

# Interesting PI Configurations

## Tata Power

Presented by **Sachin Gurao**



India's largest integrated private power utility.



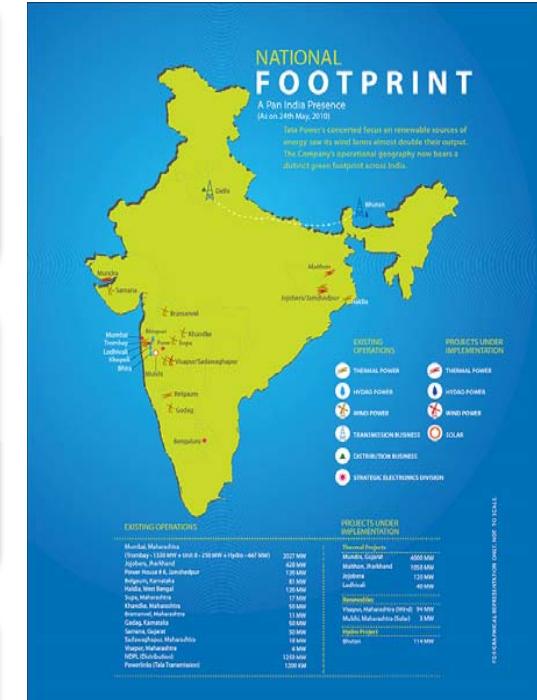
8521 MW Installed capacity (Thermal, Hydro, DG, Solar and Wind)



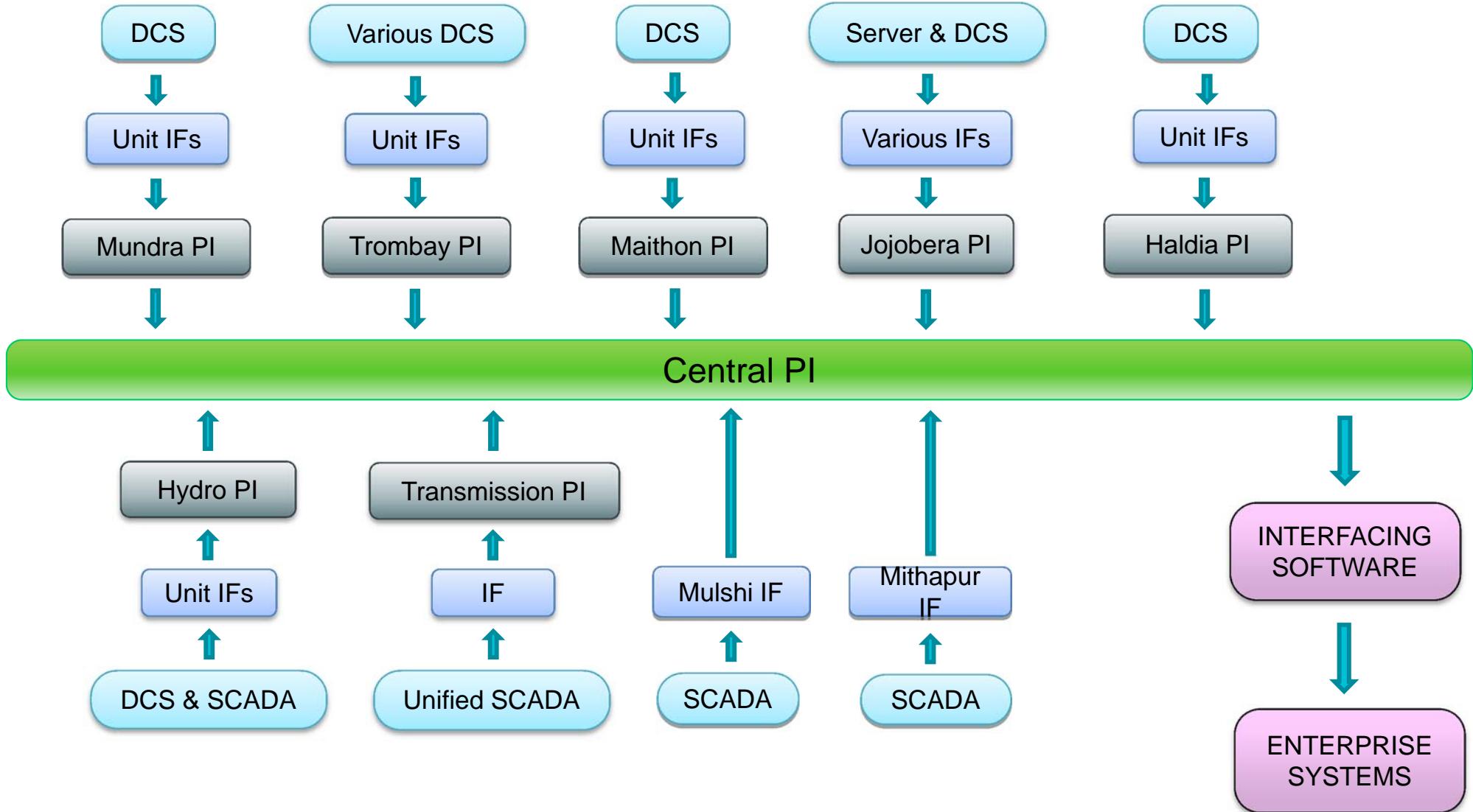
Presence in entire value chain like Generation, Transmission, Distribution, Fuel sourcing, Logistics and Power trading.



