



Book Discussion—*Hot, Flat, and Crowded—Why We Need a Green Revolution—and How It Can Renew America*

Monday, September 29, 2008

Woodrow Wilson International Center for Scholars

Edited Transcript—Thomas Friedman

Thank you, thank you so much. Thank you very much. Rob, thank you, it's a treat to be here at the Reagan Center. And, Joe, thank you, from the Wilson Center and Rob and all my old friends at the Wilson Center. I wrote *Beirut to Jerusalem* at the top of the castle in the Wilson Center with Haleh's husband in the office next door actually and I have nothing but fond memories.

I'm going to speak this morning about *Hot, Flat, and Crowded*. Try to give you an overview of the book and then Rob and I are going to have a discussion and, again, if you haven't turned off your cell phone, pager, beeper, or pacemaker I would appreciate if you do so now.

So, this book actually masquerades as a book about energy and environment. It looks like a book about energy and environment. The cover looks like a book about energy and environment, but it really is just a masquerade. This book is actually a book about America. In some ways I just use energy and environment and the challenge of meeting the crisis of energy and environment as an allegory for whether America really is up to the 21st century.

That's really what the book is about. In some ways the simple thesis of the book is that the world is getting hot, flat, and crowded. Those are going to drive the biggest problems I think we're going to face in the 21st century. And I think the other problem in the world today is that America has lost its groove. We've lost our groove as a country for a lot of reasons. And the simple meta-argument of the book is we get our groove back as the country, I believe, by taking the lead in solving the world's biggest problems.

The book actually begins with an epigram. An epigram is a billboard that appeared in South Africa last year, just last year, a big billboard advertising the Daimler 44 car. And the billboard said, "German engineering, Swiss innovation, American nothing." That was a



environmental change & security program



billboard. Someone was actually advertising their project and thought they would get more buyers by promising it contained American nothing.

That billboard pisses me off. It pisses me off. A), because I think it's wrong, but B), because it kind of says something about how a lot of people look at us today. Where does that come from? Well, it comes from my sense that we've lost our groove. Why did we lose our groove? Well, I think it's a couple of things. The first was 9/11. And that's why this book actually starts in a very odd place for a book about energy and environment.

It actually starts in Istanbul, Turkey in 2004. I had gone to Istanbul to see the U.S. consul general, among other people, but my first appointment was with him. Our consulate in Istanbul used to be located in the very heart of the city amid the mosques and the bazaars. Turks could easily drop in. I arrived in Istanbul, went to the hotel, dropped off my bags, told my cabdriver, "Take me to the U.S. Consulate."

He said, "Well, it's 45 minutes away." "What?" "It's moved." "It moved? When did it move?" "It moved after 9/11." "Where did it go?" "It went to a suburb 45 minutes out in the city center." I said, "Well, let's go." We get in the cab, we drive out there, we get to the suburb of Istinye, and I behold the new U.S. Consulate in Istanbul on a bluff overlooking the Bosphorus and it is a maximum-security prison. Fifteen foot high walls, barbed wire, guard towers. It basically says to the visitor, "Go away! Go away, all visitors welcome. Go away." I got inside, I sat down with the consul general.

I said, "What is this place? You could have filmed the Turkish movie 'Midnight Express' here." He said, "Well, I've got to tell you, there's a lot of American diplomats alive today because of those 12 foot high walls." And what he was referring to was that six months earlier Turkish terrorists blew up the British Consulate in the heart of Istanbul which used to be located right around the corner from our consulate, killed the British consul, 30 other people wounded, 400 afterwards. Turkish police actually apprehended several of the terrorists and interrogated them.

And one of them told Turkish police that they really wanted to blow up the new U.S. Consulate, but it was so secure they don't let birds fly there. He said they wanted to blow up the new U.S. Consulate, but it was so secure they don't even let birds fly there. And that's why the first chapter of this book is called "Where Birds Don't Fly," because where birds





Woodrow Wilson
International
Center
for Scholars

Environmental Change and Security Program

don't fly, people don't mix, ideas don't get exchanged, collaboration doesn't happen, stereotypes don't get broken, friendship doesn't get forged, freedom doesn't ring.

Now, don't get me wrong, I'm not against metal detectors. I went through one just to get in here, just like you. And I'd go through a half a dozen metal detectors at the front door of the Reagan Center or Dulles Airport or National Airport. My problem isn't with metal detectors. We have real enemies. We know that. We saw that in Yemen, just a couple of weeks ago again. No, my problem is that there's been nothing on the other side of the metal detector, except another metal detector.

We are not the United States of Fighting Terrorism. What bothers me is not the metal detector, what bothers me is that there's been no great national project on the other side of that metal detector worthy of the innovative capacity and inspirational capacity of this country. Even in the Cold War we put a man on the moon. That's what's been missing. I mourn everyone who was killed on 9/11, but, for me, 9/11 is still just a day between 9/10 and 9/12. Our day is the Fourth of July.

