whatever--but when we reach that point, we will have about 30 years of oil remaining in the world. And that is all due to efficiency. So, you know, I am a big supporter of efficiency. We can do--we can live just as well and just as comfortably and be a whole lot more efficient, and we have demonstrated we can do that.

And just thinking about the problem--in California, they have now reduced their use by 11 percent. That is probably mostly conservation rather than efficiency, but I don't know how you tell the difference between conservation and efficiency. You end up using less and you either are more efficient in the way you use it or you just do without and end up using less.

But we really need to focus on all of these aspects if we are going to be successful in the future. And I think that renewables are too little appreciated and too little supported, and particularly renewables from agriculture. We have an enormous opportunity to get more energy from agriculture, and I would hope that we would focus on that.

Let me ask other members of our Committee here if they have additional questions to the panelists.

Mr. SMITH. Mr. Chairman, thank you. One short question, maybe in terms to Ms. Abend. If--in the existing environment, if there was no additional tax credits, if there was no additional federal money, how much higher do you think energy
prices would have to be for the private sector to come in and
build wind or solar generating--additional wind or
solar-generating capacity?

Ms. ABEND. I think that wind and solar technologies--it
is a matter of building these programs on a-large enough
scale so that they can be cost competitive. Like I said--

Mr. SMITH. Why doesn't the--

Ms. ABEND. Like I said, wind energy actually is already--

Mr. SMITH. Why doesn't the private sector do it now?

Ms. ABEND. Well, one thing to think about is that energy
efficiency--or renewable energy programs, rather, aren't
receiving the same subsidies as fossil fuels and nuclear
power have received historically. So there really isn't that
level playing field there. Also, fossil fuel and
energy--fossil fuel and nuclear energy are mature industries
that are already--you know, have enough money to fund their
own research. That is why the argument here is not that we
don't want cleaner coal, but that--

Mr. SMITH. No. No. But still--

Ms. ABEND. --the coal industry should fund their
research--

Mr. SMITH. --back to my question. Again, for the private
sector to do it, then they have got to have some assurance
that they can make a profit. And if they--if energy prices
were doubled--and I appreciate there is a significant
variation of energy prices across the country—but if energy
prices were doubled, would the private sector be billed more
generating capacity through water or solar or wind?

Ms. ABEND. I don't know what the threshold point is in
terms of the price of energy and increasing-renewable
energies, but we can't necessarily control that factor as
well as we control how much funding that we provide to these
renewable energy sources in order to give them that boost,
and, at the very least, take away the funding from the older,
more mature industries and create that more level playing
field.

Mr. SMITH. Mr. Kripowicz.

Mr. KRIPOWICZ. I am sorry. I don't know what that price
would be except I would--

Mr. SMITH. I guess maybe the question is, if the price of
energy went up as much nationally as it has in California, as
a percentage increase, where would the--where would the
private sector—how would the private sector move to generate
energy?

Mr. KRIPOWICZ. The private sector would still build the
cheapest thing available, so they would end up still building
natural gas plants and coal plants and nuclear energy—

Mr. SMITH. But here again--

Mr. KRIPOWICZ. --and then possibly, renewable, if it is
more expensive. Now, wind is a category that it fits in
Mr. SMITH. Natural gas has almost tripled in the last year. I--

Mr. KRIPOWICZ. It is about doubled now. The price is about $4 compared to--it was down below $2 about a year-and-a-half ago.

Mr. SMITH. Well, I mean, that is part of the question. In terms of--and I appreciate the fact that we can subsidize some of the industries that might give them an advantage over the other sectors, but in the long run, it can't be a continuous government subsidy to generate electricity.

Consumers are ultimately going to have to pay the price that motivates that kind of generation as we increase our usage and the customers are ultimately going to have to pay to assure that the environment is safeguarded in that generation. Thank you, Mr. Chairman.

Chairman BARTLETT. Thank you. Mr. Kripowicz, you have recommended a $2 billion proposed spending on clean coal technology over the next 10 years.

Mr. KRIPOWICZ. The President has. Yes, sir. As of Chair

Chairman BARTLETT. The President. For this year, you have asked for 150 million. You are not going to ask for all the rest of it next year. Are you?

Mr. KRIPOWICZ. No, sir. We are right now in the process of constructing a 10-year program to review it with...
Chairman BARTLETT. Could you, for the record, provide that information for us so that we, in our planning, can look ahead to--

Mr. KRIPOWICZ. Whenever we have that information, we will make it available to the Committee. Yes, sir.