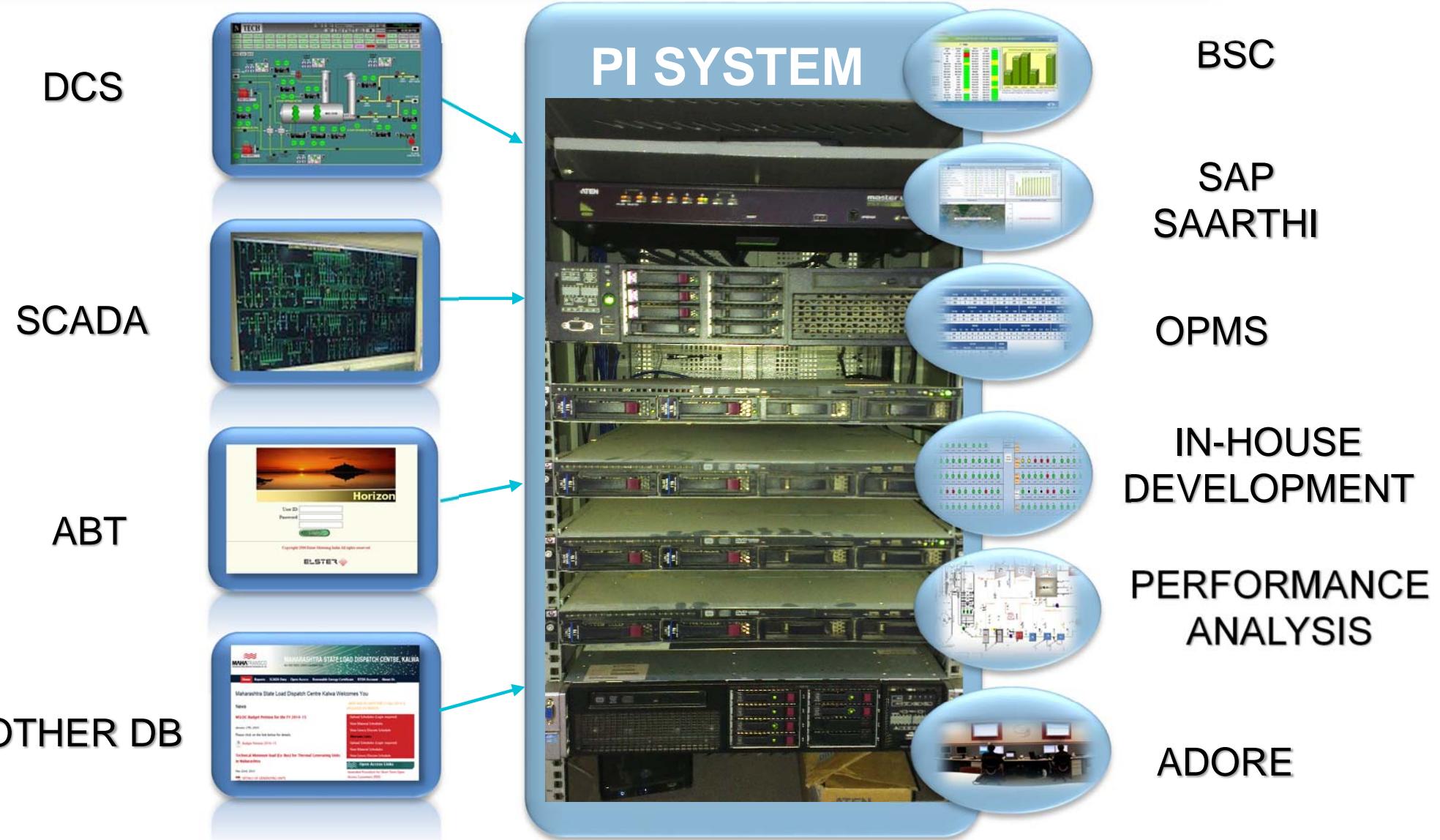
Expanding its horizon beyond India in countries like Australia, Bhutan, Singapore, Indonesia, Nepal, Africa, Netherlands & the Middle East.

