



#### **4<sup>th</sup> External TAG Meeting**

**Date & time:** 10/19/2017, 09:00 AM – 11:30 AM

**Location:** OPUC Offices in Salem, OR

**Presenters:** Mark Sellers-Vaughn, Brian Robertson, Devin McGreal, Ashton Davis & Ed Finklea

**In attendance:** Mark Sellers-Vaughn, Brian Robertson, Devin McGreal, Ashton Davis, Bruce Folsom, Deborah Glosser – OPUC, Lisa Gorsuch – OPUC, Paul Rosson – OPUC, JP Batmale – OPUC, Ed Finklea – NWIGU, Matthew Doyle - NWN, Teresa Hagins - NWP

**Called in:** Garret Senger, Jennifer Gross, Jeremy Ogden, Tom Pardee - AVA, Carolyn Stone

**Minutes by:** Carolyn P Stone

Garret welcomed everyone and stated he thought it would be a great session and he appreciated the dedication of the IRP Team and looking forward to input.

*Presentation #1 – Brian Robertson*

#### **IRP Action Plan Update**

- Brian stated that there are no areas highlighted in yellow meaning there are NO updates from Tag #3 to Tag #4, however, there will be some changes to the narrative.

*Presentation #2 – Ed Finklea*

#### **Consumer and Environmental Benefits of Shale Revolution**

- Ed started by stating that the purpose of his presentation is to show what Shale means to consumers
- He said that his career has been primarily working with consumers!
- The membership of Northwest Industrial Gas Users includes 35 companies, and is diverse. Some companies have seasonal loads while others use 365 day loads and the group includes everyone else in between. The organization was formed around the region served by NWP and GTN to the side. They are active at the PUC level.
- Ed answers the question - how much consumers benefit from the Shale Revolution, in other words, what's really happened? He said that Shale is a big deal for every consumer!

*Slide #7 – Oil and Natural Gas Price History 1983 – 2016*

- Oil and Natural gas, Ed said, used to be tied at the burner tip. Industrial customers used to switch between oil and gas so they followed each other.

- From graph, you see that back in 2005 oil and gas prices were linked!
- Ed stated that per the slide you can see a gas price “run-up” from 1997-1999 and there were sustained “shorts”. 2005 was also an active hurricane season!
- \$ at that time was being invested to import NG
- Lisa Gorsuch mentioned that back in 2005, they were modeling getting cut-off from Canadian gas!
- By 2009 Ed says, gas and oil prices were “delinked”. Gas was about \$8 per mmbtu – now it is down to \$3.00.

Slide #8 – US Natural Gas Production and Consumption in Billions of Cubic feet 1980 – 2016

- Ed stated that the majority of NG by 2040 will come from Shale. Some people think we are there already!
- Ed reminded us that there is opposition to hydraulic fracking, but the benefits to consumers are significant!

Slide #10 & #11 – YOKO & Sean sign

- Ed posits if the price stayed at \$8.00 from the early 2000's.... Lisa said it was predicted to jump to \$14 in 2008. Ed said it could have been much higher!

Slide #13 – No Fracking’s Impact on Oregon Consumers

- In 2016 consumers burned 239m Dth in Oregon (not via electric generation)
- Consumers would pay 1.1 billion more for NG in 2016 with no fracking!
- But there is more to it than saving \$, said Ed.

Slide #14 – Electric Generation & Carbon Emissions

- Emissions are part of the story – and it is a big deal!
- Why this country has “bragging rights” about reducing carbon emissions more than ANY other country....
  - Shale
  - Efficiency
  - Rapidly expanding renewables
- USA using less when prices are down, we are the region leader in efficiency!

**Question:** Mark asked why this is not advertised?

**Answer:** Ed stated that we tend to play “defense”! We need to be activists, he stated, and not be afraid to tell people what are doing and be vocal about it!

**Question:** Someone else asked if the Permian Basin is at “peak fracking” in some places?

**Answer:** Ed stated that that has not happened so far. He said it’s like the old-style drilling and then oil prices increase!

