

**Energy and Climate Change:
Buying and Selling Renewable Energy
2006 Global Clinton Initiative Annual Meeting
September 21, 2006**

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FEMALE SPEAKER: As a quick little process. If you take these two rows of tables and these two rows of tables just across each pair of tables about half of you shift down the middle do that with the table right behind you. Those of you who don't want to shift don't have to, but David got a lot of requests about this. Let me say one other thing before you start to move, table facilitators you need to change to the second subset topic on your computers to be ready for the input. Thanks. Just quickly make a few shifts here.

Chairman and Founder, Virgin Group Limited Sir Richard Branson. Partner, Khosla Venture, Vinod Khosla. CEO and Co-founder, Rocky Mountain Institute, Amory Lovins. Presidential Chief of Staff, Government of Brazil, Dilma Vanna Rousseff. And please welcome back the Honorable Carol Browner.

CAROL BROWNER: Thank you and let me compliment you on your ability to change tables in an orderly fashion. This panel, if I might have your attention will include simultaneous translation. You have headsets on your table. As I understand it, someone's going to correct me when I get this wrong, if you go to Channel one that will be the English translation for the minister who will be speaking in Portuguese and the translation from English to Portuguese

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will be on channel two.

We just as you know, we focused on renewable energy. We are now going to turn to renewable fuels. What I'd like to do is start with Sir Richard because we were all here in this room thinking hard about renewable energy. We do not know the announcement that you just made and perhaps you would begin this session by sharing with the group.

RICHARD BRANSON: We're in the airline business, the airline business and the train business, does its fair share of damage to the environment in putting out CO2. Basically what we've pledged today is that any profits we make from, or dividends, or share of sales from our airline businesses or our train businesses will plow back into global warming and investments in this area, hopefully it will be something like three billion if we're going well over the next few years [applause].

CAROL BROWNER: You can share some details if you like. We like the dollar amount.

RICHARD BRANSON: I think I said three billion. I've only woken up to the real potential catastrophe this world faces in the last three years. I think I read a book called the "Skeptical Environmentalist" about three or four years ago which sort of put me off track somewhat. Since then I've met many scientists and about nine months ago Al Gore came to

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my home and said, "Look. You're in a position where maybe if you could make a grand gesture that could maybe encourage other companies to make grand gestures as well." At the same time investing in renewable energy hopefully will make business sense as well. I think the only way that global warming is going to be whipped is if we can come up with alternative energies to oil and petrol that are profitable. It's got to be sustainable. You can't just give the money away because there's only a finite amount of money. And if you're effectively the oil and the coal companies, you've got to come up with alternative fuels that are going to be the fuels of the future and that's what we'll invest in looking for, we'll be investing a cellulose ethanol as well as ethanol, we'll be looking at butanol, we'll be looking at the whole range of new fuels. We've just made an investment [inaudible] on my right, but anyway we'll be looking and seeking out the best and the most inventive people. But anyway thank you.

CAROL BROWNER: Thank you [applause], I think a three billion dollar commitment is worth two rounds of applause [applause]. Vinod if I might ask you to speak. You have a tremendous expertise and think about the issues of renewable fuels for many aspects, but if I might ask you specifically to speak about the tremendous surge, if you will, investment

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in corn ethanol and is that really the right path to get us to cellulosic if we agree that's where we want to go. If you could control all of the purse strings what would you be investing in?

VINOD KHOSLA: So corn ethanol is a great place to start because it reduces the market risk. It allows us to invest in cellulosic technologies knowing that if you're successful in the technology risk, we'll have a market for our products. So it dramatically accelerates the amount of investment in cellulosic and if corn ethanol didn't exist we wouldn't have that. If you have the market established already, as we do, and we have the right policies to signal that this is a long-term stable thing, and by that I don't mean subsidies because I actually don't believe in subsidies. I think alternative fuels can compete unsubsidized with fossil fuel alternatives and people like Richard who are making these investments will get great rates of return in unsubsidized markets. That's the opportunity I see in corn ethanol is a great place to start. It gets us started. I very much suspect that as soon as the cellulosic technologies come in corn ethanol will stop growing, probably not go away, initially cellulosic will be done in conjunction with corn ethanol plants. And then I suspect any spare corn capacity will go to restarting something new like Bio plastics. We're

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already starting to see people use low cost feed stock like corn to get bio plastics started. Five-ten years from now those will move to bio plastics from cellulosic so I see corn as a good starting material.

