Energy Assessments for MACT & BACT

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Focus Today

- Introduce key B-MACT provisions affecting LA industry
- Look at how the B-MACT and GHG BACT are related
- Take a quick look at the two provisions with which most major LA sources must comply

Boiler MACT for LA

- No emission limits for most units (Gas 1)
- Work Practice Compliance Due Mar 21, 2014
- Once you are in...
  - Tune-ups annually for Gas 1 boilers ≥10MMBtu/hr
  - Biennially for any boiler / heater <10MMBtu/hr
  - One time energy efficiency assessment

- If you add a new unit – any change to due date?

Boiler MACT and GHG BACT – Related?

- EPA GHG guidance refers to work practices,
- MACT standard includes two:
  - Tune-ups
  - Energy efficiency assessments

- B-MACT specificity may lend itself to BACT
- Will B-MACT "Energy Use System" approach spread?

Relationship, (continued)

- EPA BACT guidance: "...the **permit** could also lay out a **requirement** to..."
  - Implement an Energy Management System
  - Implement actions that result in net savings
- MACT energy efficiency assessments:
  - Parallel universe
    - Review energy use systems and management
    - Identify cost effective measures

WP 1: Annual Tune-ups

- Inspect the burner
- Check the flame
- Check air-fuel ratio controls
- Minimize carbon monoxide / maximize efficiency
- Maintain results onsite

WP 2: Energy Efficiency Assessment Overview

- Review management and operating practices
- ID cost effective efficiency opportunities

Energy Efficiency Assessment

- Inventory major energy consuming (use) systems
- Review and evaluate
  - Facility plans
  - Energy use specs
  - Operating maintenance procedures
  - Unusual operating constraints
  - Logs / fuel use records
- Inspect boiler(s) or process heater(s)

Steps in an Assessment cont'd

- Recommend improvements to energy management practices
- List major energy conservation measures
- Describe energy savings potential
  - Cost effective
- Prepare comprehensive report

Who Conducts the Assessment?

- Proposed B-MACT Assessor
  - Certified by DOE*, or
  - Association of Energy Efficiency Engineers

- Final B-MACT Assessor
  - Certified specialists
  - Experienced practitioners
  - Demonstrable capabilities

*5 DOE certifications: steam, process heat, compressed air, fans, pumps and motors

Time and Focus

Tier 1 34.2 MMBtu/hr

- One day (really?)
- 50% of energy use output

Tier 2 34.2-114 MMBtu/hr

- 3 days
- 33% of energy use output

Tier 3 >114 MMBtu/hr

- No time limits
- 20% of energy use output

Tier 1 Example
30 MMBtu/hr Hot Oil Heater

- Determine...
  - The 50%+ energy use system
  - Stack temperature / O_2 / CO
  - Temps, flows, pressures - hot oil
  - Temps, flows, pressures – other medium
- Inspect insulation
- Review combustion controls / fuel use records

Tier 1 Example
30 MMBtu/hr Hot Oil Heater

- Evaluate...
  - combustion efficiency
  - Heat exchanger efficiency
  - Heat losses
  - Management / operational controls
- Suggest changes and create estimate of cost effectiveness
- Write final report
- Plant certifies completion to agency

Tiers Revisited

Tier 1 34.2 MMBtu/hr

- One day (really?)
- 50% of energy use output

Tier 2 34.2-114 MMBtu/hr

- **3 days**
- **33% of energy use output**

Tier 3 >114 MMBtu/hr

- No time limits
- 20% of energy use output

Tier 3 Reality – Major Refinery

- 40 times the heat duty needed for Tier 3
- 46 affected units
- 20% of energy use systems
  - Involves several sources
  - Pre-planning needed for such a site

Note: systems consuming onsite-generated electric power are fair game

Geez, Do I Have To?

