



TRANSFORMING DATA INTO ACTION

Ankit Takle Adityan Sainath

Tata Power

TATA POWER





India's largest integrated private power utility.



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





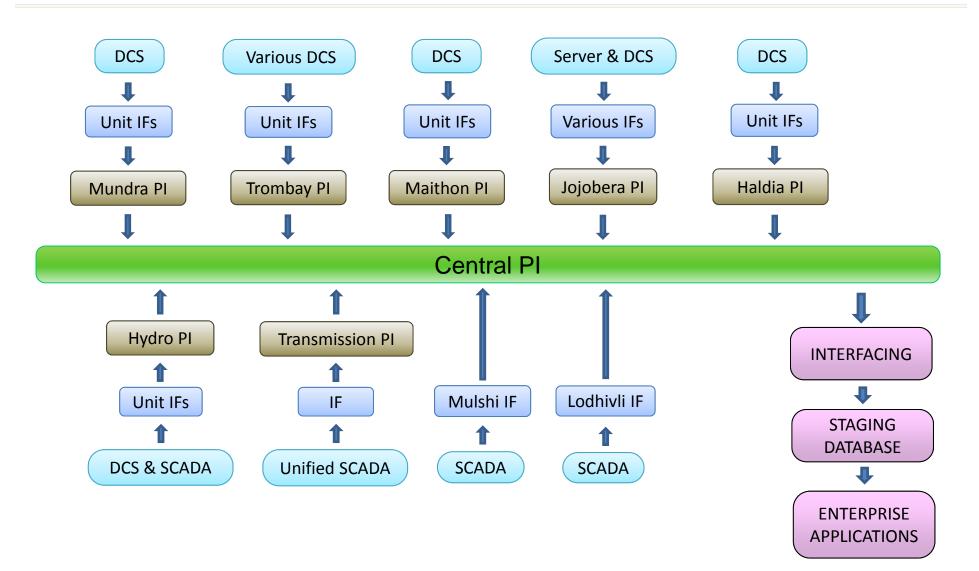
Presence in entire value chain like Generation, Transmission, Distribution, Fuel sourcing, Logistics and Power trading.



