CONTEXT
ENERGY EXAMINED

PODCAST: What's involved in an energy transition?

Dr. Scott Tinker of Switch Energy Alliance discusses the trade offs of an energy transition and the need for informed conversations about our energy future.

May 27, 2020

As the world grapples with COVID-19, climate change and energy poverty, there are many varying views on what the energy of the future will look like and how we can get there.

In a two-part podcast, *Energy Examined* speaks with Dr. Scott Tinker, Director of the Bureau of Economic Geology at the University of Texas and founder of Switch Energy Alliance, whose goal is to inspire an energy educated future. Dr. Tinker outlines the complexities and challenges of a global energy transition, and what it means for all types of energy including oil and natural gas. Dr. Tinker stresses the need for honest, informed conversations on energy, one of the most important issues of our time.

Part 1: What's involved in an energy transition?

IN THIS ARTICLE, CC

SPEAKS WITH:

Scott Tink
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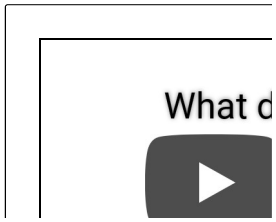

Part 2: What's involved in an energy transition?

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Tonya: Welcome to another edition of Energy Examined, the podcast that

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importance of energy to our future, Switch Energy Alliance (SEA) aims to inspire an energy-educated future that is objective, nonpartisan, and sensible through videos and web-based resources. This includes the award-winning documentary *Switch*, and it's recently released sequel *Switch On*, which grapple with the complexities and trade offs of energy transition, issues of energy poverty and the need to work collaboratively on energy challenges. Learn more at **switchon.org**.

discusses the issues facing Canada's oil and natural gas industry with the insiders in the know. I'm your host, Tonya Zelinsky. Today, I'm joined on the phone by Dr. Scott Tinker, director of the Bureau of Economic Geology at the University of Texas at Austin, and chair of Switch Energy Alliance. Thank you so much for joining me today.

Dr. Tinker: I'm glad to be here Tonya.

Tonya: Well, just so that I don't get it wrong for our listeners, do you think you can provide a bit of an overview of who and what Switch Energy Alliance is and what its mandate might be?

Dr. Tinker: Sure. Switch Energy Alliance is a not-for-profit company that I started several years ago to do non-partisan energy education. And it's built on our first film that we made called Switch. This was back almost a decade ago and released in 2012, and that was a film on global energy. We went to eleven countries and had way too much fun staying in way too bad motels and hotels. But energy was the star of this film and we looked at the best sites in the world for energy and talked to the best people in the world and made a nice piece.

Years went by and I realized the filmmaker I partnered with, Harry Lynch, was off doing things on a mental health channel that he invented, a really nice piece of work. And I said, 'Harry, you know, we kind of left out a third of the world, a world that doesn't have much energy or anything at all.'

So, we got back together a few years ago. I formed this 501(c)(3) [a registered charity in the U.S.] and started making another film on energy poverty called Switch On, and many other things to which we can talk about, but the mission of the Switch Energy Alliance is to inspire an energy educated future. And we're just looking to try to get kids of all ages from 10 to 100 just a little bit more information that they can count on, look at pros and cons, critical thinking of all forms of energy and some of the wonderful things that energy does for all of us. So that's what we do there. And it's a lot of fun.

Tonya: Well, it's kind of -- I love the energy education aspect of it. It's kind of what we try to do with this podcast in the hopes that we're just talking about things that people maybe don't have that inside perspective. And it's difficult to understand when you're not in the game and you really explain that quite well in the original documentary, which is Switch. And that was really more about energy transition. Is that a good sum up there, energy transition?

Dr. Tinker: Yeah, it was a transition and it was just trying to get people to think about the different sources of energy

and what they do and from fuels to power, you know, commercial, residential to move ourselves around in vehicles and that kind of thing. And how much we use, the remarkable amount of energy we use. The scale was -- you couldn't miss the scale in Switch. And then the transition -- at least an early look at what some of that looks like. We're concepting a third film called Making the Switch and that really is going to look hard at the challenges of both addressing the needs of energy for the developed world and the developing and emerging world, so getting energy to everyone against the challenges of keeping the environment clean and certainly atmospheric conditions is one big part of that.

But it's not the only part. You've got land and you've got water and you've got local air emissions and no form of energy is ideal for all of those. So, the real transition tries to balance the four pillars of the environment with access to affordable, available energy. And that's what the third film will be about.

