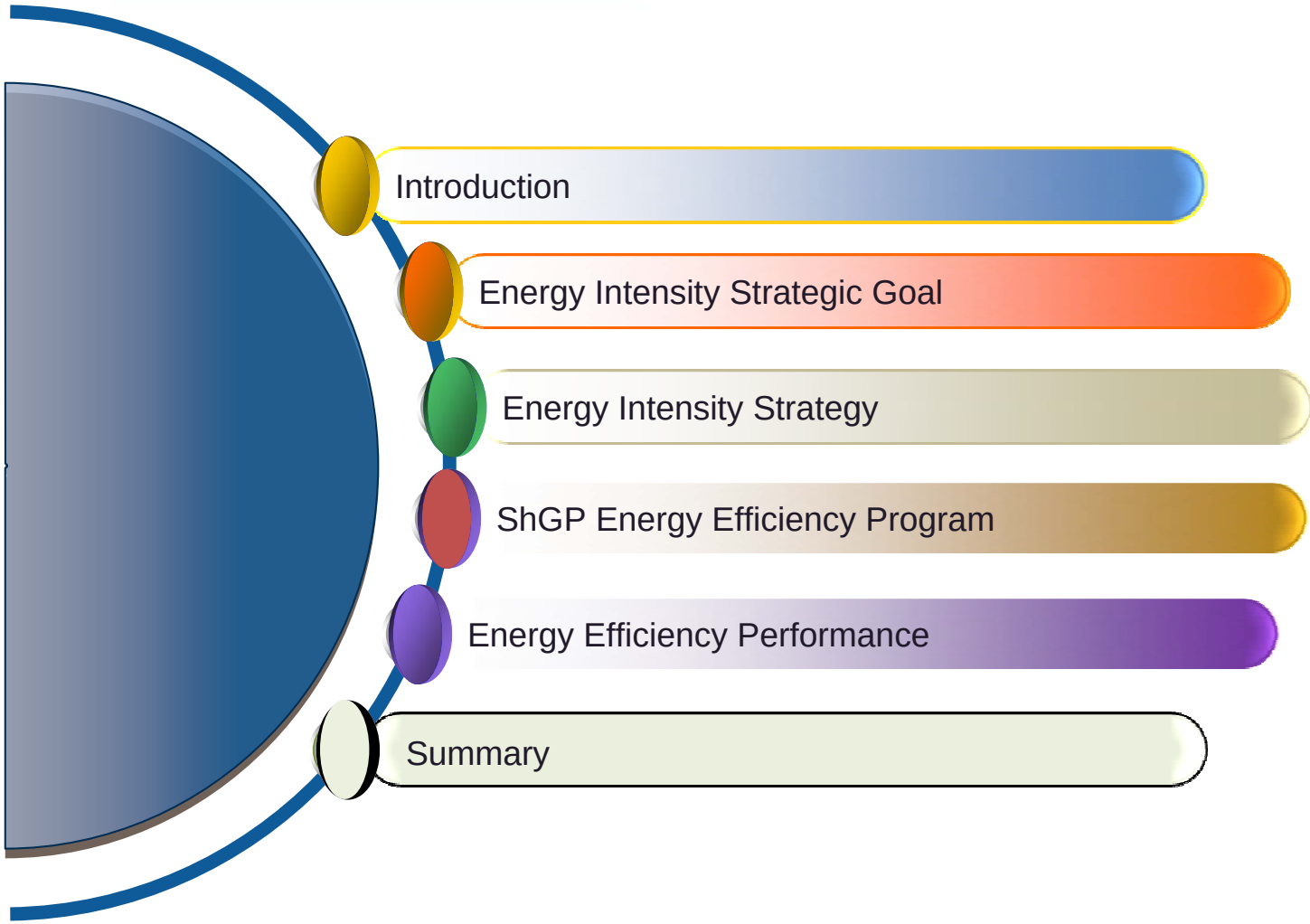
TRANSLATING STRATEGIES INTO REALITIES

A SUPERIOR ENERGY EFFICIENCY PROGRAM

By: Fahad S. Al-Dossary

OUTLINE


Introduction
Energy Intensity Strategic Goal
Energy Intensity Strategy
ShGP Energy Efficiency Program
Energy Efficiency Performance
Summary

INTRODUCTION

- **You can buy a used airplane for about the same price as a new sports car**

What's the main difference between the sports car and the airplane?

INTRODUCTION

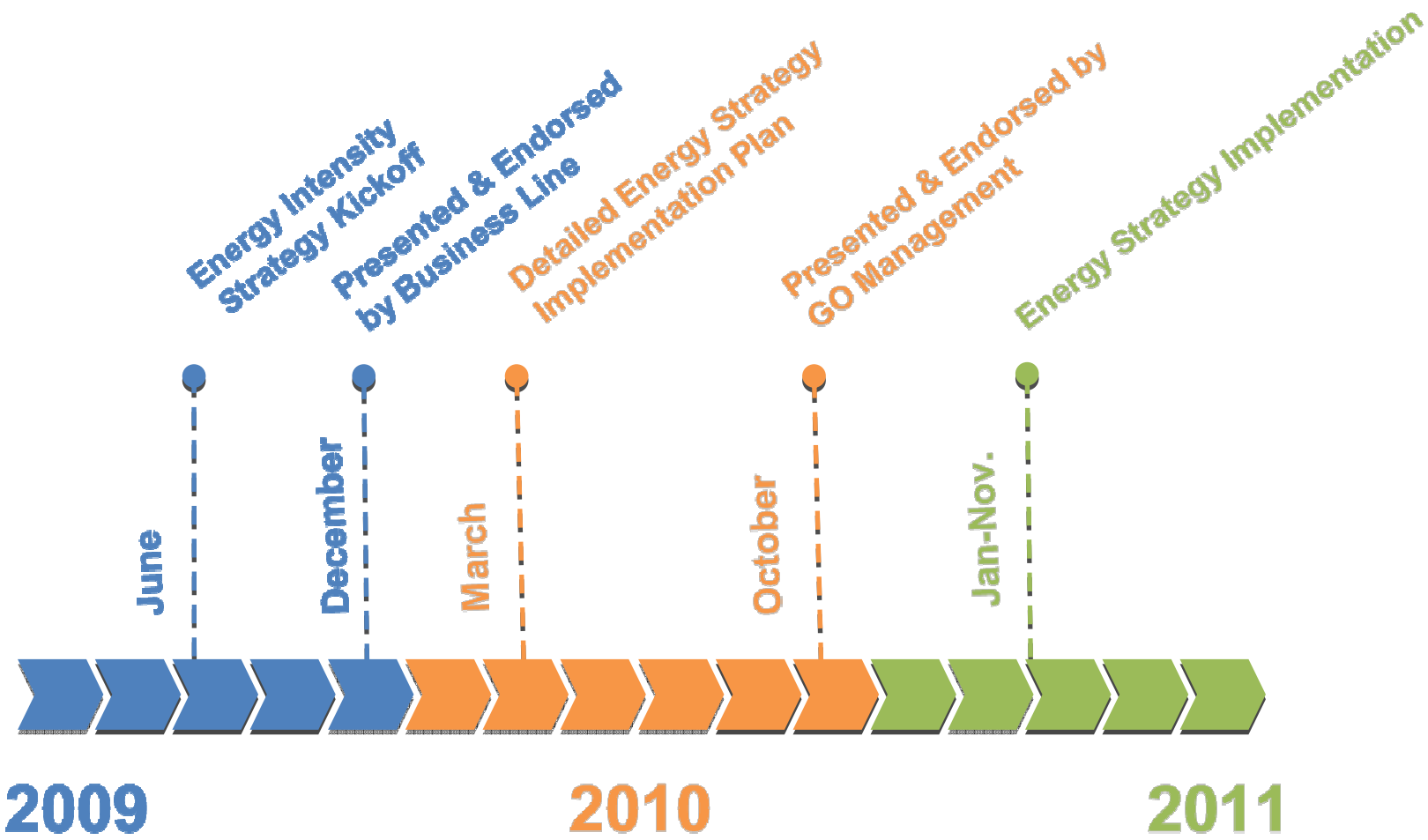
If you speed up the sports car to about 75 miles per hour and pull back on the steering wheel, nothing very interesting happens.

