



METHANE EMISSIONS MEASUREMENTS

16th Annual Natural Gas Star Implementation Workshop

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Bob Berry – DCP Midstream, LLC

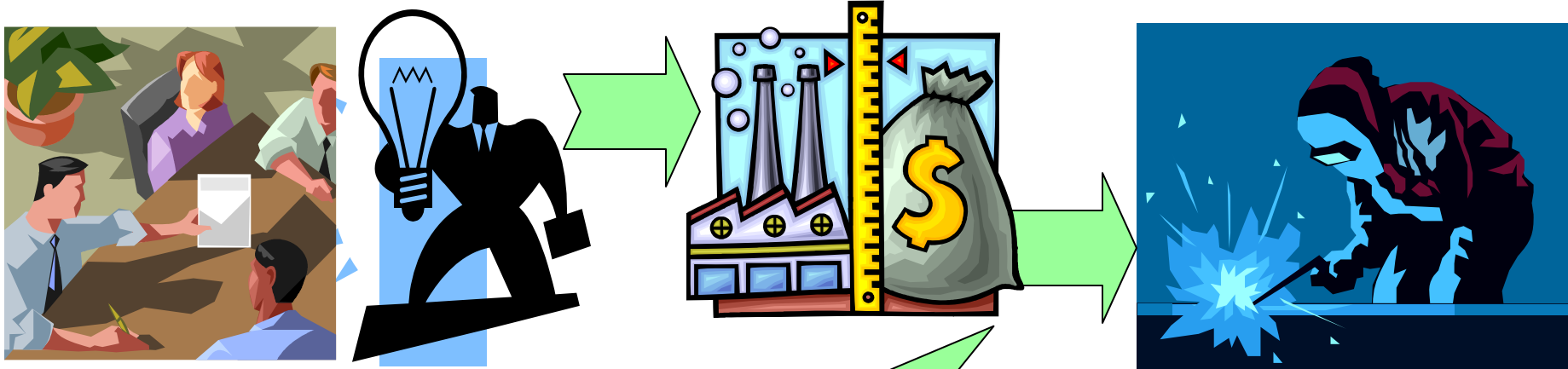


Methane Emission Measurement



- Quantification Techniques
 - Engineering Calculation
 - Material Balance
 - Direct Measurement
 - Emissions Modeling
 - Remote Quantification

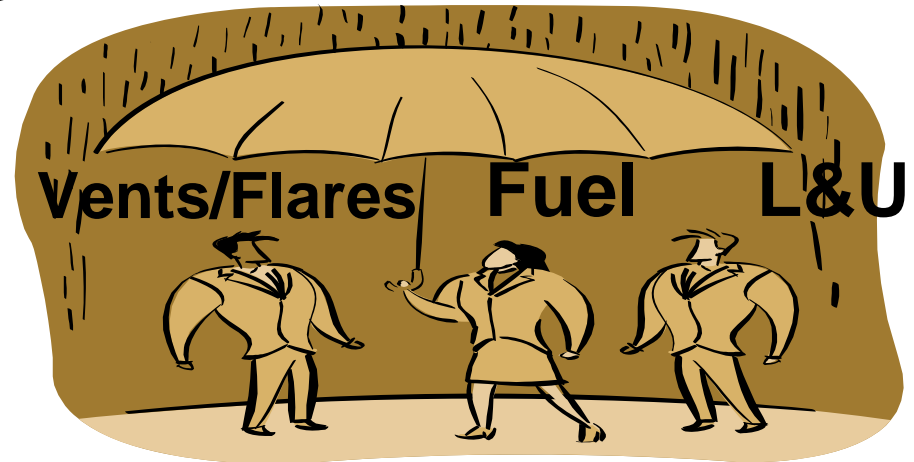
BTU Efficiency Optimization Model



Asset BTU Team



Methane Emission Reductions



Plant Balance Example



PLANT WITH AVG DAILY THROUGHPUT OF 75MM/DAY

PLANT BALANCE	<u>MCF</u>	<u>BTU</u>	<u>MMBtu</u>
PLANT INLET	2,285,631	1.255	2,868,600
PLANT RESIDUE	1,863,297	1.032	1,923,500
PLANT PRODUCT	368,451	2.442	899,900
PLANT FUEL	43,676	1.027	44,900
	-		-
GAIN/(LOSS) INLET TO SALES	(10,207)		(300)
% G/(L) (see remarks)	-0.45%		-0.01%



