

Natural Gas Advisory Committee Draft Meeting Minutes June 6, 2013

Meeting Facilitator: Chair Massoud Jourabchi. Participants list attached

Natural Gas Advisory Committee Chair Massoud Jourabchi called the meeting to order at 9:06 a.m. and thanked the participants for attending. He called for a round of introductions. Jourabchi went over the meeting agenda, noting there would be three presentations followed by a strawman proposal for the Seventh Power Plan.

Future of Industrial Gas Use in the Northwest

Ed Finklea, executive director of the Northwest Industrial Gas Users (NWIUGU), began with a description of his 38-member organization. NWIGU has been around since the 1980s and has members in Oregon, Washington, and Idaho, he said. NWIGU represents a diverse group of industrial users, including some of the largest paper mills in the region, and is active in regulatory matters, Finklea explained. He said concerns are growing about the future of industrial gas prices due to political, not supply, considerations. Finklea noted that national trends in gas use affect prices as much as regional trends and an “industrial renaissance” in the United States has ramifications for the Northwest.

Finklea presented a slide depicting industrial gas demand in the Pacific Northwest since 1994. Demand is down 20 percent since 2007, when it dropped due to the recession, he said. There was an energy price run-up before the recession and some think there is a correlation between the two, Finklea added.

He went on to explain other aspects of demand depicted on the graph, noting demand is down 40 percent since the mid-1990s. The energy crisis in 2000 to 2001 was “the first hit”; that’s when we lost the aluminum industry in the region, and we had a downturn in use that has never come back, Finklea stated. He pointed out that while some decrease is related to efficiency, a lot is “demand destruction.” A key question is what the region will do to see “we don’t go through this again,” Finklea stated.

It is expensive to run these industrial facilities and energy is a piece of the costs, he continued. Industry in the Pacific Northwest is using 240 million decatherms annually in processes such as paper, food processing, and specialty metals, Finklea said. But none of these industries is so healthy we could assume nothing would cause them a downturn; they could go away if the wrong things happen, he said.

And our industries are old, David Hawk pointed out. New plants have come on line elsewhere and that tends to push ours to operating on the cusp, he said. Our plants compete with those elsewhere in the country and the world, Finklea agreed.

So where is natural gas demand going? he continued. Finklea provided statistics on U.S. gas demand, noting that demand of 65 Bcf per day (Bcf/d) is being met with prices below \$4 per mmBtu. There were days in January when use was 130 Bcf/d, but the price stayed below \$4, he said. Looking into the future of demand, there are lots of projects that could push demand as much as 30 Bcf/d higher by 2030, depending on what goes on with LNG exports and electricity generation, as well as the amount of

industrial renaissance that occurs, Finklea said. More conservative estimates say use will be about 90 to 95 Bcf/d by 2025, he stated. There is a range of forecasts out there with regard to residential and commercial demand, some of which say demand will stay about where it is for the foreseeable future, Finklea said. But there are drivers of industrial demand, he added. There is a consensus that demand is headed for a 4 to 5 Bcf/d increase by 2018, Finklea said.

Hawk pointed that the 4.9 Bcf/d estimate is associated with a high load factor that is not seasonal and not temperature sensitive.

Finklea went on to describe areas of growth. BenteK identifies 298 industrial projects of various types, and the mid-range forecasts is for an additional 3 Bcf/d by 2018. It is a significant amount of gas; if this load comes on, it makes a big difference because it is 365 days a year, he added.

This type of development is good for the economy, Finklea stated. We hear there is a big income gap in this country, and industrial demand that creates family-wage jobs is the answer, he said. "This country needs those jobs," Finklea said.

He went on to cite statistics from the American Chemistry Council on the jobs forecast associated with industrial investment. There are potentially millions of jobs out there with an industrial renaissance, and the Northwest could take advantage and be part of that, Finklea said. Methanol plants have been announced in the Northwest at three sites, he said: Port Westward, Kalama, and Tacoma. "These would be game changers for the region's gas picture," Finklea said, adding that the facilities would provide great jobs. This region could attract this type of industrial investment, he said.

There was discussion about whether the methanol projects would come through in the end.

The money behind them is real, Dan Kirschner said, and if they can clear the permitting process, they will go; there is real money and the intent is to build. The demand is there for all three of the projects, but whether they can survive the road to permitting and construction is a good question, he added.

