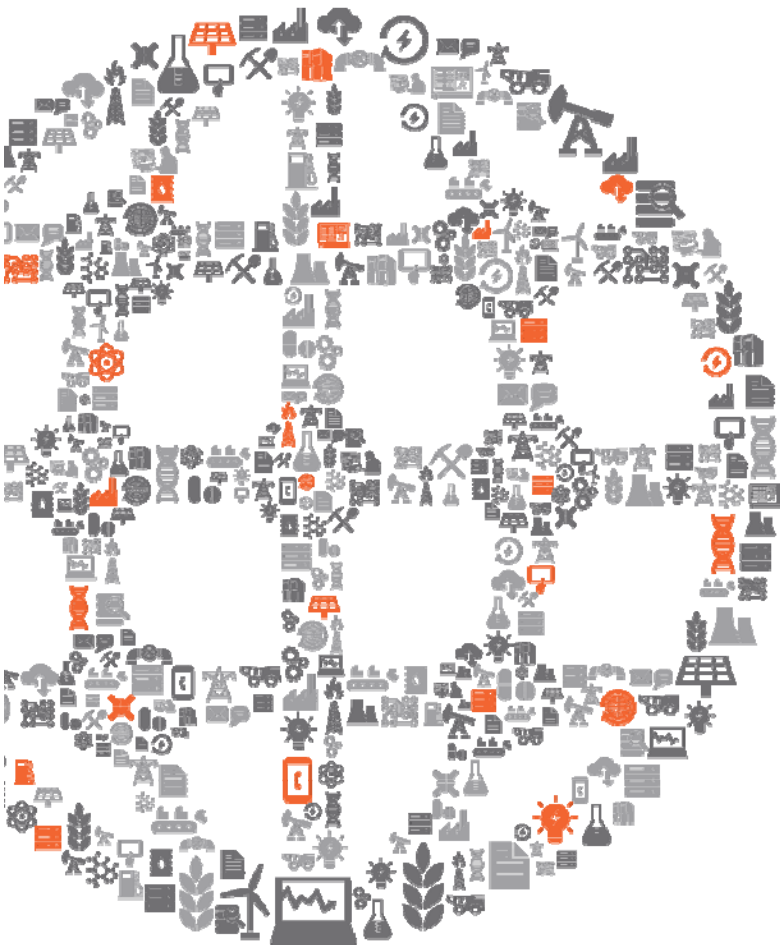


# TRANSFORMING DATA INTO ACTION

**Ankit Takle**
**Adityan Sainath**

**Tata Power**

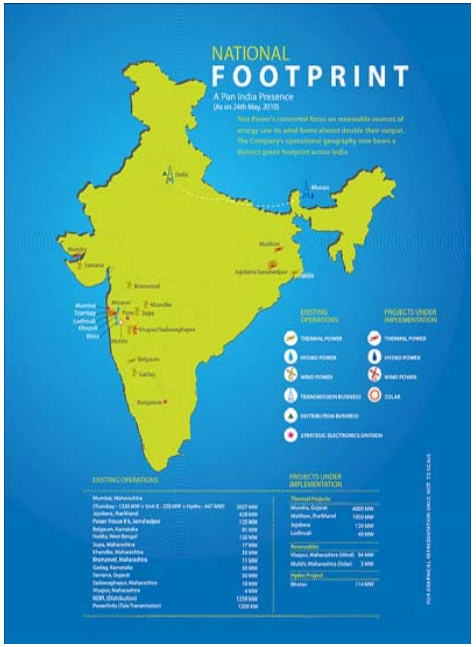
# TATA POWER

India’s largest integrated private power utility.

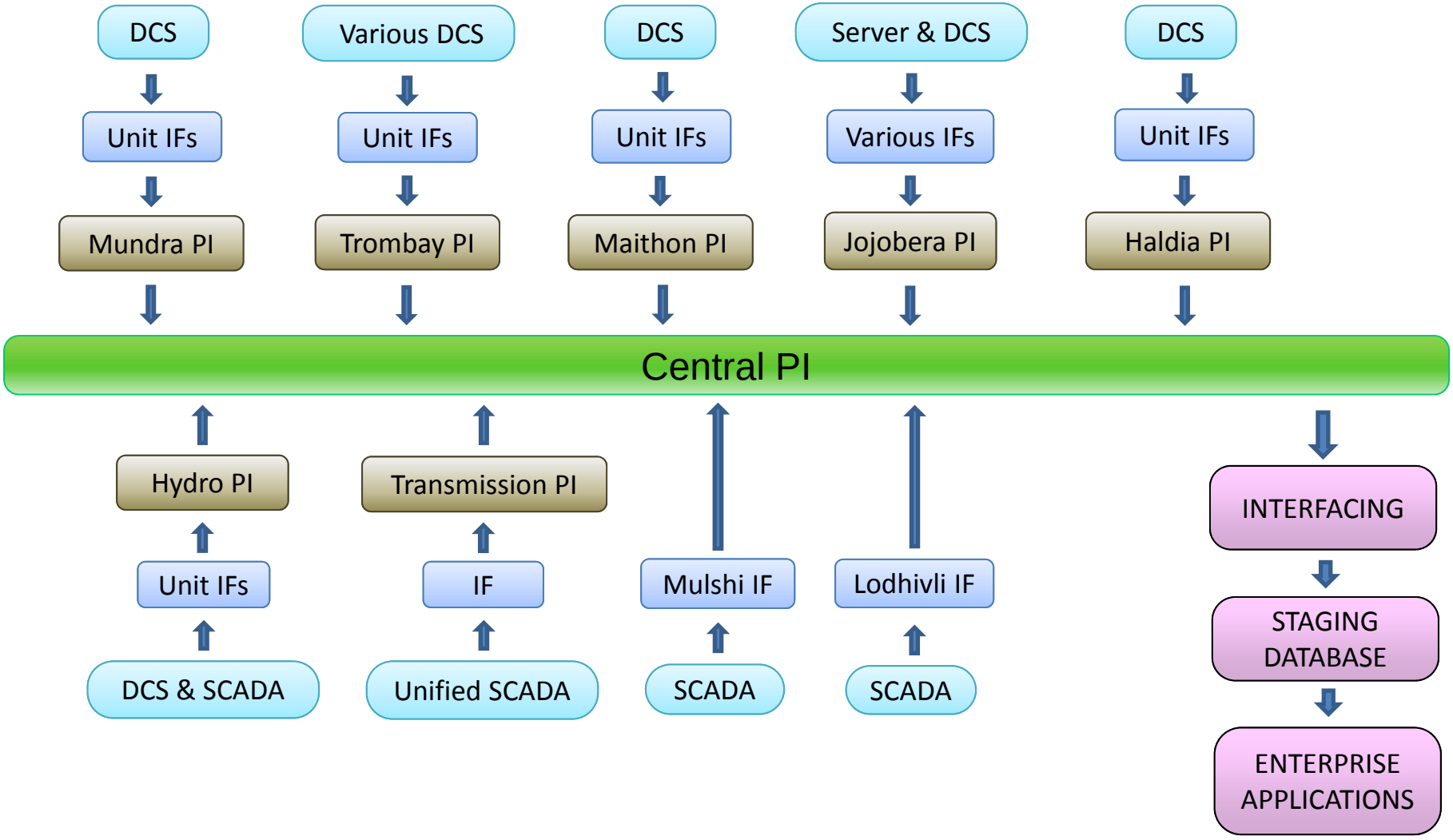
8521 MW Installed capacity (Thermal, Hydro, DG, Solar and Wind)

