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REP. ANDY HARRIS HOLDS A HEARING ON EXPANDED ENERGY
PRODUCTION - UNCONVENTIONAL RESOURCES TECHNOLOGY

May 10, 2012 Thursday

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COMMITTEE: HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

SPEAKER: REP. ANDY HARRIS, CHAIRMAN

WITNESSES:

REP. ANDY HARRIS, R-MD. CHAIRMAN

REP. PAUL TONKO, D-N.Y.

WITNESSES: CHARLES MCCONNELL, NOMINATED TO BE ASSISTANT SECRETARY FOR FOSSIL ENERGY, DEPARTMENT OF ENERGY

ANU MITTAL, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

REP. DANA ROHRABACHER, R-CALIF.

REP. BEN RAY LUJAN, D-N.M.

REP. ROSCOE G. BARTLETT, R-MD.

REP. JERRY MCNERNEY, D-CALIF.

REP. RALPH M. HALL, R-TEXAS EX OFFICIO

REP. LYNN WOOLSEY, D-CALIF.

SAMANTHA MARY JULIAN, DIRECTOR, OFFICE OF ENERGY DEVELOPMENT, STATE OF UTAH

JIM ANDERSEN, CEO AND PRESIDENT, U.S. SEISMIC SYSTEMS, INC.

REP. TODD AKIN, R-MO.

ANTON DAMMER, MEMBER, BOARD OF DIRECTORS, NATIONAL OIL SHALE ASSOCIATION

TEXT:

HARRIS: The subcommittee will come to order.

Good morning and welcome to this morning's hearing entitled Supporting American Jobs and the Economy through Expanded Energy Production: Challenges and Opportunities of Unconventional Resources Technology.

Two weeks ago, the Space -- Science, Space, and Technology Committee heard from expert witnesses about America's vast untapped unconventional energy resources. The amount of energy under own soil is striking. With continued technological advances and the right policies to enable access to these resources, America could become the global leader in energy production for the next generation and beyond.

For example, the Green River Basin located in Colorado, Utah, and Wyoming may contain up to three trillion barrels of oil -- more potential oil than the rest of the world's current oil reserves combined. If this energy -- which is overwhelmingly on Federal lands -- is made available, I am confident American ingenuity will find ways to responsibly explore and produce this resource.

Portions of the United States are already experiencing the significant economic benefits of unconventional energy production. North Dakota's unemployment rate is now the lowest in the nation due to the shale oil revolution. The state's top economic challenge is not job creation, but rather finding enough workers to fill the thousands of job openings created by the energy boom -- a problem most states would love to have.

The federal government should afford other states the opportunity to replicate this success story through aggressive pursuit of leasing, permitting, and technological opportunities.

Unfortunately, when it comes to unconventional energy, the president talks the talk more than he walks the walk. Beginning with his State of the Union speech earlier this year, the president has touted the historical contributions of the Department of Energy's fossil energy research program, while his annual budget request to Congress repeatedly calls for elimination of the very same program.

And while the president regularly boasts of his support for a quote, "all of the above," energy strategy, his administration is focused more on producing new regulations and restrictions than it is on producing more oil and gas. For example, the president has unleashed 10 different federal agencies in pursuit of potential regulations on hydraulic fracturing.

Similarly, the president's campaign website includes a quote, "all of the above," energy page that neglects to even acknowledge the fuel providing 45 percent of the United States' electricity -- coal.

It is clear the president continues to pick his preferred energy technologies at the expense of the free market and consumer need and choice. Perhaps most incredibly, just three days after his State of the Union speech declaring his commitment to this all of the above energy strategy, the president's Interior Department effectively reduced lands available for oil shale development by 75 percent -- putting over 1.5 million acres off limits not only to exploration and production, but also to research and development.

This morning I am interested in examining the impact of the administration's anti-fossil fuel policies, as well as exploring what targeted research questions DOE can and should address to facilitate the further development of America's unconventional energy resources. I also look forward to hearing how innovative companies are enabling more efficient and environmentally sound development of America's unconventional oil and gas resources.

I thank the witnesses for appearing before the subcommittee, and I now recognize Ranking Member -- I'm sorry, Mr. Tonko is the -- well, I guess, you're the ranking member for today, huh? The substitute ranking member for his opening statement.

TONKO: Thank you, Mr. Chair.

Today's hearing is focused on another unconventional fossil resource that we have heard about many times in the past decades. Every time oil prices have spiked or that we have become concerned about a major disruption in our oil supplies, oil shale gets a new look.

Why we continue to use public funds to pursue this energy source is truly a subject for research, I believe. The oil companies and the federal company have poured millions of dollars into research demonstration projects and subsidies to find an economically viable way to develop this resource. Yet, it is still years, if not decades away from being economically, technologically, and environmentally viable.

Oil shale should not be confused with shale oil. Shale oil is being commercially produced along with shale gas in various places around our great country. Through application of conventional fracturing processes, oil is released from shale formations and then pumped to the surface.

Oil shale, on the other hand, is essentially a rock that must be heated at extremely high temperatures for long periods of time before the hydrocarbons within it are -- are indeed released. The magnitude and severity of the impacts on land, water, and other natural resources require to turn rock into oil are only part of the reason that these resources have never been commercially viable. They should serve as our queue to look beyond oil.

I have listened as many of my Republican colleagues questioned the wisdom and need for public investments in renewable energy resources either through support of research or through tax incentives. But when it comes to offering subsidies to one of the wealthiest and most profitable industries in the world -- the oil industry -- their generosity knows no bounds.

When I look at the potential for oil shale, I can only wonder why we should be throwing more hard-earned taxpayer dollars after bed. Even though gas prices have recently come down a bit our constituents still feel the pain at the pump and know that it is just a matter of time before another price spike hits. The public is tired of seeing an increasing portion of their paycheck go to the most profitable companies in the world along with outsized portion of their tax dollars in the form of tax breaks for the oil and gas industry.

Subsidizing oil shale has never lowered gasoline prices or led to our energy independence. I do not believe it ever will. In spite of years of government support for research and development -- since the early 1900's -- this resource has proven to be much more bust than boom. The high cost of delivering this energy will inevitably translate into high retail prices for refined products.

It is time we took a different path and invested in alternative energy resources. The oil industry has the financial resources to pursue this further if they believe it is viable.

As our witness from the Government Accountability Office, the GAO, will outline from their investigation, there are things the federal government can do to better understand the range of uncertainties regarding the impact of oil shale development. Among these, understanding the impacts on water quality and quantity stand out as the biggest concerns.

The legendary water battles in the west are not about protecting ecosystems, though that is a worthwhile cost. These battles are about economics. There is no greater indicator of a region's economic potential, its ability to sustain human life and industry than its access to clean water. It is hard for those of us from relatively water-rich states to understand what it means for a region whose annual rainfall could be measured in single digits in a good year, but for most westerners it is a sixth sense.

I happen to be from an area of the country that is blessed with abundant high-quality water resources. Given the current and looming shortages of water in many areas of the west, I cannot imagine why we would consider trading water -- a renewable vital resource for which there is no substitute for a nonrenewable resource that we can only obtain with very costly, highly damaging, and destructive methods. Land and water are not or should not be treated as disposable goods.

The Interior Department released a draft Programmatic Environmental Impact Statement that was not only appropriately cautious, but reflected the reality of the technological immaturity of the oil shale industry. The Department of Interior is charged with managing the nation's lands for the benefit of all the public in a manner that keeps faith with generations to come.

These lands support hunting, fishing and recreation of all types. They serve as protection for watersheds that recharge groundwater supplies and feeds streams and rivers that support agriculture, ranching, power production and countless other businesses. The people engage in these economic activities in Colorado, Utah, and Wyoming also deserve consideration.

A number of groups representing these interests have voiced their concerns about leasing public lands for oil shale development and about its impact on water resources, in particular.

I am attaching several of their past communications on this subject to my testimony today. We should not sacrifice sustainable communities and livelihoods in an attempt to mimic earth's geologic process of converting rock into oil. Can we really ask the public to once again believe that we are going to secure our energy future this way? Perhaps our witnesses this morning can convince me otherwise, but I believe we can make far better investment with public funds by increasing energy efficiency and expanding our use of renewable energy supplies.

I would thank -- I thank our witnesses for being here this morning, and I look forward to hearing their testimony.

With that, I yield back, Mr. Chair.

HARRIS: Thank you very much, Mr. Tonko.

If there are member who wish to submit additional opening statements, your statements will be added at this point.

At this time, I'd like to introduce our witnesses for the first panel. The first witness is Mr. Charles McConnell, assistant secretary for Fossil Energy at the U.S. Department of Energy.

Prior to joining DOE, Mr. McConnell serves as the vice-president of Carbon Management at the Battelle Energy Technology. He also spent 31 years with Praxair in various positions in the U.S. and Asia, including global vice-president. He previously held a number of advisory positions, including chairmanships of the Gasification Technologies Council and the Clean Coal Technology Foundation of Texas.

The second witness on the first panel will be Ms. Anu Mittal, director, Natural Resources and Environment of the U.S. Government Accountability Office. Ms. Mittal has been with the GAO since 1989 during which time she has led a variety of reviews of federal programs related to land management, water resources, oceans and fisheries, environmental restoration, energy, defense cleanup, housing, food -- you're busy -- science and technology, and agriculture issues.

Thank you for appearing before the subcommittee today.

As our witnesses should know, spoken testimony is limited to five minutes each, after which the members of the committee will have five minutes each to ask questions.

Before I recognize Mr. McConnell, I want to again express what's been a recurrent theme, the displeasure with DOE's habitually late communications to Congress and to this subcommittee and committee.

The testimony for this morning's hearing -- I know if you realize this Mr. McConnell, your testimony was due Tuesday morning at 9:30. That's the standard operating procedure for the committees. We didn't receive it until seven o'clock last night. And seven o'clock last night, we were in session, debating and voting until midnight.

Obviously, members did not have time to review your testimony as we are entitled to under our rules. This extreme tardiness is the rule (inaudible) exception coming out of DOE. Whether it's delivering testimony or responding to letters from me and other committee members and questions for the record, DOE is almost always embarrassingly late.

Mr. McConnell, I trust that you will communicate this frustration back to Secretary Chu and his team, and commit to delivering all follow-up materials associated with this hearing to the subcommittee in a timely fashion.

MCCONNELL: (OFF-MIKE)

HARRIS: Thank you. With that, I now recognize Assistant Secretary McConnell to present his testimony. You're recognized for five minutes.

MCCONNELL: (OFF-MIKE)

Very recently, the president laid a specific goal to reduce the imports of oil by a third over the next 10 years. Reducing our imports will have the important impacts of improving our energy security, balancing trade, generating new jobs, and growing our economy. And we're in the progress of making that goal.

