroller's website at comptroller.texas.gov/taxinfo/proptax.

EXHIBIT 2



Source: Texas Comptroller of Public Accounts

Advanced Industries Drive Job Growth

by David Green and Gerard MacCrossan

HIGHER WAGES LIFT OTHER EMPLOYMENT SECTORS

There are jobs, and then there are *good jobs*. While any new job signals positive economic activity, the best jobs offer long-term opportunities and the disposable income that generates demand for goods and services, benefiting the broader economy. And these jobs, then, are the real goal of economic development officials and government leaders.

The Brookings Institution's 2015 report *America's Advanced Industries* attempts to quantify the job sectors that are boosting U.S. employment or wages, and points to the prominent successes featured in a group of 50 industries, the so-called *advanced industries (AI)*, which invest heavily in technological innovation and employ skilled technical workers.

Advanced industries represent innovative sectors that have driven productivity gains in our economy. These are the industries behind innovations such as 3-D printing, advanced materials and robotics, and breakthroughs in business processes and service delivery that employ sophisticated analytics, "big data" and cloud computing.



BROOKINGS' ADVANCED INDUSTRIES

The Brookings Institution identified advanced industries using two criteria:

- the industry's research and development (R&D) spending per worker must fall in the 80th percentile of all industries, exceeding \$450 per worker annually; and
- the share of workers in the industry whose occupations require a high degree of knowledge of science, technology, engineering or mathematics (STEM) must be above the national average of 21 percent.

THE 50 INDUSTRIES OF THE ADVANCED INDUSTRIES SECTOR

MANUFACTURING

- Aerospace Products and Parts
- Agricultural, Construction and Mining Machinery
- Aluminum Production and Processing
- Audio and Video Equipment
- Basic Chemicals
- Clay Products
- Commercial and Service Industry Machinery
- Communications Equipment
- Computers and Peripheral Equipment
- Electric Lighting Equipment
- Electrical Equipment
- Engines, Turbines and Power Transmission Equipment
- Foundries
- Household Appliances
- Industrial Machinery
- Iron, Steel and Ferroalloys
- Motor Vehicle Bodies and Trailers
- Motor Vehicle Parts
- Motor Vehicles
- Navigation, Measurement and Control Instruments
- Other Chemical Products
- Other Electrical Equipment and Components
- Other General Purpose Machinery
- Other Miscellaneous Manufacturing
- Other Nonmetallic Mineral Products
- Other Transportation Equipment
- Pesticides, Fertilizers and Other Agricultural Chemicals
- Petroleum and Coal Products
- Pharmaceuticals and Medicine
- Railroad Rolling Stock
- Resins and Synthetic Rubbers, Fibers and Filaments
- Semiconductors and Other Electronic Components
- Ship and Boat Building
- Medical Equipment and Supplies
- Reproducing Magnetic and Optical Media

ENERGY

- Electric Power Generation, Transmission and Distribution
- Metal Ore Mining
- Oil and Gas Extraction

SERVICES

- Architecture and Engineering
- Cable and Other Subscription Programming
- Computer Systems Design
- Data Processing and Hosting
- Medical and Diagnostic Laboratories
- Management, Scientific and Technical Consulting
- Other Information Services
- Other Telecommunications
- Satellite Telecommunications
- Scientific Research and Development
- Software Publishers
- Wireless Telecommunications Carriers

Source: The Brookings Institution

EXHIBIT 1

ADVANCED INDUSTRY SHARE OF TOTAL EMPLOYMENT AND PERCENT CHANGES, 2004-2014

METROPOLITAN AREA (RANKED BY MOST JOBS CREATED)	ADVANCED INDUSTRIES AS SHARE OF ALL JOBS		PERCENT EMPLOYMENT CHANGE, 2004-2014	
	2004	2014	ADVANCED INDUSTRIES	TOTAL EMPLOYMENT
Dallas-Fort Worth-Arlington	11.0%	10.3%	10.9%	17.9%
Houston-The Woodlands-Sugar Land	12.0%	12.5%	31.0%	25.2%
San Antonio-New Braunfels	5.7%	6.7%	40.7%	20.7%
Austin-Round Rock	12.6%	12.7%	34.1%	32.5%
El Paso	5.3%	4.4%	-3.7%	18.1%
McAllen-Edinburg-Mission	2.6%	2.1%	0.5%	25.5%
Texas	9.2%	9.5%	24.1%	20.7%
United States	8.7%	8.8%	5.4%	4.9%

Sources: Economic Modeling Specialists Intl., Texas Comptroller of Public Accounts, The Brookings Institution

annually in 2014. Comptroller analysis of the most recent data indicates that Houston’s diverse AI community provides more than 363,000 jobs in the metro area, or 12.5 percent of total employment.

AI IN TEXAS

In the past decade, Texas’ employment in advanced industries rose substantially faster than in the nation as a whole.

