THE NATIONAL COAL COUNCIL
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2012 ANNUAL SPRING MEETING

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FRIDAY,
JUNE 22, 2012
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The National Coal Council met in the Mount Vernon Room, 1177 15th Street, N.W., Washington, DC, at 9:00 a.m., C. Joseph Hopf, Chair, presiding.

PRESENT:
C. JOSEPH HOPF, Chair
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DAVID M. FLANNERY

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ROBERT D. GABBARD
PAUL GATZEMEIER

PRESENT(Cont'd):
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CLARK D. HARRISON
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CHRISTOPHER P. JENKINS
NORMAN KETTENBAUER
KLAUS LAMBECK
JOHN T. LONG
RICHARD P. LOPRIORE
CHARLES MCCONNELL, Assistant Secretary for
Fossil Energy, U.S. DOE
STEVE MELZER
JANINE MIGDEN-OSTRANDER
JEFFREY MILLER
RAFIC Y. MINKARA
MICHAEL G. MUELLER
RAM G. NARULA
KENNETH J. NEMETH
DONALD NEWELL
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RAJA P. UPADHYAY
DAMAN WALIA
JEFFREY L. WALLACE
GREGORY A. WORKMAN
NCC STAFF PRESENT:
ROBERT A. BECK

LARRY B. GRIMES
PAMELA A. MARTIN

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P-R-O-C-E-E-D-I-N-G-S

(9:09 a.m.)

CHAIR HOPF: Good morning, ladies and gentlemen. My name is Joe Hopf and I am the Chairman of the National Coal Council. The spring meeting of the National Coal Council, I'm going to hereby call to order.

This morning we are fortunate to have a number of very special guests. We are pleased to welcome this morning Assistant Secretary of Fossil, the Honorable Charles McConnell.

Many of you know Chuck from his many years working in the energy sector and it his true privilege to have him here to speak to the Council for the first time since his confirmation as assistant secretary. Chuck, it's a pleasure to have you with us today.

We also have another -- some other exceptional speakers today. They are Steve Melzer, one of the leading experts on enhanced oil recovery application. Also, Steve is one

of the lead authors on our new council study that we will take action on shortly, later this morning. Welcome Steve, and thank you for all the work you put in on the study and we look forward to seeing your presentation.

Also we have today is Daman Walia. Daman has been a leader in the developing biotechnologies to clean coal before it is burned. Many of you are familiar with his work and we look forward to his update and presentation.

I'm also pleased to recognize Robert Wright of the DOE's Office of Fossil Energy as the federally-designated representative. I'm not sure if -- yes, there he is back there. Okay. Welcome, Bob. Good to have you here today.

In addition to the speakers, we also must conduct the regular business of the Council. This morning that includes reviewing action on the new study that was requested by Secretary Chu back in October 28th of 2011, as

well as the election of officers for the new two-year term of the Council.

So, as you can see, we have a very full agenda. This meeting is being held in accordance with the Federal Advisory Committee Act, and the regulations that govern that Act.

Our meeting is open to the public. I would like to welcome guests from the public who have joined us today. An opportunity will be provided at the end of the meeting for them to make comments if they so choose.

Full and complete minutes of this meeting are being made as well as a verbatim transcript. Therefore, it is important that, when you have a question, you use the microphone when you wish to speak, and that you begin by stating your name and your affiliation.

Council members have been provided a copy of the agenda for today's meeting. If would appreciate having a motion for the adoption of the agenda.

Second? All in favor?

(Chorus of ayes.)

CHAIR HOPF: Opposed?

(No response.)

CHAIR HOPF: Okay. Thank you. Next I would like to announce that the Secretary has appointed several new members to the Council. I will introduce them and if they are present, I would ask them to stand as they are announced.

Bill Bissett from Kentucky Coal Association. Robert Finley from the Illinois State Geological Survey. Julio Friedman from Lawrence Livermore National Lab.

Mary Eileen O'Keefe, Lakeshore International. Daniel Thompson from Dynegy. John Thompson, Clean Air Task Force. Justin Zachary, and he has a representative, Desmond Chan, from Bechtel. Welcome to all the new members.

(Applause.)

CHAIR HOPF: So at this time, I

would like to move forward and introduce the Honorable Charles McConnell. He is Assistant Secretary for Fossil Energy with responsibilities for office operations and managing the oversight of Fossil Energy's Research and Development program, encompassing coal, oil and natural gas, and the U.S. Petroleum Reserves.

Prior to joining the DOE, Mr. McConnell served as Vice President of Carbon Management at Battelle Energy Technology. He also served 31 years with Praxair in various positions in the U.S. and Asia, including Global Vice President.

Mr. McConnell has held a number of advisory positions, including chairmanships of the Gasification Technologies Council and the Clean Coal Technology Foundation of Texas.

Please join me in welcoming the Honorable Charles McConnell.

(Applause.)

MR. McCONNELL: There we go, thank

you. Let's see how this works. Glad to be here. I wore my black suit today. It's actually made of coal.

(Laughter.)

MR. McCONNELL: When I took this job a year ago, I went in to see Secretary Chu and I want to share this story with you, because I think this group will appreciate it, at least I hope so.

I said, "What do you want me for? Everybody knows you hate coal." And he had a big smile on his face. He goes, "I don't really hate coal."

I said, "Well, boy, I'll tell you what, that's an interesting comment because a lot of people do sure think you do. And really, for you to be looking for somebody -- I really want to understand where you are."

And we had a, probably one of the better two-hour conversations I've ever had. Obviously, I didn't get into a whole lot of technology because the guy's a Nobel Prize

winner, and I've been selling industrial gas for 32 years.

But we talked about business philosophies and where are we going? We've got 10 -- at the time 10 demonstration projects active in the portfolio and he said to me, "So what do you think? How many of these projects are going to make it?"

And so we had a really, really good debate. But at the end of that, I told him, "There's one thing for sure that we need to address, and that is, a lot of what's been going on up to now, has been predicated on a climate change mentality in this country, from this administration, that from my perspective doesn't have a really good potential future over the next several years, and I don't want to take control of an organization's destiny based on what I think is a flawed foundation.

"And so I'm going to ask that we start to think about this whole coal power, coal utilization, fossil utilization with a

business mind set, because we are going to have to. We can't do it based on a climate change bill that I don't think is going to pass and heart of hearts, I'm not sure you do either."

And I won't tell you what his reaction is, but that's what my concern was coming into this job.

So I'm going to spend a little bit of time with you today, talking about what, over the past year, we have been working very hard at in fossil energy, and in this town, which has been another education for me personally, to try to get the aircraft carrier moved in a different direction, to a direction I believe that has a future. It's a future not just for political purposes, but for the industries that you represent and a broader base of industries, some of which even aren't in this room, but ultimately, all in, in terms of fossil.

So flash back for yourself to

2009, and this is what the realities of the world were, just in a short cartoon. Carbon legislation was right around the corner, or at least it was a 50-50 bet it was, or at least it was something that industry was willing, for the first movers, to want to grab a hold of a 50-50 cost share with the Department of Energy, to go forward on technology development, because that was the smart thing to do.

Oil was about 50 bucks a barrel. Natural gas prices were pretty high. And the cost of CO2 capture, everybody knew was high and needed to come down, and that was kind of the reality of where we were.

So now, let's flash forward for three years. We don't have any carbon legislation. If I was going to bet you, do you think it's going to come in the next two or three years, I don't think so.

Oil is 100 bucks a barrel. It's a whole different ball game. And natural gas is

low, low price, and likely to be low cost for quite some time because the shale revolution is upon is in a big way, and the only thing that's the same is the cost of carbon capture is still too high.

That's really sort of the comparison and contrast, and that says that from a business standpoint, anybody running a business, you've got to pay attention to the external environment. You've got to see where you're going. You can't just simply hang on to what you have been doing and try to keep pounding the rock. You have to keep your eye up and your finger in the wind.

So, we need to move on and the way to move on, I believe, is through enhanced oil recovery, as a means of introducing you to what had previously been discussed as CCS.

Everybody knew what CCS was. We had spent 10 years working very hard, learned an awful lot, demonstration projects, best practices, protocols, technology development,

R&D in CO2 capture, go down the list. It's all good. It's all for good purpose.

But the fact of the matter is, the purpose to chase climate change legislation and try to impact the levelized cost of electricity, I'm here to tell you today, I believe, is an anachronism.

And what we need to chase is a business driver, a business goal, in the marketplace, that's alive today. Enhanced oil recovery is being practiced across the country.

Now, most of the enhanced oil recovery across the country is being done by naturally occurring CO2, naturally occurring wells and sources.

But there are places in this country where CO2 from anthropogenic CO2 sources, with no government subsidies, is being practiced today.

EOR has increased 40 percent over the past six years. In 2010 it was five

percent of domestic overall production, but if you look at those curves, and you look at where EOR has gone, and where it's going, I'm here to tell you there's two things that are going on in the marketplace.

Number one, for EOR to continue to grow in this country, the naturally occurring sources are tapped out, and for growth to occur, anthropogenic CO2 needs to come into the game.

And the other fact is CO2 from anthropogenic sources is being practiced, EOR is being practiced today, with no government subsidies, so you don't need to have CO2 at $10 a ton for something to be realizable, because it's being done today.

$100 a barrel oil has changed the game. Now, albeit, there are places in the country where infrastructure is bought and paid for already. Pipelines are in place, fields are developed. It's incremental.

I've run pipeline businesses

before, and you are a genius when you are the guy that takes over the business after somebody else put the infrastructure in. It's a great place to be, man. For two years, I was just counting the money. It was the greatest job I ever had in terms of performance.

And the most challenging jobs I ever had were the ones where we didn't have the pipes. The customers were right there. We knew they were there. But we had to get over the hurdle.

And that's largely what we are talking about in this business right now, because the oil is out there. There's a lot of it.

And for anthropogenic CO2 to get into the marketplace, there's plenty of oil, there's plenty of opportunity, and there's a future that is different than we looked at three years ago.

We just came out with the NATCARB

Atlas. You may be very familiar with it. What I would also add to that slide before, in 2009 is, if you'd have asked me how impactful enhanced oil recovery would be in terms of geological regimes to sequester CO2, I would have said, with no reservation, "It's just a niche. There's just a little bit of that geology, and really, EOR is nothing more than a short-term pathway to enable CCS technology to ultimately come into play," because of course we all knew carbon legislation was coming.

I would suggest to you, if you look through the NATCARB results that recently came out, and what we have understood now in terms of oil-bearing regimes that are proven, and then the other regimes, such as the ROZ in West Texas and other places that you are probably all very familiar with, the potential for it is enormous.

It's not a niche. It's enormous, enormous like 50 to 100 years' worth of

geological storage capacity for the fossil industry.

This is oil-bearing regimes in places where we can go and make money doing it, not chasing climate legislation.

I'd suggest, if you're not familiar with the recent NATCARB publications, you ought to do it, because the other thing about that region in the center, with all those red zones, if you take a look at those zones and you start laying on top of that where wall the CO2 from coal-fired power plants, and ultimately natural gas-fired power plants are, it lays down on top of each other.

And so people talking about running thousand-mile pipelines to dispose of CO2 in some strange location far away, that's just not sensible from a business standpoint, never was when it was conceived.

We've got oil near where the CO2 is. We have to have pipelines. We have to have the fields developed. But this is a

business. And we start looking at it as a business concept, the factors and the forces are in place.

So this is what I have been trotting around town with. You need a catchy term in this town. I've found that out. So we are calling it the unmined gold story in America.

Anybody in this room know where the Saudi Arabia of the world for oil was in 1925? Ohio, yes, specifically the home of Ben Roethlisberger. Findlay, Ohio, right? Yes.

Here's another fact. Ninety percent of the oil that was found in Ohio back in 1925 is still in the ground. And the people that did the oil exploration, less their hearts, as we like to say in Texas, in 1925, were fundamentally doing it with medieval technology, doing the best they could, and then they moved on to the next place where there was natural pressure.