This represents a tremendous demand for natural gas and that could have big price impacts, David White said. There is also potential impact to infrastructure and supply, he said.

You need to build infrastructure to build the facilities, and the gas supply is there, Randy Friedman commented. There is real money behind the projects, but the question is whether there is enough to get through permitting, he said. China wants to displace oil and coal, he said, and there is little chance China would not be able to absorb the supply from all of the projects, Friedman said.

There is competition out there for getting a plant on line first, but the market for the product is the key thing, Terry Morlan said. A small percent of the plants get built, he added. Methanol is not a great energy product, Morlan pointed out. It's also troubling to use our energy to ship the methanol to China, he said. It may not be a good prospect, Morlan added.

We live in a global market, Finklea responded. You make methanol out of gas and ship it to China, and they make it into plastic for products that sell at the Apple store, he stated. From the industrial perspective, our question is whether the Pacific Northwest is consciously deciding not to participate in the global economy – and instead "just sell each other lunch," Finklea said. Do we participate or let all of this industry go to Texas and Louisiana? he asked.

In Tacoma, these project developers are not just talking to energy professionals, they have had meetings with the community, Bill Dickens said. The developers get on the agenda at community meetings and share their perspective, he said. They have developed a sophisticated outreach to talk about the benefits these projects could have for cities and counties, Dickens said. They aren't just focusing on Tacoma Power or Puget Sound Energy, but the whole community, he said.

Jourabchi asked how much electricity the plants use. Not a huge amount, Friedman responded. He suggested the projects have an advantage from the greenhouse gas angle. It takes carbon dioxide to make methanol, he said. When you ship methanol to China, where they make it into plastic, it reduces the emissions that would otherwise come from breaking apart coal to make it, Friedman said. "As a result, iphones will have fewer greenhouse gases associated with them," he added.

Finklea described the status of the proposed Jordan Cove operation at the Port of Coos Bay. He said he had heard first hand there is grass roots support for the project so "it could get political legs."

NWIGU is very concerned about the talk of a carbon tax in Washington and Oregon, Finklea said. Such a tax would have an anti-competitive effect on local business, he said, noting that NWIGU has calculated a \$211 million increase for natural gas consumers in Washington and a \$59 million increase for electricity generators in that state. In Oregon, the effect would be a \$137.2 million price increase to natural gas consumers and a \$138.3 million increase for electricity generators. This shows how much electricity we generate with gas in Oregon, Finklea pointed out. We will be vocal against the notion that Oregon and Washington, with the smallest carbon footprint in the world, should go out and "ruin their economy" before others ruin theirs, he added.

The carbon tax could lead to the third big economic downturn "if this region does this to itself," Finklea said. This would be truly self-imposed, he said.

Morlan asked if a national tax would be a better route. It has to be done at the national level or it is just carbon shifting, Finklea responded. "We'll make paper in Georgia instead of Camas," he added. It could shift production to a region where there is a lot of coal burned, Finklea said.

And the money raised with a carbon tax would not go to reducing emissions, Hawk said. Some would go to help the low-income consumers pay the higher bills, he said, adding that the revenue from a tax should go for its intended purpose.

California has a carbon tax, Fred Huette pointed out. It's important to consider the real impact of a localized carbon price, he said. There is a general feeling that we need a global price, but California and Quebec are doing it now, he said. What's important is what will happen in this region, Huette said.

"The fact that California can do this and not kill Google doesn't mean it won't kill Georgia Pacific," Finklea responded.

Second Presentation: Range of Natural Gas Production and Costs

Fred Huette, Northwest Energy Coalition, followed with a presentation entitled "State of Play: Natural Gas Past, Present and Future." He described the Northwest Energy Coalition, where he is an analyst,

and said he would lay out his perspective on gas issues. Natural gas “is pivotal” in the Council’s Seventh Power Plan, Huette added. This presentation looks at the demand and supply picture and at the consequence of gas prices, he said.

We are in a global context with natural gas, and global aspects are a big factor, Huette said. He noted a recent deal between Russia and China and other big factors that are affecting the global picture. We are very small players in the Northwest, Huette said.

