

# Energy Assessments to Yield No Cost and Low Cost Capital Projects

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*The Leading Producer of C<sub>4</sub> Based Chemicals*

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# Outline

- Successes
- Daily Plantwide Energy Assessments
- Large Processes Energy Consumption
- Detailed Analysis of Equipment
- Pitfalls
- Review of Successes

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# Successes

- Tighten the spec on the overheads of BD Extraction tower to decrease downstream energy consumption - \$2,500,000/year.
- Changed key component of a CC4 Pre-fractionation tower - \$750,000/year.
- Justified accelerated heat recovery reboiler cleaning schedule - \$1,500,000/year
- Avoided running in energy inefficient modes for extended periods of time.

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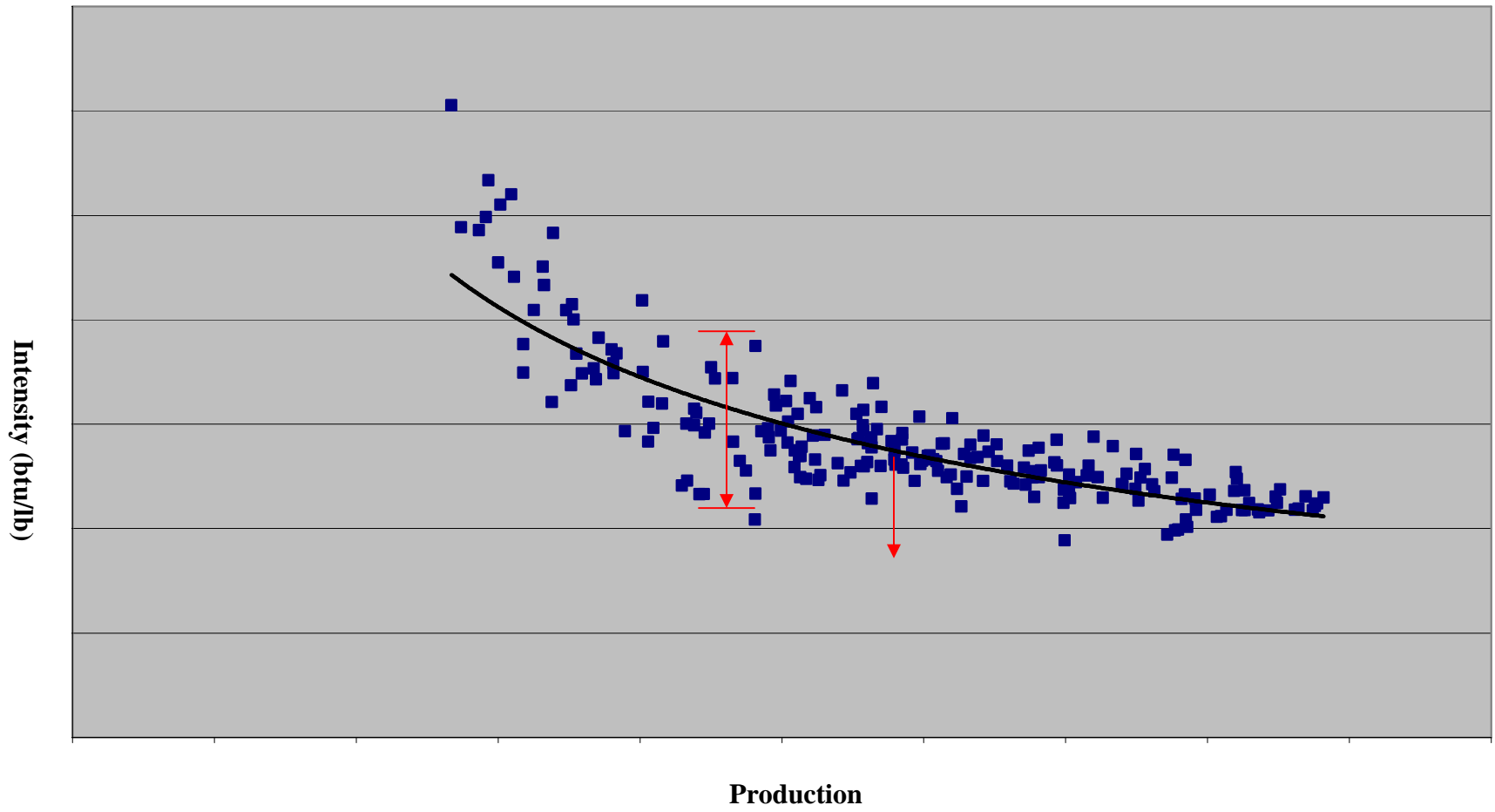
# Plantwide Assessment

