OSIsoft®

# REGIONAL SEMINARS 2012

## The Power of Data

PASAR

# Enabling Process Monitoring and Optimization through PI System

Presented by **Anthony Jarn Canonigo**

**PASAR Corporation**

# Agenda

- About PASAR Corporation
- PI System at PASAR
  - Initial Challenges
  - System Architecture
- Using PI System
  - Production Monitoring
  - Power Monitoring System
  - Metal Balance System
- Benefits of PI System
- Future Plans with PI System in PASAR

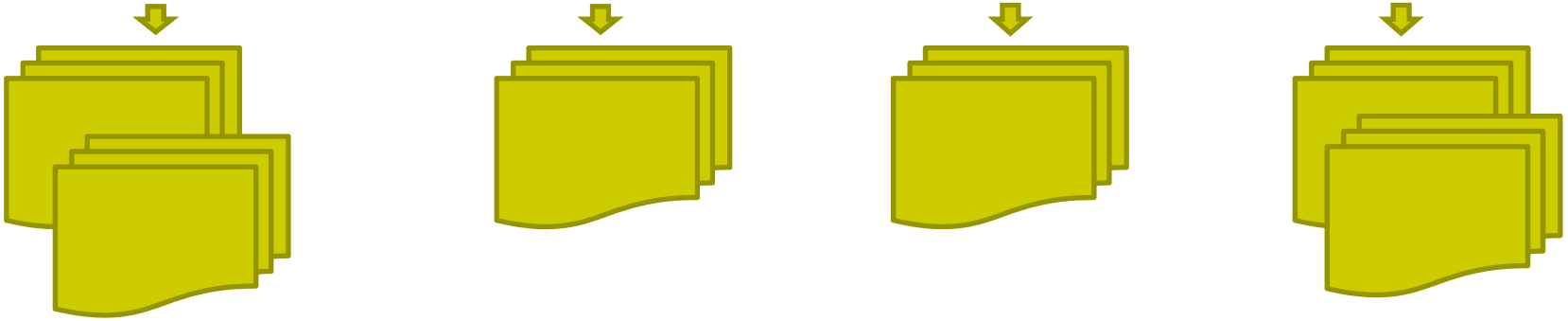
# Business Challenges


- Need for realtime data collection and archive
- Need to bring all relevant data from various data sources into one single platform
- Need for appropriate access of data provided to users based on roles & delivered in uniform & consistent manner.
- Need for reports generation and visual displays for monitoring and data analysis

