CARBON SEQUESTRATION – A COMMUNITY FOCUS GROUP STUDY OF ATTITUDES IN WILLISTON, NORTH DAKOTA

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EXECUTIVE SUMMARY

In April 2005, representatives of the Plains CO_2 Reduction (PCOR) Partnership, led by the Energy & Environmental Research Center (EERC) at the University of North Dakota, held two focus groups in Williston, North Dakota. A total of sixteen people participated; seven on April 20 and nine on April 21. The purpose of the focus group research was to gain insight into the public perception of carbon sequestration from two groups representative of citizens in the north-central Williston basin, an area with potential for both geological and terrestrial sequestration projects. Focus group participants were shown a 30-minute informational video developed by the PCOR Partnership and entitled "Nature in the Balance – CO_2 Sequestration," introducing participants to the greenhouse effect, anthropogenic CO_2 emissions, and terrestrial and geologic sequestration. These concepts were discussed in the context of activities in the PCOR Partnership region. Prior to the focus group sessions, participants provided demographic and attitudinal information. Audio and video recordings were made of the sessions.

Overall, the focus group discussions demonstrated that the video was effective as a general introduction to CO_2 sequestration in the region, and the discussions resulted in suggestions for future outreach activities involving the video. Participants indicated that the video was well paced, maintained their interest, and was informative. Their comments and discussion indicated that information was relayed regarding terrestrial and geological sequestration, the type of regional activities under way, the opportunities represented by the regional activities, the partners involved in the activities, the international nature of the PCOR Partnership, the role of the U.S. Department of Energy, and the global nature of CO_2 issues. The participants learned that sequestration is one of several options for controlling CO_2 and wondered about the progress of technological developments. Participants indicated that they needed more information on the safety of geologic sequestration, how terrestrial sequestration worked, the status of sequestration in the region including individual projects under way and planned, what it would really take to reduce CO_2 significantly, and what they as citizens could do to reduce CO_2.

Most participants had never heard of CO_2 sequestration prior to the focus groups and indicated that the session was very informative. Participants suggested outreach methods, such as television, radio, newspaper, and community meetings, as ways to relay information. Since Williston is in the middle of the oil-producing area for North Dakota, interest

in the potential for value-added geologic CO_2 sequestration was high.

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INTRODUCTION

As one of seven regional partnerships under the U.S. Department of Energy's (DOE) National Energy Technology Laboratory's (NETL) Regional Carbon Sequestration Partnership (RCSP) Program, the Plains CO_2 Reduction (PCOR) Partnership, led by the University of North Dakota Energy & Environmental Research Center (EERC), sought input on attitudes regarding CO_2 sequestration, and in particular, the PCOR Partnership video "Nature in the Balance – CO_2 Sequestration." The 30-minute video, produced by Prairie Public Television, was intended as a general introduction to the greenhouse effect, anthropogenic CO_2 emissions, and terrestrial and geologic sequestration in the PCOR Partnership region. As part of this effort, the EERC enlisted two focus groups – referred to as Group I and Group II in this report. As shown in Figure 1, the focus groups were held in Williston, North Dakota, on April 20 and 21, 2005. Williston was chosen as a pilot area for public opinion research, because it is situated in the geographic area of the PCOR Partnership region with potential for both geological and terrestrial sequestration. Williston is in the U.S. portion of the PCOR Partnership region in contrast to the Canadian portion of the region, which has active programs under way to educate the public with respect to CO_2 issues as part of Canadian actions to meet Kyoto targets. The meetings were videotaped, and video and audio tapes are available at the EERC in Grand Forks.

BACKGROUND AND FOCUS GROUP FORMAT

Focus groups provide information and guidance about a research topic through the use of group dynamics. Focus groups are essentially group interviews. A moderator guides a small group discussion on topics raised by the moderator. What participants in the group say during their discussions is the essential data in the focus group (Morgan, 1998). According to Blankenship and Breen, "focus groups are an invaluable tool for marketing researchers and the sponsors that use them. For many purposes, nothing duplicates what can happen when a group of persons interested in a topic sit around a table for one to two hours discussing how they feel about that topic (1993)."

For this PCOR Partnership activity, sixteen individuals were brought together into two focus group meetings. Group I was held on April 20, 2005, with seven participants and Group II was held on April 21, 2005, with nine participants. EERC personnel recruited the participants from the Williston, North Dakota area. This was accomplished by developing a preliminary list of participants chosen at random from the Williston area phone book. An equal distribution of men and women and an even distribution of age groups were targeted in the recruitment process. Potential focus group participants were then contacted by EERC personnel until a quota of 12 participants was filled for each session, with the expectation that 6 to 10 participants would show up for each of the focus group sessions. Reminder calls were given the day before each session, and as expected, some potential participants canceled their participation at that time.

Prior to the focus group meeting, participants were sent a letter confirming their participation along with brief background questions (see Appendix A). These questions were intended to characterize the focus group participants (background, age, and employment) and to characterize their opinions on various topics related to the environment. A few participants completed the questions in advance, while others answered them on-site before the focus group meeting began.

Figure 1. PCOR Partnership region with Williston labeled.

The data presented in Appendix A describes the focus group participants but should not be generalized as characteristic of the population of Williston, North Dakota, as a whole.

The initial portion of the focus group focused on the following activities: 1) the moderator of the focus group explained the logistics of the group; 2) participants were informed about audio and videotaping of the sessions, and 3) participants introduced themselves.

The video, "Nature in the Balance – CO_2 Sequestration," was shown, lasting approximately 30 minutes. The video, a PCOR Partnership product, was intended as a general introduction to the greenhouse effect, anthropogenic CO_2 emissions, and terrestrial and geologic sequestration and was tailored to activities in the PCOR Partnership region. After the video, a focus group discussion guide was utilized to lead the group discussions (Appendix B).

The discussion lasted approximately 1.5 hours for each group. Participants received a thank you mailing with a stipend of $20. Two participants chose to forego their stipend.

FOCUS GROUP FINDINGS

Understanding the Basic Concepts

When asked about the kinds of sequestration after the video, both groups were able to identify them but in different ways. Group I responded with both "terrestrial" and "geological" by name. Group II's first response was more conceptual, described as "one was plant wasn't it? Biological," before someone identified "terrestrial." Group II identified "subterranean" or "underneath the earth" for geological.

Both groups indicated that they found the concept of sequestration to have been clearly described in the video. Some of the questions raised in their mind during the video were answered during the course of the video.