But there is a gob of oil still

under ground, and but for the availability of inexpensive, quality CO2 that can easily come from anthropogenic sources that are up and down the Ohio river valley, in Michigan, places like that, it is the unmined gold story.

And I'm here to also tell you that although many of you may say that this administration has declared war on coal, I'm not going to debate semantics with you. But what I will tell you is, over the past several months, people are very interested in this story that we have brought forward from fossil energy, courtesy of the NATL studies, courtesy of the work that folks like you have done in terms of building up a business case. That's what we needed and that's what we've got.

We've got a lot of oil in the ground. We've got an energy security story. We've got a domestic, economic story to tell in terms of the oil it could produce, we've got jobs creation and oh, by the way, every

ton of CO2 that goes into EOR eventually will get permanently and safely stored.

So you don't have to make a choice between good economics and good climate change. You get both.

You are very familiar, I'm sure, across the country, with the regional partnerships, a lot of the work that has gone on. Let me just make a couple of comments, rather than going over the chart in detail.

First and foremost, if you look at the regions where the oil is, and you look at where the partnerships are set up and where the point sources of CO2 are, they lay down quite well.

Second thing I'll tell you is, up to now, the partnerships have spent an enormous amount of time working on saline aquifer CO2 disposition.

And although it was all good work for good purpose, generated good best practices, et cetera et cetera, I just spent

the last two months beating my brains out with OMB and have gotten to the point now where we are redirecting funds in the partnership and we are going to go after EOR geologies.

We are not going to be required to focus on saline aquifers. We are not going to be required to pursue it only as a climate change mitigation strategy. But the stuff I just showed you is now becoming very acutely aware, around this town, of what the potential for this can be.

So the partnership work will continue. Saline aquifer will not cease. But what I will tell you is the 80-20 of what we are going to be looking at is EOR, because we must.

So you are all familiar with what the demonstrations are. I don't need to -- this is a little bit more difficult than I wish it were. There we go.

So I don't need to go through the animation walkthrough. But it's interesting,

if you look at where the demonstration projects are in the portfolio, and where the focus in terms of the polygeneration capabilities of these facilities, they are near CO2 pipelines. They are near where the oil is. It's a revenue stream that adds on to the project that's not just nice to have. I'm here to tell you, it's essential.

If you are going to spend extra money on the back end of a project and you're not going to get a revenue stream for it, there's no way anybody's going to do it.

But in these cases, you've got infrastructure that is bought and paid for, you've got oilfields that are already developed, and you've got an opportunity at $100 a barrel oil and forward pricing on oil where you can afford to make the investment for CO2 EOR.

It's no surprise that all the projects that we have in our portfolio that are still healthy and are moving forward

strong, by and large, are driven by that revenue stream for EOR.

So what do we need? What's the big elephant in the room? The elephant in the room is carbon capture technology. We've got the National Carbon Capture Center in Wilsonville. We've got a lot of work that has been going on in fossil as well as RPE and in science.

But let me be real candid with you. We have got ideas and we have got teacups full of pixie dust sitting around in places that are not ready for commercial deployment.

So I get concerned about how fast can we get there, and how much of an investment, is industry continued to be enthused about, and what I'll tell you is it can't be a reluctant enthusiasm.

It needs to see the prize. Industry, overall, collectively. I'm not talking about just you in this room, but I'm

talking about the fossil industry and marketplace in general, the oil and gas community as well.

There's an enormous amount of potential out there but the carbon capture technologies that you are all very familiar with, the crosscutting R&D and the advanced systems that you are all familiar with, let me tell you what, the fossil budget right now is not enormous. It's been receiving a haircut routinely over the past several years. And we are working very hard to restore some of the pieces of that budget for research going forward.

But here's what I really know for sure. It isn't about another 10 or 20 or 30 million dollars in the fossil budget. That doesn't make that big of a difference.

The difference is made in this room by the people in industry that see what they want to go after. And when that starts to come to fruition, and the enthusiasm behind

that and the push behind that is, I'm not doing this because I'm reluctantly concerned about carbon legislation, I'm doing it because I want to make a creative investment for my shareholders over the next five years, and as soon as I can get there, the better, and this is what we need to address.

We need the industry's head in the game to get this change. And here's the other thing I believe I know for sure, is you are not going to shame the Chinese into doing this. They are going to do it for one reason -- because they believe it's in their own best self-interest.

They are ready to invest in the projects that we have in our portfolio over in this country because they don't know how to do EOR.

They are working on some of this, but in terms of what they have got in China, they are not going to spend any time putting CO2 in saline aquifers. I can tell you that

right now.

But they are going to go after enhanced oil recovery and they are going to come over here and learn, and I told them, "Come over and learn. We are happy to have you. Don't forget to bring your money, because we want you investing. We don't want you observing and we will be happy to do cooperative investment with you as well."

And there's a lot of cooperative investment opportunities going on in China as well, and I'm not suggesting we are going to have one big happy family, that we are going to partner on this thing together into the future. But what I'm suggesting to you is that's where the global story is.

So when people say EOR is only in the United States, that's true -- today. But there's a tremendous amount of oil around the world that everyone else is waking up to as well. The whole key is getting the cost of carbon capture to where it needs to be.

So what are we going to do? We need to get the demonstration projects that we have in our portfolio built, on time, on budget.

We need to get them started up. We need to run them for three years. And we need to get the operational background that comes from that.

There is no substitute for building these beasts the first time, because it's an enormously difficult task. And once we do, we can't be satisfied that we have solved the problem, because we haven't.

What we have done is taken a big step to getting the money deployed, to get the plants built, to gather the learning. But the other thing we know for sure is I hope that carbon capture technology is obsolete within the next 5 to 10 years, absolutely obsolete, way, way more expensive than what is coming in the pipeline between now and 2020 and 2025, with second generation and third generation

technology evolution that is going to drive the cost of carbon capture to what it is today, 80, 100 bucks a ton, in a good situation, down to something that the marketplace is going to be able to broadly adapt across the board, between 30 and 40 dollars a ton.

That's a big step change, but it's possible and we see the potential for it. And so we have got to move through this timeline, but I'm here to tell you it's not just about FE's budget.

If I believed it was that critical for an extra 10 or 20 million dollars one way or the other, I would -- I would be delighted to know that it was just that simple, but it isn't.

It's investment. It's your investment in the ideas. It's your investment in things like the National Carbon Capture Center with demonstrations and opportunities to bring technology to commercial deployment.

We need to get these things out of teacup sizes into commercial demonstrations, and I'm here -- I'm also here to tell you that I believe that next wave of demonstrations is very likely going to be near pipelines where the CO2 is used for EOR today, not by going out in the middle of some corn field in some strange place across the country just to demonstrate capture technology and put it in a saline aquifer.

That is an old story and the new story is we've got to lay this stuff down where the pipelines are, so we can make an impact.

And that's where the next wave of demonstration projects are going to be, and it's not going to be through a stimulus bill with $3.2 billion.

It's going to be sensible investment on the back end of a lot of these facilities that we can do for $100 million or a couple of hundred million, because we have

to. It has to be business. It has to be sensible.

So, you've got to make a choice. People ask you to make the choice. Do you want to be environmentally friendly or do you want to have it economically sensible?

And I won't answer the question. I tell people that's a bad question, because if you've got technology and you've got the capability, you don't have to answer the question to get both. It's the power of and, not or.

So this is my favorite slide when I talk to groups like this. What do you see? What do you see in that picture? Life itself. That's a good answer.

A lot of people say dirty coal miners, okay? You know what I see? I see Little League coaches. I see guys that are involved teaching at the church. I see people that are in the community, maybe even PTA leaders, right? Life itself.

It is life itself. I grew up in eastern Ohio. I used to get stuck behind coal trucks all the time, okay? And I used to complain about them.

But I learned as I grew up, that's not something to complain about. That is life itself. Right? That's where there were two cars in the driveway in most of the town where I grew up, in Steubenville, okay?

And those jobs and those guys are still there, but I'm going to tell you something else, sustainability is all driven by technology.

We have got a real challenge in front of us and it's about keeping coal and natural gas, but especially coal, in fossil, a compelling choice.

And that means it's still the best value out there in terms of energy production or in terms of chemicals production, but it's also sustainable from an environmental standpoint.

So technology is a key. It is about jobs. It's about revenues, not just government revenues at the state level, but even as far down as school taxes in the local community in which these people work.

It's GDP growth. It's environmental sustainability. I believe that coal can continue to be a compelling choice. I believe organizations like this and the work that we are doing can make it that way.

But I also believe that the way to get there is technology evolution because, as much as we could complain about the EPA, and I get frustrated too, but at the end of the day there is a lot of inevitability that is in front of us, that if we had the technology to solve it, we wouldn't be whining and moaning about it, we'd be getting after it.

And I believe that's the challenge now, is to move into that kind of regime, look at the business opportunity and go after it. So I can take some questions now. Thanks.

(Applause.)

MR. BECK: Thank you, Chuck. Just to make a comment on the statement. The Findlay college team that we used to play when I was at Thomas Moore College in Kentucky playing basketball, their nickname is the Oilers. So there is a longstanding tradition back there and they used to have a Godawful green basketball floor. It was terrible.

Anyway, Chuck is willing to answer a few questions, and at this time that would be from the members of the National Coal Council only. He is going to step outside in a little bit and talk to the media.

So I would ask the media to hold and you can go ambush him outside. Questions, comments, from members of the Council? And again, for the purpose of the record, please state your name and affiliation.

MR. McCONNELL: I would encourage you to be as provocative as you'd like to be, and if I can't answer, I'll just tell you.

MR. NARULA: Mr. Secretary -- Assistant Secretary, congratulations for the very inspiring talk you gave. I just wanted to seek clarification on your point about every ton of CO2 injected, eventually it will be all sequestered.

Now, in EOR, the first time around, 50 percent comes back and then it gets reinjected and the process continues. Is that what you meant, everything captured eventually gets sequestered?

MR. McCONNELL: There is recycling. It's a big part of the industry. But here's the other thing with people, it's interesting. Environment people get really concerned when you start talking about the oil and gas industry doing CO2 management because their natural reaction is, well, this isn't -- this is a part of an organization's, perhaps, that we are, you know, we are not as close to, we don't really understand.

And my comment back is, CO2 is the

biggest part of the cost stack for people to do enhanced oil recovery. So, sure they want to measure it and monitor it and verify it. Sure they want to get use out of every single ton.

They don't want to be venting it. They don't want to be wasting it. They want it to go into that formation, because for every ton that goes in, I get two to three barrels of oil that comes out. So I don't want to vent the CO2 and pay somebody for it. I want to put technology in place to maximize my investment.

So in my mind, again, this isn't something you are laying on top of an industry to try to make them behave better. What you are doing is you are incentivizing business to do the things that they do best, and that's take advantage of raw materials, products and resources that all of you know. That's how you manage your balance sheet and that's how you make money, and I believe this is an

opportunity for us to make money.

MR. BECK: For the purpose of the record, that was Ram Narula that asked the question. Sy.

MR. ALI: Sy Ali, with Clean Energy Consulting. What are your views in terms of using CO2 for other purposes besides EOR?

MR. McCONNELL: The question was what are the views regarding CO2 for other purposes besides EOR. It's a great question. And the answer lies in how fast can we drive the cost of carbon capture and CO2 capture down to whatever levels that we look at for biofuels, algae, this, that and the other thing, okay?

What I do believe is that in any business plan, you've got to understand what you are going to do first, and then move on to next and next and next.

And I think what we are talking about today, focusing on the here and now, is

we've got an opportunity with EOR that is going to catalyze industry to move forward. We are going to be able to drive down the cost of CO2 capture.

And I think the answer to your question is five years from now, 10 years from now, we are going to be using CO2 in a lot of different ways.

I will say, spent time last year in China, with ZhenHua, and ZhenHua's strategy is all about CO2 utilization, not just exclusively for EOR, but they make chemicals, they are involved with all kinds of things in the value chain, and everybody's aspirations are there's no point in reforming natural gas to make CO2 or other situations, why not be able to utilize it from the coal processes that we have?

