Energioptimering av rökgasreningsanläggningar på Svenska pappersbruk

Panndagarna 2016 - Karlstad CCC, Karlstad

Christer Mauritzson

Imagination at work

Nyleverans, underhåll och service inom miljövård

Med rötter från 1920 med namn som Fläkt, Bacho, ABB och Alstom – nu GE

Globalt R&D center för miljöteknik i Växjö

Teknikområden

- Elfilter
- Slangfilter
- DeNOx
- DeSOx
- Fläktar
- Styrsystem

Utbud

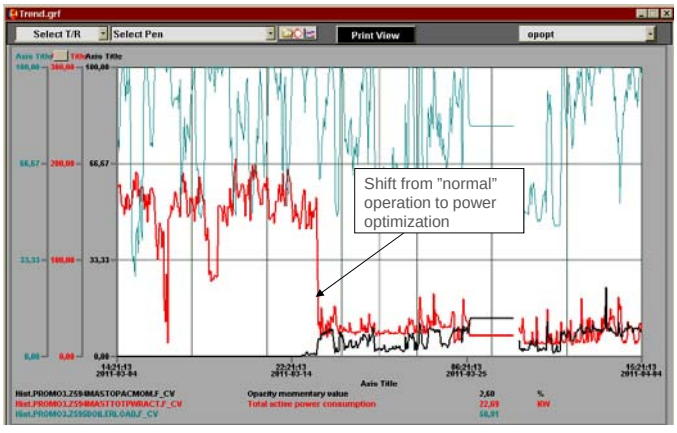
- Nyleverans
- Reservdelar och studier
- Underhåll och reparationer
- Ombyggnader och uppgraderingar

Vi utför service på alla typer av miljövårdsutrustning, GE eller icke-GE

Agenda

Topic 1	Optimization of ESPs
Topic 2	Concept of Electronic Products for ESPs
Topic 3	Opacity control concept
Topic 4	Results from optimized ESP power consumption
Topic 5	The SIR concept
Topic 6	Remote Optimization/Analysis of ESP

What is Power Optimization on ESPs all about?



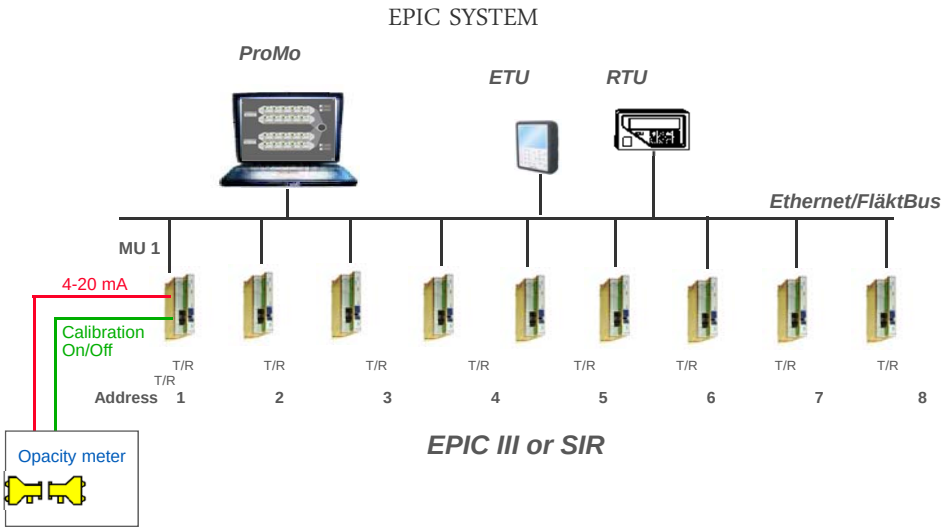
Could it be environmentally friendly to save energy?

Background and drivers for ESP optimization

Conditions required for power saving via Opacity optimization

- The ESP must be equipped with suitable ESP Control System
- There must be a reliable Opacity Meter downstream the ESP to be connected to the ESP Control System
- The dust emission at normal control of the T/R:s must be below the legal limit
- A permission must be given to allow for a slightly higher emission than “lowest possible”

What equipment do you need for Opacity Control (OpOpt)?



