COAL BLENDING CHALLENGES

PUNARBASU
BHATTACHARYA

steag

COAL BLENDING NEED ?

steag

The indigenous coal supply to the power sector will be mostly from lower grade coals having high ash content. The power sector shall have to depend on significant quantity of imported coal in the future as the demand cannot be met from indigenous supply.

For blending Homogeneity of Coal Property is always preferred but unfortunately very often the user has no control on the choice of coals which are decided by other factors such as availability and cost.

Compatibility of the imported coal with Indian coal for their non additive properties like grindability, reactivity and burning behavior in a utility furnace is of prime concern in coal blending for efficient power generation.

BLENDING ISSUES

It is widely acknowledged that blending of coals should be done judiciously taking into consideration the properties of the individual blend components. Since coal is not homogenous, its quality varies and depends on the content of several ingredient.

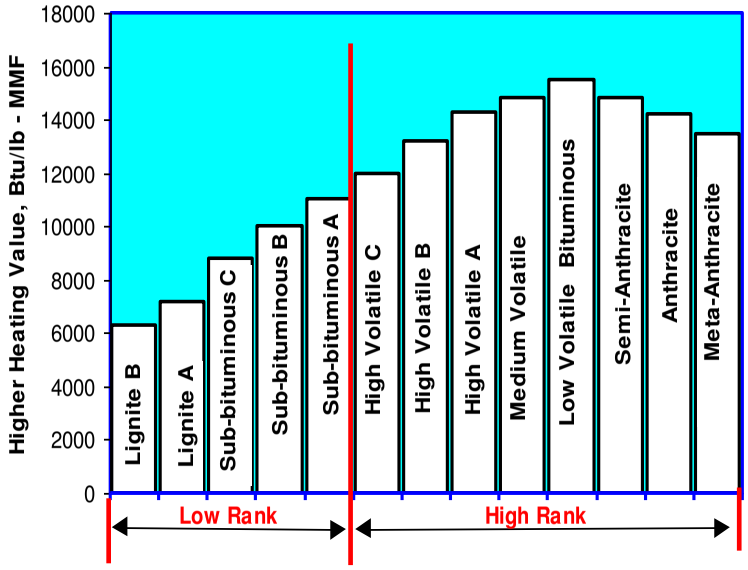
In disruptive coal market scenario it is important that utilities adopt a proper strategy of coal procurement and coal use to run their plant efficiently with higher degree of reliability while remaining competitive.

Most of the plants in India are normally designed with limited fuel flexibility- are not blend ready design. They may require minor or major modification depending on design and operation history to accommodate wider fuel property variation.