Tonya: Well, one of the interesting things I noted in both films, actually, was that when it comes to a transition to alternative energies, and by alternative energies I'm referring to biomass, solar, nuclear, everything outside of let's say oil and natural gas, it's not something that can happen overnight. You went to Norway, for example, and it took 70 years for them to create their electricity system using hydro

power. It's not -- it doesn't happen very quickly. It takes time, investment and a lot, a lot of effort.

Dr. Tinker: It does -- a lot of infrastructure involved in any transition, energy particularly because it's so massive and we use so much and then you're limited by the resources that you have.

Norway is ideally situated and has a lot of topography and a lot of range. You know, rinse and repeat. Places have great sun; places have good wind. Some places are blessed with oil and natural gas. Some with coal, etc. etc. So, the portfolio of resources matters. What you're, what you have access to.

And then making sure that you understand that there are different end uses for each of these energy forms so that if I'm generating electricity, it's good for certain things but, you know, it won't necessarily drive my car around. If I create an electric car, it would. But that has a whole fleet of other resources that have to come into it to make and manufacture a battery and then dispose of it in a landfill. And a lot of batteries!

So, everything that we do comes from the earth. And we are used to saying renewable, nonrenewable, but nothing's renewable. The wind and the sun themselves are, but the infrastructure to collect the wind and the sun, the turbines and the panels and the batteries to back them up and to move the electrons and then dispose. This all comes from

and goes back into the earth. So, it's just a different kind of resource.

Same with here -- and the oil and gas, of course, everybody understands those better. And coal as well. So, these are the really the big challenges when you think about the scale of this and how to provide it. And then the other big piece in addition to scale is whether or not the energy is always available to us, whether or not it's intermittent or steady, if you will.

So, solar is terrific when it's sunny and it's sunny in sunny places. Except at night, then it's not sunny. And you need to back that up with something. And the wind blows sometimes too much, sometimes too little. And other places just right, like West Texas. But that happens during certain times of the day. And then the other times a day, it's quite calm.

So, the challenge with some resources is, while they're good when they're good, you have to have something else ready to fill in, to back it up and be accessible. So those are called load following in the electric jargon. So, you have a natural gas power plant that sits there unused for a while until such time as you need it. And then you fire it up when the wind is not blowing in Texas or the sun is not shining and it's very expensive because it's not running very often. So, when it comes on, they charge a lot for those electrons. Somebody has to pay for that plant to sit idle. And that's why the cost of intermittent energy is actually in the full system.

What you and I pay in our homes is actually still more than baseload electricity, something that's always on, even though the panels in the turbine have got much cheaper. And they have. And that's wonderful. When you integrate the whole system. And probably the best example that is Germany, where they've got a lot of wind integrated now. They've tried solar, but it has the solar intensity of about like Seattle, Washington. So, if you look at a map, it's not great sun. They don't have a great resource there. It rains a lot.

So, this wind, when you back it up with all of the other forms, bringing in nuclear from other countries and other kinds of electricity, coal, etc., the integrated cost of electricity there is around 30 cents a kilowatt hour. So that's more than three times what we pay in Texas.

We have a lot of wind and it's more than anybody in the United States pays. So, what does that mean? Well, who pays? The challenge with that is this: everybody needs electricity. Everybody pays the same, just like gasoline at the pump. And when you have a commodity that everybody's paying the same price, electricity in this case, if I make $50 a year and you make $100 a year and somebody else makes $200 a year, electricity cost in my budget is more because we pay the same price.

I might not have as big of a home or something, but we're paying, we're paying proportionally more. And that's called regressive when you put something through that impacts

people who make less money, poor people more. That's a regressive cost or regressive tax.

And it's surprising to me that that's not made more apparent that when you're doing these more expensive energies, it impacts people that make less money more than it impacts wealthy people.

And I often ask students, when we talk about electric cars, for example, we could pick anything, but I say, you know 'Who pays for that Tesla and who has the Tesla?' Pretty much really rich people. And I say, 'Who pays for that? Well, the people who buy 'em'. I said, who else? 'Well, we do.'

And they looked around at each other because they know they're getting subsidized by taxes and it's not government money, it's our money. It's taxes. And it comes from people and it goes to governments and it goes back to people who buy Teslas or other things that get subsidized. And again, when they start to think about that, they say, 'Gee, it's cool, but do I want to buy a wealthy person's car?'

And then that's when we start to have to dig a little deeper into the complexities of all of these things so that we don't end up down the road someday feeling like we were sort-of duped into thinking 'this is clean and this is dirty, this is good, this is bad' when in fact, everything has challenges and some of the mechanisms to get there are a little bit hidden.