Over the past few years, crude imports have dropped from 70 percent to 50 percent, while natural gas today is an abundant and unprecedented price point driven by expanded production of shale gas in an abundance currently as U.S. storage capacity at near capacity.

America is sitting on one of the largest gas finds in the world as well as the globe that we live in today. The benefits are game-changing. EIA estimates that in the current rate of consumption, the nation has a 90-year supply of domestic economically recoverable natural gas. If anybody needs proof that domestic energy production can spark a renaissance in American manufacturing, increased exports can create more jobs.

Just look at the impact of shale gas on the industries across the country. Recent announcement in the global companies such as Shell and Dow -- perfect examples of that.

The American Chemistry Council estimates \$16 billion of capital investment, \$132 billion in economic output, 17,000 new high-paying jobs, and 395,000 more jobs tangential to the chemical industry. Other industries such as the electric power industry, steel industry, and heavy manufacturing will all benefit from this expanded supply of domestic natural gas.

We're poised to disintegrate things for energy and economic security. But to get those benefits, we'll have to do it right. We'll have to do it right the first time and you don't get to do-overs in this business. Sustainable future requires sustainability in the way we do our work and how the work is performed.

DOE has played a critical role in that development for years. Between '78 and '92, the department invested \$137 million in early research on innovative shale gas technologies that led to investments by independent oil producers.

Today, our research on unconventional resources being conducted against the backdrop of industry's rapidly evolving exploration and production practices. With these advances, they are exciting, but there are also challenges. Hydraulic fracturing processes have received a great deal of attention and people in communities want the confidence that the expansion of the E&P is sustainable. These are primary technical challenges and if they were received a proper focus, sensible focus, they can be addressed.

So going forward, the expertise of our natural gas technologies program is being refocused to help launch an R&D initiative with the EPA and the Department of Interior to address the potential environmental health and safety impacts of natural gas drilling practices, particularly, hydraulic fracturing. This effort is being driven by the Secretary of Energy Advisory Board recommendations focusing on shale gas safety, as well as the president's new interagency working

group on unconventional domestic gas resources. And we recently cemented this with an interagency MOU.

FE's role in this initiative will be to conduct R&D to ensure the development of sustainable fracturing technologies and techniques such as cementing wellbore integrity and water usage.

Let me add that while this R&D is focused on shale gas, many of the technologies can be applied and will be applied to shale oil production particularly in areas such as Bakken.

In addition to shale, US-led technology advances are making it possible for us to explore other unconventional resources. A prominent example of this is fossil energy's methane hydrate research process. Recently, we conducted an unprecedented test of technology on the north slope of Alaska that was able to extract a steady flow of natural gas from methane hydrates. This is a combination of cooperative work with the country of Japan, ConocoPhillips, and a collaborative effort with DOE in fossil energy to co-share.

This isn't a subsidy to oil and gas, but it's a critical research done in the early stages of the critical market where resource discovery is necessary.

Our methane hydrate research represents a critical ground floor that can provide a return on investments similar to that of our early shale gas, and we're just getting started.

Additionally, the department has focused on enhanced oil recovery using carbon dioxide from coal-fired power plants with enhanced oil recovery utilizing CO₂, putting the CO₂ in the ground and producing oil, and safely and long-term permanently storing that CO₂ for environmental benefits so we get both the benefit economically as well as environmentally.

Thank you. I look forward to taking your questions.

HARRIS: Thank you very much.

And I'll recognize Ms. Mittal.

MITTAL: Chairman Harris and members of the subcommittee, I am pleased to be here today to participate in your hearing on unconventional oil and gas resources.

As requested, my statement will focus on oil shale and will highlight the opportunities and challenges related to the development of this unconventional energy resource. My statement is based on the findings of a report that we completed for this committee in October 2010. As you know, U.S. interest in oil shale has waxed and waned since the early 1900's because, over time, average oil prices have generally been lower than the threshold necessary to make oil shale development profitable.

More recently, however, higher oil prices have renewed interest in domestic oil shale. The federal government is in a unique position to influence this development because 72% of U.S. oil shale lies beneath lands managed by the Department of the Interior.

The Green River Formation in Colorado, Utah, and Wyoming contains the world's largest deposits of oil shale. Being able to tap this vast amount of oil locked within this formation will go a long way to help to meet our future demands for oil. The U.S. Geological Survey, as you noted, estimates that the formation contains about three trillion barrels of oil of which half may be recoverable.

As you can imagine having the technology to develop this vast energy resource will lead to a number of important socioeconomic benefits including the creation of jobs, increases in wealth, and increases in tax and royalty payments for federal and state governments.

Along with these positive outcomes, there are a number of key challenges that also should be considered. First, there is the uncertainty surrounding the viability of current technologies. Today, no commercial-scale surface retort or NC2 technology has been proven in the United States that is both economically and environmentally viable.

According to some energy experts, the key to developing U.S. oil shale will be through an NC2 process because most of our richest oil shale is buried beneath hundreds of feet of rock, making mining difficult or impossible.

Second, developing oil shale poses significant environmental challenges for water quantity and quality, air quality and wildlife. The water quantity and quality challenges are of particular importance because developing oil shale will require significant amounts of water, which could pose problems in the Arid West. Estimates of the quantities of water needed to support oil shale developments vary significantly depending upon the assumptions that you use. However, it is expected that while the water is likely to be available for the initial development of the industry, the eventual size of the industry may ultimately be limited by the water availability.

In addition, in the absence of effective mitigation measures, oil shale development could significantly impact water quality through increase run-off of sediment salts and chemicals, decrease downstream flows, permanent groundwater impacts to aquifers, and wastewater discharges to streams and rivers.

While large-scale oil shale development offers socioeconomic opportunities, it also poses certain socioeconomic challenges that also should not be overlooked. Oil shale development like other extractive industries can bring a sizable influx of workers who, along with their families, put additional stresses on local infrastructure. Development from expansion of extractive industries has historically followed a boom and bust cycle, making planning for growth difficult for local governments.

As we noted in our 2010 report, industry experts believe that the U.S. is currently at least 15 to 20 years away from developing a large-scale oil shale industry, but there are certain actions that federal agencies can begin to take now to proactively prepare for such an industry. These include improving collaboration between federal agencies on research and developing more comprehensive baseline information on the current ground and surface water conditions in the region. Such information will help position federal agencies to better monitor and mitigate the impact of oil shale development if a viable industry should emerge.

In conclusion, Mr. Chairman, while there are potential opportunities for the development of oil shale, they must be balanced with a technological, environmental, and socioeconomic challenges that are also present.

This completes my prepared statement. I would be pleased to answer questions that you might have.

HARRIS: Thank you very, very much. And we'll begin the questioning.

The members will have five-minute -- will be recognized for five minutes, and I recognize myself first.

Mr. McConnell, as you know the president has recently talked, as I said in my opening statement, about this all-of-the-above energy strategy, so I'm going to ask you just a few questions by what the administration means by all of the above.

First of all, is gas production from methane hydrate one of the components of all of the above?

MCCONNELL: Yes.

HARRIS: OK. Can you just explain why for the last three fiscal years then the fossil energy budget request is proposed to eliminate the program -- fiscal year '10, '11, and '12?

MCCONNELL: I can't speak to those previous years, but I can tell you the budget request for '13 has it in there. Last year, we did work on methane hydrates with funding that was provided through the Office of Science recently

conducted a test.

HARRIS: I know, you mentioned that. Well, thank you very much and I appreciate the change of heart, believe me.

Now, is oil shale part of the all of the above strategy?

MCCONNELL: Oil shale is -- is certainly a part of the all of the above strategy, yes.

HARRIS: And what -- what is the administration doing to actively support the development of oil shale?

MCCONNELL: Much of the work that we're doing in the unconventional processing work that we're doing, oil provides a lot of the baselines for that industry as well as the hydraulic fracturing that's doing on the natural gas, as well as tide oil that's going on in that area as well.

HARRIS: Right. But with regards specific to oil shale, what's the level of investment that the administration is proposing?

MCCONNELL: We don't have a specific line item in this year's budget.

HARRIS: Do you have any idea about how much out of the -- I think the, you know, the DOE -- I don't know, they're several billion dollar budget. How important are they looking for the future, toward the future for oil shale? Is it \$5 million, \$10 million, \$15 million?

MCCONNELL: In this year's budget request, it was zero.

HARRIS: Oh, zero? Oh, OK. It doesn't sound like much active support. But what about oil sands, is oil sands part of the all of the above approach?

MCCONNELL: It is part of the all of the above approach, and it's also part of what we're constantly looking at in part of our overall process.

HARRIS: OK. Is that also line item zero in the DOE budget?

MCCONNELL: We have a number of line items that aren't specifically identified by the market segments you're identifying, but in terms of the key technologies and the crosscutting research that goes on from technologies that apply to many of the markets that you're mentioning.

HARRIS: OK. Well, may we -- perhaps you can follow up with some detail. We'll have some follow-up questions.

The DOE has, you know, requested, as you said I think, \$12 million in the budget to -- I think you called it R&D initiative. But what it sounds like is, you know, I understand and minimize the potential environmental health and safety impacts of shale gas. I mean, most people would realize this is the pro you to regulation basically. Is there any research that you're doing that might actually help increase production?

MCCONNELL: There should is.

HARRIS: OK.

MCCONNELL: It would be wellbore integrity. We're looking at processes in terms of extraction. And we don't draw a distinction between sustainability and extraction techniques. We see it as one and the same because it has to be done right the first time with a sustainable impact.

HARRIS: Right. And done right the first time. You are aware that, for instance, hydraulic fracturing has been done 1.2 million times in the United States, right, with no documented evidence of contamination of drinking water ever.

MCCONNELL: That's correct.

HARRIS: That sounds not only done right the first time, it sounds like done right 1.2 million times. But anyway, we're going to have difference of opinion on that probably.

Now, in 2007, the Department of Energy's Strategic Unconventional Fuels Task Force published a strategy and program plan that include numerous recommendations on how the federal government could support unconventional energy -- development of unconventional energy. Is the DOE implementing any of the recommendations made by that task force back in 2007?

MCCONNELL: We're working -- continue to work year-over-year with the RIBSI Organization (ph) following that -- following those sets of recommendations.

HARRIS: What progress has been made on the specific recommendation to, quote, "provide an effective land tenure system," end quote, for access to resources on public lands.

MCCONNELL: That's a question I can't answer. I don't know the...

HARRIS: OK. Perhaps you could, you know, get the answer and provide it in writing.

What -- what progress has been made on the recommendation, quote, "to provide an inclusive regulatory system and development process that encourages expeditious development and a predictable schedule for permitting and approvals?" Is the administration doing anything to encourage a predictable schedule for permit approvals?

MCCONNELL: That's not something in fossil energy that I am aware of directly, and I'll have to provide that to you as well.