9/11 was about them. The Fourth of July is about us and we need to get back to an America that's about the Fourth of July and not 9/11. And that's the beginning of how we get our groove back.

The second problem we have is we did lose our competitor, our big competitor. It was called the Soviet Union. I mean what would the Wilson Center be without Brookings? Everybody needs their competitor. What would Brookings be without AEI, okay? Well, we had a big competitor; it was called the Soviet Union. It kept us sharp. And when the Soviet Union disappeared we kind of got a little fat, dumb, and lazy.

Not American business, because the fall of the Soviet Union actually helped flatten the world and American business found itself actually in a more competitive global environment. But from a government point of view here in Washington, we fell into this mode of dumb as we want to be. Dumb as we want to be, and we'll get to it when we get to it. And that leads me to the third reason we lost our groove.

Our government doesn't work anymore. This has been on display graphically this week. And I'm not here to make some cheap political point. Our government cannot solve any big



environmental change & security program



multigenerational problem anymore, except in the face of a complete meltdown of our financial system.

Now, I've had an amazing experience. This is actually my 18th book talk in 14 days and I have been all over this country. And every city I go to I do book signings after, as we will today, and people give me their cards, and everywhere I come back with a wallet full of cards from innovators. I'm in the solar business. I'm in the wind business. I've got a duck; it paddles a wheel, blows up a balloon, issues methane, turns a turbine.

I have heard the craziest stuff! I've got to tell you, this country is totally alive. It has never been more alive in terms of innovation. It's just percolating up from below. But we do not have a government anymore that is maximizing at the speed, scope, and scale we need, that innovative prowess. As I've written, if I were to draw a picture of America today it would be of the space shuttle taking off.

All this thrust coming from below, but the booster rocket, Washington, D.C., is cracked and leaking energy and the pilots in the cockpit are fighting over the flight plan.

So we can't achieve escape velocity to get into the next orbit. And the next orbit is something I call ET, energy technology, which in a world that is hot, flat, and crowded is going to be the next great global industry. And so the argument of this book is that what red was to America of the 1950s, anti-Communism, this kind of all-encompassing idea around which we built our scientific base and our highway system and our military and our research labs.

What red was to America of the 1950s green needs to be to America of the 21st century. Unfortunately, since 9/11, we've gone from red to code red. And this book is about how we go from red to code green. Why do we need code green? Because the world is getting hot, flat, and crowded. What do I mean by that? Well, hot obviously is global warming. The fact that global average temperatures have risen almost 1 degree Celsius since 1750, the beginning of the industrial revolution, about a degree and a half Fahrenheit.

Now, I know what you're thinking. I hear it from every audience. You mean all of this Al Gore stuff, all this Al Gore stuff is about like 2 degrees Fahrenheit? Well, that's right, it actually is because the global climate system is actually a lot like your body. If you go from 98.6 to 100.6 you don't feel so good. And if you go from 100.6 to 102.6 you go to the



environmental change & security program



hospital. So does Mother Nature. Small changes in global average temperature can have huge effects.

Do you know that the difference between an ice age and an interglacial warming period like we are in right now is only 6 degrees Celsius? Six degrees centigrade is what separates the world being an ice ball and what we have right now. But we've already put one degree additional warming outside the norm. Five more and God knows what will happen. So small changes in average temperature have a big effect and we're in the middle of that. That's hot.

Flat, flat is just my metaphor for rising middle classes all over the world. From China to Russia, from Brazil to India, more people than ever today are living like Americans. And here's the dirty little secret. There are too many Americans today. There are too many Americans. Oh, of course, I'm being facetious. It's a blessing that so many people can now live like Americans. But the good Lord did not design this planet in seven days for so many Americans. And unless we, the original Americans, redefine what it means to live like an American, in sustainability terms, and invent the tools that make that possible for billions of people to live like Americans, we're going to burn up, choke up, and heat up and devour up this planet so much more quickly than even Al Gore predicts.

Crowded, well, crowded is the fact that it's 2008, as you know, and by 2020 there's going to be another billion people here. God, it's going to be great for authors. We'll pack up this room twice. In the next 12 years we're going to add a billion people to the planet.

You know, if you go to Google and you put in your birthday and you hit I'm feeling lucky, you can find out how many people were on the planet the year you were born. I was born July 20, 1953. I put that into Google, hit I'm feeling lucky, and it told me that the year I was born there were 2.681 billion people on the planet.

Now, if I keep working out and eating yogurt and I live to be 100, we currently have 6.2 billion people on the planet. And the U.N. population chart tells me that by 2053, when I hit 100, there will be 9.2 billion people on the planet. That means in my lifetime the population of this planet is going to more than triple. And more people are going to be born between now and when I die than were here when I arrived. That's hot, flat, and crowded. The argument of this book is that hot, flat, and crowded, these sort of three separate flames all came together right around the year 2000 actually to create a raging fire.