The old narrative with natural gas was that of flat supply and variable pricing, he said. But the narrative has been inverted and the new narrative is of growing supply and flat prices, according to Huette. The conventional wisdom is that shale gas production will continue to grow and prices will remain low, he said. The narrative is that we are in the midst of an endless supply with flat costs and that we won’t get to \$6 gas until 2030, Huette said. At the same time, conventional gas production is declining, he said.

Hawk said the reason for the decline is that people are not exploring for gas in the traditional way; there is more risk involved. Friedman said shale is now considered the conventional production. There is plenty of conventional supply in the Gulf of Mexico, but producers are declining to spend money for leases there when they can get sure leases elsewhere, he said.

Huette said people believe there is a supply of natural gas that will last the country 100 years. But reserves and actual production will be a lot less than that, he said.

Rick Harper said he did not agree with the premise on Huette’s slide that production costs would increase. Hawk said he’s seen evidence that “the resource is there” and the supply number has grown every year.

Huette presented a table that concludes the United States has 22 years of natural gas supply and the myth of the 100 year supply comes from confusing resources with reserves. Are you saying we will run out of natural gas? Friedman asked. What we’re saying is that with the current pricing, the supply is just over 20 years, Huette responded.

Why 22 years? Friedman asked. Huette said he had taken the data and converted it to estimate what is commercially viable. My point is that the way the statements are framed is very important, he said. People like me have trouble sorting out all of the statements, Huette said. I don’t believe there is a 100-year supply, he stated.

Huette went over a list of factors that contribute to gas price variability. We see more upside drivers than downside drivers, he pointed out. And he said there are market price limits.

Pipelines are a big part of the price, Hawk said. The Northwest has the most transparent gas operations of anywhere else, he said.

We’re concerned about the opposition to building pipelines, Finklea said. One of our advantages in the Northwest is that we have a good pipeline system, but by 2020 we could have problems, he said. Finklea pointed out that in the Northeast, “they have NIMBYed” additions to pipelines.

The Ruby Pipeline got built really fast, Huette said, but in the East, it is very different. My point is, I don’t think gas pipelines are a big driver here, he said. Production cost and policy are the big drivers, he said.

Huette went on to describe how shale gas production is different from conventional methods. The general public doesn't understand that fracking is a combination of things, he said.

Fracking is a hydro fracturing process and we've been using it for over 60 years, Rick Harper said. It isn't new, but when fracking is combined with other techniques, it provides greater productivity, he said. It would be helpful if people wouldn't use fracking as a term that covers "soup to nuts," Kirschner stated. You can't shorthand the process to a single term, he said, urging Huette to avoid using the term fracking to refer to all of shale gas production.

Huette went on to describe the decline rates and shorter lifetimes for shale gas wells, with no effective means of restimulation. Hawk referred to a field southeast of Cheyenne, Wyoming in which producers have gone back to continue fracking. Huette said a pivotal point is that shale plays cannot produce uniformly across the play. He described the situation in the Fayetteville shale. With the Barnett shale, most of the gas comes from the first two or three tiers, the later tiers don't produce as much, Huette said. For the higher tiers, there is higher cost but not much more gas, he said. Shale wells decline fast, Huette stated.

There was controversy between the experts and contrarians about the declines, but new studies show that (Arthur) Berman was most correct about the declines, he continued. Berman is not held in high regard by the industry, Hawk commented.

Huette pointed out there have been a lot of write-offs in the shale gas industry, and that because the shale plays are not uniform, production costs will go up. There is a lot of shale play in North America, but not all of it matters, he said. The top three plays have 66 percent of the total gas and the top six have 88 percent, Huette reported. Only six of the plays matter, he added.

Huette used a couple of graphs to describe the "state of play" with seven of the shale plays in the United States. Of the big six, five are in decline, he said. Huette pointed out that the overall production distribution across the plays is quite different with several in decline. The conventional production is also falling, he said. Huette presented graphs of production in British Columbia and elsewhere in Canada, pointing out that production is not going up in Canada. B.C. and Alberta make up the Canadian gas industry and production is shrinking pretty quickly, down 30 percent from the peak in 2002, he said.

Hawk said not as much Canadian gas is being shipped East because of the Marcellus shale gas field.