- Ammonia Plant Assessment
  - saves approximately **$3.5 million** annually
  - Saves 497,000 MMBtu
  - simple payback of 11 months
- Chemical Plant Assessment
  - Saves **$1.9 million** annually
  - Saves 272,000 MMBtu annually
  - simple payback of 1.5 months

EPA Influenced by DOE

- DOE certifications
  - Steam System Specialist
  - Process Heating Specialist
  - Others...
- DOE Tools
  - SSST / SSAT / PHAST
- DOE Programs
  - Industrial Technology Program / Energy STAR EPI / Energy Star Guidelines

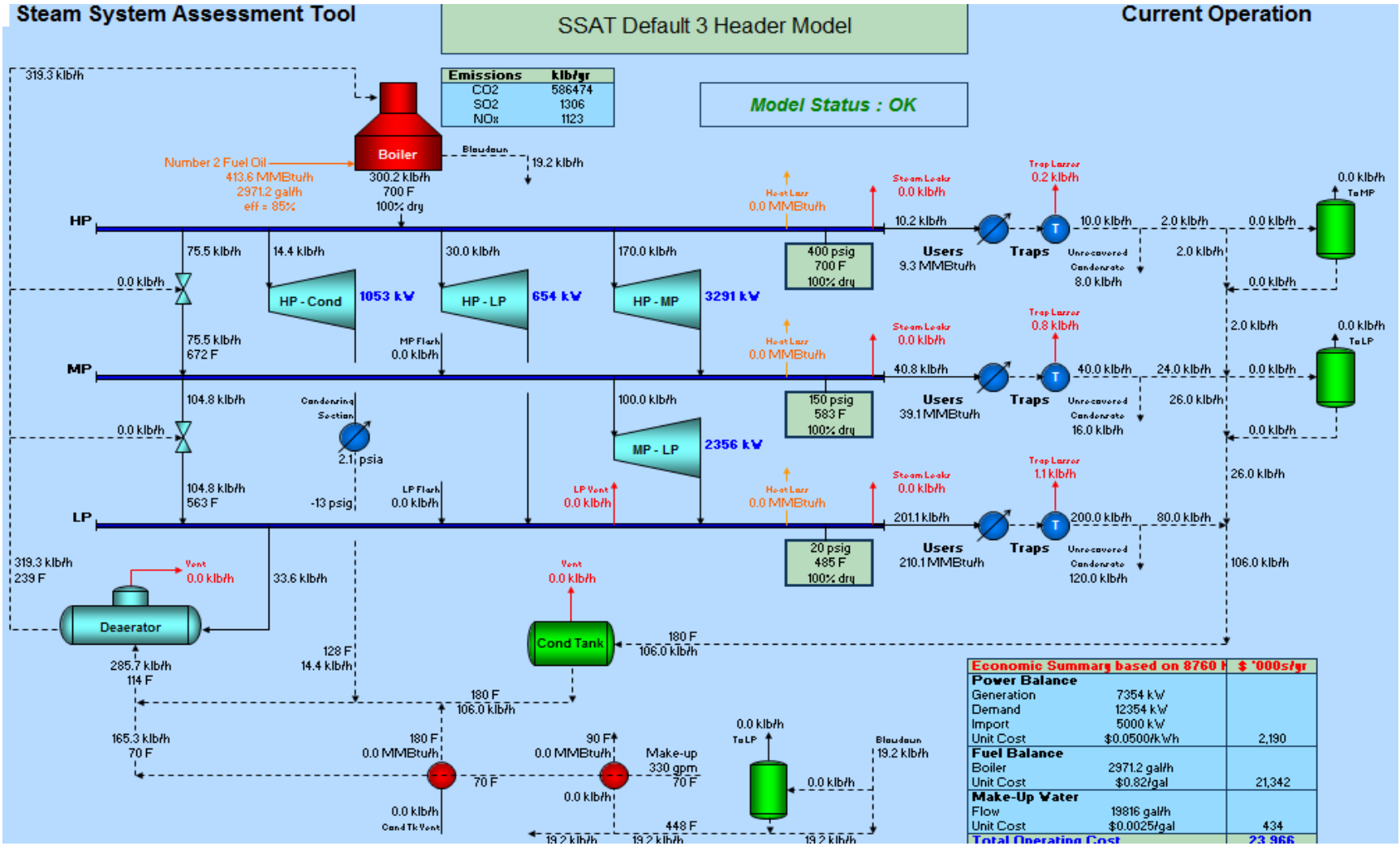
Quick Look: DOE Tools

- SSST
- SSAT
- PHAST
- EPIs

Scoping Tool: Systems Review

SUMMARY OF STEAM SCOPING TOOL RESULTS		
	POSSIBLE	YOUR
	SCORE	SCORE
STEAM SYSTEM PROFILING	90	0
STEAM SYSTEM OPERATING PRACTICES	140	72
BOILER PLANT OPERATING PRACTICES	80	0
DISTRIBUTION, END USE, RECOVERY OP. PRACTICES	30	0
TOTAL SCOPING TOOL QUESTIONAIRE SCORE	340	72
TOTAL SCOPING TOOL QUESTIONAIRE SCORE (%)		21.2%

