Real Time at TransAlta

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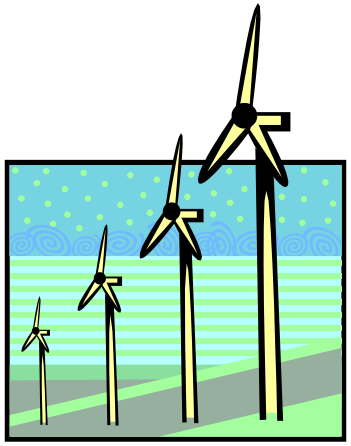
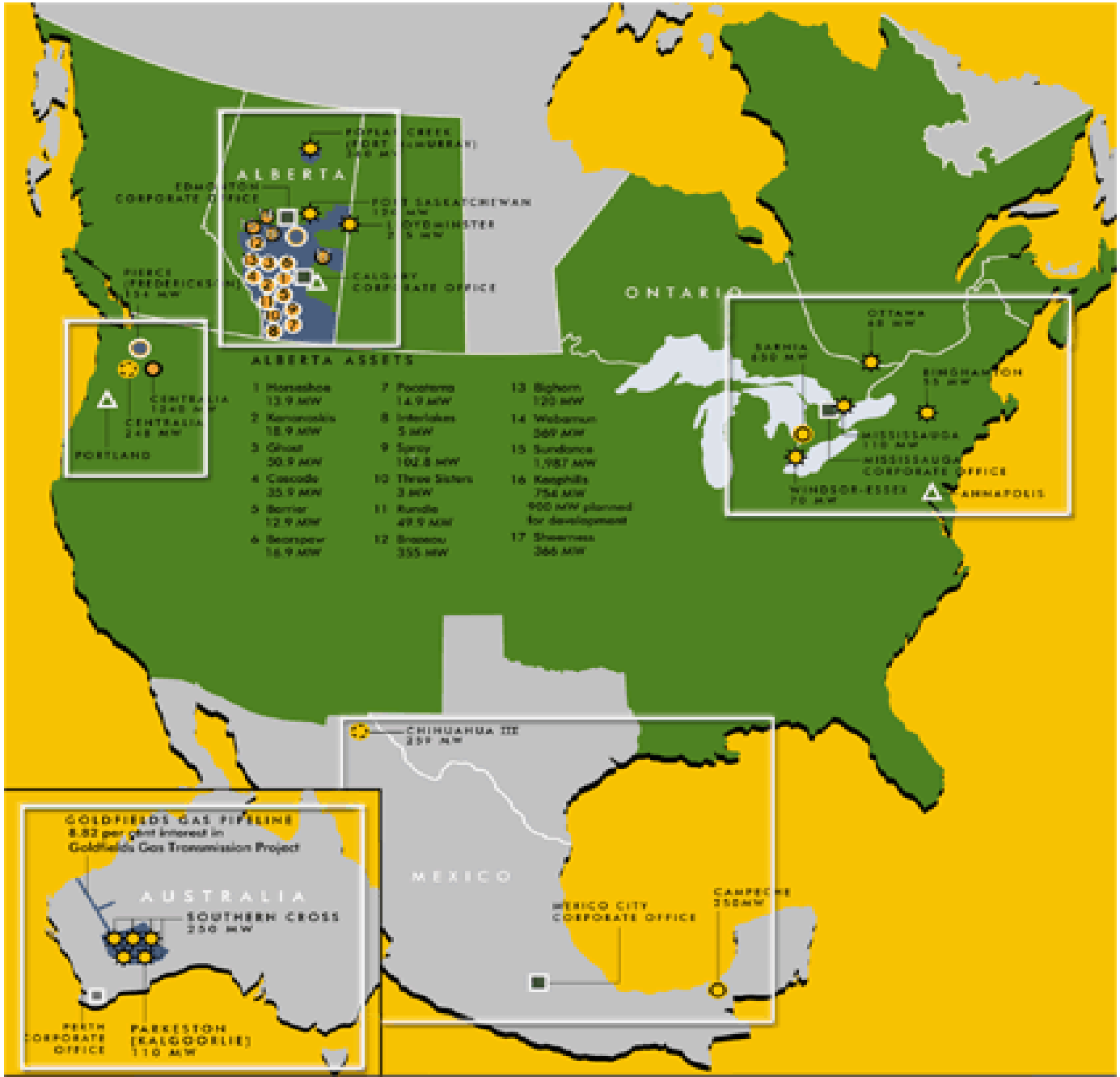
March 4th, 2002 Monterey, California

