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THE WORLD IS THINKING

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Good evening. I am Kevin Kelly for the Long Now Foundation. Stewart Brand is absent. His on a fieldtrip to the site of the Long Now Clock. And I will be host for this evening.

The next talk that we have is actually this month. We usually have this one a month, but we have actually two in May. The next speakers Paul Romer, the economist. Who will be speaking on May 18th and also a bring to your attention. If you like this talk, you might be interested in the one on July 28th, Pamela Ronald and Raoul Adamchak. Who are talking about organically grown and genetically engineered food for the future. So, speaker tonight is Michael Pollan. He will be signing books, copies of his In Defense of Food paper back out here at the end of the talk. He also will be appearing in the documentary called, Food Inc. Which will be shown I think sometime in June, first week of June or so. He appears in that and he also will be talking to us tonight about deep agriculture. So Long Now is about trying to think in terms of long term thinking and that is not also done with food, food is a system. You like to take a system view of it and that is is what Michael Pollan is actually expert at. Thinking about the kind of systematic view of food through time, but also unlike who thinks systematically also thinks about it with his heart. He is a food lover and that combination is actually very rare. On taking both the immediate view and the long view. And with that, I like you to welcome, Michael Pollan.

Thank you. Thank you very much, thank you Kevin. They want you back stage to fix your microphone. Thanks a lot. Thanks for coming tonight. It really is a special honor to be invited into this community and I am very appreciative. I looked at the list of past speakers and many of my heroes. So it is and a little bit surprising. Because I think people do not think of food and farming is about the future so much as the past generally. Certainly that was the common view of agriculture in our society, to very, very recently. It was kind of yesterdays news you know, about a sexiest green acres or Beverly hillbillies or the CBS prime time line up until a few years ago. But that is clearly changed. How we feed ourselves, today goes right to the biggest questions of our time. And that is what I want to talk about. Farming is almost cool. Hardly a week goes by and I am not exaggerating, where I meet a software developer who is taking his options in buying a farm. So what I like to do today, I am going to talk for about 40 ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ 45 minutes and then take your questions and I look forward to hearing them. But I want to offer a kind of state of the movement address. Talk a little bit about where we are, because we are at this very interesting fulcrum moment. I think of change around food and where we need to go long term. Those of us who have been working for many years to reform the food system and the American way of eating. We suddenly find ourselves in a very odd and in some ways exciting, but also uncomfortable new place. No longer holding a sign outside on the granite steps of the USDA or the capitol. But inside with the seat at the table. Challenge now is to figure out what to say. I want to start out with a little quiz. I

am going to read you quote and you tell me or try to tell me which well-known critic of the American food system said this. Here is how it goes, "Our entire agricultural system is built on cheap oil. As a consequence our agriculture sector actually is contributing more greenhouse gases than our transportation sector. And in the mean time it is creating monocultures that are vulnerable to national security threats. That are also now vulnerable to sky high food prices or crashes in food prices. Huge swings in commodity prices and are partly responsible for the explosion in our healthcare cost. Because they are contributing to type II diabetes, stroke and heart disease, obesity, all the things that are driving our huge explosion in healthcare cost." Any idea who said that? YesÃƒÂ¢Ã¢â€šÂ¬Ã‚Â¦ President Obama said that. Is not that kind of amazing?

What that tells us is that we have a president and we know he is a supreme dot connector, right in many ways. But he is a very good dot connector in the food system and that he has made the links between the way we grow our food and the healthcare crisis on the one hand and the energy and climate change crisis on the other. That is a very big connection to draw and it has tremendous implications. So we have a president who understands these issues. We actually have a Secretary of Agriculture who appear Tom Vilsack. Who appears to be charge with the mandate for reform. We do not know how far that is going to go. Although we do know his number 2, a woman and Kathleen Merrigan, who is very closely identified with writing the organic rules and is a devoted reformer. Is running the Department of Agriculture, that is kind of mind blowing. And then of course we have Michelle Obama. Who so far may be doing the most important thing of all. Which is to say, talking about real food, planting a garden. A garden she took pains to tell the media it was an organic garden. She did not have to take that extra step and you know it really pissed off the crop protection industry as they currently like to call themselves. They wrote her a letter actually. It was kind of, it was polite, but pointed about, "We really think by making this garden organic, you have cast aspersions on conventional foods in our industry. We really hope you consider, buying and using some of our wonderful crop protection products."

