

INNOVATIONS IN ENERGY



⚡ MODERATOR

Michael Noble
Fresh Energy

Michael Noble is executive director of Fresh Energy, an organization helping shape energy and transportation policy. He has been a strategist for dozens of public policy innovations in energy efficiency, renewable energy development, solutions to climate change, and market-based efforts to reduce reliance on coal and oil. He has served as CEO of four energy companies and as a founding board member of Wind on the Wires, Climate Generation: a Will Steger Legacy, Minnesota Environmental Partnership, Conservation Minnesota and the Conservation Minnesota Voter Center. He is a founding member of RE-AMP, a Midwest collaboration to reduce carbon pollution by 80 percent or more.



⚡ PANELISTS

Jim Berge
King Solutions

Jim Berge is in business development at King Solutions. He has 29 years of experience in the transportation/supply chain field. He began his post-college career with an LTL carrier, then moved on to the demand side of the equation as a customer of the transportation industry. He is now working between the carrier and end customer sides to make the supply chain as efficient as possible. He grew up on a wheat and cattle ranch in North Central Oregon. He studied resource economics at Oregon State.



Andrew Moratzka
Stoel Rives

Andrew Moratzka is chair of Stoel Rives energy development practice group and focuses on litigation of various utility- and energy-related issues. He represents iron mines, paper companies, refineries, steel manufacturers and other large industrial customers in electric and gas rate cases and various regulatory matters at the state and federal level. He also represents independent power producers and has experience arguing energy-related and bankruptcy-related issues at the appellate level. Given his background, clients also retain Moratzka for utility contract negotiations and to consult on various legislative matters.



Brent Wavra
CxS Connect

Brent Wavra is president of CxS Connect. He has 19 years of experience as a project manager, design engineer and commissioning agent. In these roles, he has been involved with energy-efficient mechanical systems for the K-12, higher education, health care, technology and commercial markets. For 10 years, Commissioning Solutions provides professional, detailed, mechanical and electrical commissioning, re-commissioning, retro-commissioning and now connected commissioning through its innovative service: CxS Connect. Its mission is to verify and document that facility systems efficiently operate now and into the future.



Chris Psihos
iDEAL Energies

Chris Psihos founded iDEAL Energies to bring to market innovative solutions for helping companies execute on renewable energy opportunities, in particular solar energy. Prior to that he founded two companies, Psihos & Associates in 1990 and Special Waste Disposal Inc. in 1996. Both were purchased by a NASDAQ company, and the tools and programs are now used across the country as model programs for managing all health care wastes in compliance with federal and state laws. Psihos earned a Bachelor of Science in chemical engineering from the University of Wisconsin-Madison and a Juris Doctorate from William Mitchell College of Law.

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From left:

Michael Noble, Fresh Energy; Jim Berge, King Solutions; Brent Wavra, Commissioning Solutions; Chris Psihos, Ideal Energies; Andrew Moratzka, Stoel Rives

NANCY KUEHN

By Holly Dolezalek
Contributing writer



The *Minneapolis-St. Paul Business Journal* held a panel discussion recently on the topic of energy. Panel members included

Andrew Moratzka, energy regulatory partner at Stoel Rives; Brent Wavra, president and director of business development at CxS Connect; Chris Psihos, president and CEO of iDEAL Energies; and Jim Berge, business development representative at King Solutions. Michael Noble, executive director of Fresh Energy, served as moderator.

Noble: Let's start with transportation. Jim, how do cost efficiency and environmental performance relate to each other?

Berge: In the past five to eight years, the tables have turned. In the past, if you wanted to be more energy conscious it was a very expensive proposition and not necessarily the most efficient way of doing business. In today's environment, there are more cost-effective ways to be energy conscious. In our warehouse, motion sensors turn the lights on when you walk in and off when you leave. The offices are the same way. Each work desk has two monitors to eliminate printing and to allow the employees to be more efficient. This is a gain in efficiency for the employees, as well as reducing our consumption of paper, toner and electricity to run the copier. So it is a win for the company, as well as reducing our carbon footprint. If you combine as much freight as possible at the point of origin to go as far as possible to the destination, you can reduce your carbon footprint. We consolidate freight at our location from many Minneso-

ta shippers. We've started focusing our efforts on maximizing the consolidation, through these efforts we eliminated 47 truckloads on the freeway. King Solutions has an average haul length of 750 miles, which is a savings of 34,500 miles. A semi-truck averages 5.5 miles per gallon, which is 6,272 gallons of fuel saved. More than 22 pounds of carbon dioxide are produced from burning one gallon of diesel fuel. The smarter consolidation efforts are not only a win for business, but also a win for the environment.