Texas AI employment rose by 24.1 percent or 1.1 million jobs between 2004 and 2014, compared to a 20.7 percent increase in all Texas employment. In the same period, national AI employment rose by just by 5.4 percent, barely outpacing the 4.9 percent increase in all U.S. jobs (Exhibit 1).

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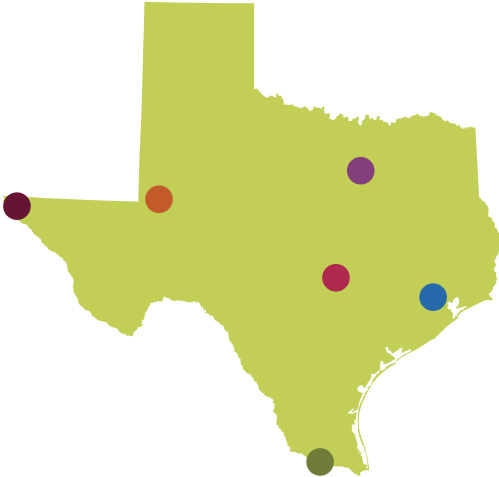
While advanced industries offer a relatively small share of jobs (9.5 percent of Texas employment in 2014), small businesses in the communities where advanced industries operate — from dry cleaners and restaurants to doctors and lawyers — benefit greatly from their presence. Brookings estimates that one advanced industry job stimulates 2.2 indirect jobs. If so, about 25 percent of all American jobs are related either directly or indirectly to advanced industries.

Advanced industries employ 80 percent of the nation’s engineers, and account for 90 percent of private-sector research and development spending and 85 percent of U.S. patents issued. They’re also highly interconnected with other industries — U.S. employers in advanced industries spend an average of \$236,000 per worker on related goods and services, compared to just \$67,000 per worker in other industries.

Brookings reports that California, Texas, New York, Illinois and Michigan together provide 35 percent of the nation’s AI jobs. Typically, advanced industries cluster in metropolitan areas; Houston and Austin ranked among the top metro areas for AI employment in 2014. Austin’s tech jobs paid an average of more than \$100,000

EXHIBIT 2

ADVANCED INDUSTRIES IN TEXAS METRO AREAS, 2004-2014



AI accounted for 12.7 percent of **AUSTIN-ROUND ROCK’S** total employment in 2014, followed closely by the **HOUSTON-THE WOODLANDS-SUGAR LAND** MSA at 12.5 percent. Advanced industries in these areas outpaced total employment growth from 2004 to 2014.

The greater **HOUSTON** area accounts for more than 32 percent of the state’s AI jobs, while the **DALLAS-FORT WORTH** metro area has almost 30 percent.

The border MSAs of **MCALLEN-EDINBURG-MISSION** and **EL PASO** had the lowest shares of AI employment in 2014, and each area had stagnant or declining AI employment in the 2004-2014 period.

Energy-sector hotspots **MIDLAND** and **ODESSA** saw significant increases in AI and total employment from 2004 to 2014; they also enjoyed the largest wage increase in non-AI jobs, at 88 percent and 79 percent, respectively.



DISTRIBUTION OF TEXAS' ADVANCED INDUSTRIES

As Exhibit 1 illustrates, Texas' AI employment isn't evenly distributed among metropolitan statistical areas (MSAs) — and that disparity is growing, according to a Comptroller analysis (Exhibit 2). Ten Texas MSAs lost AI jobs in the 2004-2014 decade, and 14 saw their share of jobs in AI industries decline. Particularly apparent was the shortage of advanced-industry jobs outside the major metro areas and the oil patch; communities along

the Mexico border and in the Panhandle, far North Texas and Northeast Texas all lost AI jobs.

