

# OSIsoft for Oil & Gas Midstream

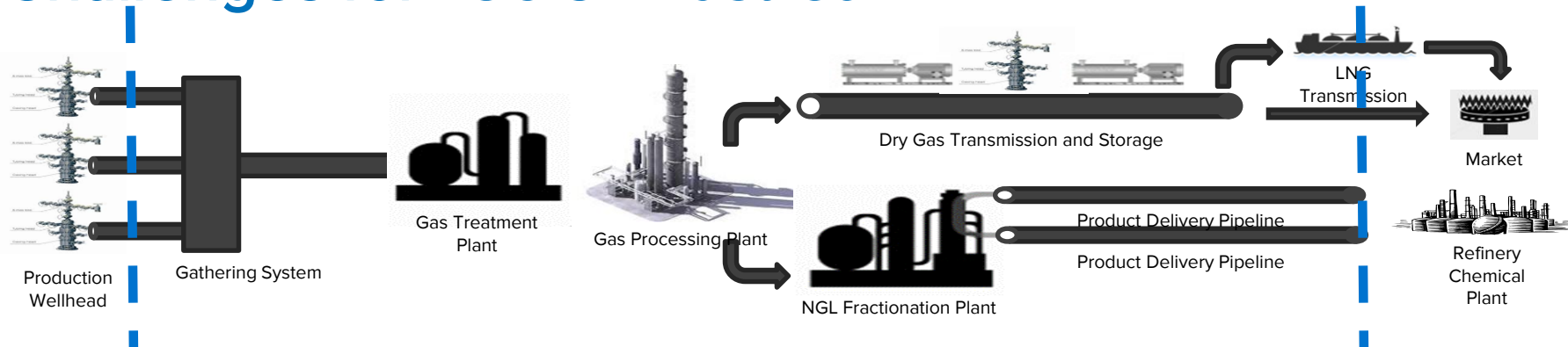
Kelly Strader, Enterprise Program Manager

November 2015



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# Challenges for O&G Midstream



## Gathering & Processing

- Leak Detection
- Meter management/accuracy
- Remote assets, telemetry issues

## NGL Fractionation

- Contamination extraction and disposal
- Plant balance
- Maintenance <sup>2</sup>

## Transmission & Storage

- Rotating equipment reliability <sup>3</sup>
- Pipeline Integrity
- Asset Performance <sup>1</sup>
- Leak Detection
- System Awareness <sup>4</sup>

## LNG

- Safety: High operating pressures, extreme temperatures
- Managing LNG Transfer: trucks, vessels



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# Traditional Use Cases

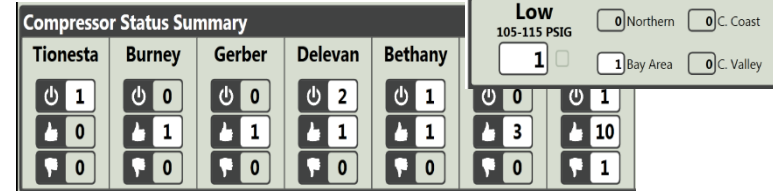


# Predictive and Proactive

PG&E

Implementation of the PI System has enabled the transformation of PG&E's ability to provide safe and reliable gas T&D to our customers. We now have proactive alarm management and enhanced visualization, collaboration, and an crisis management capability. The PI System has provided significant benefits and value.

Sr. Consulting Engineer, PG&E



## CHALLENGES

Mandated Implementation of NTSB and PHMSA 49 CFR 192 to address findings of gas explosion 9/9/2010

Large gas T&D network:

- 4.2 million customers
- 6,500 miles transmission
- 43,000 miles distribution
- 4500 RTUs

Diversity of systems, no integration

No collaboration or proactive CBM alarm management

## SOLUTION

Used the PI System as a real-time data integration for Situational Awareness

Used PI AF for:

- Advanced alarm management and notification
- Critical asset CBM
- Collaboration, visualization, & mobility foundation

Video Wall to provide system-wide status in Gas Distribution Control Center

## RESULTS

Improved alarm management, response, and crisis management capability

Significantly improved real-time situational awareness, visualization, and collaboration

Increased visibility into Gas Operations

Safer, more reliable gas T&D operations



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# PG&E – Situational Awareness

Video placeholder.



# Situational Awareness



Convert data into Information

The screenshot illustrates the process of converting raw data into meaningful information for situational awareness. It shows a software interface with three main components:

- Elements Tree:** A hierarchical list of compressor stations including Bethany, Burney, Delevan, Gerber, and Hinkley. Hinkley is selected.
- Hinkley Detail View:** A tabbed interface showing attributes for the selected station. The 'Attributes' tab is active, displaying a table with columns 'Name' and 'Value'. The 'Available' attribute has a value of 10, which is circled in red. A red arrow points from this value to the summary table below.
- Compressor Status Summary Table:** A table providing a high-level overview of the status for seven compressor stations: Tionesta, Burney, Gerber, Delevan, Bethany, Kettlemn, and Hinkley. Each station has three status indicators: a power button icon, a thumbs up icon, and a thumbs down icon, each with an associated numerical value.

The 'Compressor Status Summary' table data is as follows:

	Tionesta	Burney	Gerber	Delevan	Bethany	Kettlemn	Hinkley
Power Status	1	0	0	2	1	0	1
Good Status (Thumbs Up)	0	1	1	1	1	3	10
Bad Status (Thumbs Down)	0	0	0	0	0	0	1

In the summary table, the 'Hinkley' column is circled in red, and a red arrow points from the 'Available' value of 10 in the detail view to the 'Good Status' (Thumbs Up) value of 10 for Hinkley, demonstrating how raw data is converted into actionable information.

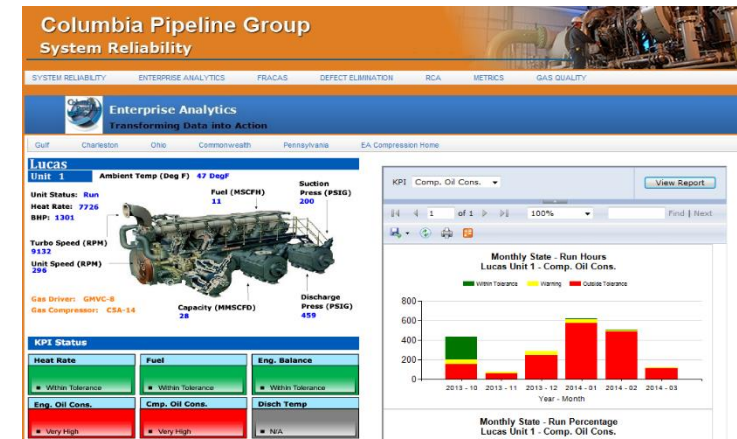


# Actionable Knowledge

## NiSource Gas Transmission and Storage

“To meet the needs of the customers and maintain total system awareness of the entire transmission and storage process, NGT&S is changing the way we think about data; data becoming information; and information becoming actionable knowledge.”

John Cox,  
Reliability Engineer, NiSource



### CHALLENGES

Meeting customer delivery obligations with an aging automation system.

Meeting the requirements of an expanding natural gas market spurred by increased production in the Marcellus Shale formation

### SOLUTION

Role Based Dashboards using PI Web Parts and DataLink for Excel Services.

Core to NiSource's "Enterprise Analytics" reliability improvement program

### RESULTS

Providing knowledge empowers stakeholder employees to autonomously monitor and maintain assets for which they are responsible.



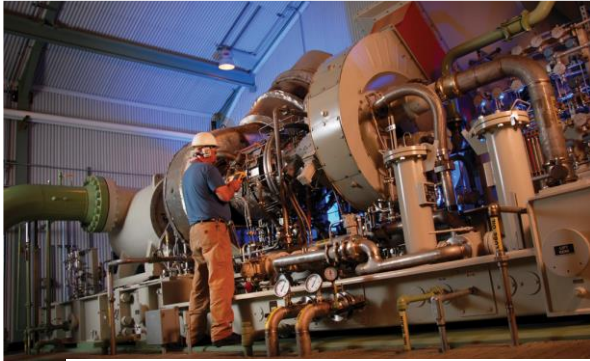
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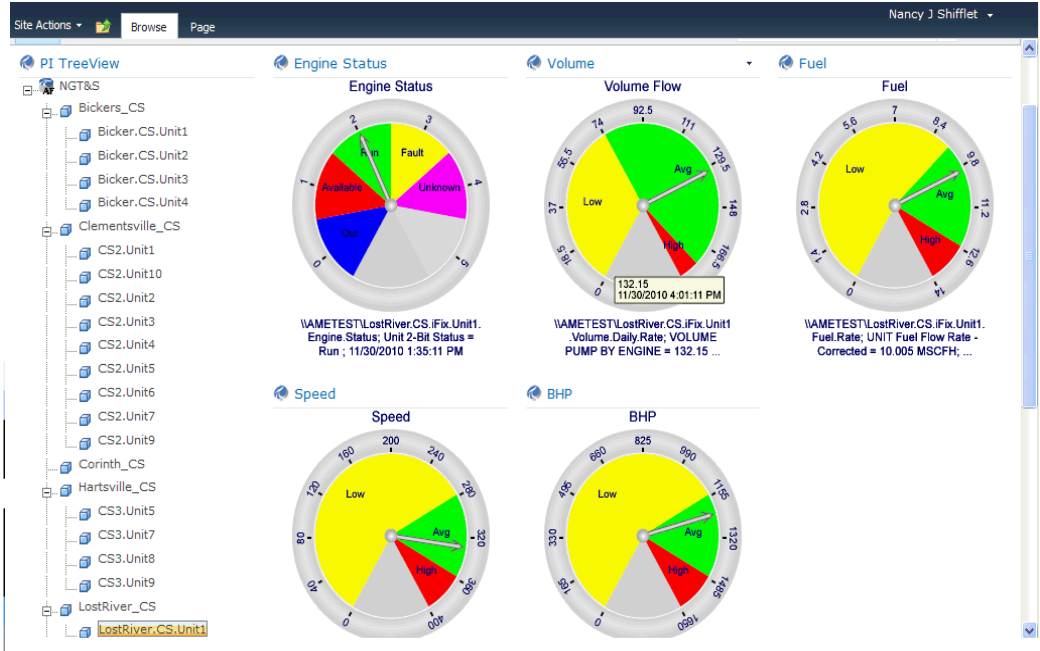
# Asset Performance Monitoring

Real-time and Historical perspectives



Excel Web Access - ExcelWebPart

	A	B	C	D	E
	Data Availability	Previous Day	Previous Week	Year to Date	YTD Unavailable Hours
1	Unit 5	100.0%	94.0%	64.9%	607.2
2	Unit 7	100.0%	94.0%	65.7%	592.9
3	Unit 8	100.0%	94.0%	66.2%	584.0
4	Unit 9	100.0%	94.0%	65.0%	604.1
5					
6					
7					





# Reliability Focused Maintenance

## Alyeska Pipeline

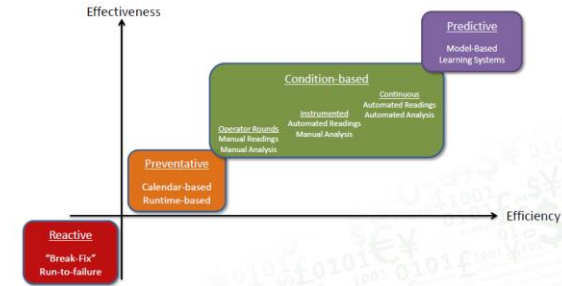
“Implementation of the PI System has enabled the transformation of Alyeska’s ability to provide safe and reliable gas T&D to our customers. We now have proactive alarm management and enhanced visualization, collaboration, and an crisis management capability. The PI System has provided significant benefits and value.