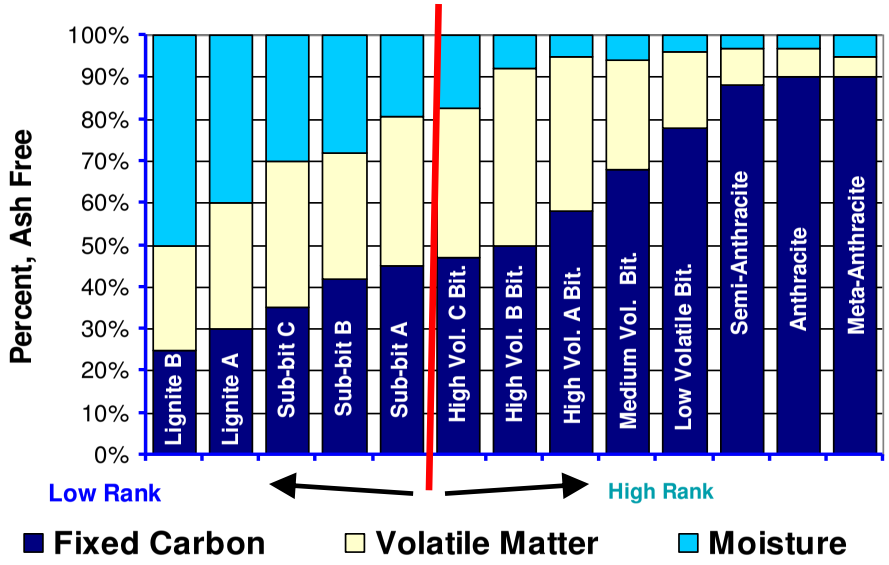
COAL PROPERTY VARIATION

steag

Ranking by MMF Higher Heating Value

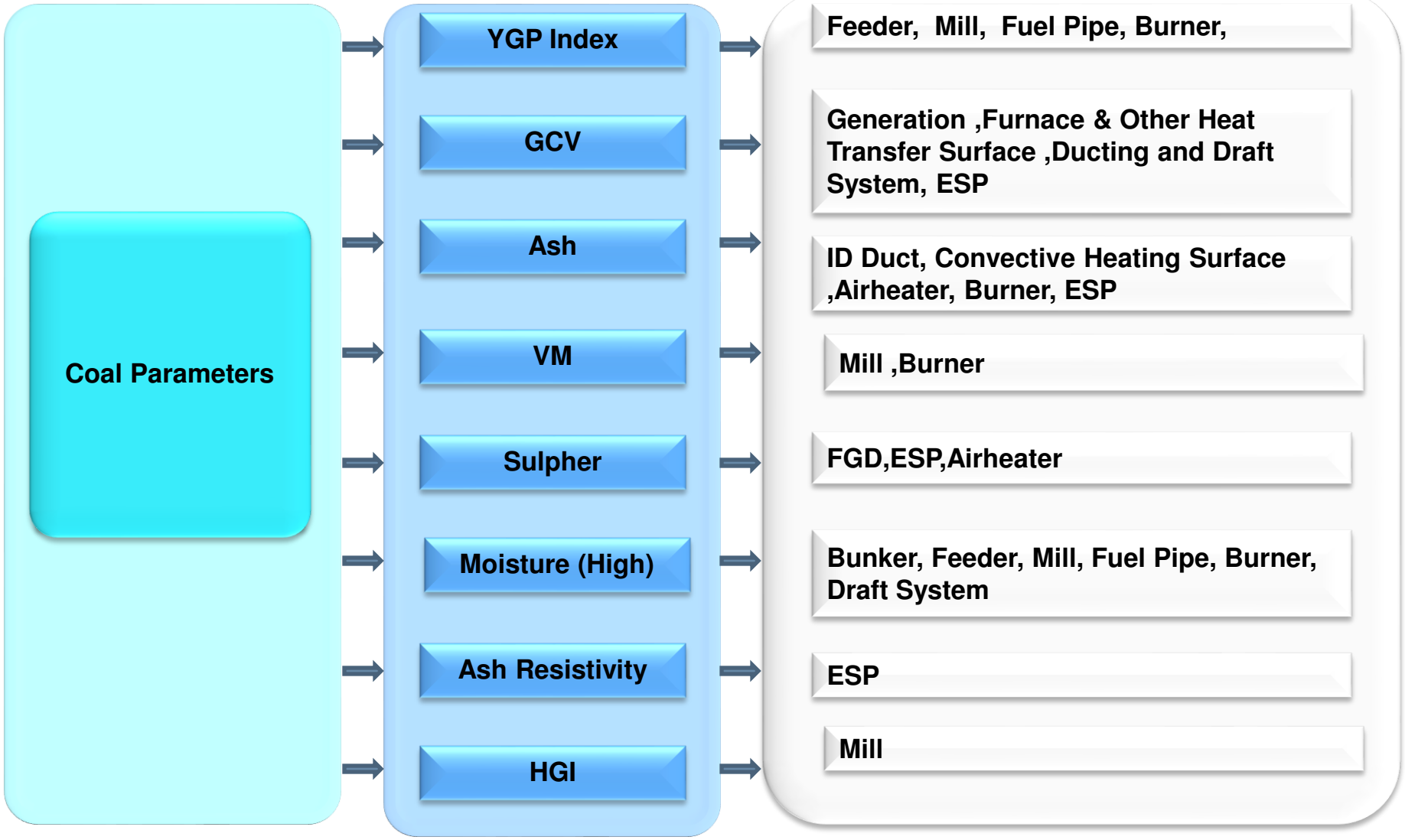


Proximate Analysis Comparison



COAL PROPERTY IMPACT ON BOILER

