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**TECHNOLOGY AS A
GAME CHANGER:
FUTURE TRENDS
IN ELECTRICITY**

**A Powering the People Colloquy
June 2013**



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An Institute of The Edison Foundation



**Technology As a Game Changer:
Future Trends in Electricity**

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Based on a panel discussion at
The Edison Foundation / IEE's
Powering the People event
held in Washington DC on
March 21, 2013

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Technology As a Game Changer: Future Trends in Electricity – A Colloquy

Will technology or policy – or both – drive the future shape of the industry? What should utilities, regulators, and other players do to ‘see around the corner’ and prepare for the change? What are the risks?

Participants: Moderator and Interlocutor – **Jim Rogers**, Chairman, President, and CEO, Duke Energy, Panelists: **Mike Balhoff** – Managing Partner, Balhoff & Williams, LLC; **Ron Binz**, Principal, Public Policy Consulting and former Chair, Colorado Public Utilities Commission.

Jim Rogers: We’re going to talk about technology as a game changer in the electric power industry. How will it change the game? Will it change the regulatory model? Will it

This discussion is an edited version of a panel discussion featured at The Edison Foundation/IEE’s “Powering the People” conference, held in Washington, D.C., March 21, 2013. We thank Lisa Wood and IEE and the panelists for the opportunity to present this valuable information and insight.

change our business model? I don’t know if the industry is ready for the change many of us see coming, and I’m pretty sure that regulators are not. But it’s coming. And the winners will be those that “see around the corner” that anticipate the future and adopt the needed changes. The winners will also work with regulators to help them understand how they can create an environment where we can harness these technologies for a customer.

■ If you look out to the horizon it’s easy to see technological change coming on both the supply side and the demand side. A big word used to refer to it –

disintermediation – means a utility may not be involved in a transaction on the supply side or the demand side. If you look at rooftop solar, if you look at combined heat and power – those are just some of the technologies that are evolving.

Solar panels, once the renewable energy industry’s Holy Grail, used to cost a dollar a watt. Now it’s 60 cents. And 40 cents is not far off. The cost of PV installation is coming down too, so that’s going to play a more dominant role in the future. But solar PV has a knock-on effect, because customers that can afford to put solar on their roofs are generally high-income customers. The solar panels will reduce their load, but the revenues the utility loses as a result will be shifted to other customers. So solar PV may not be a blessing for low-income and middle-income customers. This raises important rate design issues.

On the demand side, with more stringent appliance standards, building standards, and lighting standards you already see demand falling. That’s been a huge change. In the 1960s, for every 1% growth in GDP, there was a 5% growth in the demand for electricity. By the 1990s, for every 1% growth in GDP there was a 1% growth in electricity demand. Today we’re seeing only about 0.4% per cent growth in electricity for every 1% gain in GDP. With continued improvement in the efficiency of our electricity use, I

envision a complete decoupling of GDP growth from electricity demand. And that’s even assuming greater electrification of our economy, including more electric vehicles. Our company’s chief technology officer has looked at over 700 different technologies and we see some of them causing disruptive change.

The other major change is the shale gas revolution. A few years ago, who would have guessed that we’d be dispatching combined-cycle gas-fired units right behind nuclear units? It’s never happened in the history of

our industry. Who could have guessed that today’s carbon emissions would be at a 1992 level? (On a per capita basis, we’re actually at a 1960 level and that’s largely due

to shale gas –an innovation that grew out of a government-developed technology.)

Other dynamics that are most going to drive this change are: flat to low or even negative load growth; and rising prices to pay for for needed infrastructure. If you own nuclear, you’ll see greater costs as the units get older; you’ll also see Fukushima-related costs. If you own coal, you’ll see increased regulation and greater capital expenditures. Your grid will be converting from analog to digital and there are big costs associated with that, even though we’ll be more reliable as a result.

So great changes are coming and that’s what we’re here to talk about. So let me introduce our two panelists.

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Mike Balhoff is Managing Partner at Balhoff & Williams, which provides financial and regulatory consulting and advisory services to companies, investors, and policy makers in the energy industry. Mike brings a great perspective. He previously led the Telecommunications Equity Research Group Legg Mason and was named an all-star analyst six times by The Wall Street Journal.



L to R, Jim Rogers, Mike Balhoff, Ron Binz

He understands what happened in the telecom industry, where technology fundamentally changed the value proposition and the business model, and what the implications may be for our industry.

Next I'd like to introduce **Ron Binz**. He's a principal at Public Policy Consulting, which specializes in energy and telecommunication economics and policy. Ron is a former Chairman of the Colorado Public Utilities Commission. Both Ron and I actually started as consumer advocates and I find it interesting that we're here.