So I think that's a natural evolution and your question is probably a little bit ahead of its time in terms of other things before EOR, but it's right around the

corner, I hope.

MR. BECK: Anyone? One more. I know Chuck's on kind of a tight schedule this morning, and I guess eventually -- I've known Chuck for probably over 20 years -- I guess I'll get used to calling him the Honorable one of these days.

MR. McCONNELL: But I won't get used to it Bob, yes.

MR. BECK: All righty. We appreciate it very much, and please join me in thanking the Assistant Secretary.

(Applause.)

CHAIR HOPF: As Bob said, thank you Chuck for your time. I know you have a busy schedule but it was a great discussion. At this time I'd like to introduce Fred Palmer. He's our chairman of our -- of the Council's coal policy committee and he is going to kick off the discussion and introduce the folks that will give the presentation on our study and its findings and

recommendations. So I'll turn it over to Fred Palmer.

MR. PALMER: Thank you very much and good morning. It's an honor and a pleasure and a privilege for me to stand in front of you today as chair of the coal policy committee for the NCC to ask for your consideration and adoption of this extremely important study that we have done.

The Assistant Secretary is leaving and I want to thank Chuck very much for his counsel and support in doing this. I think we have a study that is extremely consistent with what you have put on the board here, and actually ramps up a little form there.

So we are joined at the hip and we hear what we say and we will follow through. Thanks Chuck.

(Applause.)

MR. PALMER: Coal's competitive advantage is its carbon content. The -- insofar as enhanced oil recovery is concerned

you cannot do an at-scale without coal, and there are tens of billions of tons of economically recoverable barrels of oil that we have in the United States that is available to us by furthering the technology path that the Assistant Secretary has identified in a robust way, at scale.

The title of the study is Harnessing Coal's Carbon Content to Advance the Economy, Environment and Energy Security. Coal's carbon content is its competitive advantage.

No other fossil fuel in the United States can be utilized the way coal can be utilized to recover the oil treasure that we have.

And when you combine the potential for EOR at some four million barrels per day, three and a half to four million barrels per day, plus putting in a coal-to-liquids fleet at the same time, we can get coal to liquids, essentially up to six to seven million barrels

per day in the United States.

This is a decadal-long stretch long, what we call an aspirational goal. But it is very real. And it is also economical in today's market environment.

The study that we have is responsive to the Secretary, Secretary Chu's letter. We are very fortunate to have had Dick Bajura chair this study.

I want to thank, in advance of Dick's presentation this morning, the very very hard work and diligent work that he did in advancing this, the people that participated, many of whom are in the room and in drafting the chapters that were -- became a part of the study.

And also a tip to the hat once again, to Frank Clemente who is sitting in the back, as essentially our managing editor in this process.

Frank has been involved with the National Coal Council in the study process

since March of 2006, when Greg Boyce's study "Coal: America's Energy Future" was released and has been with us over the six full years in the numerous studies that have come out at that time.

He has had hands-on involvement in every one of them, including Texas Utilities -- = not Texas Utilities anymore -- but the TU study that was done I believe back in 2007.

So a tip to the hat to Frank and a round of applause for his assiduous work.

(Applause.)

MR. PALMER: With that, let me introduce Dick Bajura, and again, my congratulations to Dick for the work that he has done in presenting this.

After Dick will take us through the -- what he study provides, after Dick is done I am going to return and I will move the adoption by the full Council of the study, following a second we will have opportunity for discussion, a call for question and

hopefully we get this accepted by the full Council today. I hope we do. We have a draft press release ready to go on it. So that cannot be released until we do.

But in any event, Dick, would you come up now and take this over for a while? Thanks.

MR. BAJURA: Thank you, Fred and good morning, everybody. Mr. Chairman, we are pleased to work with you to present the results of our study.

My presentation will follow the outline shown above, summarizing the objectives of our study, a few comments about how we were organized, discussion of our findings and recommendations, and then the overall discussion that Chairman Palmer described.

Secretary Chu asked us to conduct a new study focusing on capturing carbon dioxide from fossil fuels, also asked us to examine opportunities for fuels in chemicals

from coal, and substitute natural gas using the captured CO2 for enhanced oil recovery, non-traditional uses of coal, and finally a discussion of the economic and security benefits from enhanced oil recovery technologies.

Our administrative group consisted of myself as the study chair. Fred Palmer described the excellent work that Frank Clemente has provided in being our technical work group chair or report manager, if you will.

Fred Palmer, as usual, has offered guidance to us and to previous groups, and I thank Bob and Larry, who are the people who help make the Council work day by day, for their input and advice during this study.

Our report was organized along a thematic approach that you will see in the way we have organized the chapters. Frank and I worked with everybody to help put together our executive summary.

We illustrated our report by describing the overall scenario that we are under. Frank Clemente took the job of writing that chapter.

Roger Bezdek undertook the task of describing the economic and energy stimuli that would result from deploying these technologies, and I thank Roger for undertaking some new work in putting this chapter together.

Our third chapter addressed the issue of carbon capture technology, focusing here on what happens inside the plant, if you will. That was ably led by Holly Krupke, who also worked with us on last year's report.

We then had two chapters addressing the issues of EOR technology, the first one led by Steve Melzer, who addressed the issues related to what is EOR technology.

And then the second part, addressed by Jerry Oliver, who asked the question, "How do we integrate what goes on

inside the plant with what goes on out in the field?"

The sixth chapter was one that was devoted to other aspects of synfuels technology. That was led by Bob Williams, who also contributed a lot of new information to the study.

And the last chapter was led by Sy Ali, who addressed issues related to other use is for CO2.

Our activity schedule was as follows. The last part of last year we spent working with DOE to make sure we understood what they wanted in this study.

The early part of this year we formed our team and we spent three months working as a collective group on this study, which took us to June of this year, where we made a presentation of this report to the Coal Policy Council and are now presenting the results to you.

We had over 60 team members

working with us in one way or another on this study. We had at least 15 full team teleconferences, numerous discussions amongst our study groups, and I really want to thank the study group for the work they did in interacting with each other.

And then we made the presentation to the Coal Policy Committee in Chicago on June 7th. Today's objectives, I will review with you briefly the approach that we took in structuring the report, describe the findings and recommendations, and then seek your guidance, as Fred described earlier.

Our rationale consisted of working as the Council usually does to obtain our information from studies that are out there in the literature so that we can cite credible sources.

As described earlier, we have conducted some original studies for this report. We have posited an aspirational case that Fred described briefly. This is one

where we are asking the question, what could be in terms of the opportunities for EOR, what could be if we did what we could with carbon capture, and put together a scenario that was a stretch, but is one that we believe is achievable.

The other thing that we did in our study was to examine the ways that one chapter interacted with another, one theme interacted with another, to ensure that as we went forward with our report, the chapters were all consistent, we were studying the same problem and were making reports on topics that were integrated together so that we had a consistent story.

Our findings are listed in the executive summary. You have a copy of that summary in your packet. I will describe them briefly.

The work that we did, and thanks to Roger Bezdek, showed that we could expect something like $2 billion in sales annually by

deploying these technologies. One million jobs would be created, and state, local and federal taxes would amount to $60 billion.

The deployment of CCUS EOR technologies can expand domestic oil production. We'll get that from two components: one, the oil that we would get from out of the ground, and second would be the oil and fuels that we would produce by deploying CTL technologies.

That amounts to about 6 million barrels per day at the implementation of this full technology, which would take several years to do.

Integrated deployment would bring widespread economic development. In the presentation that Assistant Secretary McConnell did, he showed how we had oilfields deployed across the country, and if we were to use these technologies in these different regions, we would have widespread economic development in places like the Ohio valley, in

the southwest and areas of the type shown in Chuck's presentation.

Deployment of these technologies would result in reduced emissions, depending on the amount of capture, 60 percent, 90 percent, in power plans that would be retrofitted for CCS.

We could sequester the amount of CO2 equivalent to about 100 gigawatts of coal-based power. New plants should be strategically sited. We would want to integrate where we locate the new plants compared to the chances for disposal, as Secretary McConnell described.

We would need a national network, as always he has described, a network of pipelines that would serve these plants to go from the carbon capture location to the carbon injection location, which would be integrated where they would be needed as a national network to take advantage of all the resources that we have.

Coal to liquid fuel plants have been around for a long time, and we know that they can be sources of high quality fuels, and they also have low carbon capture costs because of the way these processes work. They would be integrated very easily into this scenario.

Depending upon the dispatch factor we can show that coal-based plants are more economical in terms of return on investment than natural gas plants.

For example at 80 percent dispatch, maybe the return on investment is -- or the cost of CO2 is $57 a ton but if the natural gas plant works at a lower dispatch rate, it could cost $100 a ton for capture.

Two points we made on regulatory acceptance that's needed to promote this deployment: one topic is recognition that using CO2 in this manner is a valid emissions control technology; the second one, that we would want the regulatory agencies to look at

the deployment of CO2 in this manner as a class two injection well process, as opposed to the class six process which is proposed for carbon sequestration.

The Council has examined that substitute or synthetic natural gas, depending on your choice, in many reports in the past, and we again confirmed that SNG is a viable coal use option looking into the future, both concerning national and global kind of considerations.

Our recommendations are very similar in some senses to what you heard from Assistant Secretary McConnell. We need regulatory certainty. If industry has regulatory certainty we can then move forward to deploying these technologies.

We need continued demonstration projects. The cost of bringing down the first of a kind to the nth of a kind needs to be determined and we learn many, many things from these projects.

We need to find ways to continue to support demonstration programs. We must be attentive to the fact that generating new industry requires us finding the workforce that can help us implement that industry.

While industry and academic kind of units will accomplish the training of these new workforce expertise areas that we need, we would appreciate support from the Department of Energy as they have done in the past in promoting workforce development.

We know that many states are very good at developing regulatory practices. The state of Texas would be one that would come to mind.

As we look at deploying these technologies around the country, it would be useful if states would work together with guidance from fossil energy for example, on how we can develop good regulations that could be deployed very quickly.

Long-distance carbon dioxide

pipelines may be needed in some cases. Even the ones that are short term would require cooperation of a lot of entities in order to put these pipelines in place so we could then begin to deploy the EOR technologies.

Chuck described the work that has been done with the regional carbon sequestration partnerships that have described how we can sequester CO2.

We believe that a lot of coordination and effort can be expended in helping us move forward with EOR CCUS kind of technologies by taking advantage of the work that the fossil energy office has already done and has demonstrated the kind of leadership in putting these programs together.

Co-production of liquids and biomass we view as a win-win situation -- provides CO2, provides a useful fuel. We believe that integrating biomass in with the liquid fuel production would be a benefit, and recommend that we search for ways, taking

advantage of the EOR CCUS opportunities, we can then help stimulate this industry in the United States.

As Assistant Secretary McConnell described, it's important that we continue the fundamental work to advance our clean coal technologies. He showed a wide range of topics that we need to work in. It's important that we continue to support the advanced coal technologies program as we move forward.

And the last recommendation we mentioned is that it would be very helpful if the Assistant Secretary would take advantage of any opportunity he had in his forums to talk about the advantages of CCUS EOR technologies to promote its deployment, and I think Assistant Secretary McConnell has done a very good job at the beginning.

That consists of our report Mr. Chairman, thank you for the opportunity.

(Applause.)

MR. PALMER: So our Chair worked pretty hard on this study. So I suggest we give him another round of applause to express our deep appreciation.

(Applause.)

MR. PALMER: A lot of hard work went into this. I was in the peanut gallery throwing peanuts now and then but not too often. So you know, when you read the report, the power of this report is really something.

The incremental annual coal production from the activity identified in the report is well over 400 million tons of coal a year for a 40-year period.

These are long-life assets that will become part of the industrial framework of the United States, leading to an industrial rebirth in many parts of the country -- jobs, higher incomes, more people living longer, living better, life itself, like the coal miners the Secretary showed on his slide.