Tonya: Well, do you think that's one of the misconceptions

out there, that there are some who say 'We have to make this transition, we have to do it sooner rather than later. And it has -- or it has to be now. And it will be better for everybody when we do it.' But there's not really any kind of context around that. How do you do it? How long does it take? How much does it cost? Who can do it? So do you think there is a bit of a misconception that this transition is easy?

Dr. Tinker: Sure. Yeah. There's, there's nothing easy about transitions of any kind. They go in fits and starts.

And in fact, again, to emphasize what I think of when I think of transition, it's not from one kind of fuel to another. I don't have any need to transition out of one kind of fuel if we can clean it up.

And, you know, natural gas is a pretty clean fuel, actually. It's hydrogen - one carbon, four hydrogen; it's methane. So, it's a clean fuel. There's no SOx or NOx or particulates or, you know, mercury, like coal has. It has CO2, which we have to capture and do something with. So, when you start to think about the transition, it's not necessarily from one fuel to another. To me, the transition is when everybody is coming out of energy poverty and when we clean up all forms of energy.

Coal has a big set of challenges. Oil and gas have a big set of challenges. You mine stuff, you make rigs, you drill, you produce fluids plus water. You have to dispose of water, you

move it, you refine it, you burn it. This is environmentally impactful. Let's not kid ourselves. These have impacts.

That said, they continue to get better as the industry modernizes in rich countries, not so much in poor countries. The same set of things happens in different industries. You mine the materials to make solar panels. You make them in manufacturing plants. Have you ever been in one? It's quite interesting. Big manufacturing plants.

Then you put them on trucks, and you transport them and then you install them and then they wear out when they get scratched and you have to replace them. Where do they go? Oh, we can kind-of reuse some of it, but not really. We'd put them in landfills. And the batteries to back them up go in landfills. And last time I checked, there are about 100 toxic gases that come out of batteries as they decay.

So, nothing is as clean as we might think. Nothing is as dirty as we might be led to think. They all have some challenges. But here's the piece. This is really important. This little waltz between energy, which underpins the economy and the economy, which allows us to invest in the environment. I've been in 65 countries in the world on six continents, and without exception, the poorest quality environmental clean-up or the worst environments are where it's poor.

They don't drink the water out of the tap there. The soils are polluted. The local air is terrible. You can't afford it. They're

worried about other things. The home, some food, clothing, education, the necessities. Look at air quality maps globally. It's cleanest where it's rich. You can drink the tap water. The soil is cleaned up. You know, now we use a lot of energy and put more CO2 emissions into the atmosphere. So that pillar of the environment isn't as good. There's more CO2 in the U.S. and China, for example, or more per capita in the US and even more per capita in some other countries.

So, nothing is perfect. But you can't go from a) the environment or a) energy to c) the environment. You know, let's just quit these things and then they'll all be clean. No. In fact, you won't be able to afford to clean it up. You have to have that healthy economy so that little waltz, the three 'e' waltz is vital to success. And that's where all forms of energy and a nice portfolio matter. As the world comes up on the energy and economic scale, there will be environmental impact. And then you start to roll over to where you actually see cleaning up on a much broader global scale.

Tonya: There's like a half a dozen things in there I want to unpack with you: I'm just fascinated with, so I'm going to try remembering and keep going back to them. But one thing I wanted to touch on was that value chain. In Switch On, when talking about the solar panels being delivered in Colombia, you made a point of pointing out that the solar panels were donated. They were manufactured in Singapore. They were shipped to Los Angeles. They were trucked to Miami. And

then the same goes for the batteries through China and L.A. and Ohio. And you asked, you wondered what that transportation consumption was in that process. And one thing that I don't know if I had ever thought of it in terms so specifically before was that there is a part for all forms of energy to play in this, that when you're going into a community and you're building solar panels, while they will ultimately get their energy from the sun -- to get it there requires energy, other energy sources, and I don't think I've made that connection on a personal level before.

Dr. Tinker: Yeah, well, it's very real and it's very expensive. If you look at Indigenous communities like we were doing in the Arhuaco Village there in northeast Colombia. It's very expensive. And we -- I'm sure more energy was used to put all that together than those panels will ever generate. Now, that community can't get energy any other way.

Tonya: Of course. Yes.

Dr. Tinker: They have fire, but-- and they didn't want to put a micro/pico hydro in their river. You saw us jump in, etc., but they only wanted solar P.V. So, that was cultural. We were fine. We will bring you solar P.V. But the amount of energy that it takes to make energy, there's some thought they need studies on that, energy returned on the energy invested. EROI is a set of rigorous approaches that looks at these kinds of things.