SIR - Comparison to Other ESP Power Supply

Mains Frequency Power Supply

Conv. T/R + Cabinet with EPIC Controller

Output power:	120 kW
Weight:	200 kg + 1'400 kg
Oil volume:	350 - 600 l
Efficiency*:	80-89%

*: output power/(output power + power losses)

High Frequency Power Supply

SIR E / SIR 4

28 – 120 kW	
240 – 500 kg	
48 – 90 l	
approx. 96%	

Higher efficiency with SIR than with conventional T/R

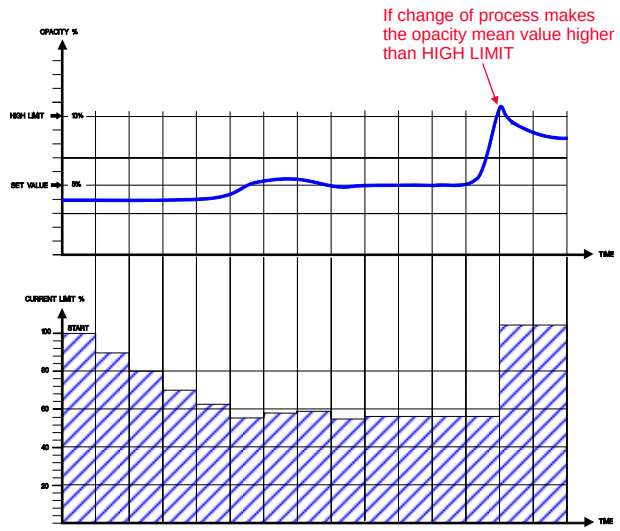
EPIC III - Automatic Voltage Controller

Electrostatic Precipitator Integrated Controller – Generation 3 (EPIC III) the cellular ESP field Controller – each bus section is individually optimized

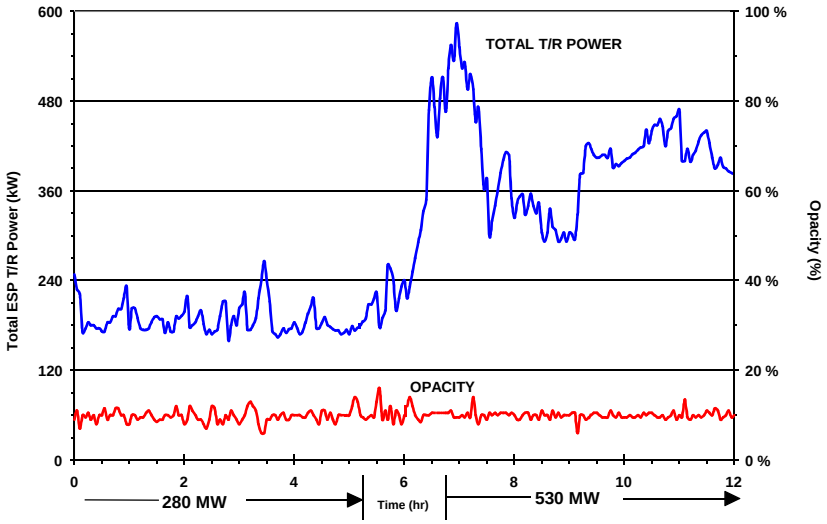
- Spark rate control
- Charging Ratio control - Semipulse
- Self-optimization algorithm for best performance (EPOQ)
- Rapping optimization + Power Control Rapping (PCR)
- Power optimization (OpOpt)
- Alarm handling and ESP operation overview