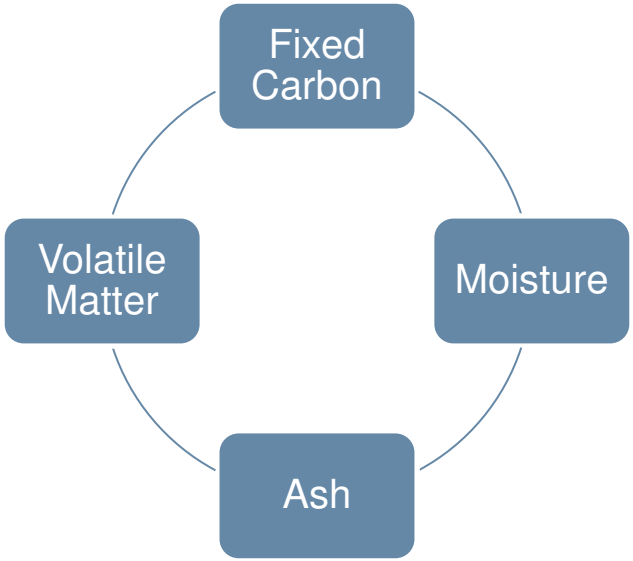
steag

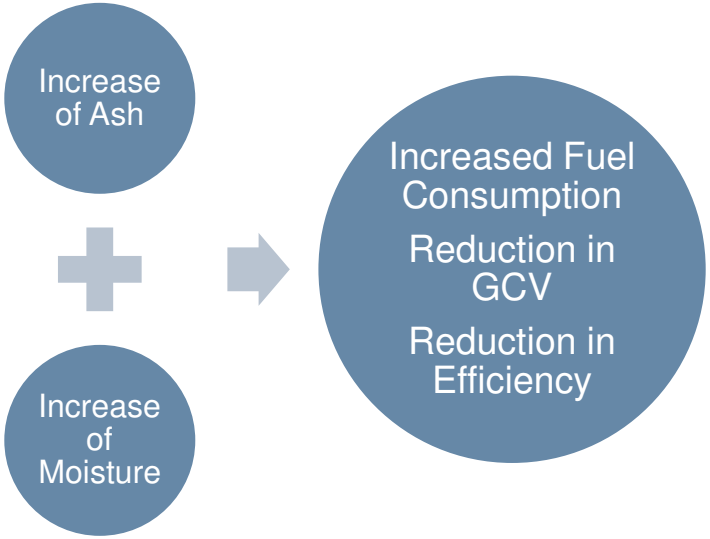


IMPACT OF COAL PROPERTY DEGRADATION

steag

COAL PROXIMATE ANALYSIS





IMPACT OF COAL PROPERTY DEGRADATION

steag

Higher Fuel Consumption