And then it turns out pretty reasonably makes sense that the denser the form of energy, the more energy per unit weight or volume in something, typically not always, but typically, the better the EROI. So that a uranium pellet, you mine the uranium or the thorium, then you - very expensive in some parts of the world to make the facility. But the energy return on the investment is quite high because energy is just so dense. And it's a very important part of these, both value chains, economic and energy chains is what it takes to make energy.

How much energy you're capable of making, especially in Indigenous communities where you're having to bring things a long way. Now, as those ramp up, we also examined it in Ethiopia. We went to the Maasai Village and looked at it there -- oh sorry, in Kenya, we went to Maasai in Kenya and looked at it there.

And it was quite interesting, you know, to see them getting a 40 or 80 or 120-watt panel on a roof in a little metal home, family, multi-generational family out on a little ranch, if you will. I mean these are very poor people, but very content people. You get 40 or 80 or 120 watts, a panel that'll light up a few light bulbs and charge up the radio. And it starts to change their connectedness. First thing they get is a cell phone. If she's a mother, walk out with one in her hand, they start to communicate.

So, it will not be long before bigger systems come and those

systems are mainly being brought by China. In fact, right there, there is a whole facility with razor wire and electric wire and China was there building a railroad and Chinese investment and debt and infrastructure and citizenship. And that's going on all over the world as these countries begin to ramp up and you see this kind of mixing of cultures going on globally, particularly in places that have a lot of resources like Africa does.

Tonya: And those resources vary depending, as you pointed out, where the wind doesn't always blow, the sun doesn't always shine and so forth, so it is quite region-specific. But in countries like, was it in Ethiopia or Kenya where they were building more coal plants?

Dr. Tinker: Vietnam.

Tonya: Vietnam, I'm sorry, Vietnam.

Tonya: So, a country like Vietnam --.

Dr. Tinker: And in Africa too. Africa is building more coal as well, but Vietnam has really pushed all-in.

Tonya: That's right because they were saying over 20 years, they want to build another 50 plants.

Dr. Tinker: 200 megawatt plants.

Tonya: So, one of the things that here in Canada that we often discuss in the oil and natural gas industry is natural gas as a cleaner energy source, which you mentioned that a little

bit earlier. Do you think that there is an opportunity then for countries that are producing natural gas like the United States, like Canada, to help displace, and provide fuel to a country like Vietnam and potentially displace some of the need for those coal plants, which then ultimately will have an even larger environmental footprint with the emissions?

Dr. Tinker: Potentially. It depends on the arbitrage that goes on between where it's exported and where it's imported. You've got to put it on both LNG tankers. And the farther you have to ship it, the more fuel you use. So Southeast Asia can get natural gas cheaper from, we saw in Switch, the first film, we went to the RasGas facility there in Qatar and they're putting three TCF a year out of gas now on LNG tankers and it's cheaper to move it from there than perhaps from Canada, although again, it depends on lots of factors really.

Tonya: Yeah, even just generally though, natural gas and LNG as being one of those alternatives.

Dr. Tinker: Sure. Yeah. I mean, natural gas to me is really the -- it is such an important fuel of the now and the future. I don't look at it as a bridge fuel really, it's just an important to fuel. It can be -- it's so versatile. You can make power with it. You can burn it right in your kitchen, which many of us do. None of us die. You know, we can put it in vehicles directly as compressed natural gas or as LPG or LNG. We can split hydrogen from it; it is much easier to energetically to split a methane molecule than a water molecule to get hydrogen.

And you can use hydrogen then as a electricity carrier for fuel cells. Very interesting, I think vehicles, fuel cell vehicles are really an important part of the future, more so in many ways than batteries, electrics and even internal combustion engines, if you think about the advantages of that. So natural gas, very versatile fuel. And yes, it should be a great substitute for coal if you have access to the resource.

It's very interesting why the U.S went to gas in the early 70s in the Carter years. It was policy that drove -- or to coal, I mean -- it was policy that drove it that direction. First [there was the] embargo and then worry about oil and gas because gas was always produced with oil, it wasn't a stand-alone. So, the administration said we're going to make coal really the next U.S.-of-the-Saudi-Arabia of coal. So, a lot of the policy and the technology that followed that which has now been exported globally came by a federal decree. Isn't that interesting?

And you'll look back and say, 'man, we sure have a lot of natural gas and we are switching,' coal just keeps getting hammered. I looked at the March this month against March last year, [20]19 against [20]20 in coal, and the U.S. keeps coming down, with solar growing, natural gas stable as well. If you can do that, Tonya, if you could start to replace coal with gas and I talk about this in talks that I give, just like the U.S. has done, our emissions have come down. Our CO2 emissions have come down dramatically.