So it's -- when you believe deeply

in coal, as the members of this Council do, and you look at this study, and you see the power of the study and you see the power of what's identified in terms of our future as an industry, and coal utilization, the current difficulties notwithstanding that the coal industry is going through, will pass, and we will come out of this ready to go for the future.

EIA itself has coal use going back to a billion seven hundred millions tons of coal a year and I'll take you over on the -- particularly with the enhancement of the EOR aspects of this.

So our job here today is to consider this study and to adopt it, and to advance that, I'm going to move its acceptance by the full Council and I would entertain a second at this time.

Thank you Jacqueline. So --

MR. BECK: I'm sorry, Fred. Can I ask who the second was for the record? I --

we couldn't see.

MR. PALMER: Jacqueline Bird.

MR. BECK: Okay. Jackie Bird.

MR. PALMER: I'll call for discussion, questions, comments at this time. You are not allowed Bob. Yes, all the way back.

MR. REUTER: Fred Reuter, environmental representative. The first recommendation is regulatory certainty and of course this is given as a reason why investment isn't occurring right now.

It's my understanding that frequently projects have to be in place before one knows what regulations have to occur, or am I mistaken about that? I just don't understand.

MR. PALMER: Well, there is a regulatory regime in place at the Environmental Protection Agency and at the state level, and of course there's been an EOR industry for decades in the United States and

Danbury makes its living doing that. Occidental Petroleum is aggressive in that space in California.

But if you went out today to put in a greenfield plant, there are regulatory issues. Let's say you wanted to go -- you wanted to go into the Gulf states and put in the summit project for example. There are regulatory uncertainties at EPA as to how they are going to treat them, with respect to the classification, are you really sequestering CO2, do you have to measure it, why do you have to measure it, how do you measure it, what kind of certainty do you have to show in terms of long-life capture.

I'm not suggesting that these questions should be asked and answered. I am saying that it is uncertain now how EPA would react to a greenfield project with respect to enhanced oil recovery.

I think the state issues are really not that substantial but I do think the

EPA issues are substantial, and as the -- as that section makes clear.

That section, by the way, was drafted by -- not Frank -- but Kipp Coddington, a lawyer in the area who was expert in carbon capture utilization and storage and the legal issues surrounding that.

So Kipp is probably as knowledgeable as anybody in the country on it, and I think the chapter reflects that.

MR. THOMPSON: Good morning. Can I be heard -- are you able to hear me? John Thompson, clean air task force. My first meeting at the National Coal Council.

I'd like to just thank the committee and everyone who has been involved in the study for their hard work, and I had a process question.

There's still a gap between the cost of capture and the value of CO2 for EOR and the report describes working with the Department of Energy to find financial

incentives or other ways to close that gap.

And my process question is, is will the coal council be doing any follow-up studies to give guidance to the Department on incentives or other programs that might help to close that gap?

After all the report identifies $60 billion in tax benefits. It seems that some of that money might be earmarked to close some of that capture gap.

MR. PALMER: Thank you. That's a really good question and we had a lot of discussion surrounding that. Earmarks are pretty controversial, and tax credits are pretty controversial, and we felt that to -- it's better to make these -- the people that are going to advance these projects from a business standpoint for sure will be companies and individuals, whomever, for sure will be going to the federal agencies where they potentially could get financial assistance or to Congress to advocate on their own behalf.

But we felt that if we got in the business of advocating tax credits or tax incentives for this, given the budget environment here, that the study would get lost in that argument and that it is better to put it forward on a business proposition.

It is profitable today, absolutely. It's not profitable to take a, you know, a post-combustion capture plan, or existing super-critical capture plan and then have to build a 500-mile CO2 pipeline that might be in the Mississippi valley or the Ohio river valley.

Those aren't as such profitable. But a greenfield project is profitable and I think over time, as this industry develops, then you can make -- take the initiatives that you are talking about in terms of going to Congress or to the state agencies for financial assistance to do it.

That in turn is dependent on, you know, what are we going to be when we grow up

in terms of our regulatory regime for carbon, what will that look like five years from now or 10 years from now, which is going to ultimately get decided by Congress, not by EPA, and what if any goals are going to be established in that process putting a quote, "price on carbon."

There was a lot of talk about that. I am personally of the view that there is a price on carbon. It's a positive price and it's paid by people that need the CO2, like the Denburys of the world, and those are all subjects for a later day.

Our studies are in response to studies requested by the Secretary, not things that we do on our own or sua sponte as the lawyers say.

But I'm sure those are subjects for a later day. What we wanted to do with this study was to put in front of the Secretary and the American people and this city, the most energy-illiterate city on

earth, the full potential of coal and the full power of enhanced oil recovery.

Any other questions? That was a compliment.

(Laughter.)

MR. PALMER: Okay. We have a motion and a second. We have had discussion. I would call for a vote on approval of this study by the Council members. All in favor, say aye.

(Chorus of ayes.)

MR. PALMER: All opposed, same sign.

(No response.)

MR. PALMER: Unanimously carries. Thank you very much. God bless you all.

MR. BECK: I want to just take a second and from the staff perspective, thank all of those over 60 experts that did all of this incredible work.

Dick mentioned 15 phones calls of about two hours of duration each. There were

lots of other things that were going on. And you have to remember folks, this is a voluntary organization. We got this whole report done without spending a dime. Everybody volunteered their time. There were weekends on Mother's Day. It was an incredible undertaking by a lot of people and from the staff perspective, me, Larry, Pam et cetera, we thank you from the bottom of our heart and especially Fred and Dick with their leadership, and Frank with his tenacity. We certainly appreciate it. And we can get back to communications and finance reports and all that other stuff. Thank you.

CHAIR HOPF: Thanks, and I would also, not to repeat, but on behalf of the Council, like to thank our staff, Bob and Pam and Larry, and Fred, Dick and Frank, and all the members, on behalf of the Council, say thank you also. Job well done.

At this time, at our fall meeting last year, the executive committee decided to

reinstitute our communications committee, and so I'd like to introduce David Surber, who is the chairman of that committee and we had our first meeting yesterday afternoon and he'll give us a report from that committee meeting.

MR. SURBER: I plan to speak for approximately four minutes. Chairman Hopf, friends and colleagues on the National Coal Council, the communications committee meeting was held yesterday from 3 to 4 p.m. I am pleased to announce that 30 Council members, as well as staff and special guests, attended.

Prior to the meeting all members were provided with a proposed work plan for the committee for 2012 and beyond. The plan was approved with no changes.

I would ask that those persons here this morning who did not attend yesterday would please study the work plan and send their reaction to Bob and to me.

Also prior to this meeting, we made a wide distribution of a factual press

release announcing the date, time and place for the full council meeting. This was distributed one week ago to all major news organizations, television and broadcast media, and even to the VDC and NHK.

The committee heard a somewhat unsettling report from Mr. William McBorrough, internationally known expert on threats to the power grid, transportation and communication by means of cyber attacks.

A summary of his remarks will be prepared and sent out as soon as possible. Jeff Miller, who handles AV matters, our excellent website and who tapes our meetings and posts this video within hours of today's event, is here this morning.

Jeff has worked, has, rather, achieved five Emmy awards for his work on important programs here and abroad, and we owe him our gratitude.

I would conclude by reminding this body that the work of the communications

committee is to provide factual education not advocacy.

Education does not take place overnight, but over time. Thank you for listening.

(Applause.)

CHAIR HOPF: Thank you, David, for that report. Yesterday afternoon the finance and executive committee held a joint session and at that meeting, both the finance committee and the executive committee heard a report on our 2011 audit that is conducted annually by the firm of Chaconas & Wilson.

Following that action, both the finance committee and the executive committee accepted that report. I'm happy to report that the Council received a clean determination, so no issues out of that audit report.

I'd like to also take this time to thank all the members who have paid their 2012 dues. We very much appreciate that. Those

that have still not made their payment, we would encourage you to do so. You can work with Bob and Pam to make that happen.

It's because of those financial dues, enables us to do the work as a Council that we are able to do, to move forward with the studies and those type of things, even though, as Bob referred, all the hours was donated, and volunteer hours, it still takes dollars to make that happen overall and run the Council.

So we very much appreciate that and please encourage everyone else to do. As we know, the economy is tight and every company is looking at every dollar they spend, and picking and choosing their choices, but the work we do here, we feel is very important, so we ask you to continue that. It's very critical and as we move forward with our mission and try to move things forward.

So at this time, we're going to take about a 10-minute break and then we'll

come back with the next presentation. So it's 20 after, so we will resume at 10:30.

(Whereupon, the above-entitled matter went off the record at 10:21 a.m. and resumed at 10:35 a.m.)

MR. BECK: Thank you. We still have two excellent presentations to get through, and also we have to elect officers and do some other housekeeping things here. So --

All right. For the purposes of the court reporter, we are back on the record. Thank you ladies and gentlemen. We are reconvening the spring meeting of the National Coal Council.

My name is Bob Beck and I'm the staff guy. I think most of you guys know me, but again, for the purposes of the record. Our next speaker is Steve Melzer.

Steve was, as you know from Dick Bajura's presentation here earlier, was one of

the lead authors in our recently-approved study, and is a recognized expert in the enhanced oil recovery business, and he's from someplace down in Texas.

But I got an email from Steve on Wednesday morning, just two days ago, and he said, "Hey," he said, "I hope you weren't counting on me being at that Friday event. I got some travel plans that conflict and I don't think I can be there."

Well, I had a heart attack right there in the office because I didn't know what I was going to do to plug the hole. So I used all of my persuasive talents, and I told him, I said, "That's not acceptable. You must be here."

So anyway, we do greatly appreciate Steve finding time in an incredibly busy schedule, first of all to do all the excellent work within the study that we just concluded, and also for joining us here this morning.

So, without any further ado Steve, it's all yours. Thank you very much.

(Applause.)

MR. MELZER: I did that on purpose Bob. Well, I am a little bit of a duck out of water with this group. You know, I think I knew two people on the committee when we started this report, but made some good friends along the way and it's been fun

I have always been a fan of coal. I look at the producer world as a whole, not a little bit unlike some of my counterparts in the oil and gas industry, but we are all in this together.

In fact, the only industry I think gets beat up worse than the oil industry is you guys, and so I have a lot of compassion for you.

But I thought what I'd do this morning was give you a quick tutorial. I know some of you haven't looked any deeper than coal reserves. Some of those are pretty deep

too. But we'll look at some of the features of oil and gas reservoirs, specifically oil reservoirs, and then talk about EOR technology.

And I know some of you have not been exposed to it. Hopefully you'll read the chapter. I guess it's now four -- it got moved from three to four, I think. Yes.

And, but we tried to do a lot of what I'm going to talk about this morning in that chapter and basically give everybody that wasn't familiar with the underground and how we do oil and gas, and especially enhanced oil recovery, that background.

I'll talk a little bit about where we are as an industry in the EOR world, how much do we use of the CO2, how much oil we produce. It will surprise you I think how much oil we do produce. And who are the key players, kind if give you a feel for which companies are out there doing this.

It is a very small sector of the

oil and gas industry, I will say that, and the players is not a long list. You have Danbury, who is here, represented here, is clearly the leader perhaps with Oxy, as was mentioned this morning, and Kinder Morgan, some others.

But we'll talk about the growing demand for CO2. I was with a producer yesterday who said he is being curtailed 20 percent on his CO2 supplies, and it's kind of a growing problem in our industry, the curtailments that are out there. We just can't get enough CO2.

And then I'll talk a little bit about some new targets. Secretary McConnell did talk about the residual oil zones. I want to give you a little background for that, why that's kind of an exciting new storm on the horizon, and market issues and barriers.

And then finally, I guess I'm probably the biggest fan of what Secretary McConnell is going around saying. We sort of needed that gospel being taught, and so if he

says jump, I ask, "How high?" I really do respect the man and his ability to answer questions that drive a lot deeper than his talks go.

You know, most of our industry is interested in drilling into a reservoir and producing the fluids back by their natural pressures.

As was discussed, in the Findlay area in Ohio that's about all we did up there. And then once you got those pressures depleted, we run off to the next exploration prospect and drill for it again.