Anyway, so all that is very exciting. It is given a huge boost I think to the movement and indeed to home gardening. If you try to buy garden seeds. You know, you go to your garden center and you will find kind of holes, missing teeth in that great wall of seed pockets. But the question still remains, "Is there a mandate for real change? Is Obama prepared to use his considerable political capital on this issue? Do we have a path that will take us from where we are and where we want to be?" Obama certainly did not run on a platform of reforming food and agriculture. Yet my argument tonight is that sooner or later, first term or more likely second term. He will find himself forced to deal with the food system. Because he will have a lot of trouble, he would discover. Making significant progress on healthcare cost or climate change or energy independence, without tackling the food system. Because it is the shadow problem overall those three other problems. And the way we are feeding ourselves is at the heart of all three issues. Consider this a couple stats. The food system as that quote indicated and this news has reach Obama. But the food system as a whole. That is agriculture and food processing. Uses more fossil fuel, about 20% of the total and contributes more greenhouse gasses, not just CO_2, but methane and nitrous oxide from fertilizer. To the atmosphere than any other industry. Somewhere depending on the studies and none of them are reliable.

Between 17% and 34% of greenhouse gases traceable to the way we are eating. The industrialization of American agriculture over the past 50 years, has transformed it from a system that use to produce 2 calories of food energy for every 1 calorie of fossil energy. Because calories are just energy, right. You can have food calories, you can have fossil fuel calories. So 2 calories you would get 2 calories of food for every calorie of fossil fuel you put into the system. To our system today, it takes 10 calories of fossil fuel energy to produce 1 calorie of food. When we use this word, unsustainable. Which is a vexed complicated word often misused. I think that is a pretty good case for an unsustainable industry. Given what we know about the future of fossil fuel. Then there are many worse cases than that. feedlot beef ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ your Mc DonaldÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s hamburger, if it is fed from corn, it is been fed from fossil fuel. It is even worse, 55 calories of fossil fuel energy to bring 1 calorie of food to the table. So when we eat from the modern industrial food system and this is the keypoint. We are eating oil and spewing greenhouse gas. Which is kind of crazy when you recall that every calorie we eat. It is ultimately the product of photosynthesis. That is the only way to get food energy off of this planet. Is sunlight feeding plants, plants turning that light, couple simple minerals and carbon dioxide into edible calories. It is the only way to do it and if you are eating meat, you are eating the result of photosynthesis in the feed. If you are eating fish, you are eating the result of photosynthesis in the algae at the bottom of that food chain. So it is the only way to do eat. Food is the original solar technology. And there is I think enormous hope in that simple fact.

Now let us turn our attention briefly to healthcare crisis. Since 1960, when I was a boy. Spending on healthcare in this country has risen from 5% of national income to 18%. We would not be able to insure everyone on this country, unless we get those cost under control. Now there are many reasons for high healthcare cost. But one of the biggest and perhaps the biggest if you look into the CDC. Is the cost of preventable chronic diseases linked to diet. Four of the top 10 killers are chronic diseases link to diet. Two-thirds of heart disease can be traced to diet, 40% of cancer can be traced to diet. Most of type 2 diabetes, most of obesity obviously, CDC estimates that of the two trillion dollars we are spending on healthcare today, 1.5 trillion, three-quarters goes to preventable chronic disease. This does not even include the cost of antibiotic resistant diseases that are coming off our feedlots or the effects of agricultural pollution. Now, is it just a coincidence, that in these years that healthcare cost were soaring from 5% of national income to 18%. It is between 17% and 18%. The cost, the percentage of our personal income, we spent on food, plummeted from 18% to 9.5%. So you see as we have spent less on food, we have spent more on healthcare. Which suggest that cheap food, perhaps has a hidden cost.

So that is the bad news. Our food system is broken. We probably can't afford to keep on eating this way. Cheap food has cost us dearly and our agricultural policies are largely responsible. The intention of those policies and I can not emphasize too much. The extent to which the food system we have is the result of the incentive system we created around food. For our farmers, for our processes. The food system we have is not the result of the free market. Is not the result of nature, there is nothing inevitable about it. It is very evitable and it isÃƒÂ¢Ã¢â€šÂ¬Ã‚Â¦ that is the real word. So we have to pay attention to policy

