

# Hopewell Site Energy Optimization

October 13, 2010

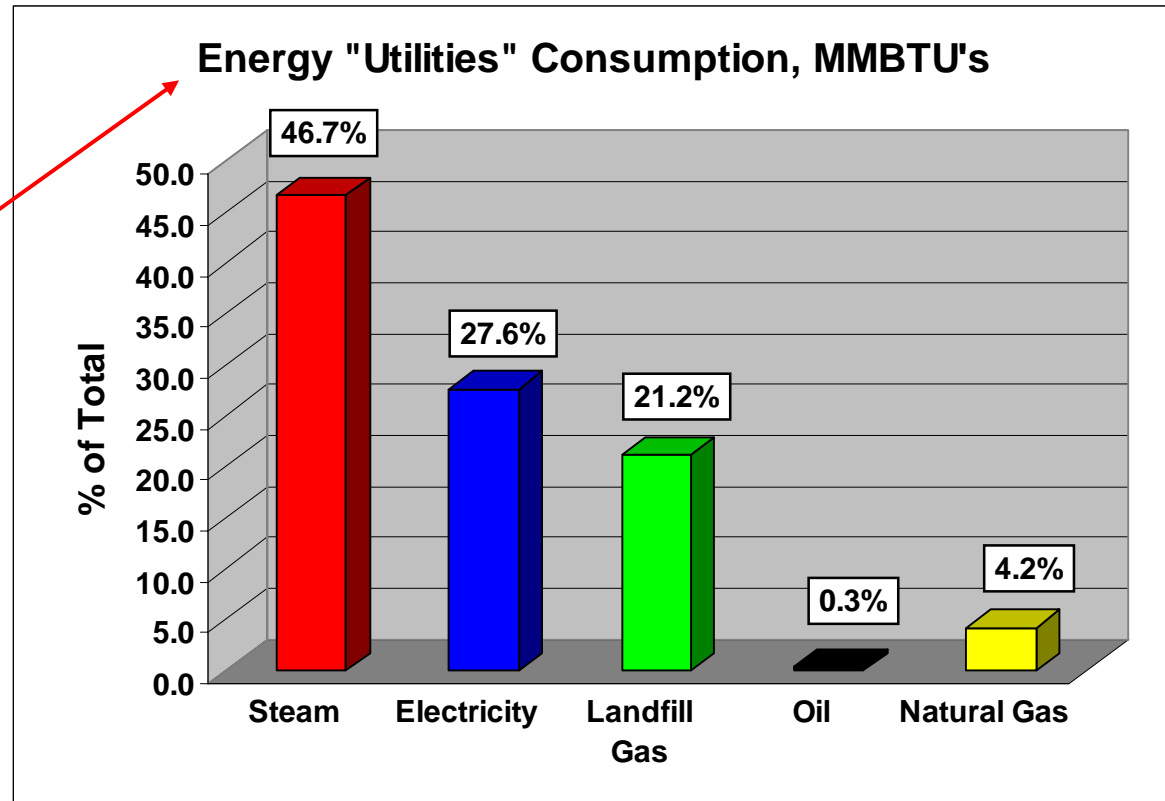
Humberto Caldelas  
Hopewell Site Plant Manager



**Honeywell**

# Hopewell Site Energy Profile

- Consume 26 Million MMBTU's per year
  - 82% is NatGas for ammonia production
  - 18% is for "utilities"
- NatGas consumption volume is equivalent to heating over 200,000 homes
- Electricity consumption volume is equivalent to powering 30,000 homes
- Total plant spend on energy is \$161 million/year



## Providing Resources

- Intensified commitment from executive, business, and plant management
- Addition of two dedicated Energy Specialists
- Utilization of UOP Energy Services
- Capital investment

## Reducing Consumption

- Energy optimization strategy utilizing zero-capital productivity savings to fund energy capital projects
- Benefits sustained by Honeywell Operating System (HOS)
- UOP energy study driving a methodical approach to identifying, assessing, and implementing energy *and* yield projects.
- Funding and implementation of several key energy/yield capital projects