EPIC III maximizes performance at the lowest possible power

Opacity control philosophy with OpOpt

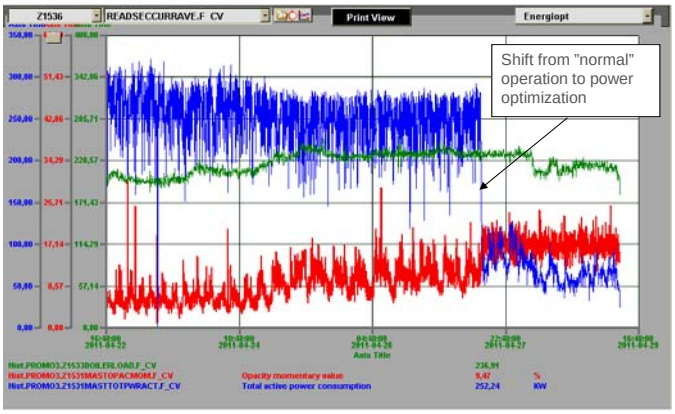


Opacity and Total T/R Power Consumption vs. time



Optimizing ESP power consumption with EPIC or SIR

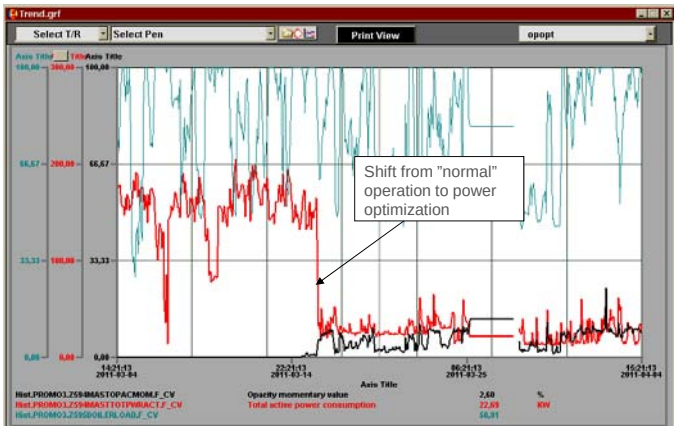
Power saving at Swedish Soda-ESP



ca 75 % power saving

Optimizing ESP power consumption with EPIC or SIR

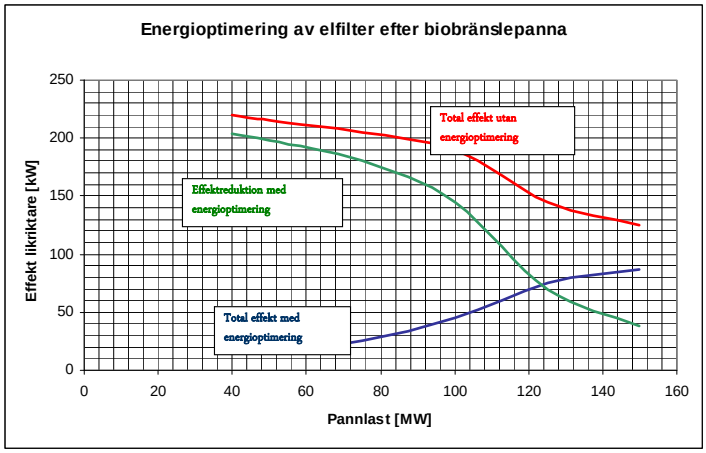
Power saving at Swedish Bark-ESP in Pulp Mill



ca 80 % power saving

Optimizing ESP power consumption with EPIC and SIR

Possible power saving by use of opacity control

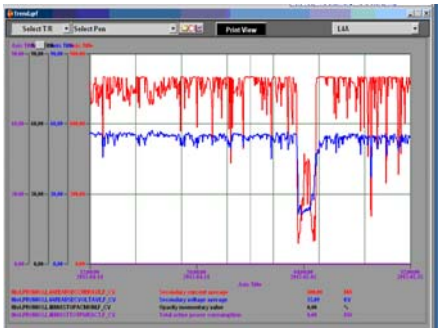


Large power savings especially at part load

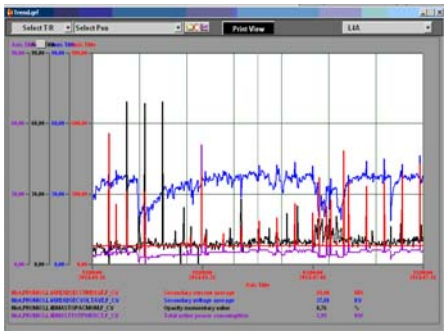
Optimizing ESP power consumption with EPIC or SIR

Power saving at Swedish Pulp Mill ESP (1:st field) after Biomass fired FB-boiler

Before



After

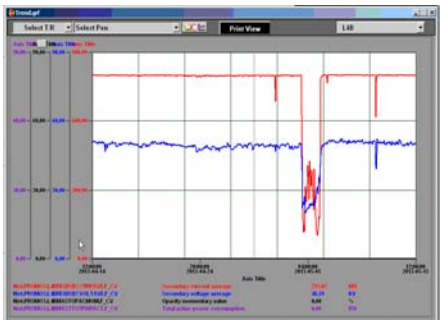


ca 90 % power saving

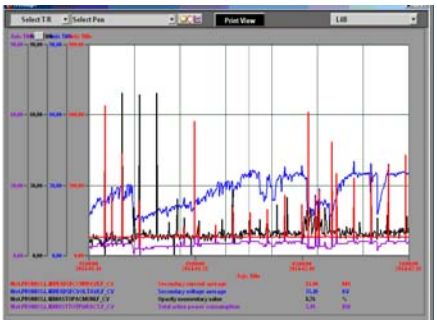
Optimizing ESP power consumption with EPIC or SIR

