

THE BREAKTHROUGH

Alex Trembath: Todd Moss, thanks for joining us.

Todd Moss: Great to be here Alex.

Alex Trembath: So what are we talking about when we talk about energy for growth?

Todd Moss: Well, I think everyone understands that energy is essential to modern economy. Energy is embedded in everything that we do, the way we live, the way we work, the way we move around. And there's been this new concept called energy poverty, which is that poor people don't have energy, they don't have enough to live the lives that people live in energy abundant economies. Now, the response to energy poverty has been a big push to increase what's called energy access, which is that everyone should have electricity at home. And this is a wonderful goal, it's actually SDG 7, is that by 2030, everyone in the world should have modern electricity at home.

Alex Trembath: SDG's being the Sustainable Development Goals?

Todd Moss: Right. The goals agreed at the UN a couple of years ago that are supposed to provide the global framework for progress, what are we all trying to achieve collectively. Energy access is a wonderful goal, household access is not the same as energy for growth which is energy to power, industry, commerce, and to power an economy, and that's especially important if you want to create jobs. In lots of developing countries, employment is probably the top development issue, and we want people to have higher incomes, so they need not just access at home but they need energy for growth to allow them to raise their incomes.

Alex Trembath: I feel like from my vantage point there's a couple components to the energy access model that you're sort of contrasting with, one of which is the notion of an energy ladder that you deliver energy access to the home. And that'll help people get more access to economic services, better schooling at home, better cooking at home, things like that, and that's the first step up in energy ladder towards growth. Another idea is the idea of leapfrogging. So can you talk about these ideas, energy ladder, leapfrogging and how they're compelling and maybe how they're not.

Todd Moss: Okay. Let's start with the energy ladder. The idea that someone who lives in a home and burns kerosene for lighting and burns wood for cooking, that they

could graduate toward, let's say a solar home system, that is the first step on an energy ladder. But the issue with the ladder is that, it doesn't go to just the first step, it's supposed to go to the top. So the idea of energy access at home is that it can provide those first couple of steps but we've seen that people who are poor and they get lighting at home, maybe their children can study for a few hours more a day, maybe it's a little bit safer at night, maybe they can charge cell phone, but it has almost no effect.

Todd Moss: In fact, a lot of the studies showed zero effect on income, on the ability to live a better life and to really have development. If it's a dead end, if access is a dead end, then it's not a step, it's not building toward what everyone is aiming for, which is for everyone to live a prosperous, modern life where energy is a liberator for human capability rather than a shackle, which is what it's become for about 3 billion people who live in economies where energy prevents them from future prosperity.

Alex Trembath: I want to get to the solutions, the type of technological and policy and practice solutions that you're talking about. But on the question of leapfrogging, there's this idea of traditional development and electrification done the way that western countries did it. The idea of leapfrogging is that we can leapfrog that development, those technological solutions, those approaches. And again, we'll get to the types of approaches that you're talking about, but we have solar home systems, we have batteries, we have new business models like PayGo, and I feel like very often those are talked about in the context we can leapfrog the old way of doing things on the road to human development. So we have these new solutions, how should we be thinking about them?

Todd Moss: Yeah. These new solutions are super exciting and they can deliver new kinds of energy in new ways, faster and cheaper than it was done in the past. And we absolutely want to have ... The global energy poverty problem is so great, we want to throw everything at it, but there's two leapfrogs that people talk about, both of which I think have some misperceptions.

Todd Moss: The first leapfrog that everybody talks about is like cell phones, where some countries skipped land lines and jump right to mobile phones. It's a very alluring analogy, but practically speaking right now, those distributed systems can only deliver a little bit of power. You still cannot run a factory, you cannot even run an entire office building on their systems, it's a question of scale. Even if you think about the mobile phone, you can charge your phone from a solar home system, but charging of the phone is less than 1% of the energy you need for the phone to actually operate, the other 99.5% of the power is used for running cell towers, data centers and to manufacture phones. I think there's a little bit of a misperception about that leapfrog.

Todd Moss: The other leapfrog issue is that maybe economies are going to skip heavy industry and jump right to services, and services maybe they don't need the same power that industry needs. Well, that's true in some ways, but actually an office building, a typical office building in the United States, mid size office

building, of which there are about 50,000 of them, still needs about a whole megawatt of installed capacity in order to function properly.