and we will as we go through this. So that is the bad news, the good news is though that food is this original solar technology. If there is any part of the economy, we should be able to resolarize, you would think, it is food.
We are as a society I think, coming to a very important recognition, and that is that you can not have a healthy population without a healthy diet. I think that is generally accepted. What is less well known, but equally important and I think it is dawning. Is the idea that you cannot have a healthy diet, without a healthy agriculture. That these two things are intimately linked and there is no way to protect yourself merely by getting the right nutrients, eating the right things from a sick food chain. That really does not work.
So the good news is that Americans increasingly sense that this system is broken. We have leaders who understand it is broken. A movement for reform is building and the market for alternative kinds of food, whether you are talking about organic or pasture based or local is booming.
The even better news is this. The same policies that will reduce agricultures contribution to climate change and the energy crisis will also dramatically improve public health. There is no issue of trade offs, this is not a zero sum, this is one those lucky issues that is not zero sum. We can make progress in all this fronts at once. Make the system safer, more secure, more sustainable and tastier. Not only here in America, but in the developing world as well. I think we would not be able to do again, is make food as cheap as it has been or something that we can ever take for granted again.
Now, food reform you know, that is a big chaotic subject. It needs a lot of different things to different people. And you have got lots of people on this movement working at in their own little fiefs. I mean you got people working on school lunch, very important work here. People working on labeling, you have people working on building local food economies. Bringing food-to-food deserts in the inter-cities. Getting the trans fats out of the food, out of food. All these different kind of elements and it is a little inchoate as a movement and that is why when I use this term movement. Some people are kind of surprised. But there is very little in the way of organizing ideas. Big, simple ideas that will knit these people together. And that is what I want to talk about, the big picture.
The virtues of a big guiding idea, is that it can help you judge all the smaller ideas. All the proposals, all the new technologies to come along. Are they moving you in the direction of your big idea or away from it? We have policies, we have personal policy. But we have public policy, so we do not have to rethink every question that comes up.
So, I want to lay out, that big idea. A long-term framework for reform and this is the process I began in an article you may have read, farmer in chief in the New York Times last fall. At the time I did not know who the Farmer in Chief would be. A chief features this ideas as I say it is not zero sum. It does not pit rural farmers against urban eaters. Or the interest of health and the environment against the interest of American farmers.
Here is the core idea, we need to wean the American food system. Off it is heavy 20th century diet of fossil fuels and put it back on the diet of contemporary sunshine. That is basically it. Easier said than done of course. It will require changes at every link in the food chain that connects you to the soil that you are eating from. Changes at the level of the farm, the marketplace and the culture. And I want to walkthrough those three levels.
But we do know this, the sun still shines, very brightly. Brighter than ever in fact. If any part of the modern economy can be solarized, it should be food. I want this very briefly

run through how we got here. This idea that we are eating fossil fuel is not immediately apparent. Basically when we begun industrializing agriculture which is begins before World War II, but really takes off with World War II. What we were doing, another way to phrase that is we are taking labor out of the farm and replacing it with fossil fuel and technology. So that all the big innovations, not all of them. Most of the big innovations in agriculture, such as ammonium nitrate fertilizer, pesticides most of which are made from petroleum were basically fossil fuel products and they were very much the products of World War II. We took the munitions ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ ammonium nitrate is bomb fuel as we learned in Oklahoma City a few years ago and we converted that to fertilizer. The same factories that are making bombs one day on its given day in the 1947 begin making fertilizer in great quantities. Vandana Shiva says that we are still eating the leftovers of World War II and that is what she means, we are eating the results of that conversation of fertilizer and nerve gases which become our pesticides. Those grew out of research into how to kill people. We found that in tiny doses, they kill bugs pretty reliably.
Now, the reason what those technologies allow you to do is something that does not happen in nature very much and that is monocultures. Very large fields of the same thing. Which have certain advantages, a monoculture can be at a very simple sense, an efficient technology and these are technologies. One tractor, one pass can harvest a whole field of corn. One corn planter can plant 18 or 36 rows at the same time. So moving from diversity to this monoculture allowed you to greatly increase production. But you could not do it without these technologies. Because if you kept, if you just have corn upon corn upon corn, you would deplete your soil, but ammonium nitrate fertilizer source of nitrogen allowed you to replenish the soil from a bad. Monocultures are also supremely vulnerable to pest, you build up a huge population of the pest of your corn or your soy or whatever it is. So you cannot have a monoculture without pesticides to defend them. This worked really well, it still works really well from one measure and we need to acknowledge the achievement of this system. Which is that put one way, you can walk into a fast food outlet and you can get yourself 2 or 3 thousand calories of food, you know ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ a days worth for less than a minimum wage for one hour. If you think about it in the long course of human history, where people have put so much time and effort to keeping themselves fed. This is an amazing achievement. It just happens to have come at a very high cost. So but we should acknowledge that. This has been our policy, we have rewarded farmers for planting monocultures. We only subsidize five crops, if you are a corn farmer, we give you money to grow corn and soy, but if you want to in a row broccoli, that land is permanently ineligible for subsidies, okay. It is illegal for you to diversify your farm, under our current agriculture policies. We wanted to encourage this, robust the great 1970ÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s era Ag Secretary said, "You know, plant fence row to fence row, it get big or get out." This is our goal, it was our goal, because the public's interest was in having more cheap calories. We need to remember when we started. I am trying to be a sympathetic to this regime as I can. That you know, early in the 20th century, the big public health problem was people were hungry. Even Kennedy when he look at poverty found in the month, in a great deal of rural hunger and urban hunger. So we ask our farmers to solve the great public health problem of that time. Which was we need more cheap calories and they did it, they did a brilliant job. The challenge today, is to once again align the public interest, with the work of farmers. Because I am convince that