Tonya: Yeah.

Dr. Tinker: In the power sector--not in commercial, residential and transport. They've been flat. But in the power sector, which was a big piece of what we were targeting in Paris, we had the Clean Power Plan. That was our proposal. It turns out we're going to meet the Clean Power Plan's objectives for Paris Accord for 2030. That was our Target 2030, a 32 per cent reduction from 2005. Even though the accord happened in 2015, our base year was 2005.

We're going to meet that next year in the power sector, ahead of any other nation in the world. And we didn't sign it, but that's mainly from coal getting replaced by gas and the growth in renewables with state portfolio standards and efficiency things that we've done, so they're all in there plus, we are now having more and more things made somewhere else.

You know, so it's the old, 'Hey, you make it. You make it and we'll be green.' And that's you know, there's states in the United States and that's their policy a 100 per cent, whatever, clean by some year. Well, that - a big, a big chunk of that is 100 per cent 'we don't make it anymore - you do.'

Tonya: We're kind-of pushing it off.

Dr. Tinker: Well, pushing it off is a nice word. But I mean, are you kidding? You know, really, people think this is going to help the atmosphere? How many atmospheres are there? Oh,

wait, there's only one.

Tonya: Well, do you think it's you know, ignorance is bliss? You know, if we're having it manufactured elsewhere, in another country whose emissions are skyrocketing, perhaps?

Dr. Tinker: Yes.

Tonya: It's easy for us in the developed world to start putting on those labels of being environmentally responsible. But meanwhile, our footprint is the reason why perhaps the emissions are rising in these other nations.

Dr. Tinker: Not perhaps, it is the reason why. Yeah, it is the reason why. I can tell you that all of the states that, all the countries that produce more than they consume are mostly the non-OECD nations, the [OECD being the] rich group of nations, about 30 of them. They produce more than they consume. Well, where does it all go? Oh, wait. Almost all the OECD nations consume more than we produce. So it goes to us. You make it, we'll consume it. And then the emission standards in the non-OECD nations are lower than ours because we have regulations. Cheaper to make over there, we get the products cheaper. Oh, wait. So, to make that product over there puts more emissions out per unit product? Yes. So, the atmosphere is doing what? It's getting worse, not better. And these well-intended sort of shell games, if you will, are really disingenuous. And I don't know, maybe some people don't understand that. Maybe others do.

But we seem to be pursuing with great passion this zero emissions thing. But at some point, it's being made somewhere.

Tonya: Right.

Dr. Tinker: So, unless you don't have a car or a house, food, clothing, a phone and anything else in your life, you're not zero emissions. If somebody is making your stuff and this is really important to understand that we have to do things that really reduce emissions in the atmosphere, like replacing coal with natural gas. Natural gas isn't imperfect. Less emissions. There's methane, too. Oh, maybe we get more nuclear. That's no emissions. Add some renewables. That's no emissions as long as you're okay with the use of the land and the mining and the disposal of the batteries and panels. It's a different piece of nature. So, these are the tradeoffs that we have to start talking honestly about. So that our kids can have deep, meaningful, critical thinking conversations and solve these issues, not play politics with them or the good, bad, the clean and dirty. The evil and holy.

Tonya: Yeah. One side of the debate. You've got the angel and the devil on the shoulder.

Dr. Tinker: Yes. Right. Right.

Tonya: Well right now we are living in a very interesting time at this very moment. We're in the middle of a global health pandemic. We've seen an economic market crash and we've

seen oil prices, particularly for Canada, just fall. Is this the time to be looking at these alternatives or is this the time to focus on what we have in place and then do more long-term planning? Where do you feel like we sit right now?

Dr. Tinker: Oh, who's 'we'? 'We' as a group, as a country?

Tonya: Well, let's look at it in terms of then, the developed nations, looking at it in North America.

Dr. Tinker: Sure. So North America has a pretty nice mix of resources. We're very lucky that way. We've got it all. We've got some places with great wind and some places with great solar, some great waves and tides off your East Coast. And, of course, oil and gas and coal. We have a good nuclear facility. We're shutting them down these days. So, we're blessed with this mixed portfolio coming out of the back end of COVID, whatever that looks like and it will be like nothing anybody expects. But we know for certain that the one thing consistent about all down cycles is they end.