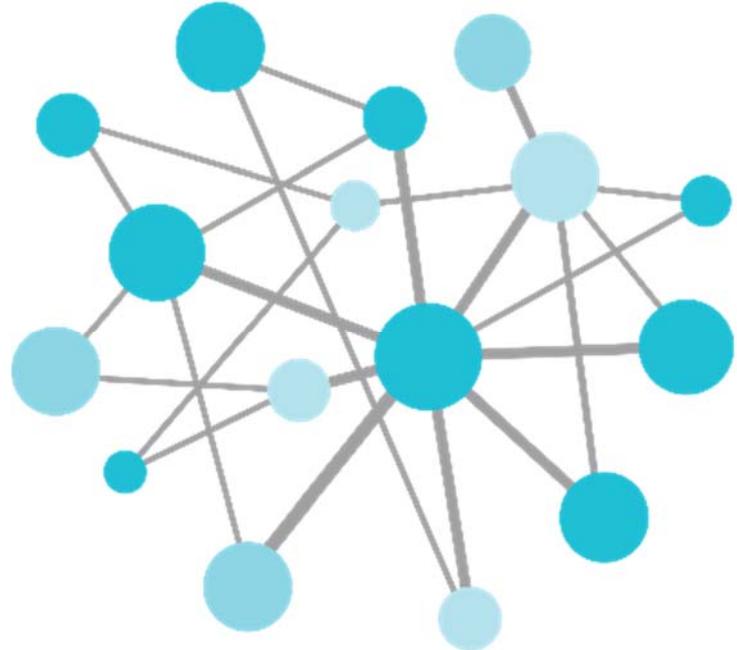


# PI SYSTEM IN TATA POWER



# PI SYSTEM IN TATA POWER





# BUSINESS CONTINUITY PLAN



# DISASTER RECOVERY

## ❖ CHALLENGE

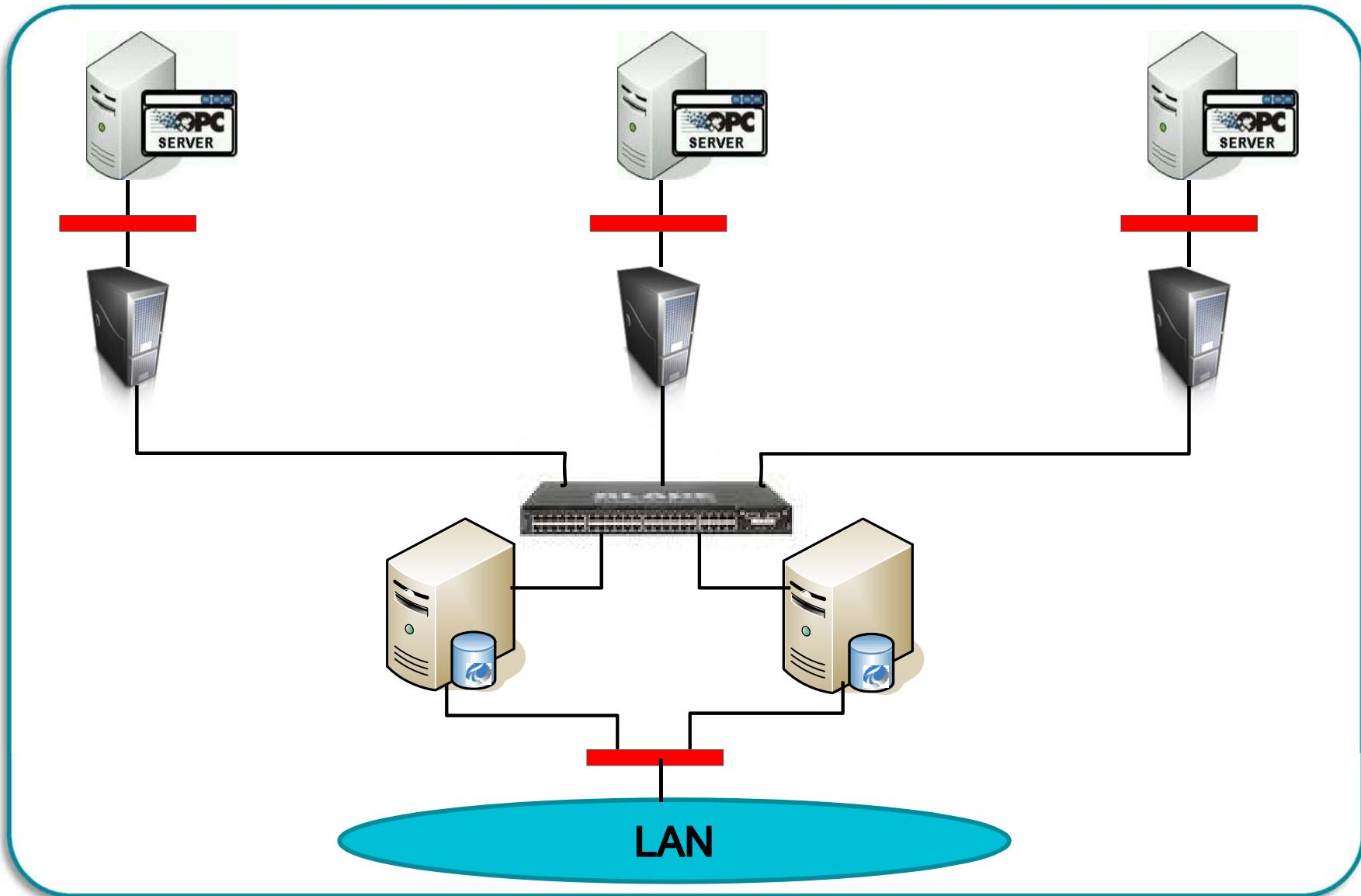
- ❖ Continue smooth operation of PI system in any disaster such as Tsunami, Earthquake, terrorist attack, etc.



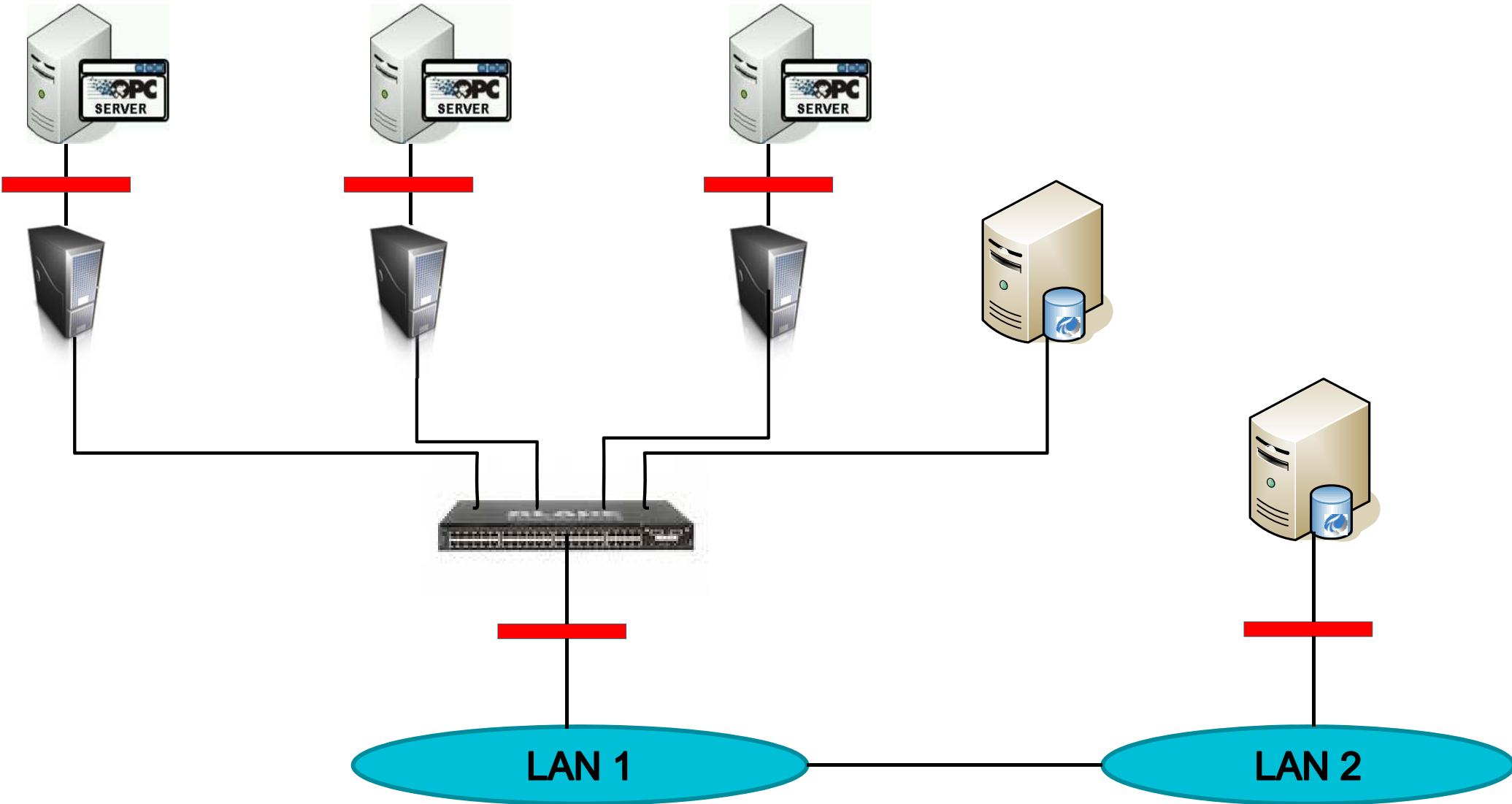
# DISASTER RECOVERY

- ❖ Disaster management plan for Business Continuity
- ❖ PI System HA architecture
- ❖ Both PI servers at the same location
- ❖ Relocate secondary PI server
- ❖ ISO 22301:2012 Societal Security & Business Continuity Management Systems

