



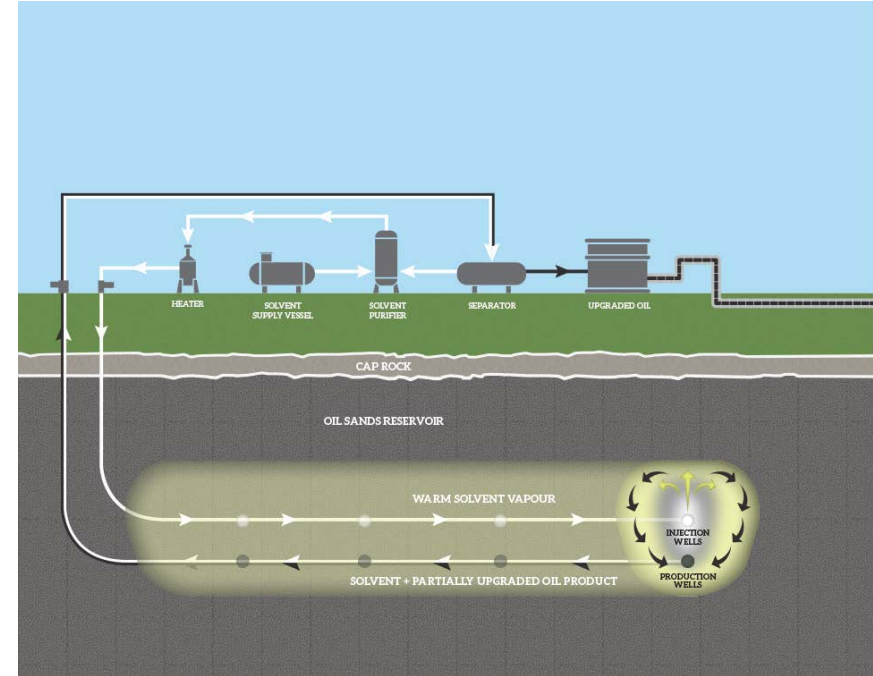
Developing Cleaner Energy with the PI System: Implementation at Nsolv's Warm Solvent Pilot Plant

Presented by **Randy Vu**



About Nsolv

- Canadian, clean-tech energy company headquartered in Calgary
- Devoted to solving operational and environmental problems of heavy oil extraction
- Patented warm solvent technology for in-situ oil extraction
- Requires zero water and very little natural gas
- 80% reduction in greenhouse gas emissions compared to traditional methods
- Small surface footprint compared to existing technologies



About Nsolv

- Fully tested in the lab for 10 years
- Pilot plant located northwest of Fort McMurray
- Produced its 60,000th barrel of oil in August 2015, all the while meeting key performance indicators
- Honouree of Canada's Clean50 for 2016, and the winner of the Research and Development category award for Canada's Clean16

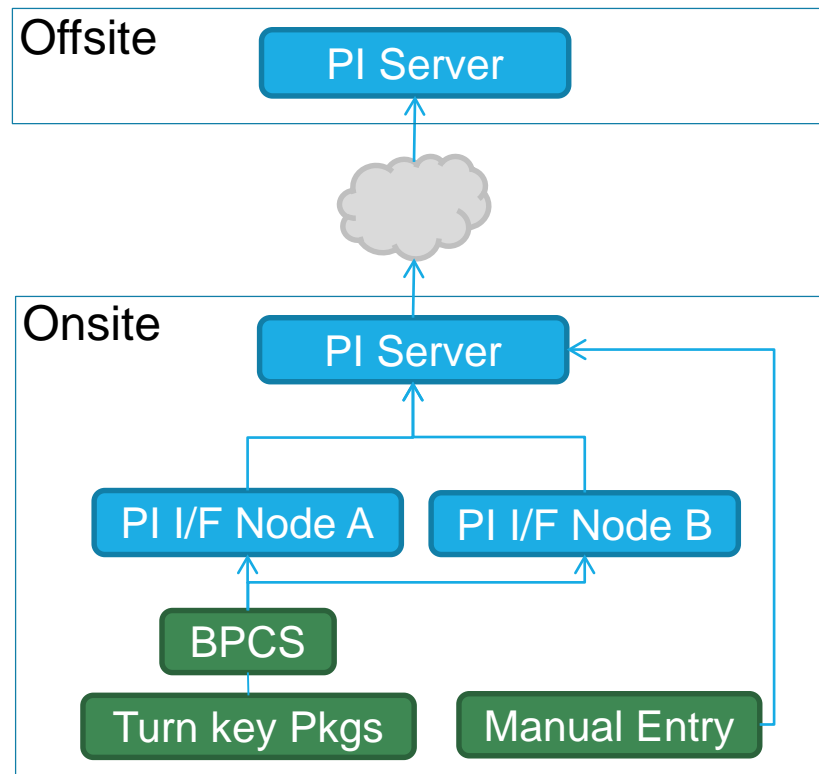


Business Challenges and Opportunities

- How can we consolidate all plant data (onsite control system, lab data, truck tickets, operational checks)?
- How can we best meet our business requirements with the resources of a startup?
- How can we provide efficient and effective remote support to our facility?