- **No Ideal Controls. The Pilot's Duties is to Control Speed & Altitude by Move Levers.**
- **Speed & Altitude Cannot be Controlled Separately.**

ENERGY INTENSITY

$$EII = \frac{Energy\,Consumption\,(MMBTU)}{Plant\,Feed\,(MBOE)}$$

BACKGROUND

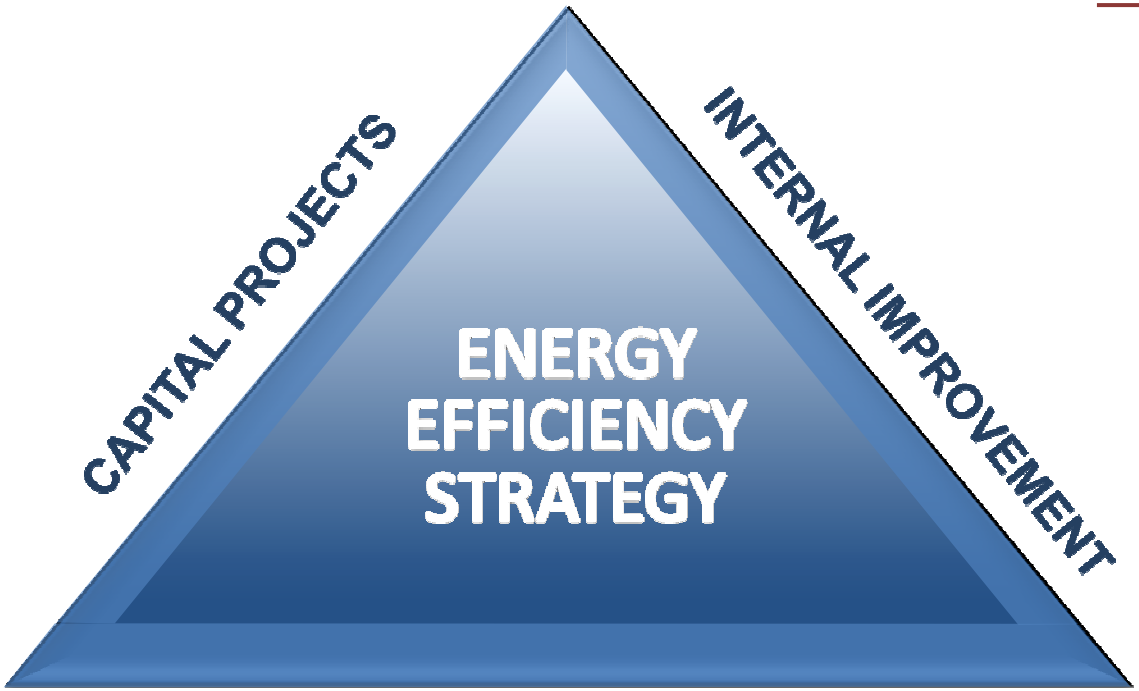

Energy Intensity Strategy Kickoff
Presented & Endorsed by Business Line
Detailed Energy Strategy Implementation Plan
Presented & Endorsed by GO Management
Energy Strategy Implementation
June
December
March
October
Jan-Nov.
2009
2010
2011