SSAT Project Models

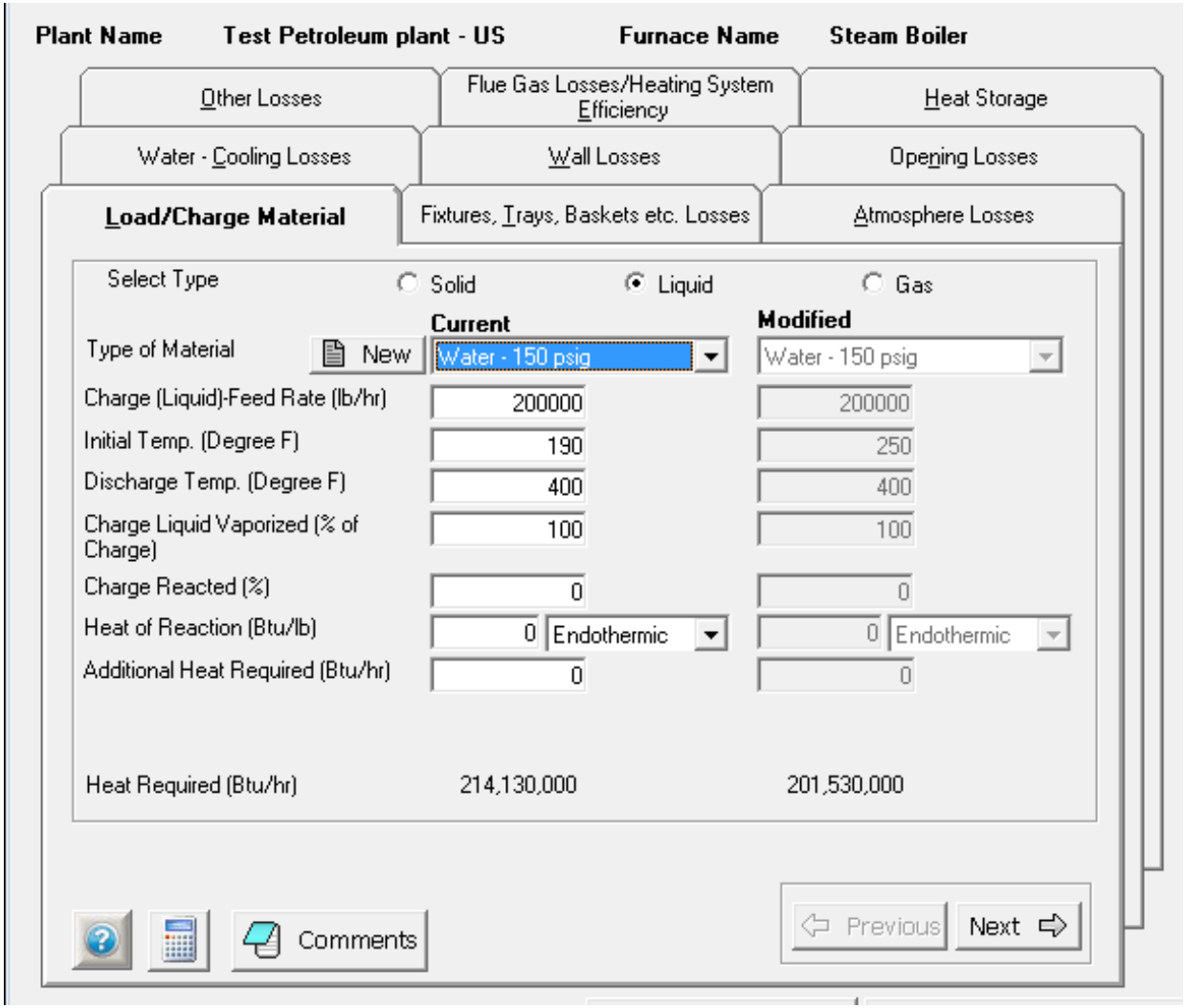


SSAT Project Evaluations

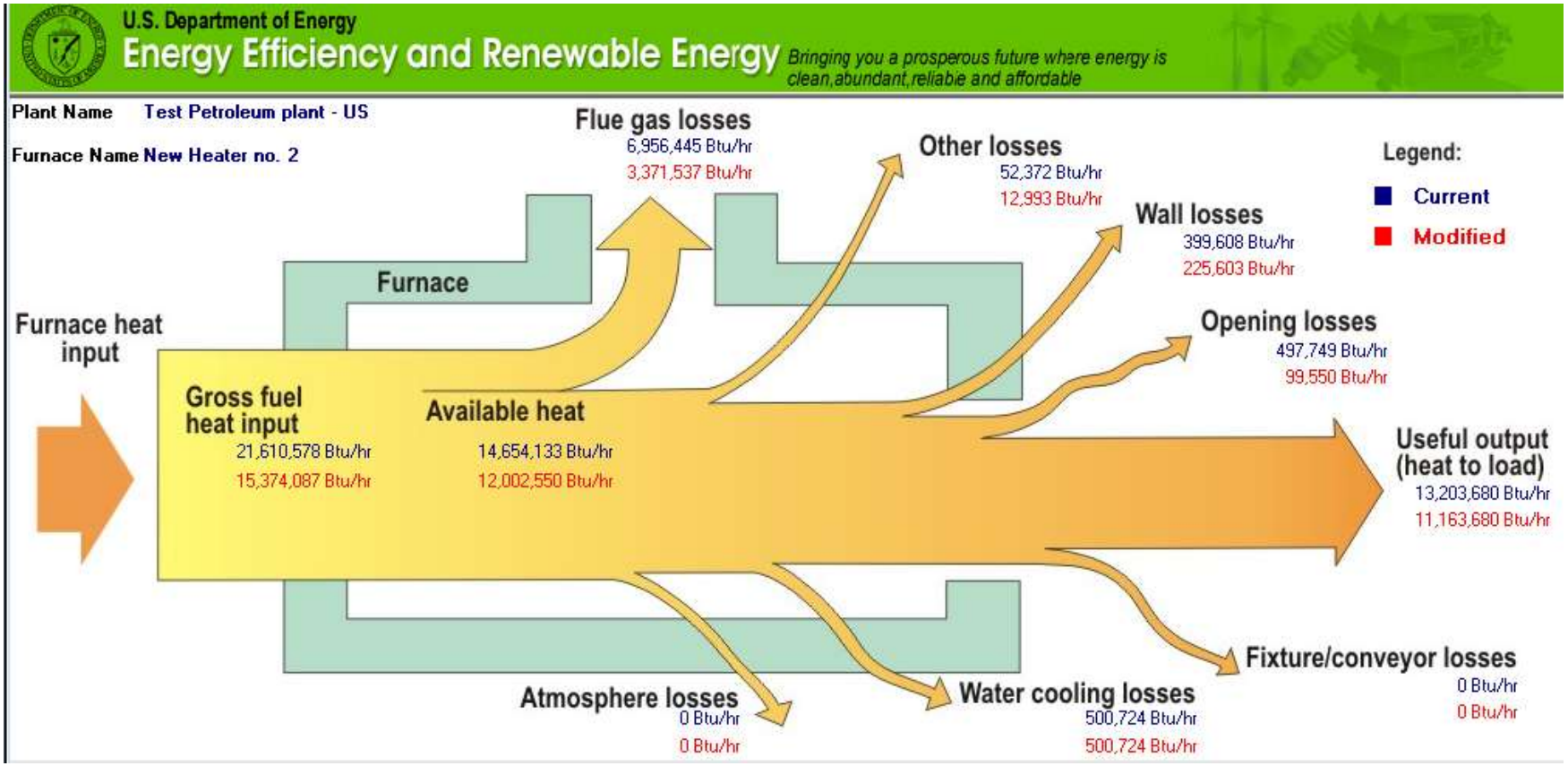
SSAT Default 3 Header Model				
Model Status : OK				
Cost Summary ($ '000s/yr)	Current Operation	After Projects	Reduction	
Power Cost	2,190	2,192	-2	-0.1%
Fuel Cost	21,342	19,063	2,279	10.7%
Make-Up Water Cost	434	401	33	7.7%
Total Cost (in $ '000s/yr)	23,966	21,656	**2,311**	9.6%

