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**Testimony
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Texas Senate**

**Hearing in The Woodlands on
Carbon Capture and Storage**

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**Testimony of L. Stephen Melzer
Texas Carbon Capture and Storage Association**

Mr. Chairman and members of the Committee, thank you for the opportunity to testify today on the subject of carbon capture and storage (CCS). My name is Steve Melzer. I am a registered professional engineer and President of the Texas Carbon Capture and Storage Association, an industry association charged with a mission to assist in the growth of the capture, transport and storage of industry/anthropogenic CO₂ for emissions reduction, enhanced oil recovery and energy security. For the past 13 years I have also directed the annual CO₂ Flooding Conference. Our goal has been to encourage more and better CO₂ floods and, with the contributions of the companies with the technology and experience, we have watched CO₂ flooding grow to contribute 73 million barrels last year to the oil production of Texas and the U.S.

OVERVIEW OF TESTIMONY

A recently announced project in west Texas is an excellent example of the rapidly changing nature of the U.S. energy supply. Two major forces are now clearly at work, 1) higher prices of oil and gas and 2) an increasing and global concern about the growing volumes of CO₂ emissions. Together they have teamed to lay the foundation for a new industry. This industry will be charged with capturing, compressing, transporting, and permanently storing the CO₂ underground. Most persons refer to this nascent industry as the sequestration or carbon capture and storage (CCS) industry. Although all states have large energy needs, some states will be prosperous in this new era of energy and some states relatively disadvantaged. The future of CCS should be quite bright for the State of Texas. Texas has a number of large sources of emitted CO₂ and a wealth of knowledge about its subsurface in which to emplace those volumes. In addition, it is one of the few places on earth that has proven the commercial nature of CO₂ injection that can offset (i.e., commercially subsidize) the capture process. Through its oil and gas exploration activities, it also possesses a very detailed knowledge of its subsurface including its multitude of oil and gas reservoirs and its almost limitless deep saline formations to host the huge volumes of captured CO₂.

This testimony will assume that others have addressed the many existing and future Texas CO₂ capture opportunities and will focus on the future opportunities and emerging needs within, the CO₂ transportation and storage subsectors of this new industry sector. You will hear later today about our Texas transportation and injection statistics that provide the foundation for the future growth.

A REFERENCE PROJECT (Refs 1 & 2)

A recently announced development within the Permian Basin calls for an exciting increase of natural gas production by SandRidge Energy while calling for processing of the rich CO₂ streams of gas by Occidental Petroleum. We, at the Texas Carbon Capture and Storage Association, believe this very large project (\$1.1 billion investment just for Oxy) is exemplary but it is just the largest and latest in a growing number of examples of things to come with anthropogenic CO₂ capture and CO₂ EOR. The recap below is a summary of our analyses in our language (not theirs).

With this landmark set of investments/developments for west Texas we see:

- 1) SandRidge makes ~350 million cubic feet per day (mmcfpd) of (processed to be 'pure') natural gas (in 2011 and beyond) and a cumulative production of approximately 1,000 billion cubic feet (by 2020) {by our analyses these should be very conservative numbers} and ultimately, 1,700 billion cubic feet as stated in their news release.
- 2) Existing but expanded legacy gas plants and Oxy's new Century plant process out the CO₂ "contaminant" from that natural gas to convert it from a waste stream that is emitted to the atmosphere to make a CO₂ "commodity" to be used for oil extraction. They will separate, compress, and transport it to oilfields to make an incremental 50,000 barrels of oil per day (in 2013) and, ultimately, 500 million barrels (these, in our opinion, should also be very conservative numbers).

The entire project would not be feasible without a secure underground home for the CO₂. Developing long-term natural gas reserves while emitting large volumes of CO₂ into the atmosphere is becoming less acceptable with each passing year. Cooperation between the CO₂ source company (in this case SandRidge) and the company with a home for the CO₂ (Oxy), demonstrates a commercial partnership between a company with the technologies needed to find and develop badly needed natural gas (SandRidge) and one with the knowledge of anthropogenic CO₂ capture and oil reserves development (Oxy). It also represents a very clear model for next generation energy where the primary product may be in the form of electricity, hydrogen, or specialty chemicals from coal, petroleum coke, or natural gas, all with by-product CO₂ needing capture.

