

2009
ANNUAL REPORT
ON THE STATUS OF
CLEAN COAL IN TEXAS

fueling the
FUTURE

FROM CLEANER AIR

TO NEXT GENERATION

TECHNOLOGY: ENSURING

TEXAS LEADS THE WAY



SPECIAL REPORT: TRACKING STATE/FEDERAL TECHNOLOGY INCENTIVES



CLEAN COAL
TECHNOLOGY
FOUNDATION
of
TEXAS



LETTER FROM THE CHAIRMAN

Fellow Texans:

We begin 2009 with a strong sense of hope and confidence in the future. Though 2008 was a difficult year for all of us, change, as well as a renewed sense of the value of sound fundamentals, are keynotes as we enter the New Year.

Energy was a fundamental issue that was discussed and debated continually during election campaigns across the country. Energy supply, cost, security, and how important these issues are for a bright and healthy future are concerns for voters, lawmakers, and industry leaders alike. It is also clear that society desires and demands long term, sustainable solutions for the environment.

Our country is blessed with a treasure of natural resources, including coal. Coal is, and has been, an important and reliable resource for our growth as a nation. Coal-produced energy represents over 50% of all power generated in our country. Coal is an indigenous resource that is secure. Coal-based energy is affordable, reliable and has become considerably friendlier to the environment over the recent past through technological innovation and real process improvement change. These are important fundamentals as we look forward.

The impact of carbon dioxide and greenhouse gases on the environment will be a big part of the change ahead as well. The reality is that policy and legislative framework for carbon taxes, cap-and-trade, and the corresponding needs of new technologies to address a carbon-constrained world are in motion and will continue to be a significant part of our future.

Over the past three years, CCTFT has produced a series of publications illustrating how coal has become significantly cleaner. The 2009 publication will build on that theme and continue to promote new technologies and demonstrations to make advancements and improvements. We also will lay the groundwork for the upcoming 2009 Legislative Session and highlight key issues that we will address in policy and with lawmakers. Our Foundation began in 2004 with all of these goals as our mission, and they continue to be the fundamentals in which we believe.

Coal-based energy must be an integral part of our energy future. New and innovative technologies to address NO_x, SO_x, and mercury also will continue to be part of our future, as well as technologies that will capture and sequester carbon dioxide. Improvements and progress through technology are how our Foundation can impact the fundamentals to affect change.

Please join me in support of our mission. Your support will make our goals a reality.

Sincerely,

C. D. McConnell
Chairman
Clean Coal Technology Foundation of Texas

“Coal-based energy is affordable, reliable and has become considerably friendlier to the environment over the recent past...”

table of CONTENTS



2 | TOWARD CLEAN COAL: AN ENVIRONMENTALIST'S
STANDPOINT—JOHN THOMPSON, CLEAN AIR
TASK FORCE

4 | TEXAS COAL PLANTS: CLEAN AND GETTING CLEANER
5 | TEXAS COAL PLANTS AT A GLANCE



6 | KEEPING EVERYTHING ON THE TABLE SO THE LIGHTS
STAY ON IN TEXAS—CHAIRMAN BARRY SMITHERMAN,
PUBLIC UTILITY COMMISSION OF TEXAS

8 | THE RESERVE MARGIN:
KEEPING UP WITH DEMAND



9 | DEEP IN THE HEART OF TEXAS: WHY THE STATE IS
IDEAL FOR CLEAN COAL—DR. IAN DUNCAN,
BUREAU OF ECONOMIC GEOLOGY

11 | THE TENASKA TRAILBLAZER ENERGY CENTER

12 | THE CO₂ PIPELINE

13 | PEABODY'S KENTUCKY SUBSTITUTE
NATURAL GAS PROJECT

14 | AMBRE ENERGY'S HYBRID ENERGY SYSTEM

15 | WHAT IS PET COKE?



16 | FINANCIAL INCENTIVES FOR CLEAN CARBON
PROJECTS IN TEXAS—MIKE NASI

19 | WHAT HAPPENED TO FUTUREGEN?

21 | FEDERAL INCENTIVES

23 | CLEAN CARBON POLICY SUMMIT & PROJECT EXPO

25 | ABOUT THE REPORT



Opinion Corner:

TOWARD CLEAN COAL: AN ENVIRONMENTALIST'S STANDPOINT

By John Thompson, Clean Air Task Force

IN THE POPULAR PRESS, COAL IS A FOUR-LETTER, DIRTY WORD. THEN WHY WOULD AN ENVIRONMENTALIST SUPPORT BUILDING ADVANCED COAL PLANTS?

Former Vice-President and Nobel Laureate Al Gore claims America can get 100% of its electricity from renewables in 10 years and that clean coal is both imaginary and can't be counted on for climate protection.

Make no mistake; Al Gore is right when he says global warming is real. Global warming puts everything that conservationists have worked to achieve for the last 100 years at risk. All the natural lands set aside since Teddy Roosevelt created the first national preserve, all the endangered species we've sought to protect, all may be lost if the ecosystems that support them are affected by climate change-induced drought, disease, and temperature rise.

But here's where I part company with Al Gore. I'm not willing to bet the planet that coal will disappear anytime soon. Most projections show coal use doubling worldwide over the next 30 years. Each year, China alone adds enough new coal plants to power all of England, Scotland, and Wales. In the US, more than half of our electricity comes from coal. Coal is an inseparable part of world progress.

So if coal is not going away, and it's also hurting the planet's climate, what is the solution? Carbon sequestration. We need new, advanced coal plants that capture carbon dioxide, compress it into a liquid-like state, and inject it deep underground. We need these plants



now—yesterday in fact. The plain truth is that if the world doesn't change how coal is used, it's game over on preventing climate change.

To those that say storing carbon dioxide is an experiment, I have this response: Texas. Texas has been injecting carbon dioxide safely below ground for decades as part of enhanced oil recovery. And because of Texas' enhanced oil recovery resource, the state could be an incubator for advanced coal technology with little carbon emissions.

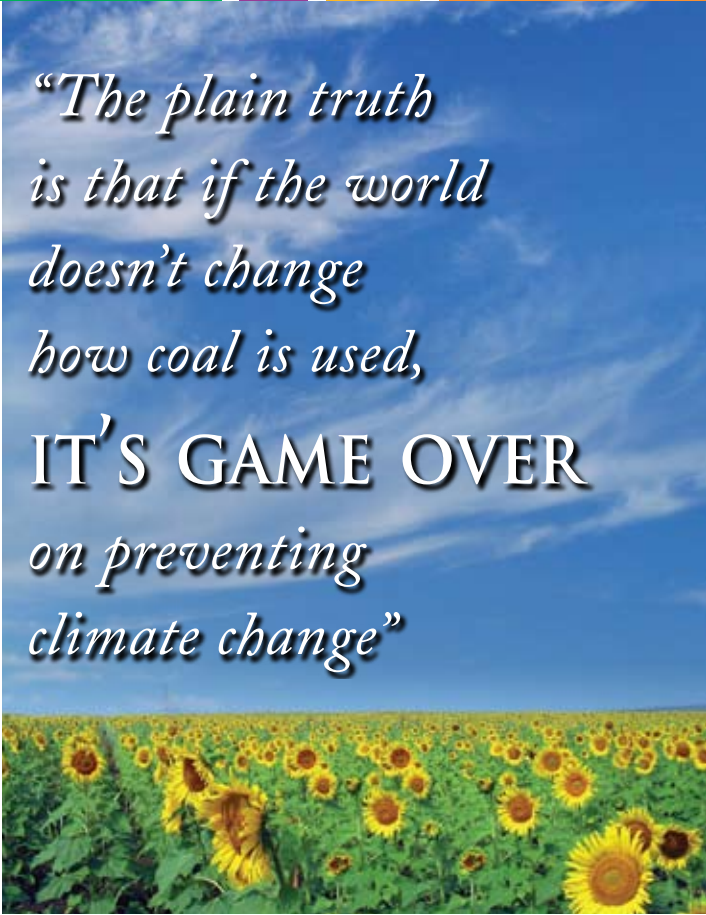
So how clean must coal become? Here's my view. In the next decade, emissions from new coal plants must be lowered on average to the level of natural gas, which is the cleanest fossil fuel on the planet. By mid-century, the world's fossil fuels—oil, natural gas, and coal—must rival the cleanliness of hydrogen. To meet those goals, the carbon capture, carbon transportation, and geologic storage industry must be not just commercially available, but widely deployed by the 2020s.

A tall order? Yes. But the carbon capture and storage industry is like the aviation industry was a century ago. In 1908, five years after Kitty Hawk, the public would have dismissed as fancy the notion of a commercially viable aviation industry by the 1920s. And yet by 1925, more than 14 million packages and letters were moving each year by air mail, thousands of people were flying between cities each year, and planes were a key component of national defense.

The barriers to such progress are as much political as they are technical. Somehow, industry, environmentalists and government must find ways to work together on coal and climate. For my part, that means working to get new coal plants with carbon capture and storage to break ground now. But industry needs to step up to the plate too. Industry needs to support mandates for low carbon performance standards, and address other impacts from coal by supporting better coal combustion waste practices and mining reforms. These actions will both hasten the adoption of this technology and make it more acceptable to the public.

John Thompson is the Director of the Coal Transition Project of the Clean Air Task Force (CATF). CATF is a non-profit environmental group that works nationally and internationally on climate change. CATF is supported by grants from private foundations and accepts no money from either government or industry.

Opinion Corner provides an open and unedited forum for discussion. Its content does not necessarily reflect the opinions of the Foundation or its members.



*“The plain truth
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TEXAS COAL PLANTS: clean and getting cleaner

Texas has a rich energy past, and it is proving to be a leader in the quest for alternative energy. The Lone Star State also is leading the way in its use of our nation's most plentiful resource: coal.

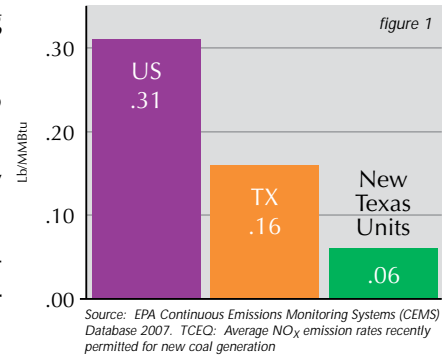
Emissions data indicates that the Texas fleet of coal units (36 in all, see page 5) is far cleaner than the national average. In fact, data shows that the Texas coal fleet is cleaner than almost every other state.