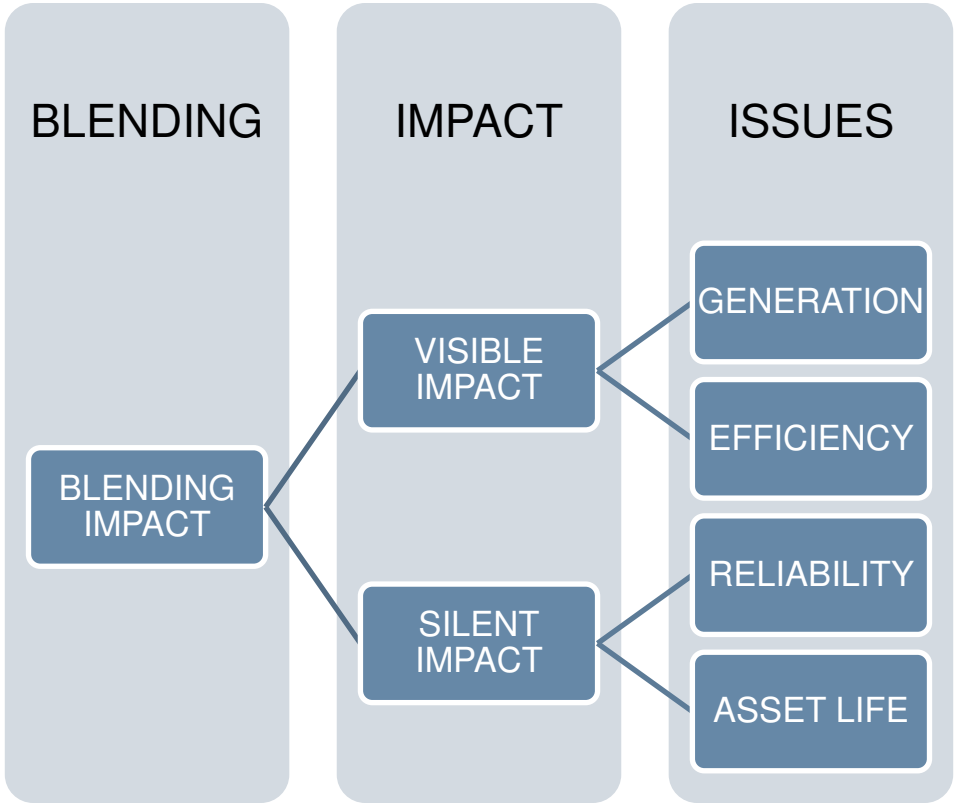
	Capacity Constraint	Asset Management	Reliability
Mill	Yes	Yes	Yes
ESP	Yes	Yes	
Draft System	Yes	Yes	Yes
Feeder	Yes	Yes	
Ash Handling	Yes	Yes	

Solution 1: Blending with High Rank Coal .