American farmers can do whatever we ask them to, as a society. We just need to ask them for something a little different.
Fossil fuel played other roles in the system, it allowed us to nationalize the system. We can move food from California, with the refrigerated trucks all the way to New York and we begun doing that. Fossil fuel pump the water in the irrigation systems. Fossil fuel is what allows us today, to have this in a really crazy supply chains. I mean we are catching salmons sustainably. Native Americans are catching salmons sustainably in Alaska. It is then being flown to China to be fillet and then flown back to California to be eaten. So when you see that sustainable salmon at whole foods. You have to realize what has not been counted. California now feeds New York that is an amazing idea. Iowa imports 90% of its food, this is the best soil in the world, does not feed Iowa. Because they export raw material corn and soy. Gets turn into process food, they buy it back. Iowa is a food desert by and large. We Herman Daly pointed out, we import sugar cookies from Denmark and export sugar cookies to Denmark and he said, "You know, it may be a good idea to swap recipes instead."
But this system will not go on indefinitely. Something very interesting happened last summer when fuel price got as high as they got. The cost of shipping a box of broccoli from Salinas Valley to the Hunts Point Market in the Bronx, went from $3 a box to $10 a box. Price of broccoli went through the roof in New York. What happened when it hit that price, it is very interesting. You had companies like [indiscernible] the big growers and packers in central valley, buying farmland in New England. Because they saw the writing on the wall. They saw that this is crazy, we are not going to able to ship produce across the country, indefinitely. We are going to have to figure out a way to grow food near to where people live. That they will be doing and not New England's farmers is a tragedy I think. But hopefully the New England farmers will get into that deal.
So I think we understand that we are in this little moment of cheap fossil fuel and that whatever you think of the system, however much you like it. It depends on that fossil fuel and can not survive it getting expensive again. So the challenge is then how do you get the system off of oil, which is so deeply implicated. And by the way it is most implicated than the fact that, we have no farmers left. We only have a million fulltime farmers in this country. 305 million people are being fed by 1 million. That is astounding. These are the most productive humans who have ever lived. One Iowa farmer they are. One Iowa farmer feeds about a 150 of his neighbors. And that has never been the case and probably can not continue. Because it all depends on cheap fossil fuel. So how do you get your system off of cheap fossil fuel? That is what I want to walk you through. You need radical reforms at three levels. Reforms that are going to take a long time. Reforms that has some serious obstacles before them. The first is, on the farm. I am going to talk a little bit about agriculture. The key to getting farms off of fossil fuel is figuring out how you produce lots of biomass without, without it, right. Amazingly enough, nature produces huge amounts of biomass every year without fossil fuels, without pesticides, without fertilizers. So how does he do it? And we have understood this for a long time. In fact some of the intellectual history of this organization dovetails with that knowledge and that is in 1971 and this really is the beginning of the modern food movement I think. Wendell Berry, published an article in the Whole Earth Catalog, introducing Americans to the work of Sir Albert Howard. An English agronomist, who