DOE's PHAST Program

- Heaters and Boilers only
- Before and after analysis
- Multi-unit capacity



PHAST Results – Single Unit



PHAST Plant Summary

Example Output

Heating Equipment	Fuel Energy Use (Million Btu/Year)	Annual Cost (USD/Year)	Electric Energy Use (Thousand kWh/Year)	Annual Cost (USD/Year)	Steam Energy Use (Million Btu/Year)	Annual Cost (USD/Year)	Annual Total Cost (USD/Year)	% of Total Cost
Steam Boiler	188,698	943,488	920	73,592	2,376,192	23,761,920	24,779,000	45.72
HP Boiler	209,664	419,328	0	0	2,358,720	23,587,200	24,006,528	44.29
New Heater no. 2	268,800	1,344,000	917	0	126,706	1,267,056	2,611,056	4.82
Heater 3	403,200	2,016,000	0	0	0	0	2,016,000	3.72
Distillation unit	0	0	192	15,360	75,492	754,915	770,275	1.42
Cat Cracker	0	0	413	20,140	0	0	20,140	0.04
SynGas heater	0	0	8,280	0	0	0	0	0.00
Total	**1,070,362**	**4,722,816**	**10,722**	**109,092**	**4,937,109**	**49,371,091**	**54,202,999**	**100.00**

Energy Performance Indicators

- Cement Manufacturing
- Dairy Processing
- Food Processing
- Glass Manufacturing
- Iron and Steel Manufacturing
- Motor Vehicle Manufacturing

- Motor Vehicle Manufacturing
- **Petrochemical Manufacturing**
- **Petroleum Refining**
- **Pharmaceutical Manufacturing**
- **Pulp and Paper Manufacturing**

Some Resources

- http://www1.eere.energy.gov/industry/saveenergynow/index.html
  - Best Practices: Steam
  - Steam Tip Sheets
  - Improving Steam System Performance: A Source Book for Industry
- http://www.energystar.gov
- http://www.energystar.gov/index.cfm?c=in_focus.bus_industries_focus

Wrap Up

- B-MACT energy efficiency assessments:
  - Structured framework could influence GHG BACT thinking
  - Can be reviewed by DEQ at any time
- If NSPS is BACT floor, then what of the B-MACT?