Binz: What happened to you, Jim? (laughter)

Rogers: Well, you know what happened? You went on to be Chairman of the Colorado Commission. I became a CEO. We're both working for the public.

I'm going to start first, Ron, with you. How will new technologies transform the electric power sector in the future?

Binz: The question of new technology shaping the industry reminds me of a quote from Victor Hugo. This isn't from *Les Misérables*, which is what he's famous for –

and the movie probably has him turning in his grave. Victor Hugo once said, "You can resist an invading army, but you cannot resist an idea whose time has come." And it is time that the internet came to the electric power industry. There's no other way of saying it.

We're on the verge of a system which will be as transformed as the media – as newspaper delivery, as movie delivery, as music delivery, as communications – by the internet. The examples that are usually given sound pretty cheesy: People will be able to control the refrigerator while driving their electric car. But if we went back 25 years and I told you, Jim, that you'd be using your telephone to send text messages to your grandkids, you wouldn't have had any idea what I was talking about.

It's hard to say what the applications are going to be in electricity, and it wouldn't make sense if we tried to describe them today. We're going to have a fabric, a network in which all devices are visible to others, that talk to each other, communicate prices, all in a very seamless way and we can't really even imagine

that yet. We're still very used to a traditional electric system.

As our discussion goes on I'm going to highlight a few technologies that I've been hearing about and reading about which I think are going to be especially transformative. And I agree that our regulatory and our administrative structures are not ready for this. Usually we hear about a "new utility business model." But I think we really need to look at a "new regulatory model," because that's where it's going to start.

Rogers: Mike Balhoff, I know about your experience in the telecom industry and the changes you saw there. What lessons from telecom do you see for the power sector?

Balhoff: Technology issues in telecom appear instructive for energy. Over the years, as financial analysts, we followed what was happening in telecom technology. It became obvious that there was a pattern: Technologies changed and opened the door to competitors. Competitors first used the new technologies in relatively simple ways, but the technologies became more and more sophisticated over time. Gradually, the incumbent telephone companies lost market share. And finally the regulatory models had to change.

If you stop and you think about the electricity industry and the telecom industry, you realize that there are rather striking analogous features. Telecom for the last 100 years was a near-impregnable network built with vast investments, with lines to residences that, people believed, could never be replaced by a competitor.

The engineers and the regulators that monitored the industries produced very, very thick books, so when I first became a telecom analyst we'd get these thick annual tomes with operating metrics so we could see exactly what was happening in terms of employee productivity, investment, customer services, and other factors. Nobody thought that the network defenses could be breached. But the technologies began to change, first in relatively subtle ways. There was a 1968 Federal Communications Commission decision that allowed other equipment to be connected to the network. That was the [Carterfone decision](#), which permitted non-AT&T equipment and telephones to be connected to the legacy network. That was the initial, apparently insignificant, invasive element.

Then, as time went on, competitive telecommunications companies began to find better and better ways to connect and provide services to the business community and, as a result, they took larger amounts of market share. That first invasive element—the Carterfone decision—almost reminds me of smart grid, which is a competitive invasion into an impregnable energy network. In telecom, we saw more innovation and more competition, and more profitable sectors targeted. Finally in telecom, the regulators began to realize that the systems in place were backward looking and no longer working. Remarkable changes ensued. Still, technology, in my judgment, was the driver, not the regulator. Competition was second, and modified regulation came tagging along later.

Rogers: That's an interesting sequence and, I suspect, something like what we're going to experience.

Ron, I'm going to go through a list of things and I'm going to ask simply this question: fad or trend?

Rogers: Roof-top solar: fad or trend?

Binz: A very persistent fad.

Rogers: I'm not sure how to interpret that.

Balhoff: He's a former regulator.

Binz: I think distributed generation is a trend.

Rogers: Other distributed generation, like CHP, like waste energy.

Binz: Trend.

Rogers: The growth in renewable energy at utility scale.

Binz: That's a very important question and it's unresolved. I think it's going to be larger than many environmentalists do. There's a lot of talk that distributed generation is going to take over. I think most of it is going to be clean energy at utility scale so I would say a very strong trend.

Rogers: Home energy efficiency devices.

Binz: Closer to a fad. I think devices like refrigerators are going to get smarter. But having control systems which the consumer actually fiddles with – I don't think that's going to persist, and there's evidence of that. Outfits like Tendril, which started out in that business, have now moved to the platform

The companies that are going to succeed are those that look forward and see the shape of the world 10, 15, 20 years out.

software business, with smart devices interacting instead of the consumer really having a lot of control. I think consumers will be asked to sort of decide on a profile, much like your

cell phone decides if you're going to be quiet or you're going to be active, or asleep or whatever. You just have a bunch of different settings by selecting a profile. I don't think we're going to see a lot of human interaction with control devices in the home.