- Deltas
- Two ways to improve energy efficiency
  - Reduce variation
    - Eliminate outliers
  - Reduce average
    - Challenge perceived minimums

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### Energy Efficiency



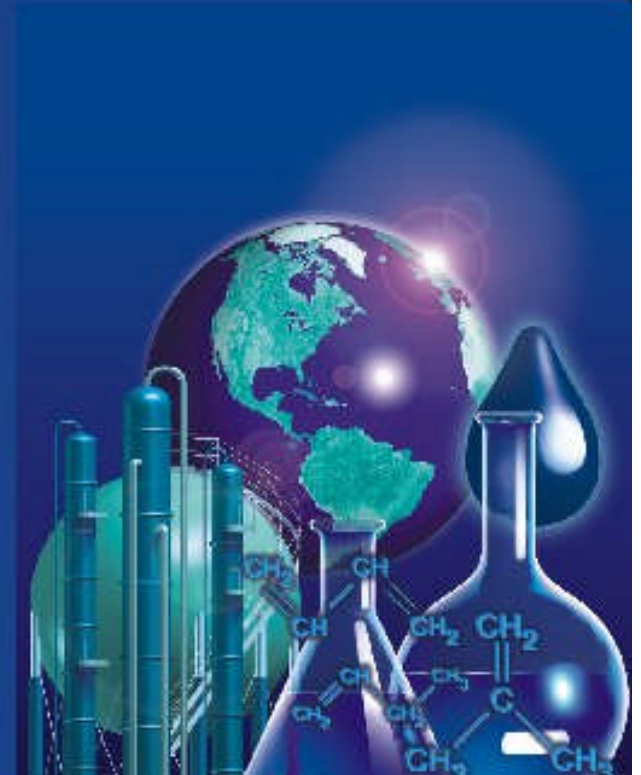
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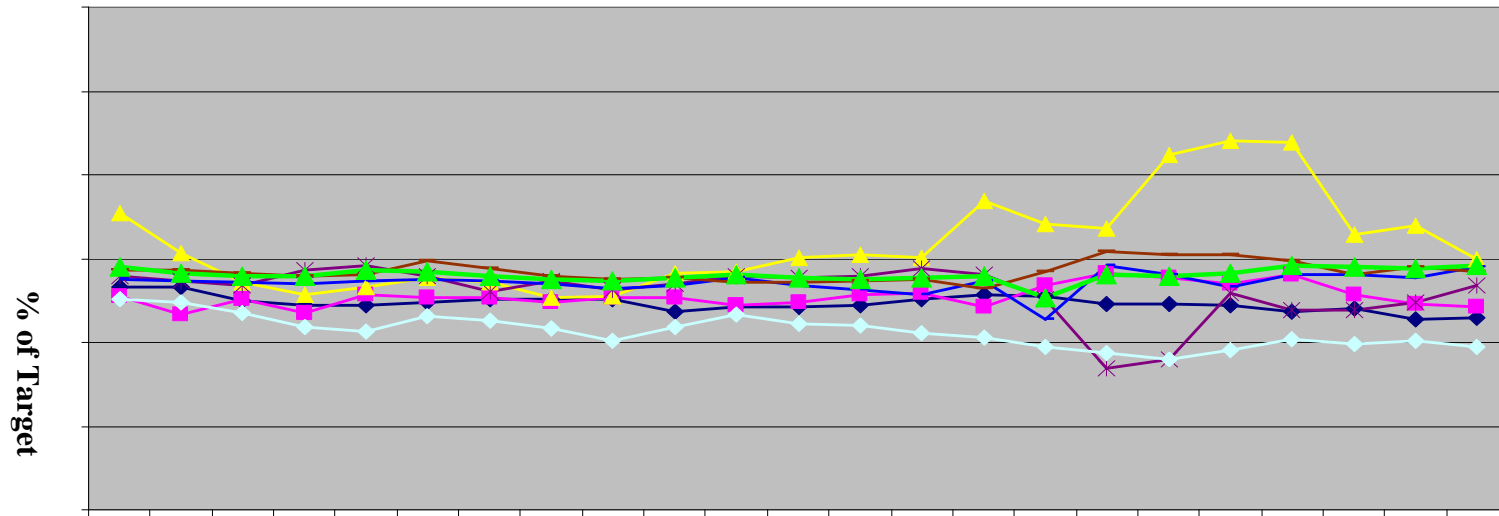
# Plantwide Assessment

- Daily monitoring on a macro level
- Compare monitoring to known target range for quick review
- Easy to read results.
- Send to a wide audience.