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

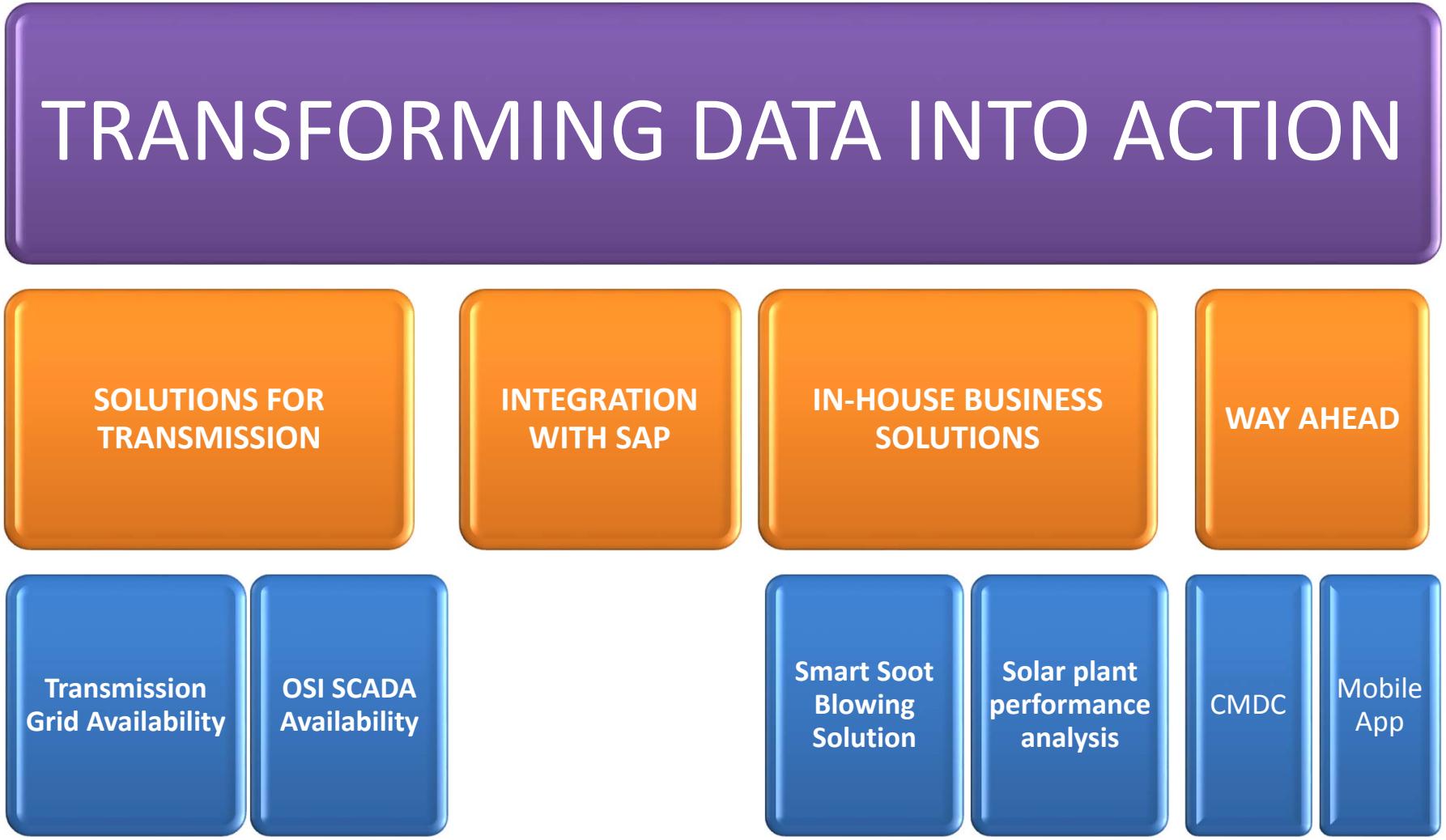
Expanding its horizon beyond India in countries like Australia, Bhutan, Singapore, Indonesia, Nepal, Africa, Netherlands & the Middle East.

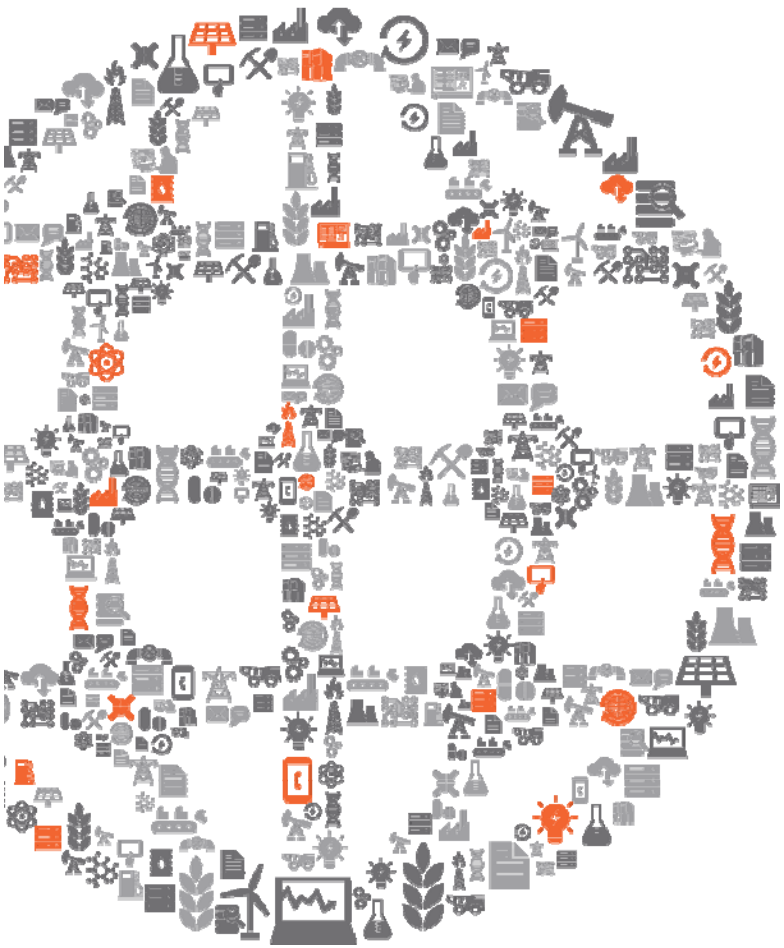


# PI SYSTEM AT TATA POWER



# AGENDA


TRANSFORMING DATA INTO ACTION
SOLUTIONS FOR TRANSMISSION
INTEGRATION WITH SAP
IN-HOUSE BUSINESS SOLUTIONS
WAY AHEAD
Transmission Grid Availability
OSI SCADA Availability
Smart Soot Blowing Solution
Solar plant performance analysis
CMDC
Mobile App



# SOLUTIONS FOR TRANSMISSION

# 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.

# SOLUTIONS FOR TRANSMISSION

## Transmission Grid Availability

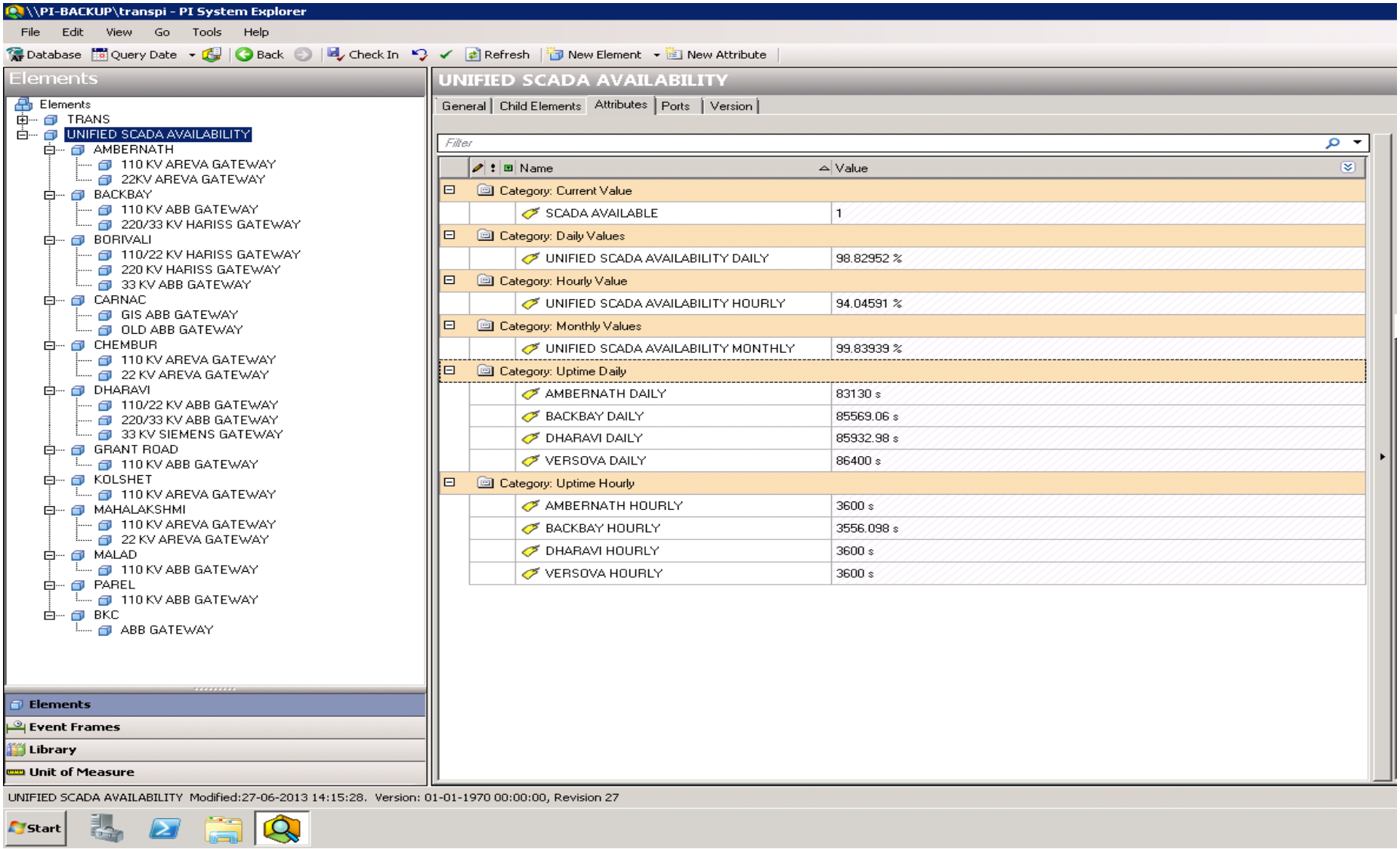
- Sequential calculations developed in PI System for calculating outage details of lines and Transformers.
- PI Performance equations developed according to the standard Grid calculations and formulae.
- Availability of each line and each Transformer was calculated to provide Grid Availability of entire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