We are sort of back in that mode with the unconventional shales right now. Ninety eight percent of the industry is dedicated to that goal, looking for those new reserves, getting that fast return on your dollar.

And our industry, the EOR industry, is a very long-term industry, and we are looking out 30 years and in our world --

Fred addressed that question quite beautifully, I thought, with the uncertainty, you know, and regulatory uncertainty -- it's hard to make a 30-year investment with the regulatory uncertainty that might be out there.

And so we do need more of that uncertainty to do long-term investments and you guys know that better than anybody because your investments are all long term.

So secondary comes after primary, and we're pretty good at doing this. We reinject with something as cheap as we can find to re-pressure it, and that's usually water, and we'll use formation water for the most part and reinject that back maybe from another formation or maybe just reinject what we produce with the oil and try to keep the pressures high, and then convert some of the producing wells to injector wells and drive the oil from the injector well to the producer well.

That leaves a lot of oil behind, as I'll show you, and now if we switch to an injectant that changes the property of the oil, we can get more of that oil, and CO2 is kind of the magic elixir.

We can use chemicals and other things but CO2 loosens the oil from the rock, thins it up, makes it less viscous and we can produce a good bit of oil using CO2. So it is a commodity in our world.

I will talk in two terms, CO2 enhanced oil recovery or EOR for short, and then I'll say flooding and the concept of flooding is usually horizontal, where we are pushing oil from an injector to a producer. It can also be from an added drive, where we are pushing down from say an old gas cap. And so I'll use both of those and they are synonyms.

And we can do CO2 flooding as a secondary process. We don't necessarily have to follow a water flood. But we generally do,

because CO2 is expensive as Chuck pointed out, and if we have to re-pressure a reservoir with CO2, it may actually jaundice our economics and so we don't like to do that.

In the world we are going into, maybe we are going to do a lot more of that. So -- and it's not in pools. I bet you everybody in this room knows that, but it's in porous and the oil is sometimes stuck in those poor spaces pretty well.

So just, you know, I mean, we use that term pool especially in Oklahoma, and it sure misleads a lot of people. It's not a lake down there, I promise you.

This is how it looks in terms of the percentage of the oil that we would produce from the total oil that's in place, we call original oil in place, OOIP.

On primary, a pretty good number is about 15 percent of that oil will come out of the ground by its natural pressure. We have seen some projects that do better than

that and we have seen some that do a lot worse, and these unconventional shales do a lot worse. They don't get 15 percent.

Secondary, a good secondary project, water flood will get more oil than the primary, but that sort of depends on the reservoir properties. Some reservoirs flood well and some don't.

And then along comes this injectant that changes the properties of the oil and we can get another 12, 15 percent. Actually, with today's economics that number is probably closer to 15 percent than it was 12.

But look how much we've got left. That's still about half the reservoir volume of oil that is still in the ground, so we have got room for more improvement yet and we will probably figure that one out and that will be the next 30, 40 years too.

This is how it looks in time. This is one of my favorite fields. We call it

gold standard in West Texas, the Seminole project. Hess is the operator and you notice they had the primary phase -- I'm trying to find the pointer, here we go -- the primary phase here and then the secondary phase, really good water flood.

And then this came along about World War II, which was a lot of our big production in Texas helped the war effort, and then the tertiary phase here at the end.

And you noticed I stopped in the year 2000. I think that will be obvious to you when I get to a later slide and I'll show you what we may want to call quaternary oil.

How does it work? Well, I think I've described this already for you but it does dissolve in oil and it changes the viscosity, loosens it up from the rock, and allows it to move more freely in the reservoir.

And so we can use it to re-pressure a reservoir, but most often we use

water to do that, and then the CO2 comes later.

But if CO2 were ubiquitously available, and cheap, we would probably re-pressure with CO2 and skip the water flood phase.

In fact Danbury is doing that with two projects on the Gulf Coast right now -- Oyster Bayou, which is right across the border from Louisiana, in Texas, and the Hastings Field.

And they -- some of you may have had the luxury of going to that field. It's just in the south part of Houston, really in an urban environment, and when people say don't do this in an urban environment, well obviously Danbury thinks you can.

And then if you drive to Denver City, Texas and you see these injector wells and producer wells everywhere, and that's got a high H2S and some of you may know H2S is a little bit more toxic and dangerous than CO2

ever thought about being.

So we can do this. And it's all about public attitude and whether they are willing to be part of the team, if you will.

And this last bullet Chuck's got mad at me for saying it this way, but typically 90 to 100 percent of the purchased CO2 volumes will remain sequestered in a reservoir.

And the reason I don't use 99.9 percent or something is because some of the factors if getting it to the atmosphere are out of our control as an oil producer. It might be a power failure that stops our compressors and so we have got to run the CO2 to a flare. We have got to add methane, if you imagine, to combust it, to get a flare, and so it's a doubly expensive proposition when that happens to us. We not only lose the value of the CO2 but we have got to add methane to combust it. So we, as Chuck very accurately pointed out, we try to avoid any

losses in the system.

And it's been around a long time. The commercial scale has been around since '72, 1972. Maybe not a long time for some of us, but I can consider it sometimes in some audiences a new technology, but it's been around long enough we know a lot about it.

Okay. All right. How much do we use, where do we use it, and who are the key players? This is a map of the U.S. obviously, and lots of infrastructure has been built over the 40 years.

Coal plant. Most of you are familiar with the Great Plains Syngas Plant up in Beulah, North Dakota. Takes its CO2 byproduct and runs it to the Weyburn and Midale Projects in Saskatchewan. Really interesting case history to examine. Had DOE help to get started.

Natural gas byproduct, CO2, from the LaBarge field in Western Wyoming, an 18,000-feet deep reservoir that's got about

two-thirds CO2 with the methane, and they separate the CO2 and then ship it off to Rangely, which is a Chevron project in Colorado and a number of projects in Wyoming to make enhanced oil.

Natural source CO2 domes, McElmo Dome is the largest pure source of CO2 that I know of in the world. It's about 98 percent pure and so we take it from a reservoir at 9800 feet deep then move it to reservoirs 5,000 feet deep in West Texas. It's a transfer process. We make oil in the meantime.

Bravo Dome shallower, Sheep Mountain, is kind of intermediate, and those are all pure sources of CO2 as well, and they have been our bulwark, our real major supply.

And then we have some natural gas byproduct down here in the south part of our basin, in the Permian Basin, this area here. And then Mississippi and the home base of Danbury resources, and then Wyoming, in the

Rockies area, we call it the short, and those are kind of our three main areas of EOR application in the U.S.

Mississippi has really grown in the last six to eight years due to Danbury's activity and they get from the CO2 from the natural source field at Jackson Dome.

Many of you have seen a proposal they have floated and it's in the report, to take CO2 byproduct from the Ohio Valley area and run it into their pipeline infrastructure and effectively start to displace the natural source CO2 with anthropogenic CO2.

If you look at EOR, it's not the only technique -- CO2 is not the only EOR technique. There are others.

The ones I have shown here are steam, where we actually add heat to oil, usually a thick oil, to make it less viscous; hydrocarbon gas, we will actually reinject the produced hydrocarbon gas; and then nitrogen, we use nitrogen on occasion.

And you can see, this is three decades of growth, the blue, the black and the read, and you can see CO2 is growing. You can see steam is now shrinking and we actually in the last report passed seam as the largest EOR technique in the U.S.

Hydrocarbon is kind of going away, the value of the liquids in the hydrocarbon stream are too valuable so people sell it, sell the methane as well and don't reinject it.

Nitrogen is sort of like CO2 but you've got to use it at deeper depths, and it's a niche application for -- where nitrogen works like CO2 does.

Chemical, and there's a lot of emphasis in the research world on chemical EOR and I sometimes wonder why, because every project is a research project.

But you can see the results there, just not very impressive on how much chemicals we use for enhanced oil recovery.

This number right here is about 100 million barrels per year, and I'll show you a graph of how that stacks up in time.

This is a really interesting chart that talks about the amount of annual EOR oil and these are in thousands of barrels a day. So you can see we have climbed all the way up almost to 300,000 barrels of oil a day.

And this is the Permian Basin number by itself. You can see we still dominate the EOR picture but our influence is shrinking and the reason is, we don't have enough CO2 and the reason for this decay is exactly that. We have got projects that are economic at $80 a barrel, and that CO2 that was going to be readjusted or reallocated to other projects is still going into those old projects that are less efficient but very economic.

And so we flattened out here and it's kind of disturbing. I finally got the folks in my community saying what I've been

saying for five years, we are out of CO2. Some of the suppliers don't want us talking like that. But that's the truth.

So how much is used? This is a picture of it. We use about 65 million tons a year of CO2. In the Permian Basin we use almost half that, or a little over half that actually, and three quarters of it comes from these pure underground sources today.

About 20 percent comes from byproduct natural gas. You know, a lot of reservoirs have CO2 in them, with the methane, and that's certainly true that the LaBarge field in Wyoming, it's true in our southern, West Texas Overthrust Belt, and there's other places as well. That Michigan dot that was on the map is the same as that. It's a natural gas byproduct, CO2.

Ammonia fertilizer, we actually have three plants that have byproduct CO2 that we are putting into EOR. This is the Bula Plant, the coal synfuels plant.

We don't have any current ethylene byproduct CO2. Canada does but we don't in the U.S., and ethanol. We had a project in Kansas and it's off now. It was a pilot that DOE funded, and all the refinery CO2 is going into food-grade CO2, which in a total U.S. market is probably five percent of the EOR market, CO2 compared to the CO2 EOR market.

There was a question earlier about all the other utilization uses of CO2 and keep in mind that EOR is the big guy on the block, maybe cement or something will come along later and displace some of that CO2 use.

But this is big stuff and the volumes will tell you that, so it's sort of the first reaction is to go to the EOR. Tell me how I'm doing on time because I know I'm over. So just give me a five minute -- are we there yet? Okay.

And I wanted to specifically point out that coal synfuels, because hey, we are trying to encourage you.

These are the players. I listed on top the transportation players, and you will find most of them are down here in the producers too. In fact we just had an announcement last week. Our last non-integrated transporter supplier became integrated. They bought SandRidge Tertiary and so they are going to go flood themselves now. So everybody that is a supplier/transporter is now a producer too, so I guess that says something.

But here's the list. I'm listing them alphabetically. The big guys as we have discussed are Oxy and Danbury and Kinder Morgan. Exxon is back in. They left, and they have come back in through XTO now, which they merged with, and so that was good to see.

Chevron is all excited about this now because of the big targets and so they are busy getting real. Conoco is still a good player, I think in the future.

Growing demand. If you look at

the number of projects here on the vertical axis over time, 84 on the left 2012, most current survey from the oil and gas journal.

You can see that steady growth, and some of you may remember, I know you remember the coal crashes, well, there was a couple of them oil crashes too, 1986 and 1998.

And the good news is we grew through that. I mean, it did de-accelerate our growth, because when you are in single digits dollars per barrel it stretches your cash flow to the limit, but we kept going and that's the good news, is that we went right through that dip.

This time frame is really interesting, and it's '86 through '88 -- '86 through 2000. I'll blow that up for you on the next chart.

We actually grew two projects a year in the U.S. through that period of time, and the oil price on this bottom chart was at average $19 a barrel in that period of time.

So, and people say this is not economic, you know, that $19 is probably equivalent to $35 or $30 now, because of the cost, expenses involved in it, but still. Still, we can grow the industry.

There is pent-up growth from just the conventional targets, which nearly everything I've talked about to this point has been, oil reservoirs that produced in primary or secondary, or both.

But there's a new set of targets out there, and that's the big carrot out there. And I want to do this for you. I have trouble doing this with a lot of audiences.

But normally when you deposit a whole series of sediments and then bury then, subside them if you will, into a basin, then you are generating, as it gets deep enough and hot enough, you are generating a conversion of that organic material into oil or gas, and it migrates into a trap, you know, where it, it may be a stratographic trap that you know, it

pitches out into shales, or it might be a structural trap.