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

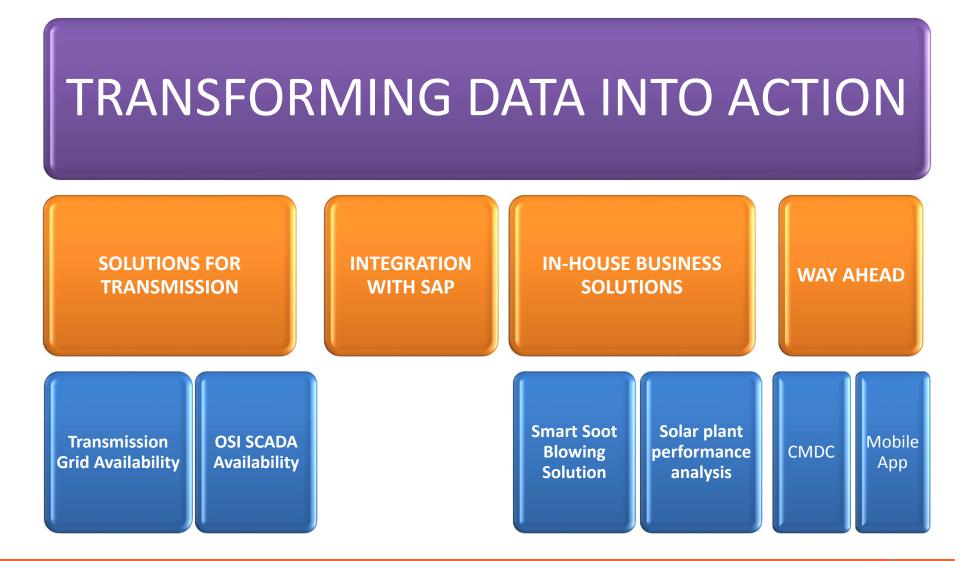
PI SYSTEM AT TATA POWER

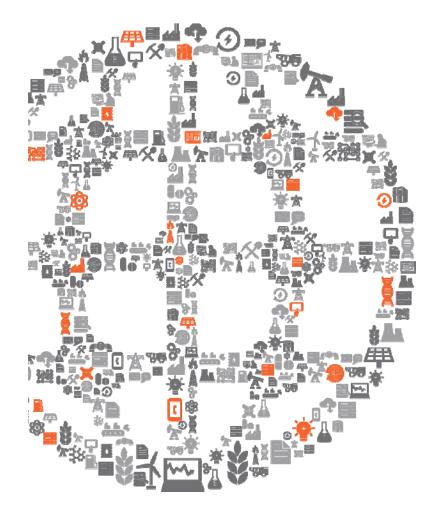




AGENDA









SOLUTIONS FOR TRANSMISSION



Transmission Grid Availability

- Mumbai Transmission grid includes 71 transmission lines and 71 Transformers.
- Status of each equipment of Switchyard of all Generation and Transmission stations made available on PI System.
- Some of the required parameters for this analysis are Station Transformer breaker status, LT breaker status, Line breaker status etc.
- The number of outages are calculated according the data available from the respective PI tags.



Transmission Grid Availability

- Sequential calculations developed in PI System for calculating outage details of lines and Transformers.
- PI Performance equations developed according to the standard Grid calculations and formulae.
- Availability of each line and each Transformer was calculated to provide Grid Availability of entire Transmission grid.

SOLUTIONS FOR TRANSMISSION



SCADA Availability

- Requirement of monitoring SCADA availability at unified as well as station level by Transmission O&M.
- This required calculation of Gateway & RTU availability at instantaneous and daily level.
- Uptime for each station and Total SCADA availability were calculated.
- > AF Structure for the system created

SOLUTIONS FOR TRANSMISSION

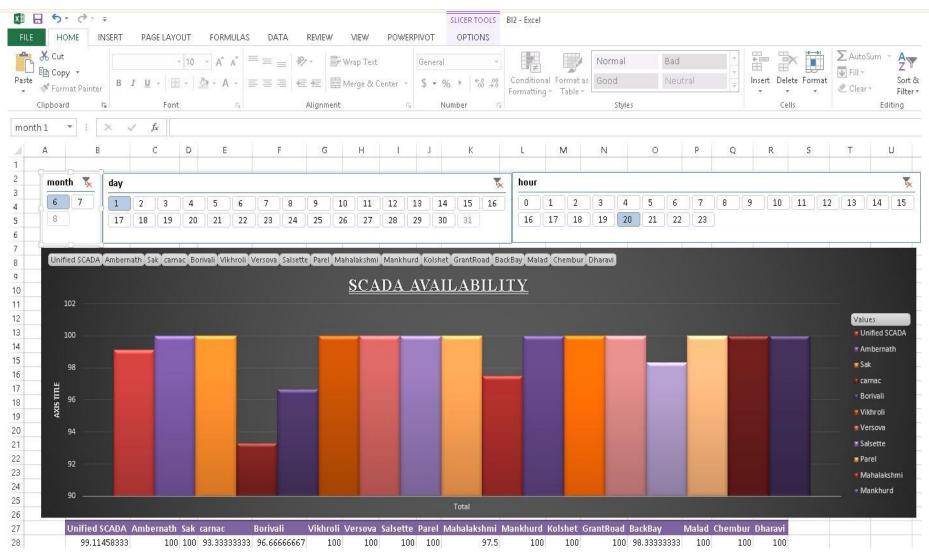
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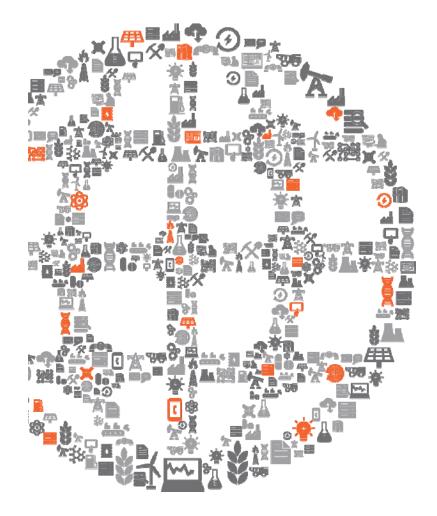