Presentation Overview

- Introduction to TransAlta and Real Time
- Project description
- Implementation and technology
- Benefit Assessment
- Future thoughts
- Conclusions



TransAlta Operations



TransAlta

Operations Map

GENERATION

COAL POWERED PLANTS	5,016 (MW)
COAL POWERED PLANTS (PLANNED)	900 (MW)
HYDRO-POWERED PLANTS	800 (MW)

IPP

GAS-POWERED PLANTS	1,358 (MW)
GAS-POWERED PLANTS (UNDER CONSTRUCTION)	1,302 (MW)
GAS-POWERED PLANTS (PLANNED)	259 (MW)

TRANSMISSION

ALBERTA TRANSMISSION LINES	11,600 km
SUBSTATIONS	260
AUSTRALIA TRANSMISSION LINES	500 km

ENERGY MARKETING

OFFICES	3

CALGARY
PORTLAND
ANNAPOLIS (MEGA)

TransAlta Profile

- Canada's largest non-regulated electricity generation company
- 4,115 MW from coal-fired and hydro plants in Alberta
- 1,340 MW from coal-fired plant and mining operation near Centralia, Washington
- 2000 MW Gas fired CoGen units with + 900 MW this year

Industry Outlook

- On Jan. 1 Alberta generating plants began operating under long-term power purchase arrangements; their generation is now sold under contract to power marketing Companies.
- On July 4 announced plans to sell Alberta-based Transmission business, choosing to focus on the Generation business.

Growth Strategy

- short-term target: increase total generating capability to 10,000 MW by 2002 and to 15,000 MW by 2005.
- plan to begin a 900 MW expansion of Keephills, Alberta coal-fired generating facility. (2005)

Real Time for TransAlta

Belief that significant potential exists to:

- optimize plant equipment operation in Real Time
- optimize plant equipment operation in unison
- provide a direct assessment of business impacts of change (markets, equipment status, customer)
- make consistent KPIs visible to all (Dashboards)
- develop technology for rapid deployment

➢ Therefore, do a pilot at one site to prove Real Time concepts

The site

- Major Heavy Oil extraction facility located in North Eastern Alberta, Canada
- November - doubled the plant output to 250 K barrels of synthetic crude oil per day
- TransAlta contracted to supply power and energy needs (hot water, steam, compressed air)
- Power exchanged with the Alberta Power Pool

Site host and selection

- A 360 MW cogeneration facility was constructed in 2001
- Any surplus power is available for sale to the power grid.
  (pay for the gas)
- Available fuels are Coke, Coker Gas for boilers with supplemental natural gas.

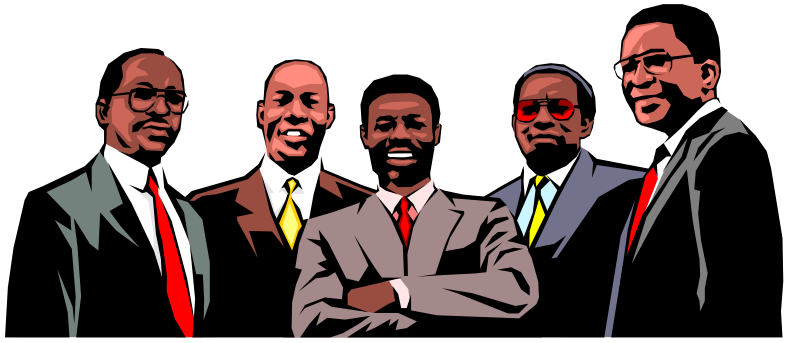
Real Time benefits at this site

Ideally suited to pilot Real time because:

- Large, complex operation
- Multiple process variables and constraints
- Different and inter-related revenue streams:
  - Power, Steam, Hot water, Compressed air to host (contracted)
  - Power to AIS (provincial power grid)
- Difficult and poorly understood contracts
- Instrumentation availability -> quality Data
- Potential to improve customer relations wi

Real Time project team

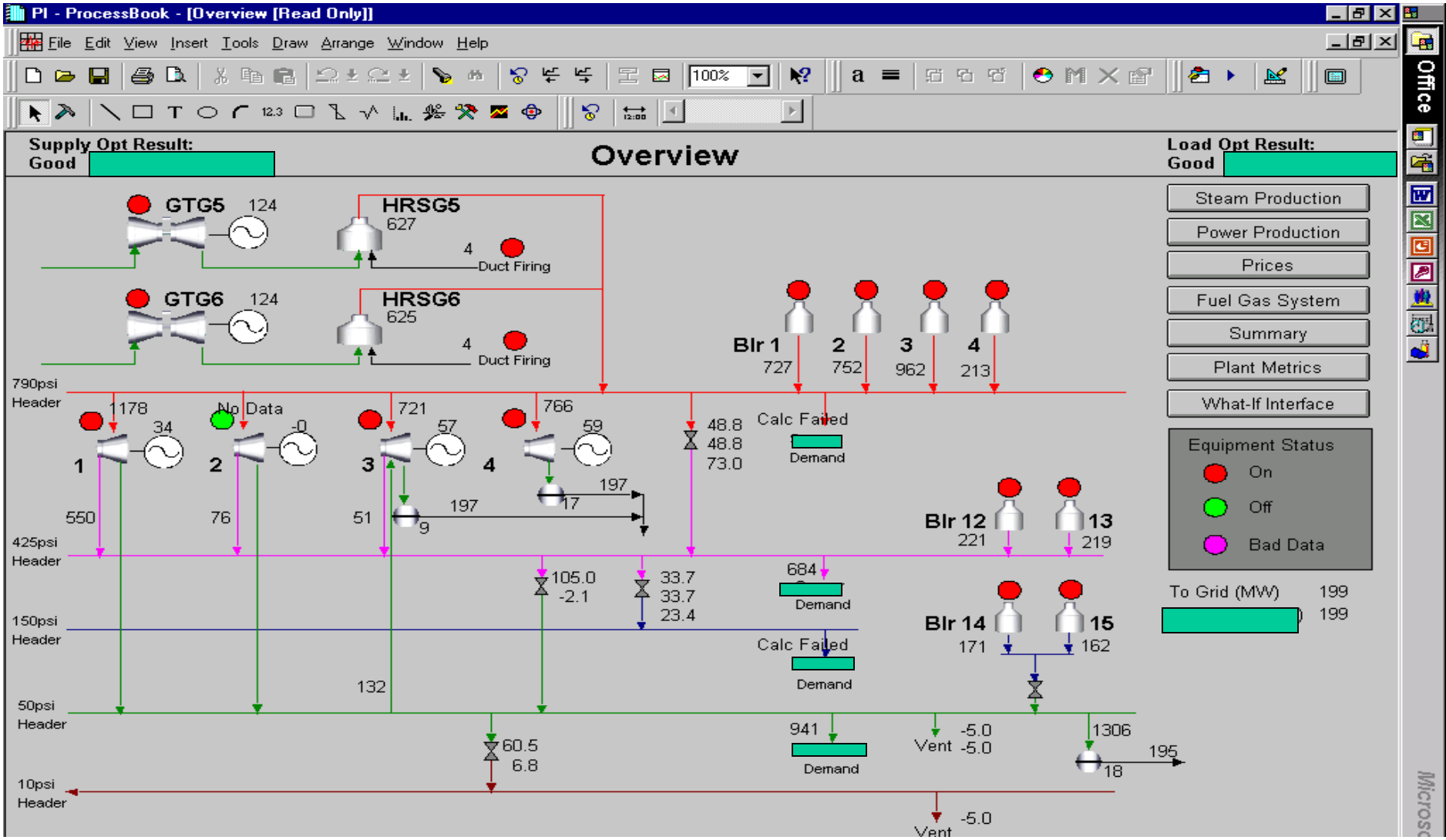
- Strong site commitment – operations, maintenance and management -> communications reps
- Opportunity to educate employees about the bottom-line impacts they can have - > ‘business’ training
- Project team from Gen, E-Bis, IS plus site personal