And this fire is actually driving five global mega-trends if you want to call them, that I think are going to define the 21st century. And how we meet or do not meet and who meets and does not meet these trends, I think is actually going to determine the stability or instability of the 21st century.

Now, the first trend, I know some of you can't see this, but I usually have a PowerPoint. We couldn't do that here. But trend number one is energy supply and demand and natural resource supply and demand. I call this chapter in my book, "Too Many Americans are Carbon Copies," because that's what's going on. What happens when you get too many Americans? Too many Americans is what happens when flat meets crowded.

Oh, when flat meets crowded watch out, when so many more people can live like Americans. I give several examples of this in the book. One of my favorite is one of my tutors, Dave Douglas, the chief sustainability officer for Sun Microsystems. Dave is one of these people always e-mailing me stuff. One day he e-mails me and he said I was noodling around on my computer and I ask myself this question, which kind of epitomizes flat meeting crowded.

He said, "What would happen," we've got another billion people coming between 2008 and 2020, Dave said, "What would happen if we just gave each one of the next billion people one 60 watt incandescent light bulb?" "Everyone should have a light bulb. Each bulb doesn't weigh much," says Dave. Roughly 0.7 ounces with the packaging, but a billion of them together weigh around 20,000 metric tons or about the same as 15,000 Priuses.

Now, let's turn them on. If they're all on at the same time it would be 60,000 megawatts. Luckily, the next billion will only have their bulbs on four hours a day, so we're down to 10,000 megawatts at any moment. Yikes! Yikes, it looks like we'll need 20 new, 500 megawatt, coal-burning power plants so the next billion people can each turn on just one light bulb.

That's energy natural resource supply and demand. One of the other examples I like to give in the book was so I traveled a lot while I was working on the book. I've visited two cities exactly a year ago.

Two cities you will be excused if you've never heard of, visited them in the space of two weeks. One was Doha, Qatar, capital of Qatar, tiny peninsular state in the Persian Gulf off the east coast of Saudi Arabia. I've been a frequent visitor to Doha over the last 20 years. The





other was Dalian, China, one of the 49 cities in China with more than a million people you've never heard of. I go to Doha. I was on my way to Iraq, land in Doha Airport.

My friends meet me at the airport, it's night, take me into downtown Doha, haven't been there for three years. I look around, I look around and I say, "That's Manhattan! You sprouted Manhattan since I was here last." There was a skyline that had literally burst out of the desert like flowers after a flash flood, of skyscrapers, glass and steel all lit up, all air-conditioned, just like ours. They sprouted Manhattan in three years.

I came home, changed clothes, kissed my wife, and went off to Dalian, China. Been a frequent visitor to Dalian because Dalian is the outsourcing capital of China and I worked a lot there on *The World is Flat*. Hadn't been there for three years. They already have a Manhattan. They sprouted another in the three years since I had been there.

I came home, I said to my wife, "You know, honey, it's so great that we and all the neighbors got hybrid cars. Doha and Dalian, two cities you've never heard of, ate that for breakfast." Oh, it's wonderful! It's wonderful the state of Maryland issued new building codes for installation of new homes and offices. Doha and Dalian had that for lunch. Oh, you all went out and replaced your light bulbs from incandescent to CFL. I'm so proud of you.

Doha and Dalian snacked on that before dinner like so much popcorn. Two cities, two cities you've never heard of now are full of Americans. And that's going to have huge energy and natural resource supply and demand implications.

Second issue, petrodicatorship, petrodicatorship. I call this chapter in the book, "Fill Her up with Dictators," because that's what we're doing. That's what we're doing with our energy purchases. We're, it's been argued for a long time, funding both sides in the war on terrorism. We fund the U.S. Army, Navy, Air Force, and Marine Corps with our tax dollars. We fund Al Qaeda Islamic Jihad and the rest with our energy purchases. How stupid is that?

The long-term geopolitical implications of this are going to be enormous. And I try to illustrate this with something I came up with, which I call the First Law of Petropolitics. Hard to see, but it looks like that. Now, what is that? It looks like a V this way and an upside down V the other way, the graph. What I did was I actually just graphed the average price of OPEC oil from 1979 to 2006. Now, if you graph the average price of OPEC oil from '79 to 2006, the graph looks like a V.





Woodrow Wilson
International
Center
for Scholars

Environmental Change and Security Program

Round numbers, \$80 here in '79. It gets down to around close to \$10 a barrel in the early 1990s, around 1991. 1991, 1991, what happened in 1991? The Soviet Union collapsed in 1991. It must have nothing to do with the price of oil.

Now, then from 1991 to 1979 the price goes back to \$80. So in round numbers it looks like \$80, \$10, \$80. Then what I did is I went to Freedom House and got the Freedom House Freedom Index for four countries, Russia, Iran, Venezuela, and Nigeria. Freedom House has a Freedom Index. They measure free and fair elections, held or not held, newspapers and magazines opened or closed, NGOs started or closed, women's groups and whatnot empowered.

