OSIsoft. REGIONAL SEMINAR APAC 2011 THAILAND

JULY 26 - 29, 2011

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BANGKOK

Cogeneration Plant Dispatch Optimization Software and The Resulted Fuel Saving

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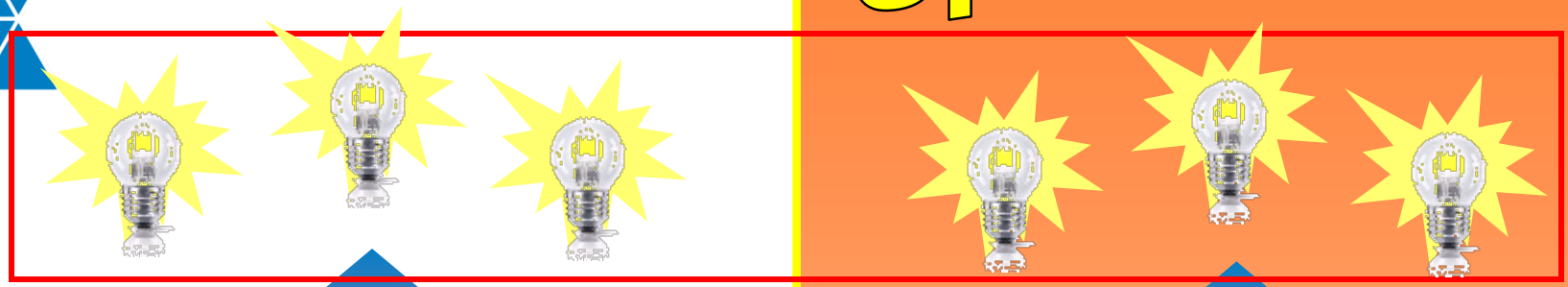
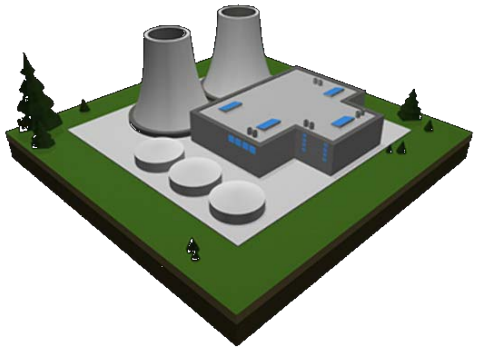
Agenda

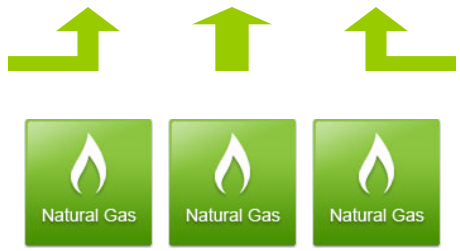
- Glow Optimizer Project Objective
- Complexity of Glow Cogeneration Plants
- Glow Optimizer at A Glance
- Optimizer Result
- Achieved Benefit of Glow Optimizer
  - Benefit assessment methods
  - THE BENEFITS!