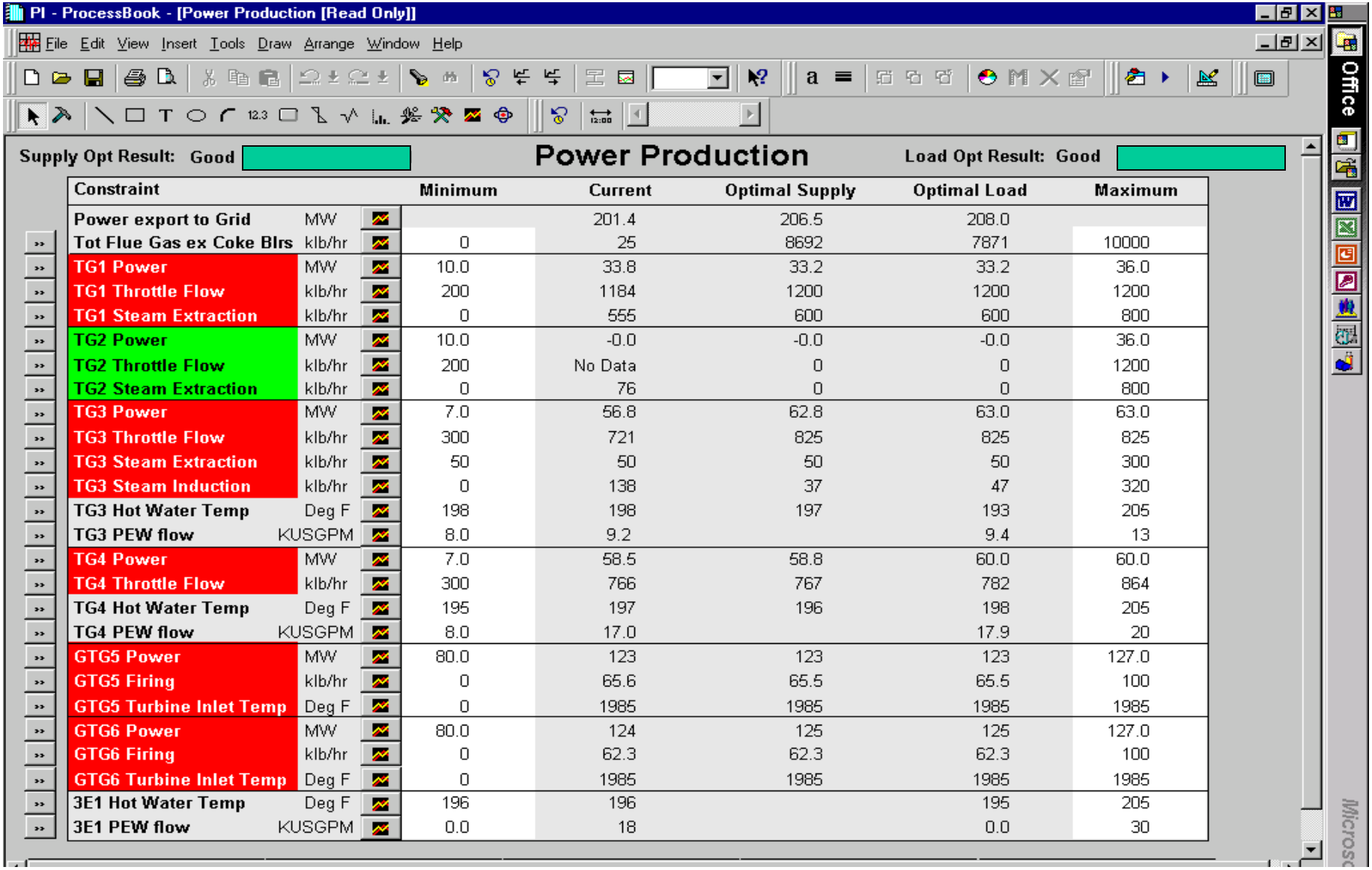
Project timeline

• Real Time site selection	Feb 1st
• Vendor analysis and selection	March 1st
• Real Time Information strategy	April 24th
• Operations data to Vendor for analysis	May 11th
• Vendor on-site; initial models	May 22nd
• PI server installed	Sept 7th
• Functional Spec (plant models, KPIs)	Sept 18th
• On-site data collection and PI installation	Oct 9th
• Factory Acceptance Testing	Nov 2nd
• Installation at site + SAT	Nov 30th
• Benefits Assessment 1	Dec 21st
• Benefits Assessment 2	Feb 18th
• Real Time on-line	March 11th

