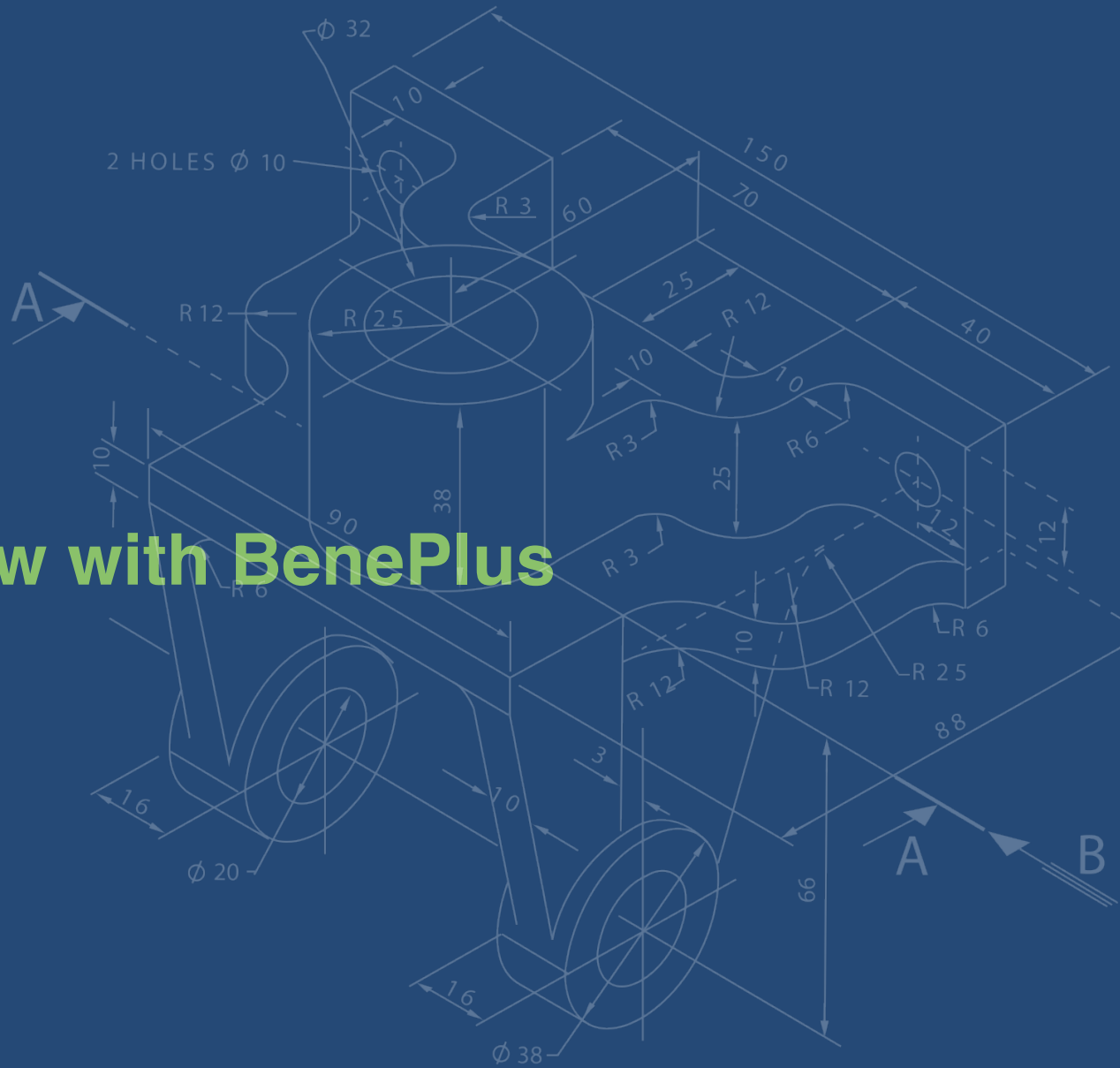


Company Overview with BenePlus



DELIVERING CLEAN & PROFITABLE ENERGY SOLUTIONS

3
R&D CENTERS



50+
GLOBAL
PROJECTS

6 YEARS
\$75M+
REVENUE

10+
PATENTS*



Emission Control Solutions



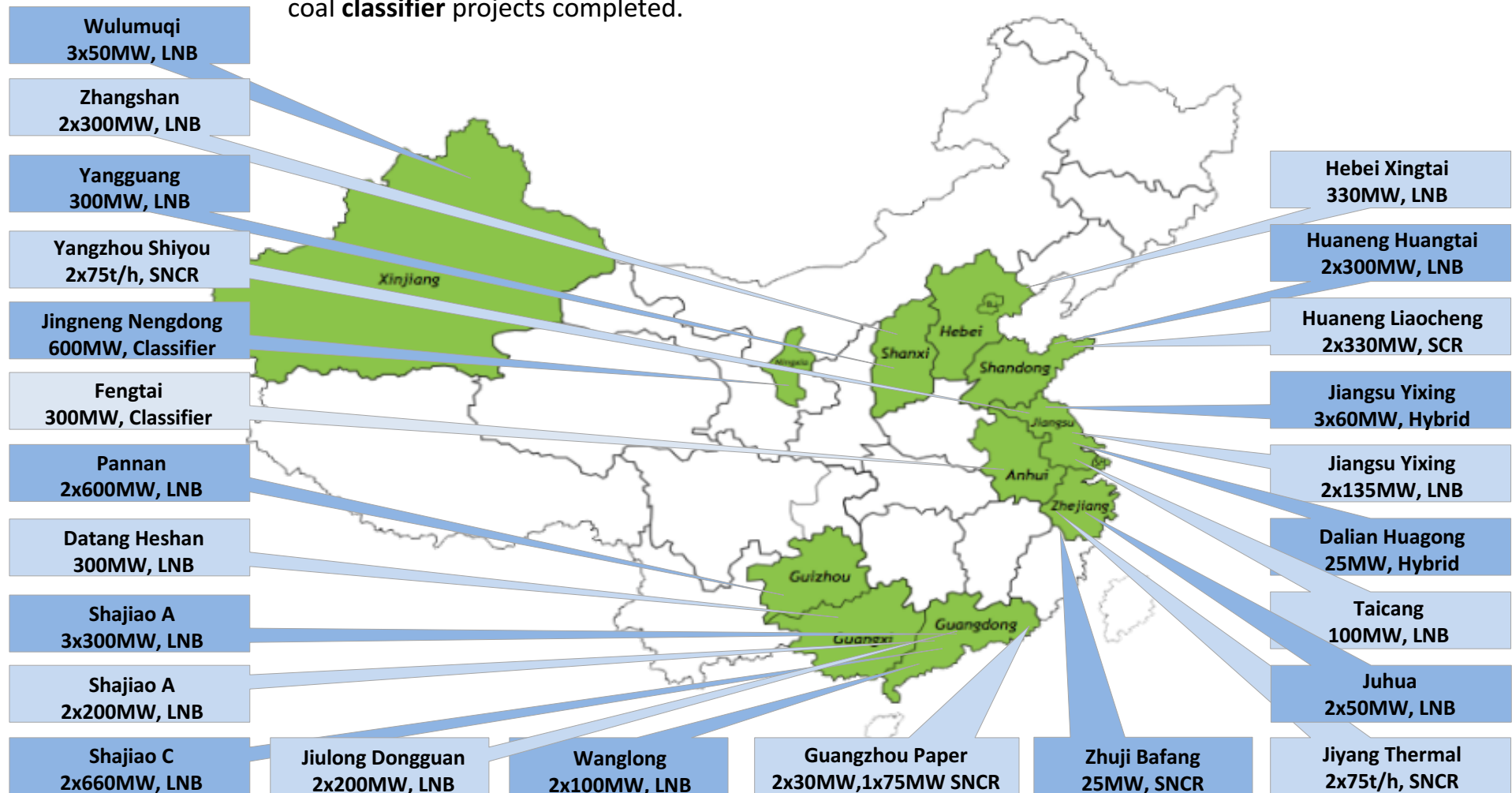
Advanced Coal Technologies

*Patents and Pending Patents

LPA gained significant experience in coal plant emissions reductions and performance improvements over the past eight years in its China operations



Since 2009, LP Amina has completed over fifty projects in China, achieving superb results and lowering NOx emissions below target levels. The map below indicates the **low NOx burner + separated overfired air (LNB)**, **selective non-catalytic reduction (SNCR)**, **LNB + SNCR + selective catalytic reduction (hybrid)**, and coal **classifier** projects completed.



Since 2014, LPA has built a growing US business focused on natural gas plant NOx reductions. The company has also built experience in coal post-combustion experience in China prior to the US.