Maintenance Strategies Program Lead

Alyeska Pipeline Service Company



## Evolution of Maintenance Strategies



### CHALLENGES

Need to improve pipeline integrity and reliability – regulation & scrutiny

Difficult operating environment

Attrition of SMEs

SCADA based system closed, difficult to work with, poor integration

SCADA data to the enterprise & cyber security

### SOLUTION

Developed Reliability Centered Maintenance and Diagnostics (RCM)

integrated with the Maintenance system including master data management (MDM) synchronization

Web-Based equipment, alarm, and event visualization & collaboration

Automated 200+ Calendar/Runtime-based PMs, root cause analysis

### RESULTS

Significant improvement in asset integrity and reliability

Captured knowledge from SMEs by developing (CBM) algorithms

Addressed cyber security and SCADA data to the enterprise

Reduced maintenance and IT costs



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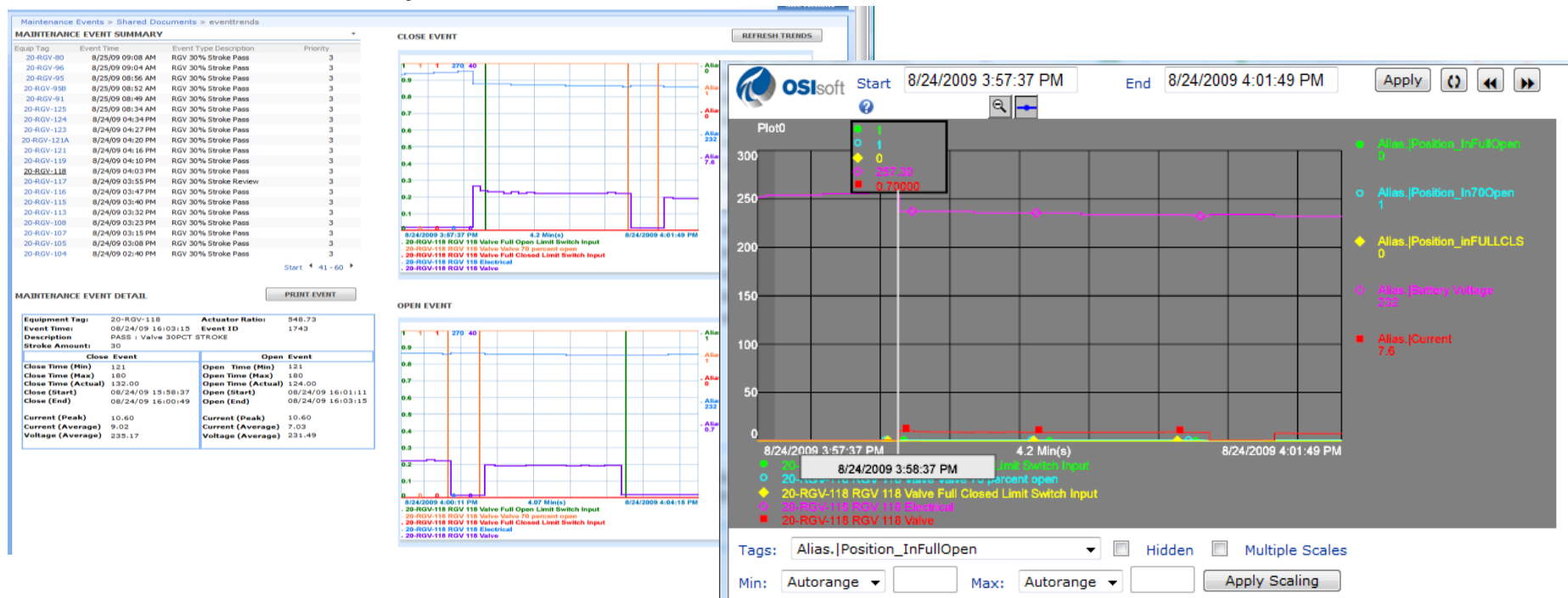
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# Reliability-Centered Maintenance and Diagnostic



