

Why Clean Energy is Critical in Combating Climate Change: Steps to Accelerate America's Low Carbon Power Economy

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Thank you for including the topic of alternative energy on your program. I must say I always find coming to California very rewarding and very inspiring. This is a place where the challenges associated with energy— achieving energy security and protecting the environment—are well understood. And that is not the same everywhere I go, and it's a place where they are being addressed through policy and practical solutions. From my perspective, California is again leading the world with foresight and vision in this area. The state is very important to BP. We have 6,000 employees here and \$3 billion in assets.

It is this favorable environment that has encouraged us to focus many of our Alternative Energy projects here in California. The state represents one of our largest markets for solar. And we are proud to be developing a first-of-its-kind hydrogen power station at our Carson City refinery. I'll talk more about that in a minute.

Today what I want to do is to talk about the challenges of energy. But, more importantly, I want to concentrate on solutions.

At the moment "alternative" energy can still sound like a fringe activity. But 200 years ago so did coal. One hundred years ago so did oil. Thirty years ago so did gas. The mix is constantly changing and is responsive to price, to technology and to need.

Oil responded to the need for mobility. Now new forms of energy are responding to the need for energy security and for lower carbon economies.

In BP we have long been convinced about the issues of climate change. We used to say we have to act because of the precautionary principle. But now, as *Scientific American* said in its headline, "the debate on global warming is over."

Action is urgently required on energy efficiency, on biofuels and on renewables. In BP we are concentrating in all of these. But today I would like to concentrate on one area – clean domestic electricity—or what we call low-carbon power.

And I'd like to give you a few numbers just to show you why power is so important. First of all, looking at where we are today.

The power sector is the world's single largest source of CO² emissions. Globally, and in the United States, it accounts for 40 percent of these emissions. That's twice the level of CO² emissions from the transport sector.

A recent study projected that global CO² emissions will be 75 percent higher than they are today by 2030. That number has been revised upwards by 15 percent just in the last year. As emissions grow, the emissions from power are also going to grow.

One projection, by the Cambridge Energy Research Associates, indicated that power will contribute 50 percent of total global emissions by 2030 if there is no intervention in policy.

That means an additional nine billion tons of CO², and yet transport is only expected to add four billion. So power is the biggest source of man-made carbon emissions. Much of this growth is due to the projected doubling—at least—the projected doubling of coal-fired power, coal, which produces more CO² than gas, oil or other feedstocks when it is burnt to produce electricity.

These numbers set out the scale of the challenge posed by growth in power demand. But I do always prefer to look on the positive side and see this challenge also as an opportunity. Here in the United States, there is a remarkable symmetry in the framing of that opportunity and the solution. I will call it the “50:50:50” solution.

Just to explain to you, of the power generating capacity required in 2030, approximately 50 percent of it has yet to be built. And that's because a lot of old power stations will be retired, and we'll need to rebuild new capacity to meet demands and to replace the old power stations. So if you say of this 50 percent new capacity which has to be built, it seems feasible to set ourselves a challenging but not unrealistic target to say that at least 50 percent of that should come from technologies that are low-carbon.

If we did that - the result would be truly remarkable. It would deliver a 50 percent reduction not in US power emissions—but in the total projected growth by 2030 of all of America's carbon emissions from man-made sources.

So 50 percent of the capacity still needs to be built, if we could make 50 percent of that low-carbon, than we could reduce by 50 percent, the total emissions of man made sources in America. That is the size of the prize we have in front of us, and that's why I think this power sector is worth focusing on.

So renewal of this power sector could well be the turning point in the effort to tackle climate change globally.

This is a massive opportunity for business and indeed policy-makers to work together here to create this low-carbon future. And it's because of this opportunity that we created in BP this business called Alternative Energy.

Alternative Energy brings together all BP's low-carbon power businesses under one roof. It includes BP Solar – a leading, global business that we have built over the past 30 years. It includes our combined cycle gas turbine operations, because natural gas produces half the CO² emissions of coal per unit of power generated, and has a place in the portfolio of low-carbon energy. It includes our plans for projects that generate power from hydrogen with carbon capture and storage. It also includes our newly established and fast-growing wind business.

