O&M practices: technologies, strategies, organization and skills

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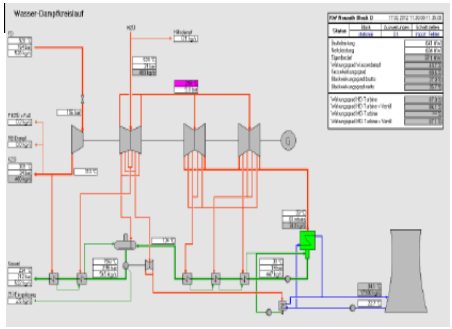
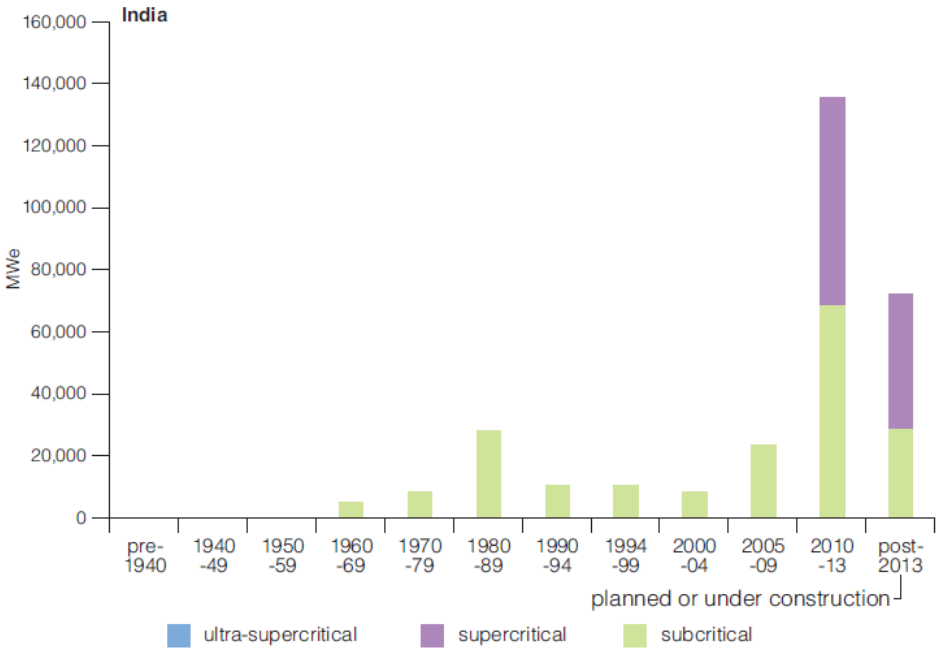
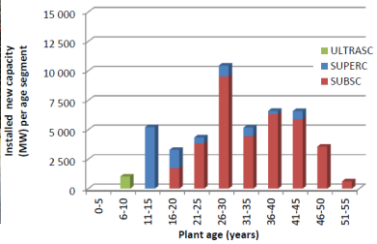
Agenda

- Introduction: Overview of retrofit measures
- Fleet management
- I&C upgrades
- Monitoring & Diagnostics
- Organization & Skills
- VGB Standards & Guidelines
- Summary

Aging plants are often the backbone of the energy supply







Source: Siemens, Alstom Power, IEA

Excellence in O&M combined with retrofit measures result in high efficiency and availibility.

Age of power plant fleets in Europe

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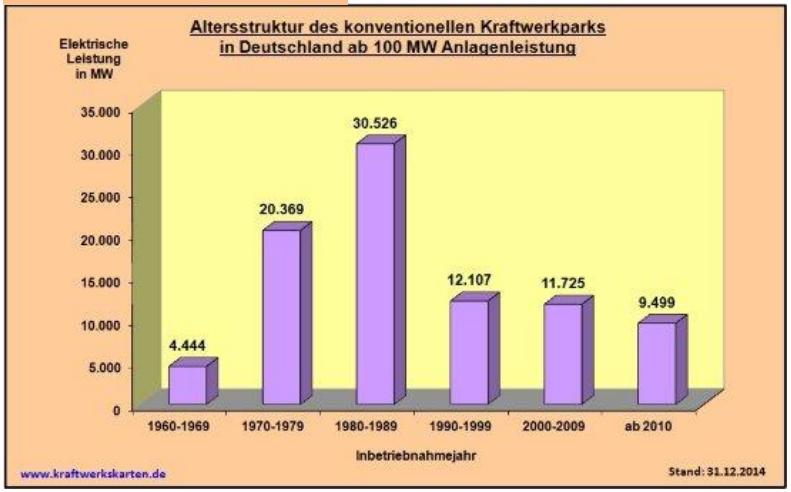
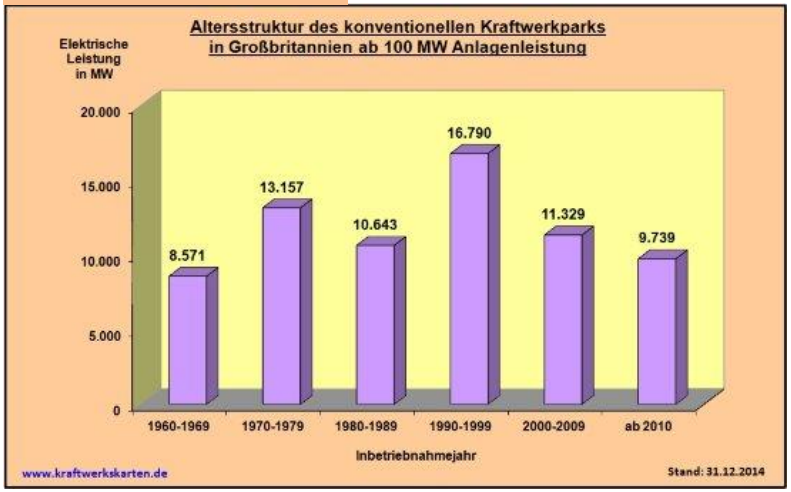
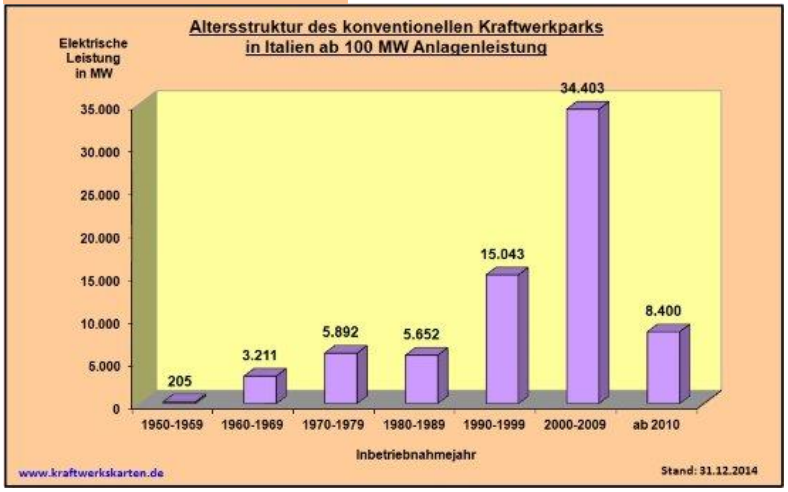
Germany