ADVANCED INDUSTRY TRENDS

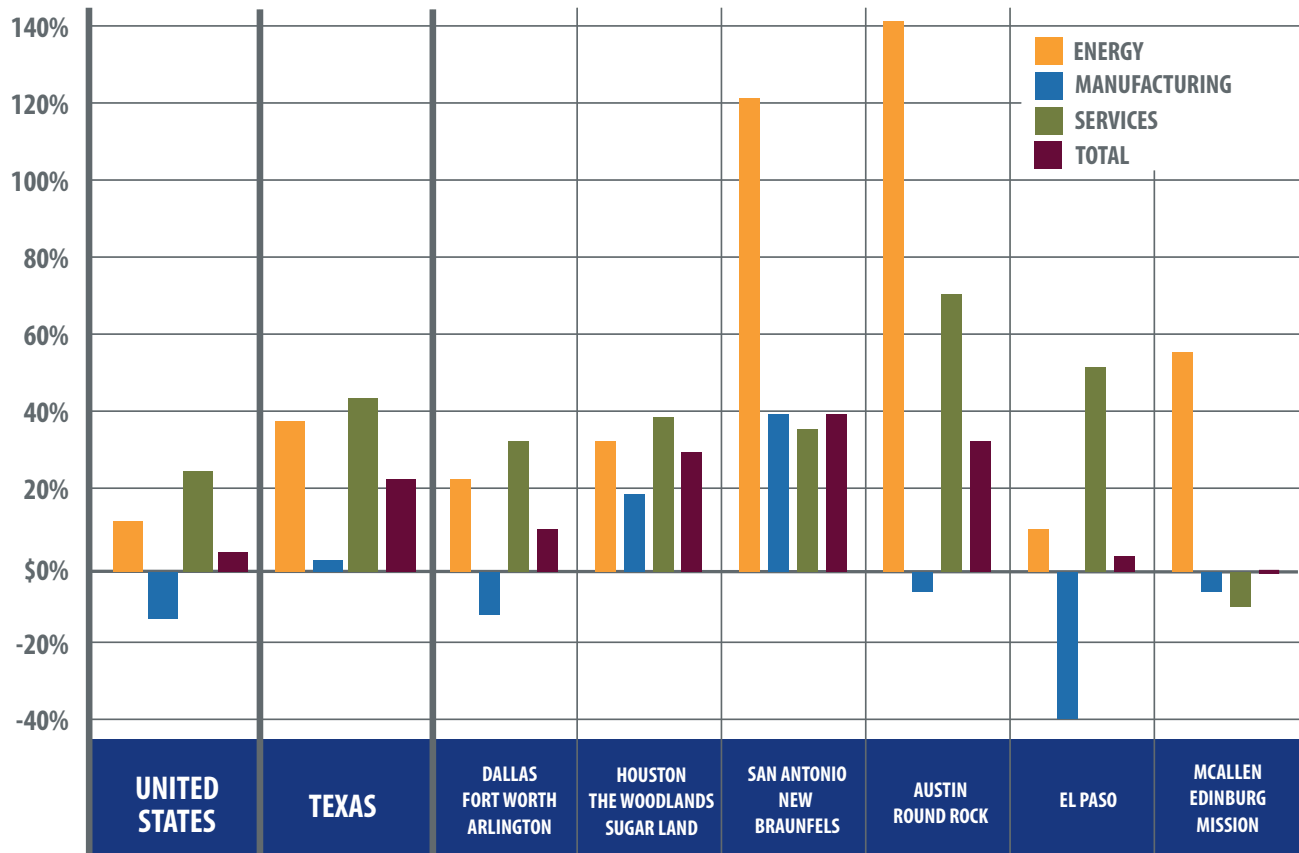
Brookings divides its roster of AI industries among *manufacturing*, *energy* and *services*. In the 2004-2014 period, AI service employment rose by 45 percent, and added the most jobs in Texas by far; AI energy employment rose by 39 percent, although the sector is much smaller

EXHIBIT 3

ADVANCED INDUSTRIES EMPLOYMENT GROWTH IN TEXAS, THE U.S. AND THE LARGEST TEXAS METRO AREAS

2004-2014

PERCENT CHANGE



Sources: Economic Modeling Specialists Intl., Texas Comptroller of Public Accounts, The Brookings Institution



and added fewer jobs. The global downturn in oil prices can be expected to temper this sector's growth. The state's AI manufacturing employment rose at a much slower rate (3 percent), but nationwide, the AI manufacturing sector saw job losses of 12 percent (Exhibit 3). Among the metro areas, Houston unsurprisingly saw substantial growth in AI energy employment (34 percent), but AI service employment rose even faster (40 percent). The most spectacular growth in AI energy

A few of Texas' advanced industries have grown very strongly, shoring up the whole sector.

employment occurred in Austin, at 143 percent, but the numerical gain was just 2,600 jobs, a very small part of the state's energy employment.

A few of Texas' advanced industries have grown very strongly, shoring up the whole sector, and

particularly offsetting job losses in manufacturing (Exhibit 4). In fact, without the 28,000 jobs added from 2004 to 2014 in the Agriculture, Construction and Mining Machinery category, which is strongly related to the energy industry, total Texas AI manufacturing employment would have declined by almost 16,000 jobs. Even so, the category saw declines from 2013 to 2014.

The greatest gains in Texas' advanced industries occurred in Computer Systems Design and Related Services, which nearly doubled in size during the decade. Notably, the greatest AI losses were in Semiconductor and Other Electronic Component Manufacturing, highlighting the economy's continuing transition from manufacturing to services, even in high tech. The next two greatest AI gains were in industries