We will invest \$8 billion dollars, more than \$8bn over the next 10 years in solar, in wind, in low carbon hydrogen power and in gas. I include gas because gas produced half the CO₂ emissions of coal per unit of power, and I do believe it has a place in the portfolio of lower carbon solutions that we need. By doing that, by having this business be alternative energy, we expect the business to reduce forecast CO₂ emissions by more than 24 million tons and that's the same as turning Chicago or the larger part of Los Angeles into a carbon-free zone.

We do intend to demonstrate that low-carbon power is good for the planet, but more importantly that it could be good business. And I firmly believe that the right businesses making money is a very powerful demonstration that this is the way to go.

But of course we need to work with partners, we can't do this alone. Even with 24 million tons of CO₂ emissions is a drop in the ocean, a drop in terms of what's required. We have found a number of partners to work with. We announced a collaboration with General Electric this year to work on carbon capture and hydrogen power technologies. We've worked with partners in Korea to build one of the largest, it's a thousand megawatt, one of the largest power plants, which will be the cleanest and most efficient in Korea.

We have bought a wind developer called Greenlight. Who have a pipeline of 39 development projects across the US with a total potential capacity of 6.5 Giga Watts (gigawatts), and we have formed a strategic alliance with turbine manufacturer called Clipper Windpower.

This business is profitable, it is less than a year old and we've already demonstrated that we can make a profit.

But our actions alone will not be enough. We believe that globally the low-carbon power sector needs to expand quickly, if we are to realize its full potential in enhancing energy security and combating climate change.

So what must we do to enable this sector to be built?

We've learned a lot in the last year. In particular, we've learned about some of the things that get in the way of building this sector. And this shows us where business and policy-makers need to concentrate their efforts.

We have identified four factors which we believe would speed up the development of more low-carbon power capacity.

The first is low-carbon coal technology. There are technologies available today that significantly reduce the greenhouse gases emitted from coal-fired power stations. What we need to do is make those a commercial reality— and at scale.

The second factor that would make a big difference is to set a price on CO₂. We have to translate the environmental cost of high-carbon energy into a financial cost through long-term, sustainable policy frameworks. The problem is, you can't see CO₂. That makes it more difficult to deal with than, for example, smog, but I think most people now accept the CO₂ does causes damage. And we believe setting a price on that would actually enable the right economic choices to be made.

The third thing we need is electricity infrastructure. We need the investment and the policy support to build, and scale up, the physical links to carry power from the places where the new low-carbon power plants can be built to the markets where the power is needed.

Finally, consumer awareness. The more that people understand the nature and scale of the problem, the more they will act to create the momentum for change. They will make sustainable choices about their own consumption patterns and urge governments to take action. Our business is to provide practical solutions, but the more people understand the problem, the more 'pull' there will be for those solutions.

Of the four factors that would make a difference, I would like to talk about two of them, if I may, today. The first is low-carbon coal technology and the second is electricity infrastructure.

The U.S., China, and India are likely to be responsible for more than half the world's carbon emissions over the coming years. Each of them has a lot of coal. Coal is local and accessible, and not vulnerable to political events, which take place in faraway supplier countries. Security of supply issues I think mean that domestic coal will be seen as a real asset.

Just under half the increase by 2030 is projected to come from conventional coal-fired power. Now that's equivalent, and I find these statistics amazing, that's equivalent to 3,600 new coal-fired power stations worldwide, that's 12 a month for the next 25 years. That's one every 60 hours. More than three-quarters of that capacity is expected to come on in India and China. But coal is also going to play a very important part in America's energy future as well.

So can coal support energy security and a clean environment? Along with others, we certainly believe the answer is yes.

The prospect of low carbon coal generation has been around for some time. There are a number of different technologies that address this, from increasing thermal efficiency and combined cycle gasification, through to carbon dioxide capture and storage. There are important initiatives seeking to implement these technologies, such as the FutureGen project. Some of them adopt post-combustion separation of carbon approaches; others focus on pre-combustion technology, and it is that technology that BP and our partner GE is working on. But as we all know, simply recognizing the need for something isn't enough. The urgency with which we must address this problem means we can no longer approach this in a "business as usual" manner with the current long development cycles.

We need to recognize the need for this and put in place programs and policies to encourage companies like BP to aggressively bring forth these new technologies to market. And do this in as short a time frame as possible. For every year we delay, coal technology power plants are being built, and they will be in place for the next 50 or 60 years.