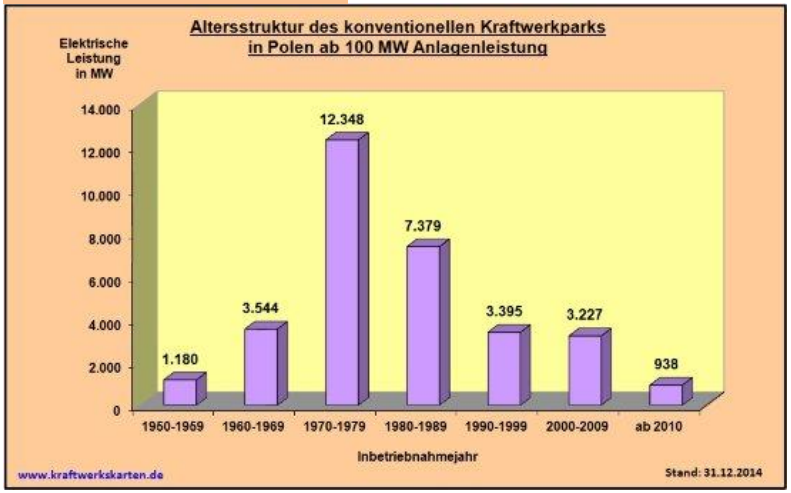
United Kingdom



Italy

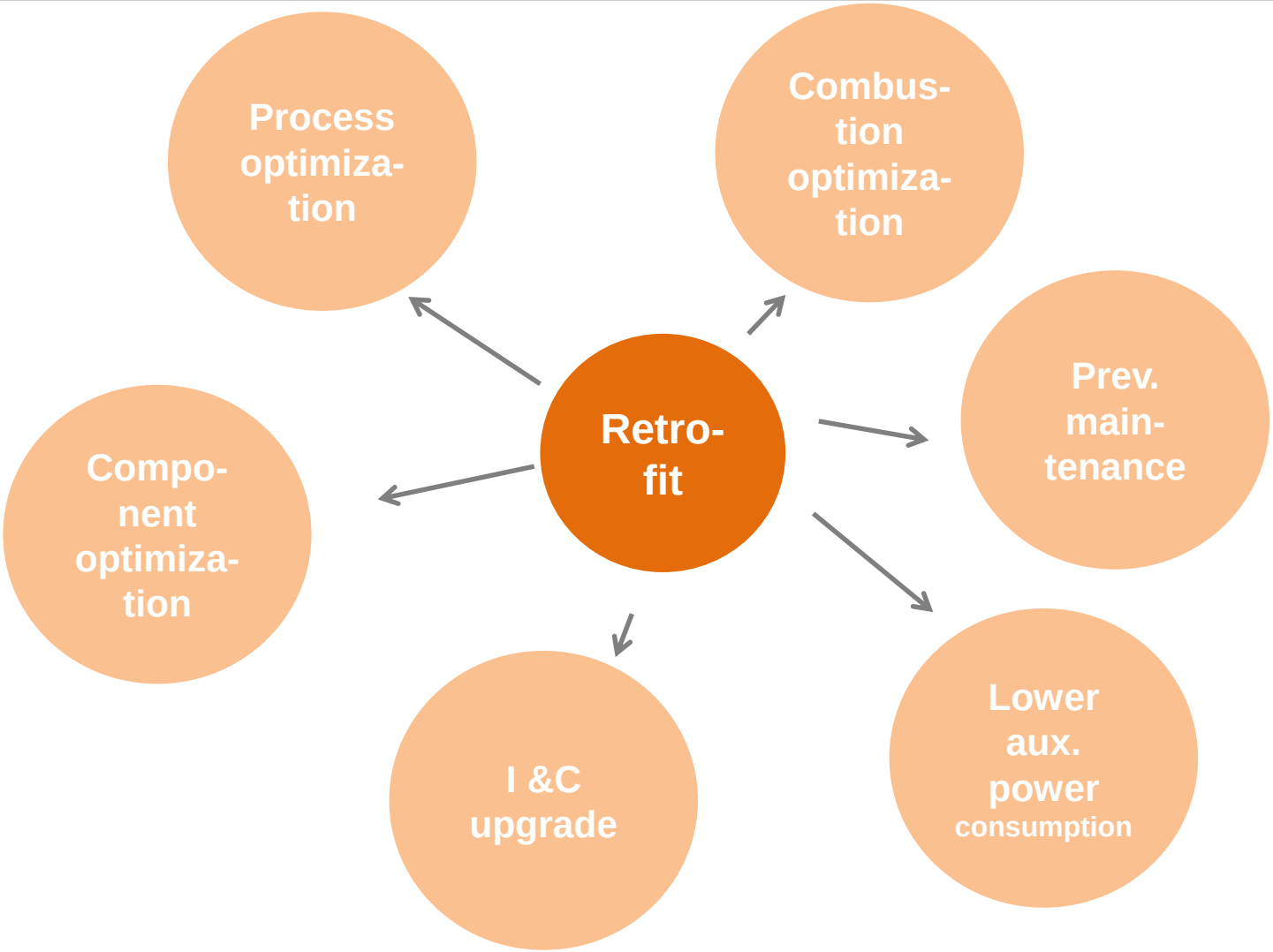


Poland



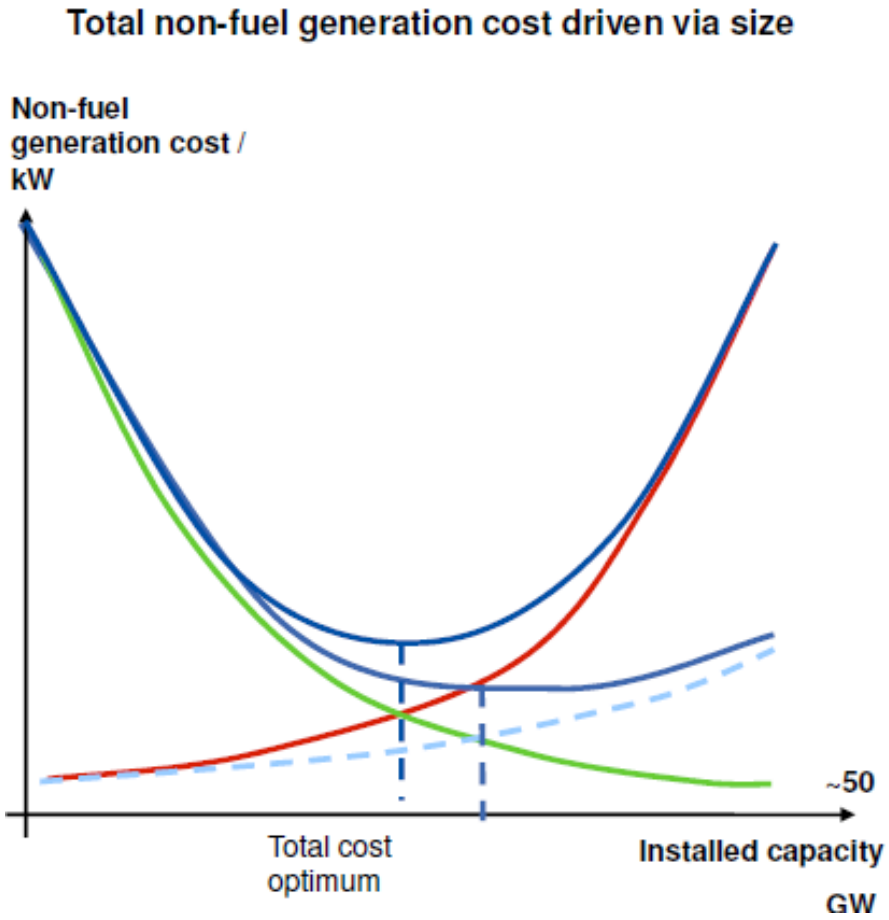
Source: Kraftwerkskarten.de

Overview of retrofit measures



Retrofit measures can result in higher efficiencies, higher availability and longer lifetime. The objective of retrofit interventions depends on the market conditions.