had spent a lot of time in India, studying peasant agricultures in the '30s and he explained that the way you did it was you modeled your system on nature. Whether you are talking about a forest or a prairie. These systems were sustainable. They renew their fertility, they have cycles of growth and decay and they dealt with pest through bio diversity. Through many, many species. You did not find monocultures in nature. That has basically been the core idea since then of organic agriculture. How do you mimic, how do you best mimic those systems and move monoculture to polyculture. Which is to say growing many crop in rotation or symbiotically. The power to produce huge amounts of food from such systems has been proven. Producing huge amounts of food basically from sunlight, soil and water at very different scales. I have written about some of it, if you read Omnivore's Dilemma. I describe Joe Salitin's remarkable farm. Which is now as many, many imitators in California. These orchestrated five species dance of creatures. That produces huge amounts of meats from very little land. But we have proof that you can do this at large scales too. In one interesting case, is Argentina. Where you have farms of five and ten thousand acres. Bigger even in the farms you find in Iowa today or Nebraska. And they have this very clever rotation. Which is to say that they graze ruminants most the cattle on grass for five years rotationally. This grazing builds up so much fertility on the soil. So much carbon in the soil that they can then plow those pastures, those perennial pastures and get three years of grain, corn, soy, whatever they want without any fertilize whatsoever, without any pesticides because the weeds that would be a problem in the pastures cannot survive tillage and the weeds will be a problem until fields cannot survive years of perennial. So we know you can do this and a lot of it depends on redefining our sense of what a clever technology is and what I suggest is that a really smart rotation like that eight year rotation in Argentina is as clever and powerful a technology as the latest genetically modified seed and we need to look at it that way. The question is why do not we look at it that way. Well, by and large because because there is nothing to sell in the case of the rotation and what makes agriculture really work in a sustainable direction are processes more than products which is why there is very little RND that goes into developing these technologies. So one of the things we need to do is shift our research agenda in that direction and not count in private companies who will not be able to figure out a way to lock up the intellectual property of a really good relationship between chickens and cows and pigs on a farm. So, that is one thing. We need to research ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ we need to shift the whole research agenda. The government though as I suggested subsidized this whole move toward strict monocultures and there is no reason why with a different set of policies changing the incentives we cannot move agriculture back. There is one reason why, actually I will get to that. We should for example, instead of right now our subsidies reward farmers by the bushel. How much can they grow of these five crops that we subsidize? We could reward them instead for diversification. For how many crops do you have? We will pay you more for everyone you add to the rotation or we will pay you to plant a cover crop in the fall which very few farmers do today. Cover crops by themselves, another great technology, completely unglamorous, you know what they do is they keep soil from eroding over the winter when it is lots of snow on it. They build up carbon in the soil. Farmers do not do it. Why not? Well they usually get a break if they spray their fertilizer in the fall because the fertilizer spread is not as busy as they are in the spring. And they want ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ and they

have a whole lot of reasons. They have to deal with their convenience and the fact that they are not rewarded for doing it. Nothing could do more to clean up the Gulf of Mexico than cover crops in Iowa and places like that. Fertility, you know in the same way that cheap oil is a curse because it leads to profligate use? Cheap nitrogen has been a curse too and there should not be such cheap nitrogen and there won't be when fossil fuel prices get high. It quadrupled in price during the oil spike. But we also need municipal composting. We need mandatory composting in our cities to generate compost to bring back to our farms and we are really just you know throwing out all of fertility that we are growing. To diversify farms to really close this nutrient loop you need to put animals back on farms. One of the things our subsidies did was allow farmer to sell their grain below the cost of production and this sucked all of the animals off of America's farm and put them on feedlots because the feedlots operator could buy grain more cheaply than a farmer could grow it so it became uneconomical for farmers to have animal on their farms. This was a disaster from an environmental point of view and I would argue from a cultural point of view as well. When you take animals off of farms and put them on feedlots you are taking, this is Wendell BerryÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s line, you are taking a brilliant solution which is to say the animals consume crop waste and give you fertility and the plants feed the animals and get fertility from the animals. You take this brilliant solution technology too and you neatly divide it into two problems. You have a fertility shortage on the farm where the crops are being raised that you remedy with fossil fuel fertilizers and then you have a fertility surplus on feedlots where you have these manure lagoons where we are breeding things like swine flu. That you know this ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ you would think farmers would die for this stuff. No, they do not want it. It has got too many pharmaceuticals in there. It has got too many phosphorus in it and so it sits there releasing methane and nitrous oxide into the air. So, like any animals back on farm, it is very, very important. We should be subsidizing our farmers and I do believe we should subsidize farmers by the way. I do not think the answer is to go to a free market system and agriculture. It has never worked in any reported civilization. Farming is subject to crises of overproduction that are just unavoidable. We can talk about that later if you want. But what we should pay them for again is to ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ is for fulfilling the interest of the public which we are not doing. We are out of phase. They did a good job. They did what we asked them to do. Now let us ask them for something else and what should we ask them for? Well, the one big thing I would ask them for is sequestering carbon. Take this 700 million acres of farm and ranch land and manage it in such a way that it is taking carbon out of the air. Estimates are between 10 and 15% of all atmosphere carbon could be returned to the soil with sustainable agriculture practices, I am delighted to hear Al Gore talking about this issue for the first time as part of the solution. And there are ways we could do that. We have to learn how to measure carbon better. We have to figure out the best ways to do it. But we know rotational grazing where you move the animals everyday produces huge amounts of carbon in the soil. I can explain how later. We know that organic agriculture compared to conventional agriculture builds up the carbon in the soil. We know how to do this. We have to figure how to measure it and how to reward farmers for it. And one of my big concerns about this cap and trades scheme is that the first bill to emerge from Henry WaxmanÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s committee simply left agriculture out. We are not going to get a handle on climate change by ignoring agriculture. Not when it