# SOLUTIONS FOR TRANSMISSION

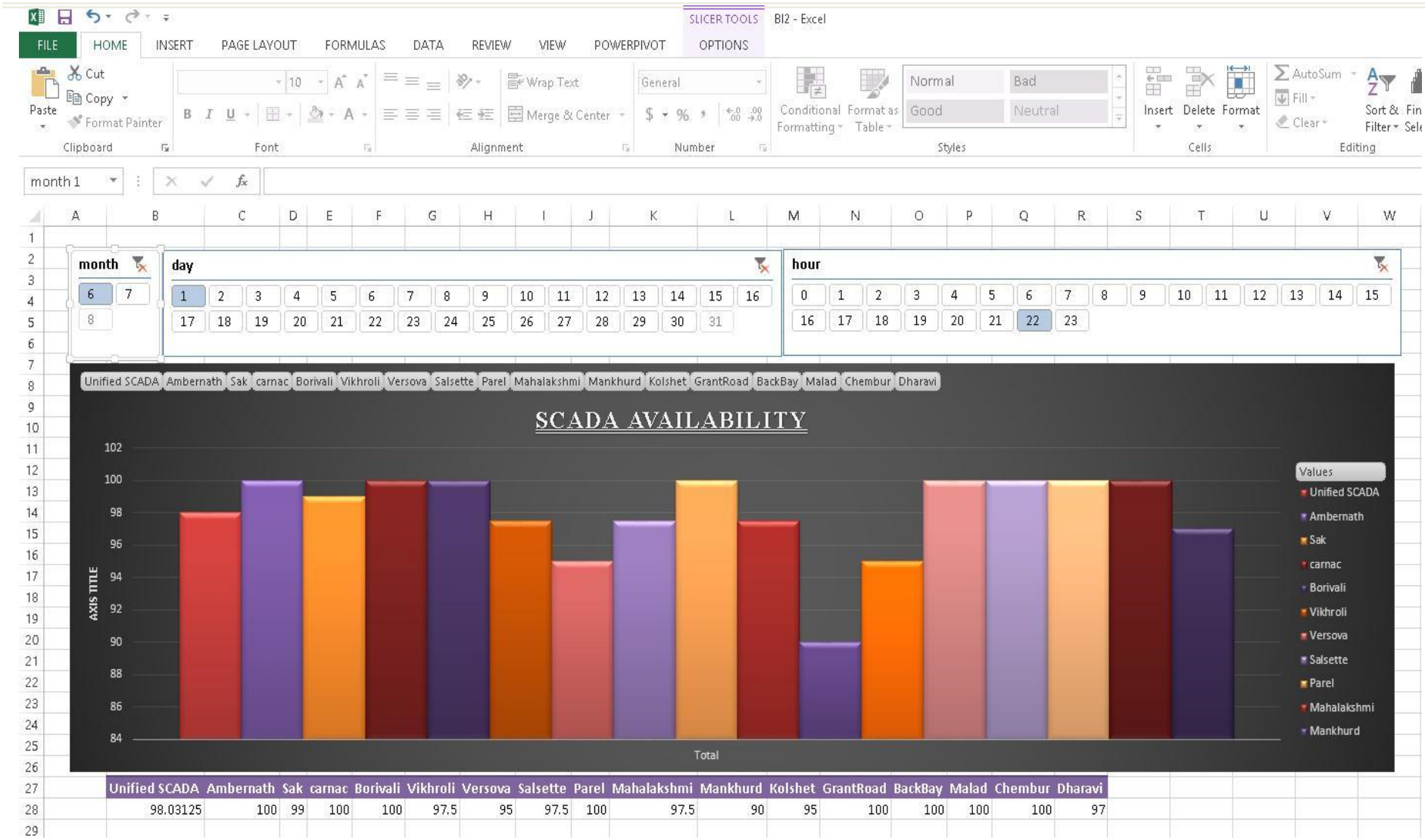
## SCADA Availability

- 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

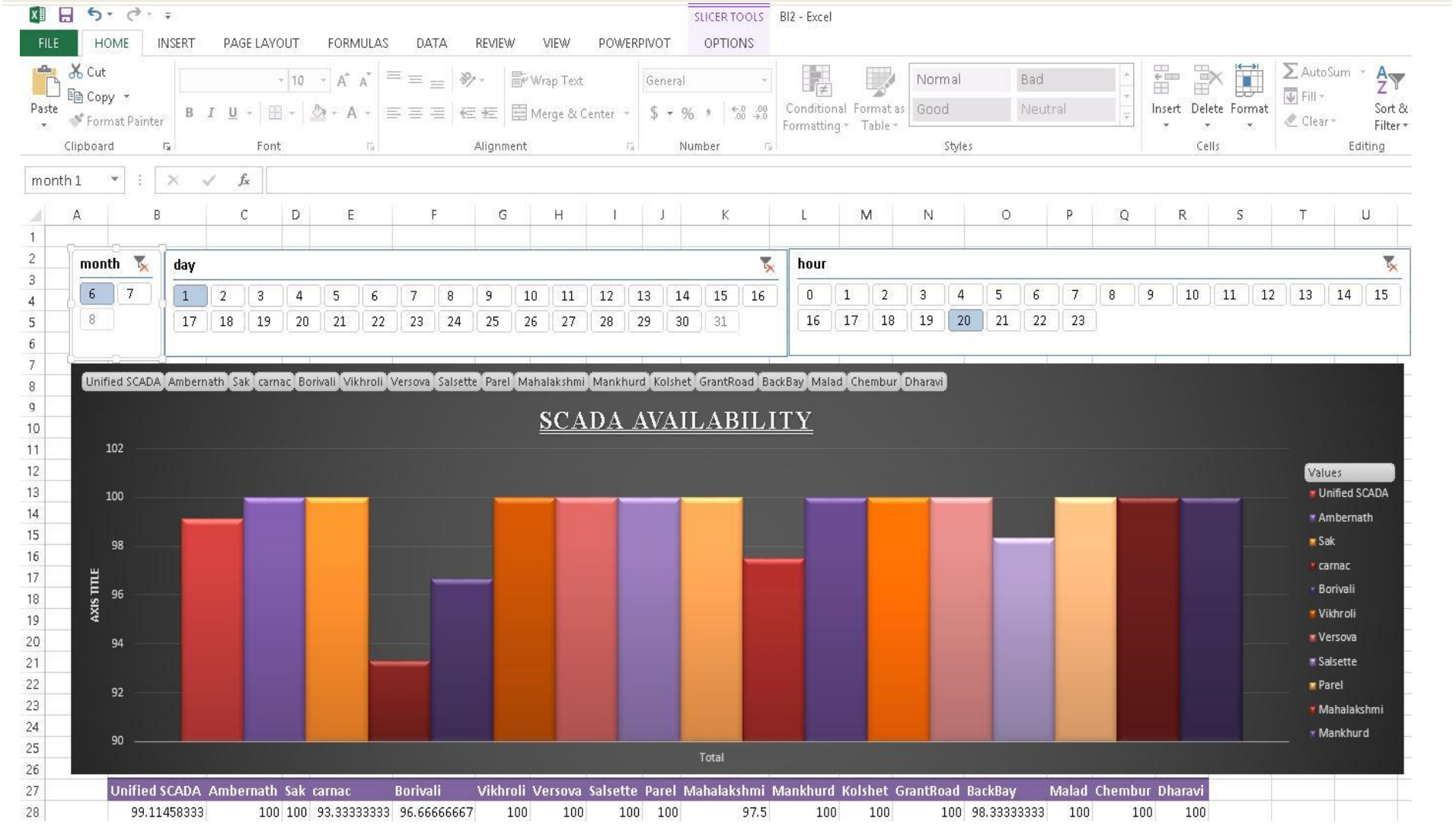


# BI DASHBOARD



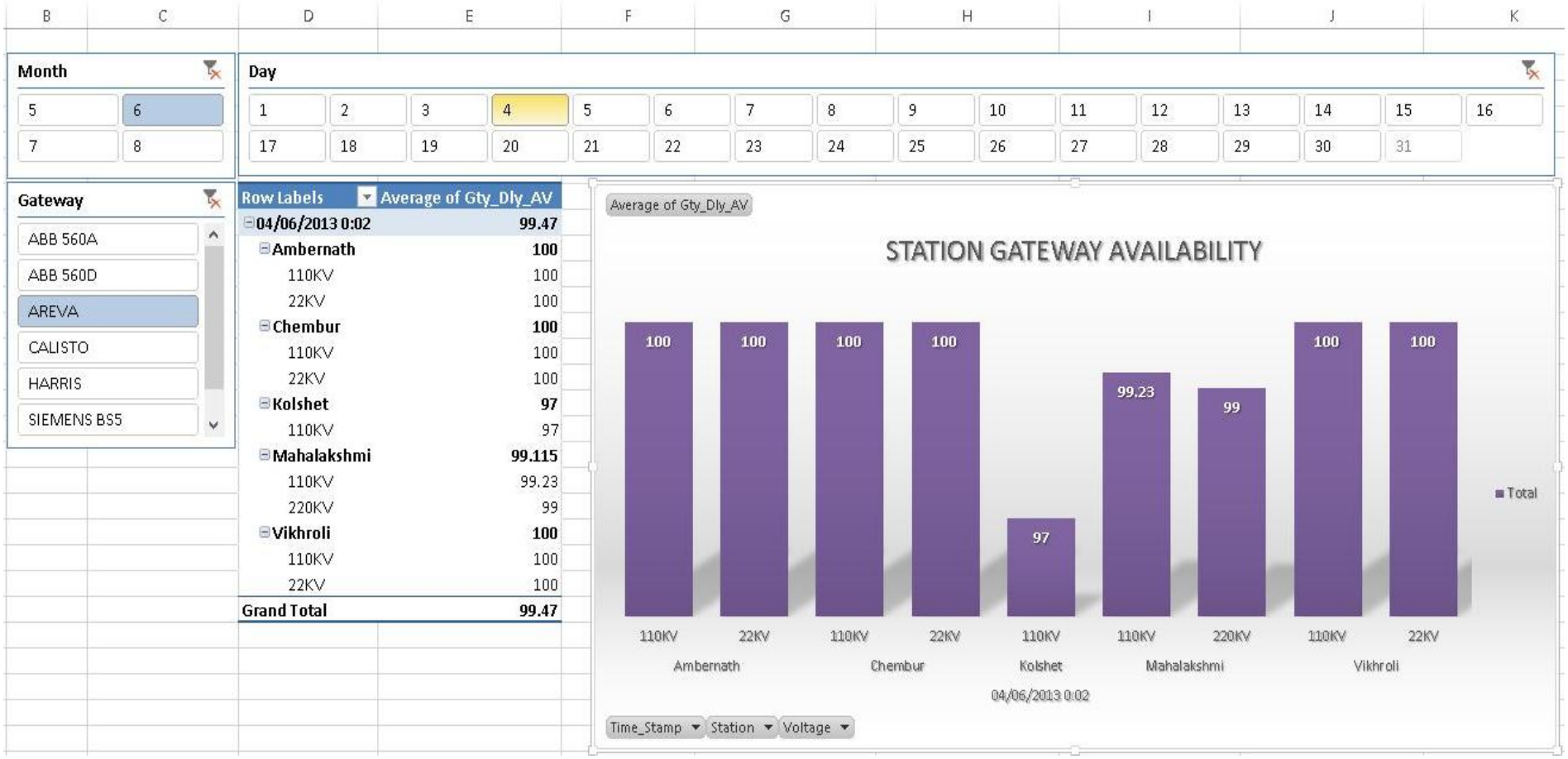

| Unified SCADA | Ambernath | Sak | carnac | Borivali | Vikhroli | Versova | Salsette | Parel | Mahalakshmi | Mankhurd | Kolshet | GrantRoad | BackBay | Malad | Chembur | Dharavi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98.03125 | 100 | 99 | 100 | 100 | 97.5 | 95 | 97.5 | 100 | 97.5 | 90 | 95 | 100 | 100 | 100 | 100 | 97 |