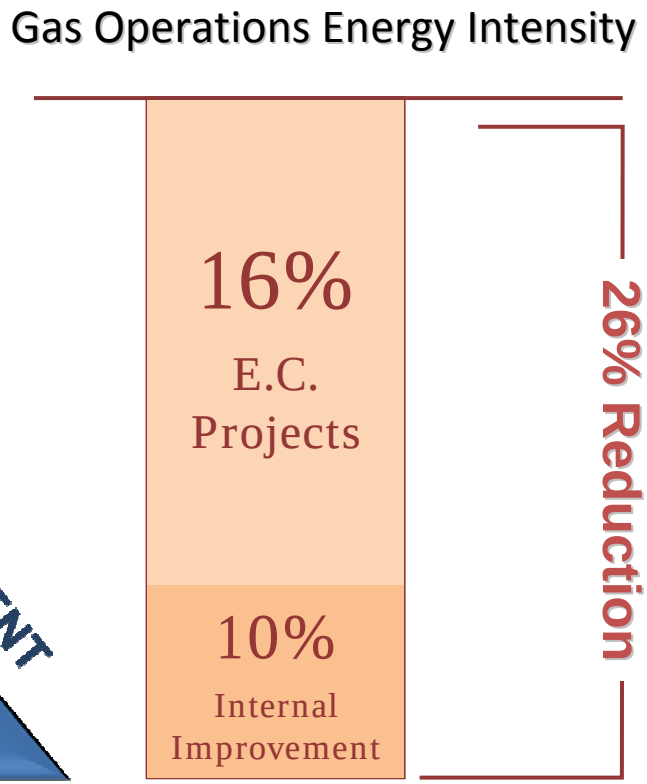
E&P ENERGY FOCUS TEAM

MEMBERS

Member		Position
S. A. Shahrani	Chairman	Manager, Gas Operations
B. M. Zayed		Manager, Oil Operations
A. S. Ajmi		Manager, Oil Operations
M. A. Said		Manager, Abqaiq Plant
K. A. Abdulqadir		Division Head, Oil Operations
A. H. Qahtani		Consultant, Eng. Services
S.A. Qahtani		Consultant, Eng. Services
M. H. Ghamdi		Eng. Supervisor, Oil Operations
F. S. Dossary		Eng. Supervisor, Gas Operations
B. J. Qahtani		Engineer, Oil Operations
R. K. Gunther		Consultant, Gas Operations
T. M. Shehri		Engineer, Power Distribution
P. H. Issa		Consultant, Oil Operations
K. D. Usail		Specialist, Oil Scheduling & Planning

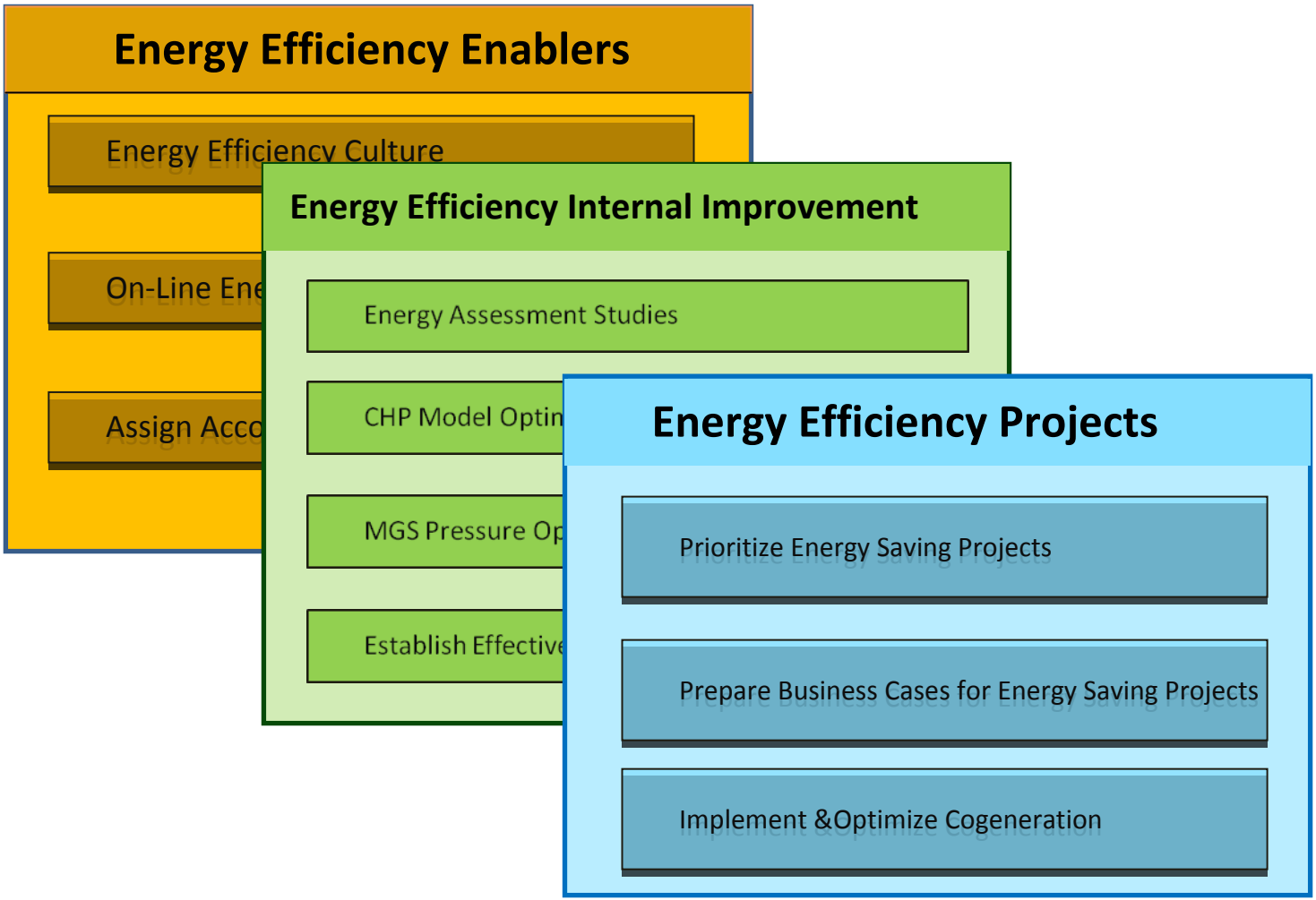
ENERGY EFFICIENCY STRATEGY ELEMENTS





INDUSTRIAL ENERGY EFFICIENCY PROGRAMS

ENERGY EFFICIENCY STRATEGY ELEMENTS



SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

Making Commitment

Energy Engineer Appointment

- Monitor & optimize the plant energy consumption
- Evaluate the plant equipment efficiency
- Perform energy assessment studies
- Benchmark the plant performance to similar facilities
- Develop business case and conceptual engineering E. Projects
- Evaluate New Tech. with Supporting Organizations
- Coordinate and directing the overall energy program
- Point of Contact for Energy Initiatives & Accomplishment

SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

WEEK#4 ENERGY EFFICIENCY REPORT

MONTHLY SUMMARY

The average energy intensity of the plant for the month of January is 211 MBtu/Boe. Despite the fact it is lower than our 2011 target (214 MBtu/Boe), January intensity fell short of its target (203 MBtu/Boe). This is mainly attributed to the low average plant loading compared to the forecasted load. Additionally, the plant energy intensity could have been improved through the missed opportunities that have been highlighted on weekly basis.

Evidently, many of the missed opportunities were not captured due to the unavailability of some key equipments such as some Utility steam drivers (steam turbines) and LRU regeneration gas compressors. Another major uncaptured opportunity is improving the efficiency of the SRU air and acid gas preheaters furnaces. These opportunities have had the potential to reduce our energy intensity to 206 MBtu/Boe, much closer to our targeted value.