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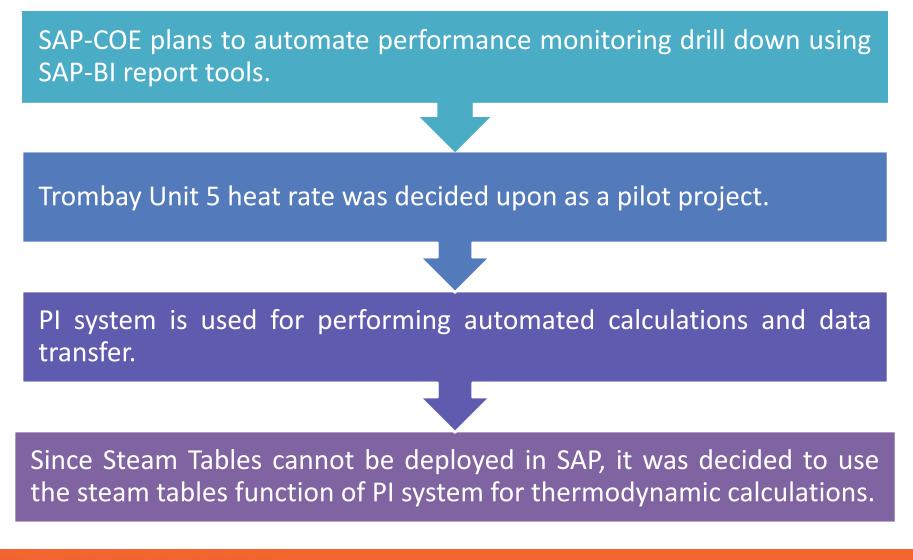


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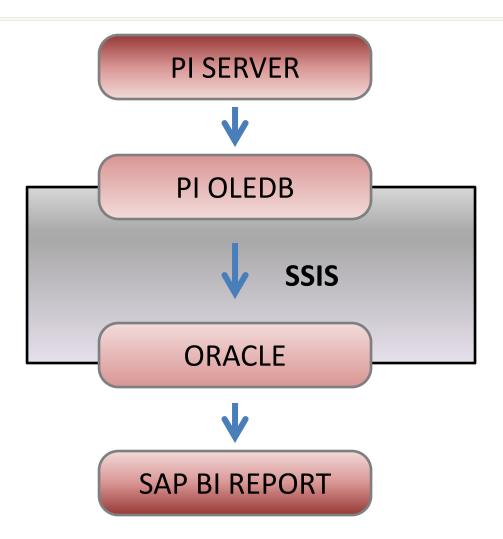