They call it the Freedom Index. I got the Freedom Index for those four countries and just for the hell of it I took their Freedom Index and just overlaid it onto OPEC price of oil and darned if it didn't look like that. Gosh, the price of oil goes like that and the freedom Index goes like that. That suggested to me the first Law of Petropolitics. That in petro states, states almost totally dependent on oil for their GDP, the price of oil and the pace of freedom operate in an inverse correlation.

As the price of oil goes down the pace of freedom goes up. And as the price of oil goes up the pace of freedom goes down. Now you actually know this without my silly little graphs, because five years ago when oil was \$30 a barrel our president, George W. Bush, looked into Vladimir Putin's soul and saw a good man down there. Now, at \$130 a barrel, when you look into Putin's soul, you'll see Gazprom, Lucos, Izvestia, Pravda, the Russian parliament and lately Georgia. All of which he swallowed courtesy of \$130 a barrel oil.

Back in the '90s, Iran, when oil was \$30 a barrel, elected Khatami as president. He called for a dialogue of civilizations. When oil headed from 80 to 100 we got Ahmadinejad and he says the Holocaust is a myth.

I have a corollary to the First Law of Petropolitics and it goes like this: At \$20 a barrel, the Holocaust is never a myth. That's just nonsense you can only afford at \$100 a barrel. So the price of oil and the pace of freedom operate in an inverse correlation, and we are driving that correlation with our energy purchases.



environmental change & security program



Third issue, climate change, that's the third mega issue. I call this chapter "Global Weirding," because we're not going to have global warming. Global warming, to a kid from Minnesota? Oh, that sounds like golf in December. That sounds kind of nice.

We're going to have what Duncan Hunter Lovins calls "global weirding," cofounder of the Rocky Mountain Institute. What happens with climate change is that the weather actually gets weird, the hots get hotter, the droughts get longer, the wets get heavier, the snows get thicker. That's actually what's going to happen. Now I begin this chapter with two questions that really rankled me. One is who made it hot? And the other is doesn't Al Gore owe us all a big apology? Really, what's that about?

Well, who made it hot came from a dialogue I did with one of my tutors, Professor Nate Lewis, a great energy chemist at Caltech. Nate was a huge help on this book. I was out visiting him one day and we were out having lunch at the Caltech teacher's new dining room.

And we were sitting there and I don't know why, it was shortly after Katrina and I said, "Nate, what was it about Katrina that really bothered us?" And he swilled his pink lemonade, the specialty of the house, he thought about that for a second and he looked up to me and said, "Who made it hot?" At first I didn't know what he meant and then it clicked. What Nate was saying was, you know, ever looked at your insurance policy, that line with the asterisks, and you go down to the bottom and it says, "This house is insured up to \$1 million, asterisk, except in the event of acts of God."

What Nate was saying is that we've introduced so much CO2 into Mother Nature's operating system we no longer know what is an act of God and what is an act of man. Did we make Katrina or did he make Katrina? Did we make it hot or did he make it hot? We don't know anymore. As Heidi Cullen, the climatologist from the Weather Channel, says, "We're now playing the lead electric guitar in Mother Nature's symphony orchestra."

So this is going to be a very interesting philosophical question we're heading for, we don't know anymore who made it hot. Growing up in Minnesota, boy, if we had a warm day in February we'd say, "What a gift! What a gift!" When I came home this February and the daffodils had all bloomed in our driveway, here in Washington, D.C., because it was almost 80 degrees in February, my wife and I say, "Did we pay for that gift? Will we post-pay for that gift? Who is making it hot?"





Woodrow Wilson
International
Center
for Scholars

Environmental Change and Security Program

We don't know anymore. Now, that leads to the Al Gore question. I got to do a seminar last year at Doblus with Al Gore and, I don't know, this idea just burst into my head afterwards and we were going somewhere after and I had the chutzpah to say to him, "Mr. Vice President, you need to write an op-ed piece. You need to write a column. And if I may be so bold, I'll tell you what I think the lead should be. The lead should be, 'I'm sorry, I'm sorry, I apologize. I completely underestimated climate change.'"

Oh, that would get your attention, because what has actually happened is while all the climate deniers and skeptics have been beating up on Al Gore ever since "An Inconvenient Truth," all the climate models have dramatically sped up and gone beyond Al Gore.

They were all beating up over him here and everyone is writing all this crazy stuff in the *Wall Street Journal*. And, meanwhile, we had an article in the *Washington Post* last week about the latest study that says we thought by the end of the century we were only going to have between 3 and 9 degrees Fahrenheit temperature increase, average temperature increase, it now looks like 11. We thought all the ice in the Arctic would be melted by 2050. We now think it's 2012. That's how quickly these models are changing.

You know, there's many good things about improved health care, but as my friend Joe Brahms says, the best part of the improved healthcare is that all the climate deniers are going to live long enough to see how wrong they were. And they may now need to just live a couple of more years. So really, what I was suggesting to the vice president, to draw attention to that, he ought to write an op-ed piece that says I'm sorry. I blew it. I underestimated climate change.