The Environmental Protection Agency (EPA) measures pollutants such as nitrogen oxides (NO_x) in terms of pounds produced per million BTU of energy (Lb/MMBtu).

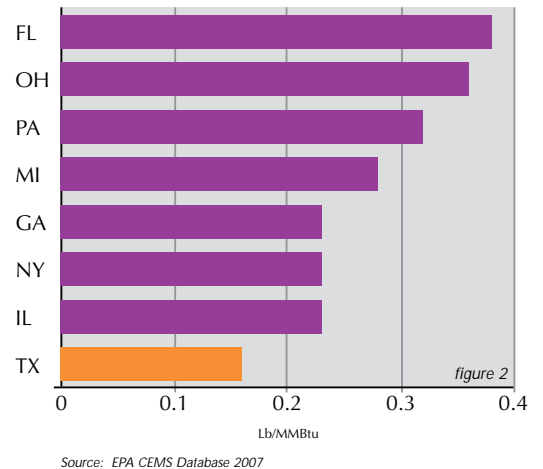
According to the latest EPA data (Figure 1), the Texas coal fleet has a NO_x emission rate (.16 Lb/MMBtu) that is half the national average. In addition, a new fleet of coal units that are being built in Texas will have an average emission rate of 0.06, meaning the state's coal fleet is getting even cleaner.

As you can see in Figure 2, the Texas coal fleet is dramatically cleaner for NO_x than coal fleets in the next 7 most populous states. The only coal fleets with cleaner NO_x rates are Massachusetts and Connecticut, which are only slightly cleaner (.13 Lb/MMBtu) and have only a fraction of Texas' generation capacity (TX: 21,018 MW; MA: 1,776 MW; CT: 614 MW). Clearly, Texas produces more clean coal power than any state in the nation.

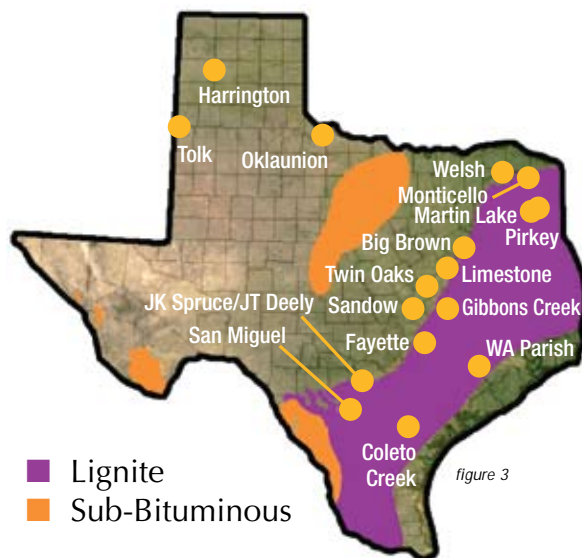
Coal Fleet NO_x Comparison



Coal Fleets by State



Texas Coal Deposits



Today's coal plants also have many advanced scrubber technologies that they did not have just a few years ago. In fact, today environmental controls make up about 40% of a coal plant's cost.

U.S. EPA data, depicted Figure 4, clearly shows that U.S. coal-fired power plants emissions have gotten steadily cleaner since 1970. At the same time, the amount of coal-based generation has nearly doubled.

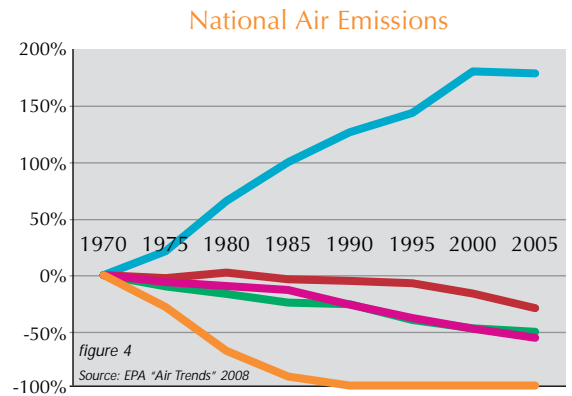
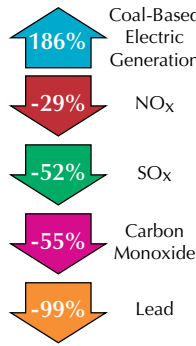
Additional EPA data suggests that the formation of ozone has been reduced dramatically over the past 30 years.

What is important to note is that EPA Region 6 (Texas, Louisiana, Arkansas, Oklahoma, and New Mexico) has reduced ozone concentrations 10%

since 1980 even though it:

- Added nearly 11 million vehicles to roadways
- Currently has half the nation's refining capacity
- Added 41 coal-fired units

Coal plants provide essential baseload energy for consumers, thus ensuring reliable and affordable energy. Based on this data, coal plants are drastically improving their environmental performance as well.



TEXAS COAL PLANTS AT A GLANCE

FACILITY	COMPANY	COUNTY	COAL TYPE	MW	IN SERVICE
Big Brown 1&2	Luminant	Freestone	Lignite	593 (1&2)	'71, '72
Coletto Creek	International Power	Goliad	Sub-bituminous	600	'80
Fayette 1-3	LCRA	Fayette	Sub-bituminous	615, 615, 460	'79, '80, '88
Gibbons Creek	TX Municipal Power Agency	Grimes	Sub-bituminous	454	'83
Harrington 1-3	Xcel	Potter	Sub-bituminous	360 (1-3)	'76, '78, '80
JK Spruce	CPS Energy	Bexar	Sub-bituminous	566	'92
JT Deely 1&2	CPS Energy	Bexar	Sub-bituminous	486, 446	'77, 78
Limestone 1&2	NRG	Limestone	Lignite	893, 957	'85, '86
Martin Lake 1-3	Luminant	Rusk	Lignite	793 (1-3)	'77, '78, '79
Monticello 1-3	Luminant	Titus	Lignite	593, 593, 793	'74, '75, '78
Oklaunion	AEP	Wilbarger	Sub-bituminous	720	'86
Pirkey	AEP	Harrison	Lignite	721	'85
San Miguel	San Miguel Electric Co-op	Atascosa	Lignite	410	'82
Sandow	Luminant	Milam	Lignite	591	'81
Twin Oaks 1&2	EnergyCo	Robertson	Lignite	175 (1&2)	'90, '91
Tolk 1&2	Xcel	Lamb	Sub-bituminous	568 (1&2)	'82, '85
WA Parish 5-8	NRG	Fort Bend	Sub-bituminous	734 (5&6), 615 (7&8)	'77, '78, '80, '82
Welsh 1-3	AEP	Titus	Sub-bituminous	558 (1-3)	'77, '80, '82

PLANNED COAL GENERATION SITES IN TEXAS

Sandow 5	Luminant	Milam	Lignite	662	2009
Oak Grove 1	Luminant	Robertson	Lignite	944	2009
Oak Grove 2	Luminant	Robertson	Lignite	944	2010
J K Spruce 2	CPS Energy	Bexar	Sub-bituminous	820	2010
Sandy Creek Energy Station	Sandy Creek Energy Associates	McClennon	Sub-bituminous	900	2012
Limestone 3	NRG Energy	Limestone	Sub-bituminous	744	2012
Pampa Energy Center	Babcock & Brown	Gray	Sub-bituminous	800	2012
Trailblazer Energy Center	Tenaska	Nolan	Sub-bituminous	600	2014
Coletto Creek 2	International Power	Goliad	Sub-bituminous	650	2014

Source: Public Utility Commission of Texas



keeping everything on the table so THE LIGHTS STAY ON IN TEXAS

By: Barry T. Smitherman,
Chairman, Public Utility Commission of Texas



A YEAR AND A HALF AGO I began spending considerable time on the issue of how to keep the lights on in Texas, to do it at affordable rates, and be sensitive to the environment.

There is little doubt that Texas will continue to grow. This state provides some of the greatest opportunities in the country. In the past 12 months alone, half the jobs in the U.S. were created in Texas. Based on current migration trends, Texas' population may double by 2040. That's 1,500 people moving to Texas every day.

Texas is also an island with regard to the independent electrical grid that serves most of the state (Figure 5). This is both a good and a bad thing. It is good in that it allows Texas to control its own destiny and make decisions that best serve the needs of its people. It's bad in that it is our sole responsibility to keep the lights on. We cannot rely on anyone else to export power to us.

The state generation mix is heavily dependent on natural gas, to a lesser extent coal, with some nuclear, wind, and hydroelectric (Figure 6). Compared with the rest of the country, Texas is far more dependant on natural gas for power than other states.

For power producers, all the generation available to the grid is built for the hottest or most energy-intensive day of the year. Figure 7 gives a snapshot of the hottest day of the year in 2008, August 4. Nuclear and coal ran constantly as baseload capacity. Wind blew in the morning and the evening.

The rest of the generation that day, resembling a camel's back, was natural gas. That was about 40 gigawatts of natural gas that needed to be activated during the hottest part of the day in the summer.

We look at resource adequacy from a three-legged perspective:

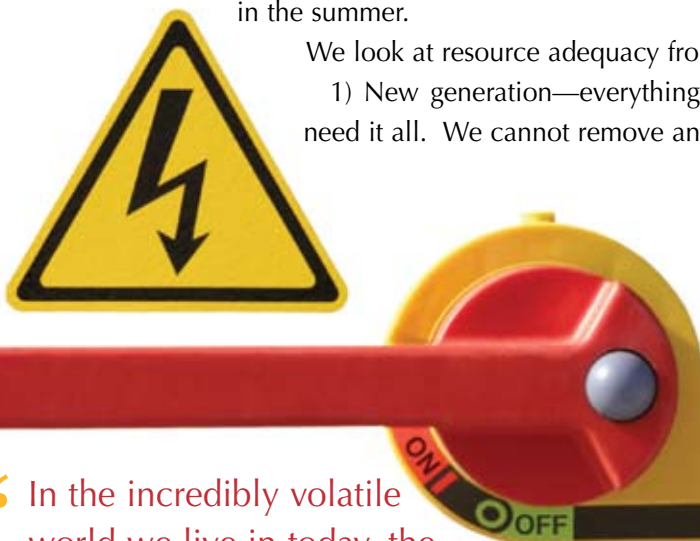
1) New generation—everything must be on the table. We are going to need it all. We cannot remove any resource.

2) We need to give consumers tools like advanced meters to make their homes and businesses more energy efficient.

3) We have to build more transmission and be smart about the way our market is designed and managed.

“ In the incredibly volatile world we live in today, the ability to keep power flowing from our own domestic resources is a very positive and necessary thing ”

NATURAL GAS. Texas continues to build natural gas plants as we increase our natural gas stock. We're always cognizant of the benefits of natural gas, which is that it is relatively clean to burn, and we have a lot of it here



in our state. Thanks to the Barnett Shale in particular, we have been able to actually expand natural gas resources in Texas.

The challenge with natural gas is that prices have been volatile, and it has been expensive. When you operate in a market like ERCOT, which uses a lot of natural gas to make electricity, this kind of elasticity and this kind of price volatility can cause real heartburn to electric customers.

NUCLEAR. Several generation companies have announced plans to build three new nuclear plants. That is more than are planned in any other state in the country. I hope those come to fruition because we are going to need the power that these large, zero-carbon plants produce. Without these new plants, coal will be called upon to play an even bigger base load role.

WIND. We are going to be building a lot of wind generation in our state, and that's a positive thing. We have a lot of wind, and we should take advantage of that resource. As we build the transmission lines to hook up a lot of this wind, that transmission will be located mainly west of I-35, and I'm hoping that we'll see some advanced technology gas and coal plants built to take advantage of the new infrastructure that we will put in place.

ENERGY EFFICIENCY. We also want to focus on energy efficiency, and closing the gap between how much power we will have and how much we are going to need. We need to work on both ends by increasing supply and reducing demand. We reduce demand by giving consumers tools so they can manage their consumption.

Advanced meters are one of those tools. Our two largest wire and pole companies, Oncor and Centerpoint, are in the process of implementing that advanced meter technology. In the future, we will be able to give you a meter that allows you to understand every day how much power you're consuming, what that power is costing you, and what your bill is likely to be by the end of the month. We do that for every other product we buy. Have you ever filled up your gas tank and not known what you just paid? Of course not, so why should purchasing electricity be any different?

2008 TEXAS GENERATION BY FUEL TYPE

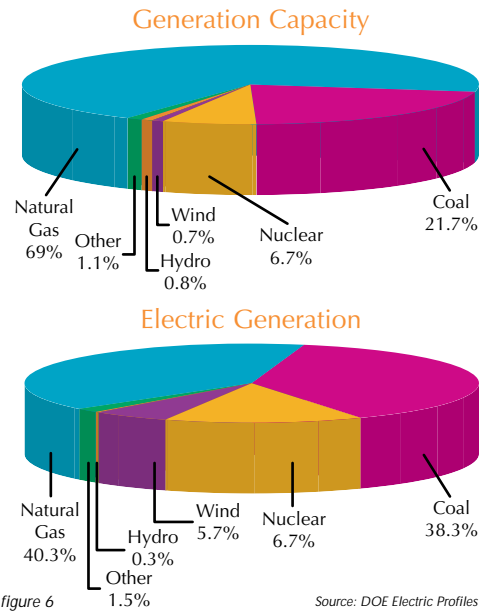
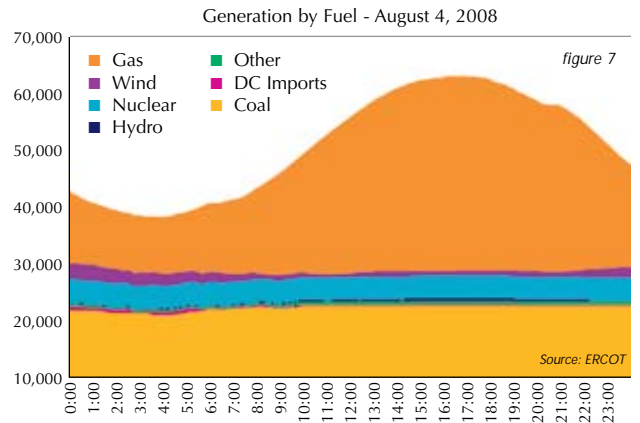
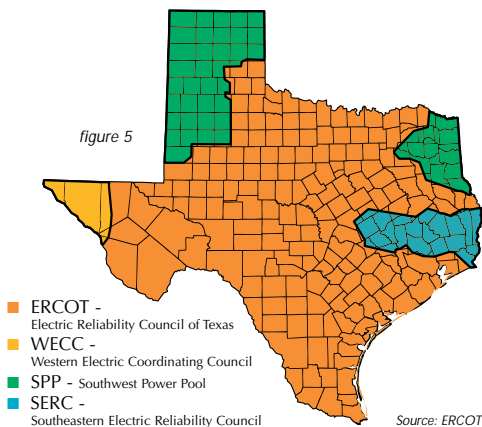


figure 6 Source: DOE Electric Profiles

ERCOT Summer Day Load Shape with Fuel Mix



Electric Grids in Texas



COAL. Texas has a number of coal plants under construction, and that's a very positive thing. These coal plants add to our baseload reserves, are cleaner than the last generation of coal plants built, and will ensure that we keep the lights on at a reasonable price going forward.

It's also great that we have a lot of coal resources. The United States has been called the "Saudi Arabia of coal." We should take advantage of that resource for a number of reasons. In the incredibly volatile world we live in today, the ability to keep power flowing from our own domestic resources is a very positive and necessary thing.

To reliably keep the lights on in Texas at reasonable prices, there is no single "silver bullet," but there is some "silver buckshot." Every resource and every demand side/energy efficiency tool needs to stay on the table.



THE RESERVE MARGIN: Keeping up with Demand

All power generation is built for the hottest or most energy-intensive day of the year. To ensure that we never have mass power failures, ERCOT sets a 12.5% “reserve margin” above the maximum electricity demand. The latest reserve margin data, released December 2008, shows that there is currently a minimum of 15.8% reserve margin through 2014 (see table), meaning that the state’s energy buffer is secure...

ERCOT Reserve Margin Predictions - Last Four Updates

Source: ERCOT	2008	2009	2010	2011	2012	2013	2014
May 2007	12.6%	10.1%	8.3%	6.7%	5.9%		
Dec. 2007	13.1%	12.1%	14.0%	11.2%	10.5%	8.2%	
May 2008	13.8%	16.5%	17.3%	15.0%	14.5%	12.3%	
Dec. 2008		15.8%	21.2%	18.7%	17.8%	17.9%	15.8%

for now.

This was not the case in May 2007 when the reserve margin was expected to drop off considerably in 2009 due to a lack

of new generating facilities. Luckily, many new gas and coal generating units are now scheduled to come online, including Sandow, Oak Grove, Spruce, and Sandy Creek (see page 5).

Texas is among a shrinking number of states around the country that have adequately prepared for the future. The North American Electric Reliability Corporation (NERC) says only 12 (24%) states will have reliable power by 2016. That means the remaining 38 states could face crippling blackouts if demand exceeds their dwindling supply.

KEEPING UP WITH DEMAND

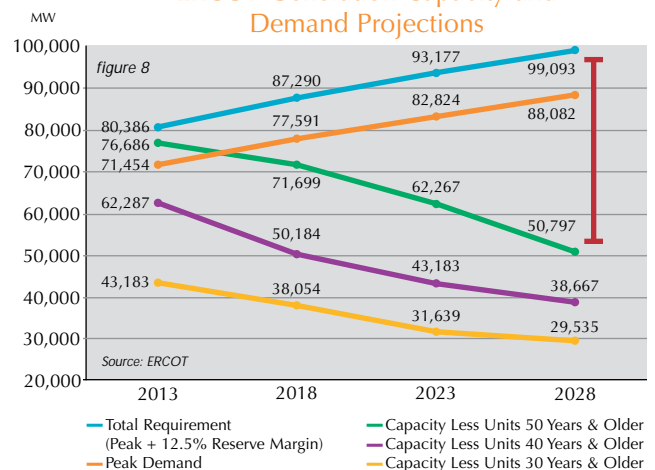
The job of keeping generation at acceptable levels never ends. Not only does demand for electricity keep increasing, generators also have to plan for units that retire over time. Based on these two factors, ERCOT predicts it will need between 50,000 and 70,000 megawatts of electricity by 2028 (Figure 8). That is roughly a quarter of the nation’s future energy needs.

To put it in perspective, 50,000-70,000 MW (megawatts) is:

- 30-45 nuclear reactors
- 85-115 coal units
- 200-280 natural gas-fired units
- 16,000-24,000 wind turbines

Clearly, no single source of power can meet all of the state’s growing energy needs. Instead, all sources of power, combined with energy efficiency and demand response, will be needed to keep the lights on in Texas for the 21st century.

ERCOT Generation Capacity and Demand Projections



DEEP in the heart of TEXAS

*why the state is
ideal for clean
coal technology*

“

Texas is in a better position than any other state to do something about its carbon footprint. Implementation of clean coal technology, in which CO₂ and other gases are captured from coal-based power plants and sequestered deep underground is a natural match for Texas

“



By: *Dr. Ian Duncan*
Associate Director for Earth and Environmental Systems
Bureau of Economic Geology, University of Texas at Austin

TEXAS IS THE ENERGY CAPITAL OF THE COUNTRY; unfortunately, it also has the largest carbon footprint. Texas is the largest producer of electricity and the largest user of coal in the country. As a result, the state could have the largest exposure to the effects of any new carbon policy that might be imposed by the federal government.

Much of the nation's refined petroleum energy is produced in Texas. Texas also produces 0.7 billion tons of CO₂ annually (about 10% of U.S. emissions), and even though the energy that causes the emissions is ultimately consumed all over the country, Texas may bear the brunt of any penalty under future carbon regulations.