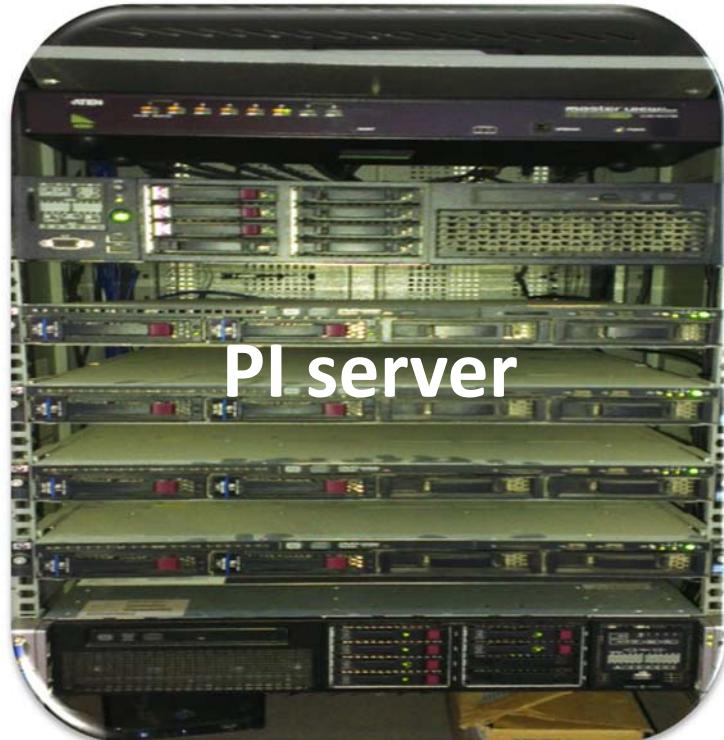
# PI SYSTEM ARCHITECTURE TYPICAL



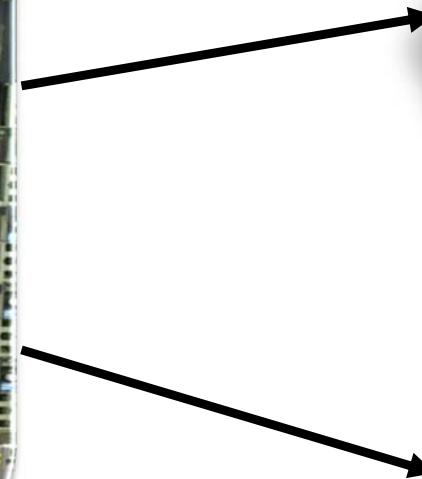
# PI SYSTEM ARCHITECTURE DR



# PI SYSTEM BCP



Local Backup

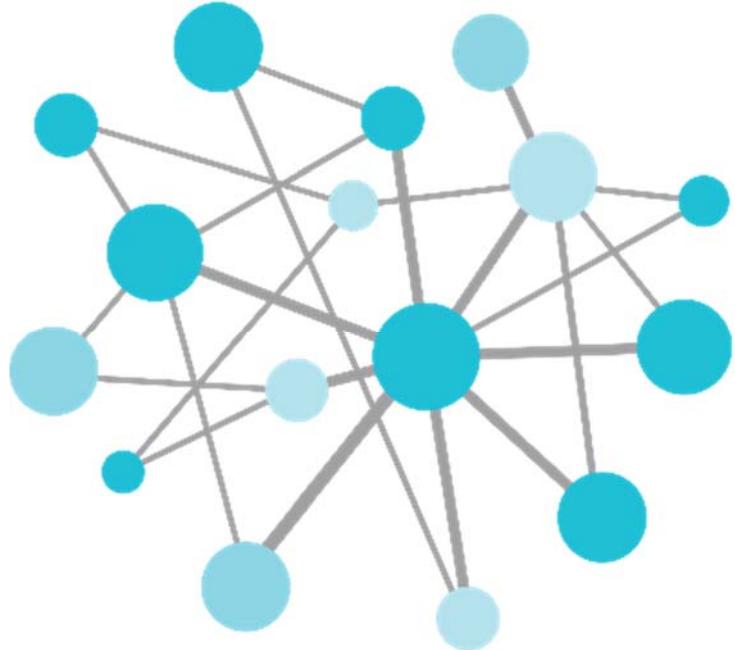


Central  
Backup

Backup in  
IDC

# Business Continuity





# ABT APPLICATION

## CHALLENGE

Provide Availability Based Tariff (ABT) energy data from AF of local PI servers to AF of Central PI Server.

# ABT APPLICATION



All ABT systems connected to PI

RDBMS / OPC interface

ABT application made in-house

AF capabilities used extensively

# ABT APPLICATION



## Current

- Block
- Frequency
- Schedule
- Generation
- Time

## Block

- Frequency
- Generation
- Generation MU till the current Block

## Comparison

- UI
- Deviation Mw
- Frequency

# ABT APPLICATION

## ABT APPLICATION FROM PI SYSTEM HALDIA MAITHON

Current Block  
Integrated Freq **49.83**

**30/Sep/2014 4:29:00 PM**

Inst Freq : **49.78**

Current Block No. **60**

HALDIA	SCH. MW	ACTUAL	UI Rate	UI Amt
	94.98	96.64	6.36	10586.91

MAITHON	SCH. MW	ACTUAL	UI Rate	UI Amt
	796.22	811.07	3.03	45004.51

GEN MUs TILL Block No.	SCH.	ACTUAL
	57	1.35

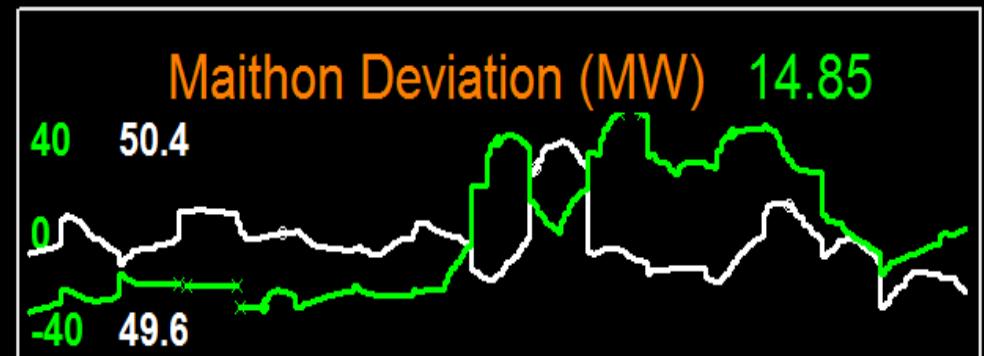
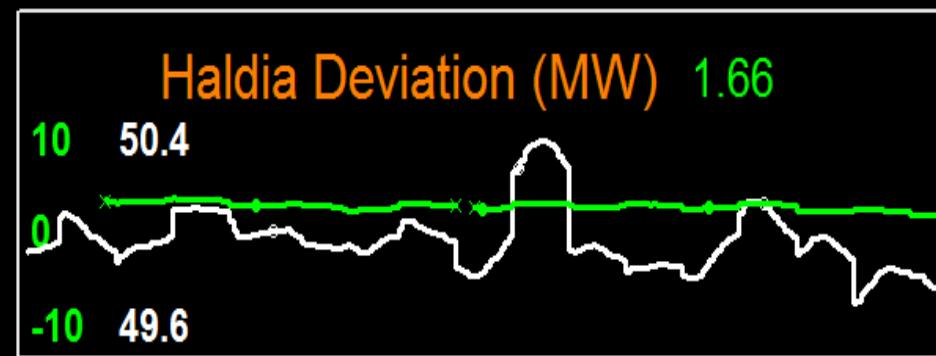
GEN MUs TILL Block No.	SCH.	ACTUAL
	59	13.72