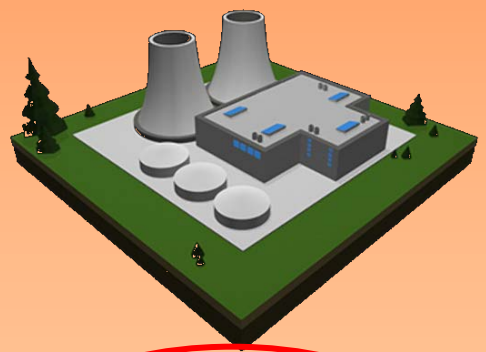
Optimization

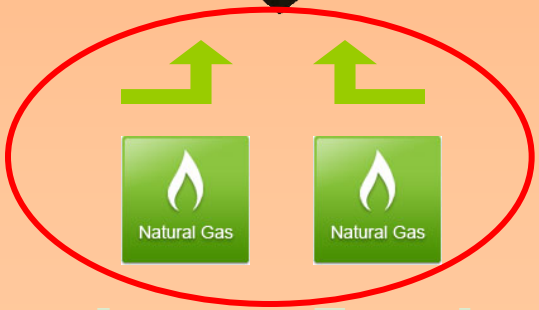


Same Output





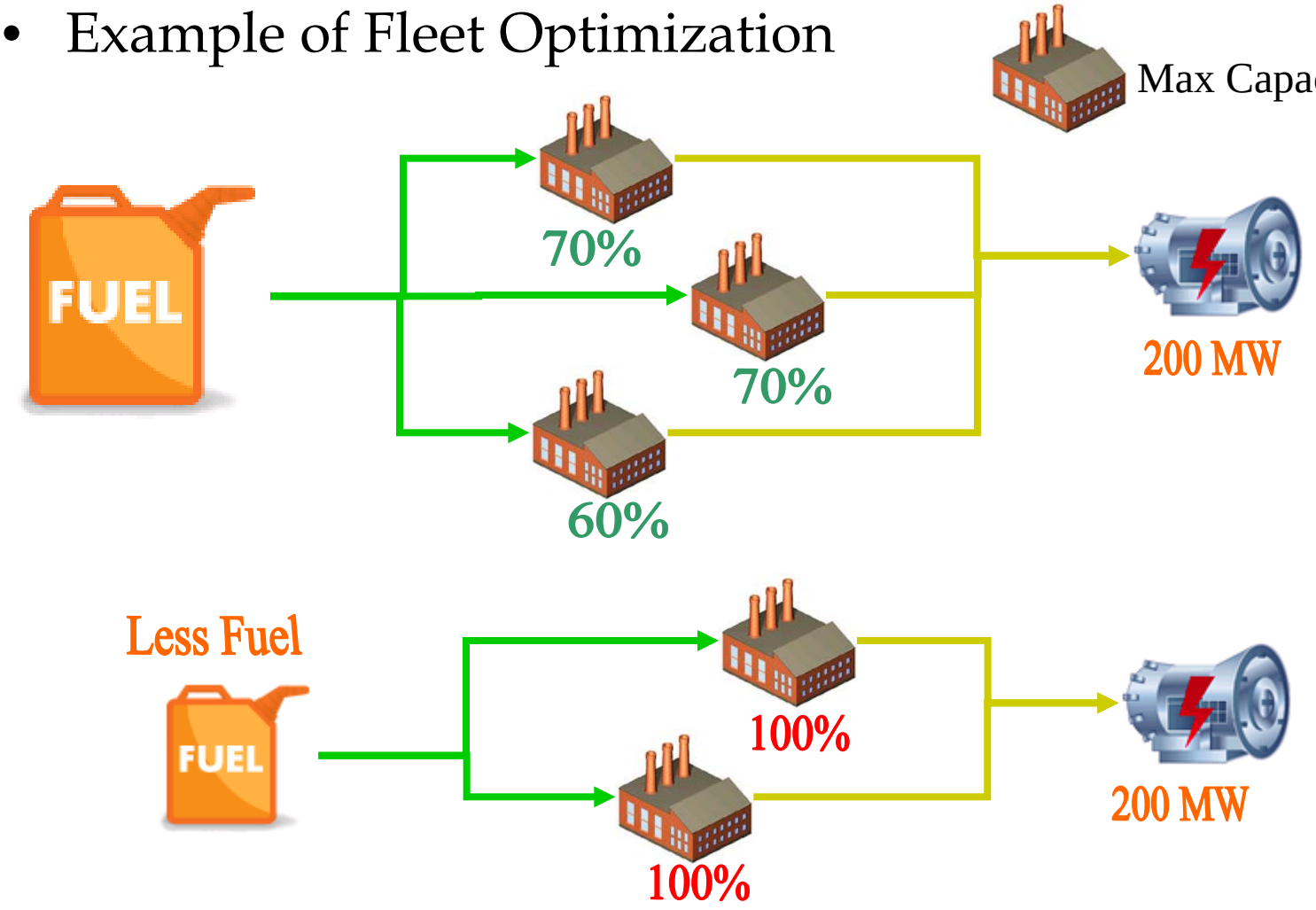




Less Fuel

2 Approaches of Power Plant Performance Optimization

- Example of Fleet Optimization



Glow Optimizer Project Objective

Objective

- Reduce fuel cost (Gas + Coal)
- Unique tool for unit dispatch, fuel budgeting, remaining capacity, investment studies, and other economic studies

Glow Optimizer Project Objective

Features of Glow Optimizer

- In-House built
- With both online and offline execution capability
- Near-Real-Time calculation capability
- Model
  a. Accurate
  b. Single model for online and offline studies

Glow Optimizer Project Objective

Project Timeline

- Phase1: Assessment, 18-24 Feb 2008