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### % OF ENERGY TARGET



Legend: DIB (dark blue diamond), HPIB (magenta square), PIB (yellow triangle), BUTENE-1 (purple asterisk), BD (blue circle), MTBE (DH) (brown circle), MTBE (RAFF) (light blue diamond), TOTAL MFG (green triangle)



# Targets

- Efficiency / Intensity Targets
  - Energy usage vs. Production
  - Set realistic targets
  - Validate targets
  - Challenge targets

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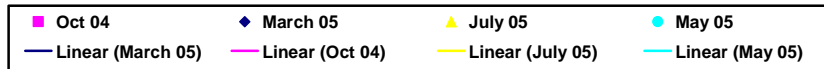
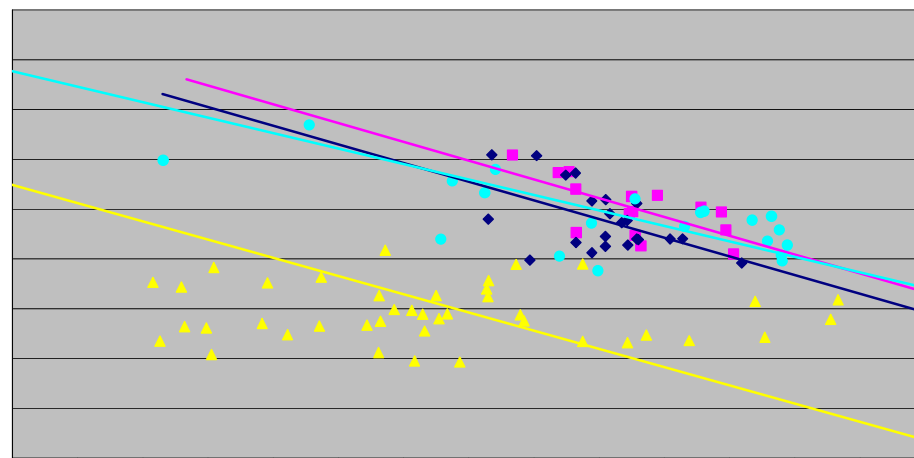
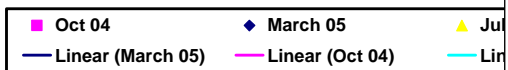
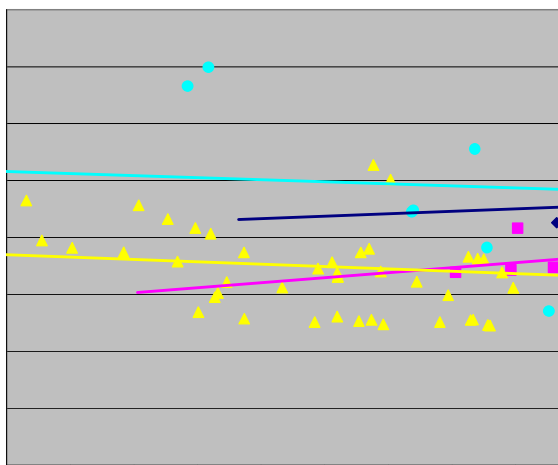
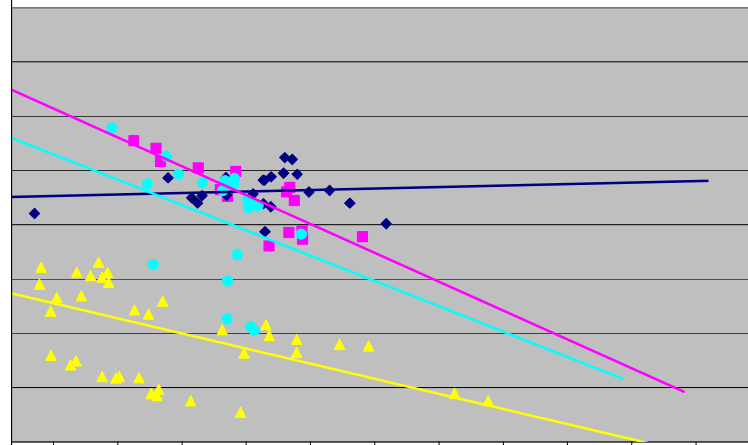
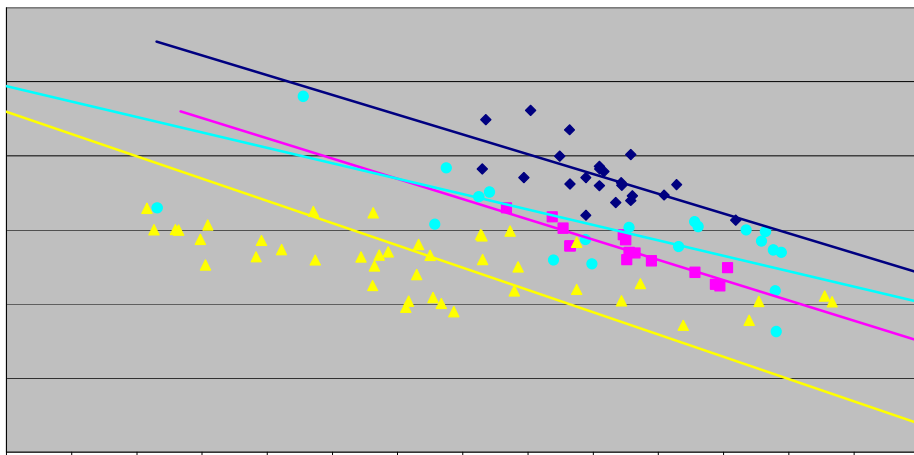


