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# From one well to thousands: The innovation multiplier in unconventionals

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Steve Schlotterbeck, CEO of EQT Corporation, comments on the opportunities and challenges of leading one of the largest producers in the world-class Marcellus Shale region.

**EQT Corporation is headquartered** in Pittsburgh, Pennsylvania. During the past several years, EQT has transformed from a regional gas utility to a fast-growing independent E&P company with a substantial and strategic midstream business. The company's roots as an Appalachian producer go back more than a century. EQT commenced production from the Marcellus Shale in 2008, and Marcellus now accounts for more than 90 percent of its output. EQT divested its gas distribution utility in 2013.

Steve Schlotterbeck joined the company through its acquisition of Statoil's Appalachian assets in 2000. He became president of EQT's exploration and production business in 2010, and president of the corporation in 2015. He became CEO on March 1, 2017.

**McKinsey:** *How did an integrated regional gas utility company become the fast-growing E&P independent EQT Corp.?*

**Steve Schlotterbeck:** We went through two transformations. The first was in the Huron play, our shallow shale reservoir in eastern Kentucky and southern West Virginia, where we took what was happening in the Barnett Shale in Texas, and adapted it to the unique low-pressure characteristics of the Huron. We developed a way to drill horizontally with air rather than drilling mud. After several early disappointments, we cracked the code and it was a huge success.

Historically, the upstream part of our business would grow volumes at 2 percent per year. That was about the most we could do. We could offset decline, grow a bit, and that was it. And then, with the start of horizontal drilling in the Huron, we were immediately able to grow in the mid- to upper teens.

So, there was a massive change management effort around implementing the new technology, and establishing a mentality for growth, because we'd never really done that before. That was the first transformation.

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## “Any innovation or experimentation we do in a shale has the potential to deliver huge impacts.”

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And right about the time we were getting really good at that, the Marcellus was discovered, and it became obvious pretty quickly that that it was in a class by itself. During the next couple years, we phased out the Huron and ramped up in the Marcellus. And that presented another set of change management challenges as we were now working with much bigger projects.

That’s been a huge success but, to be honest, I’m not sure how things would have worked out had we not had that unique opportunity in the Huron. I don’t know how well we would have been able to change from a 100-year-old gas utility into the new high-tech, big-dollar, big-technology world of the Marcellus. Looking back, the Huron play was like prep school for us.

**McKinsey:** *What has been the most exciting aspect of leading a company in this world-class shale basin?*

**Steve Schlotterbeck:** I think the epiphany for us regarding the development of shales is that they’re so widespread and relatively homogeneous compared to conventional reservoirs. Consequently, any innovation or experimentation we do in a shale has the potential to deliver huge impacts.

First, the experiments are generally low cost. Say we want to change how we complete a well, and the engineering models say it might give us a 5 percent or 10 percent improvement in estimated recovery, but the test will cost \$100,000 more than normal. In many conventional reservoirs, if you invest that risk money and it works, maybe you’d get a return on that field or project. But maybe it doesn’t apply anywhere else. The rock changes. So, it’s a one and done thing. And there is a good chance it won’t work. You make that investment; you’re out the money, and you’ve got nothing to show for it.

In the shales, if we try something and it works, we’re going to get to apply it to thousands of future wells. So, we can afford to have a variety of failed experiments on the premise that every once in a while, one will work. Then we will be able to apply that technique in other scenarios and situations. To me, that was eye opening.

Here the leverage is so great that, frankly, our threshold for trying new techniques is basically two-fold. First, we ask the question, “If it works, does it add value?” And second, “Must it violate any laws of physics to work?” If the two answers are yes and no, we fund it.

**McKinsey:** *You have low costs, but gas prices are low. How can you become even more efficient?*

**Steve Schlotterbeck:** We are blessed to have very good rocks. Honestly, much of that was serendipity, since we've had our acreage position for a long time. It just happened to be on top of some of the best Marcellus rock. But we also have done very well with what we have.

We know that one of the biggest drivers to capturing greater efficiencies is from drilling longer laterals and putting more wells on each pad. That is the primary driver behind our consolidation and acreage acquisition strategy. Longer laterals allow us to get more recovery per dollar spent, and increasing our contiguous acreage position allows us to do just that.

Another opportunity we are pursuing is what the academics call operations research, or mixed integer programming. Basically, we are building large mathematical optimization models of our operations to help us find better, more efficient ways to operate – ways that aren't always intuitive due to the high level of complexity of the processes.

For example, historically, we were driven by a mental model of minimizing rig moves. Every time you move a rig, it's a half-million bucks. You get nothing for it, and you're down for days. So, when a rig is on a location, we tended to want to keep it there and drill all the wells on that pad before we moved it.