Fleet Management – raising synergies



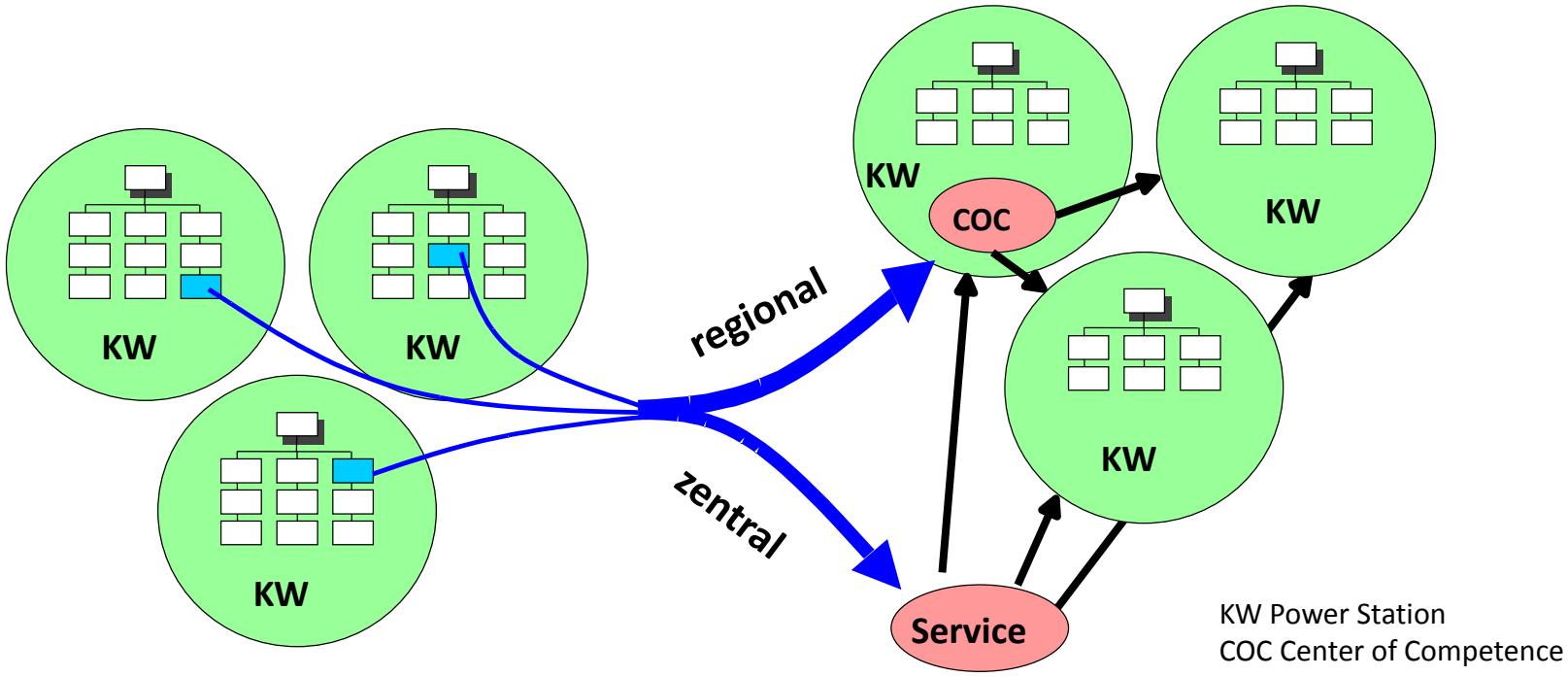
Economies of Scale	Complexity
▪ Bundling / larger volumes ▪ Sourcing power ▪ Learning curve effects ▪ Pooling effects ▪ Best Practices ▪ …	▪ Interfaces ▪ Language ▪ Standards / Laws ▪ Salary level ▪ Local stakeholders ▪ …