CAROL BROWNER: Thank you if I might now go to the minister and again there are headsets on your table if you need translation from Portuguese into English it's channel one. Madame Minister perhaps you could talk a little bit - your country's had a tremendous experience with ethanol, as you shared with me it's been almost 30 years, three decades. But as you look forward if you could perhaps share with us some of thoughts of how you continue to grow that opportunity. Are there some potential downsides that need to be managed? What's the best way to manage those going forward?

DILMA VANA ROUSSEFF: [Translator] Brazilian matrix for Bio fuels experienced considerable expansion in the content of renewable fuels particularly with ethanol. Brazil has 31 experience with ethanol. For every 20 years now no gas in Brazil is marketed without a content of 20-25-percent ethanol and as an additive to the gas now. We now have the development of 100-percent car are using ethanol after the [inaudible] and we now we have flex fuel cars. And they represent a very important part of the Brazilian fuel. We

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have 76-percent of the light sold in Brazil. We hope that by the end of 2006 we'll reach 2,000,000 units and next year 5,000,000. So much so that it is our belief in the next year or so no light vehicles will be marketed in Brazil unless they are flex fueled. At the same time I think it would be relevant to say that our learning curve has been considerable because we were able to increase the productivity in ethanol production in Brazil from a cost of 850 cubic meter, to \$200.00 a cubic meter concomitantly in terms of barrels the production cost of ethanol in Brazil in terms of ethanol from sugar cane is at \$32.00 as opposed to \$75.00 for corn ethanol, or \$150.00 for the biodiesel from the European Union. In this sense ethanol in Brazil has no subsidies the only guarantee of supply is to have long term contract for additives. In the event that ethanol is used in flex fueled vehicles, in fact the market regulation will ensure that as oil is higher than we use gas, when it's under it we use ethanol. Now there is a highly developed productive chain. We're talking about 50,000 growers, 365 refining plants for alcohol, and 16 billion liters of alcohol is produced. Our view on the future is very clear, two relevant issues to us are in terms of R&D we have line of cellulose and also the enzymatic hydrolysis for ethanol. So it's we're intent on increasing our production and by using [inaudible] and also

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the straw concomitantly we want to ensure that as we make advances in terms of production of seeds in Brazil according to the soil, we'll be able to get higher productivity. It is very important to point out that our future is really bright on a three pronged fuel usage. One ethanol that we have already done, biodiesel of several oil plants such soy, castor bean, palm oil, and aside from these three oil producing plants we have in Brazil, Brazil has [inaudible] the national oil concern, we're also developing diesel based on vegetable oil. Forgive me - we are talking about including in the production line of the refining plants, prior to the hydrogen injection in order to cut down the sulphur content we try to introduce vegetable oil in the content together with hydrogen and high temperatures, we have commercially viable production of biodeisel, very high quality. It is entirely different from biodeisel mind you. Biodeisel could be added to this product. This is the second prong. Together with cellulose research we'll be in a position to have in Brazil, a biofuel industrial base that will be of considerable size.

CAROL BROWNER: Thank you. There are number of questions I'd like to follow up on but let me first go to Amory. And Amory let me ask you to speak to the environmental impacts. Are all biofuels created equal when

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we start to think about the environmental impacts.

AMORY LOVINS: Biofuels differ quite widely in their CO2 impact. Some, if you do them badly, could be slightly harmful in this regard. Corn ethanol is a net energy yielder if done properly as you have to do if you want to make a profit consistently. But you can get about an eight times or so better net energy yield with a more advanced cellulosic based ethanol made of woody wheaty stuff like switch grass, poplar, elephant grass, crop waste. The more complex impacts that are harder to judge are in where we get the feed stock. There we need to look at land use, soil fertility, and for the reason the cellulosic ethanol is of particular interest. You can grow sustainably although most of it isn't done that way in our classic corn culture, 20 years ago growing a bushel of corn took two bushels of topsoil and we can't do that long. But for example switch grass is a prairie grass, a prairie perennial and you could actually make enough of it if you have efficient vehicles to run the US system just based on the conversation reserve lands where we pay farmers to grow nothing, more precisely we pay them to plant an annual cover crop and then we penalize them if they harvest it. But the switch grass with two meter roots will hold the soil a lot better than those shallow rooted annual cover crops so you can satisfy the conservation reserve land

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purpose of arresting soil erosion and at the same time be able to harvest this crop. If you then cocrop it with nitrogen fixers which is of course what happens in the natural prairie sponsoring its own fertility than you wouldn't even need inputs so I think poly culture or perennials is going to be quite attractive. In Brazil of course there are different issues of land use which perhaps the minister can address later on. And I think world wide this is the early stage of the industry at which we need to sort these issues properly and not end up with environmentally or socially and culturally unsustainable practices later.