But when we had a data scientist look back at one of our development areas and calculate what the optimum rig schedule should have been, there was nothing intuitive about it. There was no way a human being was going to sit down and come up with this schedule. The optimum schedule involved moving the rigs quite a lot. It incorporated many variables, including available pipeline capacity, optimum water access and disposal, frac crew scheduling, and much more. It was eye opening that intuition won't give you the optimum when so many variables are involved.

So, we are now trying to expand the use of those kinds of techniques across the full scope of our operation.

**McKinsey:** *Where do you see more opportunities to get value from advanced analytics?*

**Steve Schlotterbeck:** One area ripe for that is water logistics. As the Marcellus grew, we started to use large amounts of water. Then we started to have to manage flow-back water that was growing at an exponential rate.

We had people very good at making sure we had water where and when we needed it. They were very proud (and rightfully so) of the fact that they could say, "We've never had a frac job shut down because we couldn't get water to it."

That's a good place to start. But we really don't understand our costs as well as we should, and whether our water management is anywhere near optimized. Are we using the safest and least impactful way to get water and move it around our operations?

In the past, our water group personnel have been reactionary. They're out there in the field managing it real-time, dealing with the logistical issues as they arise. But now we are focusing on how to take a forward-looking approach by developing and designing optimal logistical strategies around our water movement. Like the rig example, water logistics have become very complex, and we need to use more advanced mathematical models to continue to improve efficiencies, lower costs, and minimize the impacts of our operations.

To do that we need data. Historically, all the real data around the process came in on paper Bills of Lading [BOLs]. Half of the information on those BOLs is almost illegible, and we don't receive the data until days after the fact. All this data is then entered manually into a database that's primarily used for regulatory reporting and invoice processing.

We are now almost done with a process to digitize all that, so there'll be no more paper. The next step will be to start using that data. I think there's so many insights we can get once we can analyze what's really going on. I could list 20 metrics off the top of my head that, if we had them, would reveal inefficiencies in the process. Once we have that we can start targeting ways to make it better. So, that's one I'm very excited about. I think we will see big benefits really quickly.

**McKinsey:** *The industry has been in some turmoil with commodity prices over the past couple of years. How do you think about pacing your investment and growth in a volatile market?*

**Steve Schlotterbeck:** I think our view is that this is a cyclical business and you have to look over the full cycle of gas prices. You need to be careful about making too many short-term decisions in reaction to whatever the NYMEX price is on any given day.

In this most recent downturn, we did moderate our capital spending, primarily because of lower cash flows. For us, it was more about cash flow than returns. The reality is that some of the best returns we have ever gotten are on the wells we drilled during the low of the lows because we spend when the well costs are at their lowest and by the time the wells come online—which can take up to a year from the time we invest—prices may have recovered.

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Conversely, investing in new wells when prices are at an unsustainably high level means spending when your costs are highest. Then wells are coming online when commodity prices are falling. The ringing of the cash register certainly sounds better at higher commodity prices.

But the models never predict that. So, I think it's a matter of staying the course. If you believe we are in one of the best gas basins in the world, you need to stay the course. You should be prudent about the strength of your balance sheet, but you need to be careful about trying to get too cute with timing rather than spending your time trying to find ways to drive down overall costs and drive up the returns you will earn at any given gas price.

You get this frenzy that gets going when prices are on the upswing. And you see how much activity happens when service costs are at their peak. Then you see what revenues you got from those investments and they're low because gas prices have crashed. There is a real tendency to chase that high price.

If you're always thinking about what Excel's telling you to do when gas prices are high, you don't really care about service costs. Excel's going to tell you, "Spend all you can and you'll get great returns." Except, when you look back, it never works out that way.

**McKinsey:** *Does that mind-set have implications for hedging and procurement?*

**Steve Schlotterbeck:** Absolutely. Especially on the procurement side, we're doing all we can to try to lock in current service costs, and maybe trying to be creative about offering suppliers some certainty of demand. It's probably a little more challenging than I wish it was. Time will tell how well we do.

**McKinsey:** *Many shale players have pursued back integration into rigs and services—investing in them rather than buying or renting them—given the deep backlog of work they have mapped out. What is your view of that opportunity?*

**Steve Schlotterbeck:** We have debated that question numerous times over many years. Where we struggle is that there will always be some variability. That means, if you need to contract externally, our fear is we might go from first in line for the best crews and lowest prices to last in line. When you factor it all in, and look at the numbers, we just haven't convinced ourselves that we would be substantially better off.

And then you consider that it's a different business than we're currently running—a different workforce, for example. There would have to be a clear, meaningful advantage for us to want to take on those management challenges. I'd say we're on the fence, but for now it's unlikely we'll go that route.