- Phase2: Increase Frequency, 1 Apr to May 2008
- Phase3: Full Online Operation, May 2008

Glow Optimizer Project Objective

Glow Optimizer Team

- Somgiat Dekrajangpetch, Ph.D. (Asset Optimization Vice President)
- Aungsuthon Puboonterm (Optimization Manager)
- Weerapol Manora (Asset Manager)
- Rungrote Jaidee (Glow SPP1 Operations Manager)

Complexity of Glow Cogeneration Plants

Glow Plant Complexity

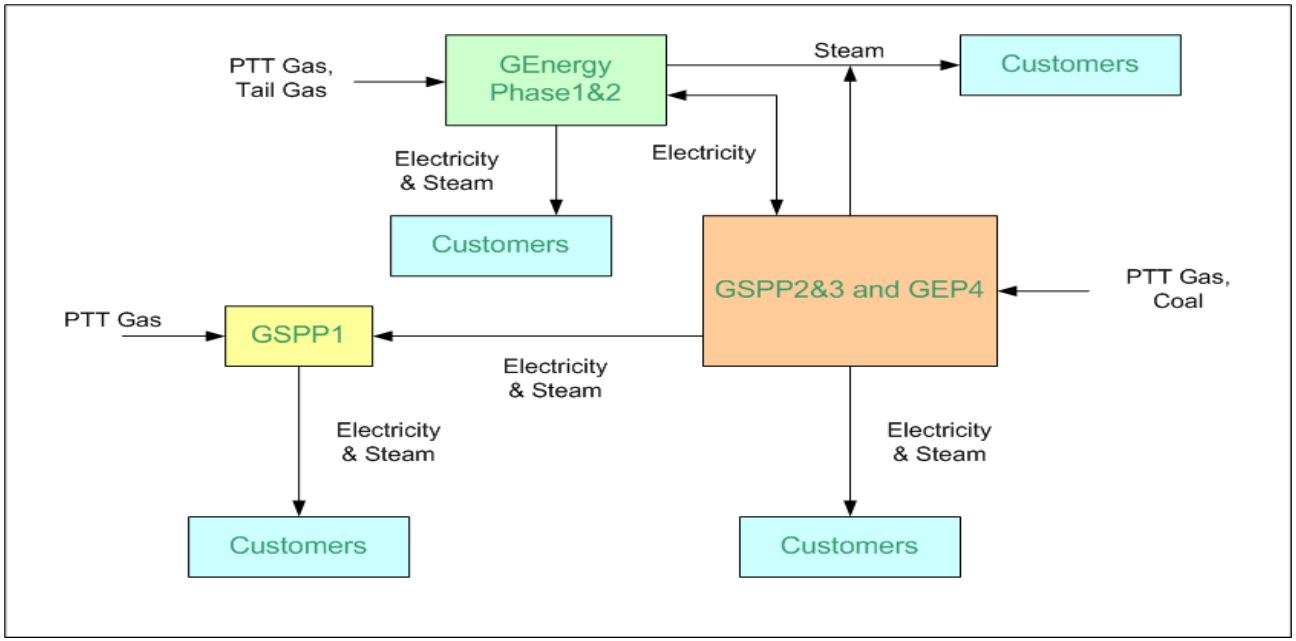
- Complex electrical and steam networks
- 3 Power Plants
  a. More than 40 electrical and steam generating units including 3 coal CFBs units
- Large number of HP steam, MP steam, LP steam and electricity customers
- 8 complicated PPAs with Electricity to the Electricity Generating Authority of Thailand (EGAT)