Comments by the group, related to CO_2 sequestration, included:

- "CO_2 recovery. You start using the big words like sequestration. Who knew what sequestration was before they came here?"
- (Before the video) "I thought they would put something somewhere. I thought of water."
- "For me, it (the video) answered the question I had in my mind about the reservoirs… I was thinking to myself, why aren't they using it for oil?"
- "The term CO_2 sequestration. I kind of had an idea of what it meant. I learned what the actual meaning of it is."
- "I didn't know what this CO_2 sequestration was. Did any of you people know what it was? I find it extremely interesting. I really do, because if that is a way that we can reduce that greenhouse effect, I think that it's something that we should explore. Once again, it gets down to the economics. If you cannot do it economically, you're not going to get it done."

Overall Impression of Video

The focus group participants in both groups were asked about their initial impressions of the video, which focused on two areas. First, the discussion related to what they had learned and the questions that the video raised in their minds. Second, they talked about their overall impression of the video and the video format.

Informative

The groups found the video informative. They also indicated that it was easy to understand, well-paced, and kept their interest. Many comments were given related to the informative quality of the video:

- "It was understandable."
- "It was interesting. I learned quite a bit."
- "It was good. It's hard for me to comprehend (carbon) out of the grass and out of the atmosphere."
- "I thought the pace of it was easy to follow. It was easy to keep up with."
- "No, I didn't know a whole lot about it (before the video). It was informative to me. Interesting how they explain things and said what they can do and all that."
- "I felt it was very informative to me. It explained things well for me. It was simple. It wasn't way over my head, and it made sense."
- "It kept my interest, and that's one thing I liked about it."
- "I don't think that it stayed on any one thing for so long that your mind wandered anyplace else."
- "I'm with them. I just thought it was very informative. I mean you read little blurbs, and you hear little things, but you don't understand the whole consequence of everything until you see this, and then you realize that this adds to this and this adds to that. It's not just one thing. You can't just fix one thing. You have to apply it many ways in order to actually fix the problem."

Some participants indicated that the video is not only informative, but that it is also somewhat persuasive about the benefits of carbon sequestration. As one participant stated, "I thought it was quite a commercial for sequestration . . . for this group (PCOR Partnership and the EERC). It's a real push. I understand it." Others agree that the video was promoting carbon sequestration. However, they also stated that it was presented in a balanced, even-handed way.

Memorable Images and Messages

One characteristic of the video that was frequently mentioned is the scenery. When asked what scenes were memorable, the following responses were given:

- "I was impressed with the scenery and all that. How the whole thing falls into place."
- "I thought it was really attractive looking. The scenery."
- "I don't know what city that was, but there were a lot of people in it."
- "I liked familiar scenes that looked like home."
- "I noticed the smokestacks."
- "Wetlands looked good."
- "The diagram that kept flashing up there, how you push the CO_2 into the ground."
- "I liked the part where they showed how they put oil underground into the wells. I found that interesting."
- "I don't know. I like wind energy myself. So, the turbine, spinning. I liked that old plow going down the field too."

Discussion of Topics Demonstrating Understanding of Current Situation Related to Carbon Dioxide

The focus group discussions were facilitated by general questions from the moderator, such as "what new concepts or ideas did you learn?" and "did you hear anything in the video that was surprising to you? Those questions generated lively discussion summarized below.

Partnerships

The groups noticed the idea of partnerships. They were interested in the idea of the regional partnerships. They were impressed that Canada and the United States are working together. They liked the maps of the various regions and found that useful. They also noticed the corporate involvement and the complexity of change. As one participant stated, "The corporations are part of all this. And with that many corporations and that many people involved, it's a big thing to change. It's just massive."

Several participants didn't realize the current efforts under way. "I was just surprised at how much has already been done. I didn't realize there was research and projects going on that were addressing so much of the environment. I wasn't aware of that. So, that was a good thing to see."

There was some question as to the timing of the carbon sequestration projects. For example, "I knew that there were different projects going on, but I'm still of the opinion that it's a little too late. We've been throwing this garbage into the atmosphere for 140 years almost, and now we want and expect to clean it up in 100 years. It's not going to happen."

After one person said, "It should have been being done 40 years ago." Another responded with "40 years [ago] people didn't realize how much damage that they were doing." And a third stated, "That's a good point too."

Others felt satisfied that we are addressing things now.

International Agreements and Legislation

There was discussion in Group I about international agreements. One participant stated that, "There have to be international agreements. That's been the problem for the last 60 years. There haven't been international agreements." Another disagreed, saying that some countries are taking action. They talked about the idea that the situation in the United States is good and our air is cleaner than other countries.

They also talked about U.S. legislation. There was a general feeling that industry is more likely to change with regulations. One participant mentioned that there are clean air acts and laws. One participant stated, "Well, they talked about factories, the U.S. factories. They're not going to change, and the government hasn't stepped in to make them change. Because if they say you've got to spend this much money and do this, they'll move to Mexico and move to China, so unless the whole world, agrees to do this, I see change [occurring] very slowly."

Population Growth

The imagery of cities with large populations sparked discussion on overpopulation in the world. The groups seemed to connect the need for energy with population growth and recognized that this was a significant factor. A couple of representative comments were:

- "I've read enough and listened enough about the fact that most everybody's heard of the concerns with the greenhouse effect and so on. The fact that it's a problem and concern wasn't necessarily new in that respect. But take China, some

of the leading economic development in the world is going to happen there in the next few years, and obviously with that many people, it's going to be a huge problem in and of itself. If all the rest of us were fine, we'd still have a big problem just with that country alone. The fact is that you have to take all of us into account. That it is a worldwide problem. I think I knew some of that but I think it (the video) just points it out. It is a major concern that we all need to be aware of."

- "With this energy thing, we no longer have a surplus…we have these countries like you mentioned. China and India are going to get much, much worse (i.e., growing population). Energy easily right now is probably quite cheap. Because we have a lot of people competing for these resources, the future is only going to be more expensive or standards are going to climb."

- "I really worry about population."

- "The thing that stuck out in my mind from watching the movie is when they discussed people need jobs and money. And they showed the smokestacks, and I'm thinking that's just going to pollute things more. And I know they're kind of setting us up to bring us to what we should do about it."

Industry Sources

The groups recognized that one source of carbon dioxide is fossil fuel use in industry. They attributed that primarily to the larger cities. However, they did recognize that it might occur in their town too. Also, they noted that although coal-fired power facilities may contribute to the problem, they also seem to be proactive. A few thoughts that were mentioned are:

- "In those factories . . . when they build an electric-generating plant . . . a coal-firing plant now, I guess they do the best they can with what we have. They mentioned that."