And we in the industry have viewed that as sort of the end-all, for a long time. And then some of us started looking at that and said, "You know, these basins are dynamic. You know, they may have a second stage of tectonics or a third stage of tectonics and they may move around.

"And so that oil that was in this trap, part of it might move here to another place. Well, in a sense, that water has to infiltrate to move that oil, so it's Mother Nature's water flow.

"And if we go after, with CO2, that oil that is left after our water flood, why can't we go after that that's left after Mother Nature's water flood?"

And we've got 11 projects doing that now in Permian Basin. I think it's the only place in the world that's doing it but we are making about 11,000 barrels of oil a day

from those zones today. So it's not just a theory and not just an idea. It's actually been proven.

So that's the engineering. We are actually demonstrating we an do that from an economic point of view and from an engineering point of view.

And we call these zones residual oil zones. That's where oil was originally entrapped there and now water is in there and -- but the good news is there is about 30 percent of that oil still there, still left behind.

This is where those projects are. This is the Permian Basin and that's the New Mexico Texas border so it's right off the corner of southeastern New Mexico. We've got three projects under way in New Mexico, and then eight over here in Texas.

The Hess project that I mentioned is the Seminole project here and I'll show you the quaternary look at that in a minute.

These are actually the three projects at Seminole. There is now a fourth called stage two. They are going full-field with their ROZ development and they have gotten stage two approvals. They are even talking about, down the road, a stage three.

This is what it looks like in cross-section with this -- this area of the field had a slight gas cap. The green is the main pay zone and the blue is the ROZ.

This is -- gross thickness is 250 feet. The main pay was only 160. The net thicknesses are shown. The porosities are roughly a little better in the ROZ. Permeabilities are a little better, flow characteristics, and about the same amount of oil in place in both. In spite of the difference in oil saturation it was 84 percent oil in the porous spaces in the main pay and about 32 percent in the residual oil one.

So, well, this, they hate for me to show this, but we -- this was that tertiary

bump that I showed you on that earlier plot. Now look at this. This was the phase one pilot. This is the phase two pilot.

And here we are charging up the hill on the stage one oil production, which, combined, those three together, they are about 8,000 barrels a day.

Now, they are out of CO2. They -- believe it or not they developed West Bravo Dome to do this project, which is another of the natural source CO2 fields, because there wasn't enough CO2, they knew it, and so they went out to develop a project they had had in their back pocket for a while.

It's probably going to be a flatter bump than what is shown here because of the CO2 limitations. That will push it out over time, probably 50 years. I think they will still be out there doing this work in 2060.

We just dubbed it quaternary oil, just to catch people's attention. I'm kind of

like Chuck. I like to have a catchy phrase now and then. So quatenary for some of you. Turns out it's in the dictionary both ways.

So how big is the business? Well, we have got a lot of places we have these ROZs. Some of them -- I've seen one project with a 400 foot thickness and lots of oil in place.

They don't even have to be under an existing field, by the way. The rest of that is kind of geeky stuff, so we will pass through that.

Market issues, and I'll finish up with this section, this -- the issues and barriers to greater deployment, because this really is pertinent to this crowd.

You know, we -- I've mentioned this already. My industry is particularly exploration-focused, and part of the reason is that regulatory certainty issue, and part of it is we are just dominated by rate of return mentality. I think Harvard taught us that or

something, I -- you know.

But if we can get our return back quick, that's the way to do it, and you have seen how long it takes for EOR. So we are pretty exploration-focused.

Until the mid-'90s this technology how to do this was really tightly held by the majors, and they started to -- in fact, that's why I'm here today, because they looked around for somebody to help them with taking that information public and I said, "I don't know anything about it." And they said, "Well, sit with us and learn," and I did, and we did the conference, the CO2 flooding conference. We've been doing 18 of those, and short courses on the subject, and really it's grown as a result of the public -- going public with the information.

It's very capital-intensive. You know, you've got to convert a lot of wells. You've got to go find a supply of CO2. You've got to run a pipeline to it, and then you have

got to have a gas plant to reinject the CO2, the recycle stream.

So it's capital intensive and it's not, it's not for the timid. And availability of CO2, and that's a big deal today. And then for a long time there were people out there saying we were just this little tiny niche industry, and it was based on the literature that was in the '80s. It wasn't based on what was going on in the late '90s and early last decade.

So we had to go correct that, that view that this could be a lot bigger than people were giving it credit for being.

Now there is one place where CO2 limitations have not impeded the growth and we give a lot of credit to Danbury for this, because they were able, and they worked hard at expanding the supply from Jackson Dome, and grew their number of projects and their CO2 production, EOR production, from that.

And this is a graph that they

provided me that shows where they think they are going in Mississippi. This is the historical oil production in barrels a day, and then this is where they think they'll be by 2014 or '15.

So it's a pretty exciting thing for that state, and the Governor of Mississippi likes them a lot.

This is a report recently by Phil DiPietro from NETL and some of his cohorts and he says the state of the art technologies in EOR in the lower 48 has this much of a requirement for CO2 EOR. It's based on an ARI study, Advanced Resources International.

And this is how much of it we think we can get out of the current sources or those project that are in planning right now. So we are half short of what we think we can have in terms of supply for just state of the art, it doesn't even include the ROZs.

So we have got lots of hope that you guys are going to come and help. And this

was some other studies and I'm going to skip through these quick because I know I'm hurting for your time right now.

But anthropogenic CO2, this is an energy information agency, and they have been involved in a lot of this. The NPR -- not NPR, National Petroleum Council, NPC, has done a lot of good work and I'm going to meet with them after this meeting a little bit to talk some about what they are doing now.

They know they need anthropogenic CO2. They are kind of on the fence about whether anthropogenic CO2 is going to come into play in the 2030 time frame. They are going to be surprised when they see our aspirational case. It blows these numbers away.

And then here's their annual energy outlook and where the CO2 will come from, and I can provide these slides. I'll skip through them.

And then you saw this slide on one

of Chuck's and this is the amount of recoverable barrels of oil based on the ARI work and that's pretty good work.

This does not include the up-sides in ROZ either. That all has been after me to give you my number and we are not there yet. We don't know how big this is. So we just signed a contract yesterday in fact, with RPSE, to help try to define this a little better.

And this is the closest thing to our aspirational case and this is the NRDC work. That is right. It's the National Resources Defense Council. And they see the reason for doing this, and I guess I give them a lot of credit, because they are environmental, they are an environmental NGO, but they know they are not -- the world is not going to quit using coal and oil, and so they have been -- I could even argue they have been a better advocate than my own industry for this approach.

And I put the National Coal Council aspirational case on that and you can see it's just a little bit higher than their best case scenario here. These are three models that they used.

So we are not all by ourselves and it's kind of interesting to have a friend at NRDC that thinks we could grow this too. I hear that.

And then this is just utilizing the CO2 EOR for CCUS and you have heard that from Chuck. He did a marvelous job presenting that case so this would be redundant.

So I don't think I have any time for questions but I'd be happy to answer them if -- okay.

MR. PALMER: Steve, thank you. First of all, thanks for participating, and the important work that you did for the study. It gives it a lot of validity and you know, your firm is expert in the field and we have huge admiration for you and what you have done

for the National Coal Council.

The question really goes to the proposition you posit, and that is the industry is short CO2, which it obviously is. There were a lot of business cases built on the assumption Waxman-Markey was going to pass, and that people were going to be throwing CO2 over the fence for nothing, including some of the oil companies that you mention.

And obviously that didn't happen. The coal industry was opposed to Waxman-Markey. If it comes back we are opposed again. The price on carbon needs to be a positive price not a negative price.

But the CAPEX in this industry is huge, and the people that have the cash are the majors, and until and unless the majors decide they want to be in this business I think you are going to be CO2 short.

Now, then would you agree with that characterization, and if not, why not,

and if so, why?

MR. MELZER: Well, thank you for those kinds remarks, Fred, and it was a pleasure working with you all.

Yes, it is such a capital-intensive business. You have got to have some people with deep, deep pockets. And it's really refreshing to me, I've now got some clients that weren't -- they weren't around five years ago.

And I think what changed the equation were the big targets. You know, they don't want to go do a one-off, small, EOR project, just like you probably don't want to go build a one-off, small plant.

And so now, all of a sudden they are looking at targets that are billions of barrels of oil in place, potentially, and saying this might ought to be a strategy.

And so I do think they -- they are getting more inclined, especially those ones that I've mentioned, more inclined to be a big

player in the future of this, and so you know, as you know they have been a player in the coal business before, so it's not too foreign to them, to team up with you.

Right, so I'm optimistic. I think the one-off, small guys is important but it's not going to -- it's not going to approach the aspirational case that we have outlined here in the report.

MR. BECK: Maybe one more. Norm.

MR. KETTENBAUER: Thanks, this is Norman Kettenbauer from Babcock and Wilcox. I was wondering, when you are looking at when you are developing a field for tertiary recovery, after you have done your homework, is there still a lot of risk that you will not get the oil out that you had planned on, or through the studying of the field, can you significantly mitigate any risk to not produce?

MR. MELZER: That's a great question Norm. Thanks. It's reservoir-

dependent to a degree. There are some reservoirs that are particularly low risk for being able to move oil from one place to another and some that are higher risk.

And then in the ROZs there's another set of uncertainties yet. I can't talk about a project that is going on yet but we are still waiting and bated breath for it to start making oil.

And it may be a function of the oil type there, that is a little different and not miscible, and I didn't go into miscibility and you didn't want me to go into that.

But the -- so yes, there's risk, and it's all about trying to quantify those risks and get a handle on them and the industry is still working on them.

The Hastings project, I mentioned earlier, for Danbury, that was not without risk. They put, I don't even -- probably it's close to a billion dollars' investment in that project and re-pressured with CO2.

And now they are reluctant to talk about it publicly, but I think they are making big oil from it now, and so -- but our industry is kind of keyed into risk, more so than a lot of industries, because you know, hey, it's all about exploration and Mother Nature doesn't tell you in advance what you are going to find down there so we -- I think those sides of it, we can handle as an industry. But it has still got risk.

And what we are able to pay for CO2 may be a function of that risk. So keep that in mind. Great question.

MR. BECK: Steve, thank you. In the interests of time we are going to have to move on, but it sounds to me like, if I give you, you know, a day or two notice before the next meeting you can come back and join us again, and we may well want to continue the dialogue back and forth with you and others in your industry and we greatly appreciate what you did for us on this study as well. Thanks

a lot.

(Applause.)

VICE CHAIR EAVES: Good morning, I'm Vice Chairman of the Council. Our next speaker is Daman Walia. He is President and CEO of ARCHTECH where he is responsible for the management and technical direction of biotechnology solutions for the better use of coal.

Prior to ARCHTCH, Dr. Walia worked for Atlantic Research Corporation. He worked for United Coal Company, where he worked on improvement in coal preparation operations.

He has a Ph.D. and an M.S. degree from Miami University. He also has an M.S. and B.S. degree in geology. Please welcome Dr. Daman Walia.

(Applause.)

MR. WALIA: Good morning, and thank you very much for the leadership of NCC for inviting me back here. I think I was here about maybe 10 years ago, sharing with you my

vision of coal through the biotechnology use.

And I'm really excited to be back here. I made it back here about 3 a.m. this morning from Wyoming and so I may be a little bit shaky.

But I want to share with you the progress and as I was listening to Secretary McConnell about the -- that we have no choice of either/or. We need both to protect -- to meet our needs as well as protect our planet, or environment.

So I asked Jeff to put my last slide first so I can make a case, and please, I guess I've got to control the slides here.

I'm not going to take you through all the slides, so let's see.

(Laughter.)

Oops, I'm trying to get to -- can you back there help me with the second last slide? Not this slide, no. Go back to the slide before this. The second last. I'm sorry I said the last one. Yes, this one.

Thank you. Yes, this is the one. There you go. See here we have a, you know, as an entrepreneur, as a scientist, I have looked at, okay, what are the needs out there, and then how can we find a way to fill those needs.