## Mitigating Price Risks

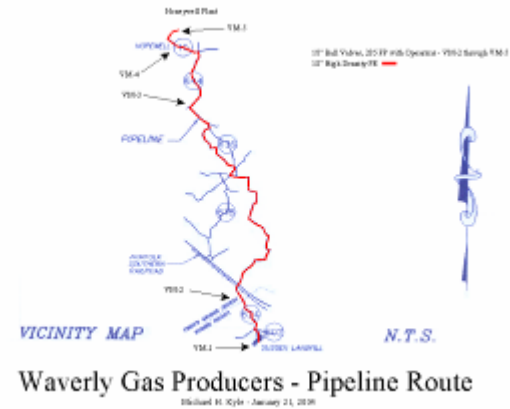
- Leading responses in legislative and regulatory processes
- Seeking alternative sources of energy supplies

***Reducing Energy Spend, Volumes, and Unit Consumption***

# Honeywell Landfill Gas (LFG) Project

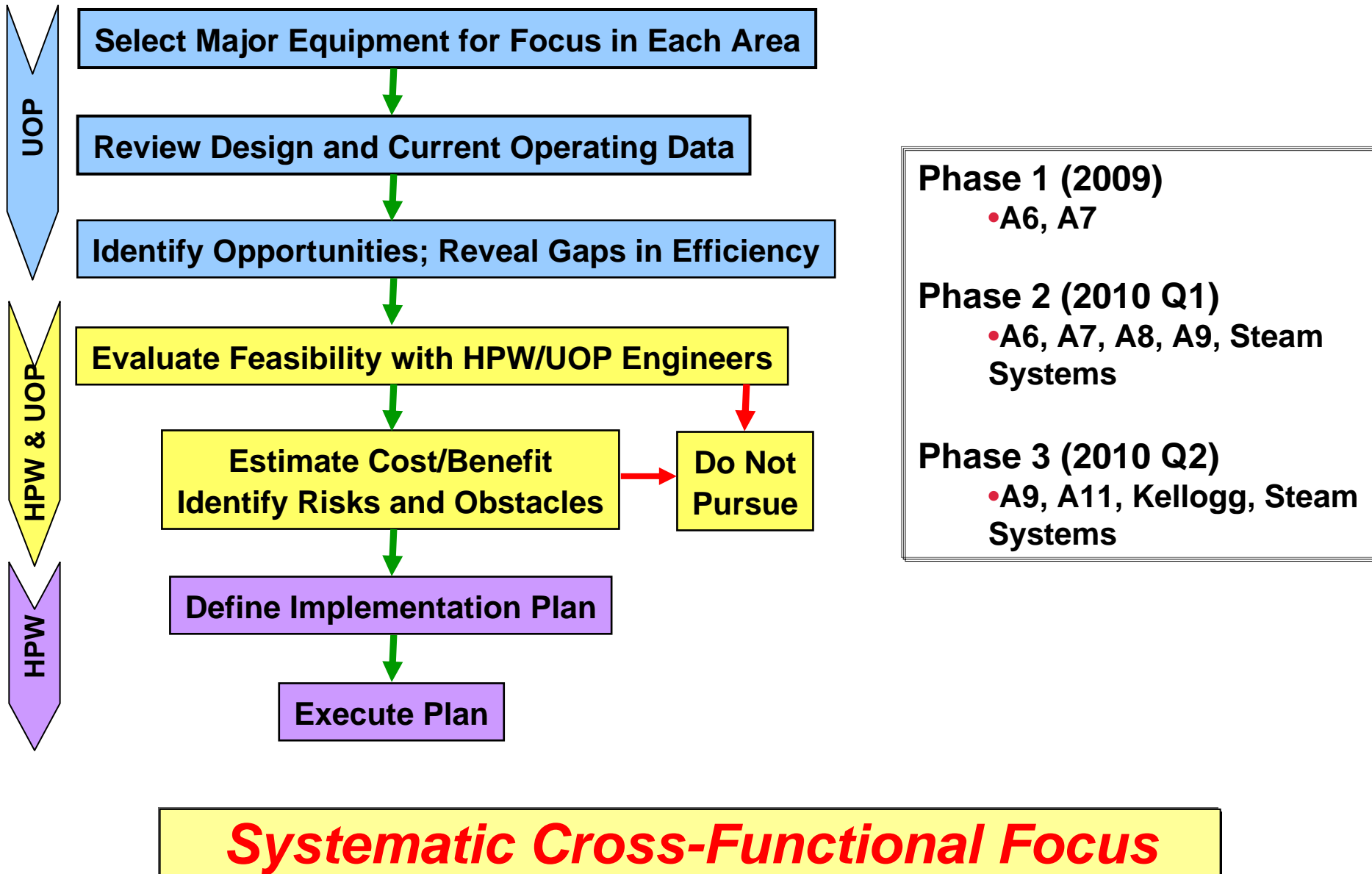
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- 15-year supply contract with Waverly Gas Producers
- Pipeline construction completed in 2004
- 23 mile pipeline – the longest LFG pipeline in the country
- Required the approvals of 3 municipalities and 7 agencies in order to be built.
- Over 22,000 hotel nights by contractors, suppliers, etc. during construction
- Zero capital project for Honeywell
- Started flow of LFG on January 23, 2004
- Winner of EPA's 2004 "Project of the Year"
- Winner of 2005 Virginia Governor's Environmental Excellence Award
- Landfill gas currently provides 90% of heat input to boiler