Raise synergies / reduce complexity

- Identify common ground
- Foster networking
- Increase standards where helpful
- „one face to the supplier“ principle
- Build a team
- …

Synergy management helps to improve the relation between economies of scale and complexity of costs.

Increasing O&M efficiency by bundling



- Responsible operation in the power station (or virtual plant network)
- Bundling of tasks and functions reduces operational costs by raising synergies and focussing know-how
- Process oriented organisation

Fleet Management – benefits

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Best Practise Transfer Safety

- Harmonize reporting
- Contractual agreements and consequences
- Harmonize use of personal safety equipment

Organisation of outages

- Standardization of outage planning
- Derivation over-all maintenance program

Combine GT26 efforts

- Fleet management
- Reduce maintenance costs

Maintenance Sourcing strategy

- 5 year forecast of projects and related sourcing efforts

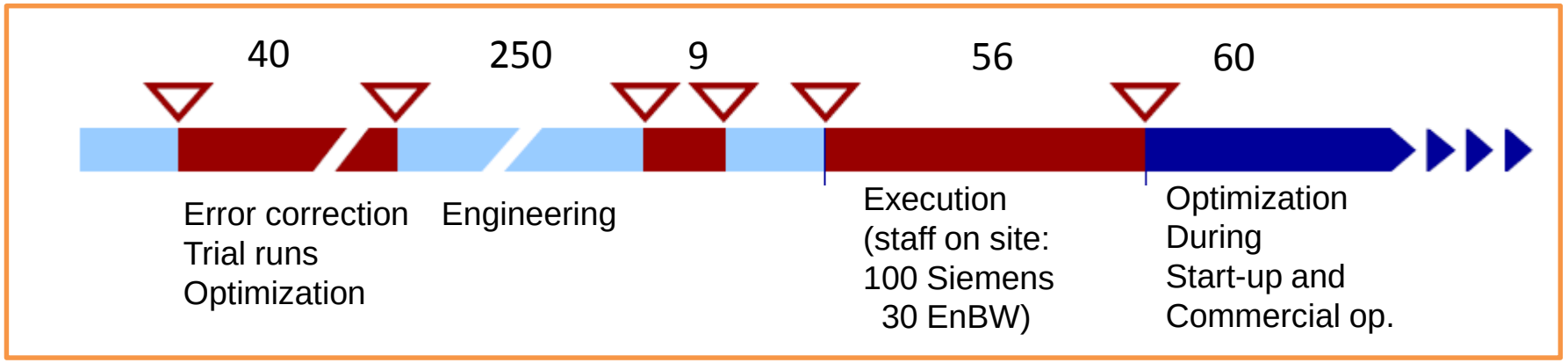
Standardization, harmonized working and reporting procedures and exchange of experiences and lessons learned are benefits of the fleet management approach.

Power Plant Unit 7 (550 MW el., 220 MW th, cod 1985)

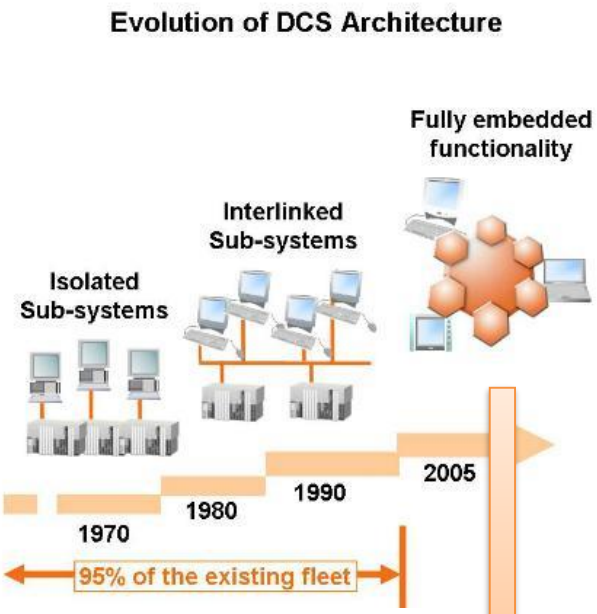
Project Goal:
Full modernization of I&C to Siemens SPPA T3000