And as I've reflected on what I've been doing with coal, you know, coal became a passion to me and I've spent my lifetime, I've failed many times, but I've made many successes, and I want to share with you.

But I'm driven by a challenge we face, an opportunity we have, in terms -- you know, we have seven billion of us, dancing around on this globe, and here are, as I reflect on it, the must haves, our desire and wants, from our perspective as well as from the perspective of our planet.

Of course from us, we need air. Without air we would not be sitting here and being alive. Water of course, food, energy, shelter and our desire is to have a health,

environment, and at once comfort, entertainment, communications and transportation.

Now, from our planet's perspective, productive soils, clean water and air, and we desire it to be sustainable and then we want to also sustain our other friends who are on this planet.

So this need continues to exist and this in fact has been a battle for our human -- throughout our human history, what I call a battle for the equity of the resources.

We have continued to struggle for it. We made progress but we still have a long ways to go.

So what I've come to a conclusion, a need exists and we need to fill the need. I was really excited to hear about this -- the potential of the CO2 use in the EOR and I think we can help.

So I have even a -- probably one of the nutcases who says that we can balance

this globe on a pile of coal.

Coal to me is really -- is the human resource, not only just a national resource for our own country but also a resource, or a treasure, for us to be able to balance this, what I've just shared with you, and I'm going to share with you how we can do it.

Can we start my first slide now? Let's see. Now, I'm here to share with you how we have made successes with this coal biotechnology there in Turkey.

And you know, this was a great opportunity, where the head of the national or the coal enterprise from Turkey came to us and asked me to bring my solution into Turkey, duplicate what I have done here.

And so I built these mobile units, took them there, and basically this has allowed me to demonstrate that we can take coal, produce into energy product as well as other products for agriculture, water

treatment and dealing with many waste issues, and create zero waste out of it, and do it in a way that it can make a -- succeed in a big-time in terms of creating economic value.

My company is here based in Washington, and as you have read in my resume, I came to Atlantic Research to help them in the coal slurry technology.

But prior to that I was at United Coal and worked with Dick Wolfe and in fact I had Pam look at it, and I was involved in actually helping start this National Coal Council in the mid-'80s, when I worked with Dick Wolfe. Some of you probably will know him, and our President Jim McLaughlin was I believe the first chairman of this National Coal Council.

And the objective was to bring the experts who can then guide and advise our government.

Of course, you know, after having failed many times in coal, developing and

demonstrating technologies for coal cleaning, we failed miserably because the economics could not be made to work, we tried to build a coal to gasoline plant in Virginia. We failed. The oil prices came down.

We developed the coal slurry technology, which is the cheapest way to take coal, make it look like oil, burn like oil and that failed, of course, bad combustion and a number of these things.

So really today we don't have much to show for and as a scientist it bothered me. So I said we need to find another angle to tackle this scenario.

And the reason we continue to fail, not the technical or the science or the engineering part, but more was the economics. And so I took on to tame the coal using the bugs, the microbes.

And this is kind of history. I did some work with the Department of Energy. We were one of the success story. We have a

number of patents.

But why coal? Not only that this is, as I shared with you, that this is a human treasure, but also this is the cheapest carbon we have on this planet earth.

And I have given a comparison here, I'm sure all of you know it. And it's abundant, it's available in very concentrated quantities and we can recover it, we can use it, we have tremendous companies and manpower who have been doing a wonderful job in pulling this out.

The challenge we have faced is here. When I came to this country, I had $8 in my pocket when I landed in New York. And I used to pay 25 cents a gallon but I was blessed to get an education.

And as I came out of school at Miami of Ohio, Ohio was a great place, wonderful people, I saw of course the first oil embargo of 1973 changed the whole scenario, because until then -- this is a

graph I am sure many of you have seen but I am going to give you kind of my perspective and the reason what had continued to challenge me, and I'm sure many others -- that even the gas used to sell cheaper than coal.

So the oil was somewhere average $2 to $5 a barrel, '73 changed that. And since then, we had almost seven times up and down, the prices of oil going up, came down.

And the small insert there shows the cost of the production. The two lines there you may not be able to clearly see it, but what they are showing is that the cost of production of oil in the Middle East countries, is the lower line, still continues to be very low, somewhere $2-$5 a barrel. The upper line is in the rest of the world, especially in the North America. Cost is somewhere in the $20-$25 or $15-$25 a barrel.

So here's what is our challenge. This is what we need to beat. Here is an evidence from the Saudi Arabia, and I sell

them my products, so I got to know the royal family quite well.

And here is the Saudi oil minister appears on 60 Minutes, makes these three points, they were not drug dealers who are making you addicted to oil. You need it. We have it. And we are going to sell it to you. You don't have alternates, and it costs me less than $2 a barrel to produce oil.

Here's another quote from the media, the Saudi Prince Talal, in an interview with Fareed Zakaria just last year, he said that if you develop technologies, we will drop the oil price, and you do not have -- and we don't want the West to develop alternates, because they need us, they need our markets.

And I have argued for breaking the OPEC in front of the defense council and if we break OPEC, we will hopefully get the whole humanity out of this bondage we have due to the high energy prices, and I'll retire.

So what I have done here is to

take coal, using the microbes. We looked at microbes from all over the world. I think I have come here in the past, given you somewhat my history of what I have done.

But my success game from the termites, and we took termites, kind of tricked them on eating coal by giving them a mixture of sawdust and coal, and the ones which were able to live off coal, we isolated the microbes, and now we can grow them at our will.

And basically what I have done here is built a big termites, because the termite is the nature's full gasification plant. It has the jaws to break up. It has three stomachs. In the first stomach it breaks up that, you know, especially it goes after wood, but the wood contains lignum so it has unique group of microbes which can break the lignum, which is the glue, and it's the same component which is the coal, gives is a challenge.

And so we take it through these two steps to produce gas, and the other marvelous thing they do is they enrich the remaining material into humus or the humic material.

We take this and using the aerobic microbes and chemicals to produce humic products.

So my challenge was, well Daman, that's a wonderful story but what are you going to do with these humic products? Who is going to buy it?

So I had to go, prove this out and I built a plant. This plant has been operating for last several years producing these products and these products are now in use.

In fact, I've seen this in government publications, that this is one of the -- the use of the termite model is one of the transformational technology. Dr. Chu makes a point that -- and they show that how

the termites can take these materials, produce the gas or hydrogen and inside is the humic acid.

So here's a business model which I had to then wrestle with and come up with, and I learned from what Rockefeller did with oil. He figured, because of necessity of -- the oil in Ohio was high in sulfur compared to the oil compared to the oil which was in Pennsylvania -- can I get some water please?

So this high sulfur oil, when they made kerosene, it stunk, so he goes to some scientist to figure out a way to make it into a non-stinking kerosene and they used chemicals, catalysts, to make into low-sulfur kerosene, but they are left with residue.

So Rockefeller was smart. He made the residue into asphalt and of course the first oil refineries were built primarily to make kerosene and asphalt.

So the oil industry has done a marvelous job on using that particular

business model as a way to build a large market and use up the oil in many, many markets. On our own, probably we can sit here and calculate probably 60, 70 percent of the products are made from oil.

So the business model they have continued to use very effectively is that when you take and plot every -- all the commodities on a quantity versus the price per unit, they all follow on a curve a like that. You can even do it on in grocery store and you will find this to be the case.

So the non-energy products, which basically drive the economics of the energy production because energy we need in a large quantity, but we need to produce it at a low cost.

So we tried to follow this model with coal, using our synthetic approaches or chemical, thermal processes. But we were making same products which we can make from oil.

So when oil prices came down, those technologies failed. So what I have done is different. I have taken coal and going back to its inherent makeup, which is being of a plant origin, is essentially coal is not a fossil fuel. If it was a fossil, it shouldn't burn.

You know, coal is a biomass. And coal in fact is not a hydrocarbon, it is a humate. And once you start looking at it from that angle, all of a sudden everything makes sense, and it's a wonderful material we have.

So we take coal and put through this anaerobic fermentation to produce gas and then the remaining coal is into these non-energy products which have multiple uses and applications out there.

So with this approach, not only we can virtually eliminate any CO2 issues related to the coal use, and in fact the coal becomes the solution. We don't need to beat our head against oil and gas, but by using these coal-

derived products we can actually start capturing CO2.

In fact, we even have a way to use these products to capture CO2 which can help in this EOR scenario.

So here is what I understood, that when we look at where is carbon in this planet, these are the major storehouses. Of course the largest storehouse for the carbon are our sediments in form of limestone, marble and other things, then of course in our ocean waters and the fossil fuels, then in the atmosphere, then of course in the land in form of biomass or as humic substances.

So currently what we are doing is we are putting our fossil fuels to use for meeting our needs and we are shifting that carbon into the atmosphere.

Then we are also stripping our soils of these humic substances or humic matter and sending it to the oceans. So we need to find a way to reverse this change so

that we can create that sustainable approach.

Again, this is just a recent United Nations report making a case that with the nine billion population we will have by 2050, with our current approaches to use of our food production we will not to be able to produce enough food to meet the human needs.

And so the biotechnology has made a major contributions in many, many industries. Of course many of us every morning take pills which are coming out of the pharmaceutical industry made from the biotechnology, in agriculture, in energy side, in the mining and environmental.

So scientists, over the last probably, you know 30 to 50 years, have made major inroads. In fact, I just came back from Wyoming where there were 160 scientist researchers who came from eight different countries and talked about the biotechnology for coal so was really very happy to see, because I have kind of been the pioneer and

the lone soldier in making this coal that we can make the bugs and the coal to gas together.

So here's what I did in Turkey, bottom line. Take a ton of coal. You produce 60 cubic meters of gas, and we produce these products. HUMASORB is my product for water filter. Another HUMASORB liquid which can actually take CO2 from the stacks or for many other applications. ACTI-SOL is the organic fertilizer and Ajax is another chemical we make from the humic materials which we have used to convert militaries' old explosives into fertilizer. So I have built plants for militaries all over the world, you know, to use this approach as a way to recycle their explosives into useful products.

So these are the products we made. And these products have been tested in looking at the germination. In fact, not only I took the unit there but I built a research facility in Turkey, trained their people who are now

doing this work themselves.

We got the government approvals of the use of the products. These products we have tested and compared with the products we make in the United States.

This is an example of one of the products for ability to remove a variety of these toxic metals, and you can see that virtually the products made from coal can remove 100 percent or 99 percent plus of these many, many toxic chemicals.

Coal is a wonderful material which has many, many attributes which we can exploit.

Here's a use of the HUMASORB of liquid product. In fact, many of you, when you drank coffee or tea this morning, you actually drank humic acid.

And the humic acid is the water soluble, organic material, and it has a unique property, that when you lower its pH, it proteinates or becomes precipitate, and you

can test this yourself when you next time have some tea, squeeze some lemon juice and let it sit and watch what will happen. You will see the color will go down and at the bottom, you will see this brown material.

In fact now I think I know how the coal was made. I can make a coal in a -- today I can show it to you if you come to my lab.

Here we are showing its ability to remove perchloroethylene, trichloroethylene and a variety of things. We have used this product even to take animal manures, chicken manure, pig manure and all kind of things, and completely destroys odor, pathogens and turn into a useful fertilizer.

This is in -- we also did test work in Turkey. In fact, my interest really from Turkey came from the military side. Many years ago they came to me, they invited me to come and show them how we can convert their explosives into fertilizers so we took again

one of the small unit, which is put in test there.

So these are the number of again products made from the -- explosives into fertilizer, germination test. The other application of this technology is to apply to the industry towards standard coals, like we are talking about here, the oil, the same way when we look at coal, you know, we are only playing around with 10 percent of the coal. Ninety percent of the coal is still unmineable.

In the U.S., according to the U.S. Geological Survey, we have about 5.6 trillion tons of coal, which would not be mineable with our current approaches, and it's -- in fact Wyoming is one of the state with one trillion tons and I have contracts and project activities in Wyoming right now, and --

So this is it, we have done the test work in Wyoming to show the amount of gas which can be produced from these unmineable

coals, and in fact our projections are that we can produce gas from coal for less than a dollar per million BTU.