***Strategic and Renewable***

# Energy Study Methodology Overview

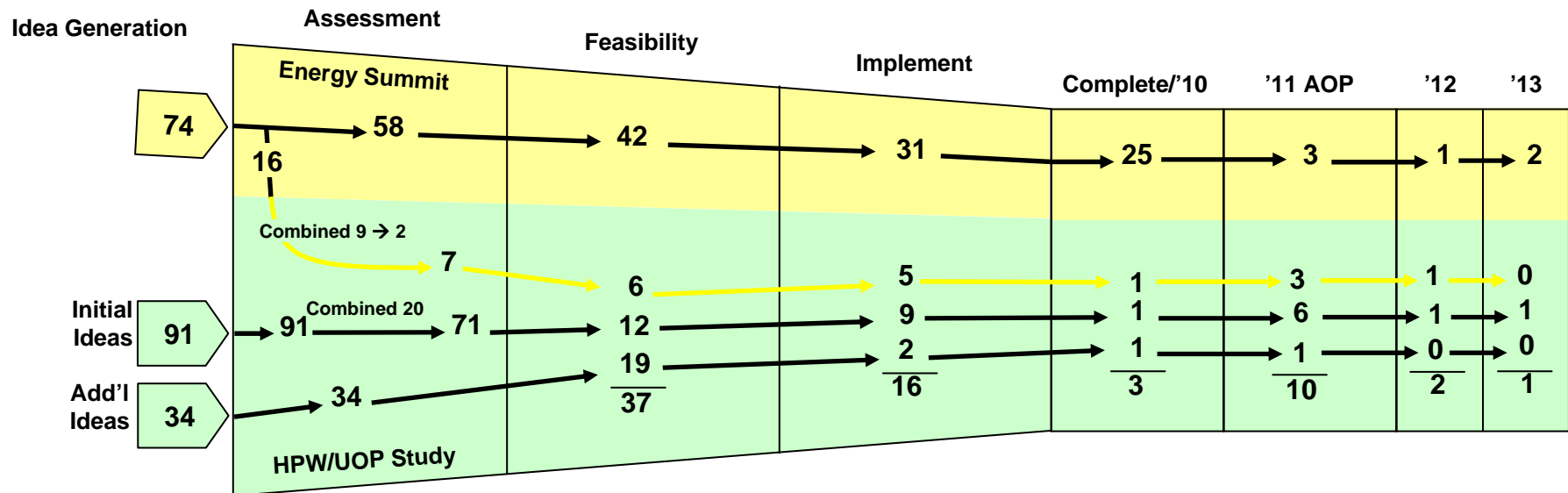




# Opportunities Assessment



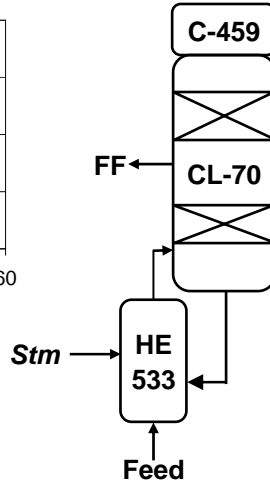
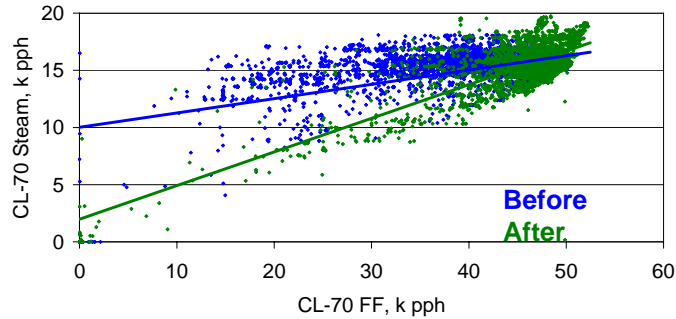
## Project Pipeline



**199 Initial Ideas >>>> 47 for Implementation**

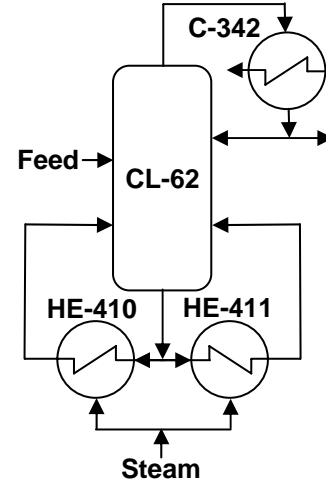
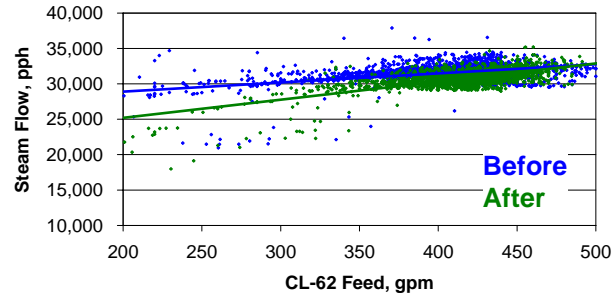
# Key Projects

## CL-70 Reflux Control



- Experion control logic automatically minimizes CL-70 steam flow while achieving desired rate and quality.
- \$43k YTD Steam Savings

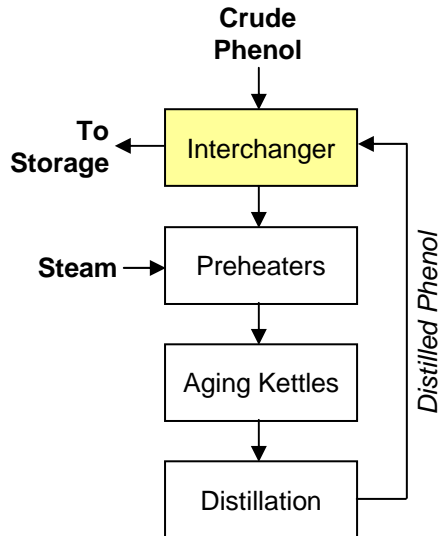
## CL-62 Reflux Control



- DCS control logic programmed to adjust reflux based on Column rate
- \$19k YTD Steam Savings