- Someone else said that the challenge with horizontal fracking is that it causes secondary damages, and rare effects.

**Question:** I used to work at Energy Trust. What is the appetite for transportation customers to be on Energy Trust?

**Answer:** Ed stated that he will be talking about this topic later this afternoon. There is a Volunteering Program. Most of his members never participate in demand side programs. He wonders if there could be a program as a transporter. Can I sign up for

some type of Demand Side management without becoming a “sales customer” ...i.e. without forcing it down our throats? Some companies would be willing. But if **Cap & Trade** is enacted, then all bets are off!

- Ed went on to say that one of his members’ pulp shortage on the West Coast put them out of business! Also, an aluminum smelter is down because aluminum is now being imported from China. Those companies used a lot of energy! There is a thin margin in many of these businesses, 92% of their cash goes out the door!

*Presentation #3* – Ashton Davis, Devin McGreal & Brian Robertson  
**Sendout Optimization Modeling**

Slide #16 – Sendout Model

- Ashton started by stating that the Sendout Model is used for resource optimization. He said it is complex and powerful!
- It minimizes costs in a way not possible in the real world, so this tool is a guide, not a decision maker!

Slide #19 – Modeling Challenges

- Supply needs to get gas to the Citygate.
- Sendout has perfect knowledge!

Slide #20 – Supply Resource Optimization Process

**Question:** Mark stated to Tom Pardee from Avista that CNGC discusses their candidate portfolio to get the total system costs and compare 25% with other industry practices, what does AVA do?

**Answer:** Tom said that they use scenarios to see what happens to an expected case. They have a new method as to how they look at Portfolios, based on normal distributions. Tom said yours is in line with other industrial methodologies.

Slide #21 – Supply Resource Optimization Process (Cont’d), steps 5 thru 8

- Later there will be a slide including all sensitivities!

Slide #22 & #23– Base Case Sendout Inputs/Supply

- Devin clarified **scenarios** vs **sensitivities**.
- Devin stated we get our supply from AECO, Sumas, Kingsgate & OPAL

Slide #24 – CNG Supply Chart

- Shows North to South using NWP
- South to North with all pipelines
- North to South using GTN

Slide #25 – Supply Base and Fixed

- Sendout will choose the supply needed to cover the load!

Slide #28 – Winter Base Supply

- The “winter” covers November thru March
- This is the “heating season”, additional baseline supply for winter months
- We can let Sendout choose the optimum MDQ (Max Daily Quantity).

- A penalty forces Sendout to take optimal additional winter gas.

Slide #29 – Winter Base Supply (Cont'd)

- Graph shows base during winter months only!

Slide #30 – Day Supply (Winter)

- November through April period.
- Winter day gas has MDQ cap but that is not an unlimited amount of gas at a cheaper price!
- Winter has a slightly higher premium.

Slide #31 – Winter Day Supply (Cont'd)

**Question:** Are you assuming you will always purchase on the daily market?

**Answer:** Day gas covers any demand along the yellow dotted curve of slide #31 at a reasonable rate for a period.

Slide #32 – Day Supply (Summer)

- This timeframe is April – November.
- Summer day supply has a slightly higher cost.

Slide #34 – Peak Supply

- Peak has a higher cost

Slide #36 – Storage

- Jackson Prairie (JP)
  - 4 storage contracts
  - Can withdraw 56K Dth per day
- Plymouth (Ply)
  - 2 storage contracts
  - Can withdraw 78K Dth per day
- Total withdrawal 134K Dth per day!

**Question:** During the summer peak days are you injecting?

**Answer:** More so in the heating season. Day supply is needed for high demand, non-heating season!

Slide #37 – Storage Example

- Our storage is not specifically tied to our system!

Slide #38 – Storage, Sendout example 2

- The target % is shown here
- Rates for storing/withdrawing storage and withdrawing/ injecting and withdrawing shown.

Slide #39 – Transportation

- NWP goes to a “zonal level” and can be constrained.
- GTN goes to the Citygate level only, no zones here.