While this project is ready to move ahead, all is not yet in place. Texas must get ready with some assistance to industry to make this work for the benefit of the state and the commercial entities. That is why we have formed the Carbon Capture and Storage Association to assist with the new legislative and regulatory initiatives needed to facilitate these kinds of projects across the entire energy sector.

WORLDWIDE INITIATIVES IN CO₂ SEQUESTRATION

There is a massive research effort underway around the world to begin the huge task of capturing by-product CO₂ from coal and other emission streams. Most people and places are intimidated by the magnitude of the job. The perspective of parties in Texas, however, is different. Our state has been capturing, transporting and injecting huge volumes of CO₂ and placing it underground in secure sites for over 35 years. To date, the act of producing oil while using the CO₂ has been our mantra. But we know that the formations store huge volumes during the process so we are quite ready accomplish both oil production and CO₂ storage in a larger way in the future. Although the CO₂ flooding industry makes 18% of the oil produced in Texas today, it has not grown to be the huge industry we currently envision for the future. The reasons for this have largely to do with the oil pricing history of the past several decades; a very different one that we are seeing today and expect to see in the future.

A recent study by Advanced Resources International (Ref 3) illustrates that 40% of the CO₂ EOR oil production potential in the U.S. lies within the Texas state borders. Since CO₂ EOR sequesters large volumes of CO₂ while producing oil, the future should be bright as long as regulatory frameworks are workable and commercially friendly. With the increasing need for clean and plentiful energy in America, a careful formulation of the legislative initiatives and

regulatory oversight should enable Texas' hydrocarbon economy to continue its impressive performance.

LEGISLATIVE TASKS

So what are the immediate tasks at hand? The TxCCSA believes that the experience of the coal and oil and gas industries should form the baseline for the new CCS industry. What is needed includes knowledge of how to capture the CO₂ volumes, the operational procedures of handling it, and what are the appropriate subsurface reservoirs in which to emplace the CO₂. Our own Texas Railroad Commission (RRC) is the most experienced CO₂ regulatory agency in the world. Their long and distinguished history of oversight of the mining and oil and gas activities together with their injection responsibilities have arguably developed the foundation of the nation's underground regulatory regimes and protected the state's interests while fostering the state's economic engine. We believe that abandonment of their oversight and history of leadership for the coming activities of sequestration would be counterproductive since most of the functions of CCS are effectively the same as the CO₂ EOR activities they regulate today. We also recognize, however, that some expansion of authority will be necessary, as security of storage over long periods of time will be needed.

Some incremental needs will require statutory attention. The RRC will be given a new mission so new staffing requirements, especially at the district offices will be necessary. The new mission will require new types of training. All of this will grow as CCS matures and general revenue grows. It will be important that sources of CO₂ be connected to multiple sinks. Some form of state-assisted pipelines could facilitate this.

A federally based regulatory regime for CCS (at EPA) is currently being considered. The authority cited is groundwater protection, which is admittedly important, but far from the only parameter critical for securing emplacement of large volumes of CO₂. Most of the parameters require state-level action and should be under the purview of a state agency like the RRC.

Some clarification of subsurface storage rights is in order. For example, Wyoming recently declared that the surface owner controls underground storage rights. In Texas today, there is ambiguity about the control of those rights. That ambiguity extends to procedures of how to aggregate disparate ownership of pore space into a project of suitable size to meet the injection needs.

Finally, we believe that certification of appropriate sites for underground injection may be the most important function of governmental oversight. It is abundantly clear that there are sites where CO₂ can be stored for geologic time frames and there are sites that absolutely should be excluded from consideration for storage. We believe that Texas is blessed with the most qualified state organization in the U.S. (and perhaps the world) to accomplish the task of ranking sites for suitability of secure injection. This is our own Bureau of Economic Geology. Many states are uncomfortable with the task of qualifying sites within their border and we would suggest that Texas step up in these robust times for oil and gas pricing to assist in an interstate effort to develop the multiple criteria for site storage. This will greatly assist with the issues of long-term liability of storage.

Our Texas Carbon Capture and Storage Association stands ready to assist where we can. We strongly believe Texas can lead the world in applying the necessary technologies and governmental oversight to make CCS work both for the economy and environment.

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