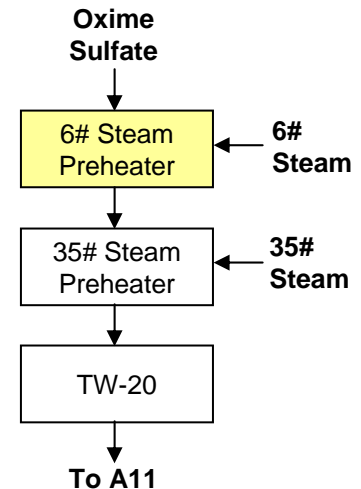
## Phenol Interchanger

- Current Interchangers bypass a significant portion of Crude Phenol
- Steam to Preheaters ensures proper temperature to Aging Kettles
- Replacing current interchanges with properly sized unit
- Reduced Preheater steam demand (\$564k annually)
- Capital required: \$550k



## 6# Steam Recovery

- Current preheater is not properly sized to utilize 6# steam from Area 6
- Currently condensing 6# steam in Area 6 and recovering condensate for Hydro BFW system
- Installation of new preheater would utilize 6# steam and reduce 35# steam demand. (\$564k)
- Potential Yield benefit (\$400k)
- Capital required: \$481k





# Tools/Monitoring – Sustaining Results

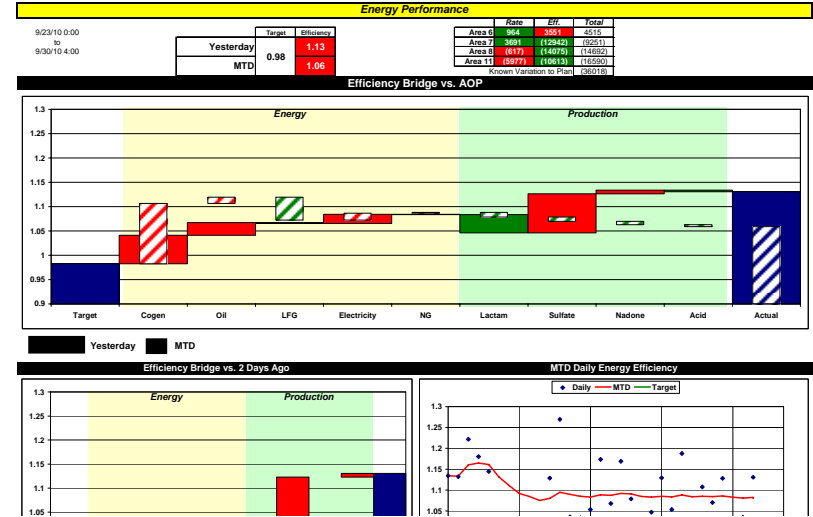


## Tiered Meetings

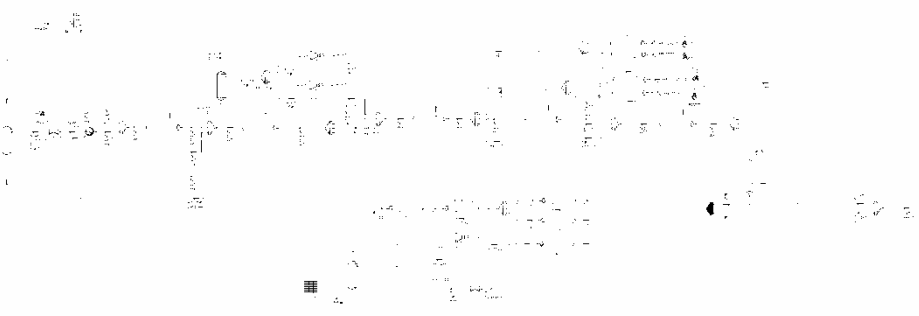
- Tier II
  - Energy KPIs in Areas 6, 7, 11, PH
- Tier III
  - Total Plant Energy Efficiency
  - Condensate Return
  - Purchased Steam Status
- Tier IV
  - Total Plant Energy Efficiency
  - Area 11 Granular/Steam Efficiency