Slide #40 – Transportation (Cont'd)

- Transport has an MDQ (maximum demand quantity), a D1 rate, a transportation rate and a fuel loss %.

#### Slide #41 – Transport Example

- NWP Pool South to NWP Pool (Dispersed to different zones & eventually Citygate)

#### Slide #43 – Delivery Rights vs Receipt Rights

- CNGC has more delivery rights than receipt rights
- This gives CNG flexibility!

#### Slide #44 – Example of delivery right flexibility

- Total of contracted cannot exceed 4K but we can drop 4K at any location!

#### Slide #47 = Transport Constraints Example

- Shows when constrained to daily max of 47,603

#### Slide #48 – Locations of Zones (NWP)

- For example, see zone “ME-OR” is the Pendleton area

#### Slide #51 – Zone 30 on Peak Day for Transport #135558

- It is the same price, so we could send it to 30-W, rather than 30-S!

#### Slide #52 – Transport Contract #135558 on Peak Day

- Example of this contract fully utilized!

#### Slide #54 – Demand Behind the Gate,

- Customer billing system doesn't have daily meter reads for CORE customers. Brian said this makes analysis difficult!
- This year we added citygate & zonal levels!

#### Slide #55 – Demand

- Demand is forecasted at citygate level by rate schedule Brian stated.
- He said for NWP demand is associated with zone and for GTN Citygate demand is associated with its interconnect.
- The inputs are forecast type, projected customers, regression coefficients & 2016 demand for the month with a growth factor.

#### Slide #57 – Demand Example 2

- Sendout inputs - usage factors
- Customer demand 20 years out – weekend base!

#### Slide #58 – Weather

- Weather inputs – Monte Carlo (MC), Historical & Normal (average 30 year)

#### Slide #59 – Weather Ex. MC

- HDD mean & Std. Dev = based on actual 30 years historical
- Once run, Sendout finds the best match year & uses that profile!

#### Slide #60 - Long term price forecast

- Market pricing & Long-term price forecasts

- Henry Hub (HH) Nymex future prices.

Slide #61 – Long Range Price Forecast (Cont'd)

- Weighted to each source
- Using most recent trading period!

Slide #62 – Price Forecast Weights

- Symmetric mean absolute percentage error (SMAPE) – looks at all sources – how accurate have they been?

Slide #63 – Example of SMAPE Calculations by Source

- Sources are EIA past 2036
- Calculates error and how much of an error, 1 month, 2 months – 3 months out

Slide #64 – Example Weights Price Forecast for 2018

- Added up and divided by total to get % weights, then value these inputs!

Slide #66 – Probable Base Case Forecasted Prices by Basins

- Nymex, Sumas, Rockies & AECO used

**Question:** Do Sumas & AECO stay below Nymex?

**Answer:** YES

*Presentation #4 – Ashton Davis*

**Alternative Resources**

Slide #68 – Major Issues on the Horizon

- Cascade identifies deficiencies & provides solutions
- CNG talks with pipelines, storage facilities and new resource sources

Slide #71 – Incremental Transport – NWP

- West Central Washington, Oregon lateral & entering Southeast Oregon.

Slide #72 – Incremental Transport – S to N

- OPAL
- RUBY
- GTN South to North

Slide #73 – Incremental Transport – Bilateral

1. T-South Southern Crossing
2. Trails West
3. Pacific Connector – Oregon Coast

Slide #74 – Incremental Storage – N and E

- Ryckman Creek, Gill Ranch, Magnum, Mist, Clay Basin & Wild Goose

Slide #76 – Incremental Supplies

- OPAL & Renewable NG (biogas)

*Presentation #5* – Brian Robertson  
**Candidate Portfolios**

Slide #78 – Portfolio Summary

- This shows scenarios based on whether we use NWP, GTN or storage.