- "They [coal-fired electrical industry] probably came along more than any other industry to clean up their act."

- "Even our environment here in Williston. I live southwest of town. There used to be a plant east of town. I would come to work early in the morning, and there used to be a haze over Williston. And it used to upset me so much, thinking . . . doesn't anybody else see this? And it just really bothers me. Because, I don't know. To me, North Dakota is such a clean, clear state. You can breathe. But, then you see that."

Personal Sources

Focus group participants took some personal responsibility for pollution and felt some connection to carbon dioxide emissions in that regard. They talked about their oversized vehicles and homes. They felt that they could all make personal changes. Although these topics were all discussed in the video, it is indicative of how the participants tried to relate the messages to their personal lives. Some comments on the topic of vehicles and housing included:

1) Vehicles

- "I don't know what the percentages are, but look at these SUVs going up and down the roads. They pollute the air. I bet I could pick on some people in this room, possibly. But, I don't want to pick on myself (laughter)."

- "I have one of the most major polluters there is. I've got a 30-foot

motor home. It's got a 460 gas engine in it. It pumps it out. But, the bottom line is, we had the technology 50 years ago, but nobody wanted to look at it, because it might hurt the oil industry."

- "Just think of all the people in the (Twin) Cities, like my son lives in St. Cloud (Minnesota). They drive 30, 40 miles to work so they can live in the suburbs so they can have a bigger house for less money. So, they drive. She goes one way, and he goes another way."

2) Housing

- "The American people. I hate to be picking on us so much, but here we are worried about conservation, and what is the average size home we're building today as opposed to 20 yrs ago? My heat bill's twice as much."

- "The average size home we're building is 3500 sq ft, and we're worried about conservation. Who's kidding who? Until we have energy so expensive, I'm serious, that it hurts to stay warm in your house, we're going to keep building bigger houses, and we get back to 900-sq-ft homes, maybe we wouldn't have some of these problems. Not that I'm pushing it on me."

- "Average of 2.5 children per family and then we have these huge homes."

- "You know you go to Minneapolis and talk about fixing carbon. You think of all the carbon dioxide in those stacks going to heat those homes because they get a lot of power from our power plants. And they're huge homes."

New Technology

Both groups talked about the need for new technology across a wide variety of areas—from vehicles to industry retrofitting for carbon sequestration to renewable energy. They also talked about wind and hydrogen.

They were interested in the CO_2 flood technology used at the Weyburn oil field in Saskatchewan. They wanted to know more about it. They noticed the economic advantages too. One participant stated, "Basin was talking about sending carbon dioxide to Canada. I was at Basin visiting with these people, and I thought that's kind of interesting. Now I hear its $1.5 million a month (in profit). No wonder. It has an economic reason. As I look at solutions, it kind of reminds me of reading about Einstein. Imagination is much more valuable than knowledge. I think the imagination we have to try to solve this problem is a lot more valuable than what we know right now, and I think this is a step maybe in that direction. I hope so. Because the highest stupidity is to keep doing something the same dang way and expecting to get results."

Some participants seemed irritated that technological development moves slowly. One stated that we had hydrogen technology 50 years ago. He stated, "If we had spent the money 50 years ago, just think where the technology (hydrogen) would be."

They wondered how technology moves forward. After some discussion, they related it back to economics and how new technology occurs, as it is needed. They made statements like:

- "I guess they just accept the fact that the power guy says, well, it's not economical to recoup it from our factories when it really should be. If they're generating money out of that factory, they should be putting some of it back to recoup this stuff,

regardless of the cost. I mean, sure, they have to put a lot of money into their scrubbers and things like that and their stacks, but why not make 'em recoup it?"

- "That's the same as trying to stop car emissions. It's not economical right now, but it could be done if we really put our mind to it and said you must do it. You absolutely have to do this and not keep saying, well, a couple more years, a couple more years, a couple more years and just keep letting industry use more fuel."

- "If enough people think that we need it, then it becomes something that they do."

Both groups seemed quite interested in technology. They focused on the carbon sequestration topic most of the time, but several of them had broader interests too. For example, one participant stated, "my interest is much more than carbon dioxide. We need to utilize new technologies, which we know exist, to solve a large part of the energy crisis, which in essence will reduce carbon dioxide problems. So, that's where I'm coming from to be very honest."

One participant went a step further and suggested a way citizens can spur technology development. In response to a question from another member of the group, he suggested that investing in companies is a way for individuals to take an active role in new technology development.

Discussion – Carbon Dioxide and Sequestration

Both focus groups were interested in the topics of terrestrial sequestration and geological sequestration. They were particularly interested in the connection between geological sequestration and oil recovery and the potential benefits. They related terrestrial sequestration back to farming and soil; however, they also saw other possibilities, such as trees. Terrestrial sequestration, overall, seemed an easier concept for both groups to comprehend.

Terrestrial Sequestration

Terrestrial sequestration was a new concept to most of the focus group participants. Several indicated that the video was the first time they had heard of the term, terrestrial, although there was some familiarity with the concept. It was not something they had heard about before watching the video. One person said, "I thought you would do as much good as you did harm anyway (referring to conventional farming)." Another said, "That was my impression too. But then when you see the video, and you look at it, you see that the carbon actually is going down into the roots and then once you till it, you're pushing the roots back up into the air, and then you're releasing the carbon back up into the air."

The groups were both interested in terrestrial sequestration, although they didn't use that term. They talked about plants, trees, farming practices, and no-till. One person in Group I commented on "natural" sequestration, "With plants and so on. . ." I liked that because it's a natural way. It's something where we have some control over planting trees and so on. It's a natural way of handling a problem although I don't think it'll completely handle it anymore, there's too much of it. But, I liked that part of it."

In Group II, the term "natural" was raised again as one participant tried to explain his understanding of terrestrial sequestration. He said, "Well, there was the natural extracting of it, sequestering it in the soils and plants and trees and water."

They connected how current conservation practices might be providing some

environmental benefit. One participant questioned, "I don't know how we compare to other parts of the state, but the last several years we've had huge acreage in CRP (Conservation Reserve Program). That would be a form of terrestrial wouldn't it?"

In addition, they started to realize that there might be benefits to farmers. As one individual said, "Right now in the farming industry, the issues of no-till are basically for erosion purposes. I don't know that we'll subsidize you even more for no-till if you do it because of the carbon reason not just because of erosion."