# Pre-PI System Structure

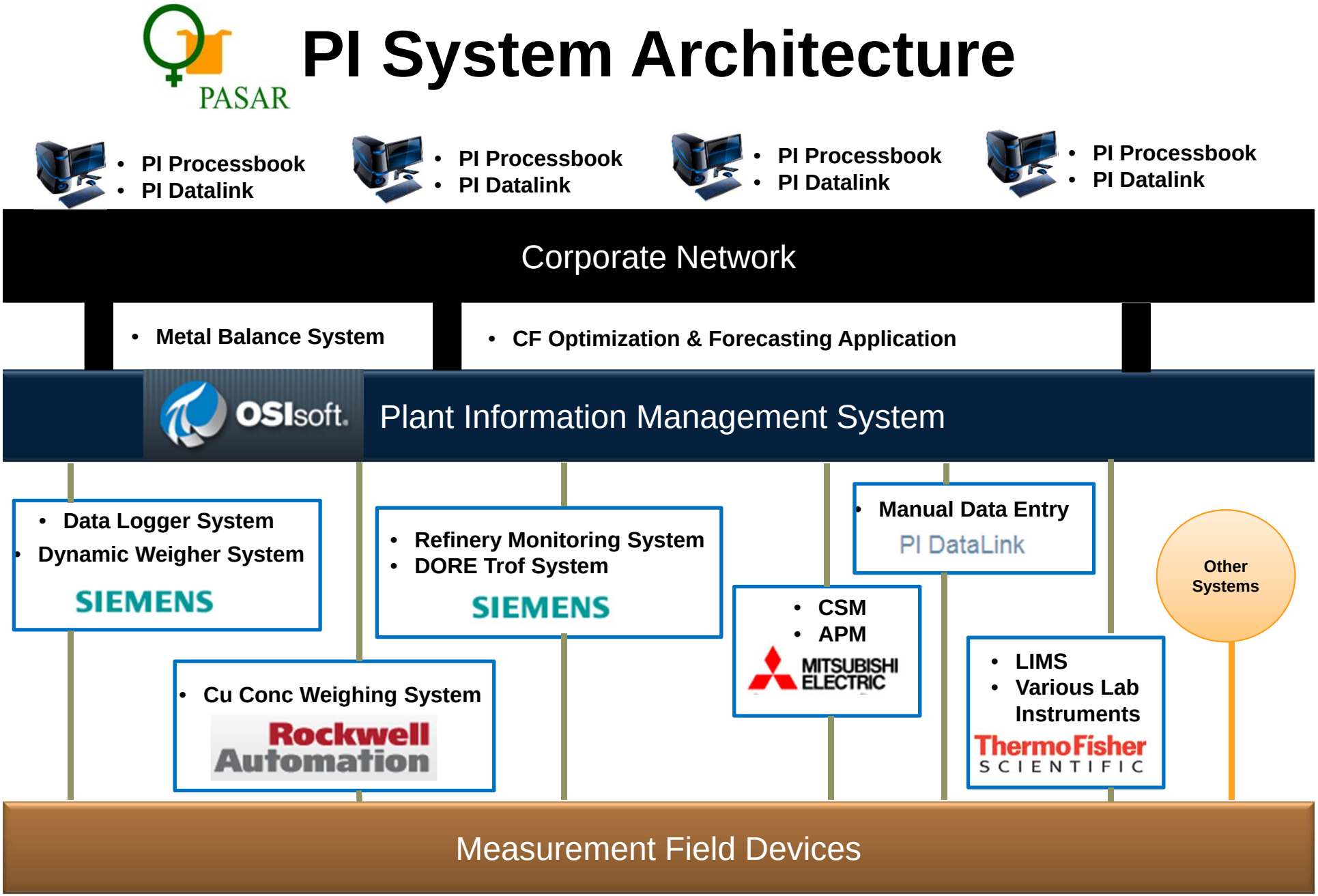
PASAR

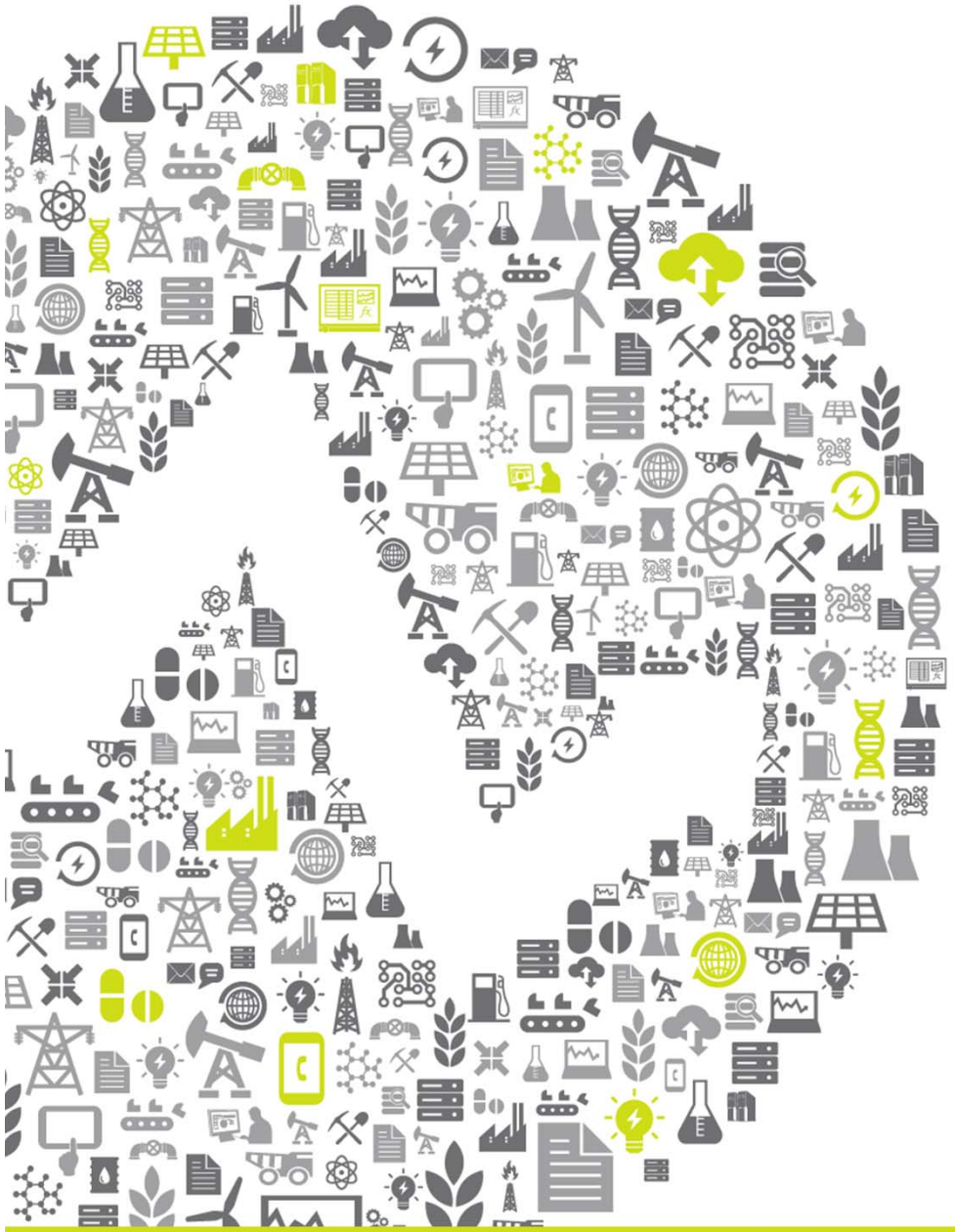
| SMELTER | REFINERY | AUXILIARY | LABORATORY |
|---|---|---|---|
| • WHB Spring Hammer<br>• Hot EP<br>• OKO Cooling Tower<br>• Weightometer<br>• Conveyor System<br>• Data Logger Monitoring System<br>• Casting Wheel | • Cell Voltage Monitoring System<br>• Cathode Stripping Machine<br>• Anode Preparation Machine<br>• Dore TROF System | • Steam Turbine Vibration Monitoring System<br>• Wet EP | • Oxygen Analyzer<br>• Autosampler<br>• Sulfur Analyzer<br>• Atomic Absorption Spectrometer |