And then they, they come up and once we turn on the engine of the world, which literally we've turned off, there's gonna be a big demand for energy again. And that's going to pull on supply. Supply won't be able to meet it initially, so it's going to yank price across the board. And all energy sectors are getting hit by this. Coal is getting crushed by this in the U.S. right now. Oil and gas, obviously, with prices way down and laying down rigs. Not drilling. The solar installers aren't

working. The wind installers are not working. The storage are not working. They can't go to work. So, when you can't go to work, you know, you stall.

Tonya: People aren't working.

Dr. Tinker: People aren't working. So, the thing that will come out of the backside is probably not that much different in terms of energy mix that we went in with. But hopefully there's more of an appreciation for why energy matters in our lives and what all that it does for us, because pick your favorite industries, airlines getting crushed. I lost my dad about a month ago and there's no funerals that are happening. You can't have gatherings of people, so mortuary business, who would have thought? It just, it goes across all sectors. Unfortunately, it's hitting again. This is another one of these regressive. It's hitting the service sector, particularly those who work in the gig economies or in the service [sector], whether it's restaurants or driving an Uber or Lyft, whatever it is, they're not working.

And you and I can have a conversation on the phone. I can do some of my job from home, but some people can't do any of their job from home. And it all involves energy. So, what happens, I hope, out of the back end of this, we start to appreciate energy and all of it. And what it does to underpin our economy, how it allows us to invest in the environment. The global implications of these things that we all just get a little bit more honest about, the critical thinking around this

subject so that we can have those good, meaty conversations and do the things that are needed, clean up everything, make sure we have access to energy. Globally it's worse, you know, it just, it hasn't hit yet, but it will. I mean, the places we visited in Switch On – Kibera, the slum outside of Nairobi, Vietnam -- these cities are densely populated and they don't have -- they're modernizing, but they still don't have the infrastructure to handle this.

And then as you go further into deeper depression, I really worry about the spread and the infection of COVID and then how it impacts everybody. I mean, the bright lights in that are typically younger populations which have shown themselves to be more resistant to and able to withstand it. But still, you know, and, and so, you know, this pandemic, partly driven by the virus, partly driven by our decision around how to manage the virus globally, is very real. And it's, it's got a whole suite of impacts that are going to have a long ripple effect on them and sitting in and around in between all of that is energy. I don't see a particular sector benefiting more than another. But what I do see is a price rebound and people get back to work and we see who can meet demand with supply then. And hopefully, again, it'll be a nice mixed portfolio so that there's more stability in the markets as we go forward.

Tonya: I appreciate that message you have that energy matters and it's not just one form of energy. As the

International Energy Agency has pointed out, that in the future energy mix, we will need all forms of energy and some are more appropriate than others depending on the area you live in. I mean, there are parts of Canada that receive 24 hours of sunlight in the summer and 24 hours of darkness in the winter. And would solar be appropriate there? Who knows?

Dr. Tinker: It's perfect - for five months a year.

Tonya: Exactly. For a short period of time, it would be perfect.

Dr. Tinker: But even there, you know, because it gets -- it's not perfect because the low latitude, you start to get, you start to get further and further away from the equator and the incidence, the angle incidence of the sun is not great. So, it's not even that great. Equatorial regions with lots of sun, perfect. You know, it goes right down on the panels and it stays there all day long.

Tonya: Interesting.

Dr. Tinker: So, it's not great. As you start moving toward the poles, your, your capacity factors or your solar efficiency decreases dramatically.

Tonya: So really, there are a lot of factors that determine this.

Dr. Tinker: Oh, completely.

Tonya: Then making this transition in another way, a segue

here, you are working on a sequel. It's called, as you said, Making the Switch. Do you want to tell me a little bit about this documentary? I know you touched on it earlier, but now that we've had this conversation, a good reminder of what it is.

Dr. Tinker: Sure. But before I do that, I want to tell you what we've done to adapt to this, this COVID challenge. Making films is a big deal. You get out on the road with a crew and you contact a lot of people as well while you travel. So, we're not doing that, obviously. What we've done, and of course, a lot of our funding comes from foundations and individuals, energy companies and other companies. And we've got great support, but a lot of them are hurting right now.

So, commitments that we've had made to SEA are struggling to honour those commitments. And I understand that. We came in with no debt and have a pretty good cash position. So, we're adapting and we're going to do some really cool things that don't take much production, which is out there shooting. Instead, there's a lot of things we can use that exist from all of our shootings and then stock footage and then me doing voiceover.

Tonya: Oh, cool.