	Unit	Forecast	Actual
Energy Intensity	MBtu/Boe	203	211
Associated gas	MMSCFD	1252	1176
Khuff Gas	MMSCFD	650	561
Sales Gas	MMSCFD	1134	1064
NGL	MBD	322	271

In January, we had three major captured opportunities: the shutdown of one sales gas compressor, shutdown of two propane compressors, and SRU#5 reaction furnace optimization. All the captured opportunities accounts for a reduction of 1.74% reduction in our energy intensity. Without these captured opportunities, the plant's energy intensity would have been 215 MBtu/Boe.

Focus Areas for Next Month:

1. Improve plant's equipments availability
2. Optimization of Sulfur Furnaces and Utility boilers
3. Exploitation of Opportunities at Cogeneration

WEEK #4 ENERGY PERFORMANCE

The energy efficiency of the plant was reviewed during the 4th week of 2011 covering the period between January 19, 2011 and January 25, 2011. The plant energy intensity (EI) is 212.7 MBTU/BOE. Following the shutdown of the HPDGA, an average of 90 MPPH has been observed as excess 75# steam. Our next week target is to minimize excess steam condensing through the following:

- Running motors instead of steam turbines: under such plant condition, it is more energy efficiency and economical to operate motor-driven equipments than steam driven ones.
- Optimizing plant's inlet pressure: increasing the plant's inlet pressure decreases FGC steam consumption and eventually elemenate excess steam condensing.

Indices	Value	Weekly Saving/Revenue
Plant Energy Intensity	212.7 MBTU/BDoe	---
Cogen % Utilization	100%	---
Plant's power export	3.68 GWh/day	
Total Captured Opportunities Last Week	2	$ 87M
Total Missed Opportunities Last Week	2	$ 27M

CAPTURED ENERGY SAVING OPPORTUNITIES LAST WEEK:

	OPPORTUNITY	EII IMPACT	WEEKLY COST SAVING ($)	YTD SAVING ($)
	SRU #5 un-optimized reaction furnace operation.	0.13%	3,300	1,000
	Shutdown of the propane gas compressor K-261A.	0.44%	59,600	85,000
	Shutdown of the sales gas compressor K-002A.	0.76%	102,800	132,000
	Shutdown of unneeded fin fan at excess steam condenser.	0.008%	800	250
	Shutdown of KM-501C in SRU #5 to utilize the steam letdown	0.10%	6,600	2,000
Total		1.88%	$ 233,000	$ 314,000

MISSED ENERGY SAVING OPPORTUNITIES LAST WEEK:

	OPPORTUNITY	ENERGY INTENSITY IMPACT (%)	HURDLES PREVENTING OPPORTUNITY CAPTURE
	Startup of Boiler #5 and Shutdown of another boiler.	0.25%	FD fan is under testing (Maint.)
	High excess Oxygen at SRU preheaters	0.33%	Better draft air control (Operations)
	Unnecessary steam condensing in excess steam condenser.	1.0%	Fluctuating control at PCV-100 (Eng.)
Total		2.1%	

NEXT WEEK FORECASTED ENERGY CONSERVATION OPPORTUNITIES:

	OPPORTUNITY	COST SAVING ($)
	Operating boiler F-105 to utilize excess steam	12,000
	Optimize all air and acid gas preheaters at SRU	8,000
	Minimize excess steam condensing at the Utility excess steam condenser.	17,000
	Assess shutting down one LRU to coincide with HPDGA shutdown.	13,000
Total		$ 56,000

SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

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Making Commitment

Establishing Performance Baseline

2010 Lost Energy Opportunities	Detailed Energy Assessment Study
4-5%	22%

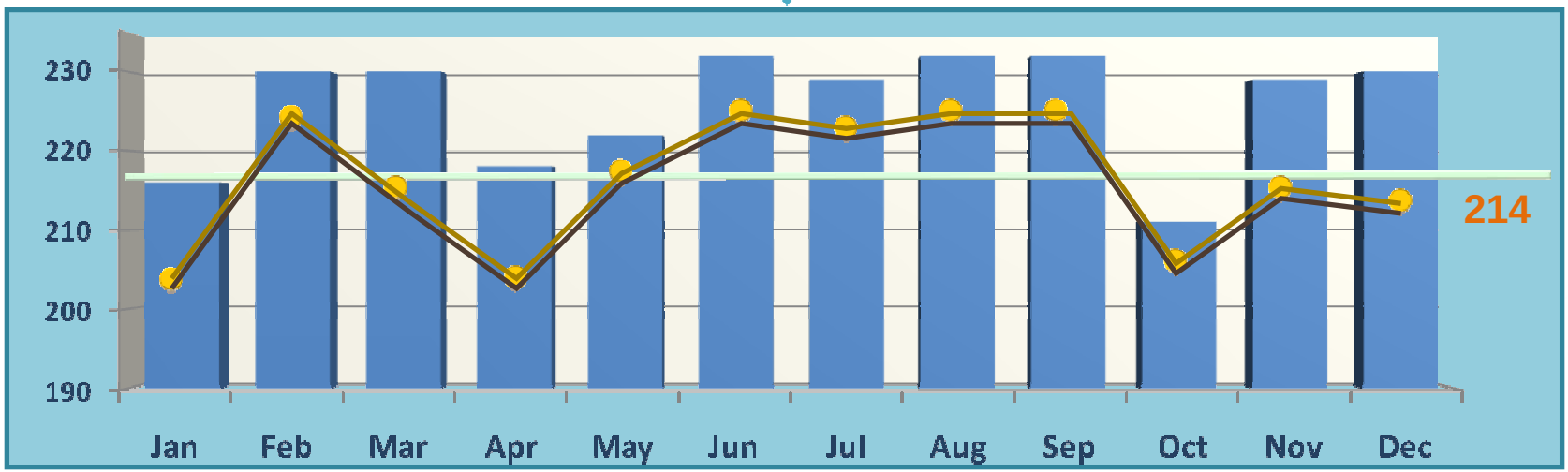
SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

Making Commitment

Establishing Performance Baseline

Setting Goals & Action Plan



SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

SHGP ENERGY BRAINSTORMING SESSION

Making Commitment

Establishing Performance Baseline

Setting Goals & Action Plan

Knowledge Sharing

- Brainstorming Sessions
- Energy Efficiency Campaign
- Energy Efficiency Conferences & Events