HARRIS: No, thank you. And do you know if the task force is still actively meeting and producing work products? Is that task force still having meetings?

MCCONNELL: It does meet from time to time regularly as -- I can't speak to how often it has met, but it has had routine meetings over the past several years.

HARRIS: And the last one being, what do you think?

MCCONNELL: I don't know the answer to that.

HARRIS: OK. Maybe you can get that answer to us also. Well, thank you very much.

I now recognize Mr. Tonko for five minutes.

TONKO: Thank you, Mr. Chair.

In this committee, we have spent a lot of time debating the appropriate role of government into the development of energy technologies. A Republican colleague seems steadfast in their result that anything beyond basic research whether it is applied research, demonstration or financing, must the government interference in the free market is somewhat of a picking winners and losers, and crowding our private investment.

However, this appears to only apply when aligning clean energy technologies and their commitment to these principles quickly disappears when it comes to supporting increasing taxpayer funds to develop technologies for the oil and gas sector.

That said, I am willing to acknowledge that there may be areas within fossil energy research space where a little

government research could be helpful.

With that in mind, Ms. Mittal, your report includes some recommendations for research areas. Could you expand on that please and address why you think these areas are particularly well-suited for government involvement?

MITTAL: When we looked at gaps in research for oil shale, we heard from federal as well as state and academic researchers a consistent message that there are two areas in which there were gaps. One was that there was insufficient information -- and data on groundwater and surface water baseline information in the region that there was not enough information right now on the conditions of groundwater and surface water in the region. Therefore, that when the -- an oil shale industry developed, you will not know what the baseline conditions are so it will be impossible to determine what the impacts of the industry are. So we need to do more research and get good information on both quantity and quality impacts -- information on quantity and quality of the groundwater and surface water.

The other area is that we need to develop more information on how groundwater and surface water interacts with one another. And this will help develop models that will allow us to determine how contaminants are transported from groundwater to surface water and vice-versa, and that -- those are two areas that were identified for needing more federal research.

TONKO: Thank you very much.

And to our assistant secretary, the department made a research announcement regarding its work on methane hydrates. Can you please provide some detail on that and, in particular, discuss how it fits into what you would consider to be a right problem space for government research programs in fossil energy?

MCCONNELL: Well, in any kind of early emerging technologies, government assistance is required to help promote and stimulate industry involvement. A good example of that would have been in the early 1970's when hydraulic fracturing for natural gas actually began. And again, that wasn't just the government investing money, but it was a combination of government and industry partnering. And George Mitchell in the Woodlands a long, long time ago was very interested in moving forward, but needed some help. And the government and Mitchell Energies moved forward with those initial -- that work, and it's borne quite a bit of fruit since then.

I think methane hydrate is a good analogy to that situation. It was -- it is a unique and emerging type of technology in an industry for natural gas, conducted on the slopes of Alaska. And it also was a partnership between ConocoPhillips, the Japanese government as well as the Department of Energy. And I think any one of these emerging technologies early on, a good measure of industry interest is their willingness to cross-share and partner. And that's the way that kind of research can be conducted and be most beneficial.

We have the work done in Alaska. It was very successful. We were highly encouraged by the results we saw. And in any type of research program, it sets the baseline for what we hope will be continued work in that area and continued involvement that we can bring forward.

And again, in partnership with industry and -- and others that are willing to -- to partner in the effort, so like in any good strategic process, you do some things, you find out what you learn, and then maybe grow from there and we're certainly enthused about what we've seen.

TONKO: In terms of comparing that with the potential DOE role in developing technologies for other unconventional such as oil shale, would you contrast that for us?

MCCONNELL: Well, I don't know that there's any contrasting, I think the most important thing we do at fossil, I believe, is to be very close to industries' interests and development so that we can stay close to their enthusiasm. And we talk a lot about technical recovery and then we talk about economic recovery. And I think industry is a far better gauge of what emerging technologies they would like to spend time on and actually develop.

And in the case of what you're describing, for us to find industry partners that are willing to do the cost-sharing, to be involved and cooperatively develop this research, what it does is it's a real bellwether for industries' level of enthusiasm at the time that they're involved and will stay very close to that.

TONKO: Thank you very much.

I yield back, Mr. Chairman.

HARRIS: Thank you very much.

And I recognize the gentleman from California, Mr. Rohrabacher, for five minutes.

ROHRABACHER: Thank you very much.

All of the above, really we have a problem with that and I have a problem with that. And I just do not believe that the president has been forthright in discussing his energy policy with the Congress. However, and we've seen that in this committee where we have seen what appears to be a purposeful deployment of regulatory bodies to stop certain types of production especially fracking. It seems to be a -- it seems to be something that is actually greatly expanding the energy available to the United States, so that gives us some concern that isn't necessarily something you would be involved in.

But I think that we -- do you agree that we have reached a technological stage that we could become energy self-sufficient within a decade?

MCCONNELL: I wouldn't debate that with you, but I think it's really important that we have energy security, and it gets little different than energy independence, but maybe we're just making a fine point of a word, I don't know. I think it is important that we be energy-secure.

ROHRABACHER: But are -- but are we technologically capable of that now?

MCCONNELL: Well, I'll give you an example. And when we talked earlier about hydraulic fracturing, and I mentioned sustainability and, in fact, we've fracked a lot of wells for a lot of years. There's no question about that.

I think it's also fair to say that in our society today, there's a lot of questions about fracturing, about the impacts in local communities, et cetera, and it's not just issues associated with groundwater, but it also has to do with seismic effects, it also has to do with wastewater disposal, wastewater treatment -- all of the issues that are really important to sustainability. And...

ROHRABACHER: Do you think it also has to do with a mindset that is what is formerly described as Luddite mindset that has been beaten into kids' heads at our universities that a habitat for a squirrel is more important than energy for American homes?

MCCONNELL: I wouldn't subscribe to that. I -- I don't think that at all. As a matter of fact, I think it's really important that it do be deemed sustainable in a big part of our future, and that's what we're doing across...

ROHRABACHER: We don't take that anti-energy attitude as -- had some impact on the administration and the production of energy in our country.

MCCONNELL: I can't comment to that. I can tell you it hasn't had any effect on what we're doing at Fossil Energy.

ROHRABACHER: All right. I -- let me just know that we have had the ability in a number of areas that I have supported energy research into solar, for example, over the years. And it wasn't up until about a year and a half ago, there were no permits issued by the federal government to move forward with solar energy plans in the desert -- none.

And in fact, Mr. Chairman, I had to actually introduce legislation to sort of goose the system into letting people go on these vast stretches of desert that we have and set up a solar plant. And -- how many solar plants now have been issued permits now in the last year and a half?

MCCONNELL: I don't know the answer to that, sir.

ROHRABACHER: I -- I think it's six. But let's just note that we are way behind the curve because technology was there and has been there to try to build solar plant in the desert. Yet, up until a year and a half ago, there was zero solar plants in the desert. And you look back, and I think it's an over a value being placed on habitat for insects and lizards rather than electric power for the homes of human beings.

What about -- I'm going to get to methane hydrates. That's another one I supported earlier over the years. Has there been any progress with methane hydrates other than Alaska? There are methane hydrate potentials, for example, in the ocean.

MCCONNELL: There are indeed. And as part of the unconventional strategy going forward, we're doing some very early work in that to make assessments of resource and overall impact, yes.

ROHRABACHER: Has there been any assessment of resource is one thing development of technology is another? Has there been any technological steps forward in trying to utilize ocean-based methane hydrates?

MCCONNELL: We haven't conducted any demonstration projects if that's your question, no.

ROHRABACHER: All right. And one last note, for the amount of energy that is being produced and -- and consumed by the American people, the amount of research money that is spent by the federal government into that particular area, wouldn't you say that oil and gas actually produces a huge amount of energy that we consume and that is actually per amount of energy that -- that we use from that source the amount of research actually is less than in other areas?

MCCONNELL: Well, from our standpoint, we -- we recognize that both oil and gas as well as coal is an incredibly big part of our future. I think what we want to be sure we do is not fall into the trap of looking at how much we're using today and having that be equivalent to how much we're spending on research or out of the emerging technologies that we're spending our money on at the federal level as well as with industry is important in that regard. So, yes, I think it's a big part of our future and it will be a big part of fossil energy strategy.

ROHRABACHER: Thank you very much. And we just hope that the president is serious and it has reflected in -- in the policies that go through his administration about this idea of all of the above because America, nothing will be better for our economy than for us to quit sending that money overseas and spending it right here.

Thank you very much.

MCCONNELL: I couldn't agree with you more.

HARRIS: Thank you very much. The gentleman from New Mexico, Mr. Lujan, is recognized for five minutes.

LUJAN: Mr. Chairman, thank you very much.

Mr. Chairman, I was really encouraged when I read the hearing charter, Supporting American Jobs In The Economy Through Expanded Energy Production: Challenges and Opportunities of Unconventional Resources Technology. But I was a bit disappointed when reading through the charter and through the testimony that was filed with us, that I didn't see any mention of fuel production from algae or that we were going to be able to talk about the energy that could be produced from battery storage.

And I -- I say that, Mr. Chairman, because there's been some recent reports that have been put out that talk about the

research and development that's taking place through the Department of Defense with unconventional energy production so that we can save soldiers' lives when we fully appreciate the amount of lives that have been lost through the transport of fuel that is developed from petro products or the weight of those batteries that they have to carry in those packs to be able to develop any generation or communication aspects.

But with that being said, Mr. Chairman, I still am encouraged at the conversation that we're having today and I hope that we can take that conversation up as well because it's an important one as we talked about all of the above opportunities through the expansion of research and development.

Pertaining to oil shale development and water constraints in the west, I appreciate the sensitivity that are being brought in that area coming from the high desert, although I have six beautiful ski areas in my district. You can imagine that the snow (inaudible) isn't always what it should be. And this year, as we talk about the re- adjudication of water from the Colorado and the way that it's going to impact the west, what that means to waterfalls, commerce, opportunities, food production in the west is something that I am very sensitive to.

And so, Ms. Mittal, (inaudible) from the southwest where water is so scarce, I'd appreciate you going into some more detail on the potential impact of oil shale development on water quality and on quantity, and how research and development might lead to other opportunities as we talk about the amount of water that is necessary in these areas.

MITTAL: One of the things that our 2010 report noted was that right now it's very difficult to assess or measure the quantity impacts of oil shale development, and that's for three primary reasons. One is that we don't have a good sense of what the baseline conditions of groundwater and surface water is, as I mentioned earlier.

The other issue is that there's a lot of uncertainty related to the technology, so we don't know how much water is actually going to be used by the technology. It's very, very uncertain.

And the third issue is that there's a lot of uncertainties related to climate change, how much water is going to be needed in the future in that region from the growing population, from compacts. There are water compacts that are going to require certain demands. They are going to place certain demands on the water in the Colorado River region. There is going to be other uses of water. So there's a lot of uncertainties right now that make it very difficult to actually quantify the impacts of oil shale development on water resources in that area.