# System Assessment

- Used to quickly determine which piece of equipment is causing delta.
- Energy graphs that can quickly be scanned.
- Not used to find out why a certain piece of equipment is out of range, just to find the system that is running inefficiently

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# Detailed Analysis

- Lots of data is required so it should be separate from other charts and analysis
- Must be able to find why a certain sub-system is not operating efficiently
- Find the project

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# Pitfalls

- Meters
  - Meter major energy users
  - The more meters the better the results
  - Meters are low cost and have high returns
  - “You can’t improve what you can’t measure”

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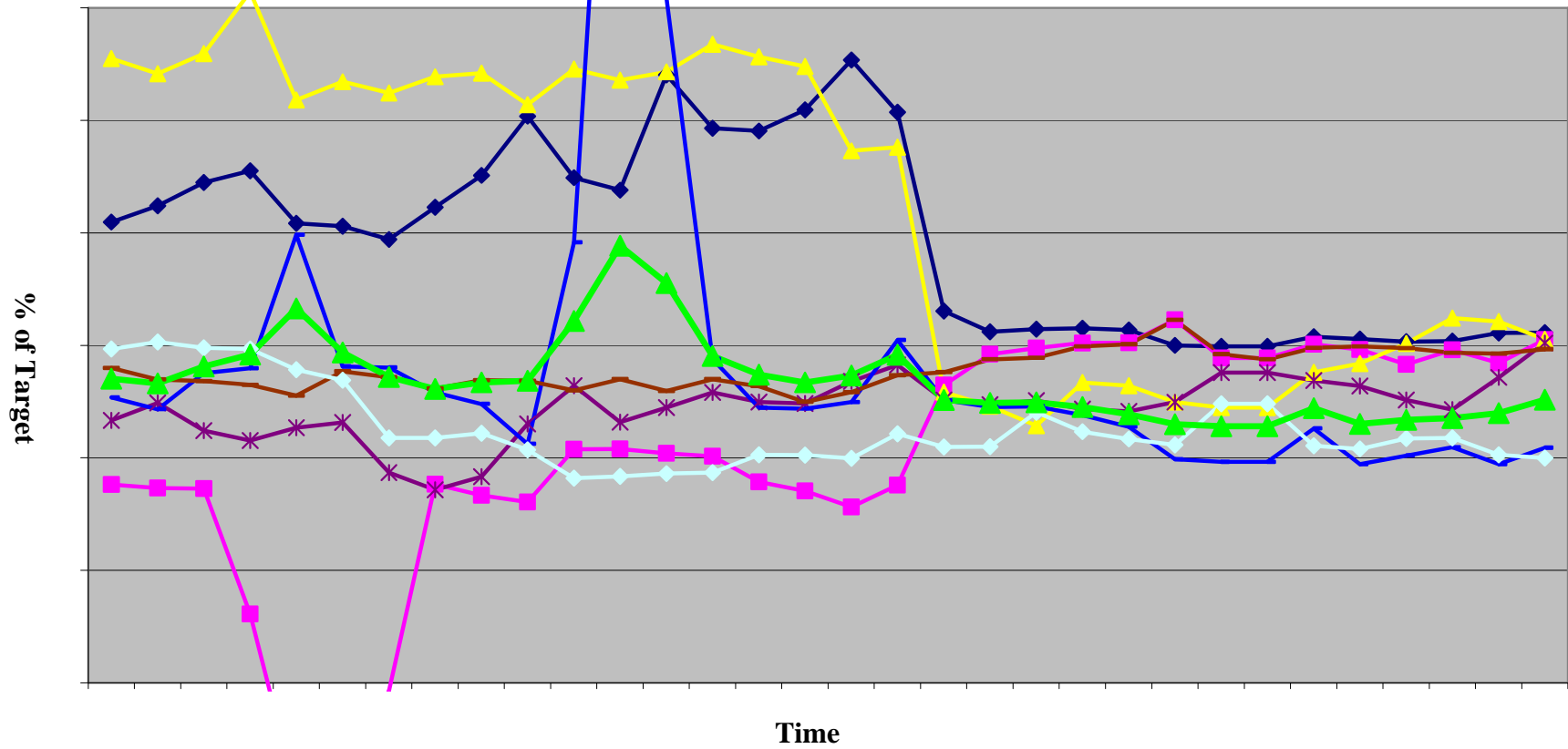
# Pitfalls