### GROSS GENERATION (MW)

U1	37.04
U2	38.55
U3	29.45

### GROSS GENERATION (MW)

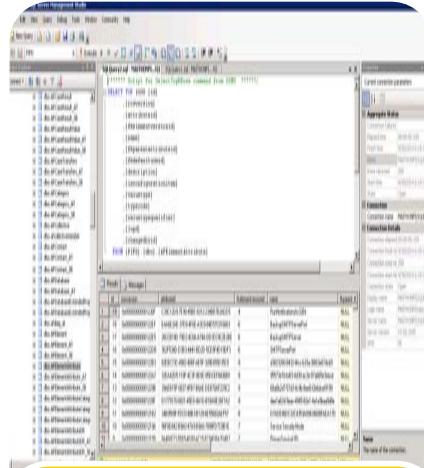
U1	439.48
U2	414.73



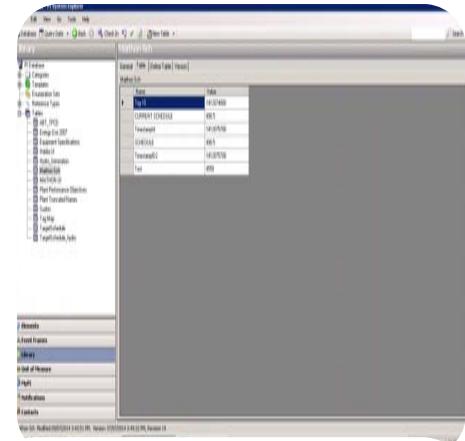
# AF TO AF DATABASE

A	B	C	D	E	F	G	H	I
Thermal EX-bus Generation For The Day								
BLOCK NO	Blockwise Time	U4	U5	U6	U8	U7A	U7B	
1	00:00	00:15	0	473	0	0	115	60
2	00:15	00:30	0	473	0	0	115	60
3	00:30	00:45	0	473	0	0	115	60
4	00:45	01:00	0	473	0	0	115	60
5	01:00	01:15	0	473	0	0	115	60
6	01:15	01:30	0	473	0	0	115	60
7	01:30	01:45	0	473	0	0	115	60
8	01:45	02:00	0	473	0	0	115	60
9	02:00	02:15	0	473	0	0	115	60
10	02:15	02:30	0	473	0	0	115	60
11	02:30	02:45	0	473	0	0	115	60
12	02:45	03:00	0	473	0	0	115	60
13	03:00	03:15	0	473	0	0	115	60
14	03:15	03:30	0	473	0	0	115	60
15								