Chairman BARTLETT. Thank you very much. I had said earlier that I was going to invite members of the Panel to pose questions to other members of the Panel if the members of--on the Committee here have not asked those questions. Are there comments made by other members of the Panel that need additional elucidation that pose a question from you? I would like to give you this opportunity now to pose such questions for the record or for answer here if they are short.

Ms. ABEND. I would like to ask Mr. Yamagata--you talked about improving efficiency at coal-fired power plants and carbon dioxide pollution. If that is an option, then I would like to know whether you support--whether you support legislation like S.60, which would--the Clean Air Act. Do you think that you be able to meet the standards of the Clean Air Act?

Mr. YAMAGATA. I know that the safe harbor provision that was applied in the first draft that has been introduced of S.60, which is legislation that has been introduced on the Senate side by Senators Byrd, McConnell, and, as Ms. Abend
The Clean Coal Power Initiative (CCPI) is a key component of the National Energy Policy that will address advanced technology on coal-fired power plants. The CCPI represents a planned government investment of $2 billion over 10 years in a cooperative, cost-shared program with industry to demonstrate emerging technologies in coal-based power generation and to accelerate their deployment commercially. It is anticipated that the program would be implemented through a series of competitive solicitations. A review to determine the scope and content of the program will be conducted later this year. When the review is completed, the results will be provided to the Committee.
said, I believe 23 other senators. And a provision in that
bill was with reference to those plants, particularly
advanced coal technology plants, to have a safe harbor from
provisions of the Clean Air Act. What I can say is that the
concerns that have been expressed by the environmental
community and others are in the process of being considered
and also that provision is being redrafted. How it is being
redrafted, I don’t know.

But it wasn’t an intent to skirt the provisions of the
Clean Air Act. It was an intent to say, we may have some
difficulties, as we do new technology, that is going to run
up against requirements in the Clean Air Act and that we need
to try and take away that uncertainty for a period of time so
that someone will, or that developers will, in fact, go
forward with those technologies. There was never an intent to
simply place the Clean Air Act on hold for the life of those
facilities.

Chairman BARTLETT. Thank you very much. I would just like
to note, Ms. Abend, that not only am I a supporter of
renewables, I am a user of photovoltaic and for a number of
years now and very familiar with that technology and very
couraged about its future. Once made and in place, you have
about 30 years absolutely trouble-free and totally
pollution-free performance from photovoltaics. And I would
like to see them a much bigger part of our electric
By the way, another big advantage is that they are, by definition, distributed—they are disbursed a little here and a little there so that we do away with a lot of line losses. When you have big power plants sending power for a long distance, that is a lot of line loss. Which is, by the way, the reason that Saudi Arabia was—and I suspect they may still be—the world's largest purchaser of solar cells with all of that oil. And the reason is, they have small communities widely separated and building a big power plant with all the line losses doesn't make any sense for them. So they sell the oil to us and buy from us the solar cells. It just makes a whole lot more sense for them. And that distributed production generation will pay big benefits in this country from reduced line losses also.

Let me now thank this Panel and excuse them. And Mr. Kripowicz will stay with us because he has given his opening statement for the next Panel, but he is a participant also in that next Panel. Thank you very much for your testimony.

--members of our second Panel. In addition to Mr. Kripowicz, who is staying on from our first Panel. We have Mr. Lazenby.

Unidentified SPEAKER. Ms.

Chairman BARTLETT. Ms. Oh. I am sorry. Ms. Lazenby. GiGi, the queen of the strippers, is with us today. And Mr. Cuneo,
Vice President and Chief Information Officer of Equiva
Services, LLC, Houston, Texas. And he is here on behalf of
the American Petroleum Institute. Dr. Craig Van Kirk,
Professor of Petroleum Engineering and Head of the Department
of Petroleum Engineering, Colorado School of Mines, Golden,
Colorado; and Alan Huffman, Manager of Seismic Imaging
Technology Center, Conoco, Incorporated, Houston, Tex.

Thank you very much for joining us. And Mr. Kripowicz has
already given his testimony in the prior panel. So we will
turn now to GiGi.
STATEMENT OF VIRGINIA B. LAZENBY, CHAIRMAN AND CEO, BRETAGNE, GP, NASHVILLE, TENNESSEE, ON BEHALF OF THE INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA

Ms. LAZENBY. Good morning, Chairman Bartlett, members of the Subcommittee. My name is Virginia Lazenby and I am the Chairman of Bretagne, an oil and gas-producing company in Kentucky. I am pleased to be here today on behalf of the Independent Petroleum Association of America and the National Stripper Well Association. We represent 5,000 oil and natural gas producers in 35 states. IPAA and NSWA welcome the opportunity to testify on the important role we believe oil and natural gas research and development programs play in the advancement of a viable, sustainable national energy policy.