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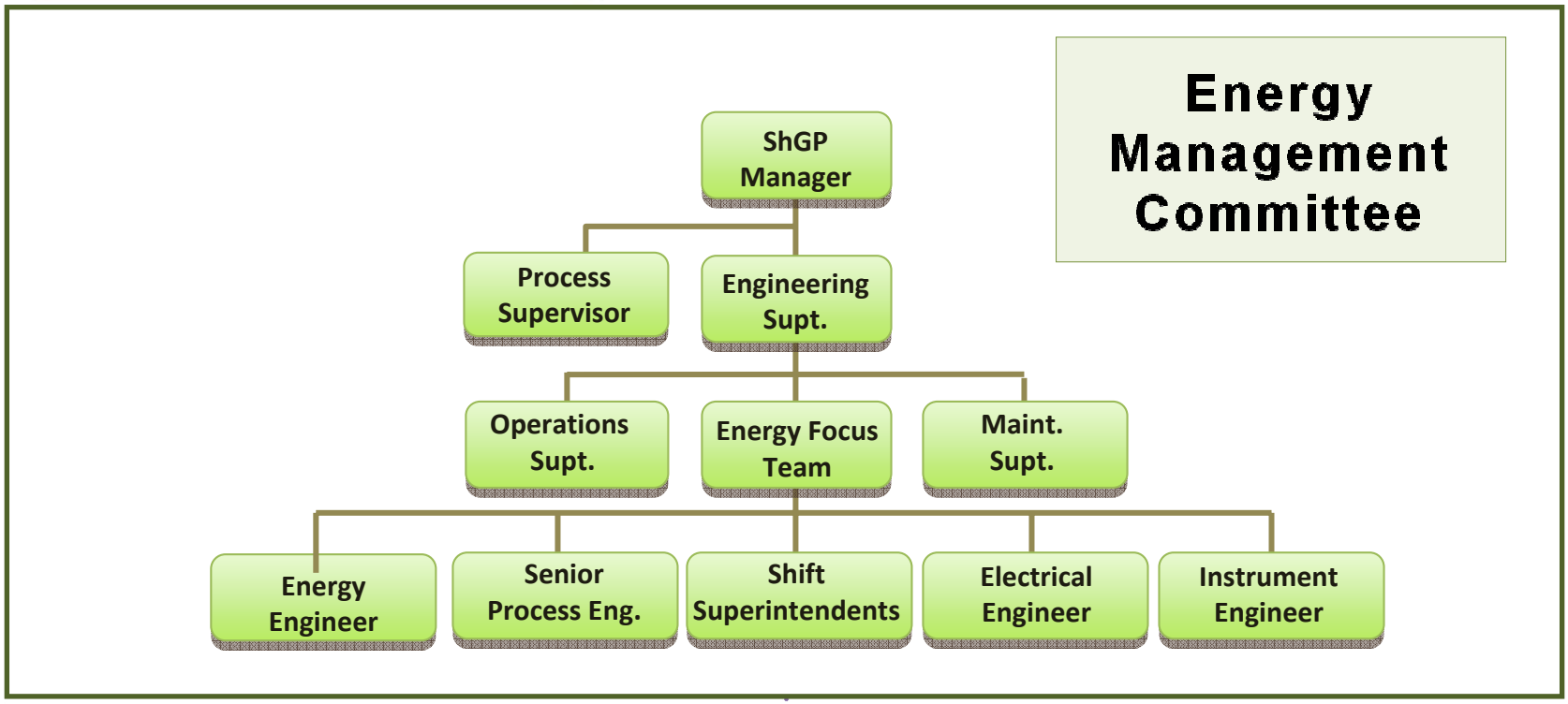
SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