The true cost of gas, which is about \$6, as opposed to what we are seeing in the market is driven by "the shale treadmill," Huette said. There is a general understanding that the price of production is higher than the market, but how do you keep that going long term? he asked. Huette listed a number of reasons for why this has happened and the consequences. One reason is that "the market is working (slowly)" according to the list he presented.

You talked about the write-offs and you imply the gas isn't there, Friedman said. "The big players wanted big reserves" but based on the modeling, they weren't there, Huette responded.

He said the polar vortex in January 2014 marked the return of normal volatility to gas prices. "I'm suggesting the price is likely to go up," Huette said. The drivers are in that direction; the oversupply era

is ending and there is trouble ahead, he stated. If you have tighter supply, growing demand and natural gas exports, prices are not going to be \$4 or \$4.50 per mmBtu, Huette stated.

Hawk pointed out that there is plenty of gas in storage and there is plenty of deliverability. We've overfilled storage, he said.

The data is out there, Huette stated. We can see what is happening, he said.

Jourabchi said the Council is less concerned about exact prices and has more interest in the range of prices. It is good to have these discussion, he told the committee members.

Third Presentation: Impact of Regulatory Costs

Ken Zimmerman opened his presentation by explaining that the people he works with are most concerned about how fracking will affect them. He noted that he did not include the dollar cost of additional regulation in the figures he would present. But to get a reasonable impact on the cost, a good estimate would be an 8 to 14 percent increase, Zimmerman said.

He proceeded through a series of graphs depicting "what shale gas has done for us" and the magnitude of the impact. It has increased gas production, lowered prices, and helped reduce CO₂ emissions, Zimmerman said. But it has also led to new concerns, he said. Finklea pointed out that if Zimmerman's table illustrating the reduction in CO₂ emissions went out beyond 2009, the reductions would be even greater. The 2012 emissions were at 2002 levels, he stated. CO₂ emissions are going down, but methane emissions are going up, Zimmerman responded. By how much, we don't know, he added.

Zimmerman went through a list of concerns associated with shale gas production, ranging from the chemicals injected and earthquakes to impeding the move from fossil fuels to renewable energy. He indicated these are concerns for which people could seek regulation. One of the biggest issues is air quality, Zimmerman said. People are also concerned about industrial development in areas where it has never been, he said. The amount of water used is another issue, Zimmerman said, adding that the biggest issue is storing the water that comes back up from the drilling process.

Friedman said statistics show that the water use in a drilling operation is about the same as what is used for watering a golf course. But I've heard that the fracturing water isn't recovered so the process is consuming water rather than seeing it return, he said.

I still hear that issue, Zimmerman responded. People want to make sure the water sources remain viable, he said. They think hydraulic fracturing pollutes water so it is no longer viable, and they are concerned about taking water out of the cycle, Zimmerman added. The other water-related issue is that others depend on this water, too, he explained. They ask, why the shale gas industry is more important than other uses, Zimmerman said. They ask why the industry shouldn't reduce the amount of water used for fracturing in the same way others have to reduce their consumption, he reported. They haven't heard promising answers from the industry; the responses sound like the industry is hiding something or being arrogant, Zimmerman said.

Right now, things are getting worse in terms of the communication, he continued. In the meetings I've attended lately, people are talking past each other and there is no communication going on,

Zimmerman said, adding that the producers are learning things. Quality of life is a big issue in these rural areas, he said. Even with studies that show air and water quality isn't being made worse, they are convinced that is not the case, Zimmerman added.

Who is feeding people these half-truths or lies? Hawk asked. Who is putting people on the defensive? he asked.

How do people reach those conclusions? Zimmerman responded. The main environmental groups are beginning to get involved in these issues, he said. They weren't that directly involved initially, Zimmerman said. In the beginning, producers' relationships with local folks were good; it didn't start out being bad, he said. But within the industry, people generally admit that they were way too unconcerned about their relationship with local communities, and it later dawned on them that they were being misunderstood and didn't understand what was going on at the local level, Zimmerman stated.

He went on to explain that there are concerns about the expansion of natural gas exports. There is now more gas to export and the issue has arisen as to whether the United States should export, Zimmerman said. The argument in favor is that it is good for the balance of payments and makes us a global player in the industry, he said. But there is an opposing argument that by exporting natural gas, we are exporting "a fossil-fuel way of life" that is dying, Zimmerman said. The argument is that it is a bad way of life that we need to get rid of, and by exporting, we are prolonging it and making the world worse off, he explained.