IPAA’s membership constitutes both large and small independents contributing 50 to 65 percent, respectively, of domestic petroleum and natural gas production in the lower 48 states, and we employ 336,000 people. My company produces from high--from low volume, high cost stripper or marginal wells and we employ 36 employees and have a payroll of approximately $850,000 annually.

The report issued on May 17 by Vice President Cheney’s Task Force on National Energy Policy Development, addressed both the Nation’s short and long term energy needs. The report cites the Energy Information Administration estimate that by the year 2020, the United States will need about 50
percent more natural gas and 1/3 more oil to meet growing
demand. I am sorry—to meet growing demand.

Meeting this formidable set of challenges will be
complicated by events in the recent past. The damage to the
industry from extremely low oil and natural-gas prices in '98
and '99 is affecting supply today and will continue to do so
until the industry has a chance to recover. It will take time
to build new drilling rigs and provide the skilled services
that are necessary to rejuvenate the industry.

Research and development, in many instances, are the last
to receive support. Ironically, it is the strides made within
the R&D community in recent years through programs such as
those administered to the Department of Energy's Office of
Fuel--of Fossil Energy that can be critical to many
producers' economic survival. The current price of oil is
helpful, but price alone does not save fields. Technology was
and is a necessity.

Many exploration and production R&D advancements are
documented in the Department of Energy's report,
''Environmental Benefits of Advanced Oil and Gas Exploration
and Production Technology.'' Quoting from the report, ''In
the past 3 decades, the petroleum industry has transformed
itself into a high-technology industry. Ongoing advances in
E&P productivity are essential if producers are to keep pace
with steadily growing demands for oil and gas. Progressively
cleaner, less intrusive, and more efficient technology will
be instrumental in enhancing environmental protection in the
future.''

According to the National Energy Report, anywhere from 30
to 70 percent of the oil and 10 to 20 percent of natural gas
is not recovered in initial field development. Enhanced oil
recovery projects could add about 60 billion barrels of oil
nationwide through the use of existing fields.

My company has utilized nitrogen huff-and-puff process to
increase production from a mature Appalachian oil field and
we have increased production from 100 barrels of oil per day
to 500 barrels of oil per day. And, Mr. Chairman, we have
recovered, in our project, 240,000 barrels from this field
and we expect to get an additional million--a total of
1,700,000 barrels. That is 4.5 percent of the oil in place.

Bretagne developed and owns the patent on this process,
but we need more refinements in technology to keep costs
down. And to that end, Bretagne has partnered with Penn
State, through the Stripper Well Consortium, in the
development of a chamber lift technology to produce
stripper--to--for producing stripper wells that requires no
expensive pump jack and significantly less electricity, which
goes to the point of conservation that you discussed earlier.
The Stripper Well Consortium is an industry-driven
organization that receives base funding and guidance from the
Department of Energy's Office of Fuel--of Fossil Energy--excuse me--and the New York State Energy Research and Development Authority. By pooling financial and human resources, the Stripper Well Consortium can economically develop technologies that would extend the life and production of the Nation's stripper wells.

Programs such as the Petroleum Technology Transfer Council, a joint public-private partnership between the entire independent producing community and the Department of Energy, and the Stripper Well Consortium, provide badly needed research and development capital.

For the foreseeable future, the Nation will be dependent on fossil fuels. Petroleum and natural gas currently account for approximately 65 percent of the Nation's energy supply and will continue to be the significant energy source. The development of any domestic energy policy must recognize this reality. Oil and natural gas research and development holds the key to the maximum utilization of the Nation's energy resource base in a manner that represents as few environmental consequences as possible. Technology can help us get there and the public-private projects sponsored by the industry and the Department of Energy are an excellent way to encourage the development of the technology our Nation needs to develop a viable, sustainable energy future. Thank you.