PI System Deployment

- PI System deployed in 2013 following plant commissioning
- PI System architecture consists of
 - Onsite PI Server
 - Offsite PI Server
 - PI to PI Interface
 - Redundant interface nodes running
 - PI Interface for OPC DA
 - PI Interface for Modbus Ethernet



PI System Deployment

- Additional PI System Tools used include:
 - PI Analytics
 - PI API
 - PI DataLink
 - PI Interface for Universal File and Stream Loading
 - PI ProcessBook
 - PI System Management Tools
 - PI Tag Configurator
- PI is scalable: functionality can be added as needed

Centralize all plant data in the PI System

- Simplifies system administration and governance
- Prevents “stranded data”
- Segregation of field ops from offsite
 - Minimizes information bottlenecks

B	C	D	E	F	G	H	I
N-SOLV Sample Cut Daily Spreadsheet							
							Date/
							4/14/2014
INLET SETTLER							
BS&W (%)	Rag (%)	H2O (%)	Solids (%)	Density (kg/m3)	Temp (°C)	Viscosity (cSt)	Temp of V (°C)
SETTLER ACCUMULATOR							
BS&W (%)	Rag (%)	H2O (%)	Solids (%)	Density (kg/m3)	Temp (°C)	Viscosity (cSt)	Temp of V (°C)
TK-101A							
BS&W (%)	Rag (%)	H2O (%)	Solids (%)	Density (kg/m3)	Temp (°C)	Viscosity (cSt)	Temp of V (°C)

B	C	D	E	F	G	H	I	J
N-SOLV Truck Ticket Entry Form								
Date	Time	Ticket #	Company Name	Volume (m3)	Temp (°C)	BS&W (%)	Obs. Temp (°C)	Obs. Density (kg/m3)
1-Oct-2015	23:08:36							
1-Oct-2015	23:08:36							

Meeting operational requirements

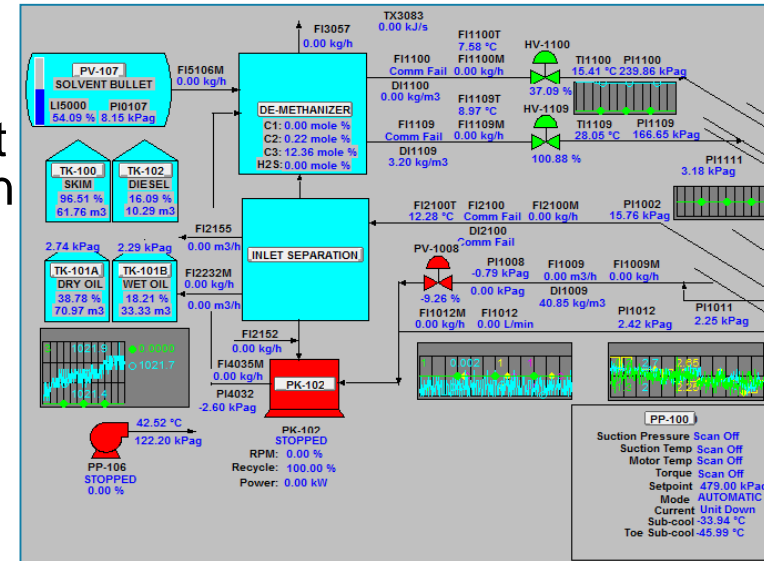
- Need to meet the requirements of a typical operating company
 - Regulatory compliance
 - Production reporting
 - Forecasting
 - KPI tracking and analysis
- PI System enables Nsolv to meet its requirements and objectives despite its small workforce

	A	B	C	D	E
1		27-Sep	28-Sep	29-Sep	30-Sep
2	Produced liquids (m3)				
3	Oil (m3)	0.00	0.00	0.00	0.00
4	Cumm. Oil production (m3)	10000.00	10000.00	10000.00	10000.00
5	Bitumen (m3)	0.00	0.00	0.00	0.00
6	Cumm.bitumen production (m3)	9000.00	9000.00	9000.00	9000.00
7	Diesel (m3)	0.00	0.00	0.00	0.00
8	Cumm. diesel production (m3)	0.00	0.00	0.00	0.00
9	Solvent (m3)	0.00	0.00	0.00	0.00
10	Cumm. solvent production (m3)	500.00	500.00	500.00	500.00
11	Water (m3)	0.00	0.00	0.00	0.00
12	Cumm. water production (m3)	3000.00	3000.00	3000.00	3000.00
13	Total (m3)	0.00	0.00	0.00	0.00
14	Cumm. total (m3)	13000.00	13000.00	13000.00	13000.00
15	KPI				
16	Daily SOR	0.00	0.00	0.00	0.00
17	Cumm. SOR				
18	Daily SBR				
19	Cumm. SBR				
20	Daily BS&W (%)	0.0	0.0	0.0	0.0
21	Cumm. BS&W (%)	20.0	20.0	20.0	20.0
22	Daily bitumen in oil (vol%)	0.0	0.0	0.0	0.0
23	Cumm. bitumen in oil (vol%)	90.0	90.0	90.0	90.0
24	Daily diesel in oil (vol%)	0.0	0.0	0.0	0.0
25	Cumm. diesel in oil (vol%)	0.0	0.0	0.0	0.0