LUJAN: I appreciate that. And although myself and my colleagues may not agree on what's causing some of the drought conditions that we're experiencing, the reality is that I have ranchers back in New Mexico that have sold off entire herds because there's less water. And I hope that we can all agree on the reality that there's less water out there, and that we could be mindful of that.

Mr. McConnell, one thing that I -- I don't believe that we do a good enough job of is explaining to the American people that there is a difference between oil shale and shale oil. But I want to concentrate my efforts on oil shale.

The way that I underbanked it is it's a rock and that there's an element in there, if I pronounce it correctly, carrageen, that has to be heated up. So we have to heat this rock up that's down below. How would you propose that we heat that rock up? You know, does it take a long match or, you know, how are we able to reach down there to heat that rock up so we can get this energy coming out of that? What kind of heat do we need?

MCCONNELL: Well, most of the technologies that are looked at, and again there are a suite of technologies that can be employed. But it's really an in situ process in which you need to get the fuel source into that area to be able to do that heating as we described it.

There are a number of different technologies that are being looked at, but again, this is a very early emerging industry. And I wouldn't say there's a business as usual case for exactly what you're describing.

LUJAN: I appreciate that.

Mr. Chairman, thank you very much, and I look forward to the next round of questions the next time. Thank you.

HARRIS: Thank you.

I now recognize the other gentleman from Maryland, Mr. Bartlett, for five minutes.

BARTLETT: Thank you very much.

I was reading the other day a report that indicated that the gas in the Marcellus shale was equivalent of 3.4 billion barrels of oil. Is that the number that you've heard? Is that in the ballpark?

MCCONNELL: Equivalencies sometimes can be tricky, but I -- I would -- I would agree with what you're talking about, yes.

BARTLETT: Underlying the Marcellus shale is a bigger footprint of Utica shale, which contains oil. The same report said that there was 4.5 billion barrels of oil in the Utica shale. That's the number that you think is in the ballpark?

MCCONNELL: Large number, yes, sir.

BARTLETT: OK. Every day, the world uses 84 million barrels of oil. That means in 12 days, the world uses a billion barrels of oil. So this 4.5 billion barrels of oil, which you said was huge, will last the world 52 days. It doesn't seem to me to be a really big deal, just 52 days.

Methane hydrates have been mentioned. There are potentially huge energy stores in methane hydrates. Let me mention something else where there are huge potential energy resources -- that's the tides. The moon list a whole (inaudible) ocean, what, two, three, four feet a day.

I carry two buckets of water. That's heavy. That's an awful lot of energy. Why aren't we getting more energy out of the tides? It's for the same reason we're not getting any energy much of any energy out of methane hydrates because it's very dispersed. It's got to be concentrated before you can really capitalize on it. I think it will be a long time before we get much energy out of methane hydrates, although the potential energy there, I think exceeds most other energy sources, does it not? It's a potentially huge energy resource in methane hydrates.

The oil shales, 1.5 trillion barrels of potentially recoverable. A shale oil company has tried twice there, and they have given up oil at \$80 a barrel. It was not high enough that was recoverable. But let's imagine that we can get 1.5 trillion barrels of oil from the oil shales.

You know, it's awfully easy when you're dealing with big numbers to slip a zero or two, and so I want you to check your -- the numbers with me. Is the 1,500 billion 1.5 trillion?

MCCONNELL: I'm going to take your word for it.

(LAUGHTER)

I'm not quite sharp (inaudible) your question, sir.

BARTLETT: I think that 1,500 billion is a 1.5 trillion. And if that's true and I now do some arithmetic, I find that if we're able to develop this 1.5 trillion barrels of oil from the oil shales that it will last the world I think 40 or 50 years.

A little over four years ago, I led a CODEL to China. Nine of us went to talk about energy, and the Chinese began their discussion of energy, they're talking about post oil. Clearly, there will be a post oil world.

The first prominent person I know up to recognize that was Hyman Rickover and if you want to read a very fascinating speech, it was lost for a number of years. Just Google for Rickover energy speech and his speech given the 15th day of May, 1957 at St. Paul, Minnesota, will come up. And he made a very interesting observation.

He said, "In the 8,000-year recorded history of man, the age of oil would be but a blip." He had no idea how long the age of oil would last. Now, we know, the age of oil is going to last about 300 years. We're 150 years into the age of oil. And we're not running out of oil, by the way. We're running out of is our ability to produce it as fast as we would like to -- to use it.

Way more oil out there, two big pumps and all the oil that we have pumped. But the challenge is pumping it as fast as we would like it -- as we would like to -- to use it.

Now, you know, if we develop all of that oil and it last us just 50 years, I've got great grandkids. What are they going to do in 50 years?

Thank you very much, Mr. Chairman. I yield back.

HARRIS: Thank you very much.

They are calling us for votes, but I think we can get a couple more members' questions in before we have to go. I'll now recognize Mr. McNerney, gentleman from California, for five minutes.

MCNERNEY: Thank you, Mr. Chairman.

Mr. McConnell, how would you compare hydrofracking technology to oil shale technology both in terms of the economics and impacts on local environment?

MCCONNELL: Well, maybe, first of all, think about it in terms of where we are in the technical scale or they're really -- it's often called the TRL, or technical readiness, OK.

In terms of -- in terms of hydraulic fracturing and what's going on in the Marcellus and other areas across the country, that technology has been noted as -- it's been performed for a number of years, recently come into a lot of prominence because of the high cost of natural gas. Just three, four years ago, we are all very concerned that we are, as a nation, going to have to import natural gas, and we're able to take this technology, put it in play and utilize it.

And from the standpoint of the Marcellus and many of the numbers that you quoted about availability of resources, et cetera, oftentimes, the first call on that is considered to be technically recoverable hydrocarbon, but it's not really technically recoverable but it's really economically recoverable. And so we've got vast quantities of additional hydrocarbon resource that with the price points being what they need to be and with the technology evolving to where it can go, it really then opens up large additional volumes.

The hydraulic fracturing activity has been performed for years and years but, of course, we continue to look at the impacts of it not just from the standpoint of the fracturing itself, but the wastewater disposal, the seismic activity, all of the other things that many of the people in our country are concerned about.

Contrast that with the -- with the oil shale that you mentioned, it's much, much less far along on its technical scale of capabilities. A lot of the initial resource assessments have been performed, the volumes and the capabilities are vast.

If you look at where we are today in terms of crude oil and the capacity that we have in this country in our domestic imports of it, I know that industry will continue to look at it as a next best opportunity to move forward to, but today, it doesn't have economic recoverability. And -- and -- and because of that, there hasn't been a draw by industry at this point to -- to get into it in the same way that we've done with hydraulic fracturing for natural gas.

MCNERNEY: Well, thank you. Would you comment on energy return on investments as applied to oil shale? Are you familiar with that term?

MCCONNELL: Well, I -- I can give you just a statistic from the National Energy Technology Laboratory. Over the past 20 years, we've done some analysis for every dollar that the taxpayers put in, we've got about \$13 of return back in terms of jobs, and economic impact, and other things that have -- that have contributed to our economy.

The statistics that I quoted earlier are the rather modest investment that was done in hydraulic fracturing for natural gas today is paying enormous dividends, and we're drawing that in the American chemical industry. And we'll likely to be using more and more natural gas and electric power generation, et cetera, as we move forward.

In the oil shale today, a lot of the initial work that we're doing, again in assessments and looking at the potential for it, I don't know that we're far enough along to actually put a return on investment just yet.

MCNERNEY: Well, by energy return on investment, I mean energy in versus energy out. So energy out is numerator, energy in is the denominator. If you have any comment on that, or Ms. Mittal, if you have a comment on that?

MITTAL: We -- we didn't look at the actual amount of energy. What we were told is that it does require a lot of energy especially the in situ process because you have to hit the rock for large periods of time at a -- to very high temperatures. It is a very high energy-intensive process.

MCNERNEY: So it's likely to have a small energy return on investment in terms of the way I just defined it?

MITTAL: It could, but we don't have the actual numbers.

MCNERNEY: OK.

Thank you, Mr. Chairman. I'll yield back.

HARRIS: Thank you very much.

I recognize the chairman of the committee, gentleman from Texas, Mr. Hall.

HALL: Mr. Chairman, I thank you.

And I'm really little confused right now. I heard something that really sounded good to me that one of our leaders said this country needs an all out, all of the above strategy that develops every available source of American energy. Of course, I jumped up and down, clapped my hand, reread it, listened to it, say it one more time. But I found it was Mr. Obama that said that in the State of the Union speech.

And other than prior energy, it's probably the most important word in the dictionary to any youngster that's in high school or early college right now. And it's very difficult to square that statement with administration's actions. For example, a budget proposal is to eliminate a \$50 million R&D program aimed at expanding safe production of oil and gas. This program, which I created in the Energy Policy Act of 2005, several presidents have tried to knock it out, supports development of next-generation technology's importance of ensuring domestic production of oil and gas is maintained and even increased. It was simple.

We knew the energy was there, but we couldn't get it to the top of the water. We created universities the technology created the same energy that they're going to get for us by giving us the technology to get it. It's an easy way to get technology without pledging or paying out money direct here too. It was a deal and it's worked. I don't -- I don't understand why anybody wants to knock it out (inaudible) the program was highlighted by the Department of Energy's own Advisory Board as the effective program. It should be enhanced and supported.

I really don't -- Mr. McConnell, if the president really wants to identify every single way to lower gas prices and increase energy production over the long-term, why is he trying to eliminate R&D program?

MCCONNELL: I don't believe he is trying to eliminate the R&D program.

HALL: What's he trying to do then? Tell me, explain to me. I don't understand that. Where do you get that?

MCCONNELL: What -- what we're trying to do is take the resources that we've got available in -- with the fiscal means that we have available. And one of the things I said when I took this job is I do the best we could to get the most impact with the resources we had available to us, and that's what we're doing.

HALL: You've got a lot of resources up in ANWR or not. All of you say don't drill on little ANWR. Sir, they're just 19 million acres in little ANWR. All we want to drill on is 2,000 acres. Maybe 40 years of energy there.

How in the world can you square what you're testifying to here, and you know you're under oath right now, don't you?

MCCONNELL: Yes, sir, I do.

HALL: Well, then go ahead and explain to me. Just note for the record it's State of the Union speech, the president said and I quote, "It was public research dollars that helped developed the technologies to extract all these natural gas out of shale rock." And it's troubling that he is suggesting the federal government made hydraulic fracturing possible while the same time trying to kill R&D within the same program that he said is (inaudible) for the current oil and gas boom.

This is a program that's working, that has worked with several universities and is paying off. Why would anybody want to knock it out?