Noble: So what's on the horizon for transportation? What are the big innovations that are going to cut carbon emissions?

Berge: In the next decade, we may see long-haul hubs outside of each metro area. Freight will go to those hubs and then nonfuel-burning vehicles will deliver that freight for the final mile. It is speculation at this point.

Noble: Electrical vehicles?

Berge: Yes. Or that technology will improve so that those electrical vehicles can pull a 40,000-pound trailer.

Psihos: That's reduction of idle, too. There's an enormous amount of fuel involved in keeping the truck running when they're sitting at the dock. That electrical technology can negate that fuel expenditure in the last mile.

Berge: Part of this is our current state of the infrastructure in our state and the entire country.

Noble: We just had a legislative session where the role of transportation infrastructure investment came up. What is the role of infrastructure

investment in the state or the federal government, in terms of your business and these environment goals you mentioned?

Berge: You really can't separate them. When you're stuck in traffic, do you turn your car off? You're getting zero miles to the gallon but you're still burning fuel, so you are producing carbon while you are waiting.

Noble: And labor costs.

Berge: Labor costs are tied to time. Improving our infrastructure wouldn't just benefit King Solutions, it would benefit every commuter and business! The environment would benefit because we wouldn't have needless carbon in the atmosphere.

Noble: In the past five years, solar has really taken off. In 2012 or 2013 there might have been \$50 million in solar in Minnesota, and now we have a billion-dollar industry, one of the hottest industries in Minnesota. Chris, how is this climate of innovation and momentum affecting your business prospects?

Psihos: We've incurred immense growth. A lot of it has to do with the development of solar panels that are very economical; the cost has come down nearly threefold since 2010. So we can now deliver solar assets at values that we were just not able to, historically. So with the cost coming down and some of the incentives in place at the federal and state level, we're able to deliver assets to our customers that offset part of their electrical consumption, which offsets the production of greenhouse gases. The world and economy of solar have completely changed, allowing us to provide solar projects to our customers that are coupled with an

immediate return on investment. The costs of coal plants and solar have reached grid parity, which means that solar can be built and delivered at the same cost as fossil fuels, which is remarkable.

Noble: That's true. The data are out there. Sooner or later the crossover will be everywhere, and solar will be cheaper than the incumbent fuels.

Psihos: Right, so we're continually developing the market so we can get ahead of that parity point. But we've got to be really careful and work with the utilities, to make sure it's overlaid on their infrastructure in a way that works for all parties.

Noble: Who is your typical customer, and what is their motivation? Why do they come to you?

Psihos: Our typical customers are for-profit businesses, non-profit businesses and the public sector who want to go green and reduce their energy expense. People want to go green, but they want to make sure they have price parity. It's challenging to get people to make decisions just because they're green, but if they have a choice between green and nongreen and the cost is equal or they can even save a few dollars, it really changes the dynamic. The economics allow them to make green decisions that they were never able to before.

Noble: For the CEO of a business, maybe with 200 employees and their own facility, what does a solar deal look like financially?

Psihos: They would put a solar array on their building or property, and the energy produced reduces the energy they have to consume from

the grid. It's like putting in LED light bulbs — they're reducing the quantity of energy they have to consume from the utility. The transaction is about how the energy produced from the solar array creates a reduction in expense over time, and based on assumptions about the cost of energy in the future, we develop financial models that provide real-time solutions to customers. We try to have a net positive purchase, meaning that they're going to save money at every point, and then when the asset is paid off, they're getting energy for free for the life of the asset.

Wavra: We're on the front end of designing the building for our customer, and solar came up. So how can we get you in front of our clients as we're designing their building?

Psihos: The first step is understanding how a solar project is developed. When solar assets are placed on a building, you need to understand the structural impacts (ballasted rooftop systems add approximately four to five pounds per square foot of additional load) and make sure your building can accommodate them. Existing buildings usually can, and new buildings can for sure because they can be designed from the onset to accommodate the additional load. If you cannot accommodate the additional load, you can't put solar on your building safely and in compliance with building and mechanical code.

Wavra: Is that something we could ask of you? We have a client, a church, who may want a solar array; can we come to you to get the life cycle, financial package and cost calculation?

Psihos: Yes! That's what we do as a company. We sit down and look at your consumption, try to find the right incentives and products, and make the transaction work economically.