Todd Moss: I work in downtown Washington DC, there's a famous street in DC called K Street, it's where all the lobbyists and law firms are. K Street has about 105 office buildings on that street, it needs about 105 megawatts of power just for that one street, that's more than the entire country of Liberia has for their entire economy. And so again, it just suggests that some of the leapfrog we're alluring is not actually going to help countries build the kinds of modern economies that they want.

Alex Trembath: I've been doing energy analysis stuff for a long time, I have never actually heard the one megawatt, one office building heuristic before, so love learning new things. So the idea is that maybe countries won't go through exactly the story of industrial development as the United States or the UK or Germany or Japan or China did, but it will look pretty similar, this process of industrial development and increasing energy consumption.

Todd Moss: I think all countries are going to follow different economic paths. The future of Ethiopia is going to look a lot different than the future of Germany, and Ethiopia is going to look different from its neighbor Kenya. But one thing that is holding universally is that all rich countries use a lot of energy. If you look across the world, every single high income country in the world per capita electricity consumption is at least 4,000 kilowatt hours per person per year, at least 4,000, in the US it's around 13,000. When you look at Nigeria, Africa's biggest economy, they use about 150.

Todd Moss: We're not talking about Nigeria going from 150 to 300, we're actually talking about Nigeria going orders of magnitude larger in terms of per capita energy consumption. So it's economies like that, that no matter what path they follow, they're going to need large scale energy if they're going to be more prosperous societies. Otherwise we're actually consigning, a low energy future is a jobless future for people, and it's a future of poverty, and I don't think anybody wants that.

Alex Trembath: So if solar home systems off-grid solutions are one approach to the energy poverty question out there in the world today, what are you doing? What is the approach of the Energy for Growth Hub?

Todd Moss: There's a lot of excitement and activity in the off grid space and a lot of people trying to figure out the best way to connect homes as quickly and efficiently as possible, and we're big supporters of that. At the same time, what the Energy for Growth Hub, our new venture, is doing, is trying to ensure that there's some balance, that when we're thinking about household access we're also thinking about energy for industry, commerce and job creation. Most economies, it's about two-thirds of the energy used in an economy is not at home, it's in office buildings, in factories and firms. And so we are a global research network that is promoting this idea that countries need not just energy access, but they need

energy for growth. And we're focused on a narrow set of issues that are fundamental if economies are going to have the energy that they need, and those are issues like grid technology, like renewables, but at the utility scale.

Todd Moss: So while we don't work on solar home systems, we do work on utility scale, solar firms and wind firms. We're working on the natural gas, gas to power value chain. A lot of developing countries like Nigeria and Ghana, they have massive energy shortages yet they're producing a lot of natural gas, and that dichotomy is an issue that can be resolved. We're also working on big data, for least cost energy planning. 50 years ago, we didn't have the tools that we have today to figure out where is the best place for the grid to go next, where is the best location for different power systems. And this is especially relevant now that we have whole array of energy solutions that are all competing for similar customers, trying to figure out where those investments make the most sense.

Alex Trembath: I know that there's, as you say, a very healthy number of NGOs and private companies filling the gap or trying to fill the gap on the off grid rural distributed generation solar home systems front. What are the multilaterals doing on this space? Given those different approaches, sort of where does the hub fit in?

Todd Moss: By the multilaterals you mean the World Bank, the regional development banks like the African Development Bank?

Alex Trembath: Right.

Todd Moss: These big institutions try to do all things for all people. The World Bank for example, does have a scaling a solar home system program, they're also investing in large scale generation and grids. What we at the hub do, we're actually partnering with the World Bank. We've got a advisers from the World Bank as part of our network, and what we're trying to do is help to bring some of the capacity and analytical capability that sitting at places like Stanford and MIT and trying to bring some of those tools to the World Bank. And at the same time the banks have a lot of data, they've got a lot of people on the ground and they've got a lot of experience in infrastructure project finance. Trying to use some of their lessons to bring to other kinds of projects. So it's a little bit of a two way street with the multilaterals.

Alex Trembath: One piece of criticism that you hear sometimes is, from really all sides, is that while the multilaterals or while NGOs or private companies are failing to engage in this space and they are, we see pretty endemic poverty not just in Sub-Saharan Africa, but largely that China and other parts of Asia are stepping in, China, Asian Development Bank. And that's talked about like it's a threat sometimes, but in a sense you would expect investors and multilaterals from not the West to be playing in this space. What's your view on China and other investors who aren't the World Bank and their impact on development and electrification?