Balhoff: I disagree with you on that one, Ron. Jim, you didn't ask me the question, but look what we see on the telecom side – look at the apps on your phone. Who could have ever imagined these developments? I will be surprised if similar edge-services don't grow in the electric sector because it's happened in every sector I've seen.

Rogers: And we have a new generation of people that are really quite comfortable with it. You should talk to my 11-year-old granddaughter.

Trend or fad: tougher appliance building standards?

Binz: It's a very welcome trend. One of the outfits that I do some work with is a company called American Efficient and they've figured out a way to actually have consumers learn about and find the most efficient refrigerators or stoves or air conditioning units, and I think that's a very strong trend. And the other option there was...?

Rogers: Building standards.

Binz: Building standards – that’s a tougher one. There’s a lot of resistance to this, as you know. Many states are not even yet to the 2000, much less the 2009 energy codes. I think it’s key, but it’s a hard slog.

Rogers: Let me turn to you, Mike. I think you’re right about telecom being a good analogous industry for us to look at. But as you look at the winners and losers in this transition, who were the winners and why did they win?

Balhoff: That’s tough to explain. There is this tendency to be backward looking. Many telephone companies tended to say, ten years ago, “We understand the engineering.” So the engineers and the regulators were confident when they implicitly argued that “We have to be backward looking because these metrics and systems have worked very well for us until now.”

But the companies that were going to be successful in the emerging marketplace were the ones that looked forward and saw the shape of the world 10, 15, 20 years out. That’s really, really difficult to do. But Verizon figured out, probably better than any large company, where things were going. In the early 1990s, Verizon was not a well-run wireless company. It was actually one of the poorer ones, but it figured out what was going on, and so, like St. Paul falling off a horse on his way to Damascus, there was a huge awakening as Verizon pivoted on its past, began to build up its wireless assets and to aggregate huge amounts of spectrum and expertise. They integrated their systems very well to prepare for a new world.

Notably, Verizon realized that it needed to aggressively become deregulated. Verizon told the regulators more than ten years ago, “We’re not putting \$18 billion for fiber to the end-user into the ground unless you tell us before we do it that you are not going to regulate it. If you tell us you’re going to regulate we’re not doing it.” And so Verizon effectively worked out a compact, if you will, to become deregulated. It believed that the market forces and technology were going to change and it needed to be freed of anti-competitive encumbrances.

There’s a second example that I think is a very, very good company, CenturyLink. It was a relatively small company – two million lines based out of Monroe, Louisiana. They realized a number of years ago that regulation was beginning to move against them, so they’d been doing a number of things to prepare for that. They decided to buy Embarq, the former Sprint local wireline telecommunications operation. Embarq had seven million lines, Century two million lines. Then a year later they bought a 13-million line company, Qwest. Then, two months after the closing of Qwest, CenturyLink bought a \$3.2 billion data center operation – Savvis Communications. Why did Glen Post do that? In my judgment, he believed he could no longer rely on a regulatory scheme where he was deriving about 18% of his revenues from regulated support funds, so he diversified to the point where that support is now in the low single digits.

Glen Post at CenturyLink and Ivan Seidenberg at Verizon realized that they needed to be prepared to deal with a world that was going to be vastly different from the

highly regulated industries that they were in at that time and that they needed to remake their business in a way that was customer-centric, not network-centric. So everything they did was to listen to what the customers were asking for. They provided a platform for change, and they worked to be freed of what they considered to be regulatory shackles. Those are the two telecom companies that began to act on the belief that the former regulatory paradigm was not going to be the critical one – that the competitive paradigm will be the new model going forward.

Rogers: I was struck by the fact that you characterized the changes as coming not next year, or five years out, but 10 and 15 years out. Ron as you look at the supply side technologies that are evolving, as well as those on the customer side, the productivity gains in those types of technologies, how would you characterize the pace of change in adopting these technologies?

Binz: Well I can give you an answer from my recent experience. Xcel Energy in Colorado campaigned against a ballot measure in Colorado in 2004 to adopt a state renewable energy standard. It passed over Xcel's objections. Four years later, the legislature doubled the goal from 10% to 20%, and three years later from 20% to 30%. Xcel finally got on board with that. In Colorado, one kilowatt-hour out of every six comes from wind energy. We saw an incredibly fast ramp up to a high level of wind, and some solar as well. So I think the pace can be rapid.

But if you ask what's the distinction between Germany and the United States, or between Mississippi and New Jersey, it's policy. It's not resources, it's decisions by legislatures and

public utility commissions and the buy-in of utilities that makes policy changes happen.