Noble: So if you have a customer who wants solar, how do you help him make his building more energy efficient?

Psihos: So this is where it's fun. Brent is in the business of measuring data points inside a building: total energy consumption, or kilowatt-hours, and instantaneous consumption, or demand, which is measured in kilowatts. Every 15 minutes, the utility measures a point at which the maximum instantaneous demand occurs. So if I turn on all my motors at once, I'm going to suck a lot of energy from the grid, and they're going to bill me based on that instantaneous amount I consume, even if I never do that again in that month. So by knowing when maximum demand occurs in a building, and when the energy produced from a solar array is produced, by lining up the foregoing, we can capture a reduction in demand. That's what the utility wants, is for us to shave demand from the grid at the peak times when the grid needs it.

Wavra: It's what we call peak shaving in our industry.

Noble: Where do you see the growth coming in the solar industry over the next five years?

Psihos: You're asking that at a time of massive change in Minnesota, at least in the commercial market. We've replaced incentive programs that were instrumental in developing markets with different programs, rules and incentives. That's going to create a bit of a strangulation of the small commercial market, because it's going to be harder to deliver projects. The small commercial market is beholden to incentives that bridge the gap, because certain costs of huge or small projects won't go away. If I have to normalize those same costs across a small project, it becomes very challenging. The opportunity is in the larger rooftop market. There's some work at the Public Utilities Commission right now that will be instrumental in developing a middle market of commercial solar — from 100 kilowatts to a megawatt in the near future.

Berge: So is it building size or kilowatt-hours? What's the break-even point for a company that wants to put solar in?

Psihos: For a for-profit transaction, you're looking at a return on investment, depending on the parameters, approximately between six and 10 years. For a nonprofit or the public sector, you have to introduce different types of business models in order to leverage federal tax incentives that they cannot use directly. Either way, our programs are designed to provide immediate and long-term savings for our customers day one that grow exponentially over time.

Noble: You hear people say, "Minnesota? Is it sunny enough there for solar?"

Psihos: We have about 200 sunny days a year here, and we're cool, and solar performs better in cooler conditions. So we actually have one of the best solar climates in the country. I think having a billion-dollar industry, with another billion coming in as you described, are clear testament to that.

Noble: Let's turn to buildings. CxS is in the buildings business, understanding buildings and how they perform. What is in the category of building systems and analytics?

Wavra: Essentially, a computer runs this building; it controls lights, air conditioning and heating and all those controlled points are being stored and are available to be analyzed. For example, this building we are in today produces and stores up to 10,000 data points every five minutes, and until recently, that was an overwhelming amount of information to sort through and provide any sort of useful information from. Our industry is now at the point where it can handle that kind of information. So, what do you do with it? We can now take this information and filter through it looking for specific



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energy saving opportunities. A simple example; this room thermostat is set at 72 degrees, but if it's still at 72 when everyone goes home, that's a waste of energy. We're [CxS Connect] not producing energy or making it, we're reducing consumption by understanding how a building lives and breathes. Now take the savings from this one thermostat and multiply it by thousands of other devices being controlled and you can start to understand the power of building data analytics. When you make these little changes on a massive scale, it can reduce energy consumption in a building by up to 30 percent, if not even more. Chris, you're talking about six to nine years for ROI with solar array, we're talking as low as six months for building data analytics and sometimes even less. As we say, data is the new money!

Noble: You could use that to buy solar panels. [Laughter]

Wavra: Here in the state of Minnesota, we consume about 370 trillion BTUs per year of energy in the commercial market, 650 trillion BTUs per year in industrial. If you decrease that by 15 percent through building data analytics, that's about 55 trillion BTUs of savings on the commercial side and 98 trillion in industrial, which equates to roughly \$1.2 billion in energy savings per year. The amazing part about capturing these savings is that it's typically done by

no-cost, low-cost changes to the computer automation system running the buildings. The trick, however, is to know what to look for and have the power to do it.

Noble: What does it mean to benchmark a building?

Wavra: Typically, the first step in our process is to look at a building's utility bills and benchmark its efficiency. Energy Star is one of the independent agencies we use to compare a building's efficiency and determine if the building is a candidate for our services based on its benchmarking score. Benchmarking a building helps us understand the potential savings and calculate the ROI on our services. Most facility owners have no clue how they're operating. For instance, if you're running at \$1.25 per square foot on a 200,000-square-foot building, even if you can shave off 15 or 20 percent, that's real dollars.