- Subdivide plant into units of responsibility
- Avoid large allocated energy cost
  - Keep energy generation separate from energy consumption
  - Balance energy use and separate unknown losses
- Selecting the correct targets
  - Set targets over the operating range
  - Use consistent time intervals

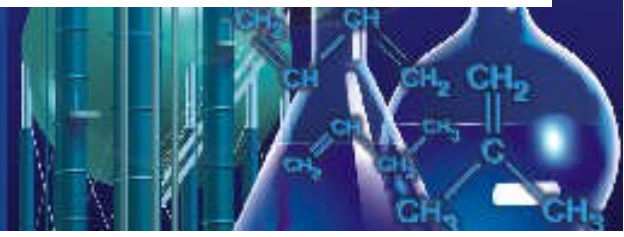
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### % OF ENERGY TARGET



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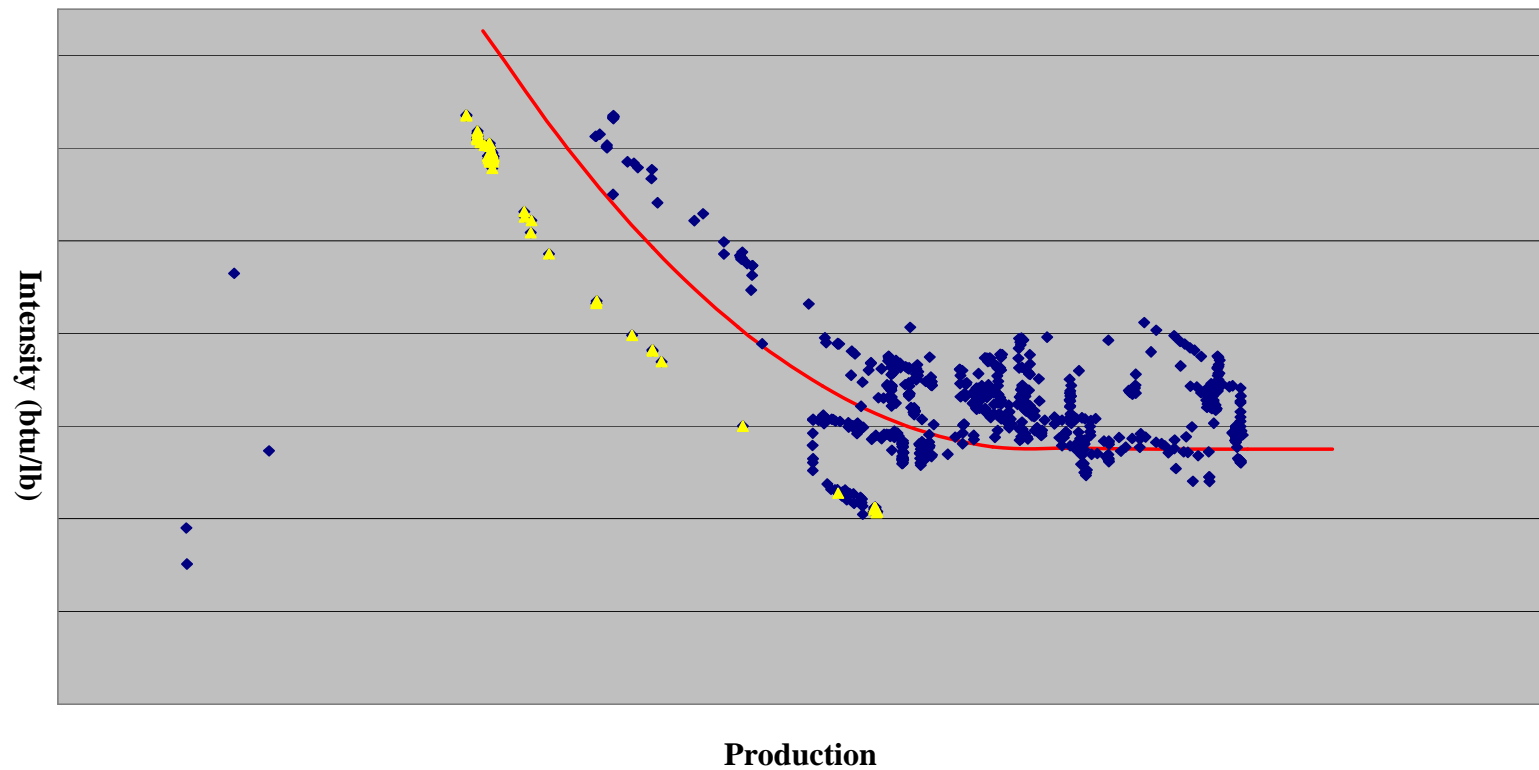
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# Tighten Spec