And this is the production projections. Here's an interesting -- the business case. What I've done here is to show that if I take the mined coal and at the same time I apply this to the unmineable coals, I produce gas. I produce these products and these are the values.

So from coal, and this is sort of an economic analysis in Turkey, like at $40 per metric ton, we will create a total value of $608 million.

So basically from a ton of coal we are creating a $6,000-worth value. If I tell you what I am doing here in Virginia, it will simply shock you, and -- but this will create a net income of about, you know, here you can read it, it's about 300 or internal rate of return at about 45 percent.

So the capital cost for this

plant, to build the initial step, is 30 million, by additional 15 million in a second step, we can make this into a fully integrated plant.

And those back there show that what are the potential applications of these products which can go into that. So this approach essentially creates zero waste. In fact at my plant in Virginia the only drain I have is a toilet. There is no other drain where any liquid waste goes out. The only solid waste that goes out are the packaging materials and other things, so every ounce of coal comes in goes out as a product.

These are the various market needs in Turkey because the question I was asked always is that okay, if you apply this approach, then is there a sufficient market.

So not only in Turkey, but in the U.S., our estimates are, based on some of the professional market analysis we have done, that this approach could utilize about 600

millions tons of coal on a yearly basis to meet not only the energy needs, but in the water treatment, agriculture and many other application.

So last week, Mr. Ildis came and I saw in your package you have the press, one of the reports, he came and gave an approval to go forward with this project.

I have signed a joint venture agreement in Turkey and we will go forward to build a plant, and this is what it will look like.

And I would like to build one of these here in the U.S. Now, the challenge in any biotechnology is the residence times. In our thermal chemical processes, our residence times are small. So the heart of the reactor is very small. But it's the back-end systems to treat the gas, do other things, become huge and costly, whereas in this case, the heart of the system is the bioreactors which are very large.

So I'm using this monolithic dome construction as a way to build these very low-cost, these reactors, and in fact one of these reactors exists in Germany at Innovation Village, and it costs about 60 euros to go see, and it takes about three months to get a time to go and see those.

So I'd like to build one of these here at the CIT building on route 28 near Dulles airport and make this as a showcase, as well as to prove this technology out.

We have tested all different ranks of coals. Now I'm going to share with you what we are doing here in the U.S. This technology has been applied -- can be applied from anthracite all the way to lignite.

Of course the amount of gas and the composition of gas varies depending on the coal and as well as the byproducts.

Again, these are, you know, again, the issues, you know, I've kind of tried to understand what are the issues we face in the

U.S. and how this approach can give us a way to get -- solve those problems.

This is the plant in Virginia. Some of you will recognize Dick Wolfe. He and I have gotten old talking about coal, and he is still very passionate, and he has been my mentor and he went to see the plant, to look at these products. In fact he is using on his vineyard and growing, making wine.

So, in the HUMASORB, this is a huge need in our country. We have 1300 trillion gallons of waste water which need to be treated from many different industries, and it's not being treated or the costs are high. So these products can help meet these needs.

Here I'm going to show you some examples of use of these products. The HUMASORB product has been -- actually this was supported by the Department of Energy for their weapons complex, and we showed that we can pretty much deal with 90 percent of the nuclear wastes they have, at Hanford and other

places, if these companies would let us come and actually solve the problem.

In fact this product can help to open up Yucca Mountain, which continues to pose a big challenge.

We have succeeded in its use of the -- in fact the Idaho National Lab have done testing, the Army has -- we put its application for depleted uranium, its applications for, at the Paducah Plant. Here's an application for mercury in Oak Ridge issues.

I've built -- a lot of success really came from the defense department. I built a system for them at one of their chemical weapons destruction plant and removed 21 different toxic metals to comply with the EPA regulations.

I've done work in the chemical weapons area to use this coal-derived material to successfully destroy organochemical agents in Japan and other places.

Here the product is being used in dealing with the storm water issues. It's a product here dealing with a number of issues in you know, the chlorinated or PCBs.

You know, in Pennsylvania we showed that with this product we can recover a saleable product out of acid mine water, or we can even stop the formation of acid mine water in some cases.

This -- in Berkeley Pit we showed that we can make actually money out of -- while cleaning the water. Here again currently we are demonstrating its application for selenium removal. As I'm sure many of you are hearing, the coal mining industry is facing a big challenge and this product has a unique ability to capture selenium and remove it.

We have done some work with power plants dealing with their, you know, these scrubber waste waters, even that the product then, after we capturing the contaminants, we

can turn into a solid filter and that can go into a creative way to safely store the coal ash.

Here again in municipal waste waters, you know, I just signed an agreement with a major company to supply them this product on a regular basis to use it for dealing with industrial nuclear wastes, as well as storm water needs. Here's an example of its use in drinking water.

So the agriculture market is another huge market which continues to beg for solutions, and again, not only for organic food, but as well as, you know, our regular agriculture applications.

I have obtained approvals of these products from U.S. Department of Agriculture for use in growing organic foods, U.S. Environmental Protection Agency for its use in combining with pesticide in these formulations to make them safe.

My products are listed by the

Organic Materials Review Institute. We recently got approval from the South Carolina Department of Transportation for use on their -- as a biostimulant for their road transportation application.

So this product is in use up and down the east coast, and many, many farmers are using for -- in dealing with the, you know, increasing the agriculture productivity of soybean, cotton, sorghum and you name it, this product is now in use, and we have -- this has been going on for the last 10 years now.

Many of you play golf. This product is used by many golf courses to create a robust root system and as well as a -- and again, for dealing with the phosphorus issues.

So we ship a lot of this product into the Gulf countries, in Egypt and other places, to help them to convert their sandy soils into fertile lands.

So you know, we have a product

which we are now using to make these chemical fertilizers into a more effective.

So the Actodemil, you know, this is one of the first unit I built where we take explosives. On one end we put in there, and we input our chemical made from coal, and you get a fertilizer on this end.

This product actually was approved by the EPA. In their munitions rule, usually you get regulators writing you a letter beating on something you have done wrong, but here the Nevada Environmental Protection Agency wrote me a letter congratulating on what we have achieved.

So back to here, this is where we have a big opportunity for coal. And we need to think outside the box. Now, why I am here? Why I know you are all the most leaders in this industry, and have been assigned to look at recommend to the government as to what governments should be spending their funds into this need.

So coming to my perspective on coal, is, see, we as the scientists have tried to tame coal with similar approaches as we have been doing with oil, and we have failed.

I won't call that we are -- have bankrupted these technologies of -- because right, we don't have plants, built all over, you know.

So the reason being that technically we succeeded. But we have not been able to succeed in the economic side, and so unless and until we find a way to deal with all of these issues simultaneously, we are going to face challenge.

So that is my pitch to you and my hope that you will reflect on it. I have a one-page business plan for the government to take on this as an approach, to help derive these solutions, and my -- that one-page business plan shows that with a modest investment, there is a potential of about 700 percent rate of return on the government's

investment in terms of the tax revenues it will generate of course, in terms of creating a green manufacturing economy and others and it will have a broad impact in the coal industry as well.

So the coal, I believe, if we take on this approach, can give us a basis of a next industrial revolution, as coal helped us to propel the first industrial revolution when we, you know, used it to burn to make steam and then steam helped us to drive the whole industrial systems out there.

So this is the vision I have. This is what I believe is achievable. Now would I succeed doing it myself? You can be damned sure I will do my best.

I'm all over the world and this approach is catching on, but I hope that I can help do it in this country because I was blessed to come here with $8 in my pocket and I dared to dream different, and I intend to hopefully succeed here.

So thank you very much. I need your help.

(Applause.)

I'll be happy to answer any questions if your time permits.

MR. BECK: Thank you, Daman. We are up against a wall, but any questions? And Daman is local. He is here in the Virginia area, so we can always put folks in contact. We thank you very much for your time and your presentation. And I think you need to call on me Mr. Chairman for the nominating committee report. Thank you.

(Applause.)

MR. PALMER: Thank you, Daman, well done. At this time I'd like to call Bob Beck to review the nominating committee report that we discussed yesterday. Bob?

MR. BECK: Thank you, Mr. Chairman. The next order of business is to elect the new officers for the new term of the National Coal Council. Traditionally we

appoint a nominating committee of past chairs as well as the current chair, and so for this particular committee, Georgia Nelson was the chair. Mike Miller and Joe Hopf were the members.

They are proposing, for your consideration and action, for Chairman John Eaves, John as you know is the vice chair, he has also recently added a whole bunch of additional responsibilities for the Arch Coal company, and as vice chair, John Long, who is a long-time member of the Council, and has been a member of the executive committee, has had a long career with Midwest Generation, Constellation, which is now Exelon, and all those kinds of things anyway.

I think everybody is familiar with John. So Mr. Chairman, I would ask a motion to -- of approval, I guess, or to vote. I can't do this because I' not a member so I need somebody from the floor to move and so --

Okay, we got Mike and Sy. Okay.

We'll give Mike the motion and Sy the second. Okay we have a slate of officers before you. All in favor please say aye.

(Chorus of ayes.)

MR. BECK: Opposed, same sign?

(No response.)

MR. BECK: Thank you. And congratulations to John and John. We're going to have to start using last names so we know exactly who we are talking about.

But I have two things to do before I go. First I want to thank Joe Hopf for his many years of service and for the last two, as being my boss.

I always tell people I have a kind of a unique situation. I get a new boss every two years. That's kind of the bad news. The good news is I generally get to pick them.

So -- and with Joe, I think we hit the jackpot and I greatly appreciate what he has done.

(Applause.)

MR. BECK: And I now understand many of you remember from the fall meeting last year, we had a presentation by a group of folks from the National Museum of Forest Service History and they are with us again today as guests, and were here last night, and they informed me that they are giving their highest reward, the Conservation Legacy Award, this fall -- I believe it's out in Vail, Colorado where they are actually going to have the ceremony -- to our new chairman, to John Eaves.

So John must be a relatively famous and successful person. We must have made a good choice. So anyway, we just wanted to make that announcement.

And John, I guess I'll turn this over to you for any kind of closing remarks or any comments you would care to make.

VICE CHAIR EAVES: Thanks, Bob. You know, it's certainly an honor to be the incoming chairman. I would like to just take

a moment to thank Joe Hopf. He has been a tremendous leader, real dedication over the last two years and I've certainly learned a lot, and will continue to call on Joe for his counsel and advice.

I also want to thank Gray and Liz for their nice award, you know, at Arch Coal we drive the organization on two things. We've got two core values -- safety and environmental performance and you know, it's nice to be recognized for those so we thank the Museum of History and appreciate that and look forward to accepting that award hopefully in Vail, Colorado. Thank you.

I did want to take just a moment and thank the members of the study. I mean, that work is strictly voluntary. Long hours, a lot of effort, really a great product and I think we all need to think about how we take this country forward

Fred, Dick, Frank, all you guys, thank you so much for all the long hours and

the product that came out of it. So we really do appreciate that.

Wanted to thank all the speakers today. I think we had some good presentations, a lot of things to think about as we move forward. Certainly in the coal business we are in a pretty difficult period. We have been in these four or five times over the last 10 or 12 years. We will come through this but anything we can do to advance technology, it help everybody in this room.

This meeting is duly authorized and publicized and is open to the public. The public can submit comments to the Department of Energy or if any individual wishes to speak, they may do so at this meeting.

Those who wish to speak may do so at this time. Is there anybody that wishes to make any comments?

(No response.)

VICE CHAIR EAVES: Seeing none, we do plan to have the meeting this fall, 2012,

here in Washington, D.C. When we have the time, place and date, we will get that all to you.

With that, if there's no other business to come before the Council I will adjourn the meeting. Thank you very much and look forward to seeing you in the fall.

(Whereupon, at 11:57 a.m., the above-entitled matter went off the record.)

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C E R T I F I C A T E

This is to certify that the foregoing transcript

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Before: National Coal Council

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was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate record of the proceedings.

Neal R. Gross

Court Reporter