CAROL BROWNER: It's always, I think, important to be mindful of not only the intended consequences but the unintended consequences. Let me go back to Sir Richard and maybe Vinod, you have a - I don't know if it's fair to call it a joint venture but the fuels program, there's been a capital investment and I'd be interested in hearing from both of you what will be success how are you thinking about this? Obviously a return on the investment but where do you see this in 3-4 years? What will make you feel like this was a good venture.

RICHARD BRANSON: This will be the first time we've talked as partners so we'll see whether we agree with each

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other not [laughter].

CAROL BROWNER: That's why we brought you here today, to make sure you—

RICHARD BRANSON: First of all I think both of us have been fortunate that we've made good monies in other businesses, so we can afford to stick our neck out and take some risk with some of the money we've already earned. Investing in alternative fuels, obviously you are boundable to conventional fuel prices collapsing and the alternative fuel industry has in the past been damaged from that happening and with global warming and with the threats in the Middle East, reliability on the Middle East, maybe all the funding that goes to farmers anyway there could be a way that governments could consider having maybe a \$45.00 insurance policy and maybe them then taking some of the profits over, \$60.00 or something. There are ways in which this industry could be protected. I'm in a sense hedged because I'm in the airline business and I'm in the train business so if fuel prices collapse I'm okay. But for a lot of people who go into this industry there are risks attached. Governments if they want enormous amounts of money invested in this industry they may need to try to think of something like that. The other thing they certainly should do, whatever happens, and that is really be encouraging the 85 cars and that every new

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car should be 85. It only costs manufacturers about \$100.00 in a new car to do that. They must encourage petrol stations or the oil company to force the oil companies to supply ethanol in at least one out of three or one out of two of their garages in a particular area. You know so it's moves like that from government which will I think protect the industry.

CAROL BROWNER: And your partner?

VINOD KHOSLA: We had a great dinner at Davos [misspelled?] in January this year which was really a lot of fun and sort of a melding of the minds and how we sort of thought about this whole area. Since Richard has covered the general concepts let me cover the specifics of this particular investment and sort of tell you why you shouldn't have predisposed notions of what even corn ethanol is. So these particular plants in California are destination plants, different than Midwestern plants and they're about half the energy consumption in their production compared to a normal corn ethanol plant. So they're substantially greener to begin with for lots of good reasons, also saves money in terms of their cheaper to produce the ethanol. So you get greener and cheaper and those to generally in this business go together because most of the costs comes from using energy. So if you save energy you do pretty well. My hope

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is that these corn ethanol plants then become platforms in which you add on and bolt on cellulosic technologies and over time you make a transition while doing that you've already established the market, the distribution channels, all that. And the goal clearly is to build one of the leading companies, and I know everybody claims that so, but the thing to keep in mind is there are so many opportunities and this market is so large that there will be more than one company and they'll have be half a dozen great companies built in starting from just corn ethanol and there'll be the cellulosic add ons in addition to that.

But this particular investment has a slightly different model of plant, it's destination plants as opposed to Midwestern plants.

CAROL BROWNER: Thank you. I want to - several of our panelists have talked about the role of government in this effort towards renewable fuels and I think Vinod you suggested that there shouldn't be subsidies. I think the minister spoke about the role of the government to some extent. I want to explore that a little bit more and Madame Minister if I might start with you in terms of your experience. What do you see is the single most important thing for the government to do to stimulate this market?

