Industrial Energy Efficiency Activities in West Virginia

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Sustainability

Development which meets the needs of the present without compromising the ability of future generations to meet their own needs"

UN Brundtland Commission





Sustainability

The Three Spheres of Sustainability





ACEEE - "Energy efficiency is easily the most affordable energy resource. The combination of supply side efficiency improvements and those by CHP technologies and efficiency improvement in industrial, commercial, and residential sectors would save taxpayers a significant amount of money over the next two decades"



US Energy Efficiency supply curve

The width of each column represents the amount of efficiency potential in **TBTU** found in that group of measures. The height of each column corresponds to the average annualized cost (\$/MMBtu) of that group of measures



Environmental Impact of Energy Efficiencv



Report published by McKinsey and Co. about Green House Gas Cost abatements

The Figure shows that the energy efficiency and waste heat recovery opportunities have negative abatement cost factors

Energy Efficiency Opportunity

The manufacturing sector offers *significant* opportunities for *costeffective* savings through increased energy efficiency.

Sector	Primary energy & cost savings (in 2020)	Investment Required* (2009 \$)	Savings Achieved (2009 \$)	Scope of Potential Opportunity
Manufacturing and Other Industrial	5,030 TBtu/yr \$47 billion/yr	\$113 billion	\$442 billion	330,000 establishments
Commercial, Private**	1,840 TBtu/yr \$11 billion/yr	\$73 billion	\$104 billion	57 billion sq ft
Commercial, State & Local**	860 TBtu/yr \$5 billion/yr	\$26 billion	\$49 billion	18.2 billion sq ft
СНР	1,470 TBtu/yr \$7.8 billion/yr	\$56 billion	\$77 billion	50 GW of additional power

Sources: Energy Efficiency in the U.S. Economy, McKinsey & Company, July 2009.

Notes: Savings achieved are net present value (NPV) positive for the 10-year period of 2010-2020.

* Not incremental; does not include maintenance costs

** Includes existing buildings and excludes new construction



Energy efficiency is a powerful solution !

- □Saves energy
- Reduces peak demand
- □ Saves carbon emissions
- □Saves money
- Increases profitability
- Increases sustainability
- Can be achieved at low payback on investment in many instances



Industrial Assessment Center





To provide energy efficiency, energy management, waste minimization, and productivity improvement services in the region and conduct research on energy efficiency measures



Industrial Assessment Centers (IAC)





IAC at WVU

- Averages \$ 400,000 a year in funding from DoE and WVDE and other organizations
- One of the longest standing centers at WVU beginning 24th year
- Average of 5 graduate students and 2 undergraduate students supported at any time
- Average peer reviewed research publications 2 to 3 per year
- □ Workforce development in energy efficiency
- □ Serves the State of WV and region



- Generation For an IAC assessment, plants have to qualify
- Manufacturing plants in WV do not have to meet the criteria due to funding from WVDE
- **D**E3 assessments done partnering with WV MEP
- The WVDEP grant facilitates assessments for development of sustainable communities
- Other entities doing energy assessments in the State



IAC Energy Assessment

- TechnologyAssessment andResearch
- Delivered Results in terms of Energy
 Efficiency, Lower
 Energy Costs, Lower
 GHG Emissions



IAC Energy Efficiency Improvement Focus Areas

- **D**Electrical Systems
- Lighting
- □ Motors (Fans, Pumps, etc.)
- Steam
- □ Process heating



IAC Assessment Methodology



Summary of Enhanced Energy Assessment Process

Pre-Assessment

- Client recruitment
- Interactive Sessions
- Utility bills analysis





Energy Management – ISO 50001 and SEP

ISO 50001 - Energy Management Standard

- Establishes a framework for industrial and commercial facilities and organizations to manage energy.
- Offers companies international approach for
 - Corporate sustainability programs
 - Energy cost reduction initiatives
 - Demand created along the manufacturing supply chain



Status of ISO 50001

- Published on June 15, 2011
- Available for purchase from ANSI
- Developed by ISO Project Committee 242; United States and Brazil led effort with the United Kingdom and China
- 59 countries participated, 14 of which observed



Impact of IAC – WVU

- Total energy saved: 5.4 Trillion Btu per year by 456 manufacturing facilities (implemented 2.38 TBTU/yr)
- Implemented projects worth of \$11.6 million USD to achieve savings of \$18.2 million USD
- Total CO₂ emissions saved: 711,410 tons per year (314,016 implemented)
- Demand savings separate
- Payback on investment: average less than 2 years

	Recommended Savings		Impleme	nted Savings
	Energy (MMBTU	/yr) Cost (\$/yr)	Energy (MMBTU/yr)	Cost (\$/yr)
Demand (kW- mo/yr)	408,174	4,050,585	200,002	1,980,503
Electricity	1,293,477	15,489,521	608,533	7,462,407
Natural Gas	3,334,920	24,995,890	1,149,785	7,777,808
Coal	369,048	1,048,973	254,787	554,048
Wood	377,716	257,478	147,520	135,493
Fuel Oil	106,978	895,474	43,997	417,937
Subtotal	5,482,139	47,528,399	2,388,276	18,162,599
	CO2 Savings	Recommended Savings (Tons)	Implemented Savings (Tons)	
	Electricity	414,992.69	195,238.69	
	Natural Gas	188,422.98	64,962.85	
	Coal	38,214.92	26,383.19	
	Wood	61,152.22	23,883.49	
	Fuel Oil	8,627.24	3,548.14	
	Total	711,410.05	314,016.36	