Zimmerman referred to a case in Ohio, where a ban on fracking was rejected. This is the settlement that is emerging, he said. No one believes they can stop fracking, but they want lots of assurances around it, including oversight and regulation to make sure it is safe, Zimmerman said. States will start to regulate in most places where fracking is feasible, he indicated, adding that in some cases regulation will be strong. People don't want to do away with fracking, but they want to have rules and want to make sure that those who break the rules are punished, Zimmerman said.

Discussion

Jourabchi presented slides depicting CO₂ and methane levels in the world. This shows that the trend is upward, he said. Huette said there is a world-class expert on the subject at Portland State University. The general trend is that methane levels are going upward, he added.

Jourabchi's next slide showed Black and Veatch's estimate of the potential impact of environmental concerns on shale gas prices, along with results from a poll of the Natural Gas Advisory Committee asking about the potential regulatory cost adder. The poll results range from \$.28 to \$.67 per mmBtu, he said. There is not that much difference between the poll and the estimates from Black and Veatch, Jourabchi noted.

He posed the following questions to the committee: Should we add the regulatory costs to the natural gas forecast? Or will the regulatory cost be absorbed by the industry and become part of the fundamental cost of gas? Should we consider the regulatory cost as already included in the high price range? Jourabchi asked.

What impact would adding \$.75 to the natural gas baseline cost have on the Council's work? Kirschner. It might make energy efficiency look more economic, he suggested. It might or might not shift the power mix, Kirschner said. What are the implications of a \$.50 to \$.75 added cost? he asked.

It won't be embedded in the price under any circumstances, Hawk stated. It affects whether a producer is likely to continue drilling in marginal fields, he said. The impact comes back to the industry, but not right away, Hawk said, and it could be in the form of reduced availability.

We're about seven years into a technological revolution, Finklea said. If the computer revolution is a model, we could see the price decrease because of technological innovations, he said, adding that might offset the costs that come in the form of regulation. Technology could counteract the impact, Finklea suggested.

Kirschner asked about the implications of increased regulatory costs. Jourabchi said there would be a higher wholesale price of electricity. I don't know the impact on other resources, he said, but if gas prices go up, the amount of cost-effective conservation would go up.

There were questions and discussion about price elasticity and how to account for it. Regulations are at the state level, so it is difficult to figure that out, Zimmerman commented.

Strawman Proposal for the Seventh Power Plan

Jourabchi went to the next agenda item, a strawman proposal for the Seventh Plan. He began with a comparison of 2013 actual natural gas prices at Henry Hub compared with the forecast. The actual price was \$3.60 per mmBtu and the forecast range was \$3.70 at the low end to \$4.10 at the high end, he explained. Jourabchi presented results of the poll of committee members about 2015 to 2035 prices. The estimates range from \$3.10 at the low end to \$8.40 at the high end in 2015 and \$4.10 to \$14.20 in 2035. There is a wide range of opinion, he said, asking whether the forecast is capturing enough range.

I'm concerned if someone thinks the price would be over \$6, Hawk said. Are we overlooking something? he asked, adding that it was important to have a discussion about the differences.. I'd like to hear that too; I'm interested to hear what would push prices into that range, Lynn Dahlberg said. Finklea pointed out that some around the table buy gas – you can find and ask people who will buy gas in 2015. Do they look at future prices? he asked.

Some sources say we are close to 70 Bcf consumption per day, Hawk said. If prices go up, we'll see a big drilling boom, and if prices go down, people will back down drilling and prices go up again, he said, adding that shale gas is like storage.

Morlan commented that given the volatility in the market, if there is an extremely cold winter and a hurricane season that takes out production in the Gulf, you could see high prices, at least temporarily, he said. If you take out the whole Gulf Coast, you can make it up in storage, Hawk commented.

Kirschner pointed out that production in the Gulf has gone down. About six percent of the gas comes out of the Gulf now, but in 2005 it was 20 percent, he said.

It takes a lot to change the price at Henry Hub much, Huette commented. I think the price is more like \$4.50 per mmBtu in the near term; beyond five years, it is hard to predict. There were comments about the price forecast and the impact of the storage situation on prices.