# BI DASHBOARD

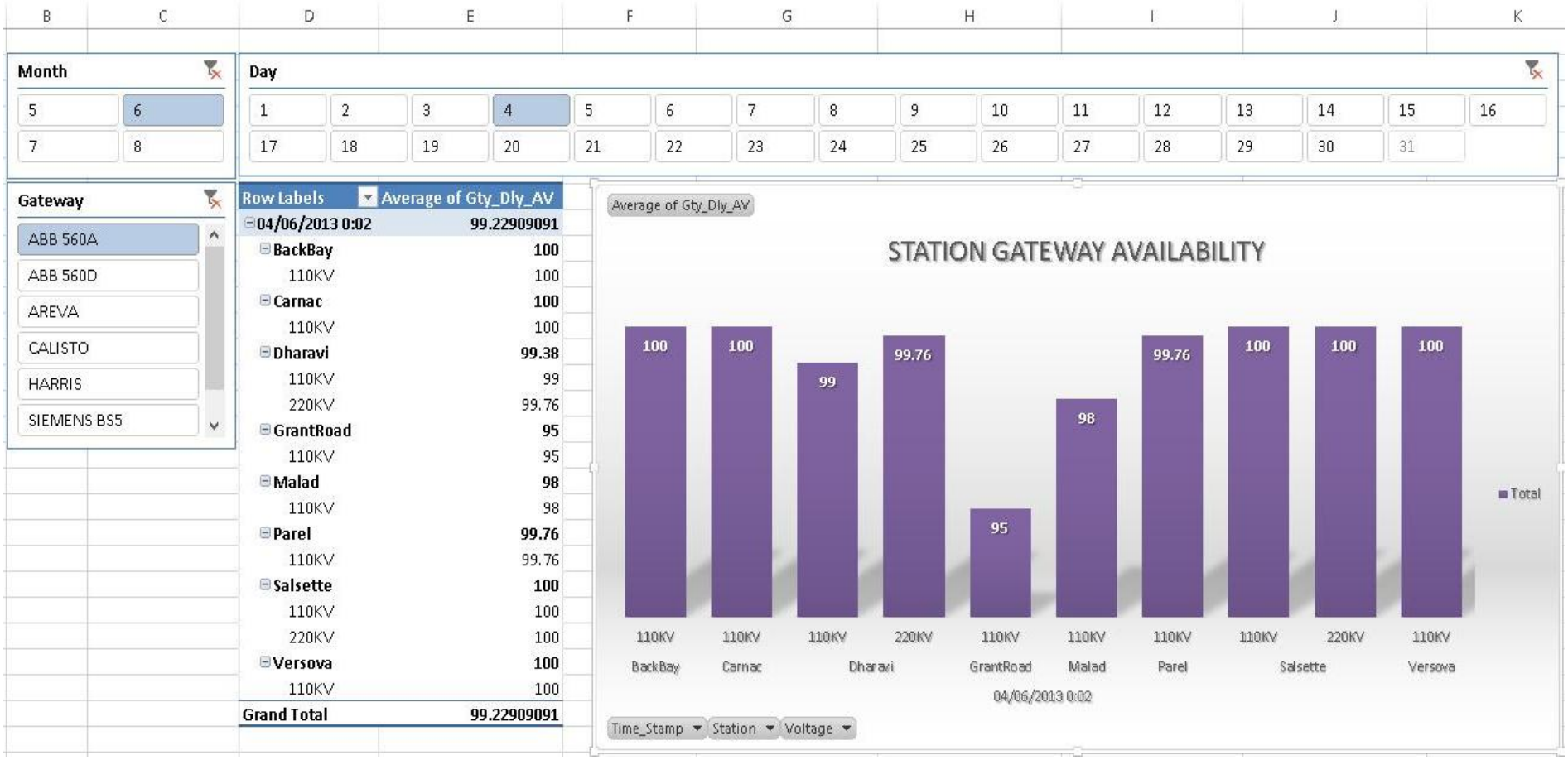


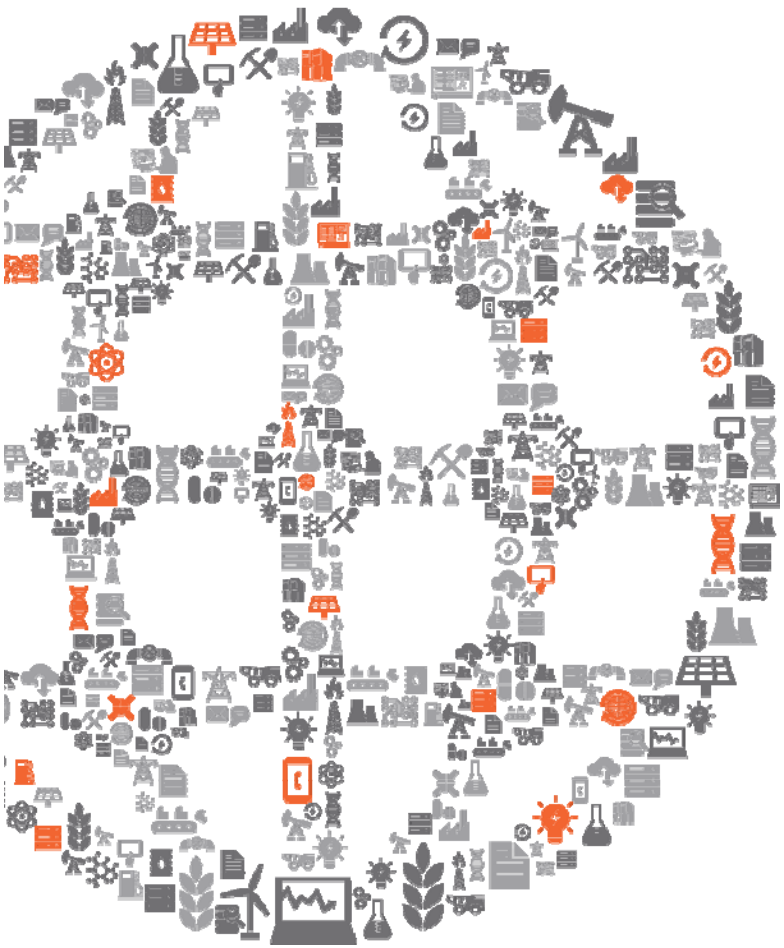

| Unified SCADA | Ambernath | Sak | carnac | Borivali | Vikhroli | Versova | Salsette | Parel | Mahalakshmi | Mankhurd | Kolshet | GrantRoad | BackBay | Malad | Chembur | Dharavi |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 99.11458333 | 100 | 100 | 93.33333333 | 96.66666667 | 100 | 100 | 100 | 100 | 97.5 | 100 | 100 | 100 | 98.33333333 | 100 | 100 | 100 |

# BI DASHBOARD



# BI DASHBOARD





# INTEGRATION WITH SAP

# INTEGRATION WITH SAP

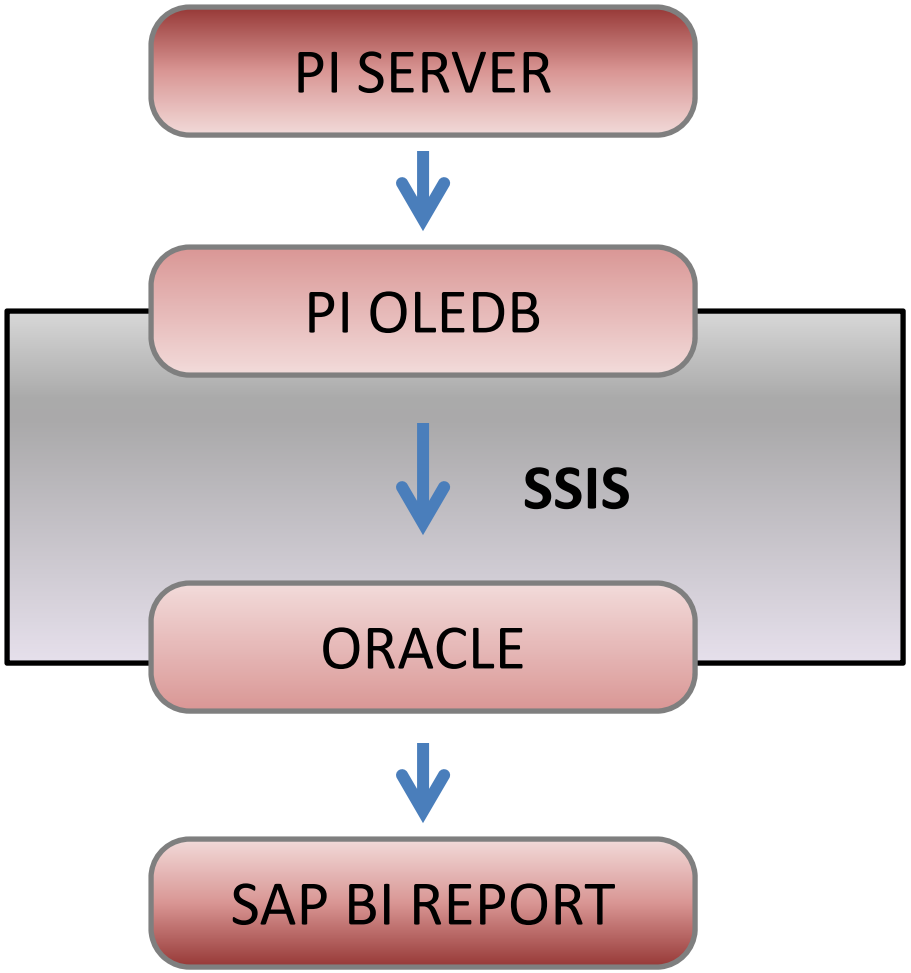
SAP-COE plans to automate performance monitoring drill down using SAP-BI report tools.

Trombay Unit 5 heat rate was decided upon as a pilot project.