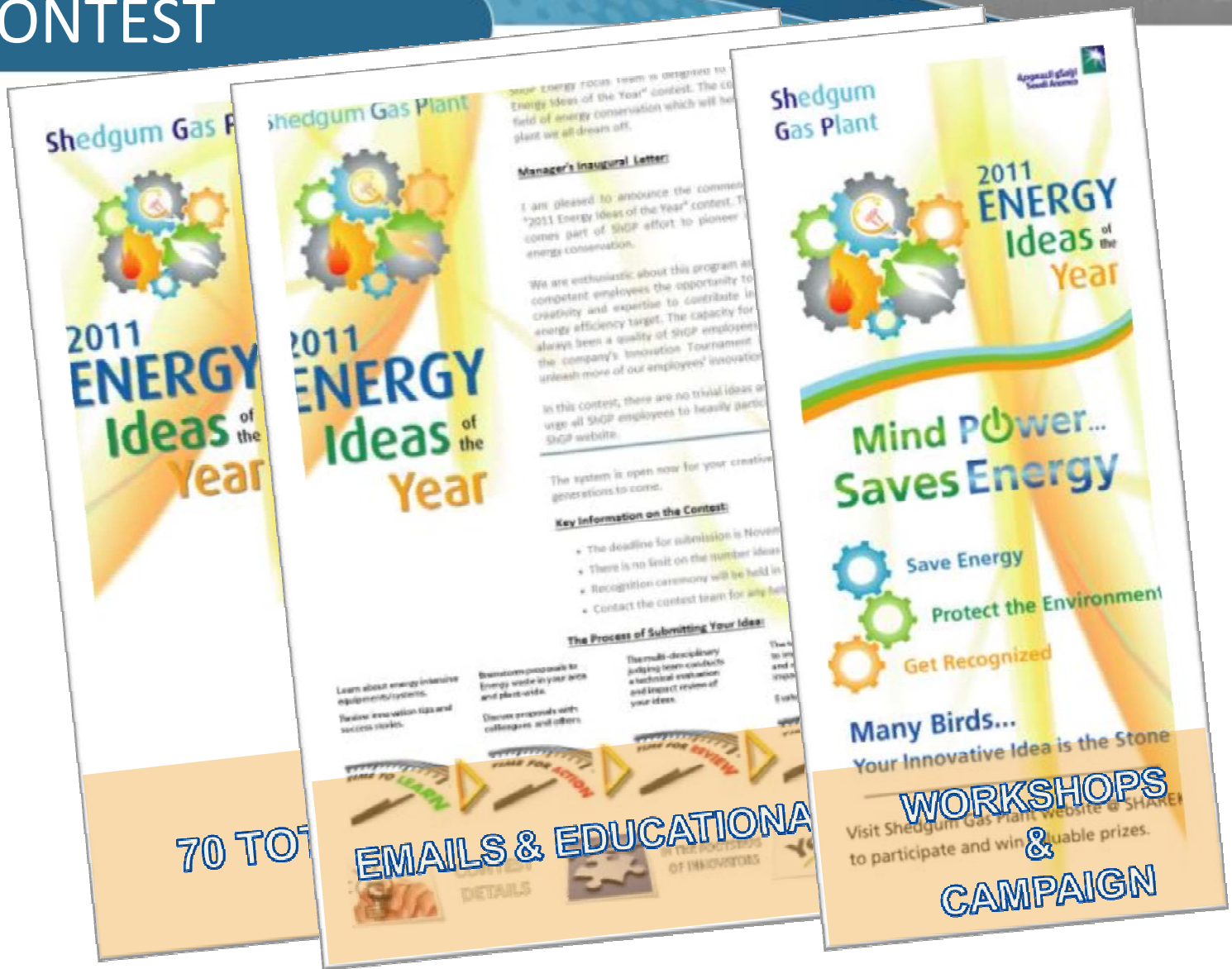


Evaluating Progress

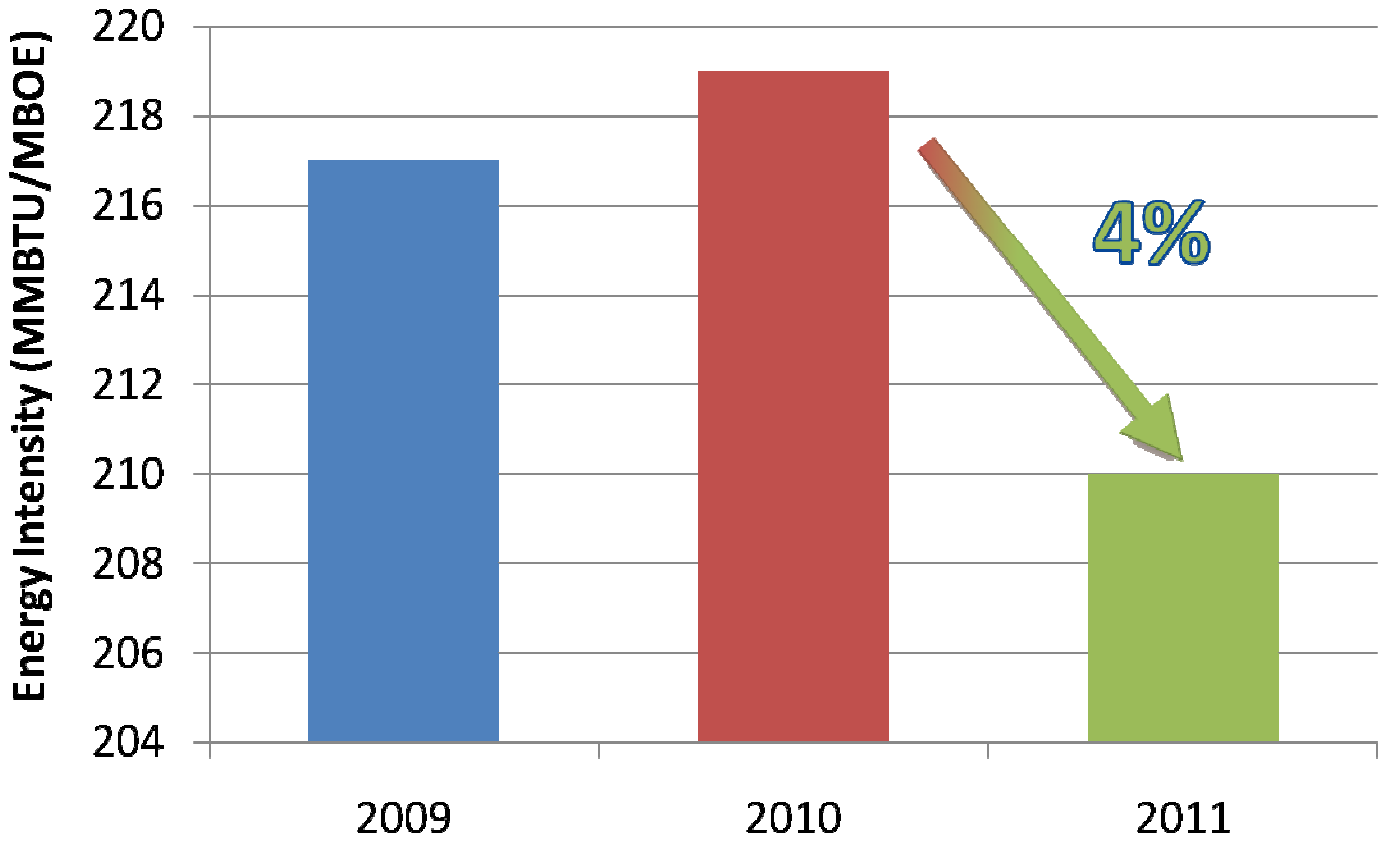
Recognizing Achievements

SHGP ENERGY EFFICIENCY PROGRAM ELEMENTS

SHGP ENERGY IDEAS OF THE YEAR CONTEST



2009-2011 SHGP ENERGY INTENSITY

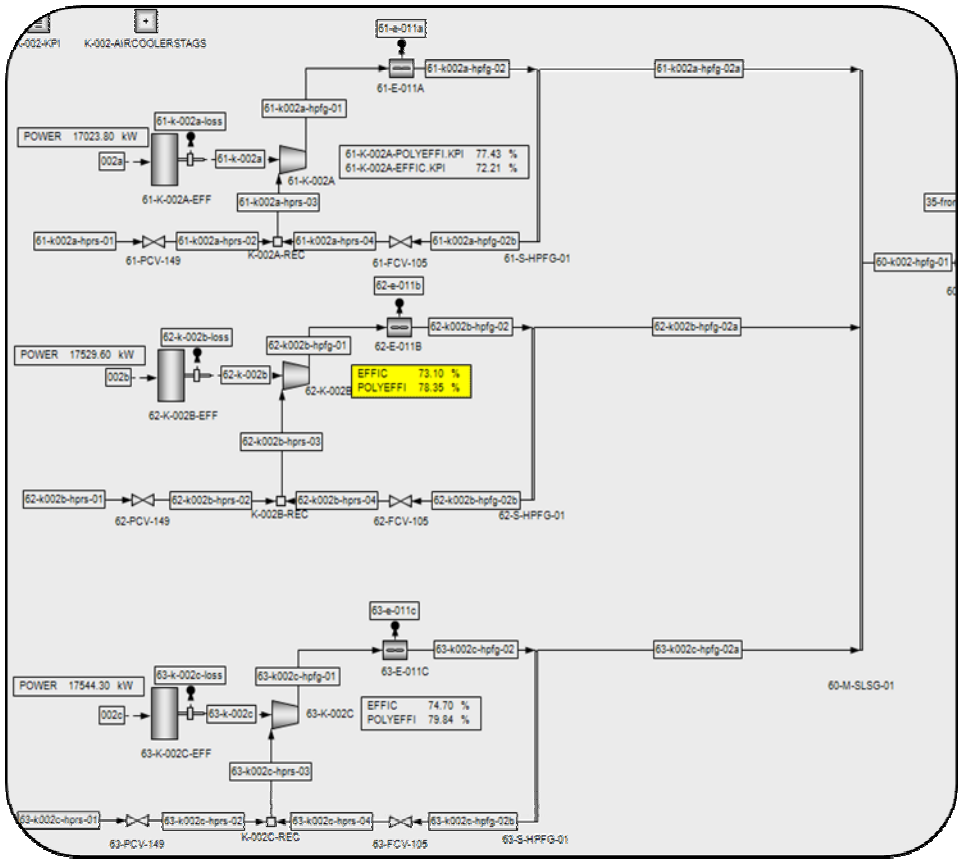


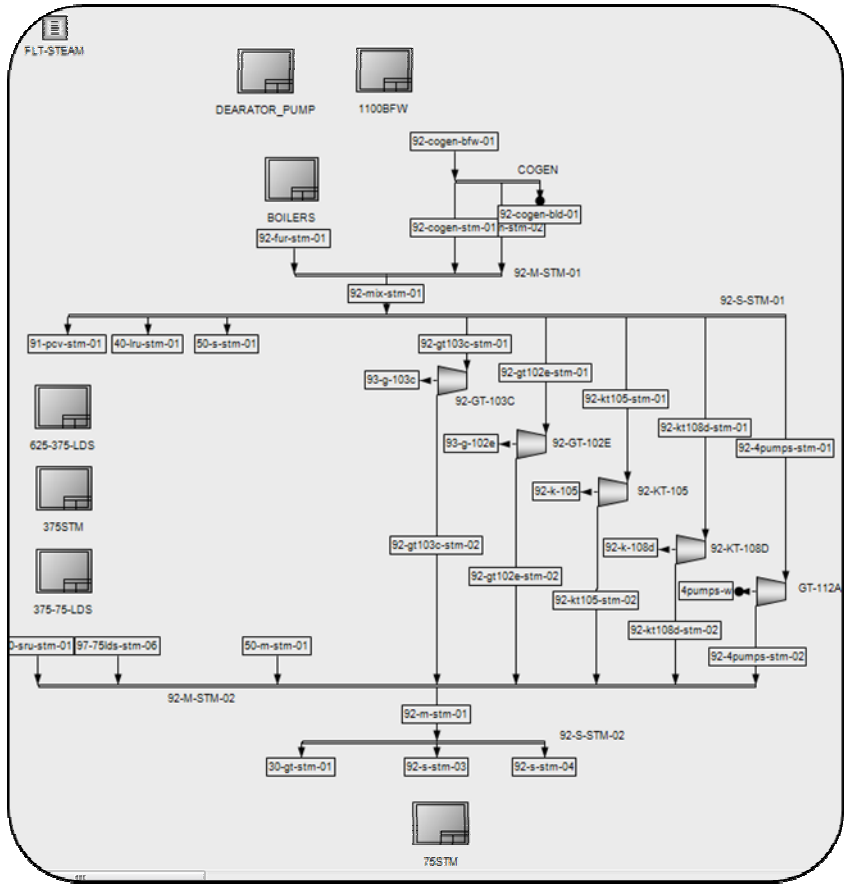
$$EII = \frac{Energy\ Consumption\ (MMBTU)}{Plant\ Feed\ (MBOE)}$$

CONCLUSION

Q & A

ENERGY PERFORMANCE MONITORING





BACK

ENERGY PERFORMANCE MONITORING

ارامكو السعودية
Saudi Aramco

IOK

	Unit	Target	Actual	Deviation