In addition to farming, wetlands were mentioned. Several people connect wetlands with the agricultural community. Prior to the video, most were not aware of the carbon benefits, as one participant said, "Well, I think there's several things that surprised me. The farming was one. And, the wetlands – I didn't realize that purpose (carbon sink)."

Also, the idea of grasslands was brought up in the group as descriptive of this region of the country. As one participant said, "I guess I was surprised, the grassland part, and where there was more water. That stuck with me. Around here, it's drier and drier. It's going to get worse and worse because the farmers have been plowing and plowing. When there's water, its better, but we don't have that much water. That caught my eye. I'm sure that's probably a minor part of it compared to the factories and industries, which are more."

The idea of conserving the Prairie Pothole Wetlands (wetlands that occupy depressions in the landscape formed when glacial ice melted as the continental glaciers retreated) was mentioned by one participant. So, retention of that phrase from the video was suggested. Participants considered conservation of the Prairie Pothole Wetlands a positive action.

Participants discussed trees and forests and related them to carbon sequestration. Often in the groups, participants asked a question and then utilized information from the video on the spot. A brief dialogue about trees took place, where a participant stated, "Deforestation. You look at all the trees that are being chopped down. And that's one of the biggest carbon…I don't know what the word I want to use is." The moderator said "carbon sink," and then the participant went on to say, "one of the biggest carbon sinks there is and you look all over the world. This is not just here in the United States. It's South America. It's up here. And we're just chopping the trees away. Oh, we'll put another one here, but it's going to be 40 years from now before that tree's going to be any good."

It was useful to hear the different ways that participants interpreted terrestrial and developed their own terms. One participant said, "It's kind of like land management. I think that's something people could do a little more of."

Oil Recovery

Since Williston is a town with an oil industry, participants were quite interested in talking about the potential ties between CO_2 sequestration and enhanced oil recovery. Three comments were:

- "Let's say you're sitting here with your oil well, and so and so over here wants to put in an injection system. If it pushes oil to your well, fine. If it pushes oil away from your well, it gets to be a big legal mess, and the only people that come out are the lawyers."

- "We just fairly recently got involved in the oil leasing and some oil drilling. I thought it was quite interesting that they use that CO_2 to get the oil out. I never knew that."

- "I didn't know they were using CO_2 to the degree that they were for pushing oil. I used to, years and years ago, live down in Oklahoma and at that point in time, there was a lot of oil drilling down there, and they used a lot of salt water at that time. So, the CO_2 being used to push the oil was new to me."

Tertiary oil recovery (use of CO_2 to recover additional oil) was discussed at length. Several questions were raised as well that appear in a latter section specially describing the questions arising out of the focus groups.

Renewable Energy

They seemed to enjoy discussing renewable energy. Some of the ideas for renewable energy were broad and general, as one participant said, "What we need is a new way of producing energy that's environmentally safe and cost-effective. That's what we simply need, because, people, we're running out of oil. Period. If you think that all of us are going to start paying $5 or $6 a gallon for gas, when are you going to give up? Are you going to be able to buy the things you used to buy? Are you going to keep driving?"

A couple of representative comments made by focus group participants related to renewable energy include:

- "They covered really briefly on the wind and the water, though, the renewables. So, if they got more going on something like that, you wouldn't have so much carbon dioxide."

- "The wind. I'd like to see more wind, especially in North Dakota."

They also talked about hydrogen. They were interested in ideas for alternative energy sources. Additional thoughts on this topic appear in the Questions and Concerns section of the report.

Energy Conservation

One of the key findings of the focus group activity is that the participants seemed to be interested in learning how they themselves could reduce CO_2 emissions. This led to discussions of energy conservation and energy efficiency.

In Group I, one female participant stated that everyone should do something. After asking for a show of hands, everyone agreed. Someone stated that it could even be as small an effort as "shutting the light off when we were watching the movie." They related various thoughts, such as:

- "I think my pickup is a bigger problem."

- "But you're still driving that car."

- "Stay cold a little bit longer and don't let your car idle in the Wal-Mart parking lot."

- "Park the car and walk."

- "I think about it once in a while. I've been told that everybody who runs a dishwasher at night after supper, so I run mine in the morning when everybody's at work. So, little things like that I've caught myself thinking about that I had never done before. It helps with surges and that. Everybody comes home from work and turns on the light. So, much at one period of time, and during the day it's a little lower."

Although much of the discussion centered on what individuals could do, participants also discussed community and regional efforts toward energy conservation and energy efficiency. They discussed what cities could do in terms of transportation.

They were interested in pollution, as a few comments demonstrate:

- "In the (Twin) Cities, they try to raise money for mass transit that puts out less carbon dioxide, yet they won't fund it. So, (Interstate) 94 is a parking lot. Have you tried to drive there when it's busy? You talk about carbon dioxide going in the air."

- "We've made a big step in the right direction, I think. I've been going to Arizona for the month of February since '88. That first time I went down there, I was driving a 79 Lincoln, 14 miles per gallon, and when you get to Mesa you could see a yellow haze. And I go down there now, and I don't see that yellow haze because they've got cleaner emissions, burning. They have laws in Arizona that you have to have 10% alcohol or ethanol. They've cleaned it up a lot. It's enough for me notice it. We've got a long way to go."

- "For 100 years, we keep doing the same thing and expect things to get better. It's not going to get better unless we come up with different ideas. I would like to think there are a billion other people out there who can see and visualize what we must do. Something has to be done. The earth is getting warmer. The ocean is getting higher. I was in New York. Pretty soon they'll take boats to work in the future because the oceans are getting higher. So, it's scary."

Related to the video, they wondered about their role and the impact individuals could make. As one participant said, "I wonder how much difference we as individuals could really make. I think that the reason we don't do much is that we don't think we (can) have that much of an impact."

Although energy conservation and energy efficiency were very small components within the video, the participants seemed very interested in it. They wanted to know more. As one person said, "It made me think if each of us did a little bit right now. Do your own part." Then they wanted to hear what they should do.

Who Should Hear About Carbon Sequestration

The focus groups defined several markets to target with the messages about carbon sequestration. The categories mentioned included youth, the oil industry, the agricultural community, the business community, government leaders, and opinion leaders.

Youth

They mentioned youth to include both the school systems and college students. At the college-level, both the science and economics fields might be interested.