Slide #80 – All in Portfolio (PF)

- All evaluated resources!
- Pick up GTN 10,200 by Nov 2027
- Gas Supply already picked up additional GTN, starts Dec 1, 2017 –
  - Originally, Gas Supply tried to get start date of Nov 1, 2017 but due to maintenance, it was moved to December with the same termination date.
- Lookout 10 years!
- Incremental Foothills – 25K by Nov 2037
- Incremental I-5 expansion 17,469 Dth by 2027 increase to 41,035 Dth by Nov 2037
- Incremental NOVA – 36K Dth by Nov 2037

Slide #81 – Incremental GTN & Storage Portfolio

- Includes Incremental GTN and all regional storage facilities!

Slide #83 – Incremental NWP & Storage

- Incremental I-5 Expansion – 7.5K Dth by Nov 2027
- Spokane 14,794 Dth by 2037
- Ryckman Creek, 1000 Dth by Nov 2037

Slide #86 – Final Ranking – Mean & VaR

- Shows Mean and VaR & unserved demand

**Question:** I asked Brian what does “mdt” stand for?

**Answer:** Brian answered that it stands for “thousands of Dth’s”.

Slide #87 – All in Portfolio

- Optimum mix of all evaluated resources including NWP/GTN & Storage

*Presentation #6* – Devin McGreal  
**Scenarios & Sensitivities**

Slide #89 – Monte Carlo

- M/C scenarios – weather

Slide #90 – Monte Carlo – Weather

- We ran 200 simulations to stress test our expected portfolio.

Slide #91 & #92 – Low & High Growth scenarios

- Will we be able to serve our customers at a reasonable cost??

Slide #95 & 96 – Monte Carlo Weather – Normal Distribution

- Weather is normal, distribution follows rule!

Slide #98 – System Weighted Annual HDD’s by Draw

- Graphical representation, NOT data inclusive!

Slide #99 – Annual Demand by Draw

- What happens over the course of 200 demand draws!

Slide #101 – Total System Cost with High Growth

- All-in Portfolio!
- 3.7 million average cost, total system
- Min/Max increase
- \$3.904 average
- Doesn't exceed VaR limit!

Slide #103 – Monte Carlo - Nymex Price

- 20-year price forecast
- 200 price simulations
- Over variety of pricing environments
- Expected PF is still optimal!

Slide #104 – Sensitivities Analysis

- 9 scenarios, at High, Base & Low-price environment
- Carbon adder impacts
- Using base price, then adding \$10, \$20 or \$30...

**Question:** Was this compared with the base case price?

**Answer:** Yes!

Slide #105 – Nymex Monte Carlo Annual Price, including 10% carbon adder – 200 draws

- Price range here is from \$2 - \$14

Slide #109 – Scenario/Sensitivity Analysis (\$000)

- Overall conclusion?
- Most risky is \$30 per ton carbon adder

Slide #110 – Peak Day Supply Take vs Demand

- Shows how demand is served on Peak Day.
- Shows what amount from all sources is needed.
- Shows the impact of DSM.

Slide #113 - Why not use Monte Carlo AND Weather?

- We spoke with the vendor of Sendout and we can only do 1 at a time.
- If you want to get the true results using 2 variables, it works out to be 200 X 200 variables.
- 200 draws scenario takes 5 hours, so doing both MC and Weather is not time effective!

*Presentation #8 – Brian Robertson*

**2018 IRP Timeline**

Slide #114 – Timeline

- Comments are due on 12/5
- Presenting to management on 1/22



- Filing on 1/25 official filing in OR
- Deadline for IRP is 2/9/2017!

**Question:** It was asked if each Commission member wants a hard copy?

**Answer:** Lisa said there should be no less than 10 hard copies created.

Mark said feedback from stakeholders is appreciated!

#### **QUESTIONS??:**

**Question:** Even with a \$30 carbon adder in 2037 would there still be the same demand?

**Answer:** We would expect that demand for gas will still be there!

**Question:** Are you assuming we will want a Tag 5 or, is it too early to say?

**Answer:** Too early to say at this time.

**Question:** Do we want a public meeting or a phone conference?

**Answer:** Lisa answered that other stakeholders who want to become involved may want a public meeting. If we have multiple questions from other stakeholders, we may need a Tag 5. We love verbal communication but written documentation is super helpful to us!

Brian Robertson thanked everyone for attending