Berge: If you do have a building benchmarked, do you see companies start to lose focus and those efficiencies that were gained diminish? How often do you need to benchmark a building?

Wavra: It's continuously being benchmarked, and when we find anomalies, it gives you the time, duration and magnitude. If you have one thermostat that's not set at the right point, we can tell you how much it's costing you not to make that change for an hour, a week or a year. Some

of those changes may not have a lot of dollars associated with them, but others have a tremendous amount.

Noble: It's putting the information in front of the building manager so he or she can make decisions.

Wavra: It's only recently that we're able to do this. Handling this kind of data just wasn't possible before. In the past, we would re-commission a building by analyzing building data using graphs at a single point in time, all the while trying to use the human eye to detect energy-saving opportunities in these graphs. Now we continuously commission buildings by writing specific computer codes to look for the same opportunities we were looking for in the graphs, but now we have the power of computers to look at far more data than before; 24 hours a day, 365 days a year. It's high-touch, high-tech stuff.

Noble: What is changing at the federal government that might affect energy innovation and energy independence and the future of energy? How will the actions of President Trump drive change or not?

Moratzka: The jury's still out, but it's clear that whether you're supporting or denouncing the current administration's positions, the current administration has done a fairly thorough rebuke of the prior administration's policies. The impact on execution remains to be seen, but it's almost a tale of two countries. There are 29 states, plus the District of Columbia, that have renewable portfolios. The U.S. Energy Information Administration's annual outlook for 2017 discusses how coal-fired generation is nearing an end and that the biggest uptick by 2040 will be natural gas and renewables. We're seeing clean energy investments in huge financial portfolios. There's progress still being made and there are going to be states that drive these policies, like Minnesota, California and others. On the other hand, you have 24 states that have banded together to fight the Clean Power Act, and Trump's announcement that the U.S. will back out of the Paris accord. So maybe things don't look so good for clean energy from this perspective, but I think given all the developments on the former and policy that's being driven at the state level and general interest in combating climate change from the residential citizen up to Fortune 500 CEOs, it seems like we're going to continue to move towards at least a cleaner energy future.

Noble: What opportunities are there for private corporations to go renewable?

Moratzka: Well, 71 of the Fortune 100 and 215 of the Fortune 500 companies have sustainability or renewable energy targets or both. That's impressive. Companies are executing on these visions through internal operation and power supply. To the extent that you're running your operations as efficiently as possible,

you're reducing your carbon footprint. In 2016, Google announced that it would be 100 percent renewable by 2017, which pencils out to about 2.6 gigawatts of wind and solar. Now, not all large companies can do that. Some companies in the service industry can pass costs along; others are in a commodity-type industry where they face different challenges.

Noble: Xcel is offering an all-renewable green tariff program for commercial customers to sign up for a solar-wind mix. Are customers interested or do they pass if it's one penny above market?

Moratzka: Some may question whether the tariff tracks prior Commission direction. In any event, the new tariff may interest some buyers, but we'll see how it takes off.

Noble: What are the biggest challenges that electrical utilities are facing?

Moratzka: One is definitely flat or declining sales. There are also more non-utility options, and corporate renewable targets are growing. Storage may be a huge game changer. Others include smart grid, advanced metering infrastructure and how customers become prosumers.

Noble: Prosumer? They're both a consumer and a producer?

Moratzka: Exactly. The average person and business are changing in their awareness of energy use. Unless there's a change to the utility business model, there's going to be increased pressure on utilities to continue with the status quo as opposed to trying to adapt to and embrace those new technologies.

Psihos: If we can start thinking outside the box and identifying ways that people can collaborate, including utilities, we'll have a spectacular forum for innovation. It's not going to be based on things we're doing right now. We need to create this stuff and it takes an immense amount of energy to do it. And that's what makes this fun.

Moratzka: To get there, you need to change the regulatory regime. The current cost-based structure doesn't work in a model where customers and utilities are trying to be as efficient as possible.

Noble: Did anything drive innovation at the Legislature?

Moratzka: There were changes to the Renewable Development Fund, solar incentives and the conservation improvement program. Ultimately, it didn't seem like either consumers or independent power producers were helped at all, and arguably they were hurt. On the other side, there's a mandate to build a 786-megawatt gas plant in Becker, and some favorable legislation for municipals and co-ops. At the 30,000-foot view, the investor-owned utilities and co-ops had a good session, but developers and consumers, maybe not so good.

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