Oil Industry

They felt that the oil industry would be important to reach. They specifically named Petroleum Producers in Williston along with an affiliated group of spouses, the Petroleum Auxiliary. Company names included Halliburton, Poole Well Service, Key Energy, and Oilfield Safety.

Agricultural Community

Farming is a major industry in the region. Participants mentioned Prairie States, the local cooperative, where 50 to 200 people attend an annual meeting each year. The electric cooperative, Montrail-Williams Electric Cooperative, typically has energy topics at its meetings. Farmer's Union was another group mentioned. The Farm & Ranch Show was mentioned as the meeting to attend to reach the agricultural community.

Business Community

They talked about various groups within the business community. Two specific

groups were the Chamber of Commerce and Economic Development.

Government

Congressional representatives at the federal and state level were mentioned as people that should be educated on this topic. As one person mentioned, "citizens should contact Congress. That's who's spending our money, and it's our money." Another said, "They're passing the laws."

Opinion Leaders

They talked about "interested" people and "curious" people, who are often the opinion leaders in the community. Often those people can be found at Monday mornings at the local grain elevator or having coffee around town:

- "That's where I think this focus group was a real good idea for you. It was something that I learned from. The bottom line was that it was something that interested me."

- "One of the things that I find interesting in the diverse group of people that are here. We are all as different as night and day, but maybe we were curious because we all wanted to learn something."

- "How can you keep reaching people who want to learn something? I think that is something that you should look at."

- "I'm sure a lot of us think that there's not much we can do. The more that's done and the more people that know about it (carbon sequestration), when it does come time for something big to happen, at least the people are knowledgeable about it. They can have an intelligent say rather than just going along with everyone else."

Local Impacts

The focus groups were interested in both terrestrial and geologic sequestration. Although they didn't necessarily use those terms, they understood the two basic concepts. As one participant stated, "considering that our two primary industries (oil production and agriculture) are the two primary (topics) covered in the video, that impacts us pretty big doesn't it?"

Oil Recovery

Oil fields in the Williston Basin have used secondary recovery (saltwater flood). Tertiary oil recovery (CO_2 flood) of the type being used at Weyburn in the northern part of the basin and in West Texas is just coming into the region. Given that oil is a major industry in the area, participants were quite interested in tertiary oil recovery and discussed the potential at length:

- "There's a lot of wells that could be tapped."

- "Maybe more oil could be taken then."

- "Most of the wells around here weren't secondary-recovered."

- "A lot of these wells could be reworked. And there's more down there. But it's who is going to invest a million dollars in a well that was already done. Sinking more money into it and hoping they'll get it back."

- "The technology is going to chase the money. Where they're going is where it's the best production. Secondary recovery. It's pretty much specified that you are going to do it."

- "There's wells that were drilled in the '50s, and they're still producing,

but they haven't gone in there with the idea to push it."

- "I worked in a law office here for awhile, and I had a guy tell me that this area is as big as Texas, and they just haven't gone after it yet."

- "That could be, but it's very expensive to drill in this area, because it's so deep in places."

- "I see the CO_2 injection. This has been an oilfield community since—what—1953?"

- "Bottom line is CO_2 injection is only going to help the oil patch. So, in turn, that helps my business. It turns around to the rest of the community."

- "Basin pulled like $1.5 million a month on the CO_2 that they shipped up to Weyburn. That's pretty high economics."

One participant had the idea of a vertically integrated system. He said, "We don't really have any big generator of it (CO_2), a stationary big generator of it. Like a power plant or something like that, but we basically export all our oil to some other refinery. I guess if we actually had a refinery here that we could look at capture and pumping it back into our own system. They mentioned that the economical way is to have a stationary generator of some sort for the stuff, and I guess if we had that, we have the location where you could put it back in the ground."

Outreach Ideas

The focus group members were asked about the best ways to reach people. They suggested a TV commercial, and they watch the Clear Channel station out of Minot, North Dakota. One of their ideas was to provide Web site information in a TV ad, in order to direct people to find more information there. They also indicated that the KFYR radio program in the morning out of Bismarck, North Dakota, is popular, particularly with the agricultural community. They also suggested newspaper ads, but acknowledged those are sometimes passed over. Even better than ads, they stated newspaper articles get more attention. Letters to the Editor are read by most of both groups. The North Dakota Rural Electric Cooperative (REC) and the UND Alumni magazines were mentioned also.

Framing the Messages – Content

In developing outreach materials, it is useful to know the kinds of content that interests the general public. Several thoughts were raised:

1) Personal – the message should have some personal stories that people can relate to.

2) Attention-getting – something that catches their attention or "they'll be like me and hit the mute button."

3) Economics and economic impact.

4) Quality of life.

One idea that arose in the groups that met most of the above criteria for ideal message content was the topic of oil. They talked about how they would relay the message to others with comments such as:

- "I think because it's an oil community, I think we have a better understanding of it (how oil works) than places that don't have it. It's helping us as human beings and the air and all that. And it's also helping our local businesses."

- "Everybody's aware of $55 oil everywhere in this country, even if they've never seen oil, but for us it

would be much stronger. But I think oil (recovery) could just catch on anywhere in the country because of its price. I really do."

- "I think you have to hit on the quality of life. The improvement. Everyone would like to have a little better quality of life."

- "If you can make it into a personal story, it would probably read better. Whenever you write personal, everybody reads it."

What You Tell Your Friends

One way to try to understand the impact of outreach is how the information would translate into word-of-mouth communication. Those who saw the video suggested that they would mention it to their friends. It wouldn't likely be a lengthy conversation, but they felt they had learned enough to describe it to another person. Also, many of them were interested in the carbon sequestration topic or became interested in the topic through the video.

A couple of representative comments are:

- "I'm going to tell them (friends) that I was at a good class, and I learned about something that I'm real interested in. That's carbon dioxide sequestration, and they'll say what's that. I think they would find it interesting."

- "I like sequestration because it makes me sound smart."

One participant stated that he would explain it simply, "bottom line in very simple words, its CO_2 recovery." Another group member responded by saying, "I like that word recovery way better than storage. That word storage really bothers me. It does." A third participant said, "That word does sound better, don't it?" A fourth participant said, "Recover it. Store it. Play on words as they say. But it doesn't change it though; it just makes me feel happier. It's a mental thing isn't it?

They didn't necessarily feel that they would have a full conversation about carbon sequestration. But when asked whether they could explain it to someone, there was a consensus that they had learned enough to explain it to family or friends.

Questions and Concerns

A variety of questions and concerns were raised in the two focus groups. Responses to the questions or concerns were provided by the moderator or the camera operator as they arose. Participants were given the option of receiving additional feedback from a scientist or engineer at the EERC.