And I say this in deference to your president, my president tried to knock it out, too -- President Bush -- before he left office. We had a vote on the floor overwhelmingly, they knew this program was working. I don't understand why anybody want to knock out something that's working when we have the greatest need in the world for more energy.

MCCONNELL: I can't -- I can't comment on what you're saying in terms of giving you a reason for what other people may view of how people want to see something go down. I guess, what I will say is that the research and the focus in the areas that we've identified in hydraulic fracturing to continue that research, to -- to put in a budget request for this year, we're enthused about it and we'll continue to work hard at all of the things that you're talking about using the resources that we've got available in -- in a manner in which we can most effectively employ.

HALL: Well, your views on hydraulic fracturing has been turned back and you spare blinded witness after witness after witness even your own witnesses, the EPA's witness have said things and admitted that what they're saying about fracturing and the danger is doing to drinking water. You had to go all the way to Wyoming to kind of drag up something that could hit fracturing. I don't understand that.

Actually, I'll just say that, for the record, that in the State of the Union speech, the president said it was public research dollars that helped developed the technology to extract all the natural gas out of shale rock. It's very troubling that he is suggesting the federal government made hydraulic fracturing possible while the same time trying to kill R&D with the same program that he says is created for the current oil and gas boom. How do you -- how do you react to that -- his campaign in one way and saying something and doing something else?

MCCONNELL: Federal research dollars originally back in the 70's were leveraged with industry enthusiasm. George Mitchell in the Woodlands and the -- the work that was done within industry and, in fact, hydraulic fracturing was pioneered by the Department of Energy's work along with industry.

HALL: Thank you. If it is a different Department of Energy and what you folks are running over there now though. I yield back my time.

HARRIS: Thank you very much, Mr. Chairman.

The gentelady from California, Ms. Woolsey, is very patient. We're going to recognize her and then we're going to walk fast over to vote.

WOOLSEY: Right.

HARRIS: Thank you.

WOOLSEY: You can answer this question, but my question is, well, he laughed. I can't imagine why I love our chairman so much after that -- that group of questions. You can answer that because you don't know, but we just think he's great, but I'm -- not today, I don't.

Mr. McConnell, our -- our colleagues as you heard today and over time have been arguing that more taxpayer resources need to be transferred from work on emerging alternative energy technologies -- into technology development for oil and gas.

So regardless on one's priorities in that regard, there is such a question about the relative impact of limited federal dollars in all of these sectors, and whether a major increase in oil and gas research funding translates into real benefits for the industry or consumers. So what happens if we increase the oil and gas research programs? Will it be a big or a small improvement? And is oil and gas industry actually beating down your door asking for more research money? And where do we get the biggest bang for our buck on this?

MCCONNELL: Well, I think that's a great question because really what it does is it speaks to the pulse in the industry and what industry is looking at. I think the signals that come from the federal government in terms of funding, willingness to support activities, and focus on research that industry is interested in, they get signals from budget, but they also get signals from the capabilities and competencies that exist within the Department of Energy.

We have received a number of enthusiastic support signals from industry. Those in the natural gas industry, the leaders in those industries are incredibly driven by wanting to ensure that sustainable processes for this, not just in the seismic or the hydraulic fracturing, but in the wastewater disposal, in the seismic impacts, in the communities, they all want this to be a sustainable long-term industry.

And -- and the ability for us at the Department of Energy to work with the Department of Interior, to work with EPA from an interagency standpoint, to do things going forward in a sensible manner so that industry can have the confidence that this administration is going to move it forward in a confident manner to make it a sustainable industry.

I think the president has been pretty clear about the fact that he wants that to happen. He's certainly been clear to us at the Department of Energy what we're supposed to do.

WOOLSEY: So what is the Department of Energy thinking about drilling and exploration for gas and oil off of, for example, the Northern California coast, which I represent? That should be a sanctuary. And probably will never be drilled, but if it was, it would take all kinds of expensive research to -- to make any of these worthwhile.

But is there -- is there any way that we can prove that that isn't worth the pennies we would -- well, the thousands of dollars we would -- millions -- invest in order to get pennies' worth of energy?

MCCONNELL: We don't have any plans to do either at this point. That's not on our short-term strategic plan. And the -- the focus that we have with the resources we have is not -- it's not oriented in that area.

WOOLSEY: OK. Thank you. And I think because of that, we're -- I'm going to yield back so we can go vote.

Thank you so much.

HARRIS: Thank you very much.

I want to thank the panel for the valuable testimony, the members for the questions, the members of the committee may have additional questions for you and we'll ask you to respond to those in writing. The record will remain open for two weeks for additional comments from members.

I'm going to dismiss the first panel. We will recess until five minutes after the last vote, which should be about 20 minutes from now, to go ahead with the second panel. Thank you very much to the first panel for being with us this morning.

The committee stands in recess.

(RECESS)

HARRIS: Thank you very much.

I want to thank the second panel for your patience with us and I will call the committee to order.

The first witness on the second panel is Ms. Samantha Mary Julian, director of the Office of Energy Development for the state of Utah. Previously she served as the energy and natural resources cluster director for the Governor's Office of Economic Development.

Ms. Julian is responsible for the promotion of Utah's state energy policy, coordinating with the governor's energy advisor to implement the governor's energy goals and objectives seeking federal grants and participating in federal programs and making administrative rules.

Our next witness is Mr. Jim Andersen, president and CEO, U.S. Seismic Systems. Mr. Andersen began his career as an engineering officer in U.S. Navy nuclear submarines and went on to hold a variety of engineering and senior management positions in engineering intensive high technology companies including Westinghouse, Whitehall/Hydroscience, Litton Industries, and Northrop Grumman.

Our third witness is Mr. Cameron Todd, CEO of U.S. Oil Sands Inc. Prior to joining U.S. Oil Sands, Mr. Todd worked five years with Connacher Oil and Gas Limited where he held the executive role of senior vice president, operations, refining and marketing.

He has had an extensive and successful career in the domestic and international oil and gas industry with over 30 years of experience in all facets of the business.

Our final witness on the second panel is Mr. Tony Dammer, member, board of directors, National Oil Shale Association. Mr. Dammer is an independent consultant specializing in oil shale and other unconventional fuels development.

From September 2008 to February 2012 he was senior vice president of Red Leaf Resources, a Utah-based oil shale technology and resource development company. He joined Red Leaf Resources after 28 years of federal service in the U.S. Department of Energy Office of Naval Petroleum and Oil Share Reserves. For the last 20 of those years he served as the director of the office responsible for the management and operation of six reserves in California, Wyoming, Colorado, and Utah.

As our witnesses should know, spoken testimony is limited to five minutes after which the members of the

committee will have five minutes each to ask questions.

I now recognize our first witness on the second panel, Ms. Julian, to present her testimony.

JULIAN: Thank you Chairman Harris, Ranking Member Tonko, and members of the committee.

Utah is the epicenter of unconventional fuel development for the United States. Our office is created in 2011 with Utah legislature seeing that there needed to be an all of the above approach to energy development.

We are the voice for energy development responsibly through economic development and policy.

I'm not here today to say that oil shale or oil sands will drop prices at the pump or immediately solve the country's dependence on foreign oil. I'm here to say that despite the lack of efforts of some federal agencies the unconventional energy industry is happening in Utah today and deserves support.

These developments are important. As the federal government needs to understand, these industries are commercially viable. Operators seek public land certainty and federal policy consistency.

Special interest groups often attack these industries claiming massive use of waiting that otherwise is unavailable in our state.

In Utah water is available for oil shale and oil sands development through existing water rights in general market system. Water is owned by the state and is in trust of its citizens. It is subject to water appropriation system and managed by the state engineer. The process has been in place for over 100 years.

Utah also manages its lands to promote responsible development. It is the main source of our funding for educational system and our peoples and educators count on it.

As any operator will tell you, whether it's shale, sands, gas, oil, coal, working with the state is much more streamlined and consistently regulated. Our oil sands technology zone is a way for Utah to lead an innovative and research and development efforts.

These are rent-free lease on a pre-permitted site adjacent to sands mine allowing proof of concept to remove technology risk for capital providers.

Our alternative energy development incentive encourages responsible development. Again, to fund our textbooks, our classrooms, and our students. It is a post-performance incentive for oil shale, sands, utility-scale renewable energy and nuclear.

Governor Herbert's 10-year energy plan is the state's path forward for responsible energy development. It is about all -- all approach diversified resources.

So how could the federal government contribute to expand production through R&D?

The most consequential assistance the federal government could provide -- and I repeat, the most consequential assistance the government could provide, is to assist the BLM in consistent -- to be consistent with the Energy Policy Act of 2005.

Secondly, current DOE procurement favors federal R&D providers. That's national labs over external providers of industry and universities.

If funding decisions were instead calculated proportionally on GDP or ranking of energy production, Utah would increase from \$3.5 million in funding to \$60 million or almost 20 fold.

Proactive work by the BLM and DOE would positively affect our energy independence, security, and decrease our -- our dependence on foreign oil.

We truly appreciate the support of Congress to make unconventional energy an R&D priority and help federal agencies understand that taking steps to ensure public lands certainty and federal policy consistency would create an energy game changer.

Thank you for the opportunity to speak today. I look forward to your questions.

HARRIS: Thank you very much.

I now recognize Mr. Andersen for five minutes to present his testimony.

ANDERSEN: Thank you very much, Chairman Harris, and members of the subcommittee.

I've a little bit different presentation and I'm going to show you some charts. And hopefully this technology will work right.

So, what I'm here to talk about is we've developed a revolutionary sensing technology that we believe will solve many of the environmental problems associated with unconventional oil and gas development primarily for -- hydrofracking.

The sensors are all fiber optic, no electronics or copper in the well, and they replace the 50-year-old -- 50-year-old sensor technology that's been used in the industry that really isn't up to speed with these new extraction techniques. And I'll talk a little bit about that.

Not to go in a lot of technical mumbo jumbo, just a real simple how does it work, you know, we have two things. We have a box we call the optical interrogator, all the smarts were in that box and lasers, electronics and all that. And then we have a fiber optic cable which we drop down the well.

The fiber optic cable has no electronics, no circuit boards or any power that goes down the well. That makes it very reliable and it's expensive.

How it works is we send laser-like pulse down the cable. When the reflection comes back the information we're looking at is in that reflected pulse. Very, very simple.

So just so you don't think that this is a, you know, smoke and mirrors, I -- in my prior life I used to run a division of Litton Industries and -- responsible for fiber optics there and we put the fiber optic sensor system on all the Virginia-class submarines. Contract was valued over \$450 million, heavy electronics inside the submarine, fiber optic sensors outside the hull, and it turned out to be a very, very reliable system. It's now on the order of a dozen submarines and reliability record is outstanding.