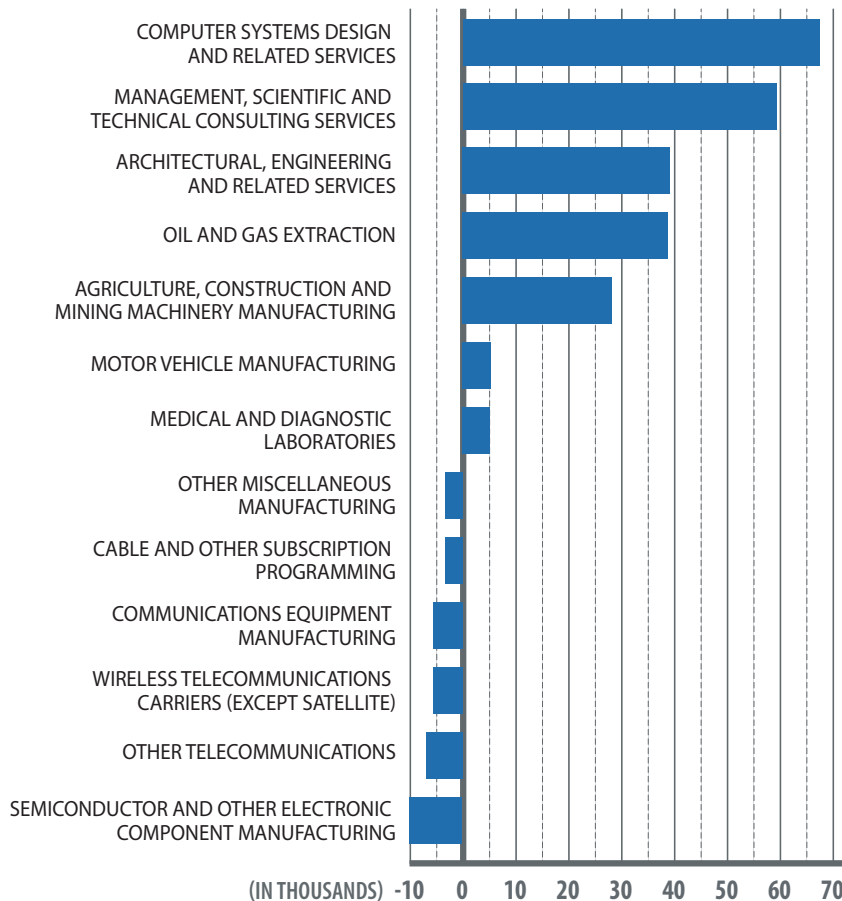
providing professional services, Management, Scientific and Technical Consulting and Architectural, Engineering and Related Services.

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EXHIBIT 4

GREATEST JOB GAINS AND LOSSES AMONG ADVANCED INDUSTRIES IN TEXAS

2004-2014



Sources: Economic Modeling Specialists Intl., Texas Comptroller of Public Accounts, The Brookings Institution



Identifying the less-favored metro areas and focusing efforts to recruit AI jobs there would help raise wages and improve both the local and state economies.

Interestingly, despite a gain of 218,000 AI jobs in Texas during the decade, 27 of the 50 AI categories actually saw declines in employment.

BETTER PAY, BUT WAGES VARY BY REGION

The advanced industries' higher-than-average wages are naturally coveted by states competing for job growth. In 2014, these jobs paid average annual salaries of \$99,967 in Texas, 10.4 percent higher than the U.S. average. By contrast, the average wage for all Texas jobs, about \$51,000 annually, is just 3.5 percent higher than the U.S. average (Exhibit 5).

For AI workers in most Texas metro areas, the financial rewards are significant, paying on average at least 40 percent more in every MSA except Killeen-Temple, and more than twice the average wage in the Beaumont-Port Arthur and Sherman-Denison areas.

AI jobs in McAllen and Brownsville pay wages 50 percent higher than average for those communities, but less than the overall average statewide wage. In both MSAs, advanced-industry jobs represent less than 3 percent of the workforce; Brownsville lost more than 1,100 AI jobs between 2004 and 2014.