## Asset-based analytics





# Innovative Use Cases



# Realtime Linepack Management

GRTgaz

Realtime Linepack management is a key contributor to reaching the operating cost reduction objectives determined by the Energy Regulation Commission. Benefits include:

- Significant input data improvement as part of the current fine-tuning of real-time optimization & supervising applications
- Reduction in operating costs connected with intra-day sourcing
- Extra level of control of intra-day consumption forecast

Anne Leray – Gas Operations



## CHALLENGES

Meet operating cost reduction targets set by European Regulators

Improve ability to manage intra-day supply fluctuations

Provide France with a transmission capacity in order to meet market demand and enhance security of supply

## SOLUTION

Configure PI-AF to model the Country, Regions, Sub-Networks, and Blocks.

Developed linepack calculations at each level (using rollup functionality)

Real-time data delivered via dashboard depicting operating conditions for each region

## RESULTS

Eliminated external models and 3<sup>rd</sup> party services for determining optimum operations (reduced costs)

Greatly improved intra-day supply sourcing decisions (more efficient operations)

Reduced level of safety margin to ensure supply commitments (reduced risk and costs)



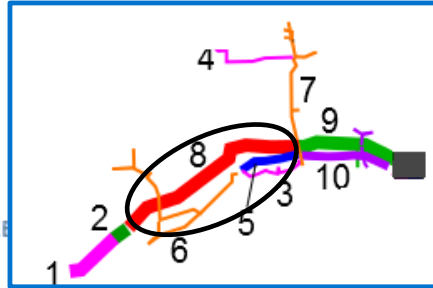
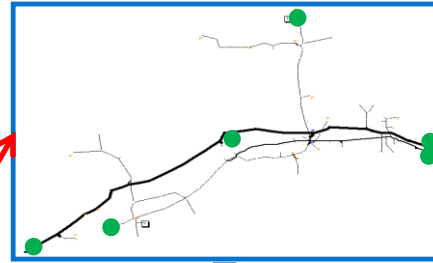
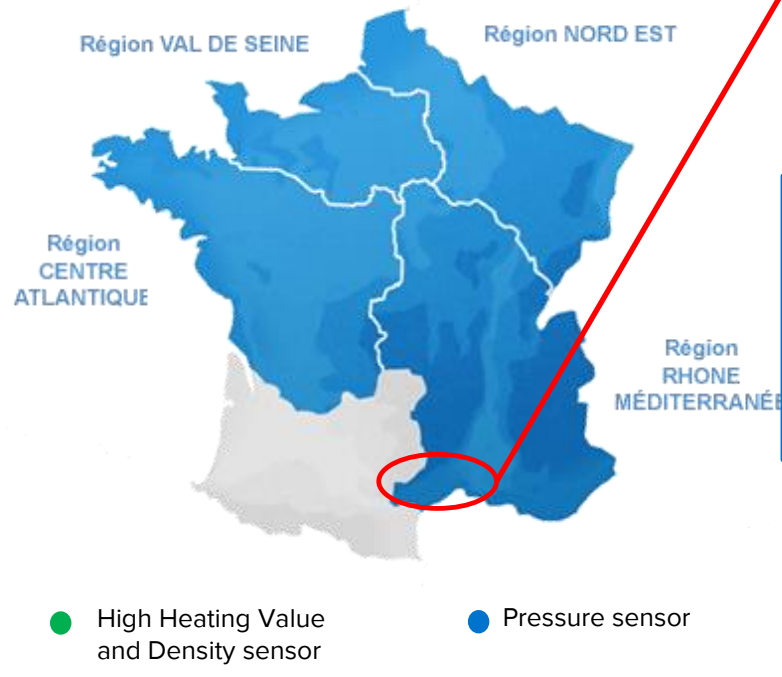
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# V – The solution

The Grtgaz network is divided into 4 operating areas with each about 15 sub-networks.