Solution 2: Boiler Modification to accomodate higher fuel consumption

BLENDING IMPACT

steag



COMPONENT LEVEL ANALYSIS - MILL

steag

MILL PERFORMANCE- FUEL DEPENDENCY

- MOISTURE
- HGI
- VOLATILE CONTENT
- YGP
- FUEL EXPLOSIVITY
- FUEL REACTIVITY
- FUEL FLOWABILITY

COMPONENT LEVEL ANALYSIS - MILL

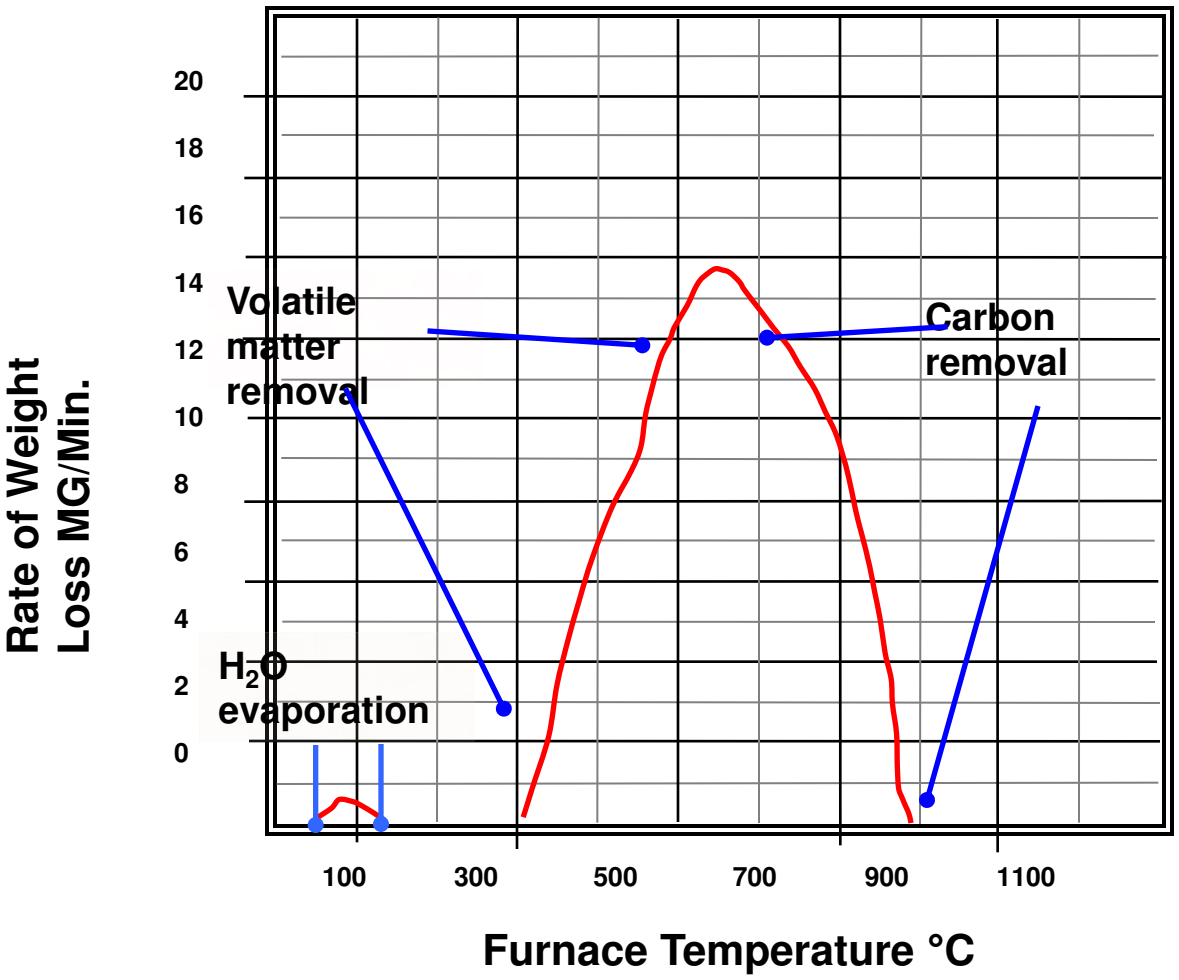
steag

	DETORIORATION OF MILL OUTPUT	GENERATION CONSTRAINT	SPECIFIC ISSUES	FORCED OUTAGE	ASSET MANAGEMENT
MOISTURE CONTENT	*YES*	*YES(PROBABILITY EXISTS)*	*DESIGN CHECK REQUIRED TO ENSURE SUFFICIENT HEAT AVAILABLE AT MILL INLET FOR DRYING*		
HGI	*YES*	*YES(PROBABILITY EXISTS)*			
YGP	*YES*				*LESS LIFE OF COMPONENT ADDITIONAL SPARE CONSUMPTION*
EXPLOSIVITY			*MILL OUTLET TEMPERATURE TO BE CONTROLLED*	*YES*	*PROBABILITY OF COMPONENT DAMAGE*
VM/REACITIVITY			*MILL OUTLET TEMPERATURE TO BE CONTROLLED CHECKING REQUIRED RESPECT TO OTHER COAL*	*YES*	

BURNING PROFILE

steag

TGA CURVE function of (FC,VM,MOISTURE,ASH)