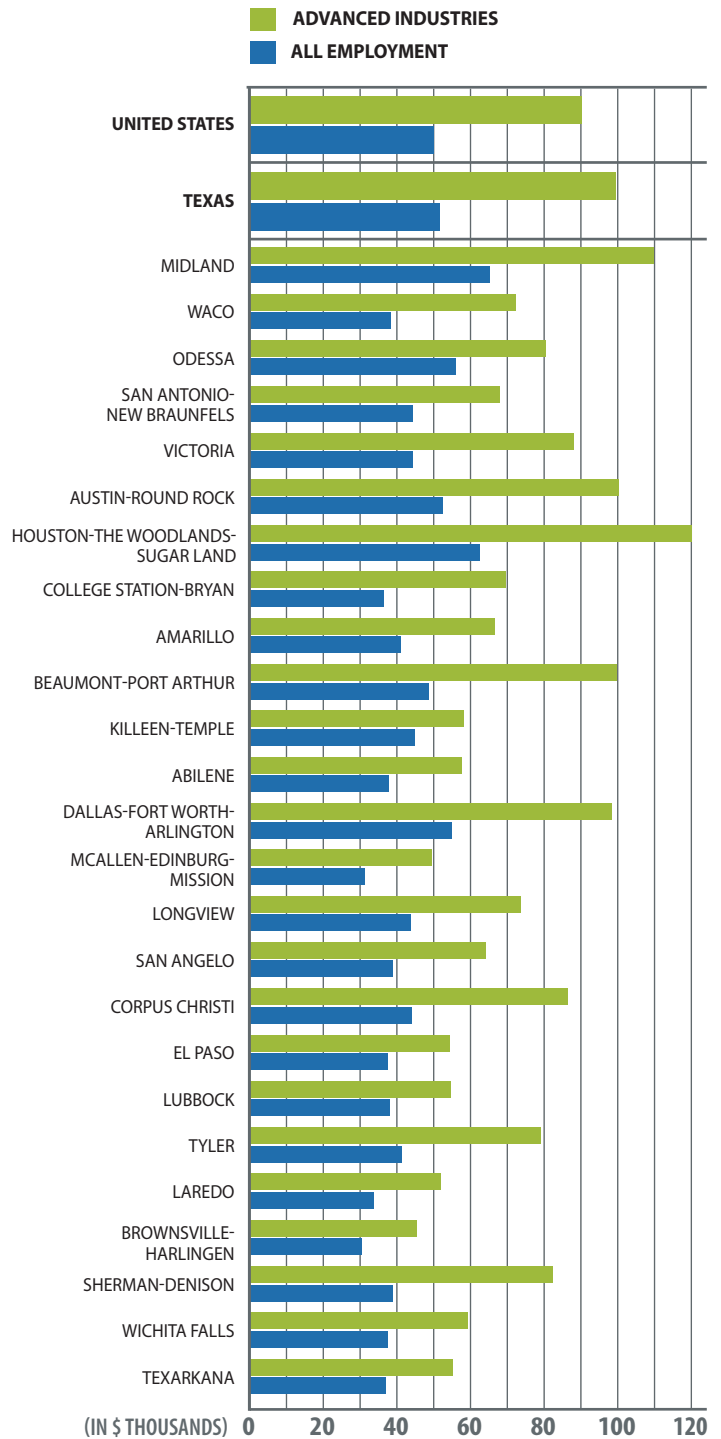
Exhibit 5 underlines the fact that advanced industries tend to benefit some metro areas more than others. Business location decisions can be complex, but the availability of energy resources, technology and skilled workers clearly prompts AI companies to cluster in some areas rather than others.

Identifying the less-favored metro areas and focusing efforts to recruit AI jobs there would help raise wages and improve both the local and state economies. **FN**

For more information on advanced industries, see the Brookings Institution's report at brookings.edu/research/reports2/2015/02/03-advanced-industries.

EXHIBIT 5

AVERAGE TEXAS WAGES IN 2014



Sources: Economic Modeling Specialists Int'l., Texas Comptroller of Public Accounts, The Brookings Institution

Recycling Fracking Water

by Jackie Benton

DRILLERS REUSE, REPEAT



Photo courtesy of Apache Corporation.

An Apache frack water recycling operation in Irion County.

By now, most Texans surely know that the oil and natural gas boom of the last few years was driven largely by the increased use of hydraulic fracturing, or “fracking,” which shatters underground rock formations to release the oil and gas trapped inside.



REESE TISDALE
PRESIDENT,
BLUEFIELD RESEARCH

Oil and gas production in general accounts for less than 1 percent of Texas’ water use, according to the Texas Water Development Board. But in areas of Texas where fresh water is scarce, the water-intensive nature of hydraulic fracturing could be a cause for concern. Some frack wells require 10 million gallons of water or more.

Isn’t there a way to recycle and reuse this water?

The answer is yes, says Reese Tisdale, president of Bluefield Research and former research director for IHS, a leading research and advisory firm — but it’s not easy, and it can be expensive.

Some frack wells require 10 million gallons of water or more.

Bluefield Research, which tracks water strategies and trends for industry, estimates that in 2014 the fracking industry spent nearly \$6.4 billion on water management — including water supply, storage, transport, treatment and disposal — with water transport and disposal costs accounting for 66 percent of the total.

Bluefield also expects the water treatment market for fracking to rise from \$138 million in 2014 to \$357 million in 2020.

THE DISPOSAL OPTION

Fracking fluid combines water with proprietary mixes of chemicals, and is unsuitable for reuse without treatment.

“There are chemicals, oil droplets, rock fragments, polymers and a bunch of gunk you need to get rid of,” says Dr. Jean-Philippe Nicot, senior research scientist

CONTINUED ON PAGE 12



Photo courtesy of Apache Corporation.

Apache stores water in converted grain bins prior to reuse.

with the Bureau of Economic Geology at the University of Texas at Austin. “Also, you may have collected chemicals that might not be compatible with the chemicals injected into the water for your fracking operation, and therefore it might not work.”

And because of its potential toxicity to water-borne organisms, frack water cannot simply be disposed of in surface waters.

Many hydraulic fracturing operations use “injection” wells to dispose of contaminated fluids. These concrete-encased wells reach thousands of feet underground and can store waste liquid from multiple fracking operations.

The Texas Railroad Commission (RRC) reports the state has about 56,000 permitted injection and disposal wells as of April 30, 2015, about 33,000 of which are active. The majority of these wells are used for enhanced oil recovery

Because of its potential toxicity to water-borne organisms, frack water cannot simply be disposed of in surface waters.

(EOR), in which steam, gases or water mixtures are used to flush residual hydrocarbons from a rock formation.