Implementation



Research Focus of IAC-WVU



Partners

- Doe, Eere, Netl
- U WVDE
- U WV MEP
- □ Industries of the Future WV (IOF-WV)
- □ International Lead Zinc Research Organization (ILZRO)
- U WVDEP
- 🖵 EPA
- USDA
- D PPG
- Bayer
- □ Lawrence Berkeley National Laboratory
- Oak Ridge National Laboratory



RECENT ENERGY ASSESSMENTS IN WV

- Steel of WV, Huntington
- Rubberlite, Huntington
- Northwest Pipe, Washington
- Quad Graphics, Martinsburg
- Ply Gem, Martinsburg
- Koppers, Follansbee, Huntington
- Flying W Plastics, Glenville
- Silgan Plastics, Wheeling
- NGK Spark Plugs, Sissonville
- Klockner Pentaplast, beaver
- Eagle manufacturing, Wellsburg
- McKenzie Dow, Huntington
- Motts, Maxwelton
- New River Hardwoods, Beckley
- Homer Laughlin, Newell
- Oliverios Peppers, Clarksburg



Energy Assessments for WV Industry - Some Results













Steel of WV, Huntington

AR No.	Description	Annual Potential Conservation		Potential Savings	Resource	Estimated Cost	Simple Payback
	·	MMBtu	kWh	(\$/Yr)	Conserved	(\$)	(months)
1	Develop a Demand Monitoring System to Reduce Demand Cost	-	-	275,195	kW Demand	8,840	1
2	Replace Existing Recuperators on Reheat Furnaces with More Efficient Units	50,087	-	221,385	NG	700,000	38
3	Implement a Motor Management System	-	2,180,892	74,556	Electricity	1,616	1
4	Insulate the Furnaces and Tundish Dryer	11,039	-	48,792	NG	2,796	1
5	Install Automatic Dampers and Occupancy Sensors to Regulate the Exhaust Flow in the Welding Booths	-	1,860,765	42,742	Electricity	2,560	1
6	Replace the High Pressure Sodium Fixtures with T5 Ganged Fluorescent Lighting Fixtures, Electronic Ballasts and Reflectors in Places Where Atmosphere is Clean	-	1,001,428	33,266	Electricity	146,250	53
7	Install Photo Sensors to Switch-off Lights in the Mill #2 area	-	366,689	18,823	Electricity	5,460	4
8	Reduce Compressor Pressure Set Point After Fixing the Air Leaks	-	279,014	9,576	Electricity	736	1
9	Replace Drive Belts on Motors with Energy Efficient Cog Belts	-	167,611	5,725	Electricity	0	Immediate
10	Repair Compressed Air Leaks	-	132,309	4,538	Electricity	1,992	6
11	Use Outside Air for Air Compressor Intake	-	131,534	4,511	Electricity	4,812	13
12	Replace Ordinary Nozzles with Vortex Nozzles	-	2,249	\$1,275	Electricity	1,077	11
	Total	61,126	6,122,491	740,384		876,139	15



Steel of WV, Huntington

- **1**2 recommendations
- □Natural gas savings, 61,126 MMBtu/year
- Electricity savings, 6,122,491 Kwh/year
- Cost savings, \$876,139/year
- Average payback on investment, 15 months
- Focus areas: Furnaces, compressor, motors, lighting



Koppers, Huntington

- **1**6 recommendations
- □Natural gas savings, 1,138 MMBtu/year
- Electricity savings, 663,061 Kwh/year
- □Cost savings, \$64,997/year
- Average payback on investment, 23 months
- General Focus areas: Lighting, motors, compressors



Koppers, Follansbee

- **1**4 recommendations
- □Natural gas savings, 41,022 MMBtu/year
- Electricity savings, 759,762 Kwh/year
- Cost savings, \$632,820/year
- Average payback on investment, 8 months
- Focus areas: Steam system, heat recovery, motors, lighting



Quad Graphics, Martinsburg

- □11 recommendations
- □Natural gas savings, 124,266 MMBtu/year
- Electricity savings, 3,031,194 Kwh/year
- Cost savings, \$1,130,332/year
- Average payback on investment, 5 months
- Focus areas: Furnaces, compressor, motors, lighting



- **1**6 recommendations
- □Natural gas savings, 17,561 MMBtu/year
- Electricity savings, 1,127,967 Kwh/year
- □ Propane savings, 1,310 MMBtu/year
- □Cost savings, \$261,565/year
- Average payback on investment, 21 months
- General Focus areas: HVAC, lighting, boilers, motors
- Additional renewable energy assistance provided



Plygem, Martinsburg

- **1**6 recommendations
- □Natural gas savings, 957 MMBtu/year
- Electricity savings, 1,217,655 Kwh/year
- Cost savings, \$83,079/year
- Average payback on investment, 17 months
- Generation Focus areas: Compressed air, motors, lighting



Summary

- Implementation of energy efficiency measures over 50%
- □ Introduction to energy management for clients
- Continual energy and cost savings and emissions reduction
- □ Replications and spinoffs
- □ Productivity improvement
- □ Utility rebates and incentives help AEP, first Energy, USDA REAP



QUESTIONS ?