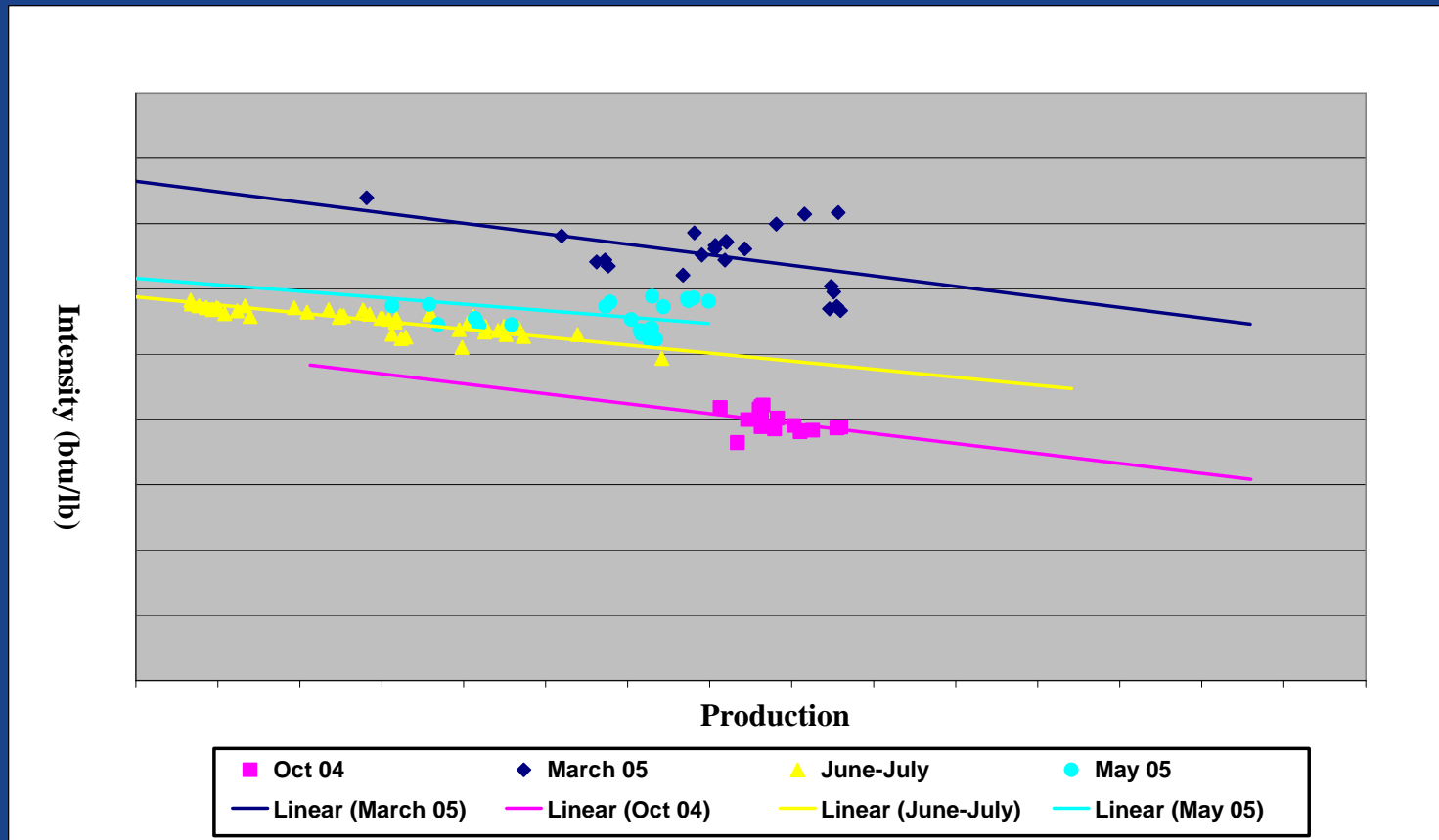


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