About 7,800 wells, however, are used for the disposal of used fracking fluid “flowback” water — as well as subsurface water produced from formations along with oil and gas (“produced” water).

“The ubiquity of disposal wells and their lower cost compared to reuse has made them the primary option,” explains Tisdale. “Recycling water has been slow to gain traction in Texas, but should increase in the long term.”

RECYCLING COMPLEXITIES

Nicot agrees that the plentiful number of injection wells makes their use for the disposal of frack water the cheapest option for many operators, and points to complications and expenses companies run into when recycling the wastewater from their operations.

“Recycling involves complicated logistics, the gathering of the [frack] water and its redistribution,” Nicot explains. “Recycling can be done through mobile units at

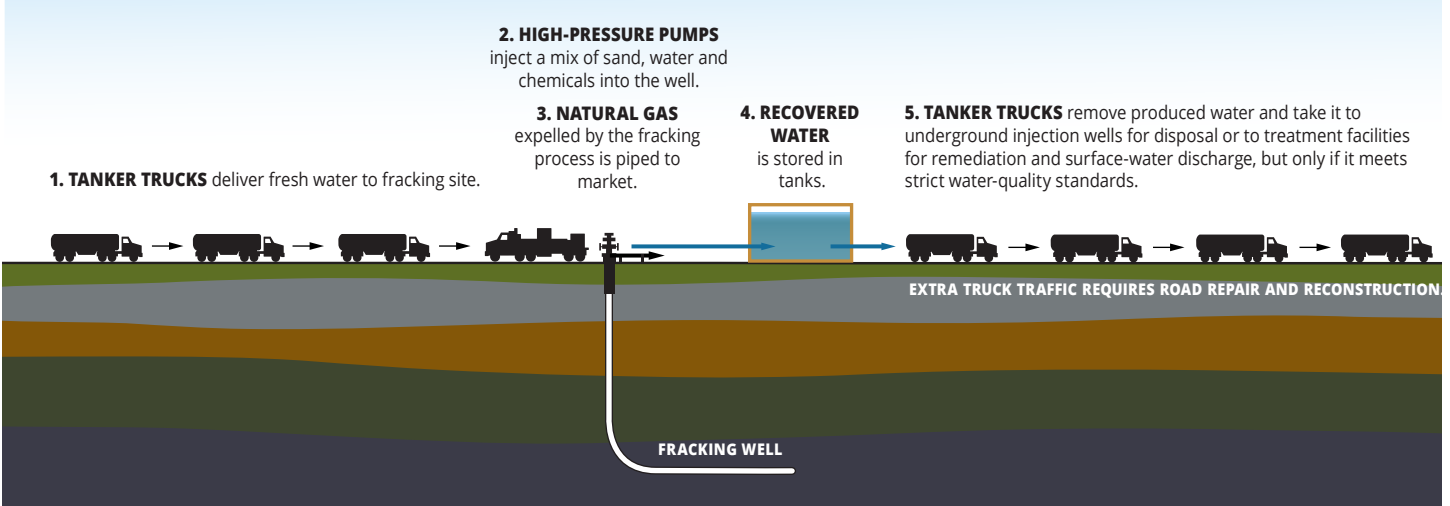
the wellhead, but it makes sense only if an operator owns many leases in the same area, and can use the recycled water to frack the next well. Some companies have developed permanent treatment facilities and a network of water lines, but it’s expensive unless you are in the area for the long term.

“Another aspect often overlooked is that the risk of contamination through accident, spills and so forth

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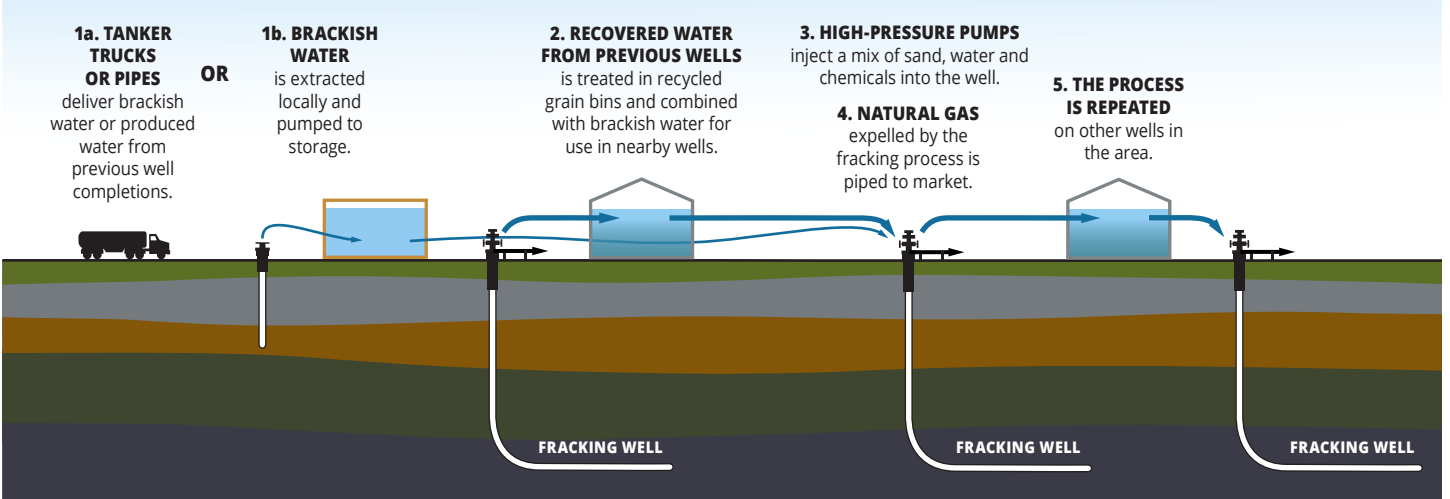
Typically, hydraulic fracturing operations use disposal wells to store contaminated drilling fluid. These disposal wells, thousands of feet deep and encased in concrete, offer a “quick fix” solution for companies that need to get rid of produced water.

