

POSTER SUMMARY

## DEGREE OF FREEDOM ANALYSIS FOR STEAM BALANCE MONITORING CALCULATIONS

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### Abstract

The SMRI is conducting research to establish energy indicator variables for monitoring and ultimately to establish benchmarks for energy use in sugarcane processing factories. Preliminary work at two factories has shown that existing instrumentation does not easily allow real-time tracking of energy use in different parts of the factory. However, custom mass and energy balances around high pressure and exhaust steam generation using existing measurements and appropriate assumptions have enabled estimates of steam consumption to be made for various sections of the factory. The frequency of the steam consumption estimates is the same as the lowest frequency of the measurements, for which real measurements must be used.

Where on-line measurement of flows of exhaust steam condensate from the first evaporator effect and high pressure steam through the let-down station are available, the calculation of the overall factory steam balance may be possible in real time.

The poster will present examples of high pressure and exhaust steam networks and associated instrumentation, and demonstrates the types of energy data that can be calculated under various measurement scenarios. The poster uses a *degrees of freedom* approach, and is based on practical experiences of developing energy monitoring in real factories.

*Keywords:* energy monitoring, steam balance