The good news is that Texas is in a better position than any other state to do something about its carbon footprint. Implementation of clean coal technology, in which CO₂ and other gases are captured from coal-based power plants and sequestered deep underground is a natural match for Texas. Texas has a wealth of underground storage space ideal for the storage or sequestration of CO₂. Texas also has considerable stranded oil that can be produced only if CO₂ is available. Because of this, clean coal technology can be a win-win for Texas.

Carbon dioxide storage falls into two categories (Figure 9):

- Brine Storage - Carbon dioxide is injected into deep saline brine aquifers, about a mile underground. In well-selected sites, we expect that the carbon will remain sequestered for thousands of years.

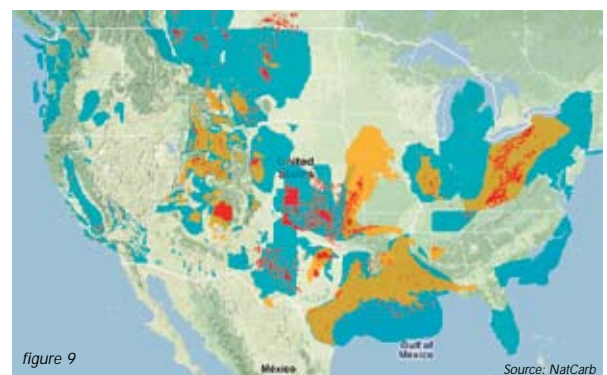
- Enhanced Oil Recovery - Carbon dioxide is injected into oil wells to help recover stranded crude. About half the CO₂ typically remains underground, the other half is recycled as oil is produced and then reinjected. Ultimately all the CO₂ ends up in long-term storage in the reservoir.

Enhanced Oil Recovery - Carbon dioxide is injected into oil wells to help recover stranded crude. About half the CO₂ typically remains underground, the other half is recycled as oil is produced and then reinjected. Ultimately all the CO₂ ends up in long-term storage in the reservoir.

BRINE STORAGE

Saline brine reservoirs are considered ideal for long-term carbon storage. Carbon dioxide would be injected into salty water that is often 2-3 times the salinity of sea water. The depth of these reservoirs is typically a mile or more beneath the surface, to the point

Sequestration Zones in the United States



■ Saline Aquifers ■ Unmineable Coal Seams
■ Depleted Oil Wells



that the CO₂ is transformed into a compressed supercritical phase, which enables more efficient storage than in its gaseous form.

The Texas Bureau of Economic Geology estimates there are roughly 200 billion tons of brine storage space on the Gulf Coast, which is a very significant percentage of the national storage capacity. If a price were set on carbon similar to the price set on European carbon emissions (about \$30 per ton), Texas and the Gulf Coast could earn future revenue from carbon credits.

There are many different issues related to long-term sequestration:

- Scientific Issues: Are the actual geologic structures secure enough to prevent leakage? Also, do we have adequate monitoring, measurement, and verification processes to ensure the CO₂ remains sequestered?
- Engineering Issues: Is the injection rate of CO₂ adequate to keep up with the amount of CO₂ produced? Also, are cement seals in the wells adequate for the lifetime of the injection? Is there an acceptable level of blowout prevention?
- Policy/Legal Issues: Is there regulatory framework in place to set performance standards, underground pore space ownership (similar to mineral rights), and long-term liability for a byproduct that is expected to remain underground for millennia?

For these reasons, and the fact that there is currently no price on carbon in the United States, many believe enhanced oil recovery is a better option for carbon storage at present.



ENHANCED OIL RECOVERY: THE PATH TO SEQUESTRATION

Usually, about half the crude in an oil field stays trapped underground following primary production and water flooding. Carbon dioxide enhanced oil recovery has been proven to recover another 15% to 20%. One pilot project in Louisiana recovered nearly 70% of the stranded oil. Carbon dioxide is a valuable commodity in oil production. Molecules of CO₂ are miscible with oil, creating a lower viscosity fluid than can be more readily produced.

Enhanced oil recovery has been practiced for more than 35 years in the Permian Basin of West Texas. Today, there are about 55 CO₂ floods in that region. Each year, CO₂ floods produce about 73 million barrels of oil in Texas, or about 18% of the total statewide oil production.

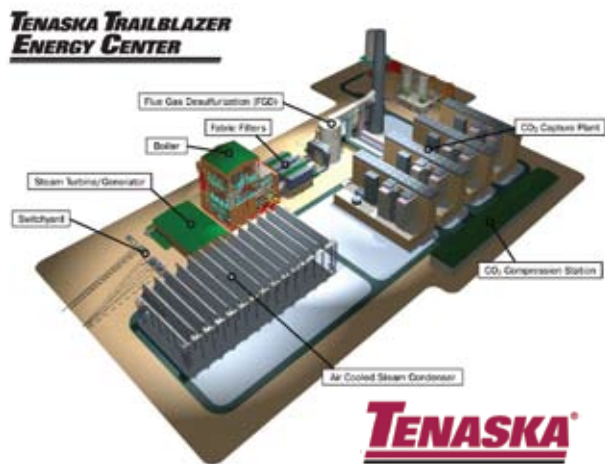
These floods consume massive amounts of CO₂. Each year, the Permian Basin Floods inject 30 million tons of CO₂ underground. That is the equivalent of six 550-megawatt coal-fired power plants.

Many clean coal projects being developed in Texas plan to market CO₂ to companies engaged in enhanced oil recovery to improve the economics of their project. By selling CO₂ to oil producers, power providers create a revenue stream to help offset the price of capture.

Oil producers currently view CO₂ as a precious commodity. The cost of CO₂ purchased normally makes up about half the cost of a typical oil flood. With no taxes on carbon, the goal of oil producers so far has been to conserve CO₂ as much as possible.

The Bureau of Economic Geology and private industry are developing methods to maximize the potential for CO₂ sequestration associated with enhanced oil recovery. This linkage between clean coal technology and increasing Texas's oil production can have a significant future impact on the state's economy.

THE TENASKA TRAILBLAZER ENERGY CENTER



Omaha-based Tenaska plans to deliver a commercial power plant with near-zero carbon dioxide (CO₂) emissions, using proven technology, cutting-edge equipment, and the right mix of incentives.

Fueled by low-sulfur coal from Wyoming's Powder River Basin, the proposed Trailblazer Energy Center would be the first conventional, pulverized coal unit to capture 85 to 90 percent of the carbon dioxide that would otherwise escape into the atmosphere.

Tenaska plans to build the \$3.5 billion plant near Sweetwater, Texas. The company decided on the site based on its proximity to enhanced oil recovery (EOR) operations in the

Permian Basin and service from two rail lines, Burlington Northern and Union Pacific.

Due to concerns about limited water supplies in the region, Tenaska is studying dry-cooling technology. By using dry-cooling, the project will require an average of one million gallons of water each day, compared to 12 to 14 million gallons of water per day if traditional wet cooling were used.

In addition to the dry-cooling unit, the Trailblazer Energy Center will employ many modern pollution-control devices, such as flue gas desulfurization.

Once the flue gas is cleaned, the gas stream will pass through the CO₂ capture plant. CO₂ typically is captured using amine solvents, which can absorb and release CO₂ using varying amounts of heat. Once the CO₂ is captured, it will be dehydrated, compressed and sold to the Permian Basin CO₂ market. Energy used in the carbon capture process, known as parasitic load, reduces the amount of power available for transmission by 25 to 30 percent.

Tenaska is researching a newer ammonia capture process, which could reduce parasitic load to about 20 percent. The technology is in pilot scale testing, but could be commercially available by the time the Trailblazer project is completed.

The project will capture about 17,500 tons of CO₂ per day at a 90 percent capture rate. That is about 15 percent of the current CO₂ consumption used for EOR in the Permian Basin. The Permian Basin has the most mature and stable CO₂ market in the world – another benefit to the Trailblazer project.

Each ton of CO₂ used in EOR can yield roughly two barrels of oil. Depending on the price of oil, Tenaska's CO₂ could help produce hundreds of millions of dollars in additional oil per year in the Permian Basin.

The Trailblazer project was conceived in 2007, when Congress was considering federal legislation to limit CO₂ emissions through a carbon tax or cap-and-trade program. Part of its business model relies on receiving carbon credits for the CO₂ it captures.

Tenaska believes the Trailblazer business model may be able to survive without an immediate price on CO₂ due to other factors, including:

- Alternative federal legislation incentivizing CO₂ capture (see page 21);
- State legislation incentivizing CO₂ capture and "early movers" (see page 16);
- Higher oil prices, placing a higher value on CO₂ for EOR;
- Higher natural gas prices, placing a higher value on electricity generated from coal.

Tenaska has received its draft air permit, with a final decision on the project slated for the fourth quarter of 2009. Construction would take four to five years, with the facility going operational in 2014.





THE CO₂ PIPELINE

CARBON DIOXIDE HAS BEEN PIPELINED FOR YEARS, as demonstrated by the enhanced oil recovery (EOR) projects in the West Texas Permian Basin. There are between 3,500 and 5,500 miles of CO₂ transportation in operation in the U.S. today (Figure 10). These pipelines transport naturally-occurring CO₂ sources underground. In a carbon-constrained future, there will be a major incentive to start using man-made or anthropogenic CO₂ for EOR and long-term sequestration.

Plano-based Denbury Resources is planning a first-of-its-kind pipeline that will incorporate anthropogenic CO₂ in the Gulf Coast. The Green Pipeline will span approximately 320 miles of the Gulf Coast, from Baton Rouge, La., to the Hastings Field near Houston. There, it will be the first pipeline to deliver CO₂ to the Texas Gulf Coast, an area with major EOR potential.