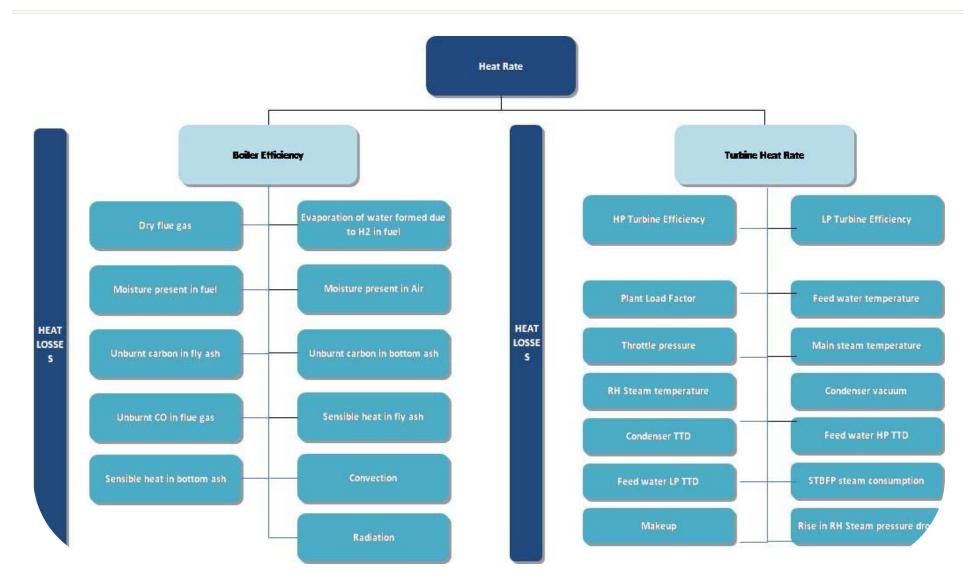














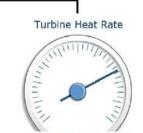
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TATA POWER Lighting up Lives!







83.63 % View Boiler Efficiency

Indudad

GENERATION

Losses in Turbine Heat Rate

HP Turbine Efficiency	85.5 %
IP Turbine Efficiency	88.79 %
Plant load factor	84.43 kcal/kwh
Feed water temperature	0 kcal/kwh
Throttle pressure	0 kcal/kwh
Main steam temperature	10.22 kcal/kwh
RH Steam temperature	0 kcal/kwh
Condensor vacuum	0 kcal/kwh
HP Feed water TTD	0 kcal/kwh
LP Feed water TTD	0 kcal/kwh
Makeup	2.09 kcal/kwh
Rise in RH Steam pressure drop	0 kcal/kwh
Loss due to RH spray	10.57 kcal/kwh



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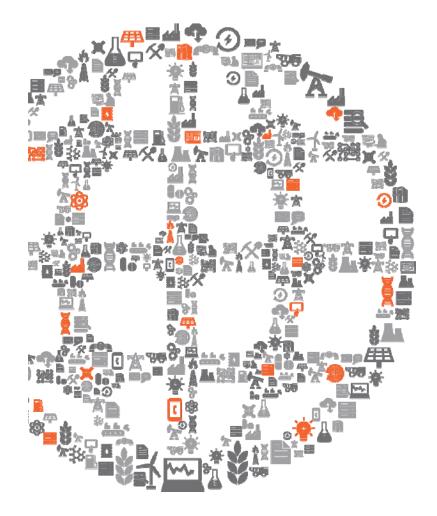




GENERATION

Losses in Boiler Efficiency

Dry flue gas	5.96 %
Evaporation of wtr formed due to H2 in fuel	4.45 %
Moisture present in fuel	4.87 %
Moisture present in Air	0.31 %
Unburnt carbon in fly ash	0.62 %
Unburnt carbon in bottom ash	0.15 %
Unburnt carbon in flue gas	0 %
Sensible heat in fly ash	0 %
Sensible heat in bottom ash	0 %
Convection	0 %
Radiation	0 %



IN-HOUSE BUSINESS SOLUTIONS



IN-HOUSE BUSINESS SOLUTIONS



Overview

Applications developed by combining the features of PI functionality, MS Excel/Processbook and VBA.

> Historical data obtained from PI system is processed using VBA.

> Advice given to users using this empirical data.

Application also consists of a User-friendly front end.



Smart Soot Blowing Solution

- Traditional Soot Blowing operations to clean ash deposited on Boiler tubes cannot have an overall impact on Boiler efficiency.
- Application is developed that analyzes effect of individual soot blowers in various conditions.
- Application developed for Trombay Thermal power plant.

IN-HOUSE BUSINESS SOLUTIONS



Smart Soot Blowing Solution

The salient features of the application:

- > Dynamically updating historical data
- Coal Mill combination using PI-ACE
- Pattern recognition
- Frequency/Impact/Elevation based guidance of soot blower operation
- Control flow feature of VBA



Smart Soot Blowing Solution

Group of most effective soot blowers is suggested to Operators for prioritizing operation of soot blowers.

Maximum impact on Boiler Efficiency, its effect is evident in improvement in SH temp, DM Water consumption and Heat Rate.