DILMA VANA ROUSSEFF: [Translator] I believe that on

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ethanol has today in Brazil a characteristic that it is fully deregulated. We have free pricing system and the productivity of ethanol in Brazil, and we should point it out that it is product, that when we started the program around 1975 the average of productivity was about 47.78 tons per hectare. And the average today of the ethanol production is about 74.29 tons per hectare. That is we basically doubled the productivity and this is what explains the fact that - and also take into account that the energy balance from ethanol compared to the corn one is much more effective. It's about three to four times more advantageous to have the ethanol from sugar cane. The price of ethanol in Brazil is extremely competitive with gas prices. So there is the interference of government in this area is only in the area of additives in order to ensure - since we don't have in Brazil gas without ethanol, we don't have it there. We assure average contracts of one year between distributors and resale and those who produce ethanol for this aspect, for this sector. For the other ones it's totally free. Why? Because if price goes up we'll use gas. If it goes up vis-à-vis oil, if it goes down we'll use ethanol. Ethanol also can each crop be measured compared to the sugar cane production so there is a logic; a trade logic, a commercial and economic logic in the productive chain of ethanol. Because it's there

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for 31 years and the all substantive part that we produce of ethanol today in Brazil, some 90-percent we consume. So and we can increase to 30, we can change the amount that is produced when we see for instance a collapse in prices, international pricing collapse. Now given that all of you know what you know about the oil market it's not very realistic to imagine that it will go below \$32.00, at least in a consistent way and lasting way.

I believe that when we're talking about biodiesel, which is the fuel that's coming into the market now, we've had to produce incentive to give incentives. What's the main characteristic of this incentive? It's make it mandatory to buy purchasing, and three years ago we launched the program with some expertise on bio fuels and by the end of these three years, we will be able to mix 2-percent of diesel to include - I mean of 2-percent biodiesel within the oil-based diesel. This biodiesel, as I said comes from castor oil, from soy, from palm oil, also use residues of - we use the fat of cows and cattle. So we can imagine that when we define a demand, the market will adjust. We wanted to provide the social aspect of the biodiesel program, so we had a policy of removal of taxes, of tax removal from the production of biodiesel as long as it comes from family farms, small agri-farmers, family farming. So these resulted

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in the growth of income in the region in the rural areas of Brazil.

And I'd like to talk now about the land use.

Biodiesel for instance, we are producing, giving priority all the tax removal, all the availability of financing is geared to a region of Brazil which is called the semi-arid in the northeast, a quasi desert area that has however many aspect favorable to castor seeds. Because these plant doesn't need irrigation in order to develop itself so and the issue of land use, I think it's a very sensitive question and it has to be well understood so I would ask for you to give me some additional time to explain the following: Brazil has 851 millions hectares of land. Of that land, a little less than half, some 383 million hectares are lands that are of soil that can be used for agriculture, that part only 3 million hectares are being used for the production of ethanol. That means .8-percent of the whole arable land in Brazil. So why are we developing a program of line of celluloses using cellulose in the production of ethanol? Why is it so because when we do it our productivity on the residues will be increased more than five times. This is why we're saying that in a sustainable way Brazil is trying to develop its production of biofuels because it will not only open a new market but it will go already to the second generation and

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there is a whole set of institutions, research institutions that are dedicated to the strategic issue for us which is line of celluloses, enzymatic hydrolysis. We have the acid hydrolysis already with some development but we are betting on the enzymatic hydrolysis and even a combination of both that's being tested by petrol grass.

CAROL BROWNER: Minister [inaudible] a question that many people had about land use and I thank you for sharing that with us. We only have a few - not even a few minutes left and I'm under tremendous pressure to keep us on time, after all President Clinton has been managing to stay on time and for those of us who had the opportunity to serve with him that's a mark, a challenge to all of us. But I do want to give Amory just a quick second on the issue of the role of government and specifically on safety net taxes, subsidies, we've heard a number of different things here today if you could give us a quick view on that. I know it's hard to get a quick view on that.

AMORY LOVINS: I agree that the market should evolve under market discipline. And I think Brazil got back its initial pump priming subsidies 50 times over already from the oil savings, in between ethanol and offshore oil is now independent of oil imports. Sweden is heading the same way. We can too. I hope we get to that in the subsequent

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discussion because it's a combination of biofuels and efficiency. There is an important role for government in supporting and not distorting the business logic that will lead this nation off oil at a fifth the price we now pay for it. But this means that the \$32.00 that the minister was talking about I think is an unrealistic expectation. Because the average price of getting the US completely off oil is 15.00 a barrel. Therefore if we have subsidies, as we do now for corn, it probably does make sense to graduate them according to world price as Vinod and others have suggested so that it prevents the Saudis from sweating the market and driving their competitors out of business as they've done before.