represents a third of the problem. Why did they leave agriculture out? Because that is what big Ag want them to do. They do not want to be involved because in addition to the carrots of paying farmers for sequestering carbon or generating you know energy, you need sticks as well. You need to take Tulare County where vast amounts of methane and nitrous oxide are leaving these huge cattle confinement operations and make them pay for that in the same way that power plants are going to pay for their emissions. So, you need carrots and sticks in agriculture and nothing could do more to drive the whole system change that we are talking about than that. But you should also be rewarding farmers for creating bee habitat. We have a crisis of the honeybees right now. That is the result of monoculture. So let us reward them for taking out a row of almonds every ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ you know 50,000 rows and put in a row of flowers of perennials so that the bees stick around for the whole year. We should reward farmers for generating electricity for wind energy. We should, and this might sound weird, one of the most important functions of agriculture is to keep cities in check stopping sprawl. We should reward farms in critical areas as bulwarks against sprawl. So again the basic goal is to realign the public interest. What we need is a society and then reward farmers for giving that to us. Now I said that there was an obstacle and the biggest obstacle to what I am describing is labor. We do not have enough farmers I do not think to grow sustainable. I said we were down to about a million. That is not enough and as fossil fuel gets expensive or runs out we are going to need more people on the land. It is hard to imagine 20 or 30 more million people on the land in this country. I actually think it is easier to move developing world agriculture in a sustainable direction as much as Monsanto wants to bring their seeds to Africa. I think that it is a place where this kind of systems will work really, really well because we still have a lot of people on the land and industrializing agriculture there and driving them to the cities seems like not a smart idea but what do we do here? Well, we have to encourage the many people, the many young people today who do want to farm, make it possible. Make cheap land available to them. Make an education in agriculture available to them. And there are signs that this is happening. For the first time the new agriculture census that is done every five years found an uptick in the number of farmers in America; the first time in history, about a hundred thousand new farmers today over five year ago. Very small farmers, local farms, people at FarmerÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s Market, CSAs, so we have to make farming cool. We have to make it pay well to encourage people to go back to the land and the last thing we have to do on the farm is preserve farm land near our cities. That is one of the most important, most endangered resources we have. We are lucky in San Francisco that you do not have to travel hundreds of miles to get to a good farm land but we have to make sure it stays this way. In the same way that if you want to develop a wetland you have to meet a very high bar of proof that is absolutely necessary and you will be strongly discouraged from doing it. The same should hold true for prime A1 farmland that you should have to provide a food system impact statement before you are allowed to develop it because once houses go up on this land; it will never be farmed again. I say that although I just heard about, there is an environmental group that is actually bulldozing defunct real estate developments in the central valley now. So, I might be wrong about that. The trust for public land is involved in a big project to actually return a subdivision to parkland but the next step is farmland and we should incorporate farms in our development schemes. We should reward developers in the

same way we reward them for you know open space. We should reward them for including farms. I mean what if we have farms in the middle of all those subdivisions instead of golf courses. Would not that be great? With CSA's, with ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ anyway, so that is the last point on farms.

Now, you ask, can we feed the world this way? This is the big question and I get asked this all the time and I will tell you the really honest answer, I do not know. I really do not know but the reason I do not know is we have not tried and a lot of people are prepared to give up before we try. I also know that there is a whole slack in this system. Half of the grain we grow in the world is going to feed animals and that the great slack is of course meat eating worldwide. I also know that a quarter of the food we are growing is simply waste. So there is probably enough land to grow all the food we need for the 10 billion that are coming. The labor I think is really the big question. But you know before people, it is so interesting how people are just, they raise this question and then they turn to Monsanto and you know we, by the same token, we do not know if we can ran an industrial civilization without cheap fossil fuel. We do not know if we can do that either but we know we have to try. We know we have to try and the same goes for food and it is not all or nothing. You commit yourself, you move in that direction, you shift the research agenda, we have the models, and what we need are the people and the commitment to do it.