Third mega issue is called energy poverty or 1.6 billion, because 1.6 billion is the number of people on the planet today who have not on/off switch in their lives. They are the energy poverty problem. That is right; more than a quarter of the planet has no consistent connection to a network grid. All of sub-Saharan Africa, excluding South Africa, last year, generated one new gigawatt of electric power. That's one billion watts. China adds a new gigawatt every two weeks. So China is now adding, every two weeks, what all of sub-Saharan Africa, excluding South Africa, generates in a year.

And in a world that's hot, flat, and crowded, to be energy poor is going to be devastating, because it means you don't have the electricity to drill a deeper well when the drought gets longer.



environmental change & security program



You don't have electricity to even run a fan, let alone an air conditioner when the hots get hotter. And, most importantly, if you have no electricity, you can't get to Google. And if you can't get to Google, you cannot get connected to all of the world's knowledge.

And if you cannot get connected to all of the world's knowledge you will fall behind, not arithmetically anymore, you will fall behind exponentially. So to be energy poor in a hot, flat, and crowded world is going to be devastating.

I really got onto this. I was in Andhra Pradesh working on the book and some friends of mine were involved in an NGO in northeastern Andhra Pradesh and they took me to some villages where they had created small health clinics. We went to one health clinic, a very small building. I came inside, there was an elderly Indian man laid on a table just in his underwear connected to an EKG machine. Next to him was the nurse.

And next to her was a television where a doctor in Bangalore was doing a remote diagnosis. I looked at that and I said, "That's so cool! The world is flat! I knew it, tele-medicine, I knew it." Then I looked over in the right hand corner and I saw the whole thing was being powered by 16 car batteries. That's energy poverty, and in a world that's hot, flat, and crowded it's going to be a mega problem for over a quarter of the planet. Last big problem, is biodiversity loss. We are in the middle, friends, of a phase of mass extinction of biodiversity.

Biodiversity, the world's plant and animal species are currently being lost because of a world of hot, flat, and crowded at a rate a thousand times the norm.

Now, if anything else in today's world was a thousand times the norm, if rainfall was a thousand times the norm, if the spread of HIV AIDS was a thousand times the norm it's all we would be talking about.

Well, that's what's going on in terms of biodiversity loss. According to Conservation International one new species now goes extinct every 20 minutes. As John Holdren says, "We're burning down our library of plant and animal species before we've even catalogued the books."

I call this chapter "The Age of Noah," because it begins in two Chinese zoos. The story, my colleague in Beijing Jim Yardley told, where the last two giant soft-shell turtles on earth are





being kept alive. One is in one zoo, it's 80 years old, one's in another zoo, it's 100 years old. One is a male, one is a female and they're trying to get them to mate. Not so easy. They're now onto artificial insemination.

To me though, those two turtles signify the challenge of our generation, the totally unprecedented and unique challenge of our generation. We are the first generation of humans that is actually going to have to think like Noah. We are actually going to have to have a strategy of saving more and more of the last two pairs.

So, to me, those five problems, those are the big problems of the 21st century driven by a world of hot, flat, and crowded. Now, there's two ways to look at that list. One way is to look at it as a series of impossible problems; I prefer to look at it the way John Gardner of Common Cause once described, a series of incredible opportunities masquerading as impossible ... as impossible and insoluble problems.

Because, you know what's really cool about those five problems and really unique? They all have the same solution, abundant, cheap, clean, reliable electrons. Whichever country, company, or community can come up with a source of abundant, cheap, clean, reliable electrons, through both the innovation of more clean electrons and energy efficiency, will actually have the answer for energy resource supply and demand.

Will actually be able to undermine petrodicatorship, will be able to mitigate climate change, will be able to eliminate energy poverty, and will certainly be able to slow down biodiversity loss.

So, the five biggest problems of the 21st century, all have the same solution, abundant, cheap, clean, reliable electrons and energy efficiency. What that says to me is something that's as obvious as the nose on my face. It says to me that the next great global industry is going to be ET, energy technology, the development and employment of abundant, cheap, clean, reliable electrons.

And my view is that the country that owns ET is the country that's going to have the greatest economic security, energy security, national security, innovative companies, healthy population, and global respect. That's what's at stake. That country has to be the United States of America. If we don't own ET the way we owned IT, the chance of our kids having the same standard of living we do I believe is zero. We absolutely must own ET. It is the next





great global industry and it's still up for grabs. And the beginning of trying to own ET is understanding what world you're living in.

I'm a big believer in redefining green and that's really what I'm trying to do in this book. I'm a big believer that to name something is to own it. If you can name an issue you can own the issue. The world is flat. And the big problem with green all these years is it was actually named by its opponents. It was really named by its opponents.