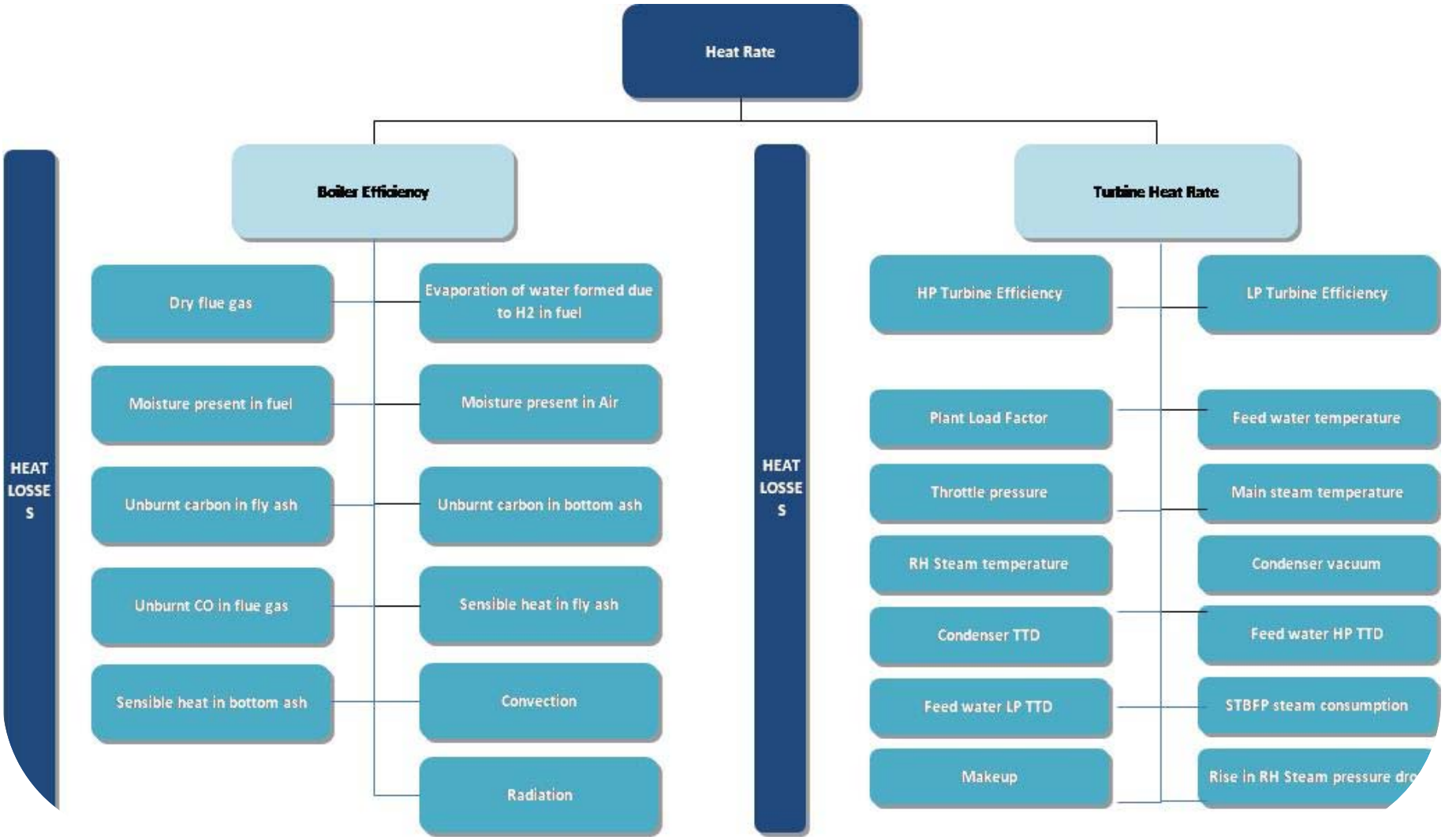
PI system is used for performing automated calculations and data transfer.

Since Steam Tables cannot be deployed in SAP, it was decided to use the steam tables function of PI system for thermodynamic calculations.