FOR A BLENDING OPERATION IT IS IMPORTANT TO COMPARE BURNING PROFILE OF 2 COALS

SLAGGING AND FOULING ISSUE

steag

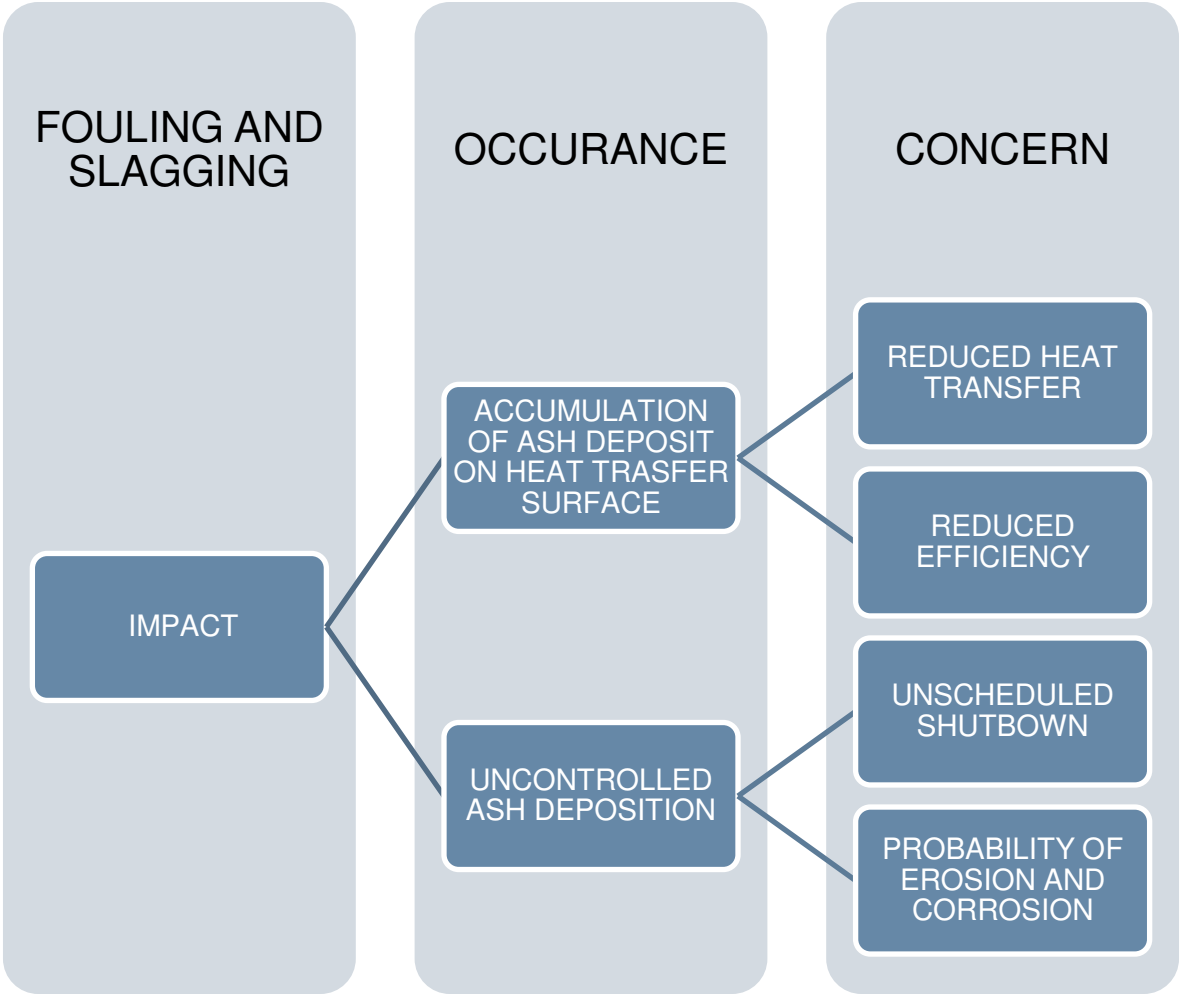
COAL HAVING HIGHER HEAT VALUE DOESN'T NECESSIRILY QUALIFY IT WIL HAVE SUPERIOR CHARACTERISTICS IN ALL RESPECT.

SLAGGING AND FOULING ARE IMPORTANT ASPECTS TO BE TAKEN IN CONSIDERATION FOR FUEL CHANGE STUDY AND BLENDING OPERATION.

SLAGGING,FOULING,ERO-SION HAS SIGNIFICANT IMPACT ON BOILER OPERATION AND ASSET LIFE.