EII	MMBtu/MBDOE		0.35	0.0%
Opportunity	USD/H		0.00	
Total energy consmp.	MMBTU/hr		1.36	
Power consumption	KW		400.00	
Feed	MMSCFD		824.62	
Production	MMSCFD		500.00	
Utilization	%		1031%	

SRU

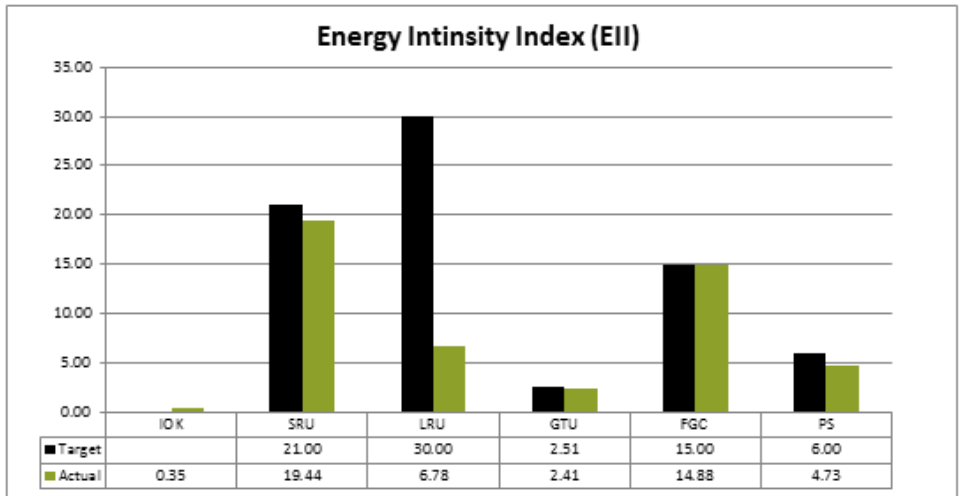
	Unit	Target	Actual	Deviation
EII	MMBTU/ton	21.00	19.44	7.4%
Opportunity	USD/H			
Total energy consmp.	MMBTU/hr		374.65	
Power consumption	KW		0.00	
Steam consumption	MMBtu/h		192.29	
Steam Production	MMBtu/h		0.00	
Fuel consumption	MSCFD		3569.53	
Feed	MMSCFD		61.84	
Production	t/h		19.27	
Utilization	%		19%	