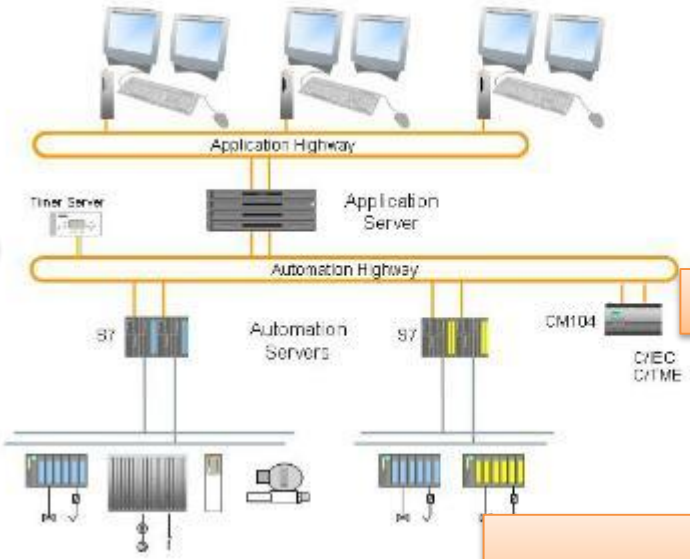
Project scope:

- New central operation room
- 26 thin clients
- 38 automation server
- 5 communication modules
- 36.000 I/O signals
- 250 control loops
- 1800 probes
- 100 km cable
- Misc. optimizations



I&C potentials: Development of modern I&C systems





Unit 7:
13 clients
2 large screens

Thin Clients

2 AppS / Profinet

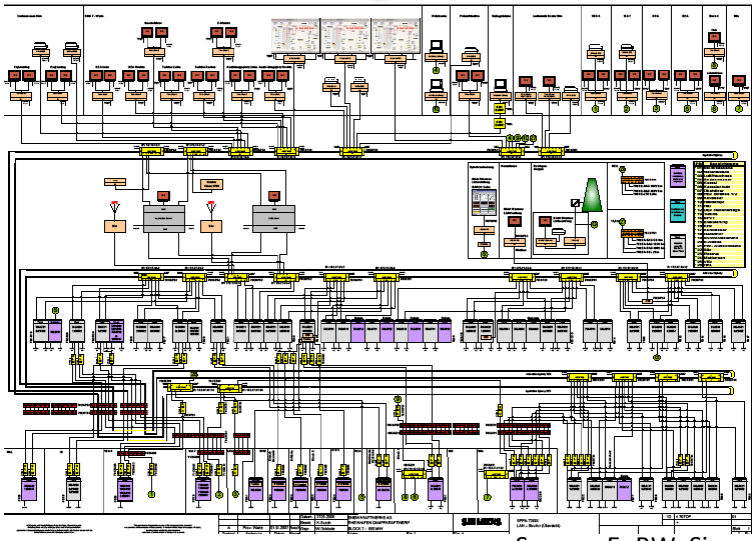
38 SIMATIC S7 IDE

Server Products

ProfiBus DP

I/O Devices

Embedded Component Service / Java based
Containing all data and functions for each process object



Source: EnBW, Siemens

I&C potentials: No modernization without optimization !

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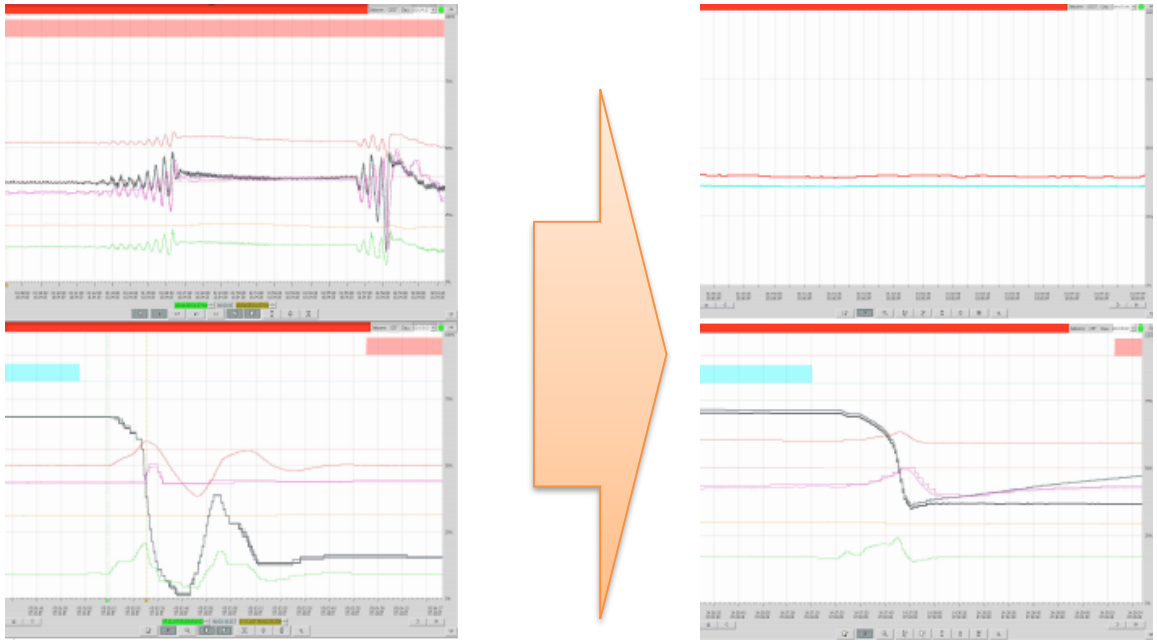
- Reduction start-up costs
- Improving unit dynamics
- Reduction wear
- Ensuring delivery of grid services (primary/secondary/control power)
- Reduction shut-down costs

- Mill control cold/hot start
- Fire and unit controller for start-up and shut-down
- Subordinated control loops / SIPOS
- BFWP turbine controller
- Electro-hydraulic converter steam turbine