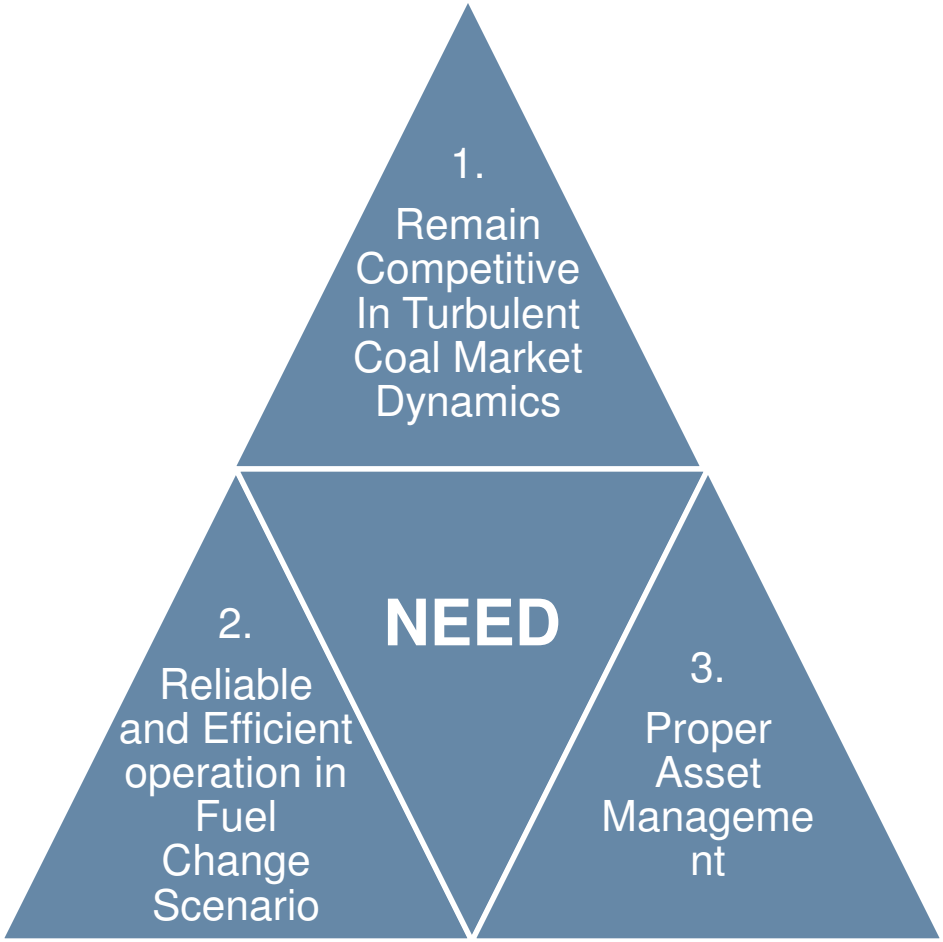
FOULING AND SLAGGING ARE DEPENDENT ON COMPOSITE ASH COMPOSITION

SLAGGING AND FOULING ISSUE



NEED ANALYSIS

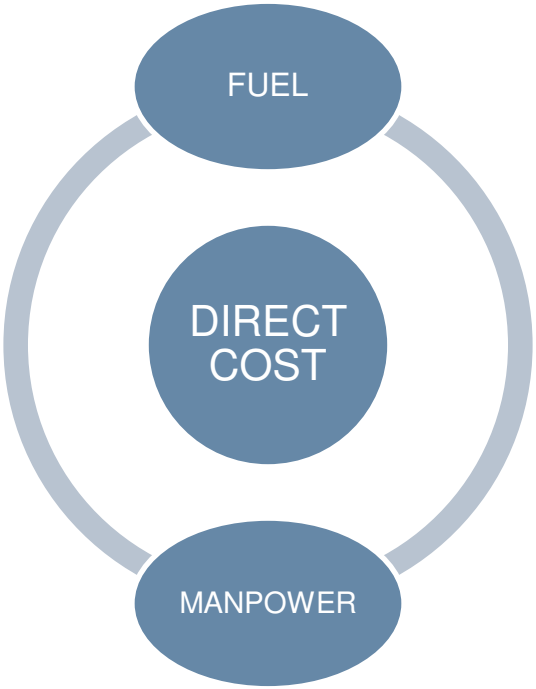
steag

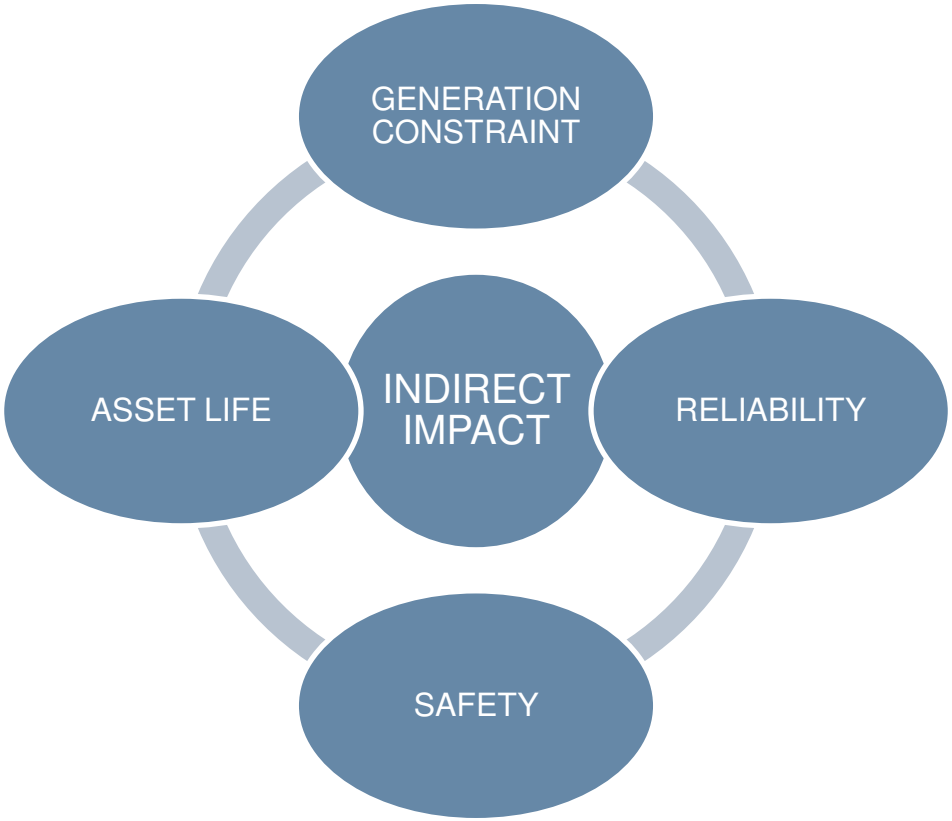


Considering present Scenario Coal Blending / Fuel switches are inevitable during the lifecycle of a Power Station.

BLENDING ANALYSIS FROM OVERALL PERSPECTIVE

steag





BLENDING ANALYSIS FROM OVERALL PERSPECTIVE

steag

GENERATION CONSTRAINT

DESCRIPTION	PROBABILITY	PROBABLE DURATION	FINANCIAL IMPACT
EQUIPMENT DESIGN CONSTRAINT			
MOISTURE PICK UP AT RAINY SEASON			
OTHER-----			

RELIABILITY

DESCRIPTION	PROBABILITY	EXPECTED SHUTDOWN	FINANCIAL IMPACT
TUBE FAILURE			
FAN STALLING			
FLAME FAILURE			
OTHER-----			

BLENDING ANALYSIS FROM OVERALL PERSPECTIVE

steag

ASSET LIFE

DESCRIPTION	PROBABILITY	POSSIBLE SOLUTION	FINANCIAL IMPACT
EQUIPMENT WEAR AND TEAR			
CORROSION/EROSION			
OTHER-----			

SAFETY

DESCRIPTION	PROBABILITY	EXPECTED SHUTDOWN	FINANCIAL IMPACT
FIRE HAZARD			
EXPLOSION			
OTHER SAFETY ISSUES			

BLENDING- DECISION TREE

steag

	FUEL COMBINATION			
Impact	1	2	3	4
Direct Cost				
Fuel + Labour + Consumable				
Indirect Impact				
Revenue Loss due to Constrained Generation				
Financial Impact due to Reliability Issue				
Financial Impact on account of Asset Life				
Financial Impact on account of Safety Issue				
Total Direct cost + Probable Indirect Impact				

ABOVE DECISION TREE MAY HELP UTILITIES IN FUEL MANAGEMENT AND FUEL PURCHASE POLICY.