One of the best things I've read lately, and I would commend this to everybody here, is a groundbreaking study by the National Renewable Energy Laboratory. NREL issued a report in late 2012 that shows, I think credibly, that 80% of U.S. energy supply by 2050 could be provided by wind, solar, biomass, and other renewable technologies. It's a very compelling document. It shows what we would have to do, and the bottom line – the punch line – is that the cost of this would not be greater than other low-carbon technology.

Now I happen to be a fan of and supporter of carbon capture and storage. I don't know if it's going to work. I don't think Duke Energy knows yet if it's going to work. But I think it's something we need to try; we need to try lots of solutions. But at least there's now a marker out there that says this is what's possible if we turn our attention to a clean energy future. And by the way there's no heroic assumptions in the NREL report about technology advances; this is what we're doing today. Maybe the turbines on the wind machines won't be fiberglass, maybe they'll be cloth-covered frames – that's the latest advancement in wind. You could actually assemble these on-site. You ship the parts, put the blades together, and stretch a fabric over it. That's the new wind technology.

But I think the pace of change could be very rapid. It depends, of course, on the policy, and the policy probably depends more on our decision as a society about whether we're going to reduce greenhouse gas emissions from the power sector, as well as other

sectors. President Obama seems to be heading in that direction this term. I think we could turn the corner on a clean energy transition more rapidly than many people – and maybe many people in this room – believe.

Rogers: Well, the traditional thinking has been if it's clean it's more expensive. And I think shale gas really changed that, because not only was it cleaner, it was cheaper. When we considered carbon in the Waxman-Markey Act in 2009, which would have been a policy-driven approach with a price on carbon, it was projected that we would reduce carbon by 17% by 2020. The reality in the power sector today is that we have reduced our carbon emissions by 16% from the 2005 level. That's an incredible example of how technology was deployed. Technology produced the result, not policy. You seem to kind of believe that this transition will only happen if it's driven by policy.

Binz: Well natural gas is a good example. It's been called for many years a transition fuel. The industry sort of jettisoned that label lately; it seems to be a permanent fuel. But on a carbon basis you hit the wall in 2035 or so with gas; you simply do. And shale gas is certainly helping my state, Colorado. We switched a thousand megawatts from coal to natural gas while I was chairman. But we also have to understand that without carbon capture and storage, that's a dead end. By

2035 or so, we're going to have to do better on carbon than even natural gas will allow us to do under current technology.

I'll just offer one more data point. I think some of you heard this shot fired around the country: There's a power purchase agreement in New Mexico priced at less than six cents a kilowatt-hour ... for solar power. So utility-scale solar, which is available at peak hours, is getting much cheaper. I hope you're right in your faith that the price of these technologies

coming down alone is enough to offer us a clean energy future, and it may be.

Rogers: Mike, talk a little bit about how the regulators handled this transition. How did they view these changes

and their responsibility to assure that the regulated telecom company was getting a fair return?

Balhoff: I'm going to do that after I comment on technology changes. Ron and I probably represent different views on what we think the future's going to be. I don't know your energy industry as well as he does. But last night I stepped outside my home and I went back in and told my wife, "It smells like snow." She said, "It's not going to snow tonight." I went out this morning and there was a dusting of snow out there.

Let me tell you something: photovoltaics smell like wireless to me. It smells like it because the wireless world provided for a bypassing of telephone lines. Photovoltaics – distributed energy –

Photovoltaics – distributed energy – makes the impregnable energy network pregnable. It bypasses the line to the home like wireless did.

makes the impregnable energy network pregnable. It bypasses the advantage of lines to the home in a way that's similar to what wireless did. People are saying it's still too expensive to use photovoltaics, and its costs may not ever get below shale gas, or some other alternative energy supply. I don't know how much shale gas is out there and I'm not sure any of us does. But the reality is this, for those of you who don't know the history: AT&T sold all of its wireless spectrum in the late 1980s. Do you know why? They said there's no future in it. It's going to be too expensive. They sold all their spectrum. Smart company? They were not smart in that decision.

People in the mid- and late-1990s said wireless is going to hit a penetration ceiling pretty soon because the cost is so high. But prices fell from 60 cents a minute to 30 cents a minute to 15 cents a minute to just a couple of pennies a minute today, and we know how successful the wireless market is. As the price curve for wireless, or possibly solar, begins to kick in, people are incented to adopt the new technologies. Changes occur.

This goes back to your question, Jim. What's happened? The current situation is that access lines (land lines) are being lost by residential customers much more rapidly than we ever could have imagined. The loss of those lines on an annual basis is around 12% for residential customers. Business customers are migrating more slowly, around 5%, because they want reliability, security, and other things.