Example 1: BFWP turbine Optimization of switch from cold reheat to E5



I&C potentials: results of modernization RDK unit 7

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Before modernization

24 separate stations

after modernization

2 application server

I&C potentials: Optimization results fire and unit controller

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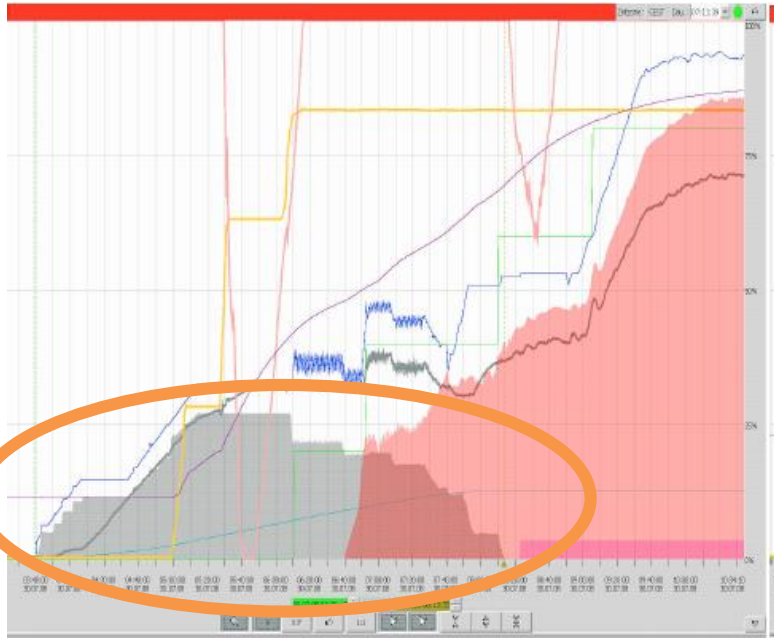
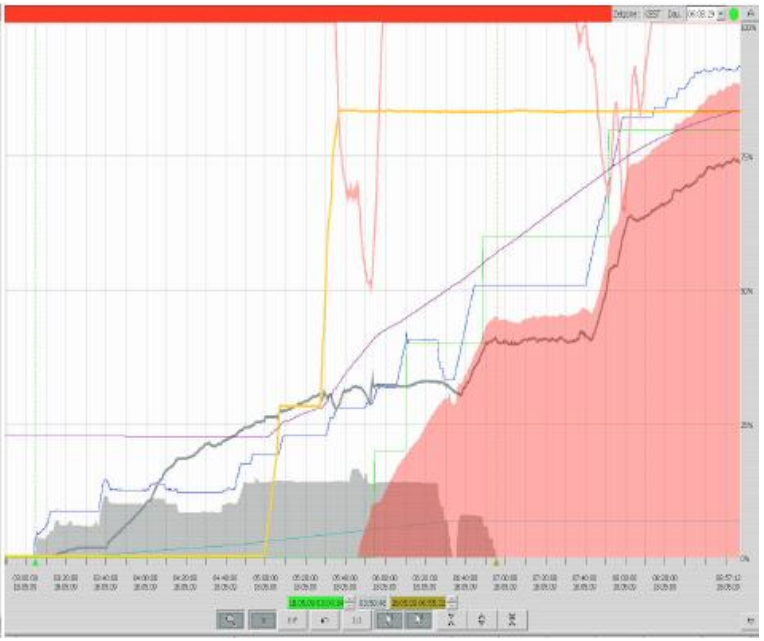
before

after





cold start
(off > 48 h)