Through our exploration and production business, we are a leader in sequestration. And our Alternative Energy team is using that experience to become a leader in power generation from hydrogen. What we do is use hydrocarbons to generate hydrogen power. And capture the carbon dioxide and store it securely and safely in underground geological reservoirs.

With GE, our ambition is to build 10 to 15 such projects over the next decade. We have well-developed plans for the next plans that are going to come on stream. The first is in Scotland and, as I mentioned, the other is at our Carson refinery, near Los Angeles. This as I said is technology

which already exists in component parts, but nobody has put together the whole technology suite, to actually do pre-combustion production of hydrogen, and then the storage of CO² in underground reservoirs.

The project is going to cost a billion dollars and use petroleum coke as its feedstock, which is similar to coal.

It's a by-product of refining and would be sourced from refineries in California. At the moment that coke is loaded onto rail cars, gets transported ten miles to the docks, gets put on a sea going vessel, and taken across the oceans to China where it is burnt. An extraordinary amount of energy is required to dispose of petroleum coke at the moment, and the impact that that has on the environment.

In the new power plant, the coke and treated waste water will be converted, as I said, to hydrogen and CO². The hydrogen fuels the gas turbine that generates enough electricity for 300,000 homes. The CO² gets put back into an existing oilfield, which actually allows you to produce more oil. So it's a triple win.

California gets 500 Mega Watts of new, secure, clean, generating capacity. Four million tonnes of CO₂ get eliminated from the atmosphere. Some aging domestic oil fields get a new lease of life, and there's more oil produced. In fact it's better than that, you get a thousand jobs during the construction and 150 permanent jobs where the plant is operating.

Of course, similar benefits would accrue wherever you build these hydrogen power plants. This technology, and there are other technologies, this is not the only one, but they offer huge global potential.

But we do need the support of policy makers to turn this great possibility into a reality. I think it is chance for the U.S. to lead— and to accelerate the adoption of a technology that can deliver reductions of carbon at enormous scale.

Because building these plants, and it's the same as the wind farm, is only a start. You then have to transport the power to the people who need it. And that takes us on to the second issue that I'd like to cover – that is the issue of electricity infrastructure.

As we have been developing projects and working with others in the industry, it's clear that this issue of infrastructure is actually a significant obstacle. How to get clean domestic power from the source, and to the cities where the power is needed. The U.S. is blessed with abundant energy resources that could deliver low carbon power. Let's just take winds and coal, for examples. The American Wind Energy Association reckons that there is enough wind to generate around three times the total electricity consumed today in the U.S. That's electricity consumed from all its sources. In theory, Texas alone has enough wind energy to supply one-third of the entire country's needs. The proved US coal reserves are proved to be a much greater energy resource than Saudi Arabia's oil reserves.

However, while the U.S. has the natural resources to create energy, they are often thousands of miles from the people who need it. Wind is strongest in the Great Plains area, demand is closest to the coasts. Coal is also concentrated in those central areas.

So should we give up on these resources? Well, distance didn't stop people building the railroads or the interstate highways. Distance didn't stop people building the Internet, the information superhighways. And I believe distance should not stop us from building a national transmission superhighway to get low-carbon, green power to people who need it. We have a major opportunity to build the infrastructure so that we can generate huge quantities of clean electricity from wind, and clean coal, and send it to market.

This could create an immense number of jobs and new businesses. It could give technology leadership. It could increase energy security and diversity. Perhaps most importantly it could deliver a major reduction in the projected growth of this country's carbon emissions.

The U.S. president set out a vision earlier this year—20 percent of U.S. power to come from wind by 2020. This is a great vision. But if it is to become a reality, we do need to act urgently. Delivering the 20 percent target means 500 Giga Watts of new wind power. That means we need to be able to get new power out of the Great Plains regions, in something like 10 to 20 GW a year, which has to mean new transmission lines. But these things take time to build.

So there does need to be an enabling legislation completed in the next two to three years so that we can deliver in the next five to ten years.

To make this a reality, a number of things need to come together, and a wide range of parties need to work together. But for that to happen, there are a number of myths that need to be addressed.

People say that wind power is too expensive. It is not. We calculate that the average US home's electricity bill would need to rise by about 0.5 percent each year over the next 20 years if all new added capacity was domestic, low-carbon power. 0.5 percent a year, when you think about the volatility of energy prices and the way they've risen, that's a tiny amount. This estimate is based on today's technology and costs. But in the last 30 years, the wind industry has brought costs down by around 80 percent, then there is a real chance that price increases will not be required.