Glow SPP Plants in Rayong, Thailand

Glow Optimizer at A Glance

Optimizer Models

- The plant model: represent current and possible operating schemes of plant



- The optimizer: indicate optimal plant operating scheme
  a. Maximize profit or minimize cost

Glow Optimizer at A Glance

Solution

- Target at objection function i.e. minimum fuel cost
- Adjust optimizer variables (plant parameters that could be varied)
- Stay within a set of constraints (high and low limits)

Glow Optimizer at A Glance

Example1

Linear Program

Max 40F + 30S

s.t.

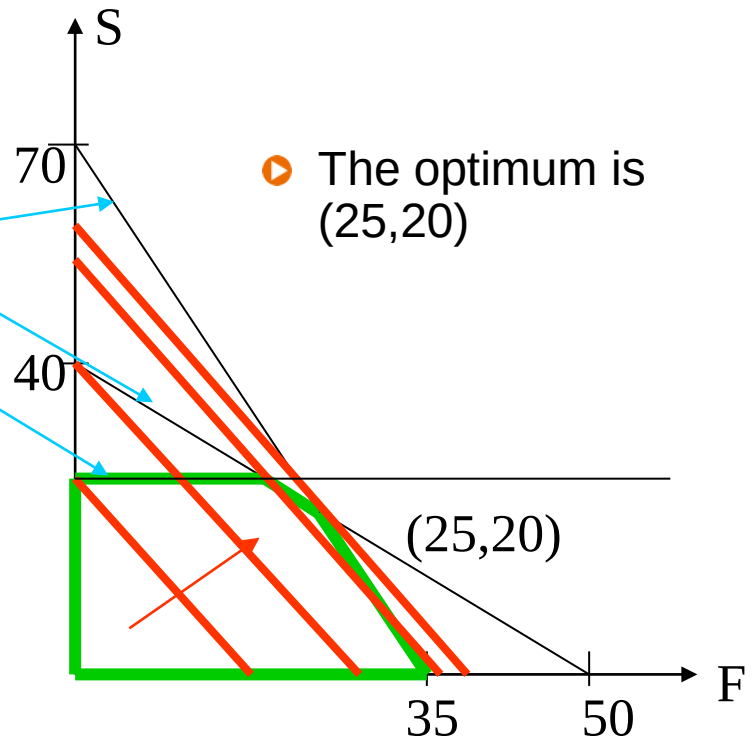
$0.4F + 0.5S \leq 20$

$0.2S \leq 5$

$0.6F + 0.3S \leq 21$

$F, S \geq 0$

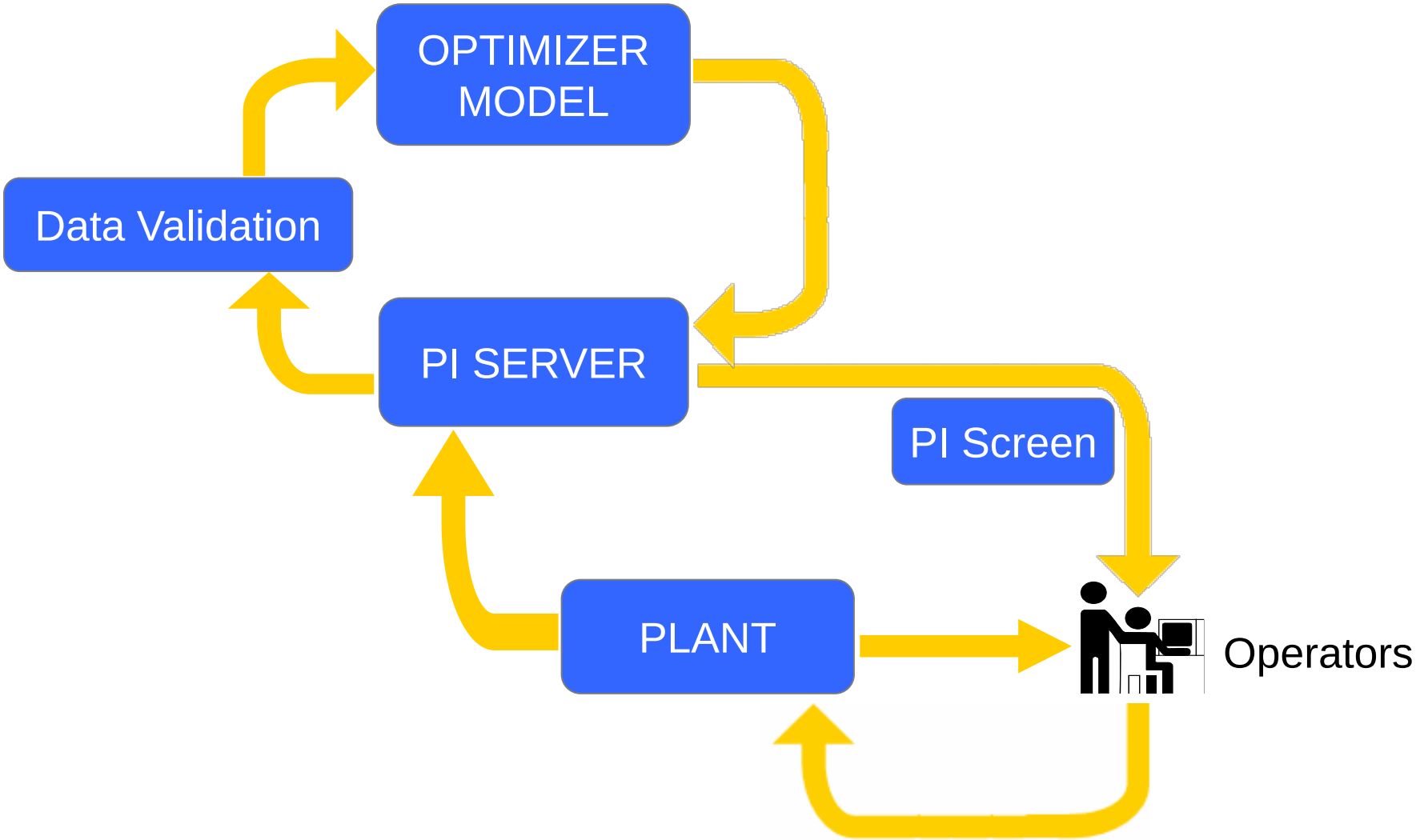
Graphical Solution Procedure



- The optimum is (25,20)