shutdown

I&C potentials: start up coal mill at cold start

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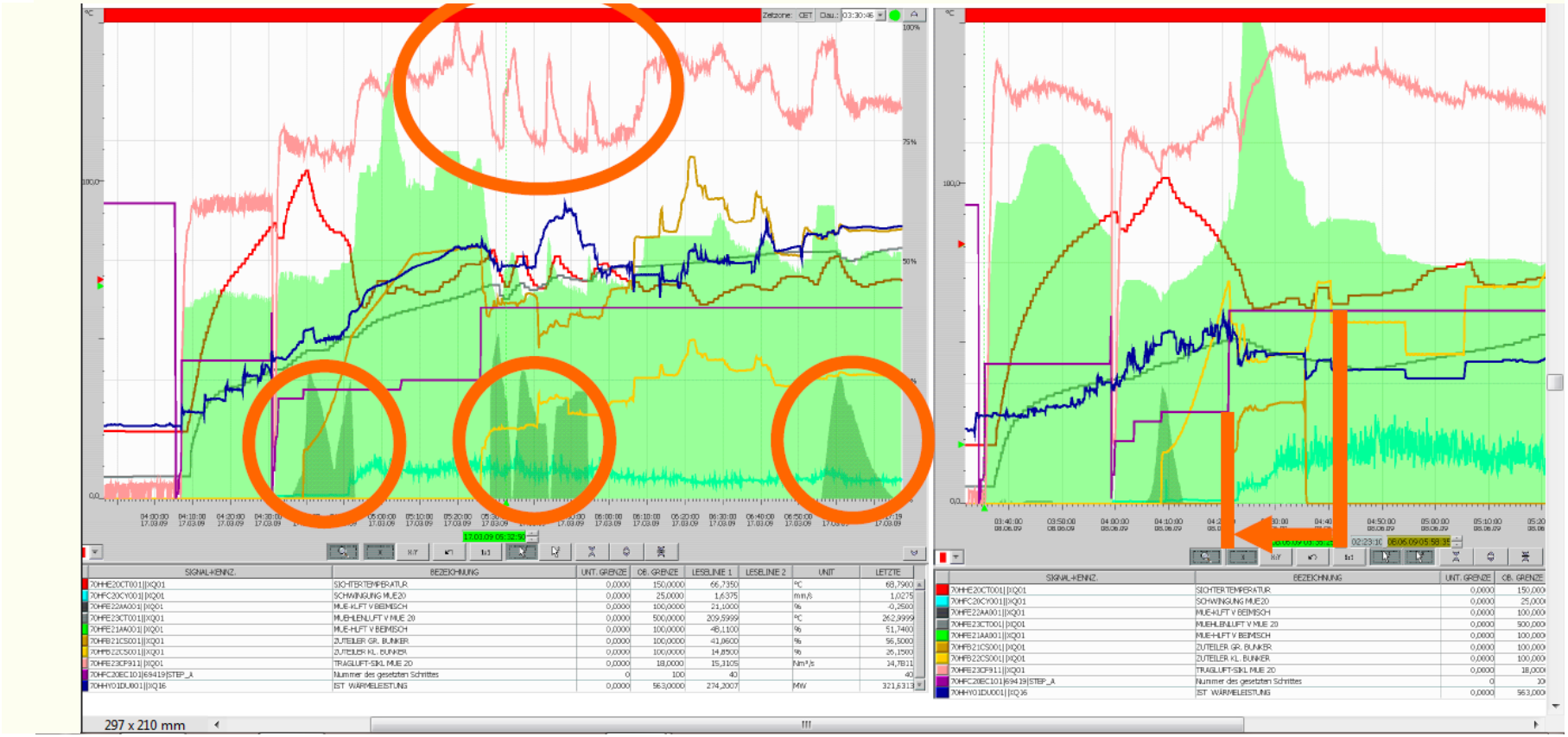
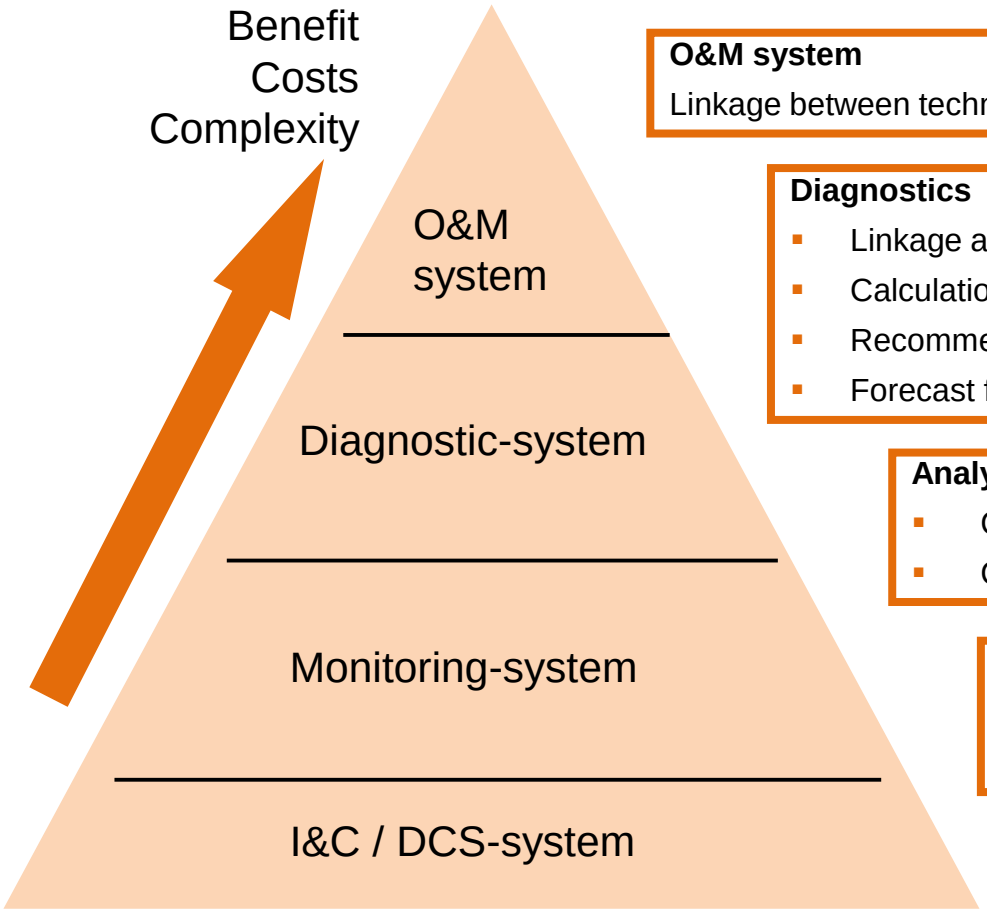
Before optimization

after optimization



Monitoring & Diagnostics



O&M system

Linkage between technical and commercial information (company-wide)

Diagnostics

- Linkage and interpretation of measured values and parameters
- Calculation and assessment of the actuial process condition
- Recommendation and automatic initiation of measures
- Forecast for further process

Analysis

- Calculation of paramenters and set values
- Comparison between set and actual values