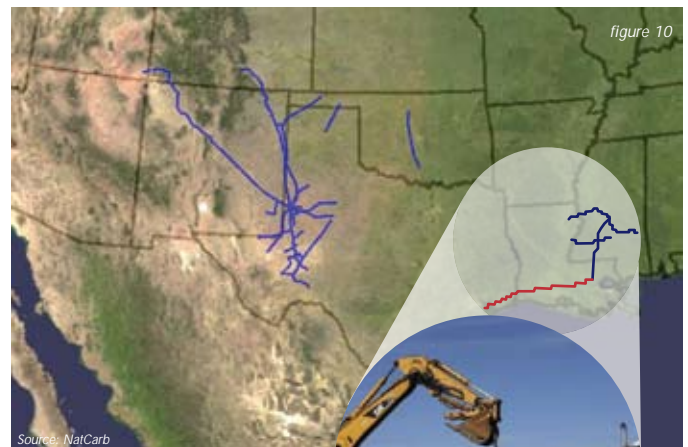
Carbon dioxide pipelines require significantly more pressure than natural gas or oil pipelines. By comparison, a CO₂ pipeline would require pressures above 2,000 psi, natural gas operates near 1,300 psi and oil is transported between 600-800 psi. For these reasons, CO₂ would not use existing pipelines.

Green Pipeline details also illustrate the costs of transporting CO₂. Denbury expects its 24" line will move approximately 800 million cubic feet (about 45,000 short tons) of compressed CO₂ per day. It is important that the line remains full to ensure maximum profitability.

To cover the capital costs of the project, assuming the pipeline is transporting the maximum volume of CO₂, a charge of \$8 to \$10 per ton is required. Any pump stations required along the line would add about \$1 per ton. The cost of compressing the CO₂ from the lowest cost emission source would add at least an additional \$8 per ton. These estimates alone attribute the cost of each ton of CO₂ near \$17-\$20.

One challenge anthropogenic CO₂ sources pose is that they cannot be responsive to the daily demand changes of EOR projects. To regulate the supply, Denbury plans to use the naturally-occurring CO₂ in its Jackson Dome facility. That way, the company can match the swings in supply and demand imbalances.

CO₂ Pipelines in the Gulf Coast



Denbury Resources is planning a pipeline that will span approximately 320 miles from Baton Rouge, to near Houston. It will be the first pipeline to deliver CO₂ to the Texas Gulf Coast



PEABODY'S KENTUCKY SUBSTITUTE NATURAL GAS PROJECT

The Department of Energy's (DOE) Energy Information Administration (EIA) has overestimated natural gas production in the United States for the past 23 out of 28 forecasts, and it has underestimated the price of natural gas in 27 of those forecasts.

The trend towards natural gas is evident. With high natural gas prices, Peabody Energy and ConocoPhillips see a way to create a valuable commodity with two low-priced feedstocks they know best: coal and petroleum coke.

The Kentucky Substitute Natural Gas (SNG) project would use gasification technology to superheat the coal mixture into a synthetic natural gas. Carbon dioxide created during this process would be captured and sequestered in a geologic formation nearby.

Over the 30-year lifespan of the project, the facility is expected to generate over 2 trillion cubic feet of SNG.

The two companies believe in the benefits of using natural gas for energy diversification. They also like SNG because it is relatively easy to store and does not depend on real-time use like electricity.

The Kentucky project will capture about 90% of the CO₂ it produces. Both companies believe their coal gasification process will reduce the cost of capture, thus reducing the project's overall carbon footprint.

In addition to Peabody's coal resources, the Kentucky project will use a mixture containing petroleum coke, provided by ConocoPhillips refineries. ConocoPhillips' e-Gas technology works best with a mixture containing petroleum coke as its feedstock.

Unlike Texas, there is little potential for enhanced oil recovery in Kentucky. Therefore, all carbon from the project will have to be stored in permanent geologic formations. The companies are currently looking at four different storage options:

- Unmineable coal seams (800 – 1,600 ft)
- Depleted oil reservoirs (1,500 – 3,500 ft)
- Devonian black shales (1,000 – 4,000) ft
- Deep geologic formations (4,000 – 14,000 ft)
- Mount Simon sandstone
- Knox Group carbonates

Most of these formations are about 30 miles away from the intended site. Another option would be to link up with as-of-yet unplanned pipelines traveling north to EOR sites in the Gulf Coast, similar to the Denbury's Green Pipeline (see page 12). However, no pipelines have been planned in the region at this time.

Peabody says the project will create 1,200 jobs during the four-year construction process, with 500 long-term jobs when the facility goes online. It is expected to generate \$100 million for the local economy.

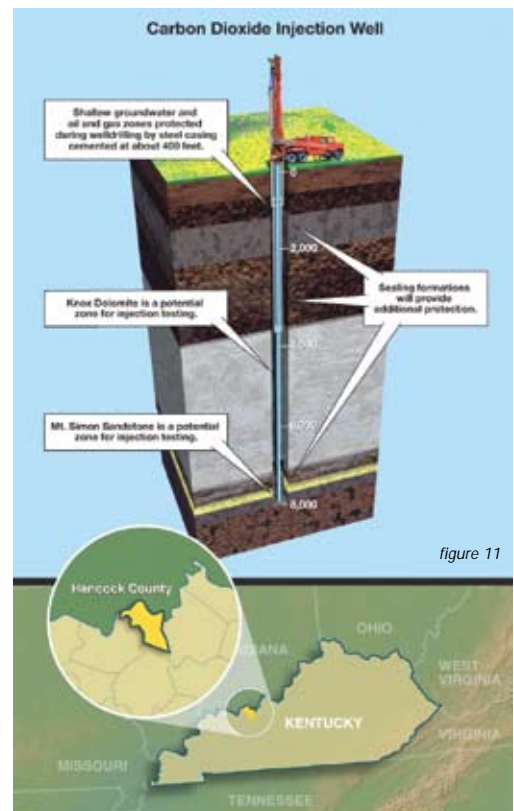


figure 11



ambreenergy AMBRE ENERGY'S HYBRID ENERGY SYSTEM

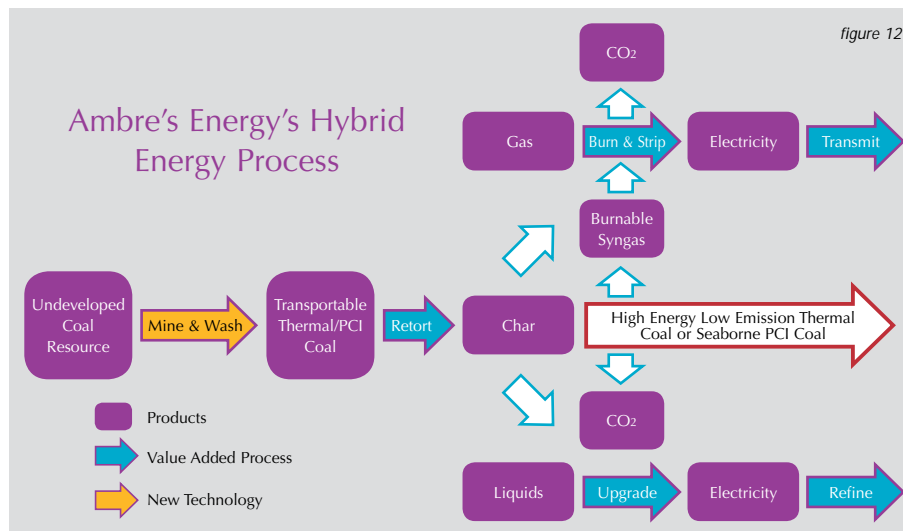
MAXIMIZING COAL'S VALUE IS THE MISSION OF THE FOUNDATION. One of its members, Australia's Ambre Energy, has two processes that increase coal's value by converting it to other high-value commodities.

Several companies are working on ways to increase coal's energy potential before it is burned. These processes lower coal's moisture content, sulfur, mercury, and other impurities. This is typically referred to as coal beneficiation. The main benefit is that it is usually cheaper to remove these impurities before coal

is burned than afterward with scrubbers.

Beneficiation works best on lower rank coals such as lignite, which are found in the Gulf Coast and in developing countries like India. Ambre Energy's process crushes, dries, then feeds these low-rank coals into a device called a retort.

The retort is an oxygen-free environment



Ambre Beneficiation Process Comparison

figure 13

	LIGNITE		POWDER RIVER BASIN COAL	
	RAW	CHAR	RAW	CHAR
Total Moisture	29.4%	0.1%	31.7%	1.2%
Ash	9.0%	15.1%	6.7%	12.4%
Volatile Matter	39.0%	16.6%	36.8%	14.4%
Sulfur	0.78%	0.76%	0.48%	0.24%
SO ₂	1.6 lb/MMBtu	1.2 lb/MMBtu	1.1 lb/MMBtu	0.96 lb/MMBtu
Mercury	0.022 lb/MMBtu	0.001 lb/MMBtu	0.01 lb/MMBtu	0.002 lb/MMBtu
Energy	8,004 Btu/lb	12,063 Btu/lb	8,075 Btu/lb	12,768 Btu/lb
Liquid Yield (mt)	1.03 barrels		1.06 barrels	

where coal is heated to 1,000°F (550°C). Once heated, the material becomes partially gasified, creating a vapor stream that has condensable and non-condensable components.

The non-condensable portion of the vapor stream can be used to power a gas-fired electric turbine which provides an internal power source for all parts of the facility.

The part of the coal that is not gasified in the retort is a high-value char. Based on studies so far, this process can increase the energy value of these coals, while reducing many of the harmful byproducts.

The condensable portion is the consistency of heavy crude oil. Tests have shown that one ton of coal can yield roughly one barrel of oil. Considering that a ton of lignite costs about \$14, the profit potential is enormous.

Ambre Energy currently has testing facilities in Melbourne and Brisbane Australia, as well as the University of Utah. It also has a 24-ton-per-day pilot facility in Vernal, Utah. The company has plans for a facility along the Gulf Coast to make use of the region’s extensive lignite reserves.



What is Pet Coke?

A single barrel of oil can produce countless products used today: gasoline, diesel, kerosene, lubricating oils, waxes, and asphalt. What is usually left over is a dense, coal-like substance commonly referred to as petroleum coke.

For years this material was either land-filled in the U.S. or shipped overseas, where it is usually burned with few pollution controls. However, developers are quickly learning that this former refinery waste product has valuable energy potential.

Compared to coal, pet coke can have lower ash, moisture, and volatile levels than typical steam coal. Its low moisture content gives it an extremely high BTU value, about 70% higher than Powder River Basin coal and 110% higher than lignite (Figure 14).