A lot of the team members that used to work for me at Litton are now at my company and we commercialized it, made it less expensive and more reliable for commercial applications. And also we built our own I.P. but we've also licensed some of the technology from Northrop Grumman.

So here's our premise. The existing equipment for frac monitoring is just too expensive and it doesn't -- the performance is marginal.

And when I say expensive I use an example that, you know, to drill a well for -- produce shale you need -- you need to -- it cost about \$5 million. And installing sensors and the cost of sensor is another \$5 million. People just don't do it. And plus the performance is poor so there's really no motivation.

We also believe that, you know, it's not just the sensing system but how much it cost to install it. And the main driver to that is the cost of drilling wells to install it. We've been working with the Department of Energy and they've done some studies and it showed we have very sensitive sensors like we do.

Instead of going down and drilling down to, you know, 5,000 or 6,000 feet you drive 500 or 600 feet. Great savings on installation also. We're trying to make this inexpensive so everybody will do it.

You know, frac monitoring, basically, it just -- what you end up with, instead of blindly pumping in fluid at high pressure and, you know, wondering if you're fracturing, you monitor with sensors in the ground and you do the stages. You could see they are different colors. You know, block off a certain section, you frac it and do the next one, and you see what the extent of the fractures are. So you have a record and if it starts going to places where you don't want you could stop it.

We believe 100 percent monitoring will solve the problems. And it's not just us. You know, the secretary of energy advisory board came out with recommendations and they said, you know, you should have stories (ph) carried out to ensure fracturing growth is limited to where you want it to occur. And, you know, they also said, we need additional studies to talk about shale gas leaking to water wells. We're also working with FTS international, a large company in the U.S. that does fracking and developing systems with 100 percent monitoring.

Here are -- I'll just talk about well casing leak a little bit. You know, it's -- it's an important issue. You know, I -- my feeling is -- is that, you know, it's designed to prevent communication between layers, but, you know, these things happen.

And the next chart will show that, you know, that from a gas migration people talk about it as like a new thing. It's been around for over a decade. You know, there are studies in Canada that 45 percent of the wells are leaking.

So mu thought is -- is rather than, you know, denying or saying does this work, happen or not, you know, we have technology that's cheap insurance and you could check for it and make sure that if it does happen you could fix it.

So, you know, summing up, you now, there are several -- the major areas in environmental concern that can be minimized via monitoring during and after the fracking process. This includes a chemical contamination of the subsurface aquifers, gas migration, and even induced seismicity. And we've developed a revolutionary fiber optic sensing technology to detect the problems and such that you could do a remediation before there are significant environmental damage.

And I thank you and I welcome your questions.

HARRIS: Thank you very much, Mr. Andersen. That's a -- some fascinating technology.

I now recognize our third witness, Mr. Todd, to present his testimony.

TODD: Mr. Chairman and members of the committee, I thank you for the opportunity to address you today on vital matters of energy, environment and the economy.

My name is Cameron Todd and I'm the chief executive officer of U.S. Oil Sands, a public company with a unique proven technology for the development of the U.S. extensive oil sand resources.

I'm here today to explain that development of these valuable resources is not only economically viable and technologically proven, but can also be done in in an environmentally responsible manner with significant economic benefit for the nation.

U.S. Oil Sands has a proprietary technology using a renewable bio-solvent to extract heavy oil from oil sand without the need for tailings ponds. This breakthrough is expected to revolutionize the development of oil sands particularly in

the United States where in spite of the extensive resources there have been no commercial extraction projects to date.

The solvent that we use is non-toxic and biodegradable, made from citrus peels.

Over the last 10 years our company has exhaustively tested and piloted our process. It greatly simplifies current approaches to development and allows them to be built on a smaller scale using modular phases.

Our company has been active in Utah for more than seven years and invested more than \$20 million developing the technology, acquiring lands, doing environmental reviews, in design, and initiating construction. Beginning later next year we expect to complete construction and initiate production on the first commercial oil sands extraction project in the U.S. By that time we will have invested more than \$50 million dollars and employed hundreds of people.

Our process demonstrates the best environmental performance of any oil sand development to date. We recovered 96 percent of the bitumen processed, the highest of any project.

Since we produce clean sand without tailings ponds, we reclaim the mined area as we go.

The process recycles 95 percent of the water used. And we use half the water of other projects. We use less than a third of the amount of energy and we have a lower greenhouse gas footprint than any project to date.

Our first project is modest, producing 2,000 barrels a day. Over the next 10 years, assuming fair access to lands, our company has expansion plans for 50,000 barrels per day.

Over the project life we expect to generate over 60,000 person years of direct employment. High quality, permanent jobs. And they come at a time when the American economy has been hit with the worst recession in 75 years.

We expect to pay more than \$9 billion in taxes and royalties and contribute more than \$20 billion to the economy. And we will be saving the import of over \$50 billion worth of foreign oil.

And while we may be first, U.S. Oil Sands is not alone. Other companies are pursuing exciting technologies and new and environmentally-responsible and economically-attractive projects are coming.

So what is standing in the way?

In short, federal policy. Even though most resources are on federal lands, it's no accident that 100 percent of our company, U.S. Oil Sands, leases are on state lands. The state is strongly supportive while the BLM essentially has a de facto moratorium on leasing and approval. This, in spite of the instructions of Congress in the Energy Policy Act of 2005.

The BLM is further proposing to reduce the lands available for development by nearly 80 percent because of their belief that commercial technologies do not exist and that only massive large scale development would occur.

It's not that these lands are conservation areas where development is prohibited. Quite the contrary, as conventional oil and gas, forestry, grazing, and mining are allowed subject to normal approvals. It is only oil sand and oil shale leasing that is restricted.

Developers are not asking for unfettered access. Every project would still be subject to extensive scrutiny and approval just as are conventional projects. We've already shown that small scale phase development is possible, and that world-class environmentally-responsible technologies are proven.

In conclusion, the oil sand resources of the western states are large and accessible. U.S. Oil Sands has developed a process to unlock these valuable resources in an environmentally-superior manner.

We expect our project on state lands to be in production next year. The process uses far less water, energy, surface area, and generates less greenhouse gas than any project to date. It generates clean tailings, requires no tailings ponds.

Our company expects to generate tens of thousands of man-years of employment, billions of dollars of tax revenue, and contribute tens of billions of dollars to the economy. In exchange we ask for no special treatment, no fuel subsidies and no grants. We simply suggest that Congress permit these developments on federal lands as mandated in the Energy Policy Act.

We at U.S. Oil Sands intend to implement our game-changing approach with or without access to federal lands. We have identified large resources on state lands and will develop them in concert with the state.

We will apply our approach to resources in Canada and other parts of the world where large deposits exist. It would be a shame if the people of the U.S. were not able to enjoy the benefits of development of their own extensive resources, but such a great technology and such a win-win-win result with respect to energy, the economy and the environment, is too good to not to be applied to solve the energy challenges of the world.

Thank you.

HARRIS: Thank you very much. And I -- our final witness, Mr. Dammer, is now recognized for five minutes to present his testimony.

DAMMER: Thank you, Mr. Chairman and members of the committee. I thank you for the opportunity to appear today. I've worked on and off in the oil shale business for several decades. They kicked me out of Colorado in 1982 when Colony folded. So I have -- have -- I've seen the ups and downs of the industry.

As been pointed out oil shale development has had a long and torturous history which would take hours to relate so I won't go over that in any detail here.

But in 1982 Exxon abruptly closed its doors to the Colony project and without warning left the scene. That was referred to as "Black Sunday."

So the industry has been characterized by boom and bust. But not until almost 25 years later, the passage of EPACT 05, the Energy Policy Act of '05, the government demonstrated any appreciable interest in the oil shale resource. High price of crude oil coupled with concerns regarding energy geopolitics and increased dependence on imported oil from unfriendly and unstable sources focused attention back on oil shale.

Today there are several companies engaged in oil shale research and development in the United States in varying degrees of development. Some are small, their work limited to the laboratory. Others, such as Shell, Exxon, AMSO, Red Leaf, TOTAL, Shale Tech International -- just to name a few -- are actively testing their technologies in various stages of development in the field.

The secure fuels and domestic report -- resources report published by the U.S. Department of Energy summarizes those technologies of 32 separate companies working in oil shale and tar sands development in the U.S. Most are oil -- oil shale development companies and their profit -- and their profiles are summarized in www.unconventionalfuels.com.

I have by no means covered the technical landscape regarding oil shale development and I regret that time does not allow a comprehensive review of all the technologies.

Advances that have taken place in the last five years are very large. Suffice to say that clean, safe, and sustainable technologies are being advanced to develop oil shale resources.

The passage of the Energy Policy Act of 2005 provided impetus for this program.

We talked a little bit about some of the key technical challenges that present us. We talked a little bit about water. I have not read anything from any oil shale company that believes that they will exceed one barrel of water per three barrels of oil shale produced.

A lot of the industries are water producers. I think there's a lot more known about water utilization than is generally understood by the -- the -- the public.

One of the greatest concerns that has been -- has been the requirement of water in development in the scarce area, I think that's been overstated. Of far greater concern in the technical challenges faced by oil shale -- the oil shale industry are policy and regulatory inconsistency and uncertainty.

Since the passage of the Energy Policy Act of 2005, the Department of the Interior has reversed itself on the initial programmatic environmental impact statement and changed the associated resource development plans. As we all know oil shale regulations were overturned in 2008.

The Energy Policy Act, however, was a comprehensive piece of legislation designed not only to prepare for R&D and leasing regulations but also to plan for the orderly development of oil shale and tar sands in what is essentially the Green River Formation of Colorado, Utah, and Wyoming. That planning responsibility was assigned to the U.S. Department of Energy under Sections 369 (h) and (i).

Section 369 (h) of that act directed the secretary of energy, in cooperation with the secretary of the interior and secretary of defense along with the governors of affected states to establish a task force to develop a plan to accelerate the commercial development of strategic unconventional fuels and initiate a partnership with Alberta and nations with oil shale resources. The task force report, with recommendations, was completed and forwarded to the president and the Congress in 2007. Section (i) of the act directed the Office of Petroleum Reserves to coordinate and create and implement the implementation of a commercial strategic fuels program.

If these sections of the act were implemented and the unconventional fuels development program was initiated within DOE, uncertainty and inconsistency in policy would not exist today. Unfortunately, there is little evidence that the recommendations of the task force or the establishment of an unconventional fuels program has occurred. My strong recommendation would be to implement the law as it was stated in the Energy Policy Act of 2005.

Mr. Chairman and members of the committee, thank you once again. I would be pleased to answer any questions.

HARRIS: Thank you very much for your testimony. And we'll now begin the first round of questioning.

I recognize myself for five minutes.

Mr. Andersen, let me just ask you, in your technology was there any government involvement in the development of the technology?