Then some people say: "We can only add a small amount of wind because it is an intermittent and the grid can't cope with it." Well no, that's not true either. The President's 20 percent target seems challenging but we believe it is in deed achievable. And even if we could only add 10 percent of wind power into grids around the world, this would have the same CO2 reductions as replacing every single car in the world with a hybrid.

Other people say: "This mismatch of supply and demand is intractable ..." Well, a supply and demand mismatch is very common. Natural gas resources in the U.S. are not well matched with demand, and yet we've built an infrastructure of pipelines to get gas to places where it is needed. Tomatoes are not well matched with demand— but somehow they get sent to highways to people who want to eat them.

These problems can be solved. Perhaps the greatest myth is that no body is prepared to invest in this infrastructure. BP is. And we have met a number of other people who are also seriously interested in investing in these projects.

But we do not underestimate the many challenges we must overcome to ensure that this investment takes place. Along with that investment in transmission infrastructure, we also need investment in the capacity that will generate the power.

If we're not careful it can become a chicken and egg dilemma, one where the transmission isn't built because the capacity isn't built and so on.

We see our major leadership action for ourselves in this area. We will begin to build the large-scale wind farms in that central wind corridor of the U.S. We will just get on with it, with assumption that actually the transmission will be built. We need very large projects where the whole industry and the country benefits from these transmission projects.

Today there is just 10 Giga Watts of wind capacity. So we have to increase the scale if we are going to get to the 500 Giga Watts to meet the president's challenge. The average size of a wind farm over the past 30 years has been 26 Mega Watts. We have plans for large projects, as do others in the industry, that are now going to be several of 1,000 Mega Watts or greater. That's what is required to get to the scale that we need.

We can take a leadership in some areas. Other companies will act in different areas. Solving the problem is more than any one company can do alone. We need to build innovative partnerships. We are exploring partnerships in investment to build this much needed U.S. infrastructure, including new models of ownership and funding.

That takes me to the final point. Even if the myths were put to rest and business stood ready to invest in plant and infrastructure, there are still several policy and regulatory barriers to creating electricity superhighways.

They include complex and diverse approval processes at state and local level, lack of clarity on ownership and rules, particularly when crossing jurisdictions, lack of agreement on cost allocation and recovery, and negative public perceptions.

But there are many things that can be done to improve matters dramatically. And indeed there are many exciting initiatives underway.

Take, for example, last April's memorandum of understanding between the governors of California, Nevada, Utah and Wyoming. This recognizes the urgent need for improved regional transmission infrastructure and taking steps to build it. Others are working on interstate coordination, and they include the Western Governors Association, the Committee on Regional Electric Power Cooperation, and other regional stakeholder groups.

It is also encouraging to see the emergence of novel measures for sharing transmission costs, such as Texas's Competitive Renewable Energy Zones. Further state-led initiatives like these—creating simpler rules, fairer cost allocations, and greater regional clarity—will be critical in driving these new transmission projects forward. So will leadership from federal government.

Over the past 70 years, federal authority has worked extremely well in creating a nationwide network of gas infrastructure. And I think that could be a model for getting big projects undertaken quickly. We need a similar approach to take clean power to market. For example, there is a major role for the Federal government in designating national transmission corridors with rights of way, and it was encouraging that the 2005 Energy Policy Act does give the government new powers in this respect.

We believe it is valid for this strategic transmission authority to extend also to transmission lines proposed for national energy security and for energy diversity reasons, as well as those for the purpose of relieving congestion.

So to conclude, I don't think any of these barriers is insurmountable. On the contrary, I am increasingly discovering people and organizations that have a deep commitment to build a low carbon power sector in the US and elsewhere in the world. I've talked about many of the reasons for doing this—but in closing I want to emphasize one in particular: World leadership.

This is an area of global concern and global importance. It's an area where America, and especially California, can show the way. The partners we have already begun to work with – such as GE, Clipper, Greenlight, Edison Mission, understand the scale of the challenge and the size of the prize. And I am sure that many others also want to play their part in building this new industry.

This is not an obscure policy issue. In my mind this is about the future of the world. And it is our responsibility to set aside partisan agendas, or issues about competition between businesses. We need to work together in a new way, in order to accelerate the growth of the low-carbon power economy to a scale where its benefits will be felt by everyone.
Thank you

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