

Presentation Agenda

Indian Power Sector

Power Sector Requirement:- Key Performance Aspects

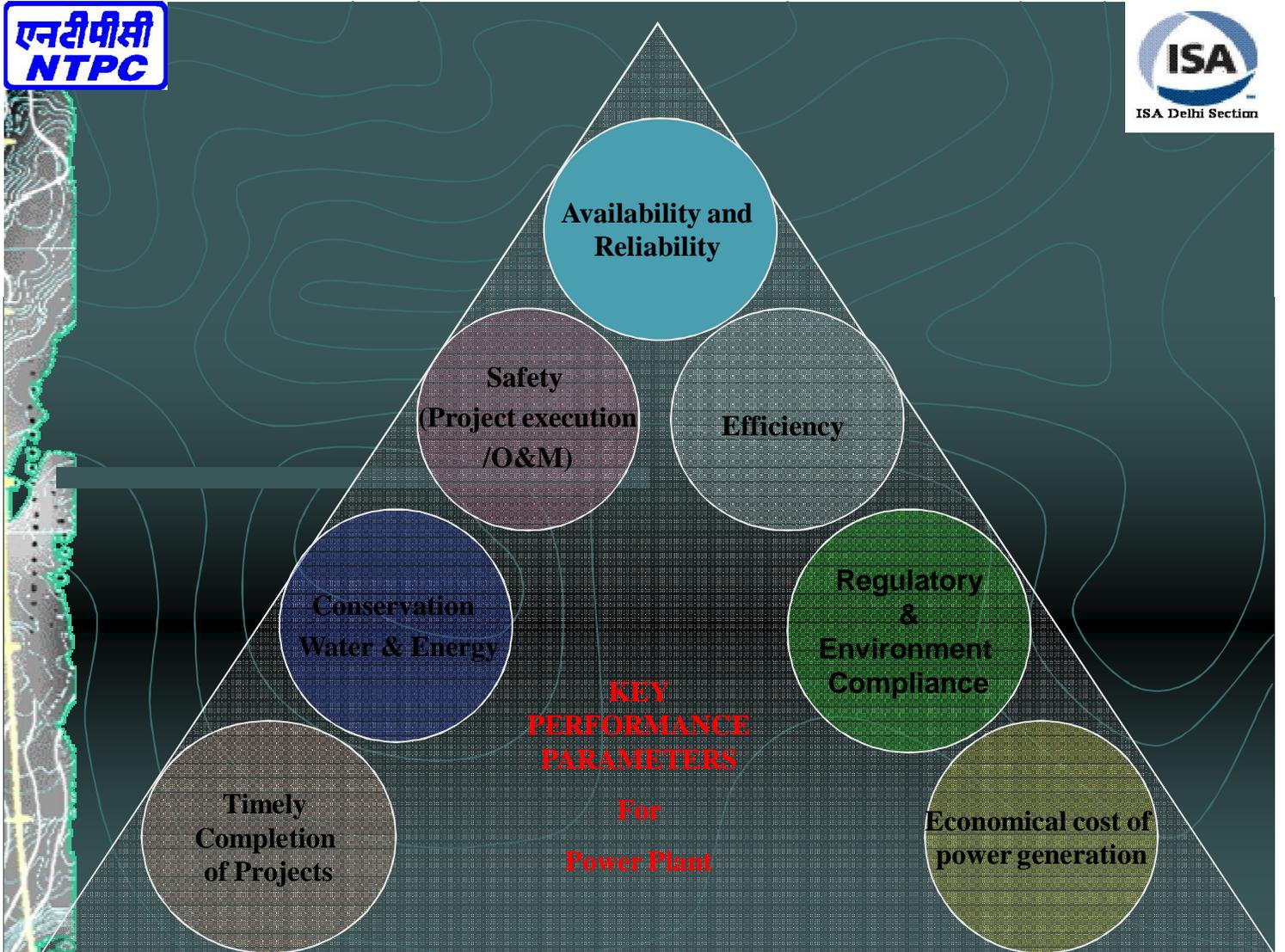
- Role Of C&I and philosophies at NTPC

Automation Advancements at a glance

- Some recurring C&I issues

End User Concern, Challenges and Expectations

Conclusion



Availability & Reliability

Meeting peak and base load power demands at any point of time with quality power in terms of voltage, frequency and power factor

Design aspects of control and instrumentation system



- **Sensors redundancies**
- **Diagnostics in field Devices**
- **Instrumentation cabling and grounding concepts**
- **Control system design in term of redundancies**
- **Interlock/ protection and logic implementation**
- **HMIPIS for improved diagnostics and easy operator interface**
- **Reliability of Power supply system**