Todd Moss: You know it's not that clear. First of all, China is a member of the World Bank, so the World Bank includes them as a shareholder and the United States is a major shareholder of the Asian Development Bank. But you do have these new Asian players, you have the Asian Infrastructure Bank, you've got the New Development Bank and you've got all the Chinese and Indian and other bilateral agencies, and they are playing a big role in infrastructure, they bring a lot of low cost finance. And right now in Washington DC, there's a lot of heads exploding, there's a lot of concern about China dominating some of these economies and that's motivated the US government actually to try to match some of these tools. But I would say that net Chinese investment in infrastructure in Africa, net it's positive.

Todd Moss: They're bringing a lot of know how, they're bringing a lot of capital and they are able to do things much faster than western institutions. Now if you're an African government and you're under pressure to try to deliver for your population, it's much easier to do a deal with the Chinese than to bother with all of the headaches of the World Bank or to try to deal with the US government or other creditors. I think there's some issues with the way the Chinese operate, they're not as transparent as we would like. Sometimes the deals are packaged in ways that it might disadvantage certain countries, but generally the more actors you have involved in the space, that creates some healthy competition. And if Chinese involvement actually gets the World Bank to move a bit quicker for its clients, then I'm okay with that.

Alex Trembath: So earlier you mentioned a term that I think some of our listeners may have flagged and that's natural gas. So another part of this story is everybody agrees, we want people in Sub-Saharan Africa and other poor regions of the world, in rural India, and elsewhere to consume a lot more energy, but they can't do with fossil fuels, or they shouldn't do with fossil fuels for a couple of reasons. One, there's an argument that fossil fuels are outdated and that there are better, cheaper technologies like solar, wind, whatever scale we're talking about.

Alex Trembath: Another argument of course is climate change. There is several billion people around the world who will consume a lot more energy in the coming decades, and if that comes from oil or gas or even coal, then that makes the climate problem even worse than it already is. So how does the Energy for Growth Hub think about your work in the context of climate change?

Todd Moss: I think the environmental impact of the power sector is usually an important issue. At the same time, if we think about the impacts of climate change on say Sub-Saharan Africa, what is it going to mean for Africa in the future? Extreme weather, means that they're going to need a lot more resilient infrastructure, which means concrete and steel. Hotter weather, means they're going to need cold storage and air conditioning and drier weather, falling water tables means they're going to need pumped irrigation, they're going to need desalination. That is the response to climate change, and I've just named six industries that are among the most energy intensive out there.

Todd Moss: What climate change actually means for Africa is not less energy, it actually means more energy. I do think that there some good questions about what's the best longterm energy mix, every country is going to do the same thing which is, figure out what's best given their endowments and given their future needs. Ethiopia is a good example, they have tremendous hydro potential and they are betting big on hydro. Kenya is a neighboring country, now half of Kenya's power comes from geothermal and they're going to continue to exploit that.

Todd Moss: Kenya has just added Africa's largest wind firm at Turkana. And then countries like Nigeria, which are already producing natural gas and unfortunately flaring natural gas, are going to be a mix of hydro, solar and natural gas. I think though, we should be very, very cautious before we start taking technologies off the table, especially for the poorest countries, and gas is a good example of this. Tanzania, Mozambique, they've just had massive natural gas finds off shore, those resources certainly in Mozambique will be developed. They're being developed by European companies and that gas will either be entirely exported to Asia or a small amount of it will be kept at home to produce electricity.

Todd Moss: That's the policy question, it's not a question of leaving it in the seabed. I think that it's incumbent on those of us that care about good development outcomes and are working with countries to try to get the best outcomes for their populations, that we leave options like natural gas on the table where they make the most economic and social sense.

Alex Trembath: Yeah. The upside for me in this has always been that it's going to be sort of a cost benefit analysis for any individual country. Of course we expect to see rise in carbon emissions from dozens of countries around the world as they develop, but those emissions are the result of economic development and of infrastructure and of, as you say, energy intensive industries that will help make them more resilient to the impacts of climate change. But second, even if you have a much more catastrophic view of the climate problem or extremely cashed up view of the climate problem, there doesn't seem to be a whole lot that the west or whatever could or should do to prevent exploitation of a countries or regions natural resources.