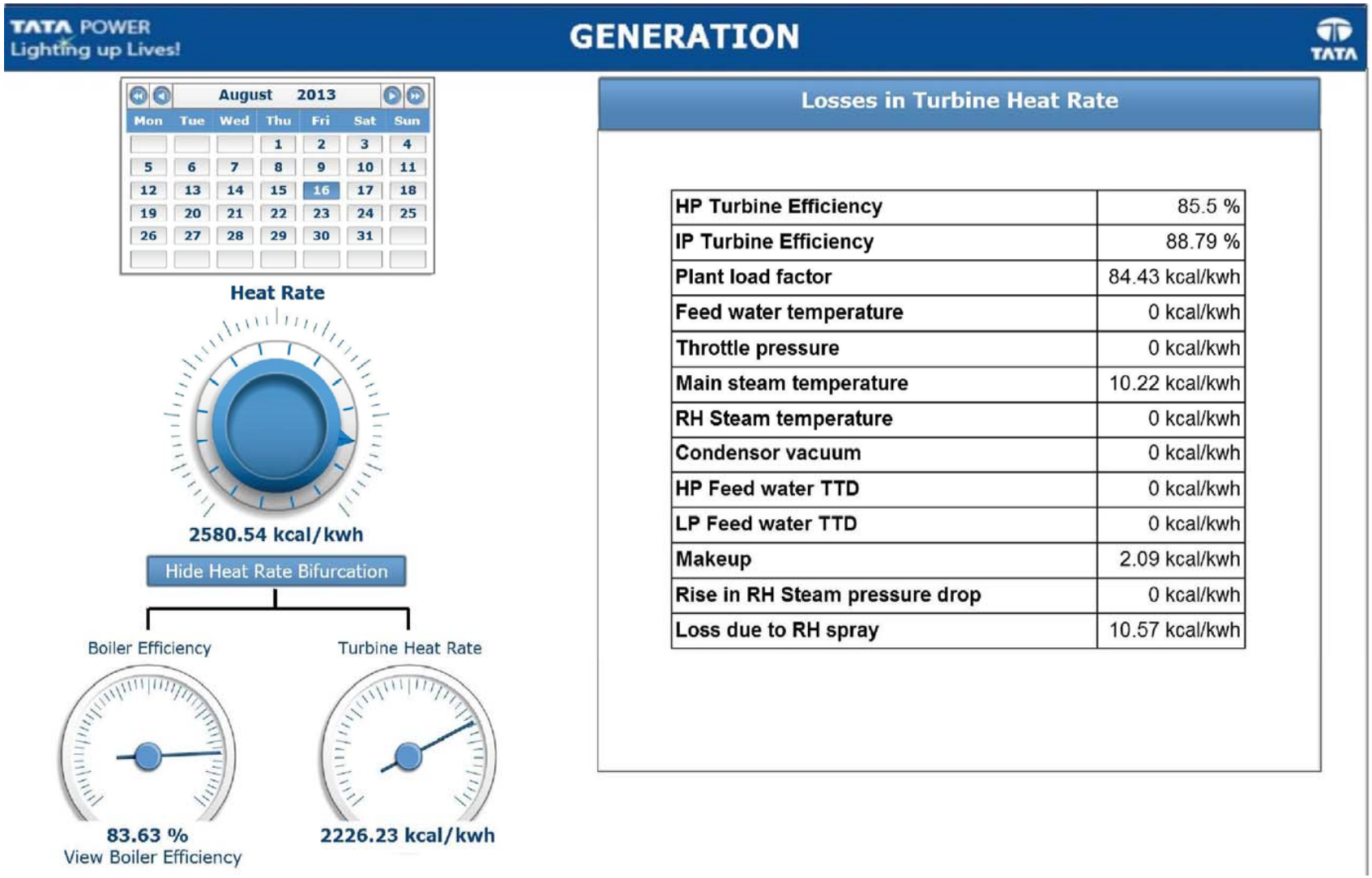
# INTEGRATION WITH SAP



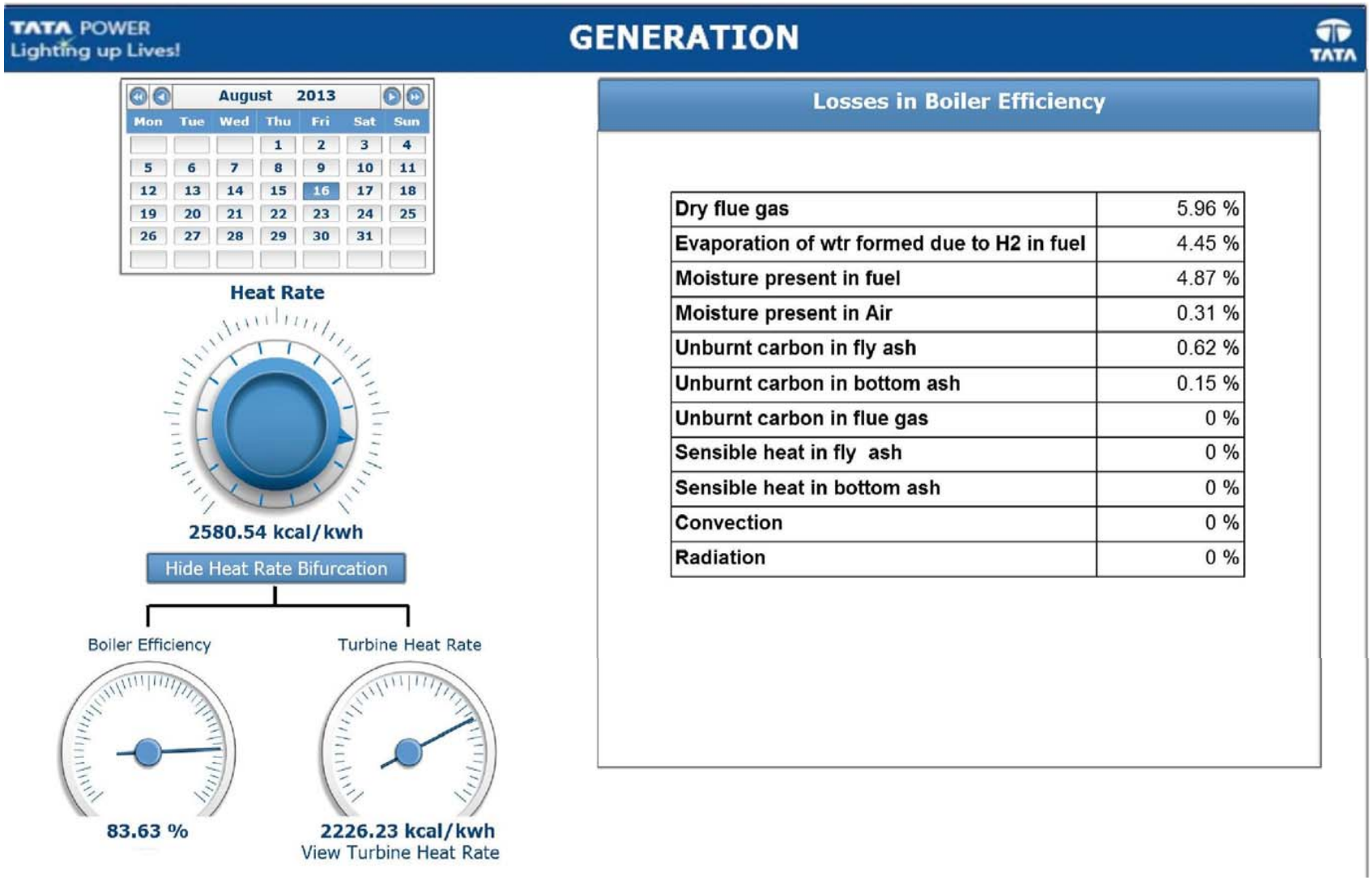
# INTEGRATION WITH SAP

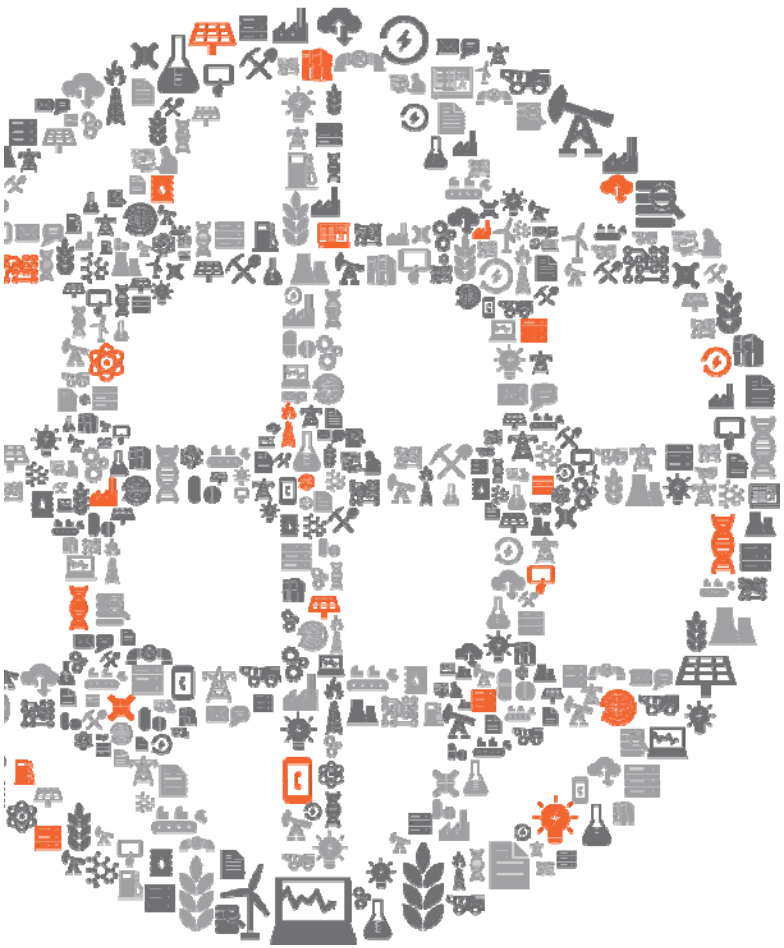


# INTEGRATION WITH SAP



# INTEGRATION WITH SAP





# 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.

# IN-HOUSE BUSINESS SOLUTIONS

## 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

# IN-HOUSE BUSINESS SOLUTIONS

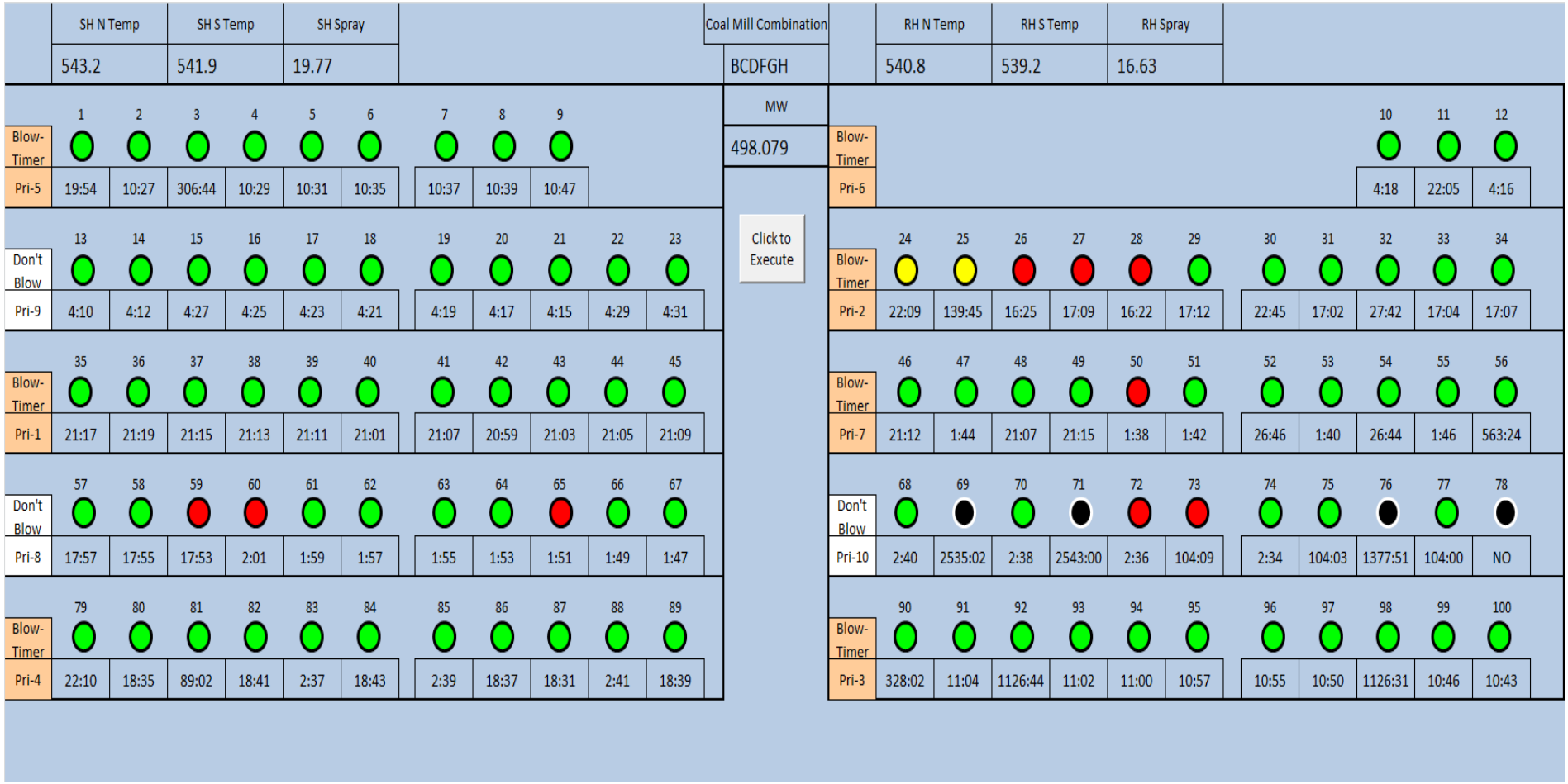
## Smart Soot Blowing Solution

- 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

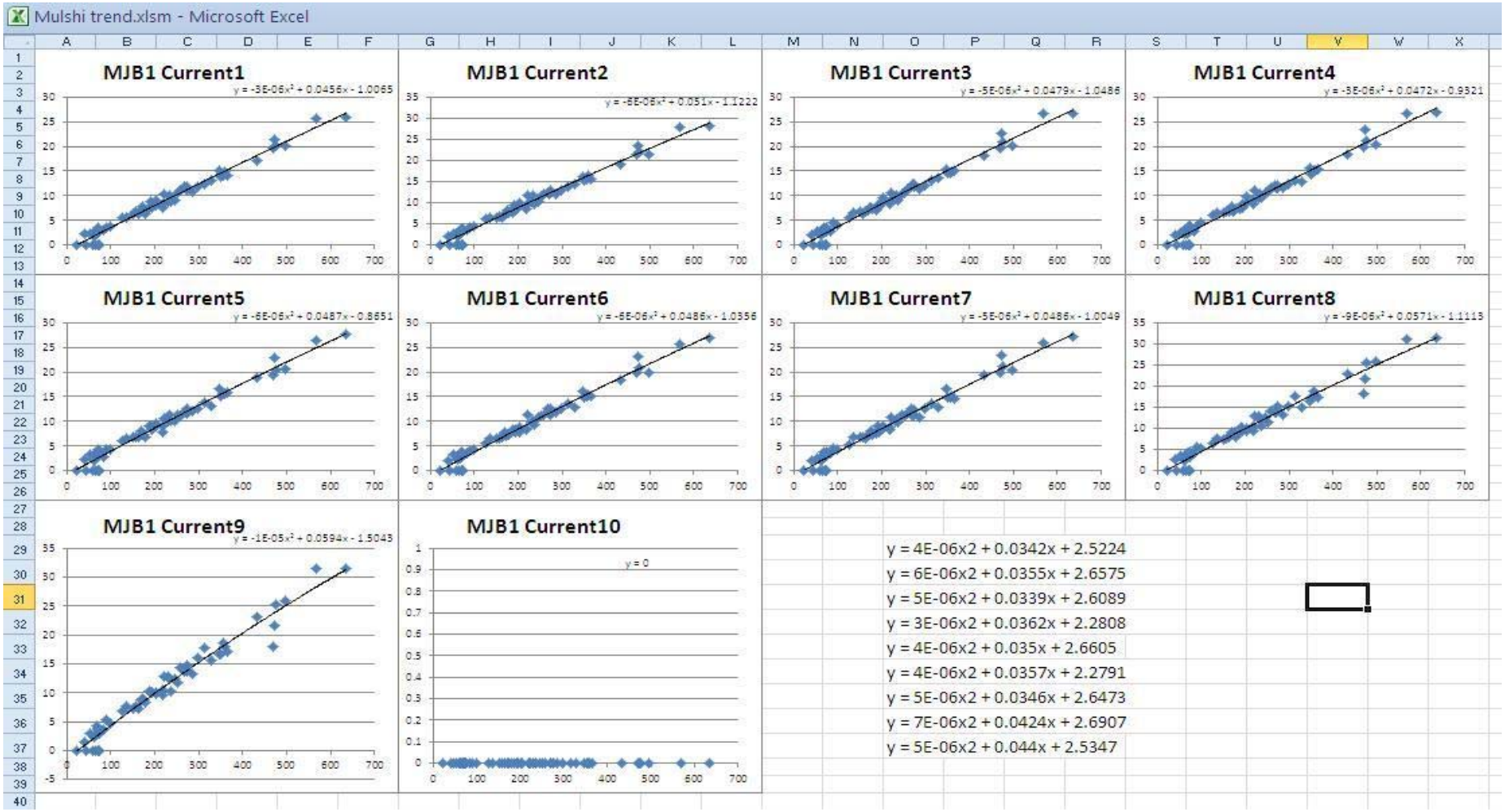


# Solar plant performance analysis

- 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.

# IN-HOUSE BUSINESS SOLUTIONS

## Solar plant performance analysis

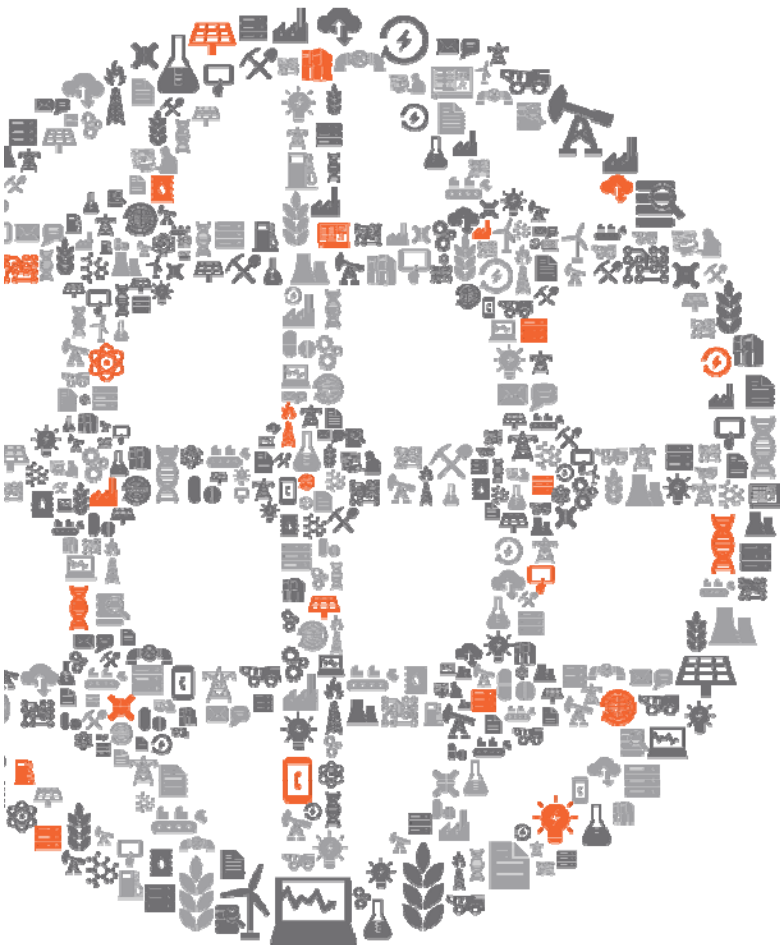