Glow Optimizer at A Glance

- **Optimizer Operating Structure – Information Flow**



Optimizer Solution

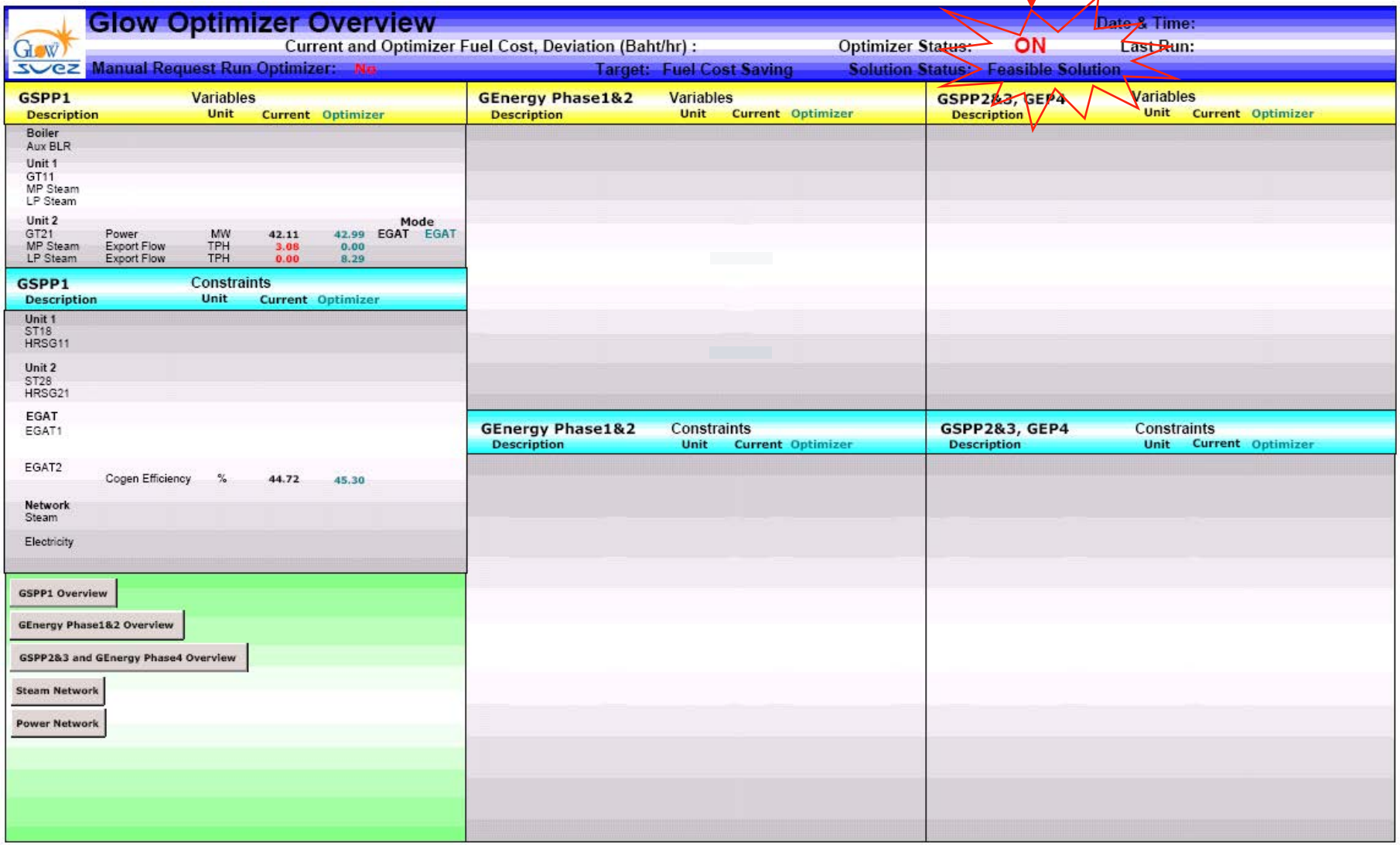
Operator Interface

- PI Process Book-Provide Optimal Dispatch to Operators
  a. Glow Optimizer Overview
  b. Power Network
  c. Steam Network
- Operators gradually adjust the operation to reach the optimal dispatch by taking operability, safety and reliability in to account