[Statement of Ms. Lazenby follows:]

Obtained and made public by the Natural Resources Defense Council, May 2002
Obtained and made public by the Natural Resources Defense Council, May 2002
Chairman BARTLETT. Thank you very much, Mr. Cuneo.
STATEMENT OF PAUL CUNEO, VICE PRESIDENT AND CHIEF INFORMATION OFFICER, EQUIVA SERVICES, LLC, HOUSTON, TEXAS, ON BEHALF OF THE AMERICAN PETROLEUM INSTITUTE

Mr. CUNEO. Mr. Chairman, thank you for inviting me to testify today on the remarkable technological developments that have been made over the past several years in the downstream sector of the petroleum industry. I am testifying today on behalf of the American Petroleum Institute, a national trade association whose members are engaged in all aspects of the petroleum industry, including exploration, production, refining, distribution, and marketing.

Americans depend on our industry to keep the U.S. economy moving as never before. In our expanding economy, we provide hundreds of products made from petroleum in volumes that would not be possible if we were not for developing new technologies that have made our industry more productive, more efficient, and more economically viable.

Mr. Chairman, I would like to focus on three areas of technology advancements with my testimony today. First in the area of refineries, then pipelines, and then in fuel for vehicles of the future.

In the areas of refining, as you know, demand for gasoline this year is at record levels. To meet it, refineries have been running all out, around 97 percent of capacity. Just a few years ago, this feat would have been
difficult, if not impossible, but development of new computerized process control and online optimization technologies make it possible for refineries to run harder and make more products than at any other time in our history while improving safety and environmental performance.

In 1981, just 2 decades ago, there were 315 refineries in the United States. Today, that number is 155. Two decades ago, we produced 6.4 million barrels a day of gasoline and today we are producing 8.5 million barrels a day of gasoline to meet the American public's demand. And we continue to produce additional products, such as jet fuel, heating oil, diesel fuel, and other much-needed products which fuel not only our transportation sector, but our chemical industry as well.

The industry has had to invent new refining processes to meet current and future product specifications and to meet environmental regulations. One example of that is the industry has developed successfully a catalytic distillation process to commercialize and produce MTBE. And you also use this technology in order to reduce sulfur in gasoline to make the future low-sulfur gasoline required by environmental regulations. Another example are flue-gas scrubbing processes which have been applied to catalytic cracking units that reduce SOx and particulate emissions while enabling our existing plants to process a wider variety of feed stocks.
Petroleum refining is one of the most energy-intensive of
our manufacturing processes in America. And, yet, today, many
refineries are running and have seen their own energy
consumption drop by 30 percent. Still, there is more
opportunity and more activities to be undertaken to reduce
energy consumption in the refining sector, and greenhouse gas
emissions as well.

One goal in improving technology is to take advantage of
the byproducts produced in the refining processes and ensure
that they are fully upgraded and converted through our modern
clean-burning gasoline and diesel fuels. The refining
industry has been a real example of using byproducts from
refineries to produce excess steam and hydrogen and even
energy—in many cases, electrical energy.

Those of us in the refining industry take pride in a
holistic approach to the future. And by that, I mean we
consider the environmental benefits side by side with
decisions on increasing capacity and improving efficiencies.

New technologies have been developed to monitor so-called
fugitive emissions from refinery valves, pumps, compressors,
and other critical areas. A refinery worker will soon be able
to walk around with a portable device based on an infrared
laser and an imaging system to pinpoint unwanted hydrocarbon
emissions and correct the leaks.

Information technology is enabling refiners to develop
online sensors to analyze the chemical makeup of crude oil as it arrives at the refinery, making it possible to turn it into various products faster and more efficiently with reduced emissions.

In recent years, there have been dramatic advances in the use of catalysts. Catalysts today are converting materials into low sulfur gasoline and diesel components from poor quality crude in ways that have never been done in the past.

- We are also refining used lubricating oil needed for today's vehicles and for many other applications in today's industrial economy. Today's modern lubricants contain synthetic components that reduce vehicle gasoline consumption and do an even better job of reducing engine wear, naturally occurring components. We have developed better processes to take out solvents that sharply reduce the amount of heat used in the lubricant manufacturing process.

Mr. Chairman, our industry is pleased to see the President's National Energy Plan include proposals designed to overcome regulatory obstacles that often make it difficult for the refining industry to install new equipment that incorporates the type of technological advances we are discussing here today.

In the arena of pipelines, computers have also transformed the pipelines that carry gasoline and other fuels from refineries to distribution points all over the country.
Instantaneous communications along hundreds of miles of pipeline keep a variety of fuels flowing smoothly and permit an instant shutdown should a break in the line occur. The reaction is so fast that little liquid escapes before the flow is stopped. Information travels by satellite, microwave, and fiber optic wiring to centralized control centers.