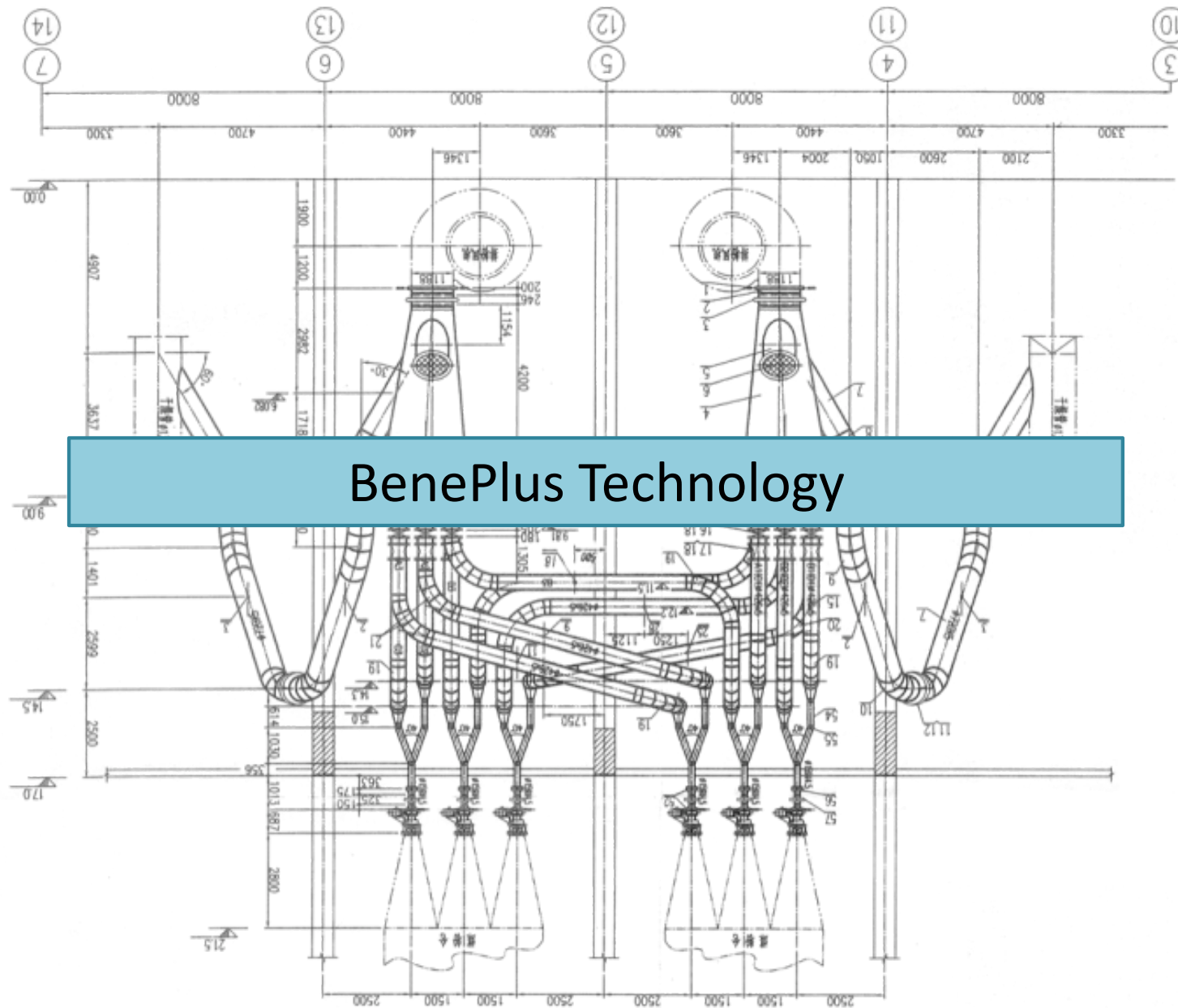


LP Amina's Ongoing SCR & CO Projects in US

#	Name	State	Capacity	Unit Type	Solution	Targeted End Date	NOx Emissions (ppmvd @ 15% O ₂)	
							Before	Target
1	Panda Power Stonewall (NEM)	VA	2x1 CC 750 MW	HRSBG	SCR / CO / VOC	Q1, 2017	13.5	2.0 (1.85*)
2	Oregon Clean Energy (NEM)	OH	2x1 CC 869 MW	HRSBG	SCR / CO / VOC	Q2, 2017	24.8	2.0
3	Eagle Valley (NooterEriksen)	IN	2x1 CC 650 MW	HRSBG	NH3 Skids / AIG	Q2, 2017	12.5	2.0
4	Carroll County (CMI)	OH	2x1 CC 750 MW	HRSBG	SCR	Q4, 2017	11.2	2.0
5	Lackawanna (CMI)	PA	3x1 CC 1300 MW	HRSBG	SCR	Q1, 2018	25.0	2.0
6	Sunbury (NEM)	PA	3x1 CC 1064 MW	HRSBG	SCR / CO / VOC	Q4, 2017	12.8	2.0
7	Moxie Freedom (CMI)	PA	2x1 CC 1050 MW	HRSBG	SCR	Q4, 2017	25.0	2.0
8	Lordstown (NEM)	OH	2x1 CC 949 MW	HRSBG	SCR / CO / VOC	Q1, 2018	29.6	2.0
9	CPV Towantic (CMI)	CT	2x1 CC 1050 MW	HRSBG	SCR	Q4, 2017	25 / 42 (DO)	2.0 / 5 (DO)