Overview – Optimizer screen



Generation – Optimizer Screen



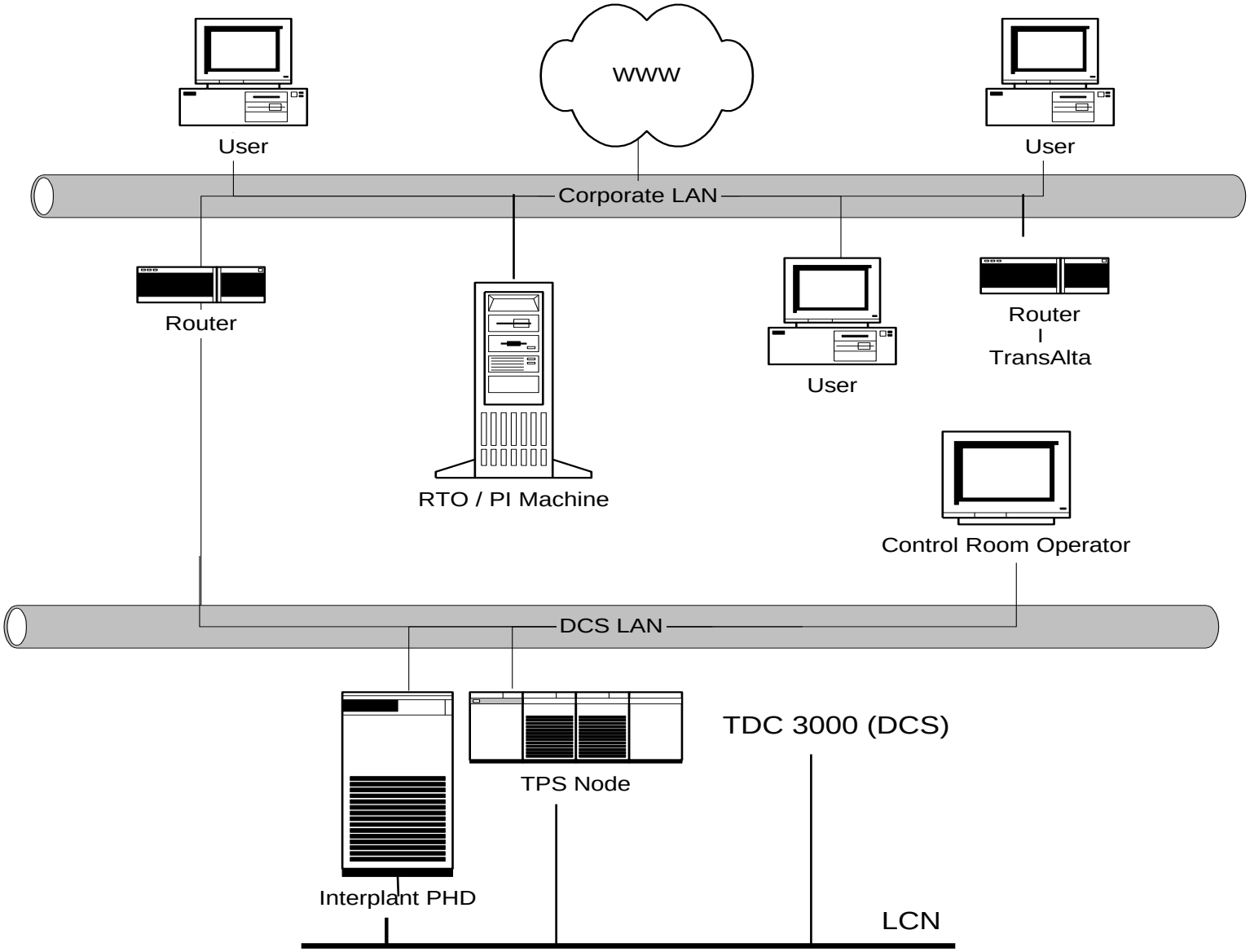
Supply Opt Result: Good

Power Production

Load Opt Result: Good

Constraint		Minimum	Current	Optimal Supply	Optimal Load	Maximum
Power export to Grid	MW		201.4	206.5	208.0	
Tot Flue Gas ex Coke Blrs	klb/hr	0	25	8692	7871	10000
TG1 Power	MW	10.0	33.8	33.2	33.2	36.0
TG1 Throttle Flow	klb/hr	200	1184	1200	1200	1200
TG1 Steam Extraction	klb/hr	0	555	600	600	800
TG2 Power	MW	10.0	-0.0	-0.0	-0.0	36.0
TG2 Throttle Flow	klb/hr	200	No Data	0	0	1200
TG2 Steam Extraction	klb/hr	0	76	0	0	800
TG3 Power	MW	7.0	56.8	62.8	63.0	63.0
TG3 Throttle Flow	klb/hr	300	721	825	825	825
TG3 Steam Extraction	klb/hr	50	50	50	50	300