What's going to happen in the electricity sector? Photovoltaic costs are going down by

over 20% a year and we're beginning to see demand for installations that, according to GreenTech, is going up by at least 50% a year. So what we're beginning to see is more and more incentives for people to figure out how to drive the cost down, just like it's happened in other industries. That may not mean complete replacement of the energy network, but a significant portion of the demand may be going away.

So the regulators are now going to have to try to figure this out. In the telecom industry, the problem the regulators had was: First, they were paying attention to network metrics more than they were paying to the customers, so they continued to look at how fast the customer service rep answered the telephone, how long outages were, etc. They didn't realize that the customers were telling them they didn't care about the same metrics the regulators were tracking, so the industry continued to change. And then gradually we reached a point where there's a real crisis in telecommunications which might provide lessons for energy.

The crisis in telecom is that, in recent regulatory reforms, the regulators are uncertain about how to provide the legacy support for the high-cost, low-density networks that are outside urban and suburban areas. In my opinion, regulators have adopted rules that will not provide sufficient support for those very high cost regions and we could have a telecom wasteland in rural areas in terms of telecommunications.

I think the changes that we saw in telecom (that took 15 or 20 years to develop) probably will happen faster in your industry because today's technologies are more sophisticated

and people in the investment community understand the risks. Then the regulators are going to have to try to figure out how to respond to the market changes. But regulators who have been backward-looking – and don't have long tenure on their commissions anyway – don't have the wherewithal to figure out the complex technological and structural industry changes. So what's going to happen is that the old models will disintegrate. In telecom they've disintegrated already.

Binz: Jim, I think you may know, I've been doing a lot of work in this area of utility business models and my conclusion is that – some of us who are trying to decide what utilities should look like as entities – we should focus instead on the regulatory regime in which they're acting and let them figure out what the adaptations need to be. One way of saying it is that in other parts of the world, Great Britain in particular, they pay attention to *what they're getting* for the rates they pay. It's sort of an output-based focus. Here, we're focused on *how much we're paying* for what we get. All of our regulatory focus on the cost misses the big picture.

I have been speaking and writing a lot along these lines: We need to move to a more output-based approach – what our targets and goals are. I think you at Duke Energy have done some of this, especially some of your proposals on energy efficiency. My preference is not to regulate prices on the basis of cost, but on the basis of a price cap

sort of regime. We did this in telecom, and you remember this very well, when competition began making cost-of-service a hard thing to grasp, we moved to a price cap.

I think it's about time we start looking at that. Give the utilities a trajectory of what their prices are going to look like over the next five, eight years, let them work on that, let them squeeze efficiencies out of their companies, because that will go to their bottom line. Hold them to some output or performance goals. It may be a percentage of renewables; it may be reductions in carbon; it

may be customer complaint levels, reliability – you can make up your own list. But state regulation really needs to step up on this. I think state

regulation, much as Mike just said, could be standing in the way instead of leading the way.

Rogers: That's an interesting observation. As you were talking I was sitting here thinking that we just completed a \$9 billion generation modernization plan that's going to allow us to close 7,000 megawatts of old coal plants. And I look up at the lights here, pretend these are in Charlotte and I'm a customer, and the lights are the same as they were before I spent the \$9 billion. Yet the air is cleaner because I'm producing electricity from five gas combined-cycle plants or advanced coal plants that burn super critical pulverized coal and coal gas. In a performance system customers can't see the value and you can't price in the value of the cleaner air. And so, as I thought about your comment, it's pretty difficult to

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have a price cap, particularly when you might be making changes to modernize your system.

Binz: It depends on what the price cap is. I'm not talking about an inflexible lid. I'm talking about an increasing price over time.

Rogers: Let me shift a little bit because we've done solar pretty hard. I tend to agree that change is going to come faster than most people believe. I like to use this analogy: If you put a frog in a pot of hot water it will jump right out. I think our industry is that frog. We're in a cold pot of water, but it's on a stove and the water is getting warmer, and we don't notice the change because it's gradual. Well, they're turning up the degrees both on the supply side with solar, and on the demand side with efficiency.

Ron, this is for you: What's your view about how fast adoption of new technologies will be on the customer side? Do you have a sense of that? Will the drop in demand be faster than the growth in supply that's not owned by the utility?

Binz: There's several questions buried in that one. Let me make a couple of points. One is that, after \$4.5 billion investment from the Recovery Act, people are asking the question "What next? Where's the smart grid going?" It appears to have stalled out, in the sense that you've got a lot of smart meters on a lot of houses but they're not doing much more than rendering monthly bills just like they used to.