10	Grayson (NEM)	CA	2 1x1 CC 75 MW	HRSBG	SCR / CO / VOC	Q2, 2019	45 (30%)	2.0

LP Amina's Completed SCR Projects in China

#	Name	Province	Capacity	Unit Type	Solution	Targeted End Date	NOx Emissions (ppmvd @ 15% O ₂ OR lb/MMBtu)		
							Before	Target	Actual
18	Caoqiao (Beijing Energy)	Beijing	2x1 CC 700 MW	HRSBG	SCR	Q3, 2011	25	3.75	3.25
28	Jingfeng (Beijing Energy)	Beijing	1x1 CC 410 MW	HRSBG	SCR	Q3, 2013	34	6.8	5.9
29-30	Liaocheng (Huaneng)	Shandong	2 330 MW	T-Fired	SCR	Q2, 2014	0.44	0.07	0.07
31	Dalian Chemical (DLHG, LLC)	Jiangsu	1 75 tph	T-Fired	LNB / SNCR / SCR	Q2, 2014	0.44	0.08	0.07
35-36	Yixing (Yixing Union)	Jiangsu	2 50 MW	T-Fired	LNB / SNCR / SCR	Q2, 2015	0.40	0.08	0.075

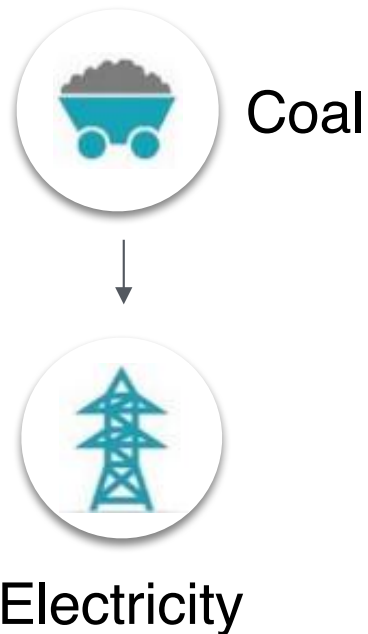


BenePlus Technology

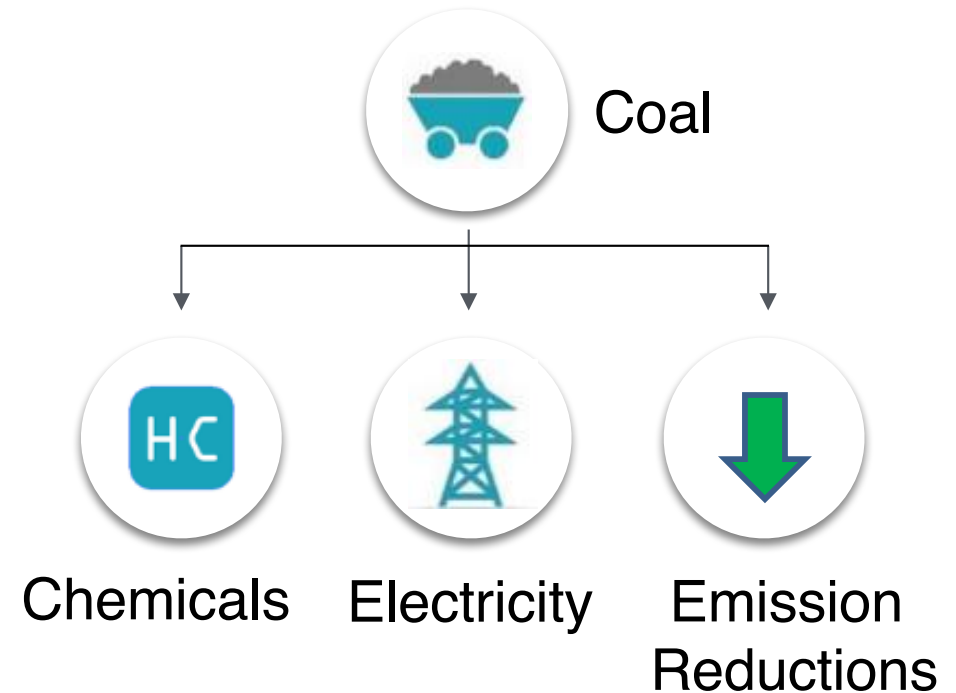
LPA's Patent Pending BenePlus Technology Improves the Economic Viability of a Power Plant and Coal Assets