If you said green to someone, what came up? Liberal, tree hugging, sissy, girly man, vaguely European, vaguely, vaguely European. Mr. Gore, you're looking a little European. Well, I'm here to tell you that, because of that list, green is geopolitical, geostrategic, geoeconomic, capitalistic, patriotic. Green is the new red, white, and blue. It has to be.

So we need to completely rethink this problem. That's what this book really is trying to do. Now, I know what you're thinking. You're thinking but Friedman, we're having a green revolution. What is your problem? We're having a green revolution. I read about it in the Delta SkyMiles magazine. I just love that when people say we're having a green revolution. I always say, "Really? Really? A green revolution? Us, a green revolution?"

Have you ever been to a revolution where no one got hurt? That's the green revolution. In the green revolution everybody is a winner, yeah. Exxon is green. BP is green, Beyond Petroleum. GM is now green. They've got a little yellow cap now they put on those Hummers that they made flex-fuel, yeah! In the green revolution we're having everybody is a winner. That's not a revolution. Friends, that's a party.

We're having a green party and I have to tell you it is so much fun because I get invited to all the parties, but it has no connection whatsoever with a revolution. You'll know, oh, you'll know it's a revolution when somebody gets hurt. Oh, I don't mean physically. I wrote a history of the IT revolution. It was called *The World is Flat*. And there was just one rule in the IT revolution, change or die. Change or die, it wasn't change your brand or die.

It wasn't somebody give me a green racing stripe. It wasn't somebody changed the color of our stationery. It was change or die. There's a whole set of companies, DEC, Data General, Burroughs, they're not with us anymore. They're in that great IT heaven in the sky because they did not change and so they died. But you'll know the green revolution is here when you have to change or die.





Now, this is one of my bugaboos. The greatest thing about being a columnist is people send you stuff. It's great. And some of it's loony, but some of it's great fun and people are always sending me things. People know I'm a golfer so they send me golf stuff.

So, while I was working on the book I got this. A recent study found the average American golfer walks about 900 miles a year. Another study found American golfers drink, on average, 22 gallons of alcohol year. That means that, on average, American golfers now get about 41 miles to the gallon. Kind of makes you proud, okay? So, I was at the doctor's office while I was working on this book one day and a magazine cover caught my eye, "Working Mother" magazine.

I don't usually read "Working Mother" I confess. But the title caught my eye. It said, "205 Easy Ways To Save the Earth." I thought, so easy, I must find more. So I went home and Googled for easy ways to save the Earth. I hit "I'm Feeling lucky," and here's just a sample of the book and magazine titles that came up. "Twenty Easy Ways You Can Help Save the Earth," "Ten Ways to Save the Earth," "Twenty Quick and Easy Ways to Save the Planet," "Five Ways to Save the Earth," "The 10 Easiest Ways to Green Your Home," "365 ways to save the Earth," "100 Ways You Can Save the Earth," "1,001 Ways to Save the Earth," "101 Ways to Heal the Earth," "10 Painless Ways to Save the Planet," "21 Ways to Save the Earth and Make More Money."

"14 Easy Ways to Be an Everyday Environmentalist," "Easy Ways to Go Green," "40 Easy Ways To Save the Planet," "10 Simple Ways To Save the Earth," "Help Save the Planet," "Easy Ways to Make a Difference," "50 Ways to Save the Earth."

"50 Simple Ways to Save the Earth And Get Rich Trying," "Top ten Ways to Green up Your Sex Life." Vegan condoms and solar vibrators, I am not making this up, OK? "Innovative Ways to Save Planet Earth," "101 Things Designers Can Do to Save the Earth." "Five Weird and Wacky Ways to Save the Earth," "Five ways to Save the World." And for those with a messianic streak, but who are short of both cash and time, "10 Ways to Save the Earth and Money in Under a Minute."

Friends, that's not a revolution. That's a party. There is one word you must never, ever, ever use about the green revolution and that's easy. Because if we manage to pull this off it will





be the greatest industrial project mankind has ever collectively undertaken since the Tower of Babel.

Round numbers, the world currently uses, at any given time, 13 terawatts of energy. That's 13 trillion watts, between now and 2050 that's going to double. We're going to go to about 26 terawatts. China grows. India grows, and we keep growing. We're going to go to 26 trillion watts. If we want to double the amount of energy we're using to accommodate for global growth and yet prevent the doubling of CO2 in the atmosphere since the Industrial Revolution, which is the redline the climate community tends to believe beyond which all the climate monsters come out of the closet.

If we want to grow that much energy, yet not double the CO2 in the atmosphere, we need to basically save, through energy efficiency, roughly what we are currently consuming, 13 terawatts. And we need to generate from clean, non-CO2 emitting sources almost another 26 terawatts. If we want to just do that with nuclear power, let's just use nuclear power to do that, we would need to build roughly one new nuclear plant every day from now for the next 36 years.

That's the scale of what we're talking about. Easy should not be in the lexicon. How do we do it? Well, very simply, I'm a capitalist. I believe in markets and I don't believe in Manhattan Projects and I don't believe in government energy programs, at the core.