One ingredient that's missing is smart prices. Former D.C. regulator Rick Morgan has famously said that it doesn't work to have smart meters if you have dumb prices. And I think it's time to make prices smarter.

One thing I challenge state regulators to do is to look at maybe not hour-by-hour real-time pricing, but at least a time-of-use price, which shows a peak period during the day, and both on-peak and off-peak prices. I think customers will respond to that. It will make electric vehicles more valuable. If you're dropping prices to marginal costs at night they become even more valuable.

I'll cite an example from Colorado. Xcel Energy has 160,000 customers who allow their air conditioning to be interrupted during critical peak times. For that they get paid \$40 a year. You don't notice it. I think all of you who have this service know, you don't really see or feel it, but the utility saves money when they interrupt your compressor for a few minutes. Why would we not do that with refrigerators and hot water heaters? There's nothing fundamentally different about the interruption of a device like an air conditioner from interrupting a water heater or a car battery or a freezer.

I'm encouraged by the way we've seen people respond to options in internet and information services. I think customers are getting more sophisticated, and I think they will buy into a lot of the smart grid sort of things – once we get prices fixed. That needs to be a priority. I don't think you have to do it for all customers. The smallest customers aren't that interesting when it comes to these kinds of devices; they aren't big enough, even collectively, to make that much difference. But for customers who have demands in the 1500 kWh/month range and above, they should be very interested in this. So I think we can actually see a relatively rapid move in

technology, if we have leadership from the states on pricing, and utilities who are willing to embrace a future where the grid is smarter and the utilities are more the orchestrator than the energy provider.

Rogers: I'm going to follow up with you Ron and then come back to Mike. Is it the utility that's deploying the devices within the home or is it a third party, an unregulated entity, in your vision of the future?

Binz: I think it will be both. As a regulator I favor the utility having the option to be involved. They're a trusted partner for most customers; I think we would squander a resource if we kept the utilities out of this game. That said, I was one of the regulators in this country who said to Xcel, "You're doing a lot of great load management with your interruptible program. Now we want you to contract with somebody," and it ended up being EnerNOC. I think there are plenty of opportunities for others to get in on this, even in traditional vertically-integrated markets, which we both know a lot about. It gets more complicated when you've got retail competition, and even wholesale competition makes it much more complicated. But I think it will be a combination of both utilities and service providers. There's still a reservoir of goodwill for the incumbents and they can make a market of it, but there are also plenty of new actors. I don't see any fundamental reason why the industry can't support that structure as well.

Rogers: Mike, will you describe the balance in the telecom industry? I kind of see the old incumbents as being pretty much out of the business.

Balhoff: There have been rather significant changes. I want to talk as a financial analyst. For years, I talked to professional fund managers and analysts at Fidelity and Alliance and Putnam and American Express and similar companies. They all want to know: Is there going to be growth? What are the margins going to look like? How predictable is it? Your industry is extremely reliant on earnings predictability and sustainability of dividends – things like that.

In telecom what happened was that new growth services began to emerge and those services were significantly based on wireless technologies. Growth in wireless, as I indicated, proved to be explosive – far more so than people expected. So there was top line growth that was unregulated, and investment people said, "This is a great opportunity to invest." They also began to look at broadband, so the demand for broadband was heroic for a significant period and continues to be very good right now, including on your wireless phone. So there was a top-line driver where there was not some sort of control on the rate of return that you generated.

In your case, if I understand it correctly, Jim, you were talking about possibly sub-1% growth for the foreseeable future and I've

Regulators want rates to stay the same and they want demand to go lower and lower with initiatives such as demand response. For an investor that's scary.

seen EEI's estimates and various others; they're talking at most 1% growth. Suppose competition comes in, and this is where I don't as much focus on green energy and those kinds of things affecting the industry as much as I care about technology change. If technology change begins to evolve and distributed energy takes away that 0.4% growth, investors are going to get very nervous and they're going to be watching cash flow margins – especially in an environment where costs are going higher, where there's carbon capture and other related concerns. In light of these forces, investors are going to start worrying about the dividends.

In the telecom space right now the great worry is that the dividend-generating sector that was incumbent telephone companies is beginning to be pressured, so there's more investor flight from the industry. Incumbent telephone companies have had competitive pressures, but they have also benefited from some growth by virtue of broadband and wireless and other types of services. Telephone companies' datacenter services also have continued to grow – the Cloud and remote storage – so there's a positive growth story for the telecom industry.