Producers have found that pet coke is extremely effective when used in the gasification process. Many integrated gasification combined cycle (IGCC) power plants operating today use pet coke, because of its low ash content. The first IGCC facility in the United States, Indiana’s Wabash facility, switched from coal to pet coke, and has been using the byproduct as its feedstock of choice exclusively since 2001.

Many companies along the Gulf Coast are looking at pet coke as a feedstock for gasification facilities in the region. Compared to coal mines, which are eventually depleted, pet coke supplies remain centrally located as long as the refineries that produce them keep operating.

Combined with low-rank coals such as Gulf Coast lignite, a pet coke/lignite blend is extremely affordable at today’s prices. A gasification facility using these blends located near the Gulf Coast could then capture and transport carbon to EOR fields, producing additional oil. The oil would then be shipped to refineries, where more pet coke could be generated for the gasification facilities (Figure 15).

Energy Potential Comparison

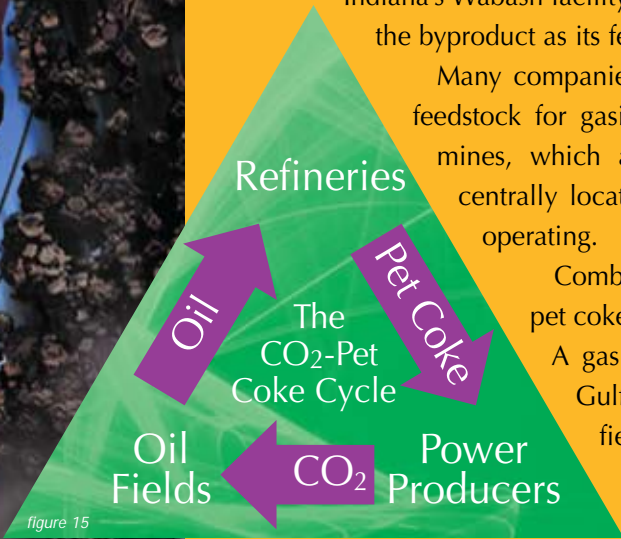
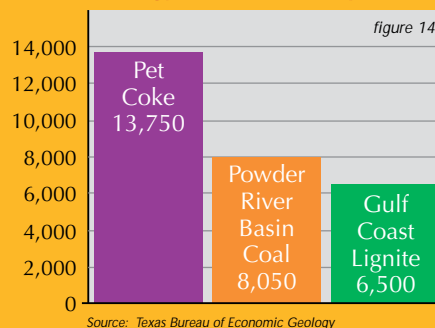


figure 15



Overview and Proposals FINANCIAL INCENTIVES FOR CLEAN CARBON PROJECTS IN TEXAS

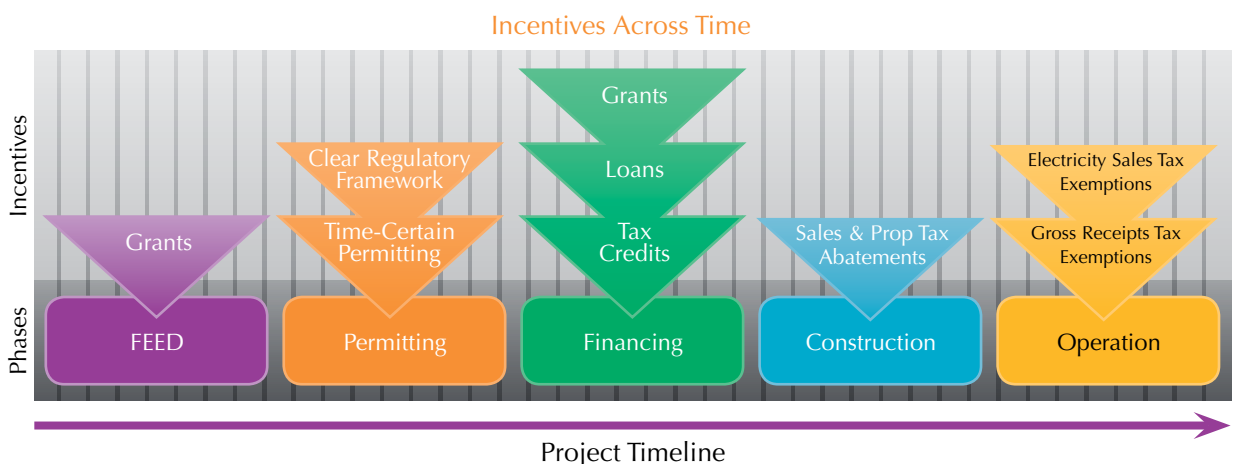
By Mike Nasi

Even in a mostly deregulated electric market in Texas, introducing cutting edge clean energy technologies can be challenging because new technology is often much more costly than conventional technology when all aspects of clean power delivery are factored in (e.g., capital cost, capacity factors, reliability, and transmission). Therefore, clean energy incentives need to be focused on closing the gap between what clean, reliable power costs and what the market is willing to pay for it. There are several tools available to close that gap ranging from grants and loans to tax incentives and market-side incentives/mandates such as portfolio standards.

Although market-side incentives and mandates have been successful in the renewable energy arena and are beginning to be deployed in other states in the non-renewable clean energy sector, this overview will neither address nor propose market-side mandates for two reasons. First, the complexity and potential market disruption of a portfolio standard may not be warranted given the promise of the other financial incentives proposed below. Second, it is not clear that the financial hurdles associated with clean carbon projects can be overcome by creating a portfolio standard and an associated credit market like the Renewable Energy Credits (REC) system currently in place for renewable power in Texas. Given these limitations, the focus of the proposals set out below will be financial incentives designed to bring down the cost of supply rather than securing a market for the energy.

Regulatory incentives, such as time-certain permitting and a clarified regulatory framework, will also be key incentives for CCS projects. However, those topics will not be addressed in this article, which is focused on financial incentives. What follows is a brief overview of the types of financial incentive tools that are conceivably available in Texas and a set of specific proposals for how each tool could be deployed to realize the dream of wide-spread, next-generation clean carbon power development within the next 10 years.

The term “clean carbon” in this context is intended to mirror the class of projects characterized by HB 3732 from the 80th Legislative Session as “Advanced Clean Energy Projects.” That term includes electric power and liquid fuel projects using “coal, biomass, petroleum coke, solid waste, or fuel cells



using hydrogen derived from such fuels,” that are equipped with state of the art emission control technology that, among other things, “renders carbon dioxide capable of capture, sequestration, or abatement.”

GRANTS AND LOANS

Grants and loans are often a good way to spur research and development and can even lead power developers to take technological risks that the market might not otherwise justify. In order to have their intended impact, the grants need to be substantial and the financing arrangements need to be much better than would otherwise be available in the market.

Some loan programs can be funded and structured in a way that lessens the fiscal burden to the state (e.g., bond-funded and eventually self-supporting revolving loan programs). However, there is still some fiscal burden on the state to carry debt service and incentivized financing is usually not enough, in and of itself, to lead a power developer to take the plunge into a large-scale new technology power project.

While grants have the potential to be a significant incentive for developing new technology, as can be seen from the success of the Emerging Technology Fund (ETF), the ever-increasing capital costs of utility-scale clean energy projects drive up the fiscal demands of a pure grant program. As state budgets tighten, the scope of any large grant and loan program would need to be adjusted and targeted to have any realistic chance of being signed into law. However, there are certain aspects of clean carbon power development that could be a good target for a state grant program in Texas.

GRANT AND LOAN PROPOSAL:

Grants for Front-End Engineering and Design (“FEED money”) and Loans for Clean Carbon Research and Development

Because energy developers looking to push the technology envelope in our state are faced with significant financial risks, it certainly is worth the state’s time to explore avenues of reducing that risk given the benefit of a successful full-scale clean carbon technology project in Texas. While a revolving loan program may ultimately be another good tool to deploy to assist in the project financing, the more immediate need appears to be the state partnering with multiple developers to help fund FEED studies for projects throughout the state. Funding for such a grant program could follow the model established by HB 3732 by redirecting gross receipts tax revenue into a dedicated fund for this purpose. Although it is true that gross receipts revenue would otherwise become general revenue, it is widely believed that the gross receipts tax on electricity sales is excessive and should be phased out in any case. If the price of electricity must continue to be burdened by an excessive tax, it would be sound policy to shift a portion of that revenue from taxes on existing power to a fund designed to ensure that cleaner power in Texas becomes a reality.

In addition to a FEED grant program, it would be good policy to implement a revolving loan program designed to spur and sustain Texas-based clean carbon technology research and development activities. The revolving loan program could be set up to be funded through the issuance of general obligation bonds much in the same way as other bond-funded loan programs. Research and development projects could benefit from the favorable financing terms associated with a G.O. bond-funded program and, over time, a successful loan program could become self-sustaining without the need for an ongoing appropriation for debt service.





TAX INCENTIVES

Tax incentives can be another key tool in closing the gap between what clean energy costs and what the market is willing to pay for it. Some argue that tax incentives “cost the budget” because they have the effect of reducing the amount of taxes a project will contribute to the general revenue. This is a fair argument when the projects would be built in the state even if the incentives were not available. That is not the case for cutting edge clean carbon technology projects that, but for the incentives, would simply not be built in this state due to cost and technology risks.

There are several types of incentives that can help ease the tax burden on a clean energy project enough to make the project’s power more cost competitive. The federal tax incentive model has been largely focused on the use of federal income tax credits that are accumulated and monetized to assist with the capital investment needed to build cutting-edge energy projects. This tool has been widely deployed by the federal government to bring about large-scale renewable power projects such as wind power.

Many other states have developed income tax credit incentives that mirror and supplement federal tax credits in hopes of attracting clean energy investment. Because Texas does not have an income tax, other tax incentive models have been developed, including franchise tax credits, sales tax incentives, gross receipts tax incentives, severance tax incentives, and tax incentive/abatement programs designed to lessen the burden of local property taxes, which can be significant in many instances.