From Site  
to Excel to  
AF Table

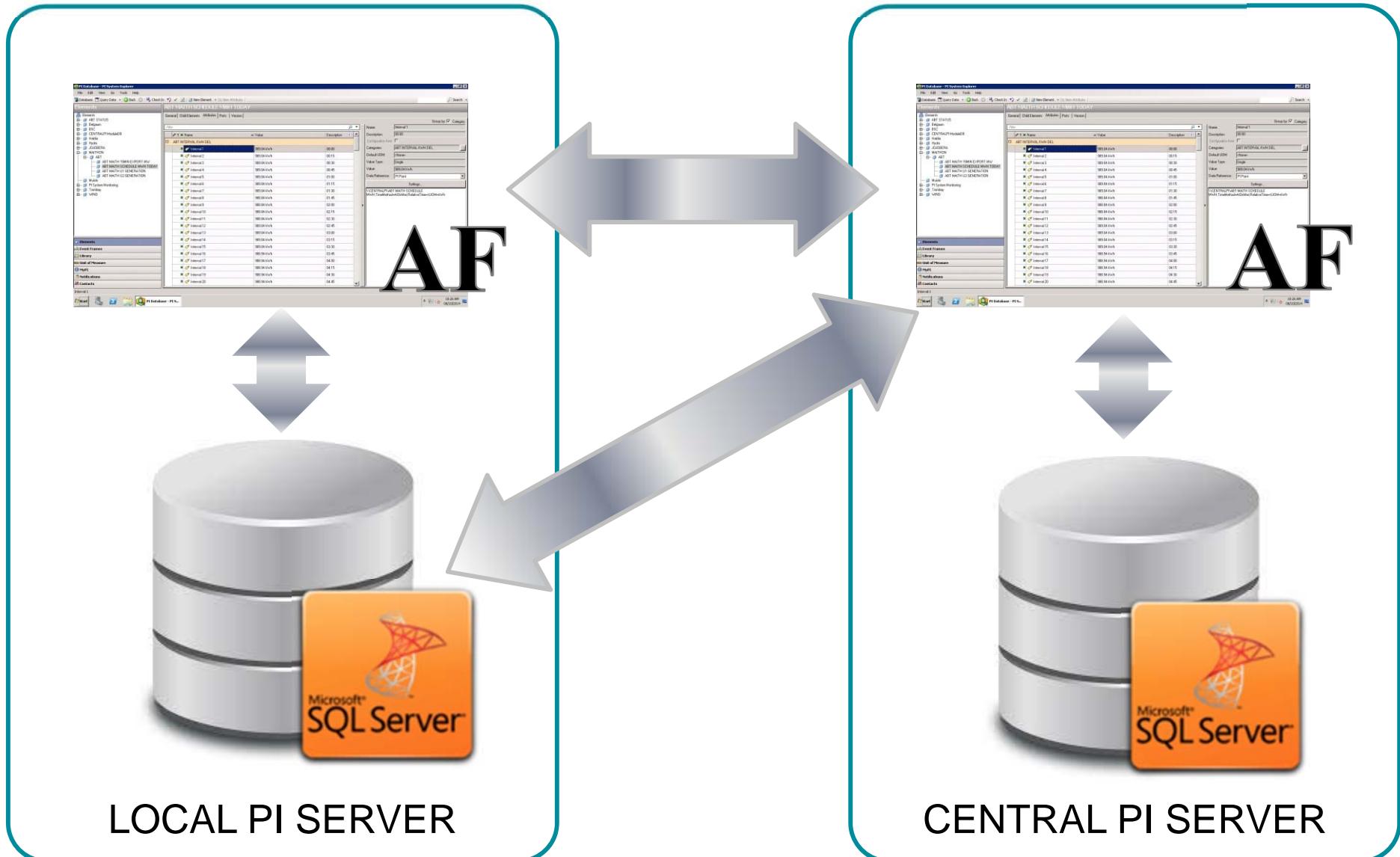


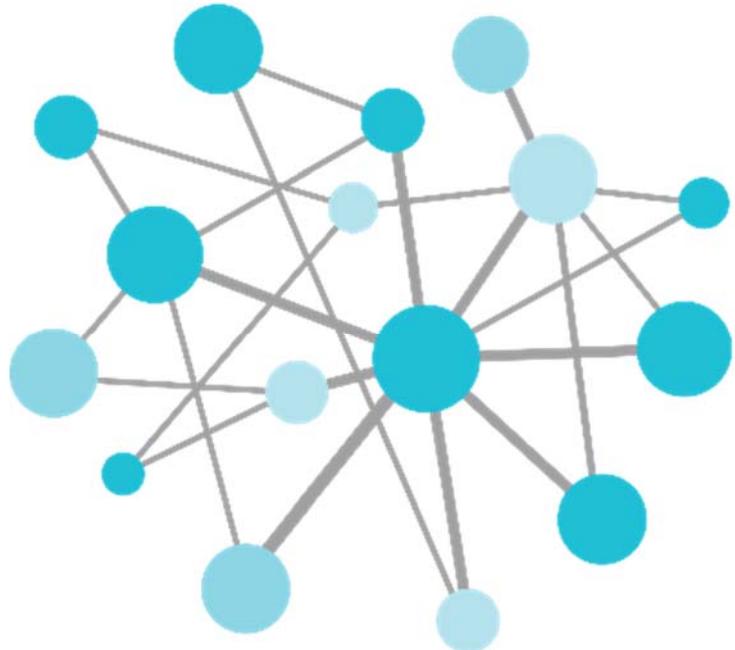
Source AF  
server  
database



Only Current  
details  
Destination  
AF server

# AF TO AF DATABASE





# INTERESTING ARCHITECTURE

## CHALLENGE

Provide a cost effective and technically feasible solution for connecting numerous interfaces to PI Server.