Dr. Tinker: And some green screen. We're going to do a couple of new things. One is the history of the energy series, eight taped segments. All with each different kind of energy

and its history, really kind of neat. And these are like four to five minutes, so you can plug them in and learn a lot in a short time. We might do a half hour segment on that as well for a PBS or History Channel or something like that. We're going to do a Switch 2020. A lot of people have said what's changed since Switch? It came out in 2012. So, it'll be much shorter, but punchy and condensed. And here's what's changed. And here's what's the same. And here's some new things. So that'll be a fun film, probably less than an hour long.

And we're going to do something that looks at 'energy and' so, energy and the economy, energy and water, energy and the broader environment. You know, we're going to look at how energy relates to a lot of different things in society. And that's going to be a little twelve-episode, four minutes each series as well. Real punchy, you can flip them over on your social media, whatever. 'Watch this thing.'

And so, we're going to be producing those in the next eight months and we're in the middle of producing a museum film. This is a Hollywood quality, four-minute long piece that will go on Houston Museum and Denver Museum of Natural Science and Nature and Science. We're building it for them, but it'll be for any museum because we're paying for it. And it's basically going to be energy, why energy matters in my life. But there's no dialogue. It's actors. The only role I have is a cameo as a school bus driver for the first two seconds of

the film.

You know, and the kids get off the, brothers, sisters get off the bus. They go home and talk on their cell phone. They go in, grab a sandwich and a glass of water, sit in front of the TV and everything behind them is disappearing. And finally, the house disappears. And this is not digital graphics. It's old school. Really cool. And there they are in their skivvies and in a field and their friends are all down the block.

And then we go through each of these distribution chains for water and food and lumber and electronics globally. What does it take to get that? And as we go through that very quickly, that thing reappears in their life. And by the end of the film, it's all back and they're looking around going, 'What the heck just happened?' And it will be, I think, we think, a wonderful way for all ages to understand why energy, how energy impacts our lives and in all the ways that it does.

So that's more than halfway through production. We'll finish that up this year and that'll be released to museums. Would love to get it up in Canada in lots of museums as well. So those are all the things.

And then the last big one and we've been producing this for a year now, we've made a -- content for a high school energy. There's a course in United States called Advanced Placement Environmental Sciences, it's taught in high schools around the nation. Six thousand teachers teach it

every year to 200,000 kids every year, high school kids, AP Environmental Sciences, 'APES'. And about a month of that is energy. And Switch has been working with teachers for the last year to create the curriculum around our videos, the quizzes and other curriculum that the teachers can use in their class through a platform that we've written to meet the AP standards and show this as their digital textbooks and they look at films, they answer questions, they do little exercises and things and it's really neat and we were ready to roll.

We were getting ready to roll out in September, but because COVID happened, we took two of the five modules and we released them just last week to 6,000 teachers across the country on renewables in one module and then oil and gas and coal and nuclear in another module. So that's coming. I think, I've talked to people in Canada and they'd love to get it in high schools in Canada as well. And then hopefully more broadly and it's all free.

Tonya: That's the magic word.

Dr. Tinker: Everything I'm describing, we put out for free. You just come to our website and there it is, switchon.org. And that's the neat part. So really trying to target the K-through-12, the college campuses, the museums, the public and decision makers with a lot of these things. So that's our portfolio for the next eight months, presuming we don't lose all of our funding.

We'll make this third film, Making the Switch. And that one is going to try to bring Switch and Switch On together with a bunch of other things and help us understand what it really takes to power the world, to literally electrify and move the world as it continues to grow. And as economies come out of poverty.

So, what does it really take to provide that energy to everyone while at the same time continuing to decrease the environmental impacts? So, this can be done. This is not rocket science, but it's science and engineering and economics and physics and all the things that go into doing this. It's got the politics in it as well. But we really want everyone to begin to think more deeply and understand some of the tradeoffs of different kinds of energy in our lives. And as we mix that portfolio into the future, what's it really look like? Who would have thought the United States was reducing CO2 emissions from the power sector faster than anyone else? Nobody.

Tonya: Nobody. You know, I don't think a lot of people know that.

Dr. Tinker: No, but it's happening. Why? Why is that happening? Why did Germany's reduction in CO2 go flat for a decade, the last decade? Because the policy said no fracking and no nuclear post-Fukushima. By default, they started burning more coal to back-up the wind and oops, and then the power got more expensive to boot.

So, you know, there's intentions and then there's true outcomes and Switch, Making the Switch is going to examine the outcomes for real and what they look like. And why did that happen and what can we do to get out in front of that and do it better? And how do we all get engaged?

But it's going to be a very positive message. What we want to communicate is that the trends are good. Poverty is getting better. Impact from natural disasters is less and less every year -- who knew that? -- on humans. We are cleaning up water around the world. Air emissions are going down, atmospheric emissions are still going up.

