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Digitization: More from Energy Infrastructure



John Moore from Acorn Energy:

The overall trend is digitization. Alfred North Whitehead once said that civilization advances as we do more of the more

important things without thinking about it. In 2012 we're going to have an acceleration of this trend.



This is happening in education, and health care, and energy. It's also happening in banking — the examples are the credit card, internet bill, ATM machine. And it's happening in travel with the way you buy tickets. These are the types of activities that are terrible for bank tellers and travel agents, but great for consumers. And it's great for you if you're on the digitizing team. Digitization is going to reduce the amount needed to spend for utility workers to be driving around in trucks, but it will increase the need for intelligent control workers and grid engineers.

The bad side of digitization is that there are fewer manual high paying labor jobs like linemen, but digitization also means there are more very highly skilled jobs like network operations people.

Basically there's a second economy emerging.

It is this vast, invisible and automatic world that is apart from the physical world. It doesn't really do anything — like clean your clothes — but it makes the things that happen in the physical world happen with fewer people and at a lower cost. It is going to improve efficiency and energy production. So I think we're going to see more focus on the smart grid, but not on home applications as much as distribution optimization.

You have to understand that utilities in the US have a problem. The average life of a transformer is about 40 years. And the average age of transformation on the US electric grid is 37 years. So what that means is that a lot of existing transformers — which are the guts of a power plant — are approaching the end of life. But the utilities don't have the capital to replace all of those transformers.

Most were installed in the 60s, so we now have to monitor them, perform a kind of triage to find out which ones are trending toward failure in order to determine when and where we are likely to have outages. One of our companies is [Gridsense](#), one of the world's largest transformer monitoring projects with a major south-eastern utility. The job of such projects is to figure out how to fix those transformers and extend their life at the least cost to the rate payer. For utilities, the digitization trend started with the automatic meter reading equipment that replaced meter readers and it is accelerating into the grid optimization side. The utilities are using DMS software — distribution management systems software — to install intelligent devices in the field to detect

faults and detect asset failures. It is converting the grid from a time-based operating and maintenance situation to condition-based maintenance through improved situational awareness.

We're developing a self-healing grid.

And we're reducing the cost of maintaining the grid by knowing what's wrong so that we can send the right equipment, the right truck, and the right technician to fix the problem in the field.

So you'll see more programs focused on the distribution grid particularly in the area of voltage conservation. Normally, the expectation is that the grid operates around a certain voltage band, but sometimes it operates hotter to avoid voltage sag. But to improve distribution, the utilities can more finely tune the voltage which will result in savings to the rate payers that will eclipse conventional energy savings gains in individual households.

I think in 2012 we're also going to see more oil discoveries.

New imaging technology in the oil industry means less pollution because of the implementation of emissions technologies. Improved sensors in the field for oil discoveries will remove a lot of the environmental concerns around shale oil and gas fracking. We have a company called [US Seismic Systems](#) that uses a device that can monitor a well to detect methane wicking up the well bore. That will give, in real time, the oil and gas producers the ability to shut down a well that is endangering the aquifers.

Technology will also increase production.

US Seismic has fiber optic sensors for doing micro-seismic monitoring of shale gas, which offers the potential to increase the yield of natural gas from 30% to 60%. The improved economics of gas drilling in a low-priced environment like we have today is critical for reducing the carbon intensity of our electrical grid. By improving productivity — potentially doubling production — of shale gas with advanced alarms for any potential poisoning of the aquifers, you're going to continue to see reduced prices for natural gas. That means natural gas will continue to take market share from coal.

One of the surprises is going to be that the people getting wealthy from the change will have to either accept more government intervention to support the people who are suffering as a result of these advances, or they are going to have to be more generous with personal philanthropy. The government is seeing that people are suffering and is trying to intercede. Basically the wealthy are going to have to decide to pay one of two ways — through sending the elevator back down voluntarily, or being forced by government intervention.

I'm super optimistic about the future. I think productivity gains are going to shock us, but you have to have an education and you'd better be part of the group that's changing the world rather than the part of the world that is getting changed.

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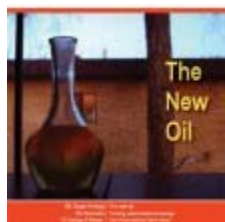
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