**McKinsey:** *Your core development focus in Appalachia is the Marcellus and Upper Devonian. You completed a very prominent well in the Utica formation in 2014. How do you think about adding the Utica to your growth plan?*

**Steve Schlotterbeck:** Utica is still an experimental project. We are drilling it primarily for dry gas, whereas much of the existing Marcellus production is wet. We have not yet achieved consistently competitive economics in the Utica, but we're becoming more optimistic that we will get to a point—hopefully within the next year—where at least certain portions of our Utica acreage will be competitive with the Marcellus. And then we will have capital allocation decisions to make.

Obviously, single well returns will be an important driver in those decisions, but midstream considerations also will be important. It's pretty inefficient to put dry gas into wet systems, so it remains to be seen if Utica will work in West Virginia, where we have wet Marcellus.

There could be a different timeline in Pennsylvania, where the gas systems are dry. But the Marcellus systems typically are compressed fairly early in their life, whereas the Utica, we think, will flow for many years because of the reservoir pressure. So, it's probably inefficient to use a lot of Marcellus capacity now for Utica. The long-term plan will require a lot of analysis and judgment.

As we get over the thresholds, and the Utica becomes competitive, we will still have a mix of Marcellus and Utica drilling. I don't expect the Utica to work everywhere. I don't think the Utica is going to do to the Marcellus what the Marcellus did to the Huron, which was basically put it out of business.

**McKinsey:** *So you clearly think about this as a large-scale regional business, not a well-by-well or pad-by-pad business?*

**Steve Schlotterbeck:** Absolutely.

**McKinsey:** *So how do you think about the industry structure in Marcellus and Appalachia, and how it might change?*

**Steve Schlotterbeck:** I think there are three segments. You have the established players in the Northeast like ourselves. Because we've been here a long time, we've got a long-term view. Then you have many new startups, typically private equity backed, with a short-term view. And last you have the majors, who have a long-term view, but their decision making and value drivers are very different than ours and the startups.

I think the way it's played out is that all this private equity money presents a challenge. They're making decisions in their own best interest, and I don't fault them for that. But that complicates our life in terms of trying to make the best long-term decisions for our shareholders.

Our industry is very fragmented, and that results in tremendous inefficiency and waste in how we develop this resource. We do not work together as an industry. And how all the individual decisions play out makes it very unpredictable.

I'm hopeful that the industry will consolidate, and companies can take longer-term views, and we can match our growth rates with the market and dampen volatility. Consolidation would also greatly improve the ability to swap acreage, allowing for larger contiguous positions which can really create efficiencies, as well as reduce the impacts our operations have on the local communities.

**McKinsey:** *Appalachia was previously an importer of gas. Many pipelines pass through here from the Gulf Coast. Now the game has changed rapidly; the region is quite long and will be for a long time. How do you think about access to market?*

**Steve Schlotterbeck:** Access to market will be one most critical factors over the next decade. In the short term, there is a lack of takeaway capacity and pipeline projects are all slowing down. Some are at risk of not happening. We're very focused on that.

One advantage we have is that we can control some of our own destiny. With our large, integrated midstream business, we can help drive the needed infrastructure buildout that will allow us to realize the full potential of the Marcellus. Specifically, we have the proposed Mountain Valley Pipeline at 2 billion cubic feet per day, which is currently in the FERC permitting process; and we recently had another project come online, the Ohio Valley Connector, which has helped.

How fast capacity comes online versus how much growth happens in the Northeast is the question, and it is hard to determine exactly how those things will balance. But I think trying to manage the optimum growth rates with capacity additions is going to be a real challenge for the industry.

**McKinsey:** *What role does the public play in the pipeline scenarios?*

**Steve Schlotterbeck:** Our industry has grown very rapidly in this region. When we first started, we were a bit under the radar. But as there was more recognition, and more press, and then some fear mongering, it got significantly more difficult for us. We have made a lot of progress recently, but there are still challenges.

Our industry has attracted some adversaries. I think it's a small number of people adamantly opposed to what we do for philosophical reasons. They can be difficult to reason with, and they're continually searching for ways to impede our business.

They have tried many tactics. Over time, I think the public will recognize the benefits that have come from the development of the shales. Right now, however, the focus of industry

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adversaries is on the pipelines. And, unfortunately, they seem to be getting some traction. A long list of pipelines has been affected by groups that want to stop them. That's the current challenge. We need a clear path, from start to finish, to get the gas to market, and there certainly are concerns in that area if the pipes can't get built. If there are significant delays, it will have a meaningful impact on what we can do.

**McKinsey:** *Final thoughts?*

**Steve Schlotterbeck:** There is a lot of attention paid to how technology has changed our business, and rightly so. But that means there's a tendency to forget about the importance of human capital in innovation. In our industries, new technologies or techniques don't remain secret for long. What differentiates many companies is how well their people embrace innovation and how well they can handle change. I think this is an area where EQT excels. We've made innovation part of our culture, and we have a great team of smart, innovative and motivated employees who will continue to be the foundation of EQT's success. □

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