ASSUMPTIONS



- Field Language and Definitions are not the same as EPA Language and Definitions
- The Inlet of any given Plant and/or booster can vary between ~40%-85% Methane
- Material Balance measurement can vary “+” or “-” 1%
- All Quantification methods are subjective
- NGLs have no methane
- Residue Gas is pure methane
- Fuel is pure methane, but is combusted

Plant Balance Example



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GAIN/(LOSS) INLET TO SALES	(10,207)		(300)
% G/(L)	-0.45%		-0.01%
Assume Losses are Equalized			
PLANT RESIDUE	<i>Methane</i>		201
PLANT PRODUCT	<i>No Methane</i>		94
PLANT FUEL	<i>Methane</i>		5



What Now?



- Assume the Plant Residue Loss is Fugitive and Vented Methane Emissions
- If every month is the same as this month, the annual methane loss is 2,414 MMBtus
- If every day is the same as this loss, the avg. daily methane loss is 7 MMBtus/day or 6 mcf/day
- Since this is an average loss, it means that on a given day, there could be a fairly large loss or no loss detected at all.
- Given our survey methods for leak detection, a leak would be detected and repaired rapidly.
- For pneumatic and instrument devices, use air instead of natural gas



REALITY CHECK



- Based on your experience, which method is most correct and why?
 - Engineering Calculation
 - Material Balance
 - Direct Measurement
 - Emissions Modeling
 - Remote Quantification

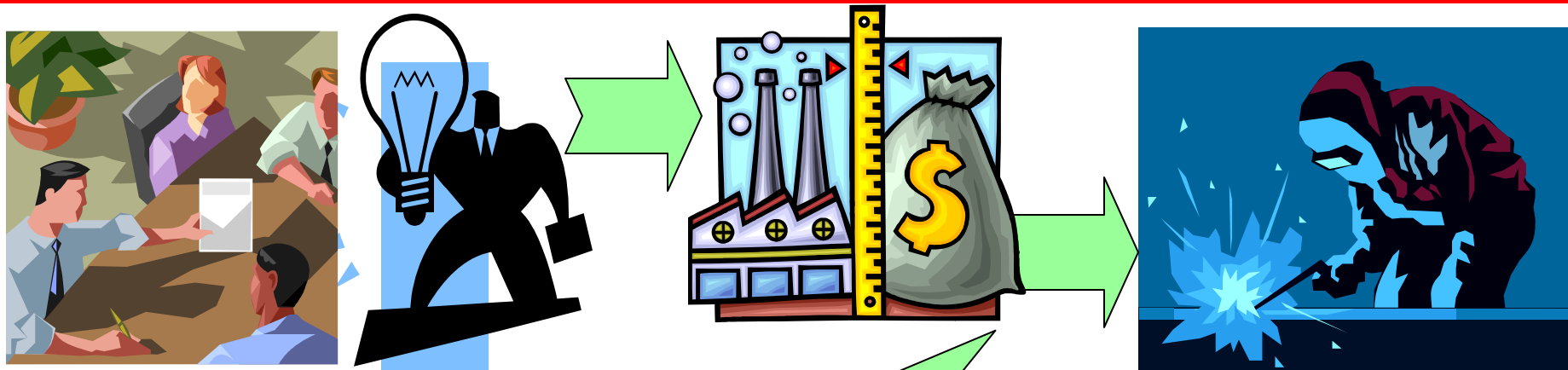


MY PROPOSAL



- ASSEMBLE A TEAM OF INDUSTRY EXPERTS (GPA's GHG Reporting Rule Working Group)
- GIVE THEM ONE WEEK TO MAKE A PROPOSAL
- DO NOT MIX DETECTION WITH QUANTIFICATION
- UTILIZE API COMPENDIUM AS GUIDELINE
- Simplify For More Accuracy
- Use Annual Balance on Facilities to Determine the Maximum “Threshold” for Possible Methane Emissions

Methane Emissions Measurement Model



MEM Facilities Team



Methane Emission Reductions