**Driving to Tier 1 (operators) in 2011**

## Daily Energy Dashboard



## Simulation



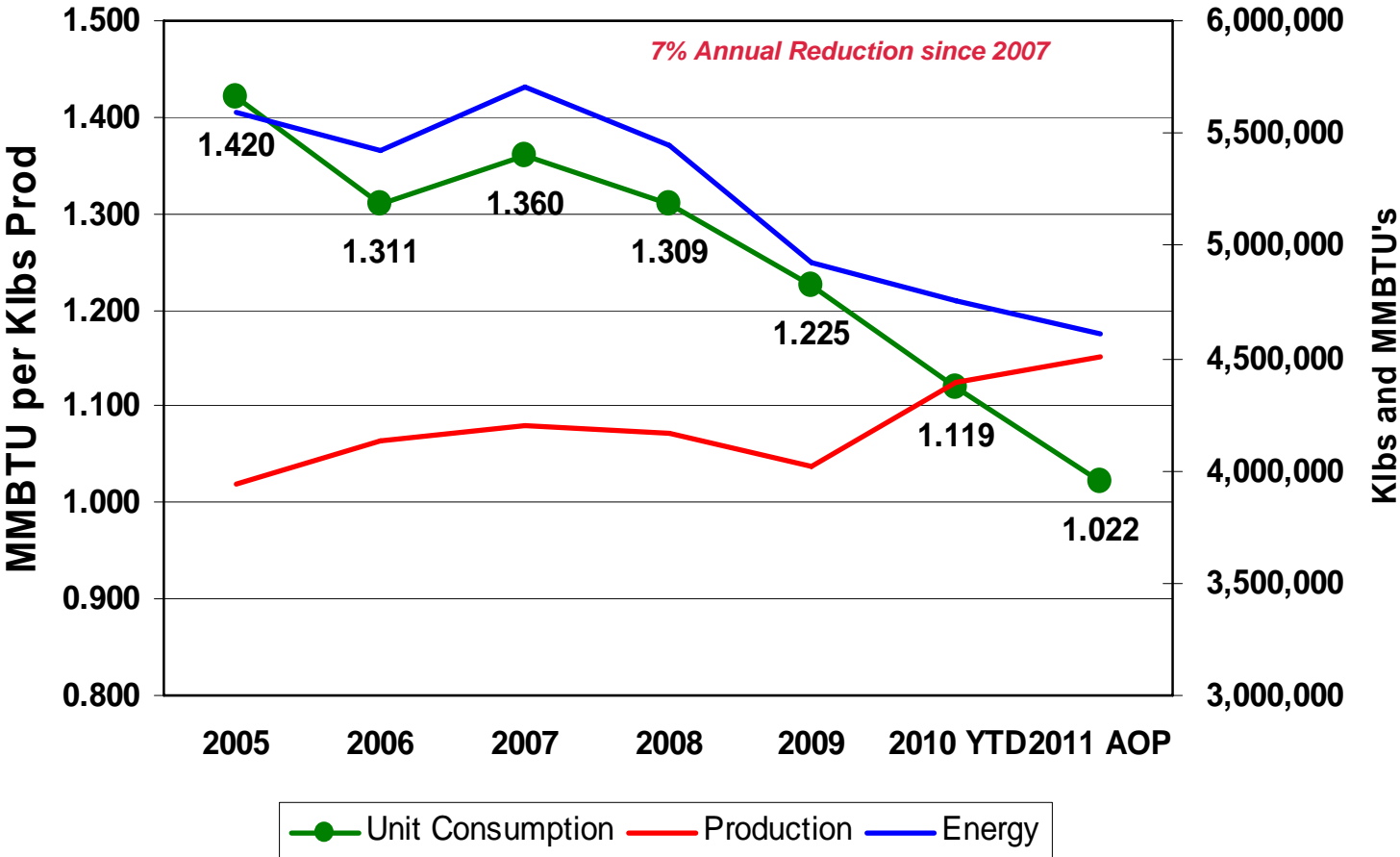
## Energy Model

		2011 Utility Demand												
		Unit												
Month	Unit	J	F	M	A	M	J	J	A	S	O	N	D	Total
Average Ambient Temp	F	37.5	37.9	39.9	61.7	69.1	78.4	79.9	78.5	67.6	57.4	51.2	38.8	562
Average Wetbulb Temp	C	1.6	1.1	1.8	19.8	22.1	28.7	28.2	20.0	11.1	12.9	6.9		
Average Windchill Temp	F	29.2	27.2	41.3	55.8	59.8	58.7	59.0	62.8	61.8	50.3	44.4	32.1	
High Ambient Temp	F	46.3	51.3	59.4	70.9	77.2	84.6	90.5	87.7	81.7	71.3	61.7	51.7	
		<b>Production Plan</b>												
Lactam, Vozac	M. Bbl	65.8	63.1	77.9	49.2	60.5	75.6	60.1	59.8	28.2	56.1	63.1	77.2	720
Hydroquinone	M. Bbl	34.0	37.4	61.1	61.1	77.5	96.0	76.3	76.7	97.0	69.1	90.1	97.9	998
Sulfuric	tons	142,038	138,600	170,520	107,684	132,552	165,480	131,544	130,872	171,360	122,308	138,096	169,116	1,722,670
AD Ure Production	M. Bbl	61.7	59.8	74.3	42.3	59.5	74.3	59.2	59.9	32.3	61.0	69.5	72.2	
AD Pined Consumption	M. Bbl	49.2	59.4	74.3	42.3	59.4	74.3	59.4	59.4	32.3	59.9	69.4	72.2	
Nadone	M. Bbl	2.5	2.5	4.0	0.2	3.5	4.0	2.7	2.7	1.0	1.3	2.0	1.5	29
Nadone	M. Bbl	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	
Acid Sales	tons	1320.0	1320.0	1620.0	1120.0	1320.0	1620.0	1320.0	1320.0	1620.0	1320.0	1320.0	1620.0	17,140
Phenol	k. tons	41.3	49.8	49.0	31.3	31.1	47.4	37.4	47.7	49.2	31.3	37.1	48.6	
Kellogg	tons	45,900	45,440	57,000	0	45,000	47,700	46,200	45,440	45,920	45,920	45,920	45,760	550,910
Sulfur Consumption	k. tons	36	33	42	28	33	42	34	31	41	31	41	41	
Area 6 - Pined Plant	%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	