Sometimes, participants, through interaction with their discussion group, answered their own questions. That gave EERC researchers a glimpse at how people might discuss similar issues within their own groups or within their community. The following section summarizes verbatim questions divided into topic areas, including pressure of CO_2, terrestrial, status of the technology, oceans, storage, earthquakes, costs, global warming, and personal action. This information is potentially very useful in developing future messages and communication strategies.

Pressure of CO_2

- Participant 1: "I wish they would have mentioned at what pressure they pump that into the ground."

- Participant 2: "They built a gas well by my farm a few years ago, and you had a gauge on it, and just the pressure of that gas was 35,000 pounds of pressure per square inch. You see at that rate, they could pump a lot of gas down there to get that pressure."

- Participant 3: “20 lb of water pressure really shoots, so 35,000, wow!”

Terrestrial

- “I was surprised about the farming. They said when you plow that land you release that into the atmosphere. But what about the vegetation that you’re turning under? I thought that would be more than the ground you turned to the top.”

- “So, what about the vegetation you’re turning under? Doesn’t that decay in the ground? That’s beneficial to the soil.”

- “Is there a point where you get too much carbon in the soil? Because you need a lot of nitrogen in the soil to grow plants.”

- “Like in the wetlands, does it (CO_2) affect water quality?”

- “They weren’t introducing more (carbon) though, it was just the natural occurrence in the wetland?”

- “You’re out on the West Coast, and you drive through these forests, and they’re all cut down. It’s kind of sick to look at that. Does all that play a role in this? And what is the effect on wildlife?”

Status of the Technology

- “What’s the cost of retrofitting power plants? That’s something I’d like an answer to.”

Oil Recovery

- “Who’s going to pay for it?”

- “Isn’t there technology to kind of tell if there is any more (oil)?”

- “I wonder why they don’t do it here (enhanced oil recovery with CO_2)?”

- “What about the Tioga Field?”

- “Is this something that’s really being worked on? Not just in this project in Canada?”

- “Well, how do they do it in the city? How do they do this sequestration there?”

- “So, this is basically new technology?”

- “Does the Federal Government have any standards or time lines, or is this just research?”

- “How do they collect it [CO_2] in the Cities?”

- “What did they say about SaskPower? Do they have a more economical version?”

- “I didn’t realize we were this far along in the regional things, with different areas in North America working on this. But, again, I guess I’m still wondering how long it has been going on and what impact are we really making? Are we getting anywhere? Or is it just so infant yet that we’re not making a big enough dent because the United States is probably one of the worst perpetrators of the whole continent to date of burning raw fuels and producing them.”

- “That technology apparently exists now [to sequester CO_2]?”

- “Maybe a 30-second blurb about the coal-fired facility, the new one that was producing hydrogen and something else off of it? I would have liked to see them go into greater detail.”

- “Well, I would be interested hearing more about that coal plant of the future (FutureGen).”

Oceans

- "Was there talk about sequestering some of this in the depths of the oceans or is that my imagination? Do you know anything about that study?"

- "What about the ocean? Was that covered?"

Storage

- "I'm just a little concerned about the….they didn't really tell us too much about the storage. I think it's a very good idea, but once it gets into the ground, is it going to seep out? Is it going to cause damage underground, so that as years and years and years and years go by, we're going to have a problem because of all that in the earth?"

- "So, is that going to be like the plutonium that they stored underground, or whatever it was, that waste from nuclear power, that they stored in the ground?"

- "I just think they should cover, like (referring to another participant) was saying, I think they should show that they are going to actually be able to contain this. I mean, because, if you wind up with …I forget the place up in New York that had the chemicals…all backed up into their water system. What are you going to do then? Are you going to come back and say oh, we didn't research it enough?" In a humorous moment, another participant replied, "You'd have carbonated water."

- They wonder about the effect if there was a leak. As one person said, "If a little bit is emitted at a time, and that's kind of a problem, what's going to happen if a whole bunch is emitted at once?"

- On the idea of trust, a participant speculated, "Somehow, things happen."

- "I might have gotten this wrong, but correct me. Carbon dioxide turns to heat. That's what I thought he said. I was thinking, okay, if that traps heat and they're going to put that into the ground. Will it get hot from the ground up? I didn't quite understand that."

- "About 10,000 feet, you get down, it's hot. I forget how hot it is, but extremely hot. That you don't have to worry about, it's already really hot."

- "This might be a stupid question, but how does the CO_2 get put into that reservoir?" After this participant received an answer, the person wondered, "How do they seal that off then?"

- "I thought it was really overdone, because there are not that many oil fields to put this stuff into, and there aren't that many salt beds to put this carbon dioxide that we have into. And that's an area I don't think was really answered to my satisfaction."

Earthquake

- "What about an earthquake or something that would make it all release into the air, then what would happen?"

- "We don't have earthquakes here, but some places do."

Carbon Dioxide Emission Related to Capture – The Big Picture

- "Did you purposely stay away from numbers not to confuse the audience? Because I was sort of trying to figure out what kind of impact all this had on places that recapture. How much do you actually recapture vs. how much are we emitting?"

- "I'll go back to the question I asked you earlier, and that's did you deliberately stay away from numbers so that you didn't get people really confused? Because maybe it would have made some sense if you would have said, we're generating this much, and we're only able to store or use up this much, so we're losing by X number or something. Not get too deep into numbers, but just kind of give general, 'cause really, we're spending a lot of money to try to do all this stuff. How much good are we doing at it? And should we be spending more money to gain more understanding?"

- "I wouldn't try to barrage you with numbers, but sometimes you see these with not necessarily a cartoon character but just some big number, like when you show the factory, you show some amount of emission and big city and some amount of emission and maybe what amount of good that the soil or trees or the pothole region is taking back up so you can kind of see what the excess left over is going to be. How much is going back to the atmosphere, that kind of thing? Just broad numbers."

Costs

- "What is the expense of the (carbon sequestration) technology?" They talked about the expense of that for the largest stationary sources.

- "How much money does UND get for this or is this one great big DOE grant or something like that?"

What Would It Cost Individuals?

- "If they suddenly got to where they were having to recover this stuff and improve their scrubbing technique or whatever, how much more would that cost us in our heating and cooling?"

- "If it costs $100 to produce this much energy, it'll cost $50 more."

How Does It Work?

- "What form is this CO_2 in when it comes out of the atmosphere? What form does it become to force it into the ground?"