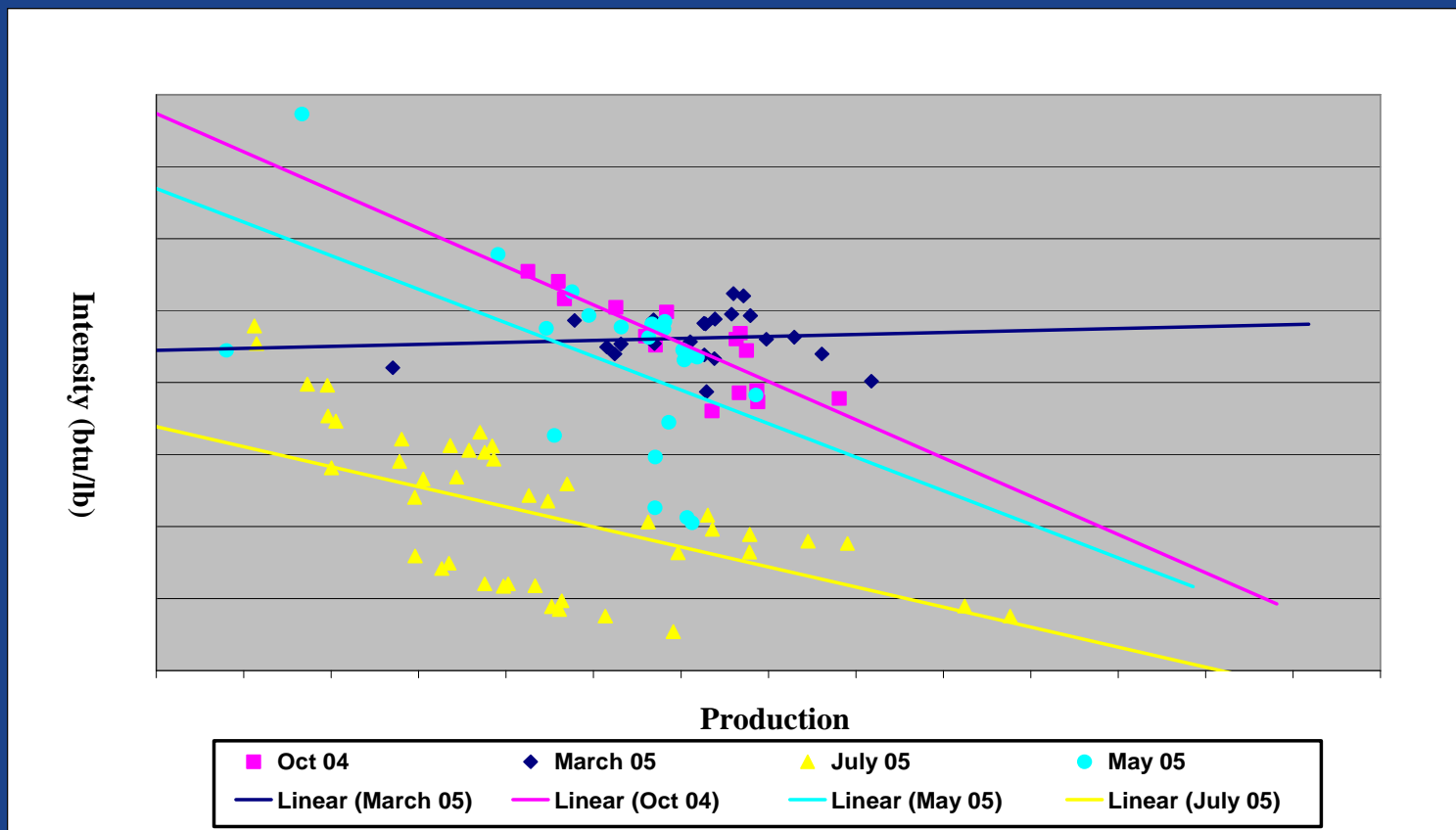
# Key Component