Conventional Approach



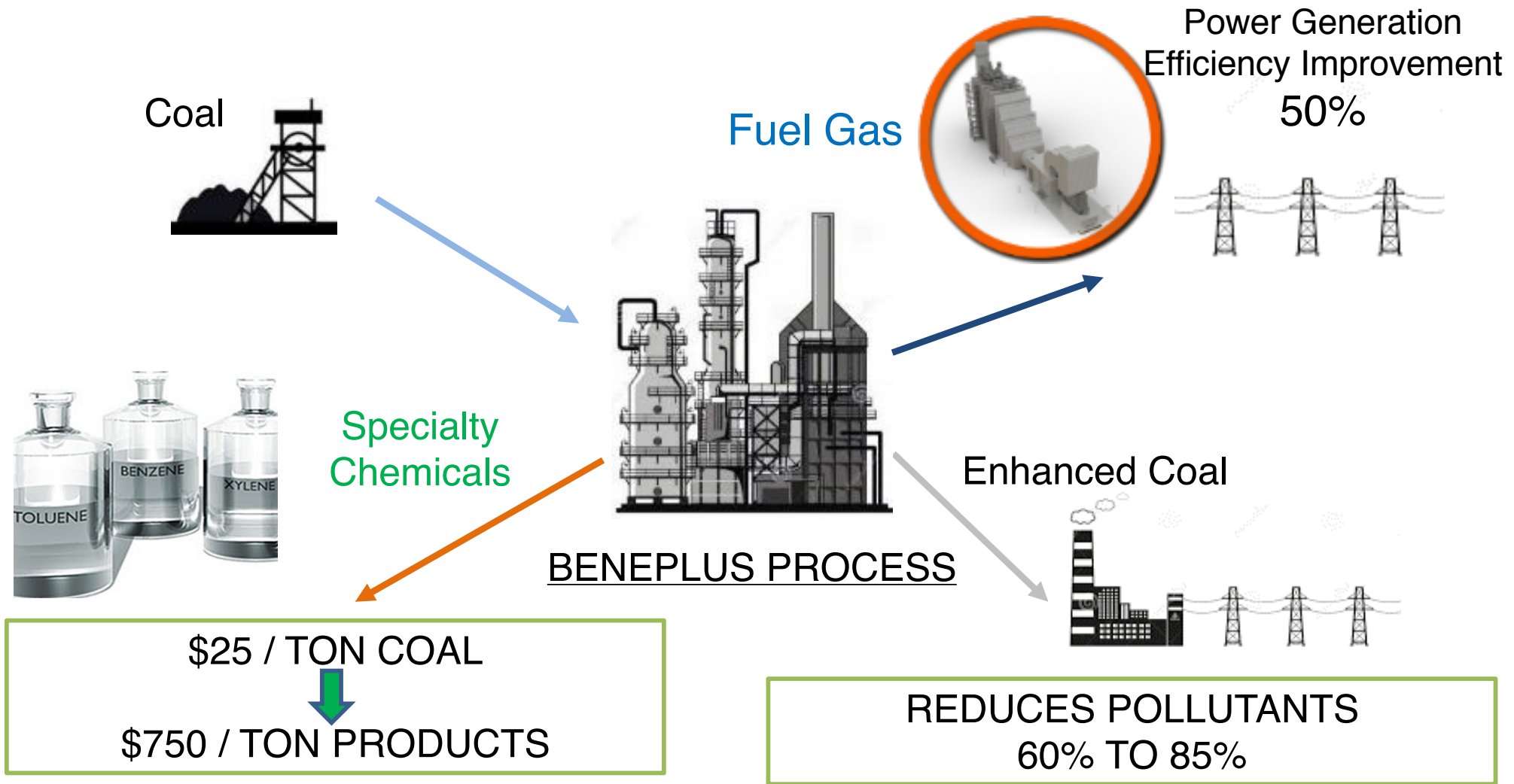
LPA's BenePlus Technology



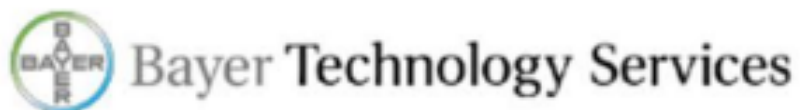
*BenePlus enables existing **power plants** to co-produce electricity, valuable **chemicals** and **reduce emissions**.*



BENEPLUS IMPROVES THE VIABILITY OF COAL



Process Validated at Lab and Pilot Scale in Collaboration with World-class Partners



Bayer Leverkusen

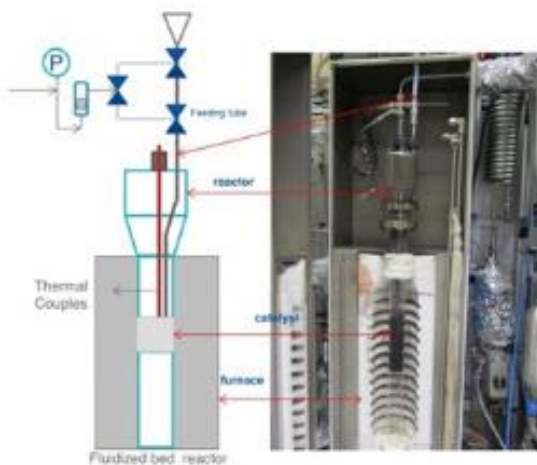


Southwest Research Institute



SwRI occupies more than 1,200 acres and 2 million square feet of laboratories, test facilities, workshops and offices

Lab Scouting: 2013-14



Pilot Facility: 2015-17



Reactor section



Product collection

BenePlus Product Slate for lignite coal

Lignite feed, dry basis

	(Feed)
VM, wt%	43.8
Ash, wt%	14.5
Fixed C, wt%	41.8
Sulfur, wt%	1.7
Sulfur emissions, lb sulfur/MMBtu lignite burned	1.65
HHV, Btu/lb, dry	10,103
HHV, Btu/lb, as received	6,343
Moisture, wt%	37.2

Syncoal product

	Char
VM, wt%	25.4
Ash, wt%	19.0