## Model's Hypothesis

**A Sub-network** : set of pipelines with homogeneous higher heating value and gas density

**Block** : set of pipelines with homogeneous pressure

$$Z = f(\text{HHV}_{\text{ave}} ; \text{Density}_{\text{ave}})$$

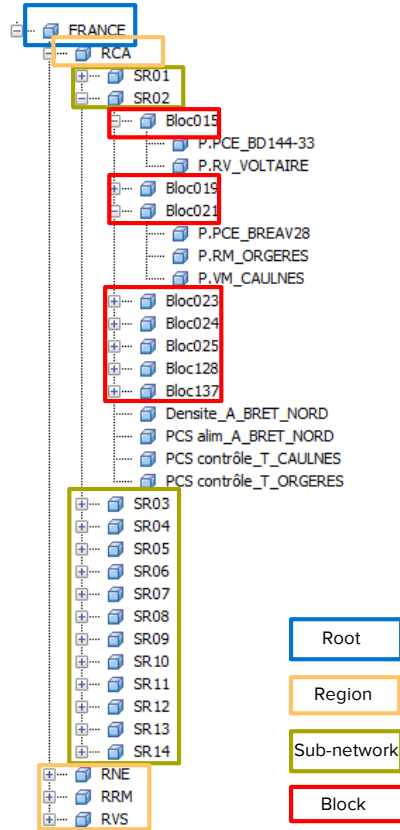
$$\text{LP} = f(\text{Pressure}_{\text{ave}} ; Z)$$

### figures:

- 60 sub-networks
- 500 Blocks
- 1500 pressure sensors
- 250 HHV sensors
- 150 density sensors



# The solution



Library

- Test\_ABACUS
  - Categories
    - Analysis Categories
    - Attribute Categories
    - Element Categories
    - Reference Type Categories
    - Table Categories
  - Templates
    - Element Templates
      - Bloc
      - Densite
      - FRANCE
      - PCS alim
      - PCS controle
      - Pression
      - Région
      - SR
    - Event Frame Templates
    - Model Templates
    - Transfer Templates
  - Enumeration Sets
  - Reference Types
  - Tables
  - Table Connections

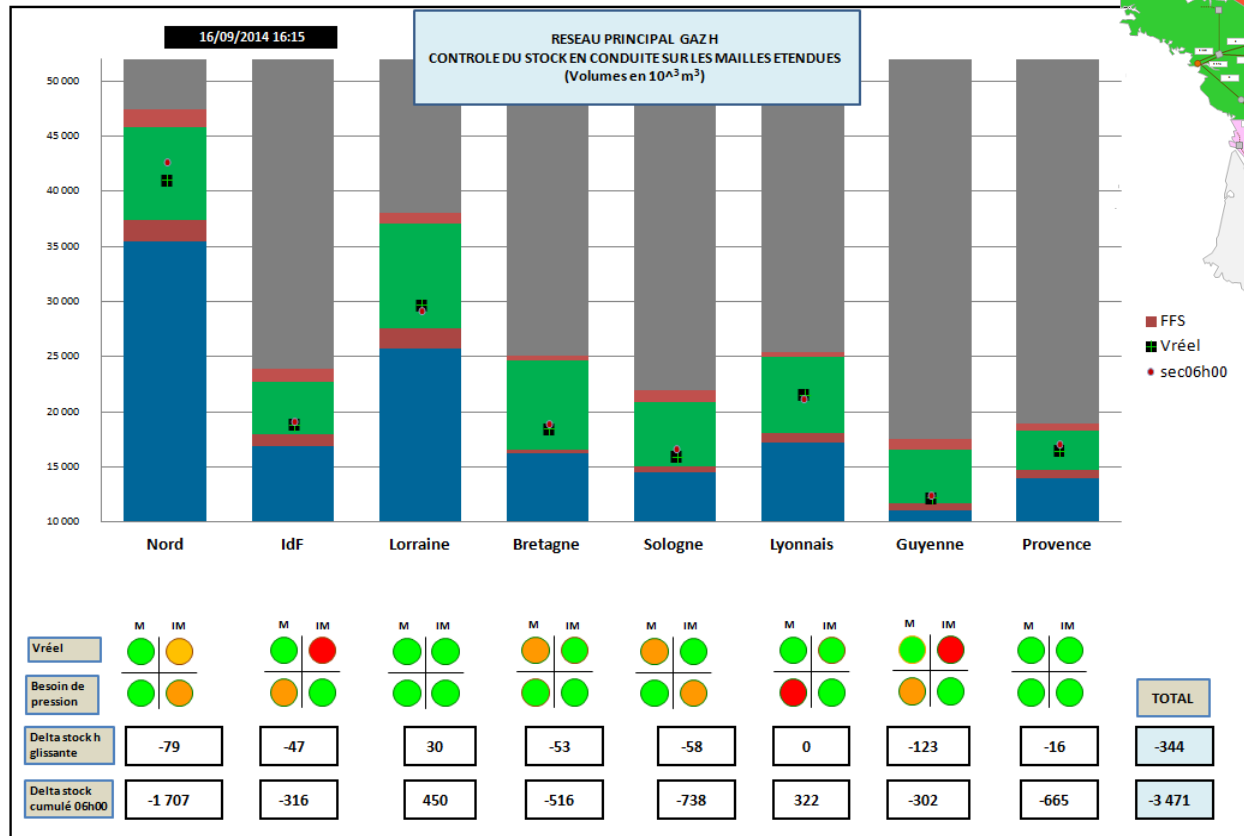
Bloc
General Attribute Templates Ports Analysis Templates