ANDERSEN: Well the -- I talked about initially there were some government involvement in the technology that was put on the submarine...

HARRIS: Right.

ANDERSEN: ..., but we took that and developed our own intellectual property, our own funding. We built some systems for the government, but the R&D for those was all internal.

HARRIS: OK.

And did you ever request any help from the Department of Energy or, you know, sought some of the funds that -- from some of the programs we have been talking about today?

ANDERSEN: No, we haven't.

HARRIS: OK.

Now, Mr. Dammer, you -- your testimony -- I want to thank you for your testimony.

You know, it was a little disturbing to me that, you know, the Department of Energy, you know, Mr. McConnell kind of admits that, you know, oil shale and oil sands are part of all the above, but they're not spending any money on them. They're not really doing anything.

The -- the task force that you mentioned that produce that -- those -- that report in 2007 did outline some impediments that are occurring or constraints that -- that exist on development of oil shale. In your opinion is the DOE or BLM really doing enough or doing anything to implement the recommendation of that task force or basically is it all almost ground to a halt?

DAMMER: I can't really speak to what the Department of Interior is doing. I -- I'm -- let me correct that. I -- I know exactly what they're doing and they really are on the regulatory side of this and we've sort of jumped the gun on regulations because as you've heard today you have people questioning water usage. You have -- the carrying capacity of the Western Energy Corridor, social economic concerns.

Those are the concerns that needed to be addressed and addressed in a plan. And that was -- what was the purpose of Section 369 (h) and (i) was intended to do. They weren't intended to promulgate new regulations that's the responsibility of the DOI. It was to put together a plan to reasonably develop these resources and these resources stretch from Wyoming down through Colorado and they do broach the Green River and the Colorado River.

So, there's all kinds of hydrologic issues. Incidentally some of which have been answered far better than the testimony by GAO...

(CROSSTALK)

HARRIS: Let me ask you -- so -- because my understanding is that that -- the oil shale, is it true that if you look at oil shale resources that the United States really has more than the entire world's reserves if we could unlock oil shale?

DAMMER: Many times over.

HARRIS: OK. That's what I -- that's what I thought. So the -- you know, it's an interesting all of the above strategy, it's all I can tell you.

I want you to directly comment on the use of water because in my understanding the GAO report suggests that it -- it takes five barrels of water to produce one barrel of oil. You say that -- that more likely that it's one barrel of water for three barrels of oil. Is that because of advances in technology or -- or the feeling that we can -- we can make those advances and that's our goal.

DAMMER: Well, I -- I think the genesis of that statement is that companies like Shell, Exxon, TOTAL, Red Leaf, have been out on the ground for some period of time. A number of those companies have pilot projects.

In the case of Red Leaf we run a pilot project so we know exactly how much water we were using and we were using, actually, less than one barrel of water per barrel of oil sale produced. And -- and most of that water was for domestic consumption and -- and dust control.

So there's -- there's -- there's a gap between what's going on in the industry and what's being talked about by these various reports and what not.

HARRIS: OK.

Thank you very much. And as you said -- I mean, the purpose of the Energy Policy Act was trying to answer some of those questions.

Mr. Todd, you -- you know, thank you for all the work the company has done. Just out of curiosity, were there -- because you say, you know, you don't really want any loans or programs or grants or whatever and that's kind of too bad because I think the money in your company would be much better than Solyndra for instance. Probably much better spent.

What is the -- the price per barrel that is going to cost you -- that ultimately would -- when you begin this production can you give us an idea about what the price per barrel producing is from the oil sands using your technology?

TODD: We estimate our operating cost at under \$30 a barrel and we estimate the economic limit to be about \$50 a barrel price to -- to -- to allow it to go ahead.

HARRIS: So even at today's relatively -- I hate to say relatively depressed price of Midwest oil compared to the world, but, you know, roughly \$97, \$96 a barrel, whatever it was in the last few days, it's -- it's economically -- again, the Department of energy testified that it has to be economically viable and clearly that's economically viable in today's oil market.

TODD: Absolutely. Because one of the problems we have in oil sand side in the federal level is -- is to lump oil sand and oil shale together. They're different resources, they're both very large, they both occur in the western states. That's about...

(CROSSTALK)

HARRIS: And they both start with oil.

TODD: But -- but -- but the fact is that the technologies of -- of developing oil sand are -- have been well at play. Our company has a unique (inaudible) in Canada. We're -- we're -- we've got 2 million barrels a day. It's hardly unconventional anymore.

HARRIS: Yes, I know. Thank you very much and I will probably in the second round, but I want to recognize Mr. Tonko for five minutes.

TONKO: Thank you, Mr. Chair.

Mr. Dammer, the -- since oil shale companies have secured thousands of acres of oil shale resources in Utah and have apparently secured funding to move forward with a commercial oil shale development program on these lands, why do you think it necessary for the federal government to make millions of acres of federal lands available for the commercial developments since, A, large amounts of federal lands have already been available for oil shale development; B, millions of acres of oil shale resources in the west are already in the hands of private industry, none of which to date have been commercially developed; and, C, it seems that ample oil shale resources have been acquired to move forward with the commercial program.

DAMMER: I think -- I think the short answer to that is -- is the economics. The richest oil shale on earth is located in the Piceance Basin of Colorado. It's a relatively small area, but it's the area where the RD&D leases are located. That's where Shell, Amso, Exxon, and Chevron want to deploy their institute technologies. And the reason for that is, is that in that particular region the pay zone in the middle of the Piceance Basin is a thousand foot thick. All right?

So there's about a thousand foot of overburden and then there's about a thousand foot of pay, a very, very high quality consistent oil shale. So what they want to do is they want to put those electric heaters down into that very thick

pay. Keep in mind you -- you would be heating that hold column of thousand foot and the payoff for that is tremendous.

Shell incidentally believes that they will produce a million to 1.2 million barrels per acre. There's no conventional oil play on earth that is that productive and that concentrated.

So that's -- that's the story with the Piceance Basin.

TONKO: And with the state in private lands that exist along with the proposed research leases in PEIS. Are those not enough in terms of area or land space?

DAMMER: Well they reduced -- they've reduced the land space from 2 million to somewhere below 500,000 acres. The thought is, no, that -- that is not enough land.

TONKO: Even for research and commercial pilots?

DAMMER: For commercialization. The -- the 2 million acres that were -- that were the preferred alternative in the original regulations were 2 million acres. So what's happened is that amount of land has been carved back to somewhere below 500,000 acres. And, yes, that -- that the -- the answer to your question is that's not enough open land.

TONKO: OK.

In support of -- of -- of this discussion I would ask that the wilderness society document outlining the private and state land leasing for oil shale be included if we might, Mr. Chair, in the record?

HARRIS: Without objection.

TONKO: Thank you.

And the oil shale industry has a very long history of grant failures which have (inaudible) enormous costs to investors and to taxpayers and certainly the environment. Yet today we're talking about it as this resource of the future as if it's some new idea that has not seen a century of attempts with no return on investment.

GAO just testified that their project to assess the water impacts of oil shale was complicated by the fact that the technologies were not mature enough to inform a precise assessment. Yet here we are hearing that it's a proven commercial-ready technology and all you need is the federal land to make it happen.

Mr. Dammer and Ms. Julian, what -- what has changed to -- to perhaps have us think differently here?

DAMMER: Well, I -- I don't want to correct you, but I -- I -- I don't think we said that -- that these were ready for commercial -- to be commercialized. There is no commercial oil shale development project, but what I -- what I would say is that there has been a lot of private R&D that's gone in to these technologies.

Shell has spent hundreds and hundreds of millions of private capital out on their site in Colorado. They have a -- they have a very good idea of what their water usage is and their energy return on investment, as does Red Leaf Resources Incorporated who has run a pilot.

So...

(CROSSTALK)

TONKO: And has that research provided for any different approach or would it be the same -- it's the same effort with the same potential impacts on water and the environment?

DAMMER: Well, I think -- I think the Institute Technology and the -- the -- the Red Lead Technology which is a modified into two is unlike any other kind of technology that you might hark back to -- to the 80's where the surface retort was (inaudible) and -- and, you know room and pillar mining and surface mining were being considered.

That's not to say that surface retorts haven't improved their technology remarkably, but this is not your grandfathers oil shale industry anymore just as with shale gas technology 10 years ago. I've been in the oil and gas business for a long time. Ten years ago people were saying you would never be able to deviate a well into a -- into a shallow conventional shale reservoir that's 10,000 feet deep and put out a long reach horizontal well and another 10,000 feet. People would have laughed at this. So, I mean, it's a technological play that's evolving and -- and it's evolving very fast.

TONKO: Thank you.

Mr. Chair, I yield back.

HARRIS: Thank you very much.

And again we'll have a second round here.

Ms. Julian, in your written testimony you state that as any operator will tell you coal, oil, gas, winds, solar, shale, sands, et cetera, working on state land is not only more clearly streamlined, but consistently regulated. Could you please expand upon some of those lessons from Utah with regard to the permitting process or energy regulation with regards to state versus federal?

JULIAN: Sure.

In the state of Utah our regular -- regulatory policy is laid out pretty simply. We completely lay everything out on the table and we really want it to be an expeditious business-friendly process.

It's not subject to interpretation as much federal regulation is which creates a delay in -- in terms of into a judiciary system. The process to improve everything from air and water permits to mining permits in the last three to four years is -- the timeline has decreased significantly where some permits can be done in 90 to 120 days.

And some of the things that we do in the state of Utah is we put all the regulators in the room together for an entire project and we have them work it out together with the company all at the same time and say, "What are the timelines? What are the obstacles? Where do we need to go through for this?" and just getting them in the same room and having these predesigned meetings has cut down on all kinds of things that regulatory agencies go through on a federal level that turn into a judiciary-type situation where you have lawsuits delaying projects and perhaps losing private investments that happens with the federal entities.

HARRIS: Thank you.

I would like to ask unanimous consent to enter into the records the following three documents from the state of Utah -- the Utah's economic development plan, Utah's 10 year strategy and energy plan that's called energy initiatives and imperatives, and Utah's response to the BLM's draft, programmatic environmental impact statement for oil shale and tar sands.

So without objection so ordered.

Thank you very much.

Specifically, you know, you discussed Governor Herbert's 10 year strategic energy plan. Are there any particular examples from the plan you would like to highlight with regard to regulations streamline development coordination long term planning? Anything that you'd suggest to the federal government adopt some kind of similar strategies?

JULIAN: Sure.

There were eight recommendations that came out of the plan from the task force. One of them was to increase transparency to really look at the regulatory system, the licensing system, put it on line, have people see exactly where it's at, and a just regulatory framework to technology. Modernize it.

Some of the things that we looked at and the way that we looked at regulatory processes are decades old. We haven't changed it. Technology has changed. Some of these processes were put in place before there were cellphones, before there were other -- other messages -- excuse me, methods of technology and we haven't sped up the regulatory process to keep up with technology.