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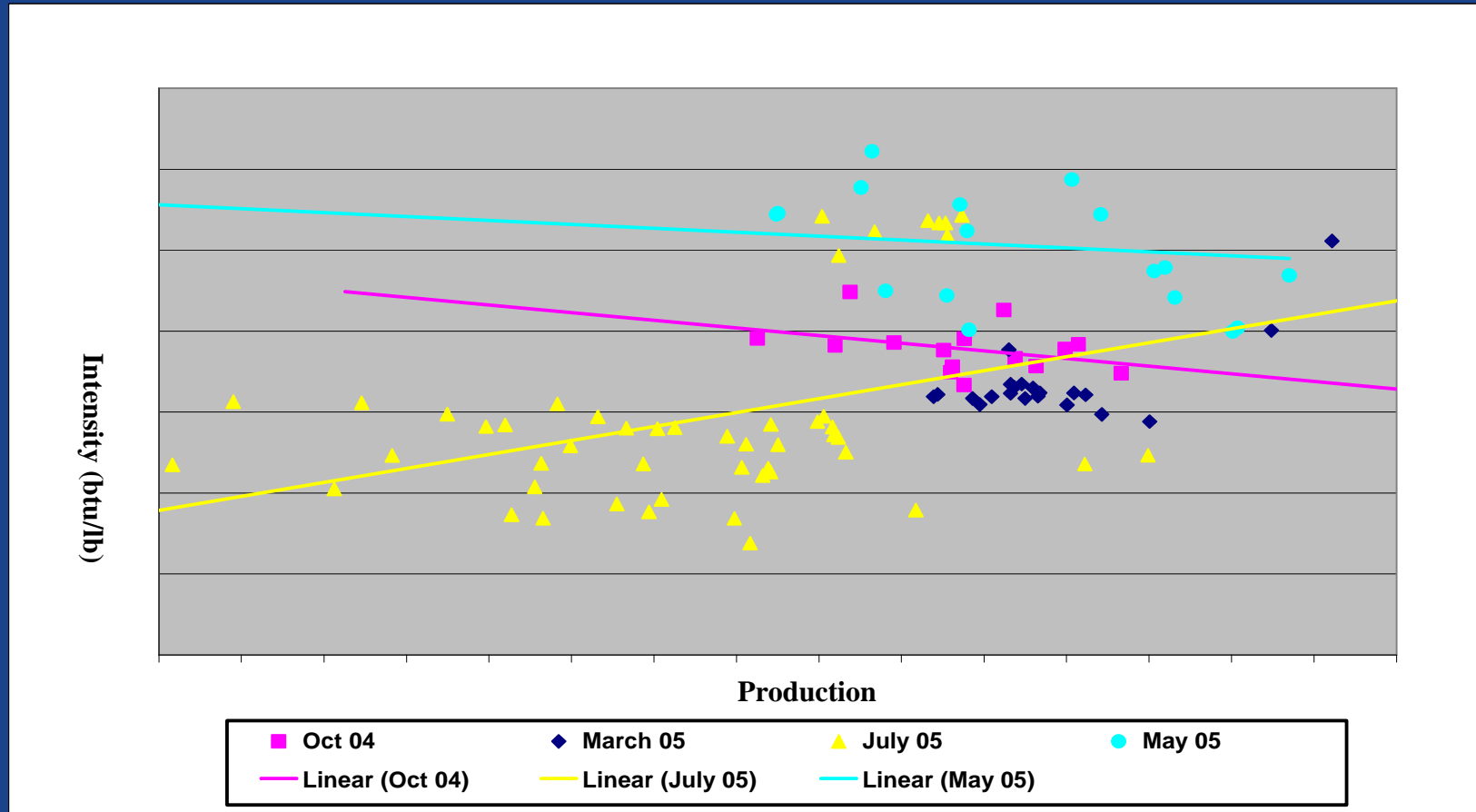
# Heat Recovery



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# Avoiding Inefficient Operations



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- Thank you for your time

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