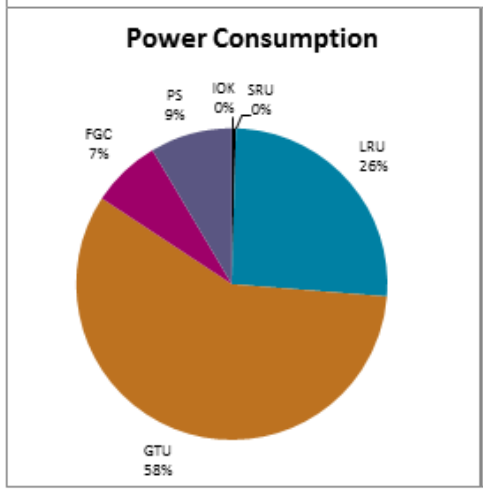
LRU

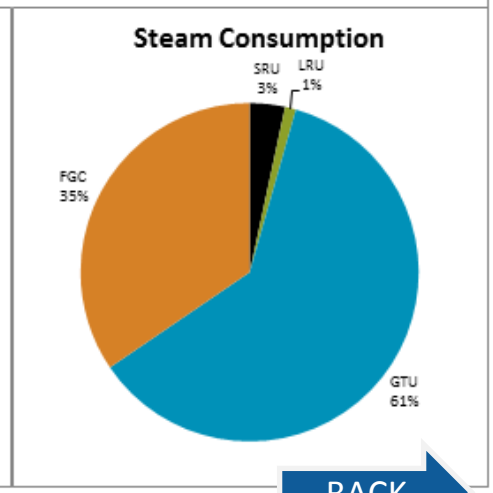
	Unit	Target	Actual	Deviation
EII	MMBtu/MBDOE	30.00	6.78	77.4%
Opportunity	USD/H		459.87	
Total energy consmp.	MMBTU/hr		88.21	
Power consumption	KW		24413.12	
Steam consumption	MMBtu/hr		60.16	
Steam Production	MMBtu/hr		55.25	
Feed	MMSCFD		1200.00	
Production	MBDOE		312.27	
Utilization	%		86%	

GTU

	Unit	Target	Actual	Deviation
EII	MMBTU/MBDOE	2.51	2.41	4.0%
Opportunity	USD/H		421.72	
Total energy consmp.	MMBTU/hr		3681.05	
Power consumption	KW		54785.57	
Steam consumption	MMBTU/hr		3494.12	
Feed	MMSCFD		2000.00	
Production	MBDOE		302.08	
Utilization	%		80%	

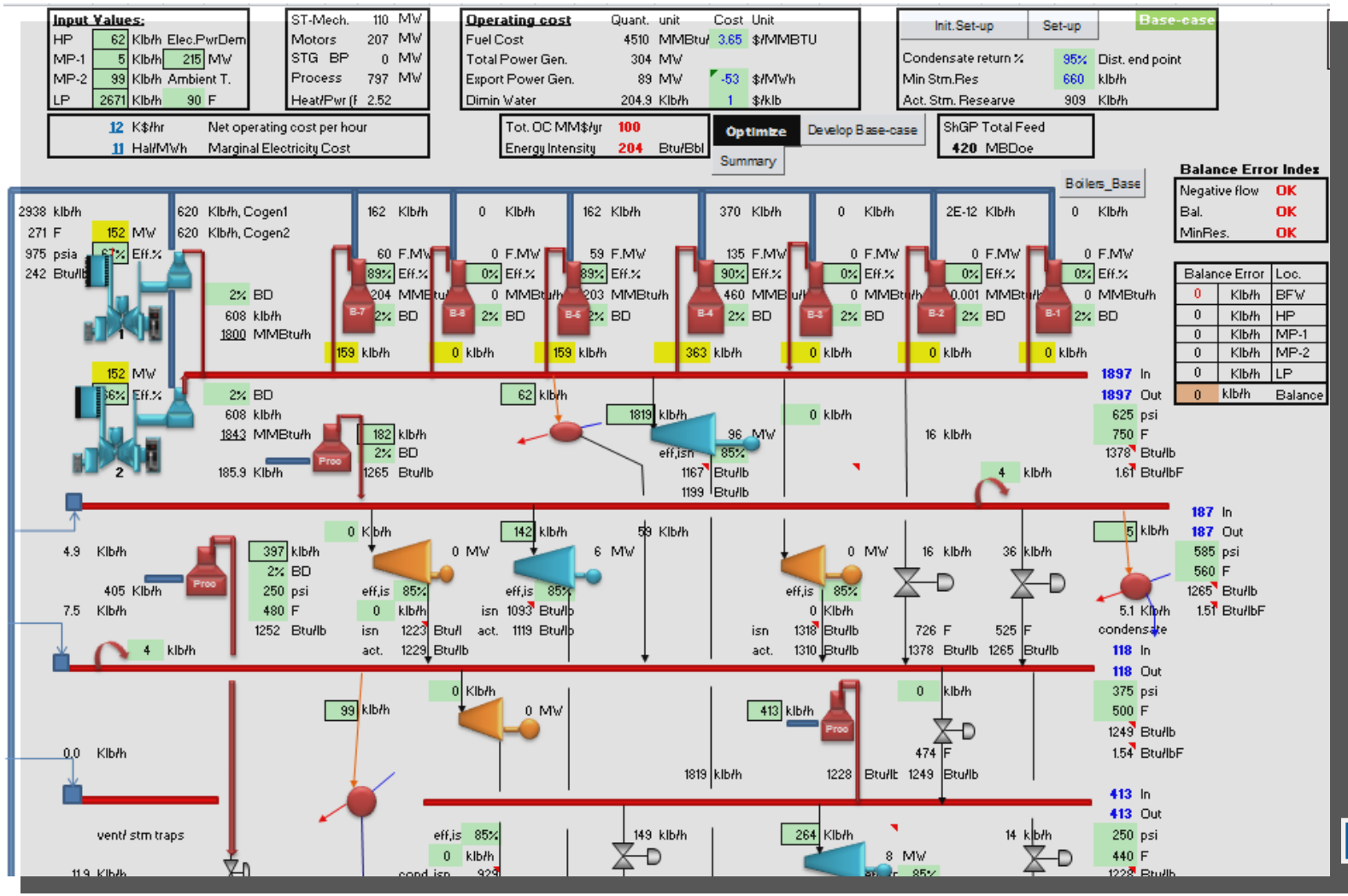






BACK

COMBINED HEAT & POWER MODEL



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