Monitoring

- Collection and Storage of measured data
- Comparison with simple limit values

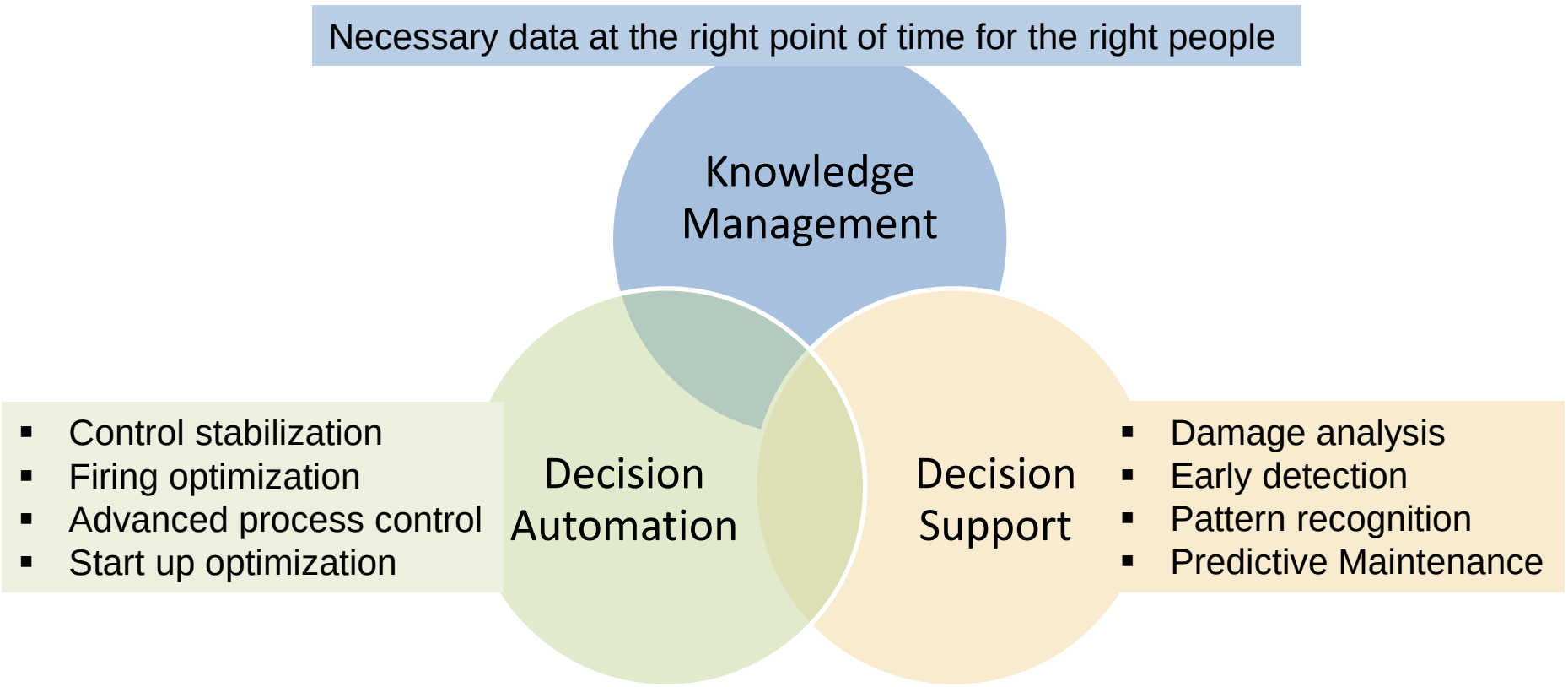
I&C and DSC

Measuring, operating, monitoring and protection

An optimized mixture of monitoring and diagnostics provide useful information resulting in measures to increase availability, life-time and efficiency.

Monitoring & Diagnostics: Use of “Bid Data” and Software

Necessary data at the right point of time for the right people



Monitoring & Diagnostics & Performance Optimization

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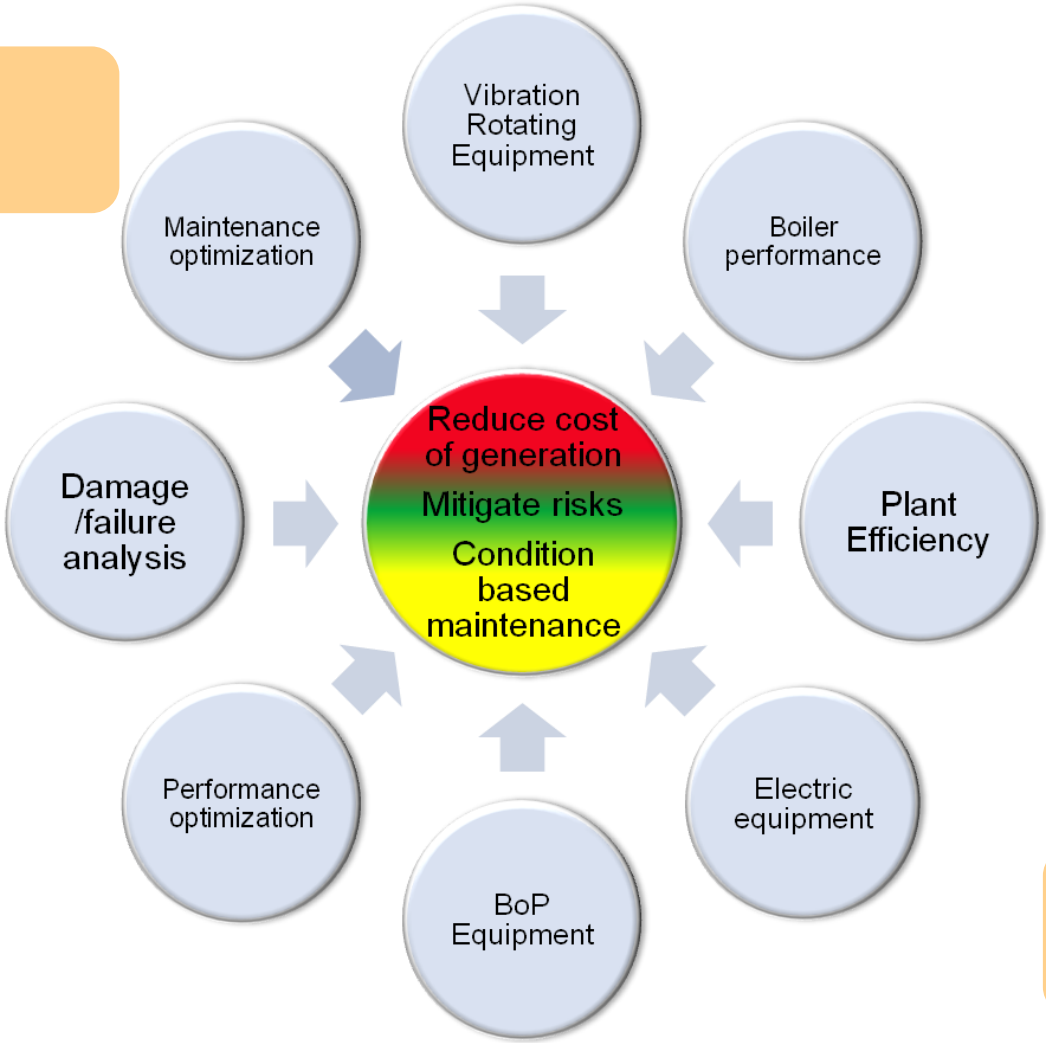
Monitoring:
Engineering
Operation



Diagnostics:
Maintenance

Performance Opt:
Asset
Management

Beneficiaries