Your industry has a dynamic that is so foreign to me, and I ask myself, "What do the

regulators want?" I observe that regulators want rates to stay the same and they want demand to go lower and lower with initiatives such as demand response programs. For an investor that's scary, especially with rising

capital and operating costs. So, if I were talking to you as a financial analyst who published on your sector, that would make me spooked going forward because I see the cost of capital rising and, if the regulators begin to lose control, I see the policy and operating risk factors continue to emerge.

So I think the larger strategic issue you need to monitor is the appetite of the customers for change, especially with fundamental technology changes that we're beginning to see. I believe that customers on the edge of your network are going to want to migrate to alternative distributed technologies and they are going to want to control their networks more and more going forward, once those consumers become more sophisticated. I think it's going to happen fast.

Binz: This is a case of: Electric utilities – are you in the railroad business or are you in the transportation business? – that is the question.

Balhoff: That is correct.

Binz: And your example of decreasing sales – that's not what customers are seeing on their end. They're actually seeing a growth in services. They're just being done more efficiently, less intensively with respect to the amount of energy consumed. A refrigerator today – you know what the average around-

the-clock load of a refrigerator is today? It's under 100 watts, about the same as a light bulb. This is to have a freezer and refrigerator and ice-maker and everything else. The fundamental change that's occurring, the reason why EEI is projecting lower growth, is because of the efficiencies that the U.S. economy is undertaking with respect to electricity. It's not that they're using less electricity *just* to be using less electricity. They're getting more out of it and using less.

Rogers: So now I've got the question for you Mr. Regulator, Mr. Chairman. You want to encourage me to drive down my energy sales, so I'm guessing – because you want me to have a fair return on investment, and to back up the guy that's got rooftop solar and now it's cloudy or it's raining like hell, or whatever – that you support a fixed-variable rate so I get all my fixed costs back and they're allocated to all the customers. Or maybe you're so enlightened that you will even adopt maybe a formula rate that effectively gets all my fixed costs back regardless of my sales. Are you there?

Binz: I'm actually close.

Rogers: Come with me. (laughter)

Balhoff: This is being taped. (laughter)

Binz: Yes, I realize that. I was going to make a Hugo Chavez joke; I think I won't. Jim you did a magnificent job of laying out incompatible choices, so let me see if I can work on that. Actually, I do think that the way in which utilities are compensated for what they do or what they are said to be doing has got to change, absolutely. And about a

formula rate: I have never embraced decoupling as just a Band-Aid all on top of cost-of-service regulation. But if you read some of the things I've written and others working in this area have written, I prefer a metric for compensating the utility that measures outputs – the services that customers get, as opposed to kilowatt-hours. It would be a revenue cap, if you want to put it in those terms, instead of a rate-of-return cap, and it would be pricing that's independent of the volume. So I agree. I think that's where we're headed.

I don't think we're in a crisis situation, but I think regulators have to step up their game – and I include myself in the ranks. I tried to do a lot of things as a state regulator. It was a tough place to be innovative, I agree with that, but I think we're all coming around to a consensus that the new utility business model is absolutely required and a predicate for that will be a regulatory environment in which utilities actually can develop that model.

Rogers: I kind of love that answer. Mike, a quick question to you now. You were a financial analyst in your earlier life, and as a financial analyst in our industry the more regulated you are, the higher your P/E should be, right?

Balhoff: If you have good regulators.

Rogers: Yes, that's why we have six different states and diverse regulation, because at any moment you could have rogue regulators and if you're just in one state it's a bad day.

Balhoff: It doesn't often happen.

Rogers: Not often. But today, in this environment, the more regulated you are, with a higher percentage of regulation – assuming a good regulatory jurisdiction – you get a higher P/E.

A major concern—and telecom failed here – is you’ve got to educate your regulators and you have to do so very early.

Balhoff: Right.

Rogers: So your stock trades better and you’re able to grow, attract capital ...

Balhoff: Correct.

Rogers: ...at a lower cost. What happens to utilities that are sitting in that world with a high P/E and they see all the guys come in to put solar on the rooftop of their customers and they see all these new technologies reducing their load.

If my response is a telecom response, what I would do is start a company to put solar on the rooftop of every *other* utility until I got really good at it, and then I’d put them on our own customers’ roofs – small joke. But really, what I’d do is, I’d start a company, kind of an ESCO, like the old days, but aware that many of those went directly into the ditch in the late ‘90s because they couldn’t figure out a way to make money. So I’d start an ESCO and I’d take all these new technologies and I’d go into customers’ homes.

Actually, we’ve done this. We’ve done it in South Charlotte, where we took a hundred homes and we put sensing devices between refrigerators and dishwashers. If somebody turns a dishwasher on, it sends a signal to the refrigerator so the

refrigerator cycles down; when the dishwasher finishes, it signals the refrigerator to come back on. We reduced demand on peak 20% without the customer seeing any difference in the quality of

service. So I would say that I need to get in that business because, guess what? My regulators are not going to give me the same return on every dollar I invest in energy efficiency. I can invest a dollar in nuclear and earn more; but they won’t give me the same return on energy efficiency.