CAROL BROWNER: Thank you. Actually Vinod should get the last word on subsidies because he's actually the first person who used the word in this panel.

VINOD KHOSLA: The main point I want to make is this industry to get good rates of returns for investors doesn't need subsidies. Most of what I've recommended as policy is signals to Wall Street that this is a stable policy and without subsidies I think we can generate high rates of return. Most of it is related to signalling, the most important being mandating that some large percentage of the cars be capable of taking flexible fuels. Let me stop there

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and keep on us time.

RICHARD BRANSON: I'll just let Henry Ford finish the conversation, I just found a quote I had to use it. He'd be turning over in his grave if he could see the large cars that have produced now coming towards global warning but anyway in 1925 he had the foresight to say, "The fuel of the future is going to come from fruits, apples, weeds, sawdust. Almost anything. There is fuel in every bit of vegetable matter that can be fermented."

CAROL BROWNER: Thank you and on that we will end this part of the session.

FEMALE SPEAKER: Thank you very much panel, and as you folks know the panel will now have about 25 minutes to look at the questions that you produced during their conversations and you will now have those same 25-30 minutes to talk about two questions at your tables. This time the two questions at the tables, again I'm sure you've seen the pattern. We're always asking you one question about how can I promote more widespread use of renewable fuels. And this time I think you're going to have a little fun with the second question. It's very broad and very open ended, it's basically asking you collectively to report back to the panel what you think it will take to get the US to end our dependence on oil or frankly what it will to get the globe to

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reduce our dependence on oil. Again, if there are any tables that have only a couple of people at them, we would recommend that you consolidate for your discussions. If anyone had a headset that really didn't work just let your facilitator know.

[END RECORDING - PART 2]

[START RECORDING - PART 3]

CAROL BROWNER: We're back if we can get everyone's attention. As we did with the first session, we're going to take some of the questions that you all provided during the session while we wait for the tabulation of your discussions. Let me begin with Vinod, and let me start with one of the questions we received was what proportion of US gasoline could be replaced by corn ethanol, by cellulosic ethanol and how much land would this require?

VINOD KHOSLA: My answer is there is no question we can replace all of our gasoline within the relatively short period of 25 years. The detailed for model for that for those of you who are interested are on my Web site at khoslaventures.com/resources.html. But there's not question that we can replace all of it quite easily and the amount of land is relatively modest it's 40-60 million acres is my estimate. I know Amory and George Schulz [misspelled?] and

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John Walzy [misspelled?] have written about 30 million acres to replace half our gasoline and there's a great NRDC report that talks about 114 million acres. There's a whole range of estimates between 40 and 100 million acres to replace all of our gasoline. I actually think we'll do better than that.

CAROL BROWNER: I like the optimism. Amory, an issue that didn't come up this morning but one that did hear from see people on, the issue of vehicle efficiency. Can you speak to that?

AMORY LOVINS: Well the extra land use actually goes to zero. That is we don't have to displace any crops nor do we need any irrigation if we make the vehicles efficient. And we have the technology today to triple the efficiency of cars trucks and planes. The key to that by the way is new materials and integrative design. If we make cars out of advanced carbon fiber composites like this, you know plastics have changed since *The Graduate* [laughter] you take away half the weight and half the fuel use. The car costs the same to make and it gets safer as the stuff can absorb 12 times the crash energy per kilogram of steel. When you look at all the uses of oil, you find the using the oil in a way that saves money cuts US oil use in half and the average cost of doing that is \$12.00 per saved barrel.

Then it gets a lot easier and cheaper to replace the

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other half of the oil on the supply side with a combination of say natural gas and advanced biofuels. When you do that the often posited conflict with agriculture goes away and actually you can about triple net farm income. So if you invest 180 billion dollars you get the US completely off oil by the 2040s and its lead by business for profit because the average cost is \$15.00 a barrel, that's a fifth of what we pay for oil and your 180 billion dollar investment by 2025 is already returning 70 billion dollars net per year, 155 billion dollars gross per year if the oil your displacing is only \$26.00 oil.

CAROL BROWNER: Wow thank you.

AMORY LOVINS: Obviously at higher prices you make even more money.