Now, level 2, I am going to go a little faster through level 2 and 3. If the farms diversify you know somebody has got to buy that stuff if they move to five crops in Iowa and there is nobody left to eat food in Iowa. That is not going to work. Right now the grain elevator only will buy corn and soy if you live in Iowa. So, we need to diversify the food market place. We need to build a real local food infrastructure. We need four seasons FarmerÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s Markets in every town in America not expensive buildings. As soon as you have FarmerÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s Markets that were not simply seasonal and we have to remember the idea of a 50-week FarmerÃƒÂ¢Ã¢â€šÂ¬Ã¢â€žÂ¢s Market that we are all spoiled on here in California is quite rare in the rest of the world but if you have indoor structures, beautiful structures like the Boqueria in Barcelona and Europe is full of these structures you would have farmers growing produce under glass, more root vegetables and more meat and cheese and all that kind of food which show up in those markets. So that is I think is a very important thing we need to do. The basic premise though here is we need to decentralize the food system. Now you say that might be a little less efficient and I will concede it is less efficient but one of the most important lessons I think of the last few years is that as important a value as efficiency is, resilience finally is a more important value. An efficient systems by definition are not resilient because resiliency depends on redundancy, right and by definition that is inefficient to do things you know twice. So, the advantages of decentralizing the food system are many though. It will reduce fossil fuel consumption but more important the system can better withstand shocks and the only thing we can be sure of going forward is that there will be shocks ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ oil price shocks, weather shocks, pathogen shocks, terrorism shocks and one of the real vulnerability of our food system of this national food chain based on monocultures, based on only four companies selling all the beef, three grain traders you know incredibly cinched waste economy of this food system is that it is explicitly vulnerable to accidental or deliberate contamination. We learn this after 9-11. The government was looking for all the

different vulnerabilities in our society and the GAO did a report government accounting office and they said one of the biggest vulnerabilities of all is the food system. We have a single hamburger grinding plant that is feeding 50 million people over the course of the month. We have a single lettuce washing facility that is doing 26 million servings of salad every week. A single canister of poison introduced into those systems could kill huge amounts of people. And the government saw this threat and said well yes we have a problem to centralize food production in this country and then buried it because nobody wanted to go there. Nobody wanted to go there but we need to go there. And if we re-localized the food system, we will be eating more real food because this system of monocultures feeds into a system of heavily processed food. They can you know the deathless twinkie that lasts you know on the shelf for years is very much tied to the system system I am describing. So the market is pushing things in this direction. There is incredible ferment. Lots of effort to re-localize food but the government can do a lot to encourage it and to get out of the way in some ways. They need to deregulate small food processors who you know I talk to farmers all the time. They are growing wonderful pork but they are not allowed to smoke a ham without having a hundred thousand dollars of facility because the rules are designed for Hormel and a little farmer with his you know couple of hams simply cannot afford to be in that system. We need antitrust enforcement. This food system is so heavily concentrated that even if we just went back to the level of antitrust enforcement of Dwight Eisenhower we would have a completely food system than we have now. I think that most important thing the government can do to create a, you know renaissance of local food production and consumption would be simply to regionalize food procurement. Just you know pass a law in the same way we have a law that a certain amount of procurement for say military contractors. It has to go minority contractors because that satisfies a public goal. Well, what if 1 or 2% of all the money the government spends on military bases, on prisons, on schools went to local food production, food grown within a hundred miles, that would do it, just that 2%. It is all we need. And we also need to develop urban ag because there lots of places where food can be grown in cities and one of the most exciting things happening in this food movement that I did not mention earlier is what is happening in our cities. If you go to Detroit there is an amazing project there to feed the city from the city. Will Allen is a visionary farmer in inner city Milwaukee who is growing huge amounts of food on two acres in the middle of Milwaukee and has plans to feed 10% of that city from city from his farm. So we need to support that kind of work and there is evidence that this government will be supporting that. I think we barely began to test the potential of urban agriculture to deal with these food deserts which is such a big part of the public health problem. So that is level 2, the economy. There is a lot we can do. It is not that expensive. It just takes a commitment on the part of the government and the food industry that is willing to allow it to happen and that may be the hard obstacle there. And level 3 is the food culture. The fact is I have described this as a supply driven problem; that we have all these cheap calories coming off the farms. It is turned into processed food that we eat. It ruins our health, it ruins the land, and it really has ruined the occupation of farming for so many people. Well we are all implicated in the culture of fast, cheap, and easy food. If you look at the numbers for this food industry, we spent about 881 billion dollars on food every year. You know how much of that gets back to