TG3 Steam Induction	klb/hr	0	138	37	47	320
TG3 Hot Water Temp	Deg F	198	198	197	193	205
TG3 PEW flow	KUSGPM	8.0	9.2		9.4	13
TG4 Power	MW	7.0	58.5	58.8	60.0	60.0
TG4 Throttle Flow	klb/hr	300	766	767	782	864
TG4 Hot Water Temp	Deg F	195	197	196	198	205
TG4 PEW flow	KUSGPM	8.0	17.0		17.9	20
GTG5 Power	MW	80.0	123	123	123	127.0
GTG5 Firing	klb/hr	0	65.6	65.5	65.5	100
GTG5 Turbine Inlet Temp	Deg F	0	1985	1985	1985	1985
GTG6 Power	MW	80.0	124	125	125	127.0
GTG6 Firing	klb/hr	0	62.3	62.3	62.3	100
GTG6 Turbine Inlet Temp	Deg F	0	1985	1985	1985	1985
3E1 Hot Water Temp	Deg F	196	196		195	205
3E1 PEW flow	KUSGPM	0.0	18		0.0	30

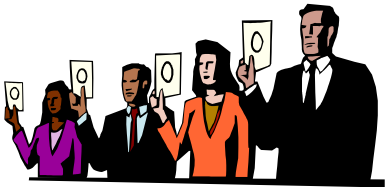
Network Overview



Software Vendor

Must Haves:

- Comprehensive products

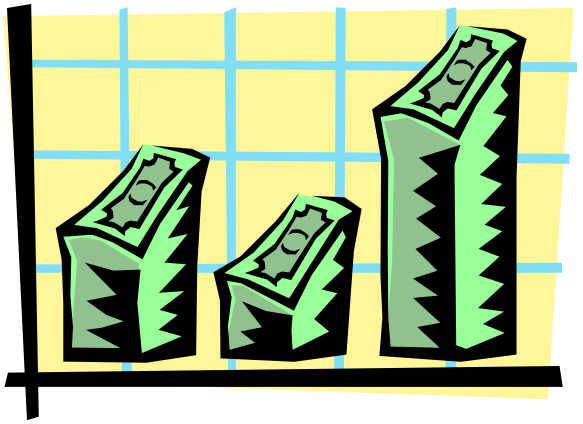


- Strong customer references
- Low cost implementation

- Offer a what-if analysis tool
- Provide a Performance Guarantee

Operations Optimizer Package

- Optimizer model based on design calculations with real time inputs via PI
- Process Optimizer provides suggested controller set-points to achieve targets (open loop mode)
- Field inputs are compared to models and substitute data as required
- Output is in Dollars
- What-if models



Software Features

The system is configured to:

- Perform Plant Modeling
- Data Reconciliation
- Performance Monitoring
- Real-Time Optimization, both open, closed loop
- Coordinated optimization between other systems
- Equipment selection optimization
- What-if studies on-line and off-line
- Multi-time periods
- Interface through PI hence easy to maintain, upgrade and modify

Off-line Performance Monitor

- Process data is automatically collected via PI and submitted bi-monthly via the web.
- The data is validated for consistency, accuracy
- Data is compared against a pre-defined design models
  CG turbines, steam turbines, boilers, HRSGs
- Performance parameters are calculated: efficiency, equipment deviation vs. original design conditions, actual cost of performance deviation.
- The measurements indicate how the equipment is degrading from its original operating (‘as new’) conditions.
- Report issued to the plant for review.

KPI's and Metrics

- Created a dedicated tool with PI to display plant specific metrics and KPI's – graphs, export features…..
- People, Reliability, Customer Satisfaction, EH&S, Earnings, EBIT, Equipment performance
- Manually update 40% - rest uploaded from PI automatically
- KPI data will be live and visible to all at site

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So what ?

- Operations
  - Improved visibility of Operational data
  - Operational data directly converted into ‘actionable’ information
- Maintenance
  - Ability to view equipment performance vs. benchmarks
  - Moves in direction of predictive maintenance
- Management
  - Provides direct measurement of site benefits and revenue
  - Confidence that best business decisions have been made for present real time market conditions
  - Using the “What-if” models allow best business decisions to be tested prior to implementation
- Site and Host Benefits

Benefits Assessment and Measurement

- Target set for minimum increase in capacity.
- Measured benefit was from:
  - On-going improvements in process operation
    (direct benefits)
  - One-off benefits from the optimizer
    (i.e.: open bypass valve or off-line Optimizer run)
- Two week assessment period
  - case studies and reviews,
  - tracking of accumulated benefits
  - Verification that Optimal condition was reasonable
- Results

Potential Issues

- PI as a bridge – potential security issue

  Suggestions? Thoughts? Comments?

- Standards for measurements, screen development

- New Technology and Software – What will survive?

Conclusions - site

- The project demonstrated the concepts were correct:
  - optimize plant equipment operation in Real Time
  - optimize plant equipment operation in unison
  - provide a direct assessment of business impacts of change (markets, equipment status, customer)
  - make consistent KPIs visible to all (Dashboards)
  - develop technology for rapid deployment
- Plan to move to Closed Loop mode this year

More Conclusions

- Evaluating other potential sites
- Standards for existing plants

  (KPI's, data collectors, performance monitors)
- Citrix apps – Information Portal

  Anywhere, Any time by any one!

Thank You

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