Fixed C, wt% (by difference)	55.6
Sulfur, wt%	0.7
Sulfur emissions, lb sulfur/MMBtu syncoal burned	0.69
HHV, Btu/lb	11,016
Moisture, wt%	1.1
Yield, lb/100 lb dry coal feed	57.8
HHV upgrade, $HHV_{syncoal}/HHV_{feedcoal}$, as rec'd	1.7
Reduction in sulfur emissions per MMBtu	58%
Ash retained, lb / 100 lb ash fed	76

Product Gas Yield on Dry basis lb gas/lb coal fed Compositions (wt%)

CO2	CO2, wt%	10.2	
Fuel Gas	CO, wt%	6.67	
	H2, WT%	0.24	
	METHANE, WT%	2.18	
	ETHYLENE, WT%	1.16	
	ETHANE, WT%	0.43	
Hydrocarbons	RG Propylene	PROPYLENE, WT%	1.35
		N-PROPANE, WT%	0.15
		ISOBUTYLENE, WT%	0.19
	Naphtha Liq	1-BUTENE, WT%	0.10
		1,3-BUTADIENE, WT%	0.08
		TRANS-2-BUTENE, WT%	0.09
		CIS-2-BUTENE, WT%	0.10
		2-METHYL-2-BUTENE, WT%	0.11
		N-HEXANE, WT%	0.13
	BTX Liq	BENZENE, WT%	1.19
		Toluene, wt%	0.98
		Xylene, wt%	0.16
Sulfur	H2S, WT%	0.84	
	OTHER SULFUR, WT%	0.13	
Phenol		0.1	
Higher HCs		0.2	
Total, wt%		26.77	

LP AMINA

Growth Through Innovation

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