So, as a consequence, I need to start a company and be in that ESCO business. Now you’re an analyst and I’ve got a high P/E because I’m 90% regulated, but I need to change that from 90% regulated to 70% regulated because I need to build all this rooftop solar. I need to go to all these homes and reduce their usage 20 to 30 per cent on peak. Are you going to keep my P/E high if I’m preparing for a world that I think I’ll see 10 or 15 years from now? Or are you just going to have me sit there in the pot and let them turn the heat up on me and all of a sudden I can’t jump out.

Balhoff: Well, I can tell you that a number of forward-looking companies had to go through challenging times when their P/E ratios contracted. In telecom, Verizon’s stock price was depressed when it started making its fiber to the home ([FiOS](#)) investment, because of the resulting lower cash flows associated with the investment in that initial period. Also, when Verizon began going into various investments—certain wireless and fiber

technologies—that were perceived as being riskier, investors remained on the sidelines and the stock price contracted. I think that you have to take a longer-term view. Your stock may be under pressure while investors perceive that risks are growing in the short term while you take a longer-term view in order to be able to achieve your strategic goals.

A major concern – and I think telecom failed here – is you’ve got to educate your regulators and you have to do so very early concerning the financial consequences of what’s happening. Regulators need to understand the consequences if they are putting in place systems that are problematic for the longer term. For example, in the zero-energy-growth scenario, the regulators are incenting some customers who can afford to create their own energy to adopt new technologies so that costs and energy are off-loaded onto other parts of the network. In that particular case I think you need to educate the regulators as to what’s going to happen five or 10 years out – that it’s going to be an untenable solution.

We went through similar challenges in telecom. I wrote about problematic regulatory “solutions” ten or fifteen years ago. Some regulatory orders were based on poorly conceived policies that eventually resulted in distorted financial outcomes that anyone could have predicted. There were a number of analysts and corporate executives who argued strongly against those policies because the policies were so obviously flawed. But in those particular cases it was a backward-looking view by regulators and a politically expedient set of decisions that they made. I think that there are politically expedient

decisions that are being made in this industry that make no sense from a financial point of view.

If I were to go back in time to counsel the telecom companies, I would say, “Be rigorous and fight vigorously to clarify a long term view for regulators about what’s going to come,” because the regulators are important for the overall value of your company. I am sure there will be different issues for energy, but the regulators have to be smart, well-educated, and understand the importance of what they’re doing.

But I do think that there may be P/E hits while you diversify. Verizon’s a really good example. They traded below AT&T for a period of time, and Verizon’s stock has come back because people now see the sense of what they’ve done.

Rogers: Let me ask you both to make one last comment. If there’s going to be one message that people leave with, in terms of the role of technology in our sector, what message do you want people to have?

Binz: I’m going say a couple of things. One of my clients is Dow Solar. They’re producing a roofing shingle with thin film solar baked into the shingle. You nail the shingles down with galvanized nails and hammers, connect them, row across row, and you get a solar roof. It’s guaranteed by Dow – this isn’t a commercial – for 20 years. Those shingles are being installed now in subdivisions in Colorado as if they were just ordinary roofs.

The electric utility industry, I think, is beginning to understand how big the

challenge is. I think it's time for a new grand bargain between regulators and utilities. I am pro-competitive, where that works, but I believe we're still going to need a network – and this is what we've really been talking about – to keep all the pieces talking to each other, working economically and efficiently. Society must have that. It's time to restructure the bargain that regulators and utilities are operating under, one that looks forward to these immense challenges that technology is bringing to the industry.

Balhoff: I would say I smelled snow last night and it snowed, and I smell technology changes in this industry. I don't think that the regulators are going to control it. I think you have to run your businesses assuming that significant technology changes are coming and it's going to change the entire competitive paradigm in your industry. The financial model that you've known for the past 100 years, of which you are justifiably proud, is about to change. You need to have a longer term view, and that will mean sometimes dealing with your stock price being under some pressure. In part, it will mean educating your regulators, but I assume that the regulators are not going to control the paradigm – technology will, and competitors coming in will, and you need to discern that pattern as far out as you possibly can.

I think you will probably have six or seven or ten years to figure it out, but I think it's going to come much faster than the change in telecom. And I think it's going to be a very, very significant change in the underlying financial model that you've known, and in your access to capital. ■

The financial model that you've known for the past 100 years, of which you are justifiably proud, is about to change. You need to have a longer term view.

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