Area 6 - Diethylene	%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	
Area 6 - Ethyl Recovery	%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	
Area 7	%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	
Area 9	%	98%	98%	98%	92%	98%	98%	98%	98%	98%	98%	98%	98%	
Area 10	%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	
Area 11	%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	
SAP	%	97%	97%	97%	49%	97%	97%	97%	97%	97%	97%	97%	97%	
Kellogg/Gardline	days	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	97%	
Gardline	days				7									
Hydro/Cry	days				3									
Area 9	days				14							14		
SAP	days				14									
Area 11	days				2									
#9 Boiler	days				14									
Plant Shutdown	days				14									
A Train	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
B Train	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
C Train	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
D Train	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	
E Train	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
		<b>Plant Participation</b>												
Run	hph	90,243	90,243	98,701	48,241	90,243	90,243	90,243	90,243	90,243	77,581	90,243	90,243	
Steam Demand	mbh	29,278	29,278	43,177	11,370	40,278	40,278	40,278	40,278	40,278	35,961	40,278	40,278	
Production	hph	0	0	0	0	0	0	0	0	0	0	0	0	
Administration	mbh	39,473	39,473	38,686	30,742	39,473	39,473	39,473	39,473	39,473	35,144	39,473	39,473	
2011 Steam Demand	mbh	39,473	39,473	38,686	30,742	39,473	39,473	39,473	39,473	39,473	35,144	39,473	39,473	

# Total Plant Energy Efficiency Performance



### Historical Energy Unit Consumption



# Hopewell Site Energy Optimization

Questions?



**Honeywell**