Optimizer Solution

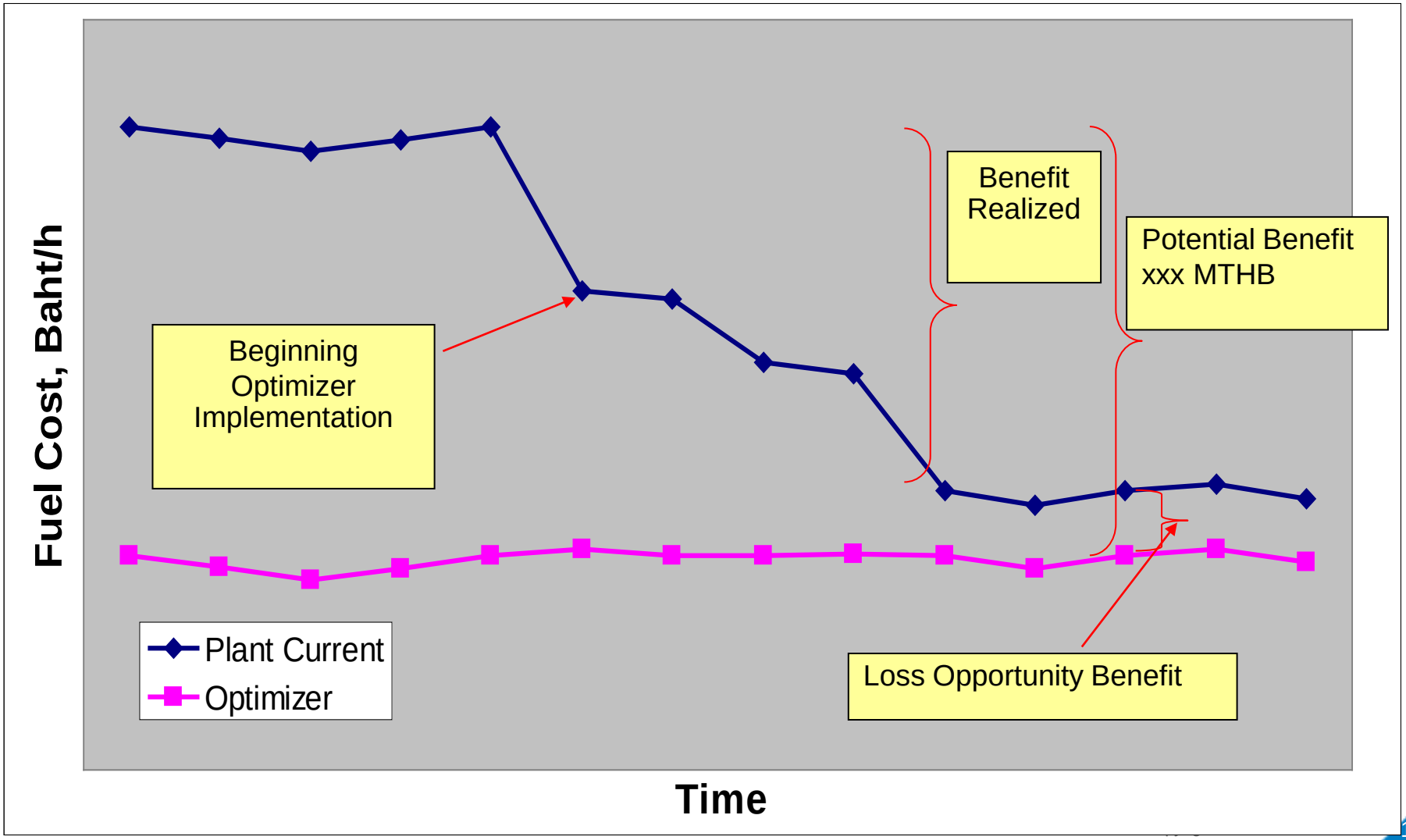
Glow Optimizer Interface

Implement while show “ON” and “Feasible Solution”



Achieved Benefit of Glow Optimizer

- THE BENEFIT



Thank you