# INTERESTING ARCHITECTURE



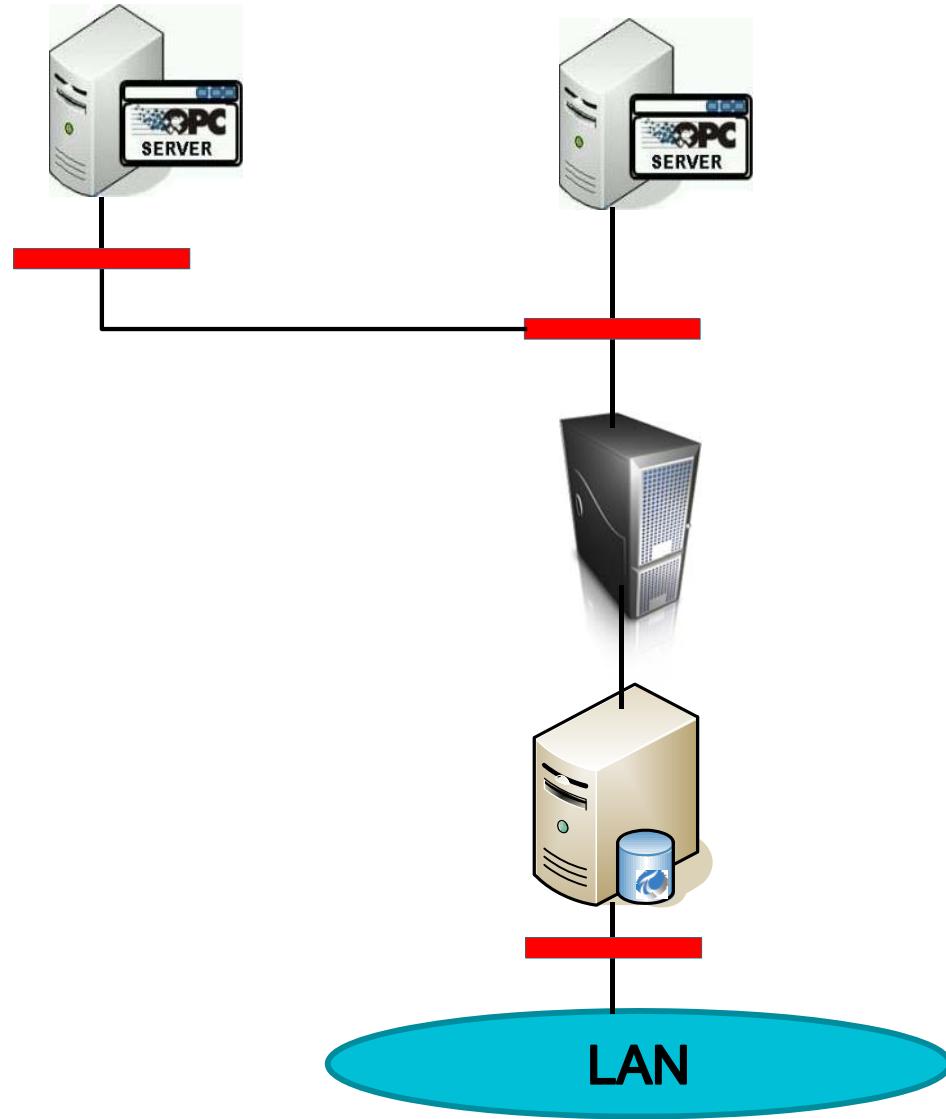
Multiple DCS in single Unit

Originally only one DCS connected to PI

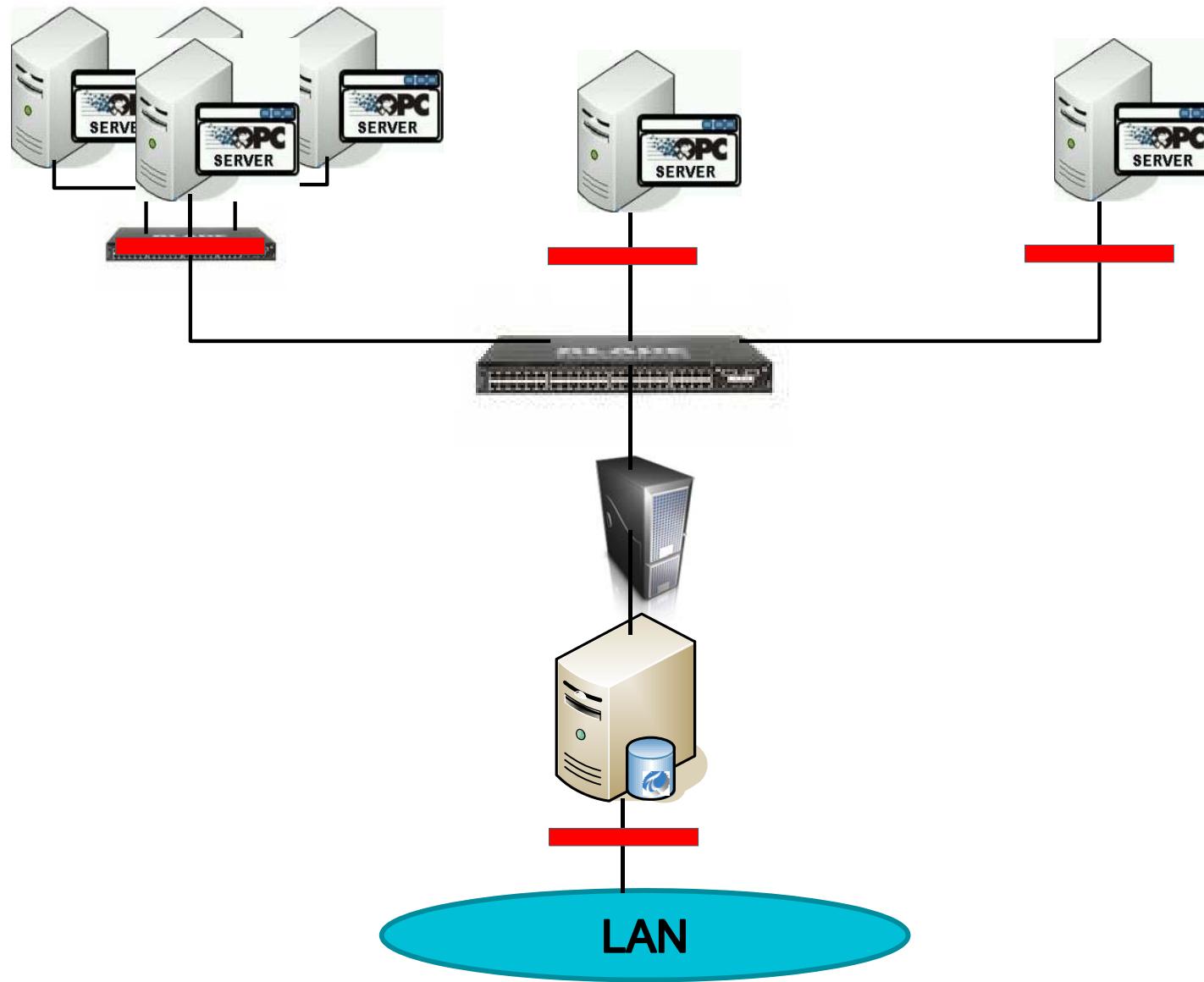
Utilization of lesser hardware & software

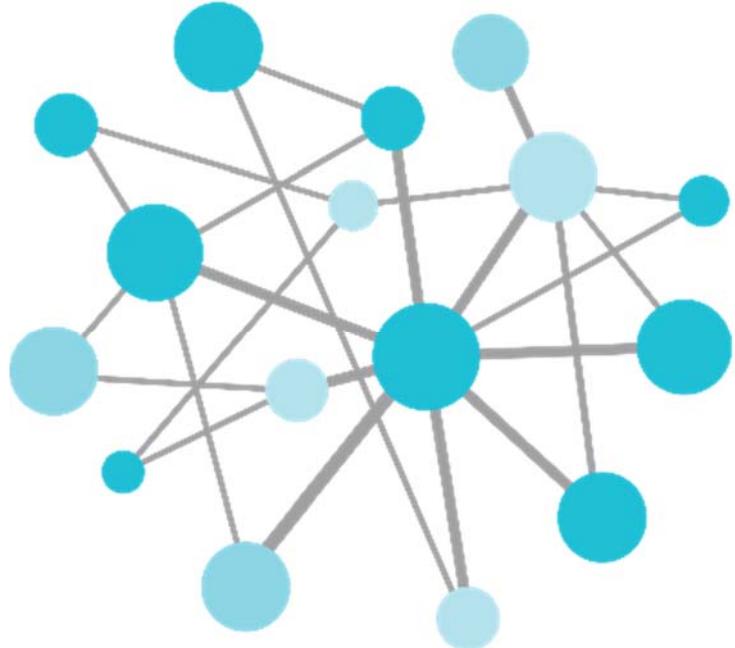
Firewalls to the rescue

# INTERESTING ARCHITECTURE



# INTERESTING ARCHITECTURE





# SAP-BI INTEGRATION



# INTEGRATION WITH SAP

SAP-CoE is using SAP tools to automate performance monitoring.