There's some really good trends, but there's still work to do. So, this film is going to, I hope encourage people, particularly young people, to roll up their sleeves and say, man, we can make a difference here. We can. It's not depressing. It's not the end of the world.

I want to tell you a story. I was teaching, guest lecturing in a college course about a month and a half ago - undergraduate. And one young man near the end, I was doing an open Q&A like this for two hours, he said, 'why does it matter? We're all going to die anyway?' I sort of looked at him and smiled and I could see he was serious. I said, 'what do you mean?' He goes, 'humans won't be here in 100 years.' I said, 'how many in the class think that humans won't be here in hundred years?' Half the class raised their hands.

Tonya: Wow.

Dr. Tinker: And I was, I was instantly saddened. And then I said, 'Do you all know how good the trends are in almost all the major issues we're concerned about because we're living in one of the best times for humanity ever. Now, there's work to be done. But do you know the data on this?'

And they've been so conditioned to think and I'm going to say it, you know, that, that climate change is an existential crisis, that humans will not exist in a century. And we may not. But I don't think it will be because of climate change. I mean, we've got to make sure we get our heads around that challenge for sure and begin to reduce emissions and some of the big emitting countries, ours, the U.S. for sure.

But also, where goes India? Where goes China, Southeast Asia, growing Africa from one to two billion people? Latin America. There's a lot of challenge to it, but it's all very solvable. And so, that's what Making the Switch is about, is helping us understand the challenges, some of the big things we can start to do. And putting us together on a positive path. And I call this the radical middle, the overlap between the environment, the economy, that space in there is the radical middle. It's where the data exists.

It's challenging. It's not always clear. You have to compromise. You might be wrong. And, it's OK. That's where these big things get addressed. And we've got to expand the

radical middle. We've got to grow it. So, everybody's playing in there and really taking these big challenges on together instead of in such a polarized way.

Tonya: An even playing field where we can all work together.

Dr. Tinker: And then there's nothing fair in the world and there's nothing even -- go visit any country. I mean, look, I see the light. I have adult kids, 30 down to 19. So, you won the lottery about where you were born and when. It won't always be that way. You know, there's things that are not even, they aren't fair, but that doesn't mean we can't bring the same kinds of opportunities to the world that we have and not in an aid or gifts sense. This is one of the big conclusions of Switch On that -- and it was subtle -- but if you if you look closely throughout the film, you'll see little mini medical markets forming. A woman selling cook tops in Nepal.

Tonya: Yes.

Dr. Tinker: Street markets open at night in Nairobi and in Kibera. Selling popsicles in Colombia from their refrigerator. This didn't exist last year. So. You know, pardon the sort of religious metaphor, but not bringing fish, first teaching to fish. The economies themselves, at whatever scale they're ready for, need to determine what it is they will do as they get energy and get educated. They will self-determine.

And as they do that, they'll be invested in it themselves. And

then they reinvest in their own community. And it won't be what I might say, 'hey, you should go do this'. Well, I don't know their economy. I don't know their culture. They do. And so that's what's exciting is, is growing things that matter to everyone in the world in their own ways, because we're all unique.

You know, there's some commonalities and then there's these unique things. And that's one of the big messages of Switch On is, is how do you learn to fish so that that it's durable, that it has staying power.

Tonya: Well, I'm really looking forward to this, well, to everything you've outlined that is coming up here in the next eight months and Making the Switch, and with that, I feel like I have taken up a lot of your time here today. So, I want to thank you again for joining me on this podcast and sharing some of this information. I'm fascinated by it. And I do hope that maybe down the road as some of these projects come to fruition, that maybe you will join me again to have a conversation about them.

Dr. Tinker: Absolutely. And what I'd like to encourage your listenership to do is, we are making Switch On available in virtual screening rooms. Anybody who wants to see it, can host their own virtual screening room for themselves or their families or scout troop or a school or a company or museum. Anybody. You you've set up a virtual screening room on our website. You get a month and anybody who wants to can

watch it. And then I'll be doing open Q&As a couple of times a month that anybody can join. And we'd love to start getting people to watch the film and seeing those resources on our websites that we can in this time really begin to share things that are nonpartisan and get this conversation rolling.

Tonya: And for more information on the Switch Energy Alliance projects, people can go to switchon.org, correct?

Dr. Tinker: Yes. Yes, ma'am.

Tonya: Well, thank you so much, Scott. I won't keep you. Enjoy the projects you're working on. They sound fascinating.

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