Smart pigs, computerized sensors that look like giant rubber bullets, travel through pipelines to detect thinning caused by corrosion and construction gouges that could, in turn, eventually mean a broken line. The most advanced kind of smart pigs contain ultrasonic sensors that identify the tiniest of cracks, dents, and gouges on the interior of the pipeline. Some of these devices can even change size permitting them to move through different-sized pipelines and past gate valves.

When we look to the future for fuels and advanced vehicle technologies, we believe that ultimately one of the most significant parts of this story will be a new chapter on fuel cells. No one is certain what the fuels and cars of the future are going to look like, but a pattern is emerging. Our children and grandchildren will be driving vehicles that are safer, cleaner, and more efficient than any in history. In the next 5 to 15 years, they will probably be powered by an internal combustion engine that is much cleaner and more efficient today, and long term by fuel cells. Either
proposition system will use an advanced, ultra-clean gasoline
provided by the U.S. refining industry.

Mr. Chairman, what I have offered here today has been a
taste of the many fast-moving technological developments in
our industry. There are two thoughts that I would like to
leave with you. First, new technologies will continue to
allow our industry to be more productive and efficient while
at the same time improving our environmental performance.
And, second, that industry and government should cooperate in
research in these areas. Thank you for inviting me here
today.

[Statement of Mr. Cuneo follows:]

****************** INSERT 9 ******************
Chairman BARTLETT. Thank you very much, Mr. Van Kirk.
Mr. VAN KIRK. Is that about the right distance for the microphone? Thank you very much for the invitation to come here today to be of some assistance. My name is Craig Van Kirk. I am a Professor and Head of the Petroleum Engineering Department at the Colorado School of Mines and have been for 21 years.

Just last week, Monday and Tuesday, I was in Houston for a first-of-a-kind, invitation-only meeting of international, American oil companies and American universities and international universities also and a representative of the Department of Energy. And we met for 2 days to discuss today’s and near-term and long-term research needs of the oil industry, upstream, exploration and production. The oil companies and the service companies shared their needs with us representing the universities and we shared our needs and our capabilities and our areas of interest and expertise with them. As I say, this was the first time a meeting called for this particular kind of venue and we had an excellent conversation and plan to meet again in October to further these discussions and have some more concrete plans.

Imagine our abilities in the petroleum industry and petroleum engineering, in particular. We can drill seven
miles into the earth. We can drill in one to two miles deep oceans around the earth. We produce products for the benefit of society and have for many, many decades, all over the world. And not just energy. I appreciate that the major concern of today's discussions are energy, but petroleum and crude oil and natural gas production go into the manufacture of many things in this room--the paints, the--probably the curtains, the carpet, the plastic cups, the containers for the water we are drinking. These things are made from the production of petroleum. Sometimes people ask if we are going to run out of petroleum soon or stop producing soon. No. The world will need plastics and materials made from petroleum for hundreds of years. We will continue to produce for hundreds of years for those reasons.

Now, some people think that the petroleum industry is not very high-tech because all they see are big pieces of equipment--offshore drilling platforms or drilling rigs or pumping units. Well, as a matter of fact, the high-tech level of development in the petroleum industry and application is extremely high. And I have included some examples in the written testimony that I submitted to you earlier, and I will just repeat a few right now.

For example, in the area of seismic investigations into the earth's surface, we can see down several miles into the earth and we can create three-dimensional images of what the
earth's subsurface looks like. And this helps us find new resources of oil and gas, new reservoirs. And when we do the 3-D seismic, three-dimensional seismic, over a period of time, we get a time-lapse photograph, if you like, to see where fluids are moving. We call this 4-D, the fourth dimension being time. So we can watch fluids moving around underground, whether it be a shallow movement or a great depth, a mile or two or three miles deep. We can watch fluids move and we can distinguish between types of fluids. This 4-D visualization is a major new endeavor.

Also, horizontal drilling. We can drill directionally from one surface location seven miles laterally, seven miles in another direction. So we can cover an area of 14 miles from one location. Now, this is not routine and we don't do this every day. But directional drilling, to drill several thousand feet or several miles in different directions, to exploit a very large reservoir from a very small footprint, this is a new development that continues to improve with our research.

Now, the fact is that oil and gas do not exist underground in big open pools or rooms like this room. They exist in the pores, small pores of rocks. But at several thousand psi, fluids can flow quite well. Now, based on our technical developments and research and experience through the years--is that a buzzer I need to be concerned about? And