NTPC Philosophies



- **2 V 3 measurement schemes**
- **Smart Positioners & HART devices**
- **Standard schemes for instrumentation cabling and grounding.**
- **Control system design according to process/equipment redundancies**
- **In-house Engg of Interlock/ protection, logic with extensive FAT**
- **LVS based multi window operation**
- **UPS and 24 V DC with diagnostics features**

Operation of Power plant cycle and its sub systems at their designed efficiency

Design aspects of control and instrumentation system



- Provision of necessary measurements at right location with desired accuracy
- Diagnosis and analysis of performance variation from designed limits
- Design control algorithms that are best suited for the given process
- Tuning of control system
- Selection of Control system to match requirement of main mechanical/electrical equipment requirement

NTPC Philosophies



- Adequate measurements provision for performance monitoring
- Adopted PADO-(Performance Analysis and Diagnostic Optimization) package
- Deployment of advance control algorithms
- Software for tuning control loops
- Selection and configuration of control system as per process requirement

Safety (Project Execution / O&M)

Safety Compliance for protecting equipments and personnel safety during project execution and Operation and Maintenance phase

Design aspects of control and instrumentation system



- CCTV based project execution monitoring.
- Designing of appropriate protection schemes for equipment and personnel safety
- Ensuring compliance to design through FAT and commissioning checks
- Adopting Safety Instrumented Systems for systems such as BMS and other hazardous areas
- Security of power plants like CCTV based perimeter surveillance system
- Cyber security of automation network

NTPC Philosophies



- Establishment of Safety Control Room for erection and overhaul Monitoring
- In-house design of protection schemes as per OEM recommendations
- Thorough FAT and commissioning checks
- NFPA complied BMS logic implementation
- DCS automation network designed to take care of cyber security threats and regular security audit.

Regulatory & Environment Compliance

Compliance to grid norms and environmental norms of regulatory bodies like CERC/SERC and CPCB/SPCB respectively

Design aspects of control and instrumentation system



- Designing of control system and schemes to take care of grid norms for ABT/FGMO regimes of operations.
- Better measurement, monitoring and control techniques for reducing the emissions of green house gases, Suspended particulate matters and discharging effluents from water

NTPC Philosophies



- Control system selection well suited for implementing control schemes like turbine governing, CMC etc
- Adopted flue gas emission measurements, Effluent water quality discharge measurement and control systems
- Monitoring of ambient air quality through AAQMS.

Conservation Of Water & Energy

Reduction of water consumption and energy losses (Electrical and thermal)

Design aspects of control and instrumentation system



- Better measurement, monitoring and control techniques for measurement of water flow at various points of raw water, treated water, Cooling water and DM water
- Providing appropriate measurements for electrical equipments as well as for Heat Exchangers.

NTPC Philosophies



- Initiated process of water consumption measurements at various locations to identify and arrest water losses
- Monitoring of real time electrical parameters for major auxiliaries
- Provision of additional measurements for heat exchanger performance monitoring.
- Initiation of regular energy audit
- Soot Blower optimisation through PADO

Economic Cost Of Generation

Reduction of life cycle cost including O&M cost

Design aspects of control and instrumentation system



- **Optimising control locations**
- **Implementing Asset Management Systems**

NTPC Philosophies



- **Introduction of combined control room for off site areas**
- **Adopted Vibration monitoring and analysis systems**
- **Control Valve Diagnostics software for valve health monitoring**
- **Implemented merit order rating solution**

Timely Completion Of Projects

Avoiding cost over-runs by delivering ready to commission control and instrumentation system

Design aspects of control and instrumentation system



- Improved engineering processes to reduce time to engineer, test, deliver, erect and commission the system without compromising on quality of such products.

NTPC Philosophies



- Extensive standardisation of C&I engineering
- Adopted unified DDCMIS based system for offsite (BOP) areas as well.
- A mechanism of knowledge transfers from one project implementation to the other
- Streamlining of application and system testing.

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Automation Advancements at a glance

State of the art
software based
control system

Improved Diagnostics
of
field devices

Smart
Field
Instrumentation

User Friendly configuration
and programming tools in
control system.

Field Bus Remote
IO's/Fiber optics based
systems.

Availability of large nos of
Performance Improvement
software packages

Remote Access
For
trouble shooting

Large Use of Engg
Software
to design C&I System

Operator
Friendly
Interface

But hard realities are....

Operator Screen
Goes Off

Non availability of
correct information
from huge data
deluge

HMI / Control
System Hangs

Spurious
Trips

Spare Parts
Non-Availability

Field Sensor
Malfunctioning

Delayed Service /
Support Response

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Issue:- Product Quality

Expectations

There is report by "The economic times" quoting study by CII that 20 % of the products are of poor quality.

Issue:- Project Erection and Commissioning

Expectations