So the average price forecast is pretty reasonable, Jourabchi concluded.

He went on to comparisons for the Henry Hub long-term prices. The graphs show that by 2035 we get to \$7 per mmBtu, which is based on the committee member poll and other sources, Jourabchi said, noting that there was not a lot of changes from last year.

Most companies rely on four or five producers so it doesn't surprise me that they look the same in the out years, David White commented. Beyond 2020, I think the price will be higher, Huette said. In my assessment, we'll see the basins peaking in most cases, and in the long run, gas production will flatten out or decline into the mid-2020s, he said. We cannot underestimate the demand side in setting the price; the price will be sensitive to supply and demand, Huette said.

The price has to come up in some basins for the financials to mesh and motivate someone to drill a \$6 million well, Hawk said. I think there is plenty of gas we can access, but it has to be at a higher price, he stated. Conservation and efficiency and the utilization of gas for electricity generation can help with the price, Hawk said.

I'm concerned about the high end of the range because it has an impact on the Power Plan, Huette said.

Jourabchi presented graphs of the past actuals and projections for the low, medium and high future price at Henry Hub. For the low range, we have proposed staying within the same trajectory and ending up with a little higher price, he explained. Jourabchi pointed out where the cases differ from the poll results and the shale gas reference case.

If we are at 70 Bcf of consumption and you add eight for export, four for industrials and eight for electric generation, we are at 90 Bcf, Hawk pointed out. Prices will go up, he said, adding that there are not nearly the number of oil and gas companies as there were in the past. Even the seven sisters became the three sisters, Hawk noted. We have fewer companies and lots of investors who own production and drill as they need to, he said. Those factors tend to push prices up, Hawk said.

Huette said the Council should use a high price of \$8 for 2020 and \$10-\$12 beyond 2030 in modeling for the Power Plan. My suggestion is \$8 in 2020 at the high end of the range and \$10-\$12 by 2030, he reiterated.

Dickens commented on the wholesale power price. I use a vendor for gas intelligence and based on their latest numbers for Henry Hub, I don't see anything that looks like the high range, he said. It's coming in about \$2 under that for 2035, Dickens said, adding that he is uncomfortable and reluctant to go with the \$9 price. I haven't heard why the price would be that high; if you go with what the gas vendors project, it's not realistic to go that high, he stated. I think it's about \$7, Dickens added.

Finklea pointed out that a representative from Charles River was concerned about over-export. In his analysis, even with a 12 to 20 Bcf increase, the price is still in the \$7 range, he said.

The international market is much higher than the market here, and that is the upward pull, Huette said.

Friedman pointed out that research shows that the less people know about something, the more narrow their estimates. And we are overly influenced by what's happened most recently, he said. We look way too narrow in our range, Friedman said, adding that gas has been at \$9 per mmBtu in the past. We can't anticipate all of the changes that could occur, he said. I think prices can go up more than they will go down; the low end can go lower and the high end can go higher, Friedman stated.

With anything past 2020, talking about policy is a waste of time, White commented.

There was discussion about the range of possibilities, including "black swan events" that change things in unexpected ways and the value of options when one doesn't know the future.

Jourabchi showed the proposed gas prices for Henry Hub. He asked whether the range is adequate. Huette and Friedman said the prices could be higher for the high case. Morlan said the low case should go lower. You need wider jaws, they said. Rick Harper said he agreed.

Jourabchi went on to list issues that impact the forecast of oil prices, including a ban on the export of crude oil. The issues with liquids is complicated, Huette said. If oil exports are controlled, the prices for oil and gas would go up, he said. But the requests for liquid export facilities are expanding, Huette said.

There are already liquid exports; it's already happening, Rick Harper said.

With regard to the mismatch between refining capability and tight oil supplies, Huette pointed out that the U.S. refinery fleet is very old. Wouldn't you expect more refineries to be built? he asked.

Jourabchi showed projections for oil and gas production declines in the Bakken shale. He went on to slides that presented a range of proposed refiners acquisition costs (RAC). Hawk said the medium case forecast for the RAC is unrealistic; it's too low. The world is increasing its consumption of liquid hydrocarbons, he said. It is a global issue, and we are currently producing 90 million barrels and using 87 million, Hawk said.