Because of the uncertainty surrounding the revenue projections associated with the “margins” tax, this article will not address or propose franchise tax credits for clean energy projects. However, such an approach might be a very effective incentive to consider down the road. Instead, the focus here will be on lower hanging fruit. Last session, HB 3732 created gross receipts, severance, and local property tax incentives. Heading into the 81st Legislative Session, there are some key steps that should be taken on the tax incentive front that could speed the commercialization of clean carbon technology, including carbon capture and storage, without subjecting the state to a significant fiscal burden.

TAX INCENTIVE PROPOSAL 1:
Clarify and refine local property tax Incentives in Chapters 312 and 313 of the Tax Code to better fit the project development timelines of clean carbon projects.

Chapter 312 of the Tax Code empowers local taxing authorities (other than school districts) to abate local property taxes to attract projects and their associated local economic benefits. This

A combination of one or more tax incentives could go a long way toward improving Texas’ chances of attracting utility-scale clean carbon projects in the near term



program needs to be extended and should be amended to expressly allow deferral of tax abatement agreements to account for the project development timelines of clean carbon projects. Although there is already a sound legal basis for such deferrals, the inclusion of express deferral language in other parts of Chapter 312 could create uncertainty as to that authority in other instances. The prudent approach is to make it absolutely clear that deferrals are authorized for clean carbon projects.

Chapter 313 of the Tax Code, also known as the Texas Economic Development Act (TEDA) authorizes school districts to cap, for a limited time, the taxable value of a proposed project under certain circumstances as a means of attracting projects and their associated local economic benefits. TEDA also needs to be extended and refined to ensure that school districts are given the right tools to attract clean carbon technology projects. Among other refinements, it is critical to leave school districts the option to extend the “qualifying time period” up to 5 years. This would enable TEDA agreements to be deferred to enable local governments trying to attract clean carbon technology projects to offer the most attractive tax benefits possible.

TAX INCENTIVE PROPOSAL 2:

Provide incentives from state sales tax for the purchase and installation of otherwise taxable items involved with clean carbon projects.

Sales taxes on equipment and certain services can contribute significantly to the cost and financial risk



What happened to FutureGen?

For years it was THE clean coal project. FutureGen, announced by the Bush administration in 2003, would have been the first-of-its-kind full-scale gasification facility to produce hydrogen, electricity, and sequester carbon dioxide. But where is it now?

Texas was one of the most aggressive players for the project. Nine Councils of Government submitted proposals for FutureGen. Ultimately, Odessa and Jewett became two of the four finalists, competing against two locations in Illinois.

The initial outlay for the restructured FutureGen program was \$290 million; the 2009 stimulus added another \$1.52 billion.

On December 18, 2007, the FutureGen Alliance announced that Mattoon, IL, would host the FutureGen project. This announcement was made despite a protest from the Department of Energy.

Shortly thereafter, the DOE announced rising costs of the project would “require a reassessment of FutureGen’s design.” The Department’s part of the cost was based on a percentage; what had originally been \$620 million had ballooned to \$1.33 billion. To ease the Department’s fears, the FutureGen Alliance responded that they would cap DOE’s share of the project at \$800 million.

On January 29, 2008, the Department of Energy announced it was withdrawing funding for the Mattoon project, based on the escalating costs (from \$1 billion to \$1.8 billion by December 2007). The main reason for the rising costs? Higher prices for steel, concrete, and labor.

A brief attempt to restore the Mattoon project’s funding emerged in the 2009 stimulus; early drafts of the bill would have granted up to \$2.4 billion. However that funding was eliminated at the joint conference, where the versions of the bill passed by the Senate and the House were reconciled.

On June 24, 2008, the Department of Energy announced a new, restructured FutureGen program, soliciting proposals for several clean coal power plants using gasification or other cutting-edge technologies with CCS. The initial funding for the restructured program was \$290 million; the 2009 stimulus bill added another \$1.52 billion.

With new funding, the original FutureGen could re-emerge. After all, Mattoon is in President Obama’s home state.



associated with new technology projects like those associated with clean carbon projects. While existing incentives for manufacturing equipment and pollution control equipment provide some relief, there is an opportunity for the state to significantly lessen the sales tax burden on clean carbon projects that could make them more commercially viable. At the minimum, manufacturing and pollution control property sales tax incentives should be clarified to fully apply to all aspects of clean carbon power generation. This would include the carbon capture, processing, compression, transportation, and injection of carbon dioxide. Beyond that, the commercial viability of clean carbon projects could be dramatically improved if items currently considered outside the scope of these incentives were deemed nontaxable for clean carbon projects.

TAX INCENTIVE PROPOSAL 3:

Extend partial severance tax incentives for oil recovered through the use of carbon dioxide captured from industrial sources.

HB 3732 put in place a 75% severance tax incentive for oil recovered as a result of enhanced oil recovery (EOR) operations using man-made (a.k.a. “anthropogenic”) carbon dioxide. This incentive is designed to increase the value of the captured carbon dioxide by lessening the taxes associated with oil recovered as a result of EOR operations that use man-made, as opposed to naturally-occurring, carbon dioxide. The current incentive expires after the later of either seven years or when EPA adopts a final rule regulating carbon dioxide as a pollutant.

“There is an opportunity for the state to significantly lessen the tax burden on clean carbon projects that could make them more commercially viable”



Federal Incentives

Washington is still leading the way with clean coal incentives. In addition to the restructured FutureGen program, as a part of the American Recovery and Reinvestment Act of 2009 (2009 Stimulus), Congress made billions of federal dollars available for clean energy projects. The Stimulus provided \$3.4 billion for fossil energy research and development. The Department of Energy is currently working to revise and streamline the application process for this funding and hopes to make applications for the loan guarantee program available by late April. Here are a few of those programs:

CLEAN COAL POWER INITIATIVE (CPPI)

Introduced by the Bush Administration in 2002, the CCPI is a public/private investment program that awards federal dollars to clean coal projects that can be rapidly deployed. As part of the 2009 Stimulus, \$800 million was appropriated to the program.

RESTRUCTURED FUTUREGEN PROGRAM

The restructured, seven-project FutureGen program initially included \$290 million for clean coal power plants using gasification or other cutting-edge technologies, with CCS. The 2009 Stimulus has added another \$1.52 billion in funding to the program. In early drafts of the Stimulus, \$2.6 billion was allocated to revive the original Mattoon, IL, FutureGen site, but that funding was stripped before the bill passed. (For more on FutureGen, see page 19).

FEDERAL LOAN GUARANTEE PROGRAM

In the Energy Policy Act of 2005, Congress gave the Department of Energy authorization to issue federal loan guarantees for projects that “avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases,” including clean coal projects. In the Stimulus Bill, Congress appropriated an additional \$8 billion to this program. The first round of applications for clean coal loan guarantees were due December 22, 2008.

INVESTMENT TAX CREDIT

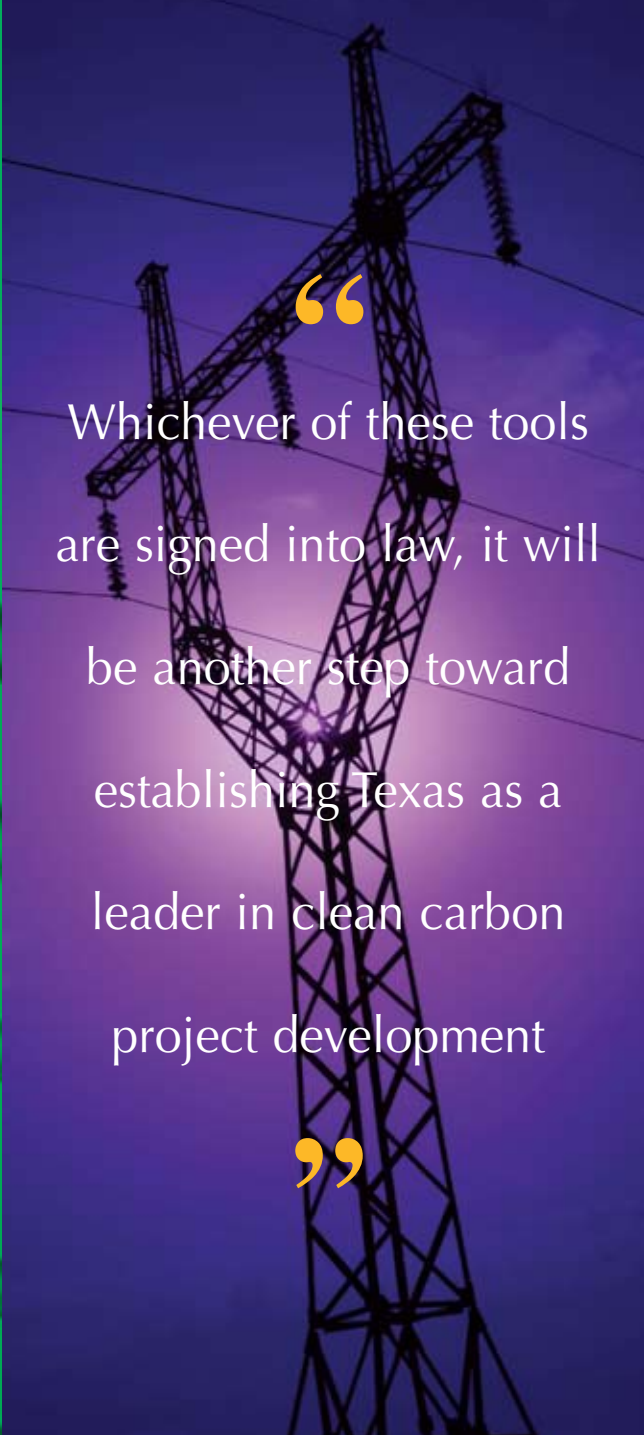
The 2009 Stimulus also includes a new 30% investment tax credit for advanced coal systems, including gasification-based and other types of combustion-based systems. There is a \$1.25 billion cap on the credits available. The Treasury Department and DOE already have a system in place for this program and will begin soliciting applications in early 2009.

CARBON SEQUESTRATION TAX CREDITS

The \$700 billion Emergency Economic Stabilization Act of 2008 (the Wall Street Bailout) includes a carbon sequestration credit. It rewards \$20 per ton for permanent storage of carbon dioxide in geologic formations and \$10 per ton for sequestration of carbon dioxide using EOR. The tax credit is limited to 75 million metric tons for the program.