Filter

Name	Description	Default Value
Code_Artere_HELP	N/A si réseau r...	N/A
Densite_moyenne_SR		0
Facteur_de_compressibilite		0
Maille_etendue		0
Nom_artere		0
Nombre_de_capteurs		0
PCS_moyen_SR		0
Pression_moyenne		0
SEC_Energie_bloc		0
SEC_Volume_bloc		0
Somme_des_pressions_au_carre		0
Temperature_du_gaz		11 °C
Type_Artere	Ite: Intermaille...	0
Type_gaz		H
Variation_bloc		0
Volume_en_eau		0 m3
Zone_gaz		Nord



# Exploitation of results

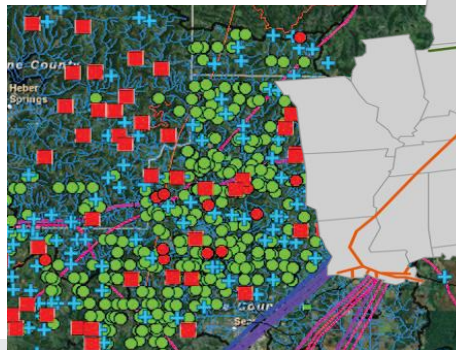


# Gas Quality Mapping – PI/ArcGIS (POC)

## Columbia Pipeline Group

We are very interested in exploiting the capabilities of our investment in PI and ArcGIS. A real-time spatial view of gas-quality entering and leaving our system would be very helpful to ensuring we meet our delivery commitments.

CPG Gas Operations



Columbia  
Pipeline  
Group

### CHALLENGES

- Improve visibility into gas quality variances across the system
- Improve gas quality communications to producers, shippers, and markets.
- Achieve more value from investments in PI and ArcGIS
- Reduce the need for 3<sup>rd</sup> party applications

### SOLUTION

- Launch a POC in 1H2015:
- Implement the PI Integrator for ArcGIS
- Display real-time gas quality information on key POR's and POD's.
- Extend access to gas quality information to broader audience within CPG

### RESULTS

- Expected results include:
- Improved understanding of BTU rating and variances across the system
- Better decisions from Gas Operations to adjust in-line blends
- Greater situational awareness of gas quality



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# PI/ArcGIS Integration



# Thank You



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