The West – Q & A

West Natural Gas and Power Fundamentals

5/15/2019
EnergyGPS – Who are we?

- Energy Product (Vendor) and Consulting Company
- Former Traders – Enron, UBS, Saracen Energy
- Fundamental Approach – Inflection Points, Supply/Demand
- Enjoy the energy puzzle
The West – Vince Lombardi
“What the h%$# is going on out here?

• Natural Gas
  • SoCal Gas
    • Storage
    • Pipeline Infrastructure
  • Enbridge Pipeline
  • Storage Facilities

• Power
  • Renewable Penetration
  • Flex Ramp
  • Seasonal Hydro
Natural Gas Volatility – SoCal Gas Issues
Storage/Infrastructure

- Line 3000 Work
- Line 4000 Work
- Line 235 Work

Legend:
- Compressor Station
- Storage Field
- Transmission Pipeline
- Foreign Pipeline
- Receipt Point

Map showing various storage and infrastructure locations.
Natural Gas Balancing Act – Enbridge Explosion

Megawatt vs. Molecule

Three Components – Storage, Rescom Demand and Power Burns

Who wins the battle?

Throughput from the top is crucial (T-South Maintenance)
Natural Gas Storage

End of Winter/Early April
- Continued cold in British Columbia and Pacific Northwest
- Pipeline constraints at T-South
- Rockies gas moved East to West
- Power Burns priced to not consume natural gas

Mid-April/May
- Mild Weather – less rescom demand across the board
- Solar penetration in California
- Rockies gas continued to move East to West
- Power Burns down due to higher hydro flows/wind
- Refill rate is steep
Power – Renewable Penetration

California Solar Monthly Component Breakdown

Solar Curtailments

Solar Capacity
- Utility Scale – 11.3 GW 2019 YTD vs. 9.894 GW end of 2017
- Standard Profile for Solar – Monthly and Daily
- Cloud Cover/Rain Disruptions (Weather)
- Behind the Meter Growth

Curtailments
- More to come (blue bars system, orange local)
- Weekday curtailments, indicates other Energy Imbalance Participants (EIM) have done what they can
- Less natural gas consumption for power
Power – Flex Ramp (Solar/Wind)

Flex Ramp
- Roof-top embedded in load profile
- Utility Scaled Solar sticking around for the foreseeable future
- Midday to Evening Ramp Expansion (Flex Ramp)
- Wind Volatility
### Power – California Hydro Water Year

#### Northern California Snow Water Content

#### California Hydro Breakdown
- Massive water year, tops 2017 record level in the North
- Monitoring the soil as any movement could cause disruptions
- Still plenty of snowpack in the Sierra Mountain
- Big delta from 2018

#### California Hydro Generation – Year on Year Comparison

#### Things to Watch
- Ability to Shape the hourly profile
- Storage levels and how much more can be produced during the evening ramp periods
- Impact to gas sector, more can go into the ground as the hydro year on year delta continues to play out
The West – Supply/Demand
How is this year different?
The West – Gary Coleman
“Whatcha talkin’ about Willis?”

- Natural Gas - Uncertainty
  - SoCal Citygate Summer
  - Enbridge Pipeline Maintenance
- Power – Increasing Implied Heat Rates
  - Scarcity Fear
  - Carbon Market
  - Load Shift (CCA/Direct Access)
  - Flex Ramp
  - Weather
  - Retirements/Outages
Natural Gas – SoCal Citygate
Summer Volatility

Natural Gas Price Action Changing
• SoCal Citygate and Sumas
• SoCal Border and Malin
Natural Gas – Sumas
Summer Maintenance
Power – Scarcity Fear
March 4th, 2019 – Perfect Storm

• Midc’s bilateral settle printed $890 for the heavy load average for flow date March 4th
• Reasons
  • Day prior, exports out of California on the Paci line saw congestion prices high enough to where money was not made
  • Nob S to N flows were de-rated at 0 MW
  • Not enough gas on Northwest Pipe for natural gas-fired generators to turn on (still cold)
  • Hydro flows were projected to be low
  • No wind generation on the grid
  • Units offline (coal plants)
  • Alberta real-time prices were very high due to some unplanned outages, high demand and no wind
  • T-South Compressor restrictions in play
Power – Carbon Market/Load Shift

• Carbon Market
  • Renewed interest in this market as we are now 6 years in
  • Bank will max out in a few years
  • Pace of carbon footprint, looking at a deficit over the next 5 to 10 years
    • Send a price signal to change behavior
    • Continued renewable penetration

• Load Shift (CCA/Direct Access)
  • Fixed Price Buyers
  • Hedging after last summer
  • Go to market for purchase (non-utility transaction)
Power – Flex Ramp Capacity

Flex Ramp Capacity
- Imports maxing out (low middle of the day/high evening ramp)
- Natural Gas-Fired Generation sitting at PMix
- Quick starts
- Wind Volatility
### Power – Weather

#### Weather Forecast
- Desert Southwest and California
- Pacific Northwest
- Las Vegas/LA Basin specific
- Forecast Trend for summer months, July 2018 one of hottest on record in California

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**Pacific CDD - Departure from Normals by Model Run Date**

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Power – Retirements/Additions

Retirements
• Coal Plants
  • Colstrip
  • Navajo
• California Plants
  • La Paloma

Additions
• Desert Southwest Gas-Fired Plants
• Renewables
The West As We Know It

“That is what I am talkin’ about Vince”

- Natural Gas
  - Timing of SoCal Maintenance
  - Aliso Canyon Storage Injections
  - Infrastructure in British Columbia

- Power – **Rubber meets the Road**
  - Futures
    - Scarcity Fear
    - Carbon Market
    - Load Shift(CCA/Direct Access)
    - Flex Ramp
    - Weather
    - Retirements/Outages

- Fundamental Supply/Demand
  - Grid is flat year on year – Summer 2019
  - Retirements/Water Year/Policy will impact the market in the coming years
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