CAROL BROWNER: Thank you the minister, before I pose a question to her from you all asked for a show of hands, you're going to have put your hands up high for us to see because of the lights on how many Portuguese speakers we might have in the room. Quite a few, thank you. Do you also speak English we assume you do, you're been listening. The minister wanted to spend just a moment to speak to one of the questions we got and then a second question. The first question is the question of rainforest destruction. Apparently a number of people asked this and we want to give

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her a minute to respond to that. And then I also want to pose a second question which is what are the most important steps to take to expand Brazil's success to other developing countries? Madame Minister?

DILMA VANA ROUSSEFF: [Translator] I believe that it's essential for all countries that might be interested in using bio fuels that developing countries particularly those between the Tropic of Cancer and Tropic of Cancer, obviously they think the relationship between land for energy and arable land have incentives to produce ethanol. This is because these are regions that because of the sun they receive are capable to produce with greater productivity, particularly when we mix those circumstances, we combine those circumstances with technology they become able to produce in a more competitive way the needed ethanol. And this will be strategic so that it becomes possible to create a market without protectionisms and without subsidies. That is to create a commodity market that would be international in its character for the production ethanol. Without that market we would have problems in some strategic aspects in order to have an energy market. First of all the safety of the supply and second is some standardization that's essential even if we have a market for second generation of line of cellulose and enzymatic products and so on, it's

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essential to structure this market nowadays today. Only this market will offer an assurance against the lack of supply, which is the big threat that we have in the energy market. And I believe therefore that the tropical areas of the world, of course, taking into account and preserving agriculture, is a strategic character because the financing lines and Brazil wants to participate with other countries in this incentive and this expert of ethanol production technology.

CAROL BROWNER: Now my favorite question that we've received thus far and it might be a favorite of many here, particularly for those of us who spend far too much time on airplanes to Richard, how do we lessen air travel [laughter]?

RICHARD BRANSON: If everybody flies Virgin Atlantic and then the other airlines go out of business [laughter]. I think on just to sort of answer the question in a slightly more serious way. Obviously domesticate air travel, if there's a suitable train that is travelling on the route and you've got a choice between a train and domestic plane the amount of CO2 you're going to use on the train is about seven times less than on the plane. And if you actually use biodeisel in the train it will be about 16-17 times less. So on the short haul, ideally take the train. On long haul, you know you've got no choice and what we've got to try to do is come up with ways of saving the CO2 usage of long haul

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planes. And this time next week we actually have a press conference in New York where we're going to unveil a whole mass of different ideas where we think we can save millions of tons, the industry as a whole could save millions of tons of fuel. The industry's got to do what it can to try to reduce fuel. As a matter of interest, and I've read quite a lot of books on the environment in the last two or three years and after September the 11th, this is my little pitch for the airline industry now, after September the 11th, in the five days after September 11th the world heated up by 3 degrees and that was because of the amount of planes that were grounded for those five days. What they believe happened is that the amount of CO2 in the world is so bad that bizarrely what is actually protecting the world is from heating up at the moment is the plumes that we put out from the planes that in the day time the sun is hitting somebody'll be able to expand this more scientifically than I can, but they're hitting those plumes and bouncing it back into space again. So although airplanes are producing about 2-percent of the CO2 in the world, bizarrely because we've actually put so much CO2 in the world, they may actually in the short term be doing a service whilst we get the clean fuels going and sort out the cars and sort the lorries and sort out the busses and hopefully come up with a clean fuel

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for the planes. Have you read about this?

VINOD KHOSLA: I think he was referring to contrails, aircraft contrails, reflecting sunlight back in the atmosphere.

CAROL BROWNER: Thank you. David.

DAVID: Thank you, Carol. I'm at least as interested in hearing Amory's and Vinod's thoughts on Richard's comment as what I'm about to say. In the first panel this morning we had resistance to the first question but we just had, I think, disinterest in the first question about what can I do from the tables here. We got about two or three times as many answers to the second question as we did to the first question. There's some lessons here I think. How can I promote more widespread use of renewable fuels? We had a lot of leading by exempling, buy flex fuel vehicles, buy biofuels when available, ask for flex fuel when renting cars. That was interesting. Some comments about taking political action, pressuring elected officials to require fuel pumps that can pump ethanol and supporting an end to the ethanol tariff. And increasing public awareness, mentions of Willie Nelson, lots of people suggesting buying Willie Nelson albums, Nascar race is another.