Government has a role. I believe in markets and I believe the American marketplace is actually the greatest innovation engine God ever created. Our ecosystem of research labs, universities, national labs, venture capitalists, and capital markets is actually the greatest innovation engine God ever created. But for markets to produce innovation they have to be shaped with the right price signals, rules, regulations, and standards.

And right now our market, when it comes to energy, is shaped to produce cheap, dirty fuels. And if we want to have a real clean revolution the first thing we have to do is change the price signals, rules, and standards in that market to stimulate 100,000 innovators in 100,000 green garages trying 100,000 green solutions, a thousand of which will be promising, a hundred of which will be way cool, and two of which will be the next green Microsoft and green Google. That, to me, is the only way we're going to remotely address the scale of this problem.





We are not going to regulate our way out of this problem. We can only innovate our way out of this problem. This is a challenge for engineers and we have got to turn it over to the engineers. The engineers will not take up this challenge at scale unless the market signals change, because ET is different from IT in one very fundamental respect. The IT revolution was a green field.

There were not three browsers out there when Mark Andreessen invented the Netscape browser. With ET it's different. With ET you are always competing against an existing cheap, dirty alternative. Let me explain with a simple example my friend Nate Lewis taught me. Remind me of your first name again. Andrew, now Andrew, our host here at the Reagan Center, we'll use him as my partner in this example.

Let's imagine that I invented the world's first cell phone. I invented the world's first cell phone. I came to Andrew here who runs the Reagan Center and I said, "Andrew, I've invented a phone you can carry in your pocket." He would say, "A phone I could carry in my pocket? Tom, that would give me a set of functions I've never had before. That would change my life! I could call everyone at the Reagan Center, rent out this space 365 days a year without leaving my office! Wow! I'll take 10!"

"Whoa, wait a minute, Andrew," I say. "These phones cost \$1000 each." "Tom, a phone that I could carry in my pocket would change my life." I sell ten to Andrew. I sell ten to Joe, ten to Rob, ten to her, ten to him. Well, you know what happens. You know what happens. Six months later I'm back, the phone is half the size. It's only \$500 and I'm on my way down the cost volume learning curve heading for the China price, the price at which my phone will scale in India and China.

Now I'm on a roll. Come back a year later. "Andrew, remember that phone I sold you? Worked out pretty well for you, right?" "Oh Tom, that was great. It changed my life."

"Got another deal for you. See the lights in this auditorium, Andrew? I'm going to power these lights with solar energy. It's going to cost you though \$100 more a month." What would Andrew say?

Andrew would say, "Tom, you know that phone you sold me? Well, that changed my life. In case you haven't noticed, we, at the Reagan Center, we already have lights. We already have





lights at the Reagan Center and the GAO. I'm on a tight budget. So I'm really not interested in your solar lights because I don't care where the photons come from."

Unless the government comes in and says, "Andrew, my good man, from now on, you're going to pay \$150 more a month for the lights here because you're going to pay the fully burdened cost of those lights. You're going to pay for the cost of the troops protecting the oil coming from the Persian Gulf. You're going to pay for the CO2 we're putting into the atmosphere, charging on our kids Visa cards. You're going to pay the fully burdened cost of these lights." It's going to be 150 more a month. Do you know what happens then?

Then Andrew reaches into his pocket, he gets that cell phone I sold him, he calls me and he says, "Tom, those solar lights you were talking to me about, I'll take 10." And then I'm down to cost volume per, heading for the China price. Without that price signal you will not get innovation at scale and this is a scale problem in clean tech.

It would be as if you were trying to launch the Apollo space program. You were trying to get funding for NASA of the Apollo space program when Southwest Airlines already flew to the moon. That's what we're trying to do. Do you think the Apollo space program ever would have gotten funded if Southwest Airlines already flew to the moon and gave away free peanuts? I don't think so.

And you're not going to get innovation at scale in clean tech for the same reason, because ET is different from IT. Oh, I know what you read in that Delta SkyMiles magazine. You read that \$5 billion went into VC investing last year in clean technology. I love that. I always say to people, "So, 5 billion, 1, 2, 3, 4, really?" Do you know how much money went into IT VC, venture capital, in the year 2000 at the height of the dot-com bubble? Eighty billion dollars. If \$5 billion fell off the table in the IT revolution, no one even bothered to reach over and pick it up. Oh, no, don't want to hurt my back, just 5 billion? Leave it there. Five billion was a rounding error in the IT revolution. It was the sum total of VC investing last year. Why is that?

Jeff Immelt, head of GE, explains it in the book. He says, "Tom, I'm not going to make a multibillion dollar, 40-year bet on a 15 minute signal. I was born at night, but not last night. Oh, I'll go in, we'll do eco-imagination. We'll do all that stuff, but I will not be all in."



environmental change & security program



Woodrow Wilson
International
Center
for Scholars

Environmental Change and Security Program

"Not when I just saw the price of crude oil go from \$147 a barrel to \$87 a barrel back to \$107 a barrel. And you expect me to make a multibillion-dollar bet on that 15-minute price signal? No way, no how!"