*Not actual Plant data

Provide robust remote real-time operational support

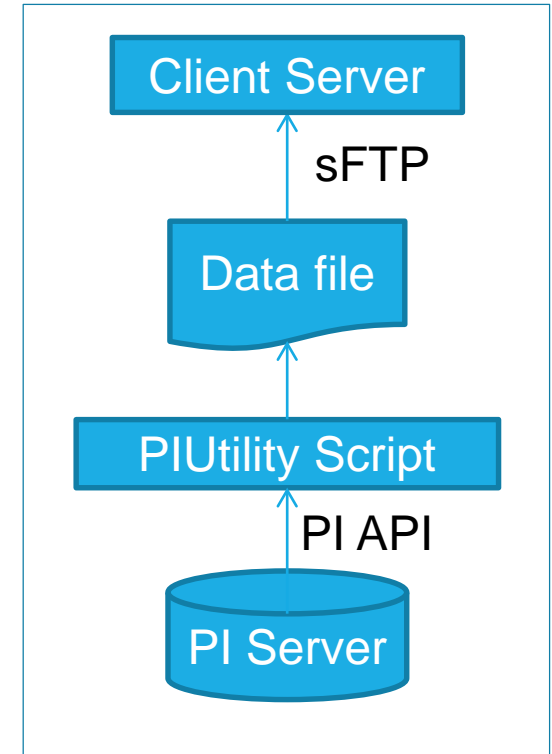
- Production and technical teams largely based in Calgary and Mississauga
- Critical to be able to visualize and present data to simplify data analysis and decision making
- Achieve cost savings by eliminated need for additional support staff onsite
- Use PI ProcessBook and PI DataLink
 - Accurate and reliable real-time data from site
 - Make informed decisions and provide timely support



*Not actual Plant data

Generate revenue through data-sharing agreements

- The PI System has enabled Nsolv to monetize its Pilot data
- Customers are production companies evaluating whether Nsolv technology is suitable for their resources
- Facilitated by using PI ProcessBook, PI DataLink and PI API

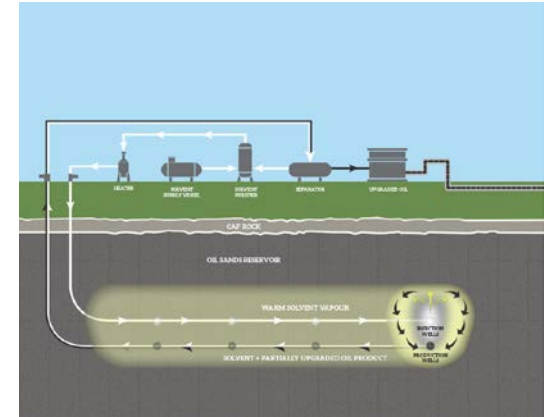


Future Plans

- Improve production reporting by incorporating PI Analytics
- Adopt Asset Framework to benefit from
 - Notifications, Event Frames, PI Coresight
- Implement PI Cloud Connect to augment data sharing process

Summary

- Successfully deployed PI System and leveraged it to meet business objectives
- Derived cost savings with remote support ability
- Generated revenue through data sharing
- Facilitated technology development through partnerships



Contact Information

Randy Vu

rvu@nsolv.ca

Systems Engineer

Nsolv



Questions

Please wait for the
microphone before asking
your questions



State your
name & company

Please don't forget to...

Complete the Survey
for this session



The **Power of Data**
DECISION READY IN REAL-TIME

Evaluation Form (Seminar Location - Date)

Name: _____

Company: _____

Email: _____

Quality and content of the presentations

Poor Good Excellent N/A

Welcome	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Journey To Real-Time Operational Intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The Power of Connection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tank Level Management System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using the PI System to Aid in Troubleshooting Operational Aspects of Oil and Gas Well Drilling and Completion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unleash your Infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on the Spot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wrap-up/Seminar Conclusion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Quality and organization of the seminar

Choice of date	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time allowed for lunch/breaks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Choice of presentations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Days and time allowed for the presentation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado