

Agility Integrity Care
Trust Respect

PI – Power of Data for Operational Analytics



Presented by:
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Tata Power

TATA POWER

- India's largest integrated private power utility.
- 5297 MW Installed capacity (Thermal, Hydro, DG, Solar and Wind).
- Presence in entire value chain like Generation, Transmission, Distribution, Fuel sourcing, Logistics and Power trading.

NATIONAL FOOTPRINT

A Pan India Presence
(As on 24th May, 2010)

Tata Power's concerted focus on renewable sources of energy saw its wind farms almost double their output. The Company's operational geography now bears a distinct green footprint across India.



EXISTING OPERATIONS

Mumbai, Maharashtra	2027 MW
(Trombay - 1330 MW + Unit 8 - 250 MW + Hydro - 447 MW)	
Jojobera, Jharkhand	428 MW
Power House # 6, Jamshedpur	120 MW
Belgaum, Karnataka	81 MW
Haldia, West Bengal	120 MW
Supa, Maharashtra	17 MW
Khandke, Maharashtra	50 MW
Bramanvel, Maharashtra	11 MW
Gadag, Karnataka	50 MW
Samana, Gujarat	50 MW
Sadawaghapur, Maharashtra	18 MW
Visapur, Maharashtra	4 MW
NDPL (Distribution)	1259 MW
Powerlinks (Tala Transmission)	1200 KM

PROJECTS UNDER IMPLEMENTATION

Thermal Projects	
Mundra, Gujarat	4000 MW
Maithon, Jharkhand	1050 MW
Jojobera	120 MW
Lohivalli	40 MW
Renewables	
Visapur, Maharashtra (Wind)	94 MW
Mulshi, Maharashtra (Solar)	3 MW
Hydro Project	
Bhutan	114 MW

FOR GRAPHICAL REPRESENTATION ONLY, NOT TO SCALE.

Business Challenge

- Automation of KPI Monitoring
- Multiple sources reporting at various levels
- Make the KPI data flow streamlined.
- Provide precise feedback on performance with better data to investigate.
- Give real time visibility to management.
- No single source of information.

Solution

- Leverage existing operational data sources like DCS, SCADA and other automation systems like ABT/AMI to PI System in divisional level.
- Setup a Central PI System to acquire data from all divisional PI servers.
- Make Central PI Server the only source of truth for all MIS/KPI systems for operational data in the company.

Our Journey



PI Servers in all Generating Stations & Transmission.

Central PI server

Energy data from ABT System

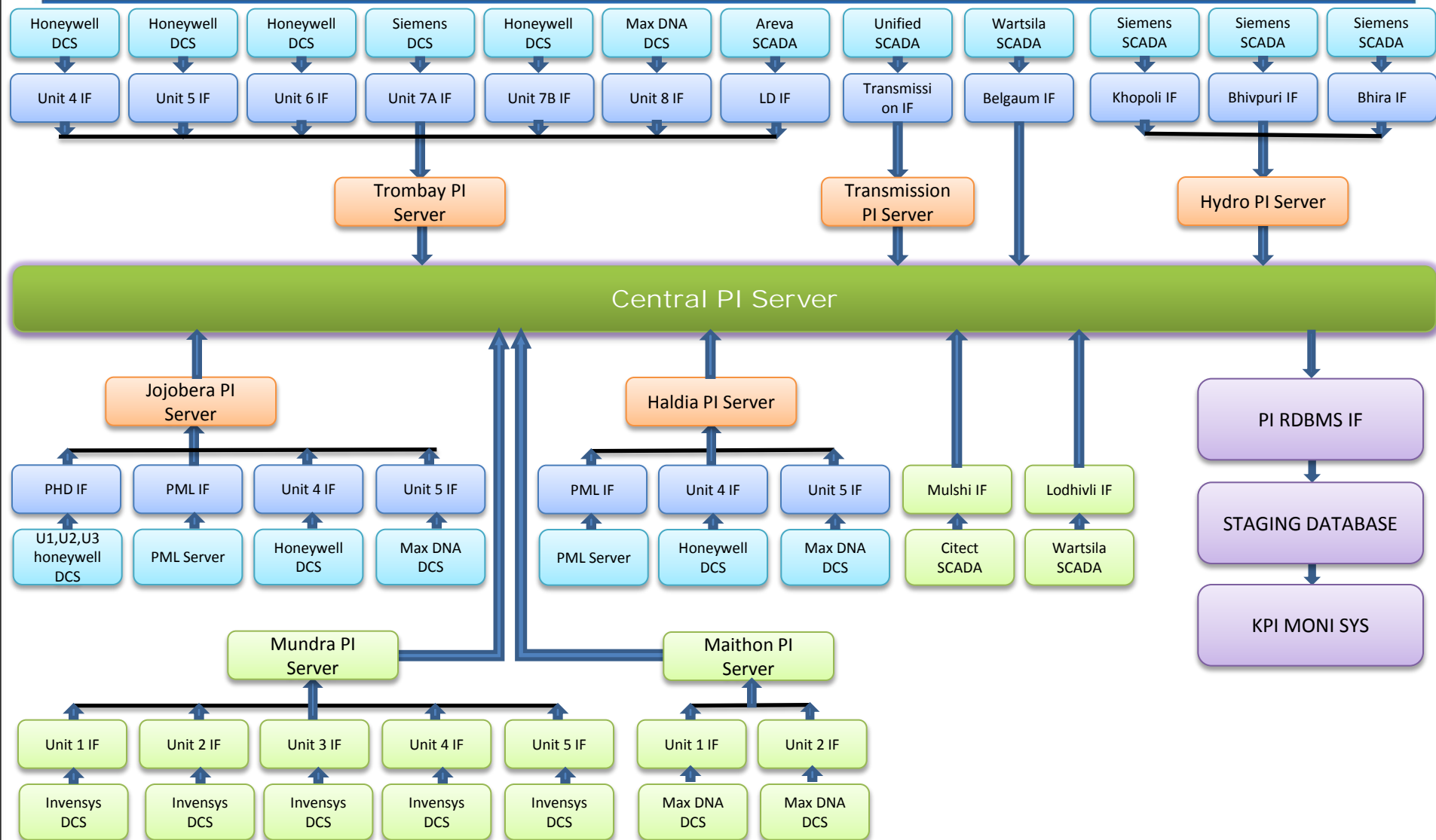
RDBMS Interface

PSA

Automated data transfer to KPI monitoring system

Web based Operations Performance Monitoring System

Our Journey



Our Utilization of PI



KPI Monitoring System

- KPI Parameters are automated. Monthly values of KPIs are calculated in PI server and transferred to KPI Monitoring System on the first week of the month using a trigger. Non automated KPIs are manually entered into PI server by the divisions.

OPMS(Online Performance Monitoring System)

- Customized web dashboard for the top management . OPMS features with real time data, historical data, day wise scrolling facility, division wise and consolidated dashboards.

Our Utilization of PI



Sankalp

- Structured, Time bound, Team based program with top management support & bottom up approach to impact the company's bottom line with minimal investment in shortest possible time.
- Uses the creativity and energy of the people of Tata Power and all its stakeholders
- Utilizes Online Data from PI System to take informed decisions.

PSCC (Power System Control Centre)

- Central operation & monitoring station for Generation, Transmission & Distribution.
- Utilizes ABT data from PI system for monitoring and report making.

Our Utilization of PI-AF



Online Reports

- Generation and maintenance reports required by operation, automatically generated from PI AF and sent to the operation team using PI notifications.
- KPI Parameter reports to MIS personnel at each site.
- Hourly generation and PLF reports to the top management on email from PI AF.

Our Experience

- Single source of information.
- KPI monitoring is automated.
- Top management trusts only on automated data.
- Great achievements in performance and efficiency in operation due to the availability of data at finger tips.
- Great reduction in man-power for the generation of reports.
- Instantaneous monitoring of generation and transmission is easier.
- Full fledged ABT system is available in PI server. AF used extensively for this.
- Automated schedules as well as last interval generation are available for the operation in the same display.
- Wide acceptability for PI data.

Way Ahead



- Self Sufficient

Already done PI server installation and commissioning on our own.

- Central monitoring

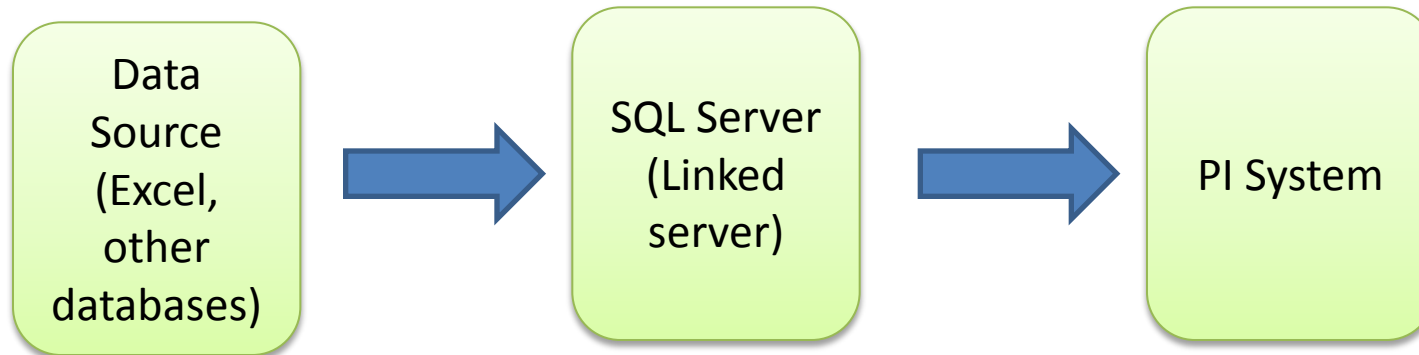
Set up a Central Monitoring Station for all thermal generating stations for improving the performance and efficiency.

- Diagnostics and Predictive analysis

Use third party software for diagnostics and early alarming to improve the availability of the plant.

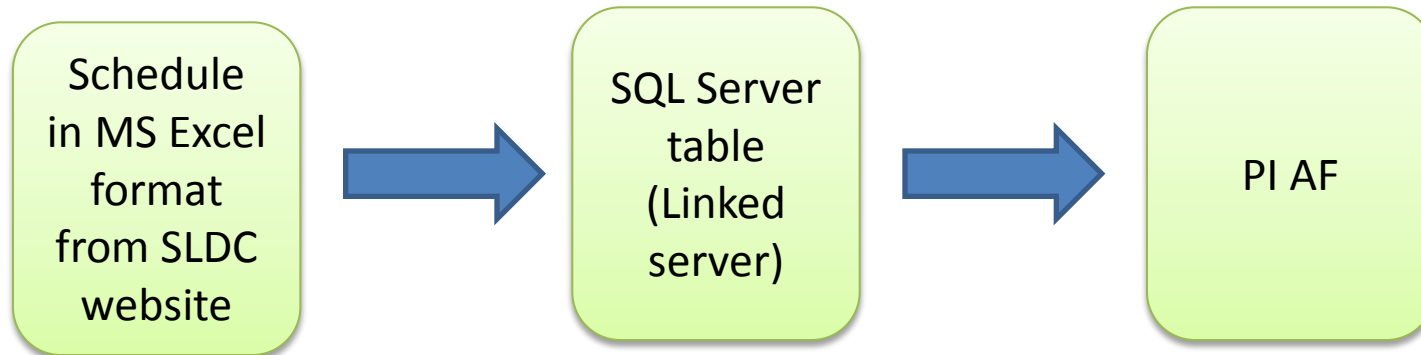
Data Enhancements and Automation

Data from Linked Server



- Source database does not contain time based primary key.
- Scan based data transfer from ABT system database into PI server resulted in erratic and intermittent data.
- SQL Server used as a intermediate linked database for the data collection from external systems like MS excel and other data bases to PI. Update & refresh frequency increased.
- Data processing and addition of timestamp in SQL server.
- Utilizes the capabilities of SQL server.

Generation Schedule Automation



- Generation schedules in excel format from SLDC website.
- Import excel data to SQL server table.
- Mapping timestamps with the data
- Transfer data from SQL server to PI.
- Unit availability calculated from tentative schedules, actual schedules and generation parameters.

ABT System Using PI Data

- ABT regime started in Maharashtra state, India from August 2011.
- Acquisition of data from ABT System deployed for Mumbai Operations.
- SQL Server used as a intermediate linked database for the data collection from ABT system.
- RDBMS Interface connectivity with PI server
- Mumbai Operations assets mapped on AF.
- Displays and trends made with Process book.
- Generation schedules which are available from regulator's web portal, automated using PI AF.

ABT System Using PI Data

- Window for operations for simultaneous comparison of current and previous interval ExBus generation and schedules.
- Reports from PI being utilized by PSCC for planning and forecasting.

ABT System Using PI Data



TROMBAY ABT APPLICATION FROM PI SYSTEM

20/06/2012 11:44:05

UNIT 5

473 MWH

472 MW

10.530 MU

8.790 MU

UNIT 6

450 MWH

463 MW

6.728 MU

3.269 MU

UNIT 7

175 MWH

178 MW

4.200 MU

4.017 MU

UNIT 8

235 MWH

230 MW

5.640 MU

4.971 MU

Current Schedule
for Interval No. 47

Current net
Generation

Daily Target
as per LD

Current MU
Generated

No	SCH.	ACTUAL	UI
1	473	486	
2	473	485	
3	473	486	
4	473	484	
5	473	484	
6	473	485	
7	473	482	
8	430	483	
9	390	482	
10	345	481	

No	SCH.	ACTUAL	UI
1	145	149	
2	145	149	
3	145	147	
4	145	147	
5	145	147	
6	145	147	
7	145	147	
8	145	147	
9	145	147	
10	145	147	

No	SCH.	ACTUAL	UI
1	175	186	
2	175	186	
3	175	186	
4	175	186	
5	175	186	
6	175	189	
7	175	190	
8	175	190	
9	175	189	
10	175	188	

No	SCH.	ACTUAL	UI
1	235	234	
2	235	234	
3	235	234	
4	235	234	
5	235	234	
6	235	234	
7	235	234	
8	235	234	
9	235	234	
10	235	234	

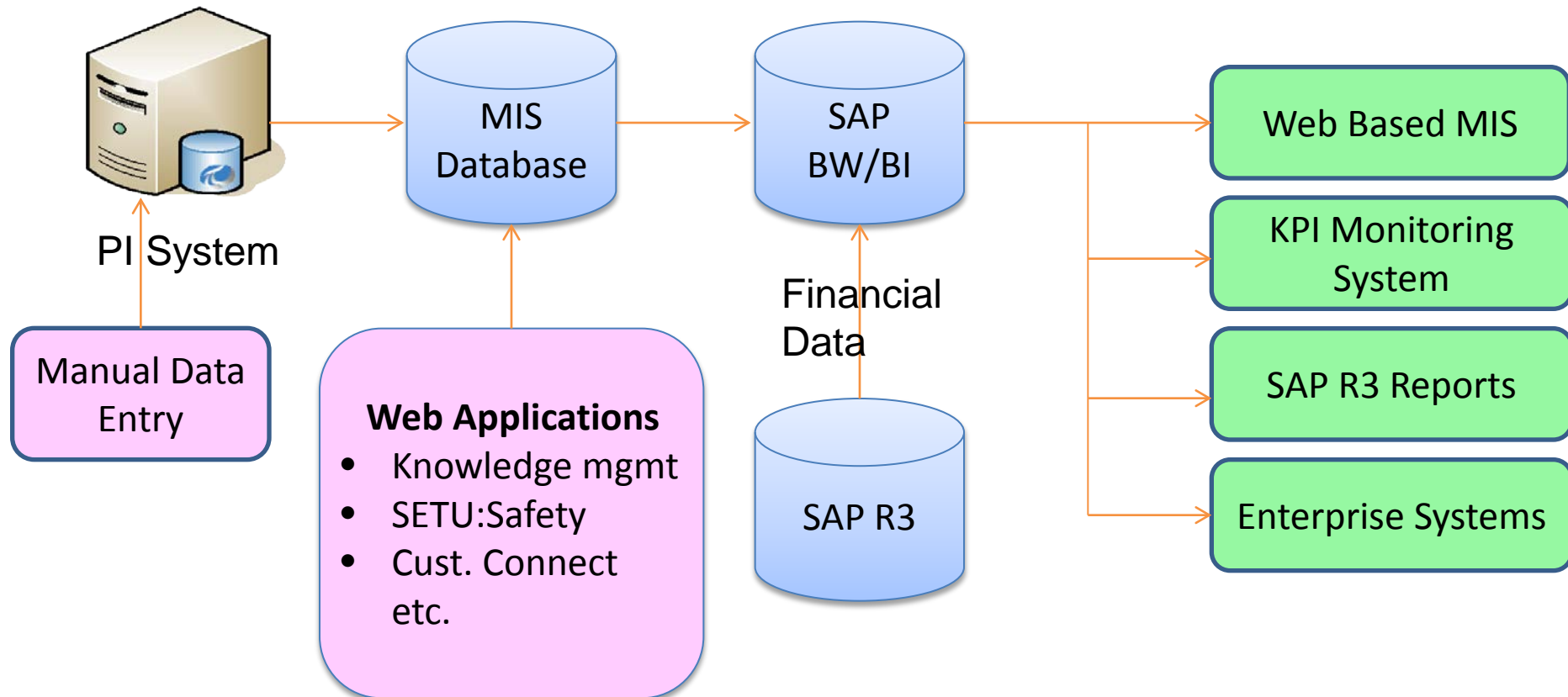
KPI Monitoring

KPI Monitoring

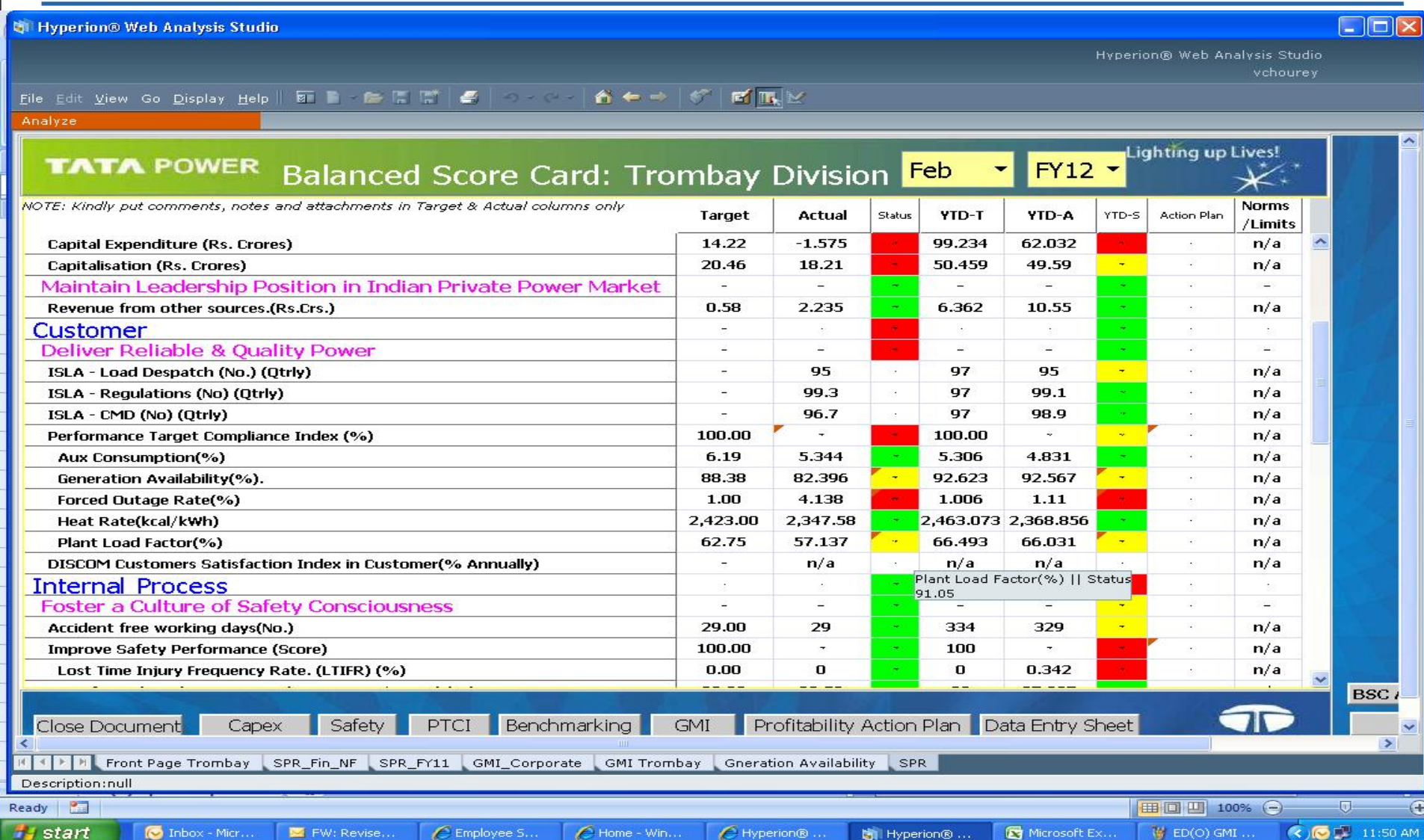


- Enterprise wide Balanced Score Card (BSC) monitored using KPI Monitoring System.
- PI system the only source of data for operational and environmental parameters (GMI) KPI.
- Central PI Server acts as the single source of truth for KPI Monitoring System.