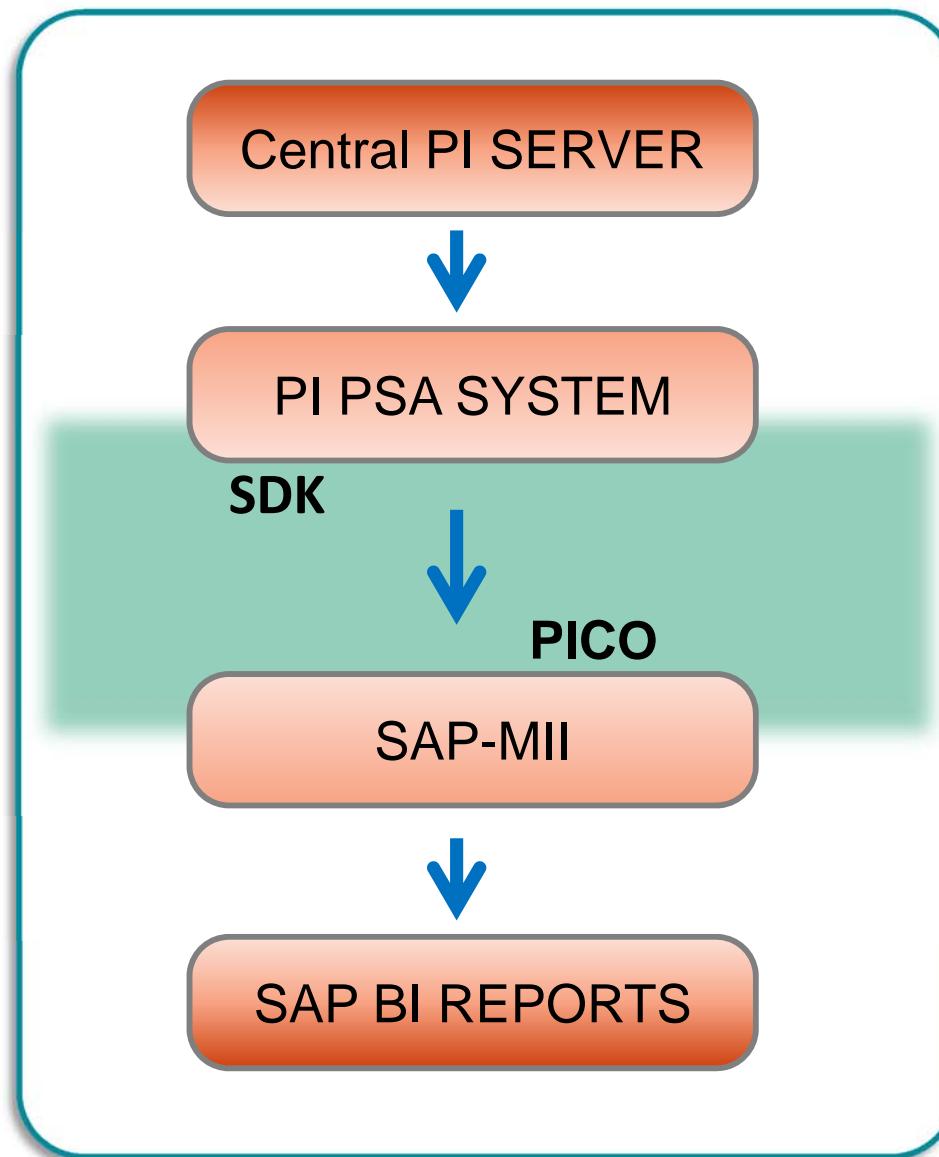
Daily - Flash Reports

Monthly – BSC review

Continuous monitoring for CBM with SAP PM

PI system is the source of automated operational data.

# INTEGRATION WITH SAP



# INTEGRATION WITH SAP

## HSE

### Operations

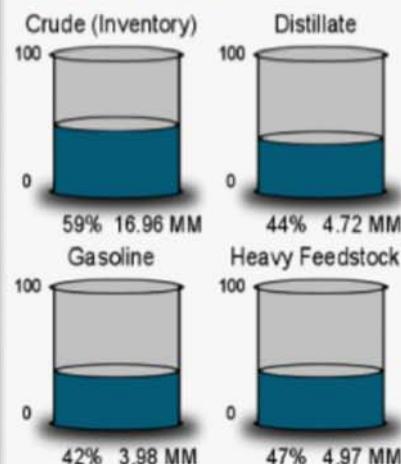
	MTD		YTD	
	RI	LTI	TRIR	LTIR
Employee	3	0	0.99	0.37
Contractor	0	0	0.82	0.16

Environmental Scorecard Incidents  
(Data for February 2009 as of 03/18/2009)

MTD	YTD	Previous 12 Full Months
43	86	595

## Tank Inventories

Percent of Capacity 13:16:29 CDT 04/08/2009



Inventory Type	Current Level (%)	Capacity (MM)
Crude (Inventory)	59%	16.96 MM
Distillate	44%	4.72 MM
Gasoline	42%	3.98 MM
Heavy Feedstock	47%	4.97 MM

### Injury Statistics

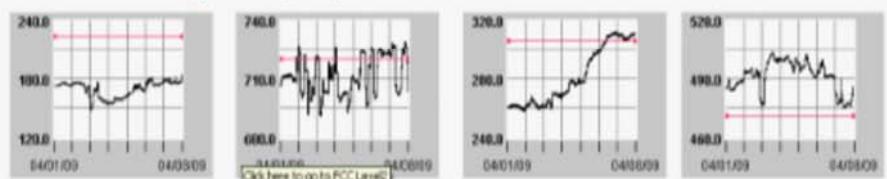
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Unit	Percent of Plan	Metric
Crude	100 %	1.92 MMD
Coker	98 %	311 MBD
HCU	82 %	184 MBD
FCC	102 %	731 MBD
Reformer	102 %	312 MBD
ULSD/HWT	103 %	487 MBD

### Percent of Plan

### 7-Day Trends(MBD)

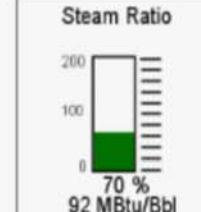


Click here to go to FCC Lines

## Energy Scorecard

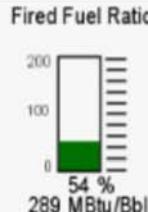
### EII and Energy Consumed

EII	99
Energy Consumed	450 MBtu/Bbl



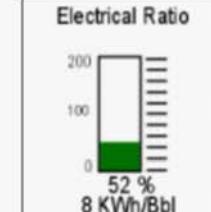
Steam Ratio  
70 %  
92 MBtu/Bbl

### Percent of Plan



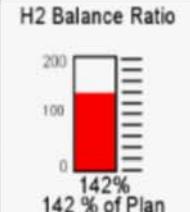
Fired Fuel Ratio  
54 %  
289 MBtu/Bbl

### Electrical Ratio



Electrical Ratio  
52 %  
8 KWh/Bbl

13:20:48 CDT 04/08/2009



H2 Balance Ratio  
142 %  
142 % of Plan

## PSM

### PSM

February 2009

- Incidents ● Action Items ● Inspections ● Training/Certification ● Risk Management ● VPP ● Hazard Reviews

Local Internet

100%

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# INTEGRATION WITH SAP



Easily accessible dashboards allow asset managers and staff to monitor asset health in real time via measurement points



Real-time alerts via dashboards give instant updates on equipment status and allow rapid reaction



Trend analysis identifies problem areas for immediate investigation



Links to ERP data to trigger maintenance workflow to reduce unplanned downtime and improve reliability.

# QUESTIONS





**Thank you**

We take pride in Lighting up Lives!