For the question which I think engaged you more about what will it take to end our dependence on oil we had lots of

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suggestions for different government policies, setting more stringent targets for renewable fuels use, we already have some in this country. They could be made more stringent people suggested. Enacting taxes on petroleum, big suggestion. Eliminating subsidies for fossil fuels. Creating incentives to purchase renewable fuel vehicles. Government fleets should be flex fueled, require service stations to have flex fueled pumps. Suggestions on preventing oil price manipulation with oil price floor or a counter cyclical tax. Switching all agricultural subsidies to bio fuel crops. And a grand bargain with Detroit in which hybrids for health care.

Numbers of comments about how the car companies need to get out ahead of this issue, it's not just a government issue but the car companies need to show vision and leadership and they sense that not all car companies are doing that in terms of R&D. And then some comments about plug in hybrids which is actually not in the scope of a renewable fuels discussion but is responsive to the question how can we end our dependence on oil.

We had a couple of gems. Somebody said, "The simple answer higher oil prices." And then to the first question which is what can I do to promote the use of renewable fuels somebody said simply, "Move to Brazil."

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CAROL BROWNER: With that let me give our panelists one last round. I assume whoever said, one last round of comments but you can applaud for them they've done a good job so far they're going to continue to do a good job. I assume whoever said higher oil prices is not an elected official given what's going on if you look at oil prices and popularity in our polls right now as we lead up to elections. I want to start with the minister, one of the gems as you see was move to Brazil. You had asked for a moment to speak to the rain forest issue and if you might do that?

DILMA VANA ROUSSEFF: [Translator] The difference, it's important to notice that Brazil is a very large country. The distance of the area that produces 88-percent of all the ethanol of the country to the Amazon forest is the distance between Lisbon and Moscow and the south of the Canada and Florida. We are actually very huge country, there reason as I explained when I was talking about the arable land, there is no chance of destroying all of the Amazon for us in order to produce soy beans. And there's no way that we can do it on ethanol production. Since this is the case, before saying that - why don't we do it? Because it's not necessary. Even if it were necessary we wouldn't destroy the forest and besides not being necessary to do it the most productive land is in the southeastern area of the country. That's where we

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have the highest rates of production. We have sugar cane with the highest productivity. It's a total mistake and lack of knowledge to think that there is this kind of alternative.

I would like to make a final comment about changes in Brazil. I think if someone wants to buy flex fuel cars they're available any of the seven international car producing companies, assemblers of cars in Brazils. 76-percent of light vehicles in Brazil today are flex fuel vehicles. We expect that by 2007 all will be flex fuel cars or vehicles because the cost of production for a flex fuel and non flex fuel the difference is minimal, it's not even minimal it's zero. And it's for the population is very much attracted to the flex fuel vehicles.

CAROL BROWNER: If I can ask you all very nicely, the audience provided with a list of government actions and Amory I know you want to comment on an earlier statement but any of these that are more appealing than others.

AMORY LOVINS: I'll give a much shorter answer. If you go to oilendgame.com you can download for free a detailed study we published two years ago yesterday for the Pentagon on how to get the country completely off oil lead by business for profit. We're already well along in implementing it irreversibly by institutional acupuncture where we figure out where the business logic is congested and not flowing

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properly and then we stick a needle in it to get it flowing. This works just peachy because we built the whole argument not around forcing by public policy something that isn't economic but rather around competitive strategy for the car, truck, plane, oil, and military sectors. And because we spoke to the strategic interests and needs of those sectors and told them how to make more money and less risk they received it quite enthusiastically and are getting on with the job. I think that's actually more promising than most of the measures listed here.

CAROL BROWNER: Thank you. Vinod if you might, some in the audience may be aware of the ballot issue in California that you've really been the master mind of I suppose. If you might share with the audience and sort of your sense of where that's going.

VINOD KHOSLA: We have a ballot initiative, proposition 87 has become the most important single electoral issue in California for November 7th the big election day. So any of you willing to make contributions please contact me. The oil companies are spending heavily, Chevron just put in 12 or 13 million dollars into a campaign against us. We think they'll spend well north of 40 million dollars in a campaign against us. The point is all the money raised from this severance fee on oil in California is the only major oil

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producing state in this country without a severance fee, even Texas a fee, we will raise about 4 billion dollars through this ballot initiative if it passes and use it to do mostly do reduction petroleum use. It's market oriented system where the most cost effective ways to reduce petroleum will be given funding. I might just add that no approach that relies on subsidies or cash incentives will ever work because the scale of the problem is too large. We should start thinking about making this attractive for business to invest in through policy and that's the only way we will counter the hundreds of billions going into oil investments which they still are. Think no subsidies, think policies to attract investment. I will just say if and I should rather say when we have a cap and trade system, it will dramatically help these alternative energy technologies. My estimate is biofuels will have a 20-30 cent a gallon advantage if you institute a cap and trade system in this country. Keep that in mind and that's the kind of policy and long term stable signalling that will make a difference not subsidies. There's not enough government money around to subsidize a big enough change.