TYPICAL WATER HANDLING FROM FRACKING WELLS



Recycling the water produced from hydraulic fracturing operations, however, reduces the demand for fresh water and the environmental impacts associated with truck traffic, such as emissions and road wear.

WATER RECYCLING FROM FRACKING WELLS



Source: Apache Corporation

In addition to the environmental benefits, Cooper says that recycling frack water in place saves the company money on transportation and eases the burden on local communities posed by truck traffic and increased road wear.



DR. CAL COOPER

MANAGER OF SPECIAL PROJECTS
WITH APACHE CORPORATION

increases when the water is moved around," Nicot says.

Until 2013, operators who wished to recycle frack water required a separate permit to do so. In that year, RRC adopted new regulations that eliminate the need for a recycling permit if the operator is recycling the fluid on its own lease or transferring it to another operator's lease for recycling.

IN IRION COUNTY

One Houston-based oil and gas producer, Apache Corporation, has been developing ways to reduce its water resource needs, and its new water management practices are

proving to be both environmentally and economically beneficial.

The company's recycling efforts began in Irion County in 2013, in West Texas' Permian basin production area.

"Apache was inspired to develop a facility in Irion County because of a keen awareness of water supply issues and a strong desire to prove that using recycled produced water would be economically sensible," says Dr. Cal Cooper, manager of Special Projects with Apache Corporation. "The lessons [we've] learned over time have resulted in a method of water treatment and reuse that is both economically and logistically superior to trucking it away for disposal."

Apache has used its method for dozens of wells in the Wolfcamp Shale formation of water-sensitive West Texas. Fracking each well requires about 340,000 barrels of water. To avoid using freshwater, Apache treats and reuses water recovered from the company's previous well completions in the region, and supplements it with brackish water from the local Santa Rosa aquifer that is unsuitable for human consumption or agriculture.

"The brackish water is stored in a large, lined containment basin capable of holding about 500,000 barrels," Cooper says. "A system of pipes carries flowback and produced water from previous well completions to a row of storage tanks — actually recycled and modified grain bins — where the water is treated to remove iron."

Both types of water then are piped to a current fracking operation for use.

"The water is treated to eliminate bacteria and subsequently pumped under high pressure down the hole to release trapped hydrocarbons," he says. "Once the pressure pumping concludes, the downhole pressure created within the target formation and by the escaping hydrocarbons flows the water back to be produced at the surface, and the process is repeated."

Thus for its operations in this area, Apache does not have to purchase freshwater or pay to dispose of produced water in deep-injection wells.

GOOD FOR THE COMPANY, GOOD FOR THE COUNTY

Irion County residents are appreciative of Apache's water conservation efforts, says Scott Holland, general manager of the Irion County Water Conservation District. "I've talked to local folks here, and they know what Apache is doing, and they think it's wonderful," says Holland.

And Apache's recycling operations are expanding to other parts of the state. In the Eagle Ford production area near College Station, the company fracks wells with treated effluent purchased from the local wastewater treatment facility.

In addition to the environmental benefits, Cooper says that recycling frack water in place saves the company money on transportation and eases the burden on local communities posed by truck traffic and increased road wear.

"In 2014, Apache treated and recycled more than 10 million barrels of produced water," says Cooper, "which was then used in the company's hydraulic fracturing operations. These efforts reduced the company's road use by more than 80,000 truck trips."

Other oil and gas operators are recycling in Texas. While recycling frack water is economically sustainable and creates better relationships with adjacent communities, Tisdale believes further regulation will be required before recycling really takes off. Pennsylvania's regulations, for instance, strongly encourage water recycling in oil and gas production, and reuse rates there exceed 70 percent.

"It's a balance between cost impact on operations and good water and community stewardship," says Tisdale. "In a water-stressed environment, recycling wastewater makes sense." **FN**

State Revenue Watch

This table presents data on net state revenue collections by source. It includes most recent monthly collections, year-to-date (YTD) totals for the current fiscal year and a comparison of current YTD totals with those in the equivalent period of the previous fiscal year.