OTHER FUNDING FROM THE 2009 STIMULUS

- Geologic site characterization activities, \$50 million
- Geologic sequestration training and research, \$20 million



“
Whichever of these tools
are signed into law, it will
be another step toward
establishing Texas as a
leader in clean carbon
project development
”

EOR developers have expressed concern about the reliability and duration of the current incentive. To ensure that the goals of HB 3732 are met and additional value is placed on captured carbon dioxide for use in EOR projects, it seems prudent to refine the current expiration clause to establish a known end date of 10-20 years. This would be done so that power and EOR developers can evaluate the viability of projects based on a known timeframe.

conclusion

While it is not realistic that all of the proposals outlined above will be adopted by the Texas Legislature in this or subsequent sessions, there are several useful tools described here that could be readily deployed to attract clean carbon projects without fiscally burdening the state. This is by no means an exhaustive discussion of the types of incentives that might be useful or entertained by the Legislature, but it captures what appears to be the most viable prospects given the current political and financial position of the state.

Whichever of these tools are signed into law, it will be another step toward establishing Texas as a leader in clean carbon project development.

Given the economic and environmental policy debates raging on the national level, we would be well-served in implementing as many of these incentives as possible, as soon as possible, to keep Texas ahead of the curve and prepared to deal with a carbon constrained energy market.

Given that the authorization to distribute over \$3.8 billion to clean carbon projects under the 2009 stimulus will expire in September of 2010, this legislative session can be fairly characterized as the last opportunity for Texas to develop its ‘best and final offer’ in hopes of attracting clean carbon stimulus dollars.

save the
DATE
OCT 27-28

THE CCTFT BOARD ANNOUNCES THE 2009
Clean Carbon
Policy Summit & Project Expo



Clean Carbon Policy Summit & Project Expo

“Over the past few years, the Foundation has not just promoted clean coal technologies, but also other key carbon-based sources of energy such as petroleum coke, biomass, solid waste, and hydrogen fuels cells derived from these fuel sources.” — *Chuck McConnell*

If the Clean Coal Technology Foundation’s annual conference is remembered for two things, it will be 1) How the nation’s financial crisis is affecting the rollout of clean energy technology, and 2) The introduction of the term “clean carbon” into the energy lexicon.

Foundation Chairman Chuck McConnell quickly explained the deviation from “clean coal” to “clean carbon” in the event title during his opening remarks.

“Over the past few years,” McConnell said, “the Foundation has not just promoted clean coal technologies, but also other key carbon-based sources of energy such as petroleum coke, biomass, solid waste, and hydrogen fuels cells derived from these fuel sources.”

“I’m sure everyone smirked when they heard the words ‘clean carbon,’” quipped CCTFT counsel Mike Nasi. “I did. But I use the term. It has got to be everything.”

Attention quickly focused on the nation’s financial crisis. The Clean Carbon Summit came less than one week after Congress passed the historic \$700 billion Emergency Economic Stabilization Act of 2008. Several presentations deviated to address the issue.

“If you can’t finance a new Chevrolet, you’re not going to finance a coal plant with carbon capture,” said Tenaska’s David Fiorelli. “Obviously we all expect and hope for a return to normalcy sooner rather than later, but it certainly isn’t there today.”

“I have every confidence that Texas and the nation will persevere,” said Senator John Cornyn. “We’ll get by this tough spot, we’ll come back stronger, and learn important lessons that I will hope will never let this happen again.”

Cornyn and Coal Utility Research Council Director Ben Yamagata both presented aspects of the Stabilization Act that affected the energy sector



*Senator John Cornyn and
Chairman Michael Williams*



Governor Rick Perry and Chuck McConnell



Chairman Barry Smitherman participates on a Q&A Panel

(see page 21). As a member of the Senate Armed Services Committee, Cornyn also touted coal's role as a fuel for military aircraft and other vehicles.

Other special guests included Governor Rick Perry and Railroad Commission Chairman Michael Williams.

"Texas needs to lead the charge in energy independence, partly because we're better at producing energy than anyone in the United States," said Perry. "Texas has a substantial supply of lignite in our backyard, and we have been a leader in clean coal technologies. We need to keep pressing forward because the threat CO₂-related federal legislation looms bigger and more ominous every day."

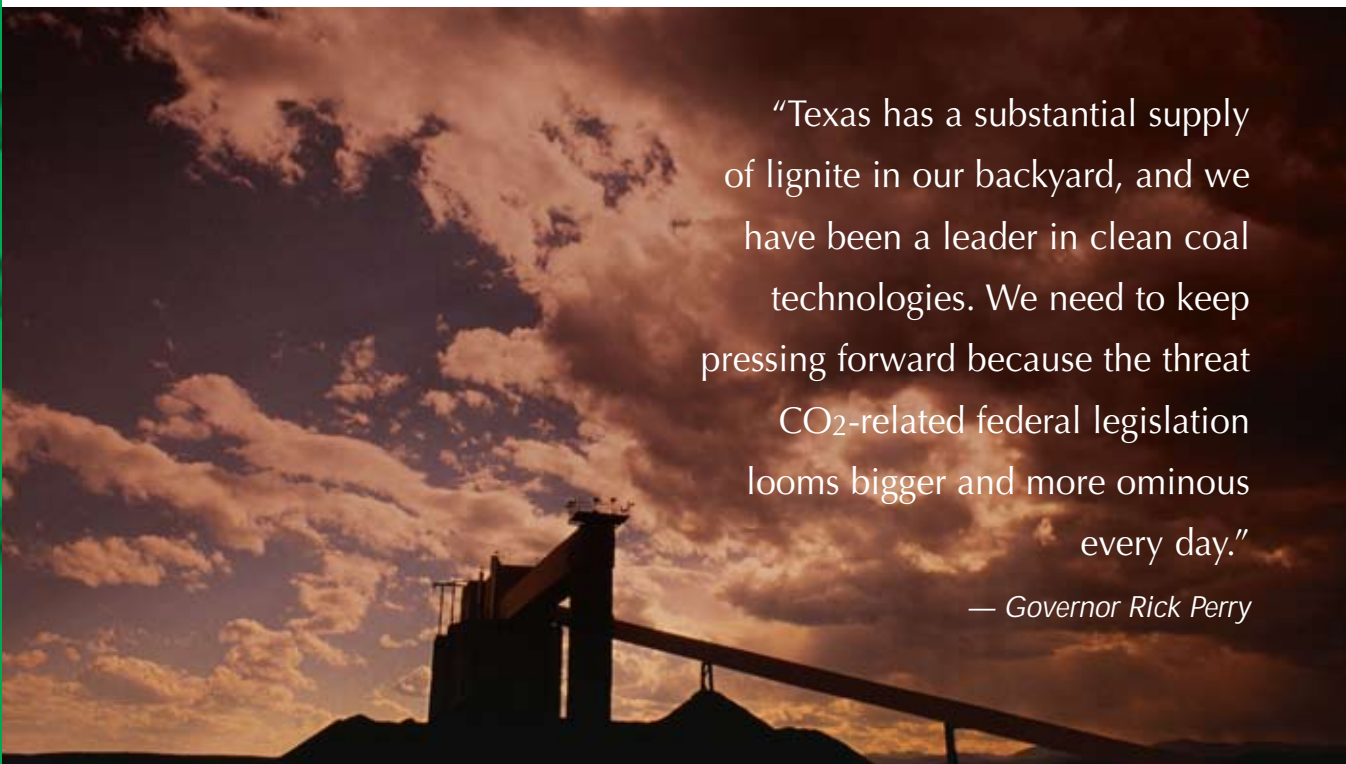
Four of the six sessions were moderated by state lawmakers, including Sen. Kip Averitt, and Representatives Dennis Bonnen, Kelly Hancock, and Warren Chisum. Thursday's Project Expo session was split into two parts, hosted by FutureGen Odessa Director Hoxie Smith and FutureGen Jewett Director Tom Wilkinson.

"In West Texas we have the luxury of EOR, where you can sell the CO₂," said Smith in his closing remarks. "The goal of FutureGen was ubiquitous, where you could put these things everywhere you have a power plant, and so we have to do a lot of work with CCS and find ways to make it affordable for everyone."

The Project Expo included presentations for exciting new projects from Tenaska, ConocoPhillips, Peabody, Praxair, and Ambre Energy, many of which have been detailed in this publication.

"Texas has a substantial supply of lignite in our backyard, and we have been a leader in clean coal technologies. We need to keep pressing forward because the threat CO₂-related federal legislation looms bigger and more ominous every day."

— Governor Rick Perry



ABOUT THE REPORT

Since its inception in 2004, the Clean Coal Technology Foundation has been a respected source of information in the dialog about clean carbon and this state's energy future.

The organization began with an executive order, signed by Gov. Rick Perry in 2004, to facilitate the discussion about clean coal in the state of Texas. That year, the Clean Coal Technology Council was born, spearheaded by Texas Railroad Commission Chairman Michael Williams. Today, the Foundation carries out the mission of Commissioner Williams, Governor Perry, and the Council.

Fueling the Future 2009 also follows an important series of publications released by the Foundation: Making Progress 2006, Power Outage 2007, and Finding Solutions 2008. We believe this document will match the same level of quality and integrity that you have come to expect from the Foundation over the years.

We look forward to working with you to ensure that these burgeoning technologies have a place in our energy future.

With pleasure,



Jay Dauenhauer
Executive Director, CCTFT

ABOUT THE CLEAN COAL TECHNOLOGY FOUNDATION OF TEXAS

The Clean Coal Technology Foundation of Texas was founded in January, 2004, as a non-profit entity to promote the use and development of clean coal technologies that will result in reliable, low cost, and environmentally responsible energy for Texas. Foundation members are:

AEP Texas	North American Coal
Ambre Energy	NRG Energy
American Coalition for Clean Coal Electricity	Peabody
BNSF Railway	Praxair
Hydrogen Energy	Russell & Sons
International Power	Tenaska
Lower Colorado River Authority	Westmoreland

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