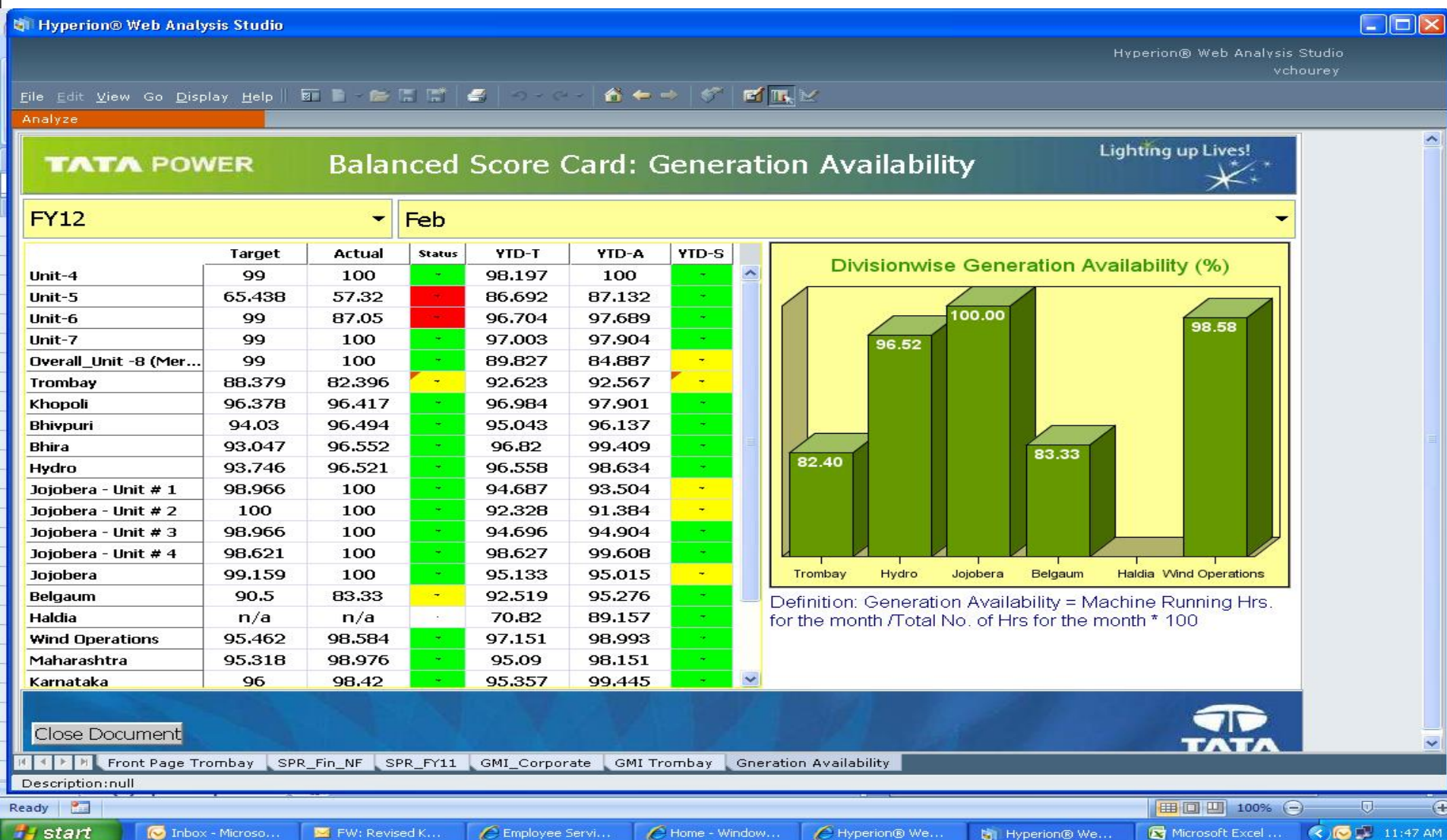
KPI Monitoring



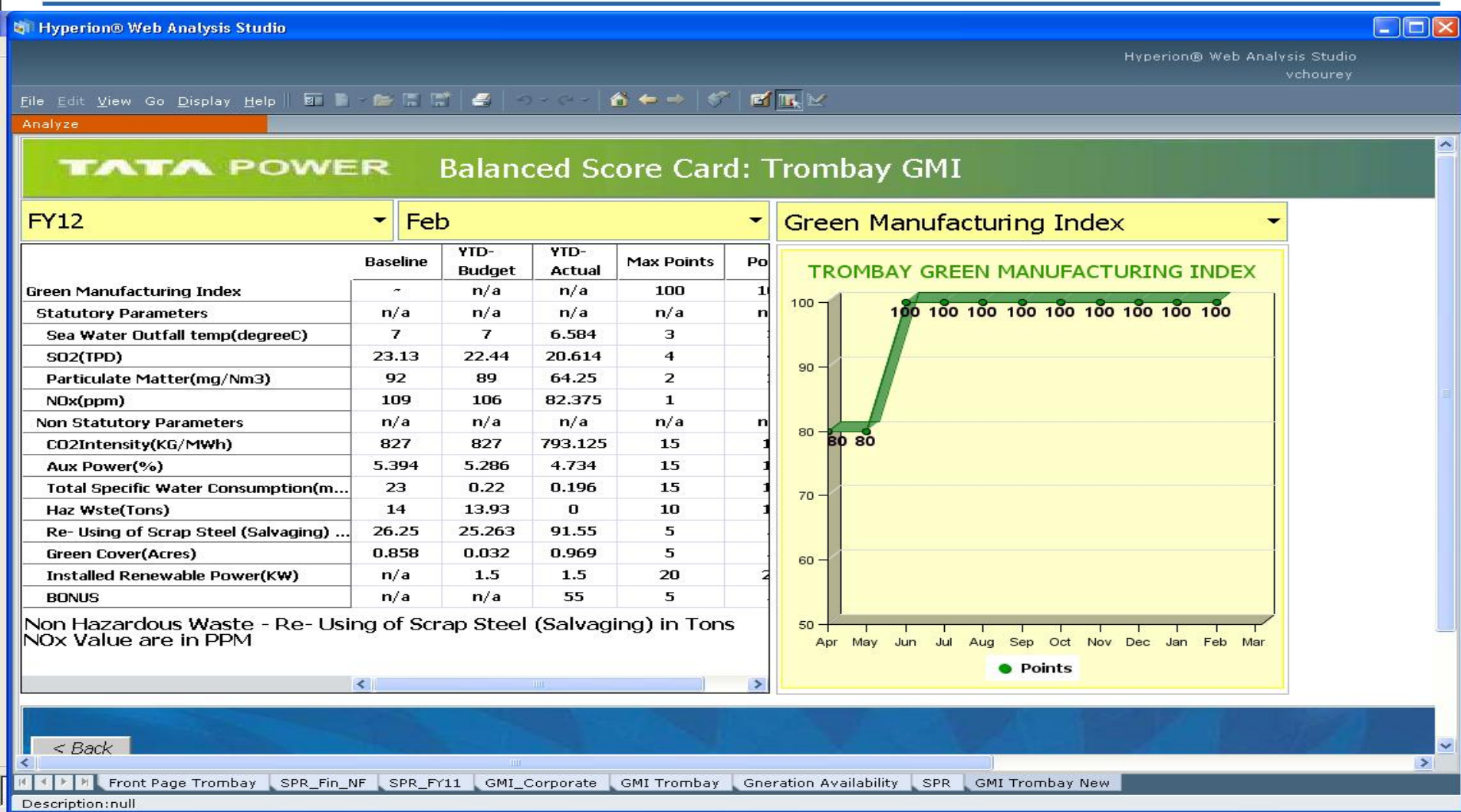
KPI Monitoring



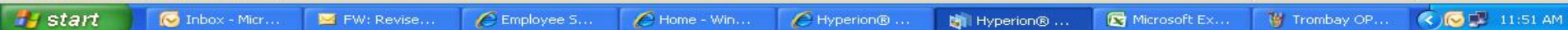
KPI Monitoring



KPI Monitoring



For Help, click Help Topics on the Help Menu.



Thanks