These numbers were current at press time. For the most current data as well as downloadable files, visit TexasTransparency.org.

Note: Texas' fiscal year begins on September 1 and ends on August 31.

NET STATE REVENUE — ALL FUNDS EXCLUDING TRUST

(AMOUNTS IN THOUSANDS)

Monthly and Year-to-Date Collections: Percent Change From Previous Year

Tax Collections by Major Tax	AUGUST 2015	YEAR TO DATE: TOTAL	YEAR TO DATE: CHANGE FROM PREVIOUS YEAR
SALES TAX	\$2,568,919	\$28,910,857	5.57%
PERCENT CHANGE FROM AUGUST 2014	-0.37%		
MOTOR VEHICLE SALES AND RENTAL TAXES	425,985	\$4,514,186	7.23%
PERCENT CHANGE FROM AUGUST 2014	7.11%		
MOTOR FUEL TAXES	306,730	\$3,446,157	3.93%
PERCENT CHANGE FROM AUGUST 2014	4.60%		
FRANCHISE TAX	151,129	\$4,656,286	-1.61%
PERCENT CHANGE FROM AUGUST 2014	-4.37%		
INSURANCE TAXES	221,202	\$2,049,417	5.21%
PERCENT CHANGE FROM AUGUST 2014	-12.34%		
NATURAL GAS PRODUCTION TAX	99,977	\$1,280,410	-32.60%
PERCENT CHANGE FROM AUGUST 2014	-52.28%		
CIGARETTE AND TOBACCO TAXES	182,565	\$1,532,414	14.15%
PERCENT CHANGE FROM AUGUST 2014	64.51%		
ALCOHOLIC BEVERAGES TAXES	95,859	\$1,138,776	8.12%
PERCENT CHANGE FROM AUGUST 2014	7.32%		
OIL PRODUCTION AND REGULATION TAXES	201,419	\$2,879,055	-25.68%
PERCENT CHANGE FROM AUGUST 2014	-46.02%		
INHERITANCE TAX	N/A	-\$3,817	-16,633.45%
PERCENT CHANGE FROM AUGUST 2014	N/A		
UTILITY TAXES¹	56,764	\$480,766	0.54%
PERCENT CHANGE FROM AUGUST 2014	-0.34%		
HOTEL OCCUPANCY TAX	50,128	\$525,819	8.33%
PERCENT CHANGE FROM AUGUST 2014	5.52%		
OTHER TAXES²	12,873	\$272,734	1.82%
PERCENT CHANGE FROM AUGUST 2014	-29.01%		
TOTAL TAX COLLECTIONS	\$4,373,550	\$51,683,060	1.35%
PERCENT CHANGE FROM AUGUST 2014	-4.62%		
Revenue By Source	AUGUST 2015	YEAR TO DATE: TOTAL	YEAR TO DATE: CHANGE FROM PREVIOUS YEAR
TOTAL TAX COLLECTIONS	\$4,373,550	\$51,683,060	1.35%
PERCENT CHANGE FROM AUGUST 2014	-4.62%		
FEDERAL INCOME	2,709,898	\$36,700,990	7.11%
PERCENT CHANGE FROM AUGUST 2014	6.16%		
LICENSES, FEES, PERMITS, FINES AND PENALTIES	645,329	\$9,649,624	13.56%
PERCENT CHANGE FROM AUGUST 2014	-4.88%		
INTEREST AND INVESTMENT INCOME	43,791	\$1,393,601	-4.75%
PERCENT CHANGE FROM AUGUST 2014	-83.95%		
LOTTERY PROCEEDS³	134,929	\$1,893,534	0.82%
PERCENT CHANGE FROM AUGUST 2014	2.87%		
SALES OF GOODS AND SERVICES	26,349	\$428,665	63.40%
PERCENT CHANGE FROM AUGUST 2014	38.43%		
SETTLEMENTS OF CLAIMS	2,298	\$541,071	-5.93%
PERCENT CHANGE FROM AUGUST 2014	-81.72%		
LAND INCOME	137,067	\$1,547,831	-16.93%
PERCENT CHANGE FROM AUGUST 2014	-11.28%		
CONTRIBUTIONS TO EMPLOYEE BENEFITS	3	\$56	-36.13%
PERCENT CHANGE FROM AUGUST 2014	-38.97%		
OTHER REVENUE SOURCES	421,344	\$5,589,826	8.66%
PERCENT CHANGE FROM AUGUST 2014	18.70%		
TOTAL NET REVENUE	\$8,494,559	\$109,428,258	4.27%
PERCENT CHANGE FROM AUGUST 2014	-3.05%		

1- Includes public utility gross receipts assessment, gas, electric and water utility tax and gas utility pipeline tax.

2- Includes the cement and sulphur taxes and other occupation and gross receipt taxes not separately identified.

3- Gross sales less retailer commissions and the smaller prizes paid by retailers.

Note: Totals may not add due to rounding.



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