HARRIS: Again, thank you.

Now, Mr. Andersen, with regards to your technology I understand that one of its usefulness is actually can be -- to direct how the drill -- horizontal drilling occurs. Is that right? The -- by detecting the -- by doing -- well, by seismic detections as you're drilling?

ANDERSEN: You could do that also. That's not one of the -- I guess parts that we're pushing here, but basically you put a bunch of sensors in the ground (inaudible) trying to (inaudible) some event that's occurring and knowing exactly in three dimensions where it is be it a fracture occurring or a drill progressing down, you know, to drill a well.

HARRIS: And your -- what you're suggesting is that the technology actually would enable it to be more efficient with regards to the fracturing. Is that right? That we should know exactly where it's occurring and when it's occurring and the extent of it, and whether you're near or you shouldn't be?

ANDERSEN: Absolutely.

And one of the things I -- I primarily talked about here was the environmental effects, but in reality there's a big efficiency improvement. I was a -- in a frac job down with a -- in Fayetteville Shale about a year ago and I was talking to the geophysicists we have there doing the frac monitoring. And, you know, I asked her and I said, "What's your interest in this? Why are you monitoring, a lot of the other guys aren't?" He says, "Well, you know, we have a certain amount of acreage. We want to maximize how much we get out of that field. If we don't monitor we have to guess how far we space the wells because we're not sure where the fractures are occurring. So, if you put it too close you'll have thief zones and the fracture would leak into a previous fracked area."

So the point was, is their thought if they could get this done inexpensively they would do this on all their frac jobs and it will allow them to get maybe 30 percent, 35 percent more pout of the fields where I've been leaving areas just untouched.

HARRIS: So, in essence that also relatively reduces the amount of -- the environmental impact per, you know, million BTU of gas extracted from a gas well for instance. Right? Because you're extracting more from the same bore hole.

ANDERSEN: Exactly.

And -- and one other point is that, you know, I was talking -- we had an investor day at my plant yesterday and I was talking to one of our clients who, you know, does a lot of fracs and he says, you know, typically you might do stages like six or eight stages, half of them may not produce but you don't know because you're not monitoring it so you're not, you know, seeing the effects so there'd be a lot of efficiency improvements if you monitor 100 percent.

HARRIS: And the bottom line is, two years ago that technology just didn't exist.

ANDERSEN: Did not exist. That is correct.

HARRIS: So, you know, as we look in -- and the whole purpose of the hearing is to -- is to look at -- at research and development of unconventional oil and gas. I personally believe -- and I'm going to ask you whether you agree, but I suspect you do that we -- is to do technological improvement, that we will actually improve and increase the amount of available unconventional oil and gas. And I think your product is are perfect example how you do it through technology.

ANDERSEN: I agree 100 percent.

I am, just real quickly. You know, they are talking in the 70's that oil -- peak oil reach, energy is going down, but then, you know, here technology came along hydrofracking, you know, you look at it and starting around 2008 it's going up. You know, technology has done that.

And what I'm worried about is, you know, that whole evolution could get slowed down by, you know, people who have concerns about the safety of it. And we could monitor that. And the technology exist to do that and if some events start happening they could be corrected before there's any significant environmental damage.

HARRIS: You know, this is -- it's great. I'm a firm believer in technology.

I wish, you know, we had invited ATK, a company that has some presence in my district, but I know you may or may not be familiar with. It's doing the propellant fracturing. So...

(CROSSTALK)

HARRIS: ...water and -- and -- and, you know, they claim they can roughly double the yield of wells of their test wells done with that technology.

Now, you combine that with your (inaudible) and all of a sudden you -- you know, we've got -- we've got potentials that we knew nothing about two or three years ago which is always exciting.

With that, Mr. Todd, briefly and I'm going to...

TODD: If you don't mind I -- I might build on the same point relative to water. The last company that I worked for in in-situ oil sand developer in Canada, we were the first company to use a new water recycling technology that's been developed and acquired by G.E., it was a -- it allowed us to get the highest water recycle that's ever been achieved in the oil sands to date. That's a technology that did not exist five years prior. It's now standard practice. And it couldn't have existed if we'd had have the answer before we were allowed to get access to the resource.

As you start on the projects and you start small you identify the problems and the opportunities, and technology works along with you. But if you have to solve it all before you get started you can never...

(CROSSTALK)

HARRIS: Thank you very much.

Mr. Tonko?

TONKO: Thank you, Mr. Chair.

Ms. Julian and Mr. Dammer, there seems to be an apparent difference in public acceptance in Utah versus Colorado. Can you speak to that, please?

JULIAN: There is public opinion difference, definitely, in Colorado versus Utah, and much of that is that some of those folks that aren't interested in oil shale development actually don't live in those regions or areas and so they are

worried about those particular concerns because they're not in the area, they're -- they're not aware of the jobs, the economic benefits to that community, and the fact that it isn't just about water availability, it's -- it's how you use the water.

And so, Colorado and Utah do have somewhat of a difference. Even though Colorado has a great resource the state of Utah is open for business and many oil shale and oil sands companies are coming over the border to do business with us.

TONKO: Mr. Dammer?

DAMMER: Well, I -- I think that Utah has an entirely different -- different attitude toward commerce and development than Colorado has. Colorado is very much more diverse. I got a letter -- I guess it was last night that said that a number of -- of mayors had objected to the expansion of -- of oil shale lands to 2 million and they were back in the 400 and something thousand (ph) acre.

And one -- one of the objectors was from Carbondale. Well Carbondale is -- is southeast and halfway to Aspen. So there's a lot of -- there's a lot of recreational -- there's a lot of retirement- type of activity out and around Rifle and the Piceance Basin. And I think one of the challenges for oil shale development is going to be how are you going to responsibly and sustainably build that industry in that area. It's -- it's going to be different.

The other side of the coin is -- is that three county commissioners -- Mason County, Garfield County, and Rio Blanco County -- wrote the opposite letter saying that we represent the people of these counties and we support the 2 million acre.

But what you're seeing in Colorado that I don't think you're seeing in Utah is you see retirement communities that are not interested in mineral development. But if you go in to these towns and talk to people that have to shift their kids down to Aspen that serves Starbuck's coffee, the -- the people in the area they're interested in high-paying jobs. So it's a -- it's a push and pull.

I worked in Utah and it is open for business. It's -- it's an entirely different environment.

(CROSSTALK)

TONKO: I'm sorry.

JULIAN: I'm sorry.

I would also add to it that I think people don't realize that you can have both. You can have environmental sustainability and energy development. It's not mutually exclusive. These things can happen together. You can have prosperity and economic development and jobs -- ripple effects to -- to -- into the school systems.

And you can still have tourism. You can still have your endangered species and all of the species that (inaudible) plant life survive and thrive. And you can still have other industries such as agriculture and hunting. It can be done together. It is, again, not mutually exclusive.

TONKO: My understanding is that the processes used in Estonia have created massive environmental damage there. Would we use that same process here?

DAMMER: No, sir.

I worked in Estonia for several years. You're exactly right. The old antiquated surface retorts that they use there are pretty nasty business. They produce a lot of semicoke. You know, they call them the Estonian Alps.

To the credit of Enefit which is their -- they have a U.S. subsidiary now called Enefit American Oil and they own -- they own a -- they own land in Utah. They refine that retort. I can't tell you exactly all the technical details of it, but it's -- it's much improved, but you would never want the retorts that are operating -- operating in Estonia to come to the United States.

As with the -- as with the Chinese retorts, the Fushun retorts. Those are horrible and nasty things.

TONKO: The -- many of you have made reference to the technologies that produce water. What's the quality of this water compared to that which already exists on the surface?

TODD: You know, in our case the water is -- is -- is a freshwater that -- that -- that we produce. We don't actually discharge water. The water that -- that -- that we lose is essentially water that evaporates and is coating the sand grains. And so, it's like putting wet beach sand on the ground. It's -- it's got water entrained in it and -- and that's all the water that's -- that's used in our process.

TONKO: I believe I'm out of time so I yield back, Mr. Chair.

HARRIS: If you have additional question -- take a little extra time if you want to ask another question.

TONKO: If I could just ask Mr. Todd about the -- in terms of commercial readiness what is the difference between oil sands and oil shale?

TODD: There -- there are many, many differences and we can go back to the chemistry of it all. But -- but oil sands have oil in them. It's -- it's oil that's ready to go into a refinery.

And so when we produce our oil it -- it will go direct to refining. It does not require to be upgraded. It's not a kerogen, it is oil.

It's heavier and -- and it requires some technical dealing with viscosity. Those are chemical problems to be dealt with.

The -- the kerogen that -- that they both started off in the shale, all the oil and gas in the world started off in shale, the stuff that -- that migrated out of -- out of the shale after it became mature became oil and gas. And then oil if it came close to the surface as it has in Utah and the surface was eroded away and that oil came into contact with the atmosphere, the light ends of the oil would run off and what would be left of it is very heavy and that's why it's hard to get out of the ground.

And then on the other hand what's left in the shale is still -- needed to be cooked, but unfortunately it wasn't -- it wasn't left buried long enough and so now it needs to be cooked manmade to get it out.

So they're very -- two completely different problems. One is the oldest oil in the world and one is the youngest oil in the world.

TONKO: OK.

Mr. Chair, in support of the discussion we've been having I ask that the nine-page report by the Checks and Balances Project titled "A Century of Failure" be included in the record.

HARRIS: Without objection so ordered.

TONKO: Thank you.

And also a -- a compilation of expert quotes titled Not Ready for Prime Time, expressing opinions about the

commercial readiness of the oil shale also prepared by the Checks and Balances Project, be -- be included in the record.

HARRIS: Without objection so ordered.

TONKO: Thank you, sir.

HARRIS: Thank you.

I'm going to ask unanimous consent to enter into the record three resolutions passed by the board of county commissioners for Garfield, Mason, and Rio Blanco Counties, Colorado opposing the U.S. Bureau of Land Management's 2012 oil shale and tar sands programmatic environmental impact statement for lands administered by the BLM in Colorado, Utah, and Wyoming.

Additionally, I'd ask unanimous consent to enter into the record two additional documents -- a white paper co-authored by Mr. Dammer entitled, "Economic Impact of failure to Implement Legislative Mandates of Section 369 of Energy Policy Act of 2005", and a letter from Dr. Deg Newman -- Newmetal (ph) and Dr. Jeremy Boak with the Colorado School of Mines regarding unconventional oil and gas development.

Without objection so ordered.

I want to thank the witnesses for their valuable testimony and the members for their questions. The members of the committee may have additional questions for you and we ask you to respond to those in writing. The record will remain open for two weeks for additional comments for members.

The witnesses are excused. Thank you all very much for coming. The hearing is now adjourned.

END

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