Todd Moss: Well, If somehow we were able to turn the spigot off and there was zero finance for all of Africa, we couldn't do this, but if we could, zero finance for all of Africa for all fossil fuels, and we did that tomorrow, the global effect on emissions would be close to zero. So we would be causing tremendous harm for almost no global benefit. And I always have to remind colleagues when I sit in Washington DC, almost always in an air conditioned, well lit office packed with computers and we talk about these issues about what kinds of financing options should be available for infrastructure in Africa. That Washington DC's power comes from, 95% of that power comes from coal, gas and nuclear, and those three options are severely constrained in Africa. And if you add the constraints on hydro of which there are many, you're really taking most of the options off the table for some of the poorest countries in the world.

Alex Trembath: So where does the Energy for Growth Hub come from?

Todd Moss: Yeah. So I've been working at the center for Global Development for a number of years, and working on the energy portfolio we got involved with the Power Africa Initiative, which is a US government initiative to promote electrification in Africa. We were involved in looking at ways that energy access is measured and two big things really struck me. One was that when we think about energy and development, we immediately go to the house, we immediately think of lights and refrigerators at home. And when we know that energy is mostly used for jobs in industry and commerce.

Todd Moss: The second thing I've noticed was that there is just an incredible amount of analytical capacity in the world on energy issues. There are these fantastic energy policy centers at Columbia, at Carnegie Mellon, at Chicago, at Berkeley, at Stanford, at MIT. And a lot of these big brains are working on things like the California electricity market or they're thinking about Germany, but very few of the scholars there were actually thinking about Nigeria or some of the other markets which are going to be building most of the infrastructure for the next 20 or 30 years. And they also did not have a natural way to connect with policy makers in those markets.

Todd Moss: I want to try to fill these two gaps by creating a network of community that was all dedicated to a high energy future for everyone. We've got about half of our scholars are at US universities and about half of think tanks in Africa and South Asia, and we try to work around a core set of issues that are relevant for helping to build that high energy future and to do it in a data, evidence driven way.

Alex Trembath: And how did you Todd, find this work? I know you worked with the State Department for a long time before your time at CGD, were you always interested in energy? How did you get on this path?

Todd Moss: I actually started working largely on development finance issues at CGD and then I went into the State Department through a series of accidents. But as a diplomat, one thing that really struck me was in that, when we're negotiating with our African allies, we were asking them all kinds of things. We want your help on counter terrorism, we want your help to fight HIV/AIDS, we want your help on tackling narcotics trafficking. And they'd say, that's great, we're going to help you with that, what we want from you is, we want private investment in infrastructure. So when I left the State Department, went back to CGD, I started working on this investment in infrastructure issue and came at it largely as a US foreign policy tool.

Todd Moss: But the more I dug in, the more I started to see energy embedded in everything, and that was really motivating to keep pushing the envelope, and that pushed me down this path toward energy for growth, which I saw as a little bit of a gap.

Alex Trembath: So speaking of the State Department, as we get to the end of this conversation, I have to ask, who is Judd Riker?

Todd Moss: I had great honor to work for Condoleezza Rice and State Department, I was her West Africa person. And it was a terrific experience, but one of the things I learned is how ugly and dysfunctional US foreign policy really is. The way that decisions are made inside the government is beyond anything you could imagine, I'm sure you, you think it's bad but it's far worse. So when I left government and I went back, I had all of these new insights into how government functions and I started writing a book about the dysfunction in US foreign policymaking in the 21st century.

Todd Moss: And it was getting really depressing to write and I decided it would be more fun to write and definitely more fun to read if I put it in a fictional format. So I created a character, Judd Riker, who's an accidental diplomat who tries to bring data and evidence to make US foreign policy work better. His first adventure is there's a coup in Mali in West Africa and he has a hundred hours to reverse the coup. I wrote this largely to just get it off my chest for fun, but when I was done, I wanted to sell the book, and by coincidence, Mali had a real coup and that helped me sell the book to Penguin and they asked for three more.

Todd Moss: So there's a four book series, the Judd Riker series starts with the golden hour and he moves to Zimbabwe, then Cuba, then to Russia and Nigeria. It's been really a lot of fun but the idea was to try to take regular people inside the US embassy during a crisis and show them through a fictional format sort of the ugly sausage machine of US government.

Alex Trembath: Well, I have read them and consider this the first and maybe only positive endorsement of a fictional book series that you'll hear on the Breakthrough Dialogues. Seriously if you haven't, listener, check them out.

Alex Trembath: Todd Moss, thanks for joining us.

Todd Moss: Thanks Alex.