the farmers? They clear about 69 billion of that. Okay it is a tiny, tiny amount and 14 billion of what they are clearing is subsidies. Just to give you an idea, the people who make the packages, the cellophane, and the cardboard, they are clearing 69 billion dollars. They are making more money than the farmers are okay. We are spending more money on the packages our food comes from than on the farmers. So we cannot expect them to drive this change. That is too much to ask. It is really that 770 billion dollars of food marketing, food processing which is to say convenience eating. So you know the farmers are not the decision makers here. To a larger extent it is about policy and it is about us and that means changing our behavior. We need to enlist more people in this movement and that is why I think what Michelle Obama is doing is so important. We need to begin with our children. We need you know Alice Waters really got this one right. The fact is that the way you begin to change the food culture is teach children how to grow food, how to cook food, and how to eat food. Now that might sound a little paternalistic that our schools should be teaching children how to eat and that strikes parents as odd. But make no mistake, we are teaching them how to eat right now. If you give kids for lunch chicken nuggets and tater tots and 10 minutes to eat them in, you are teaching them very effectively how to become a fast food consumer for the rest of their lives. So we need to teach them in a different way. So I think reform of school lunch which is very much on the agenda this year, the school lunch re-authorization is coming up is vitally important. We need to bring back Home Ec. We need to make as Alice Waters said, make lunch an academic subject. I think she is absolutely right about that. Now we also need to teach adults because a great many adults are not aware that they are eating fossil fuel. They think they are eating hamburgers and french fries and you could see how they might make that mistake. It looks more like hamburgers and french fries than fossil fuel. So we have to make it look a little more like oil and the way you do that I think is you put a second calorie count of every package processed food that there are you know 60 calories of food energy in this head of lettuce or whatever it is and 160 calories of fossil fuel energy. So you can know at a glance are you eating something that took more fossil fuel energy than solar energy to deliver to you and if we put that on every food package, at least those people who care would be educated about what is really going on. We need much more ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ that is one example of a whole raft of measures to make the food system more transparent. The fact is people are really deeply disconnected from where their food comes from and it is very hard to find out. The products all lie. There are you know images of farms and pastoral scenery on the packages that really are coming from feedlots. When the food system gets this long and this opaque it is very hard to know what kind of system you are really supporting and consumers are deeply confused. So I think we need to move toward a system where there will be a second bar code on every product, I know I am crowding these labels, and that you could run that bar code under a scanner under a kiosk in the supermarket and there would come an image of the farm where that chicken actually lived. This is no longer expensive at all and you would see the ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ you press another button and see the diet. What did that chicken eat and what pharmaceutical went into that chicken and then you press another button and you see the slaughterhouse and nothing would clean up those awful places faster than cameras broadcasting through the web to eaters on a 24-7 basis. So we should be fighting for transparency. The principle of the glass abattoir, the glass wall in

the slaughterhouse you know will be more powerful than any regulation you could dream of. And then of course we need and I proposed this in Farmer in Chief and I have been very happy to see that it is actually happening is that the White House set an example and Michelle Obama has began to do that. We have a White House organic garden which is you know very ÃƒÂ¢Ã¢â€šÂ¬Ã¢â‚¬Å“ how thought that this would actually happen except for Alice Waters actually but I never thought it would really happen. You know this sounds symbolic but if you go back to World War II when Eleanor Roosevelt did the same thing, we got to a point where there were 20 million victory gardens in America in World War II and they provided 40% of the produce in this country. We have this huge resource called the Great American Lawn and so the extent we can rip that out and begin growing food, that is most local food of all; that is the shortest food chain of all; the freshest, most nutritious and often tastiest food that you can possibly grow. But gardening is very, very important for other reasons too and I am going to end on this point and talk a little bit more about politics perhaps when we sit down because gardens teach a different way of being in the world. A tremendous part of our problem I think confronting climate change today is that we all feel helpless. It is too big a problem and our lives are just too deeply woven into the system of what Wendell Berry called the cheap energy mind. By that he meant we do so little for ourselves today. We depend on distant others to feed us, to entertain us, to do our taxes, to do everything and it is only cheap fossil fuel that allowed us to have this incredible division of labor. It has underwritten some good things but the challenge of living without cheap fossil fuel is the challenge of doing more for ourselves and the wonder of gardening is the discovery that doing something more for yourselves is imminently doable, imminently pleasurable and makes you feel empowered. And I think that finally is what is driving this whole food movement. It is one area of our lives where we can take back power from the cheap energy culture and even if it is incremental, even if it is in parts but we see how we can do it. We do not see how we can live without our cars, without our heat, without our air conditioning but we can change the way we eat and begin really to tackle these problems one delicious bite at a time. Thank you very much.