- "How is it processed? How does it come out of the air? You talk about reservoirs, and you're drilling wells. I know about wells only because I grew up on a farm, and I'm thinking if you're putting it underground."

- "Am I right that they were trying to extract some CO_2 from the air?"

Global Warming

- "Isn't CO_2 good for the environment though? It depends how you think of it. Shouldn't global warming be good to a point that it will actually melt the snow faster in the spring and the trees will grow, and it will move up into the tundra, and we'll have more greenery up there? Eventually, the ice age will be gone and we'll have enough trees to soak up all the CO_2. It can go in cycles like that. We don't have to pay the big heat bills in the wintertime, because it gets warmer."

- "I don't know. I know I was confused when we started, and I'm still kind of confused. Like I said, I think I'd like to see some introduction with some of these things. Well, global warming. What is that?"

- "It looks like the biggest problem is the CO_2, isn't it?"

Uses of the CO_2

- "Well, I learned a lot. I guess it's amazing how they can recoup that stuff and save it, and they take it back out of those storage places where they put it, the CO_2 I 'spose?"

- "It's not recyclable somehow? Couldn't it be recycled into something that's usable?"

Smog

- "We didn't talk about smog. And I don't know what all comes in smog. That used to be a real topic. That comes back to CO_2 doesn't it? You've got your gas guzzling cars. I'm just curious, because we're talking about things in the air."

Wind

Focus groups often generate their own answers to questions through their discussion. Here's an example of a dialogue, related to wind energy:

- Participant 1: "What's happening with our wind power? In North Dakota? I get the feeling that the utilities don't want it a whole lot. I don't see that a windmill is going to cost as much as a coal-firing plant."

- Participant 2: "You need a whole lot of (windmills) . . ."

- Participant 1: "I know that. I drive from here to Grand Forks approximately every other week. I see one windmill on Highway 2 between here and Grand Forks, and you can't tell me the state of North Dakota doesn't have the wind for it."

- Participant 2: "You have to move it. To have a windmill at my place blowing, and then I got to sell electricity to Minneapolis. I've got a real problem. I got a lot of wire I've got to straighten. So, it's not just the wind, its how do you get it to your market. That's the problem. I mean you already have the lines there."

- Participant 1: "But you don't own those lines."

Hydropower

- "Hydropower. That seems to be pretty clean power. Why don't we use it more?"

- "It couldn't be any worse than the Corps of Engineers draining our lakes. I'm surprised we don't use the hydropower more than we do."

Personal Action

- "What can we do, I mean personally?"

- "What could I do? What's my little role?"

Terminology

Group II was interested in having a glossary of terms provided to them either within the video or as a separate handout.

- "Not to make the video any longer. Again, I heard a lot of conversation before we started about trying to figure out what all these things are. Maybe if you had a 10- or 15-minute lead in to the video that defined some terms or words or something and then went into another 20-minute segment that showed more of it?"

CONCLUSION OF LEARNING OUTCOMES

Throughout the focus group process, one gains a sense of what the groups were learning. Because of the small size of the focus groups, this is a qualitative evaluation of their learning rather than a quantitative measure of outcomes. After the focus groups, several comments were received in a follow-up mailing asking the following question, "What is your current understanding of how CO_2 emissions generated by human activity might be reduced?" The following comments were received:

- Discuss the problem and make people more aware of the problem. Factories capture CO_2 and store underground.

- Developing technology that reduces CO_2 in our world.

- Investing in energy-producing facilities that are not dependent on the old processes.

- Continue emphasizing recycling.

- Carpooling.

- More wind power.

- Have more wetlands.

- No-till of land.

The participants learned the basic concepts of carbon sequestration from the video and discussion. The interactive format of the focus group allowed them to ask questions. In addition to learning the basic concepts, the majority of the participants were very interested in renewable energy, conservation, and what they could do as individuals. Those themes also arose in the follow-up mailing.

As stated throughout the report, focus group participants were very interested in what they could do personally. That was an encouraging finding of this research. Perhaps in future outreach, this idea could be addressed, either through another video or other outreach products.

REFERENCES

Blankenship, A.B., and Breen, G.E., 1993, State of the art marketing research: Chicago, Illinois, American Marketing Association, p. 225.

Carlson, D.K. The Gallup Organization 2005 Environmental Poll. www.gallup.com (subscribers only).

Morgan, D.L., 1998, The focus group guidebook: Thousand Oaks, California Sage Publications.

Schackley, S., McLachlan, C., and Gough, C., 2004, The public perceptions of carbon capture and storage: Working Paper 44, Manchester, United Kingdom, Tyndall Centre for Climate Change Research.

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APPENDIX A

BACKGROUND QUESTIONS

BACKGROUND QUESTIONS

Prior to the focus groups, participants were asked a series of questions as background for the focus group discussion and to gain a sense of the demographics and attitudes of the group members. The following selected questions are listed here, and the responses are summarized next.

QUESTIONS

Demographic Questions

- What is your age?
- What is your educational level?
- What is your occupation?

Attitudinal Questions

- What do you feel are the three most important issues facing the United States today?
- Consider the following environmental issues. Please rate them from 1 to 5, where 1 is a high concern and 5 is a low concern.
- From the following list, please circle three issues that you feel should be the three top priorities for energy research in the United States.
- Do you believe that human activities influence global climate change?
- From what you know about global climate change, which of the following statements comes closest to your opinion?
- Which of the following sources of information do you rely upon for news related to the environment?

SUMMARY OF RESPONSES

Demographic Responses

Between the two groups, there were eight females and eight males. The ages (Table A-1) and educational levels (Table A-2) describe the combined focus groups. The percentages are not generalizable to the underlying population because of the small focus groups. Percentages are not applicable to the Williston, North Dakota, area, rather only to each focus group.

Half of the participants were over 55, one-third were between 45 and 54, and the remainder were between 35 and 44.

Table A-1. Age Category

	Frequency	Percent
35–44	3	18.8
45–54	6	37.5
55–64	4	25.0
65+	3	18.8
Total	16	100.0

Table A-2. Educational Level

	Frequency	Percent
High School or Less	3	18.8
Some College	5	31.3
Technical/Trade Degree	3	18.8
College Degree	4	25.0
Graduate Degree	1	6.3
Total	16	100.0

Nearly half of the participants had high school or some college. One-third had college or graduate degrees, and the remainder had a technical or trade degree.