Market and political factors are important, Huette stated. The demand side will drive these numbers beyond 2020, he said, and there will be an effect from carbon policy worldwide. Decreased demand will be a factor, Huette said. We won't get above 90 million barrels a day of consumption, he predicted. We're pretty close to maximum capacity globally, Huette added.

Some people believe we will get to 115 million barrels and plateau, Hawk said. Then consumption will start to decline, he said.

Jourabchi asked if the proposed RAC price spread looks right. The demand side is key, Morlan responded. If gas price uncouples from oil, there is a potential for easing of oil prices, he said. To the extent there is "a war premium" in these prices, there is a chance for easing of prices in the short term, Friedman said.

Jourabchi went on to slides showing the trends in Powder River Basin coal prices. He asked the committee's view on the price impact of the new EPA Clean Air Act regulations. As part of the analysis of

the regulations, one consultant's report said coal prices would be 15 to 16 percent lower, Jourabchi said. How would that affect natural gas prices? he asked.

For coal plants that are not fully depreciated, ratepayers will pay, Hawk said. Then when you have new plants, consumers pay for that, too, he said. But the unamortized plants must be paid for, Hawk said.

It makes sense to me that if federal policy destroys the demand for coal, it brings down the price of coal, Finklea said.

Jourabchi pointed out that the productivity of coal has gone down significantly. This is a substantial change from what has been the case historically, Morlan commented.

Jourabchi asked for the committee's recommendations on coal prices. Hawk noted that 40 percent of the nation's electricity is generated with coal. By 2030, will that all be gone? he asked. If the price of gas goes above \$7, the industry will look at coal, Hawk said. And we don't know what will happen with CO₂ capture, Morlan said.

Hawk suggested increasing the high end of the range to \$2.50.

Next Steps in Forecasting

Jourabchi went over information about how the natural gas price forecast is used in the Council's power planning. He showed a graph of the patterns in the commodity price index that included metals, food products, and energy prices, and noted that the patterns are similar. Hawk suggested the similarity could be due to energy prices.

Jourabchi explained the list of analytical steps the Council uses in forecasting wholesale electricity prices, which include estimating the monthly shape factors and the monthly prices for fuel. He went on to a bar chart of the monthly shape of natural gas prices at Henry Hub, noting that the spring months are higher than November.

Do you focus on wholesale prices? Finklea asked. Jourabchi said the analysis uses both wholesale and retail prices. Finklea said there will be more regulation in the future on the safety side for residential gas. There will be price impacts on the retail level from safety regulations, he said, adding that this is an issue the industry sees on the horizon.

Jourabchi presented the monthly shape of natural gas prices at various hubs. He asked if there are other issues that should be incorporated into the forecast.

Rick Harper asked how catastrophic events are incorporated. Jourabchi said a lot of variables come into play in the Regional Portfolio Model. Friedman said in addition to pipeline replacement costs, there are costs that will be incurred as a result of pipeline improvements and expansions.

Steve Simmons reported that that Council's Generating Resource Advisory Committee has considered some of the pipeline issues.

There was some discussion about the impact of exports. White said there are dramatic shifts going on with pipeline flows. That will cause regional disruptions to the historical pricing, he said.

Will those have a large effect on the Stanfield price? Morlan asked. White said it would. It could be very disruptive, Friedman agreed.

There is a very strong tendency in the gas market is to maintain North American parity, Huette said. I don't see a lot of chance for big regional variability, he said. There is a big change in pipeline flows, White responded.

If there is new demand for industrial gas, there will have to be expansion in the pipeline and the costs of that will have to be absorbed somewhere, Steve Harper said. New business will see the higher price, he added. There are pipeline escalations for any new generating resource, Simmons agreed.

There was discussion about pipeline capacity and adequacy, including how FERC actions could affect price.

We hope to capture this discussion into our forecast for the Seventh Power Plan, Jourabchi said. We are redeveloping the Regional Portfolio Model and the timeline calls for that to be done in February 2015, he said. We plan to have a final plan by the end of 2015, Jourabchi concluded.

Morlan noted that a draft Seventh Plan will be released for public comment ahead of the final.

The meeting adjourned at 12:50 p.m.

Attendance: Natural Gas Advisory Committee June 6, 2014

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