"Unless there's a floor price under crude oil, my shareholders will not understand that." So if you don't get the price signal right you will not get clean tech, green innovation at scale. And it's a scale problem. If you don't have scale, you have a hobby. I like hobbies, used to build model airplanes, now I play golf. Don't try to change the world as a hobby. And that's what's going on right now.

So, where does that leave us? Well, I've come to the conclusion where it leaves us is the penultimate chapter in my book. I was doing actually a management seminar for Mr. Immelt one day with all the GE Golden managers. At one point he just sort of threw up his hands. He said, "Tom, what we need is a president and the government that will set the right price signals, set the right standards, set the right regulations.

Everyone will complain and moan for a month and a month later the whole American ecosystem of innovation will adapt and just take off." And I thought about that afterwards and I said, "Jeff, what you're really saying is if only we could be China for a day." Just one day. Would it be so bad? So the penultimate chapter of the book is called, "China for a Day, But Not for Two." If only we could be China for just one day and do like they do and impose from the top down all the right prices, standards, regulations, it would work.

Shame on me. I love China, have many Chinese friends, but I don't want to be China for a day. I don't want to be China for an hour. I want my own government to work. And that's why the concluding chapter of this book is called, "A Democratic China or a Banana Republic?" Because I think those are our choices. Right here, this week, we are either going to be a democratic China that is -- we're going to generate democratically by getting our system to work.

We're going to generate democratically the will, focus, authority, direction, and stick-to-itiveness to launch a real ET revolution and own the ET industry or we're going to be a banana republic. Oh, no, no, not the Latin American kind. No, in the utility business they use the acronym BANANA. You've heard of NIMBY, not in my backyard? The utility people use the term BANANA, build absolutely nothing anywhere near anything.



environmental change & security program



That's us. We are either going to democratically get our system to work to generate the will, focus, authority, legitimacy, and stick-to-itiveness for a real green revolution or we're going to be a banana republic and build absolutely nothing anywhere near anything when it comes to clean power.

Now, I don't want to leave you on a downer. It's not my nature. You know, pessimists are usually right. Optimists are usually wrong, but I'm a big believer that all the great change in history was done by optimists. So I just want to read to you just a little bit from the last page of the book so you get your money's worth. A eulogy is no way to end a book. But the remarks that Amory Lovins delivered at the memorial service for Dana Meadows expressed so many of my hopes that I can't help but share it here.

Dana Meadows was one of the great environmental teachers. She taught at Dartmouth. She was the teacher of many of the leading lights in the environmental movement today, including Amory Lovins.

And on February 21, 2001, after she died, Amory delivered this eulogy at her memorial service. "A biologist, perhaps E. O. Wilson, noted that these ants and termites, though not very smart individually, display high intelligence collectively."

And then he added, "People seem just the opposite. Dana Meadows was an exception. She was one of those promising specimens that are turning up more and more often in the search for intelligent life on Earth. One of those much higher primates whose love, logic, radical stubbornness, courage, and passion awaken the rest of us to our ability and our responsibility to save the world."

"She wrote three years ago, "By nature I'm an optimist. To me, all glasses are half full." Yet she didn't shrink from reporting bad news always blended with encouragement about how to do better. She treated the future as choice, not fate. And she defined with luminous clarity how to do, as one sometimes must, what is necessary."

"She shared Rene Dubos's view that despair is a sin, so when asked if we have enough time to prevent catastrophe, she'd always say that we have exactly enough time starting now." Two years ago, when e-mailing an unusually somber column about events that made her weep, she appended the following note as counterpoint. 'A CEO was having to babysit for his young daughter.'"





Woodrow Wilson
International
Center
for Scholars

Environmental Change and Security Program

"He was trying to read the paper, but was totally frustrated by the constant interruptions. When he came across a full page of the Nassau photo of the Earth from space, he got a brilliant idea. He ripped it up into small pieces and told his child to try to put it back together. He then settled in for what he expected to be a good half hour of peace and quiet."

"But only a few minutes had gone by before the child appeared at his side with a big grin on her face. 'You're finished already?' the father asked. 'Yes,' she replied. 'How did you do it?' Well, I saw there was a picture of a person on the other side, so when I put a person together, the Earth got put together too." There is so much to admire in that eulogy.

The conviction that the future is our choice, not our fate. That when you put people together, you put the planet together. That there is nothing in the universe quite as powerful as 6 billion minds wrapping around one problem. And most of all, the best expression of sober optimism I've ever heard, we have exactly enough time starting now. Friends, we are at a really serious moment in our country right now.

That's always the way people end these lectures, but this time it really isn't jive. We are at a really serious moment. The hour is really late. The project could not be harder. The payoff could not be greater. But we need to get back to work on our country and our planet and we have exactly enough time, starting now. Thank you very much.



environmental change & security program