Occupations represented by the two focus groups included artist, civil engineer, decorator, family support coordinator, housewife, insurance clerk, occupational therapist, part-time news writer, retired farmer, registered nurse, sales manager, surgical nurse, retired grain buyer, retired higher education teacher, and an employee of an oil field equipment manufacturer.

Important Issues Facing the United States Today

The initial part of the Background Questions, summarized in Table A-3, was intended to determine the three most important issues facing the United States today. Results indicate that only four, or 25%, of 16 participants ranked environment in the top three.

Table A-3. Important Issues Facing the U.S. Today

Issue	Most Important	Second Most Important	Third Most Important	Total
Crime	1	1	1	3
Drugs	1		2	3
Economy	2		1	3
Education		3	1	4
Environment	1	2	1	4
Family values	5		1	6
Federal Budget Deficit	2		2	4
Foreign Policy		2		2
Health Care	2	5	1	8
Inflation				0
Poverty	1		1	2
Social Security	1		2	3
Taxes			2	2
Terrorism		3	1	4
Unemployment				0
Total	16	16	16	48

Of the 48 total votes possible among the 15 priorities provided to them, the top responses were health care (8), family values (6), environment (4), education (4), terrorism (4), and the federal budget deficit (4).

Levels of Concern on Environmental Issues

When asked to rate their level of concern about specific environmental issues on a scale of 1 to 5, where 1 was high concern, the respondents indicated their level of concern over several environmental issues as shown in Table A-4. For air pollution and water pollution, twelve out of sixteen participants rated it a "1" or a "2" on a scale of 1 to 5, where 1 indicated a high concern. Whereas for global climate change, seven of the sixteen rated global climate change in those top two levels of concern. From these results, it appears that the groups were more concerned about air and water pollution, in general, than global climate change.

Choices of Top Three Research Priorities

As shown in Table A-5, the respondents were nearly unanimous in identifying renewable energy as a research priority, and about half also identified the need for greater fuel efficiency and research to aid in increasing oil and gas reserves.

Opinion on Climate Change

Prior to the focus group, participants were asked the following question, "From what you know about global climate change, which of the following statements comes closest to your opinion?" They were given a series of statements as possible responses, and the following Table A-6 shows the number indicating each statement. The majority of the focus group participants were almost equally divided in 1) believing that climate change is occurring, that there is reasonable evidence for a human link in climate change, and that some action should be taken and 2) believing that we don't know enough about global climate change to take action without more research.

Table A-4. Levels of Concern on Environmental Issues

	High Concern (1)	(2)	(3)	(4)	Low Concern (5)	No Response	Total
Air Pollution	5	7	2	2	0	0	16
Water Pollution	6	5	3	0	0	2	16
Waste Management	2	10	4	0	0	0	16
Overpopulation	3	2	2	4	4	1	16
Ecosystem Destruction	4	4	4	3	0	1	16
Global Climate Change	3	4	5	2	2	0	16

Table A-5. Choices of Top Three Research Priorities for Energy and the Environment

	Number of Responses = 48	Number of Responses/Number of Participants	Percent of 16 Choosing the Priority
Renewable Energy Sources: Solar, Wind, and Bioenergy/Biomass	15	15/16	93.8
Vehicle Fuel Efficiency	9	9/16	56.3
New Oil and Gas Reserves	8	8/16	50.0
Hydrogen Energy	5	5/16	31.3
Energy Conservation	4	4/16	25.0
Clean Coal Technologies	3	3/16	18.8
Nuclear Power	2	2/16	12.5
Hydropower	1	1/16	6.3
Other	1	1/16	6.3

Table A-6. Responses to Statements Regarding Climate Change

Statement	Frequency
1. Global climate change resulting from human activity has been established as a serious problem and immediate action is necessary.	2
2. There is reasonable evidence that global climate change may be affected by human activity and some action should be taken.	6
3. We don't know enough about how human activity affects global climate change and more research is necessary before we take any actions.	7
4. There is evidence that global climate change is taking place and affected by human activity, but there is nothing we can do to prevent it.	0
5. Concern about how human activity affects global climate change is unwarranted.	0
6. No opinion	1
Total	16

Belief That Human Activities Influence Global Climate Change

When asked a related question, "Do you believe that human activities influence global climate change," the majority of participants (more than 60%) indicated yes. Specifically, ten participants indicated yes, one indicated no, and five didn't know.

Information Sources on the Environment

The focus group participants were asked about the sources of information that they rely upon for news related to the environment. From a list of choices, television was cited by all participants, but newspapers and magazines were also important as well

as opinions of friends or family. A summary of their responses is provided in Table A-7.

Prior to the focus group, only two of the 16 indicated that they had heard or read anything about carbon sequestration. Twelve of them said that had not read anything, and the remaining two individuals were not sure if they had or not. Eleven of the sixteen participants said they would be interested in receiving information by mail from the University of North Dakota Energy & Environmental Research Center on methods to control emissions of CO_2 from human activity and CO_2 sequestration research in the next year.

Table A-7. Sources of Information about the Environment

	Number of Responses = 48	Number of Responses/Number of Participants	Percent of 16 Choosing the Information Source
TV Program	16	16/16	100.0
Newspaper	14	14/16	87.5
Magazine	10	10/16	62.5
Friend or Family	8	8/16	50.0
Internet	5	5/16	31.3
Seminar by an Expert	2	2/16	12.5
Scientific Journal	1	1/16	6.3
Other	1	1/16	6.3

APPENDIX B

DISCUSSION GUIDE OUTLINE

DISCUSSION GUIDE OUTLINE – PCOR PARTNERSHIP

A. Send out background questions with confirmation, asking participants to fill it out and bring it to the focus group.

B. Introductions, describe focus group procedures

C. Show video

D. Video Discussion Questions

1. What is your overall impression of the video?

2. What new concepts or ideas did you learn?

3. What scenes did you find most memorable? Why?

4. Did you hear anything in the video that was surprising to you?

5. Did the video raise any new thoughts or questions for you related to climate change?

6. What would you tell a friend or family member you learned from this video?

7. Based on what you have learned from the video, how do you feel carbon dioxide (CO_2) emissions generated by human activity might be reduced?

8. Is there any other information related to the video you would like to know?

9. What types of people, groups, or audiences do you feel would benefit from seeing this video?

10. How do you feel this information might impact your local community? How about you personally?

11. In what format would you like to receive more information? (if not mentioned, ask about mailings, newspapers articles, Web site, public meetings, video series).

12. Ask participants to complete question related to their opinion on climate change at the end of the focus group.