CAROL BROWNER: Just from my perspective as goes California hopefully the rest of the United States. Yesterday you had California choosing to sue the major

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automobile manufacturers for greenhouse gas emissions. Governor about to sign a cap and trade program, a ballot initiative. Keep at it, you'll be helping the rest of us think through how to deal with this -

VINOD KHOSLA: In fact those of you who want there's a bill before the governor now that by 2020 half the vehicles in California take an alternative fuel and those of you who can lobby him to sign it, strong business forces lobbying against it, but we think it'll get signed.

CAROL BROWNER: I want to pose a final question to all of our panelists. Ten years down the road, what's the fuel of choice?

RICHARD BRANSON: I think with enough support from the government on creating the right climate, ten years from now we could be up to 25-percent alternative fuels and hopefully more than that.

VINOD KHOSLA: I'll give you a surprising answer 10-15 years from now first we'll be well on our way to replacing all our gasoline, and it's unlikely that fuel will be ethanol. In fact next issue of *Wired* magazine I have a long 5,000 word article on this, comes out on the stands next Tuesday. BP and Dupont have talked about butanol. We have scientists designing new chemistries. They will have two constants: they will run in the same engines, the flex fuel

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engines of today and they will be based on the same feed stocks, which is bio mass based feed stocks. Other than that everything in between can change and will get better and better so all these assumptions are pretty silly that these arguments you hear about today.

AMORY LOVINS: A lot more is up for grabs technologically than just the molecule or just the efficiency of the vehicle. But those are very big variables. An ultralight hybrid is about three and half, four times as a present car, put E85 in it and you just reduced the gasoline use per kilometer by another factor of five or so. And then it goes on from there. Oil can be come a lot less important pretty quickly. But don't assume that biofuels are used only as a blending agent with gasoline and you burn them as fuel. The Sloan [misspelled?] Automotive Lab at MIT points out that if you have a little canister of ethanol that you replace every few months and it's injected in the form of plasma into your engine at the right moment you're gasoline or diesel engine will put out about twice as much torque. Therefore the engine can be about half as big to meet the same acceleration requirements. This has a very dramatic effect on efficiency and economics and it's a much higher leveraged way to use the ethanol than anything we've talked about here no matter how efficient the physics of your car are it's just

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a different engine arrangement to use the ethanol. Watch this space all these technologies have to be taken into account not only the fuel.

CAROL BROWNER: Madame Minister ten years from now what will the world be using as a fuel?

DILMA VANA ROUSSEFF: Within ten years of ten years from today I believe that our challenge is to have in the case of biofuels that we'll have the need the possibility of taking this technology to the developing countries that are very appropriate for producing these fuels because of climate and territorial extension and land. Africa is one of these regions, that means more income, more jobs, and a better world for all of us. Besides that I also believe that biofuels are an adequate transition because it doesn't imply in changing logistics, it doesn't imply in changing of the car industry. It can be done without additional costs; otherwise, the adoption of alternate fuels can become economically not viable so I believe that as far as biofuels are concerned, we understand that the vehicles have to be flexible, and we have to use bio mass. And we have to use all creativity to do the research and to develop this industry without compromising agriculture.

CAROL BROWNER: Let me make a final comment. I appreciate the incredible knowledge that this group has

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brought to the discussion today, but perhaps even more importantly the optimism that they have brought to this. The idea that from the technical, the science, the government, the business leaders that we have here today that there is a way to go about getting this done. And the final thing I would like to say is and Vinod mentioned it I think from the United State's perspective I hope we are on a short path towards a national cap and trade program. I think in some ways from a national perspective one of the greatest things we could do to really commit ourselves and the resources that will be necessary to start our change, not just our fuels, but as we talked about in the session earlier today our electricity mix.

Again I want to thank our panelist, please give them a round of applause and thank you for all of your participation.

[END RECORDING - PART 3]

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