Power saving at Swedish Pulp Mill ESP (2:nd field) after Biomass fired FB-boiler

Before



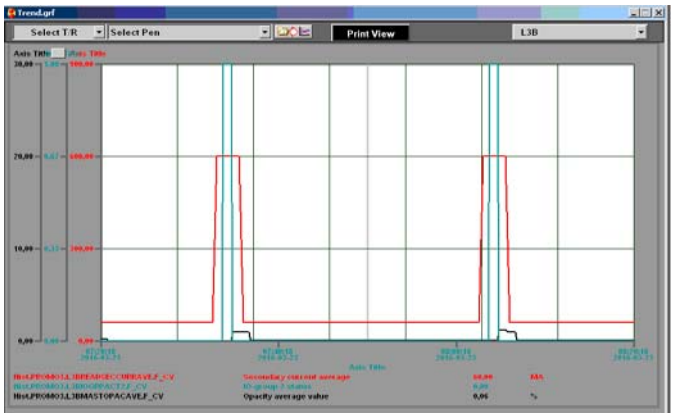
After



ca 90 % power saving

Optimizing ESP power consumption with EPIC or SIR

Power handling at Swedish Wood powder-ESP in Pulp Mill



"Power-up rapping" reducing rapping spikes

High-Frequency Power Supply - (SIR)

Switched

High frequency electronic power processing technique.

Integrated

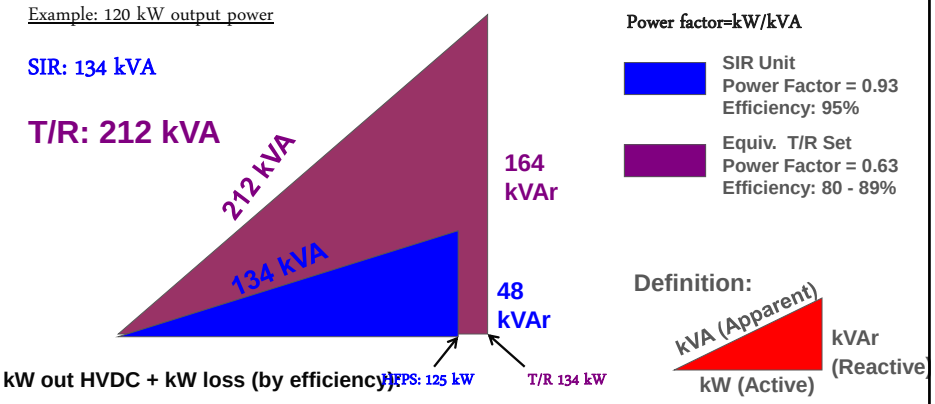
Transformer, power electronics and controller are integrated in the same housing.

Rectifier

AC input, DC output.

Power Factor, Efficiency – SIR vs. Conv. T/R

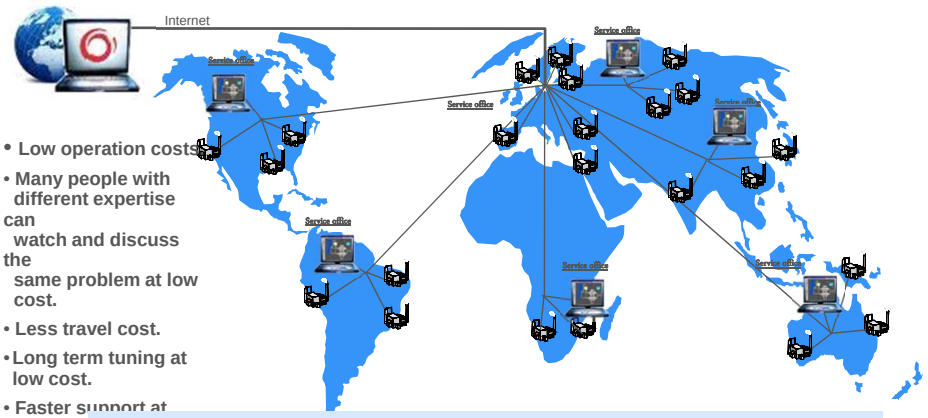
The HFPS unit typically uses approximately 63% of the kVA required by a conventional unit and can still provide the same kW to the ESP.



Remote services

Remote workstation

Remote services advantages



- Low operation costs
- Many people with different expertise can watch and discuss the same problem at low cost.
- Less travel cost.
- Long term tuning at low cost.
- Faster support at emergen

A more effective approach for maintenance and supervision of ESP

Remote Analysis ESP

What does GE provide?

- Connect to plant ProMo System as contractually agreed and provide report of the result and recommendations
- Dedicated Promo III remote workstation handled by Environmental Process Experts.
- Experience from 190 ProMo systems installed at customer sites around the world

Remote Analysis ESP

What is needed from plant?

- ProMo to be installed at customer site
- Internet connection or fixed phone line. Secured line.
- Remote Performance Inspection contract with GE

Customers voice of Remote Analysis of ESP

What do our customers get out of it?

Stora Enso, Skoghall:

"Samarbetet fungerar mycket bra och vi får kontinuerlig hjälp att utvärdera elfilterdriften av expertis från GE. Vi sparar både energi och tid och kan lägga fokus på vår kärnverksamhet – att producera massa"