IN-HOUSE BUSINESS SOLUTIONS



Smart Soot Blowing Solution

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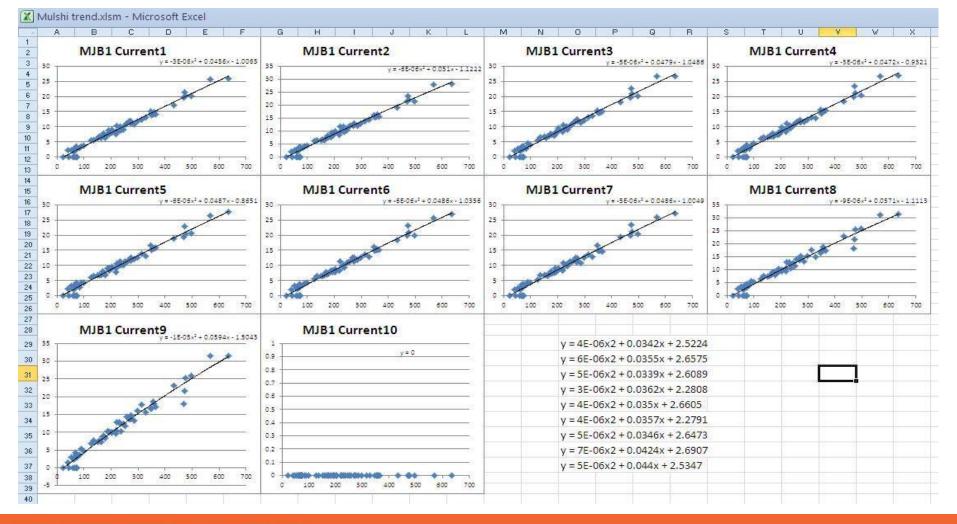


Solar plant performance analysis

- > Application is developed which provides direct relationship between solar irradiation and current in the form y = f(x).
- Alarming condition is provided if any deviation from normal condition is observed.
- Helps in predictive analysis of future deviations for solar power plant
- Application developed for Mulshi Solar power plant.



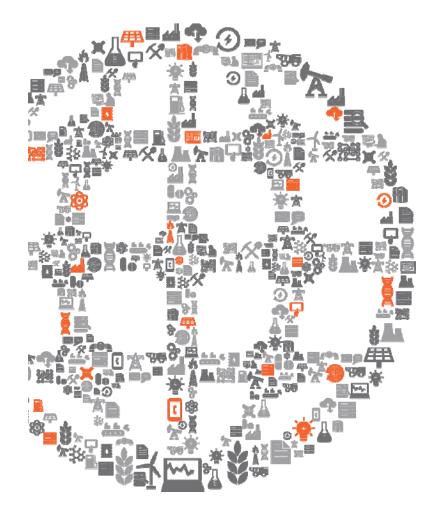
Solar plant performance analysis





Solar plant performance analysis

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5 6	P29	P30	P31	P32	P33	P34	P35	P36	P37	P38	P39	P40	P41	P42	
7 8	P43	P44	P45	P46	P47	P48	P49	P50	P51	P52	P53	P54	P55	P56	
9 10	P57	P58	P59	P60	P61	P62	P63	P64	P65	P66	P67	P68	P69	P70	
11 12	P71	P72	P73	P74	P75	P76	P77	P78	P79	P80	P81	P82	P83	P84	
13 14	P85	P86	P87	P88	P89	P90	P91	P92	P93	P94	P95	P96	P97	P98	
15 16	P99	P100	P101	P102	P103	P104	P105	P106	P107	P108	P109	P110	P111	P112	
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WAY AHEAD

WAY AHEAD



Centralized Monitoring and Diagnostic Centre



Data from decentralized plants to Centralized location

Facilitates Centralized diagnostics and analytics Expert advice from centralized location to decentralized locations





PI System Mobile App

- Application being developed on new generation smart phones to view live real time and cumulative dashboard of Tata Power generation.
- Convenient, easy to use application which is very similar to OPMS web based dashboard.
- > Application supports all Blackberry, Android and iPhone.
- Convenient, easy to use opening/closing, zooming, navigation, login facilities as well as simultaneous use on multiple phones provided.