# IN-HOUSE BUSINESS SOLUTIONS

## Solar plant performance analysis

P22

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 | P13 | P14 | |
| 2 | | | | | | | | | | | | | | | |
| 3 | P15 | P16 | P17 | P18 | P19 | P20 | P21 | P22 | P23 | P24 | P25 | P26 | P27 | P28 | |
| 4 | | | | | | | | | | | | | | | |
| 5 | P29 | P30 | P31 | P32 | P33 | P34 | P35 | P36 | P37 | P38 | P39 | P40 | P41 | P42 | |
| 6 | | | | | | | | | | | | | | | |
| 7 | P43 | P44 | P45 | P46 | P47 | P48 | P49 | P50 | P51 | P52 | P53 | P54 | P55 | P56 | |
| 8 | | | | | | | | | | | | | | | |
| 9 | P57 | P58 | P59 | P60 | P61 | P62 | P63 | P64 | P65 | P66 | P67 | P68 | P69 | P70 | |
| 10 | | | | | | | | | | | | | | | |
| 11 | P71 | P72 | P73 | P74 | P75 | P76 | P77 | P78 | P79 | P80 | P81 | P82 | P83 | P84 | |
| 12 | | | | | | | | | | | | | | | |
| 13 | P85 | P86 | P87 | P88 | P89 | P90 | P91 | P92 | P93 | P94 | P95 | P96 | P97 | P98 | |
| 14 | | | | | | | | | | | | | | | |
| 15 | P99 | P100 | P101 | P102 | P103 | P104 | P105 | P106 | P107 | P108 | P109 | P110 | P111 | P112 | |
| 16 | | | | | | | | | | | | | | | |
| 17 | P113 | P114 | P115 | P116 | P117 | P118 | P119 | P120 | P121 | P122 | P123 | P124 | P125 | P126 | |
| 18 | | | | | | | | | | | | | | | |
| 19 | P127 | P128 | P129 | P130 | P131 | P132 | P133 | P134 | P135 | P136 | P137 | P138 | P139 | P140 | |
| 20 | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | |



# 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

# WAY AHEAD

## 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.

# QUESTIONS

# THANK YOU