**Each system generating its own set of reports/logs.**

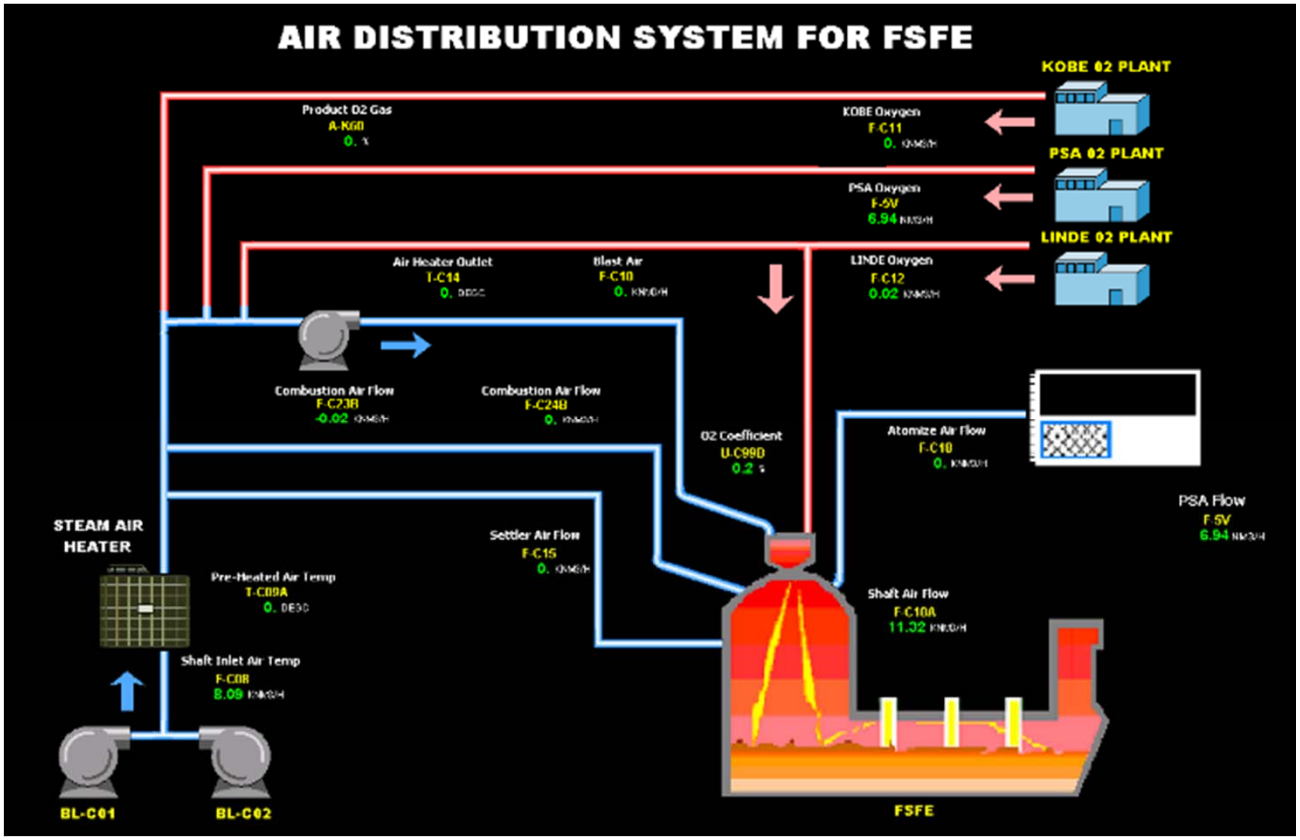
# PI System Architecture





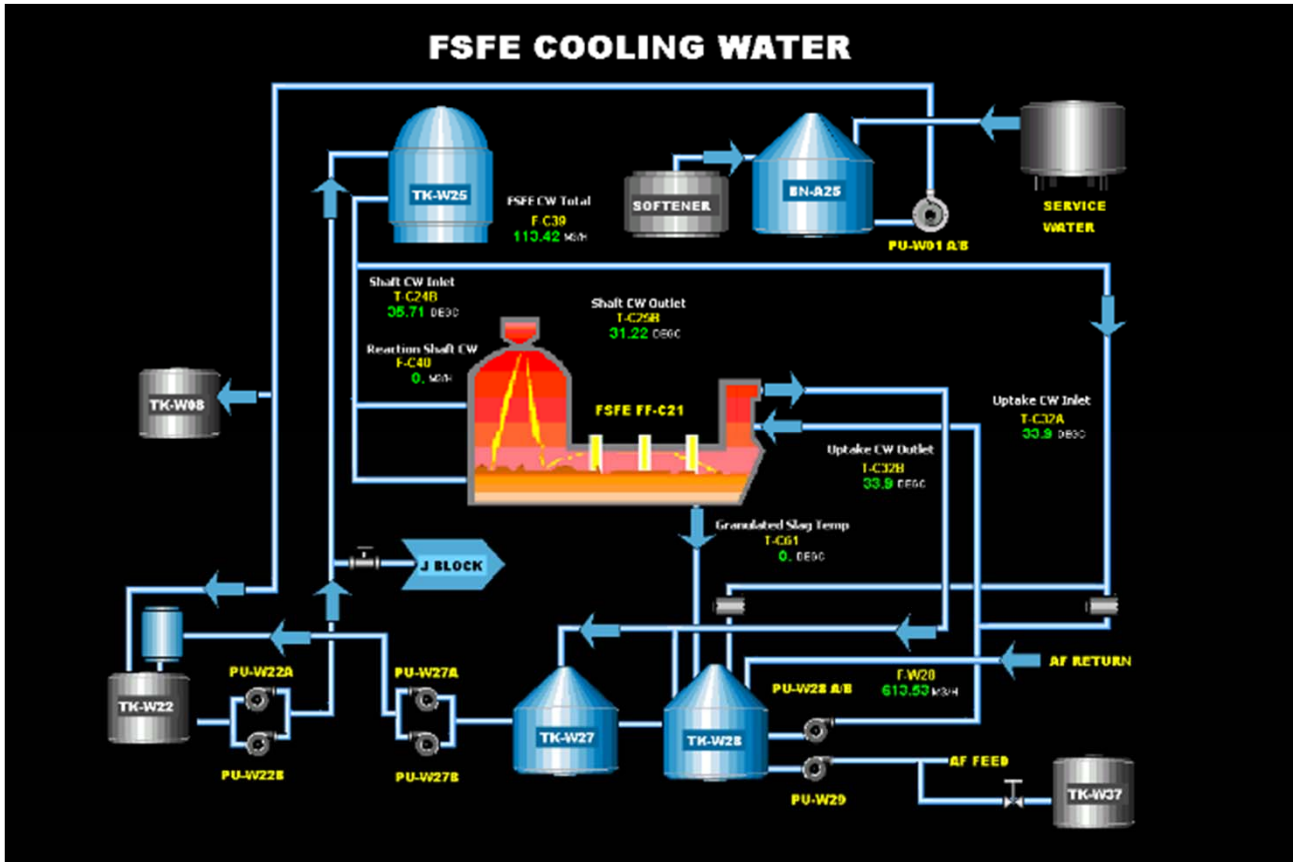
# Production Monitoring and Analysis Tools

# Smelter Displays using PI Processbook



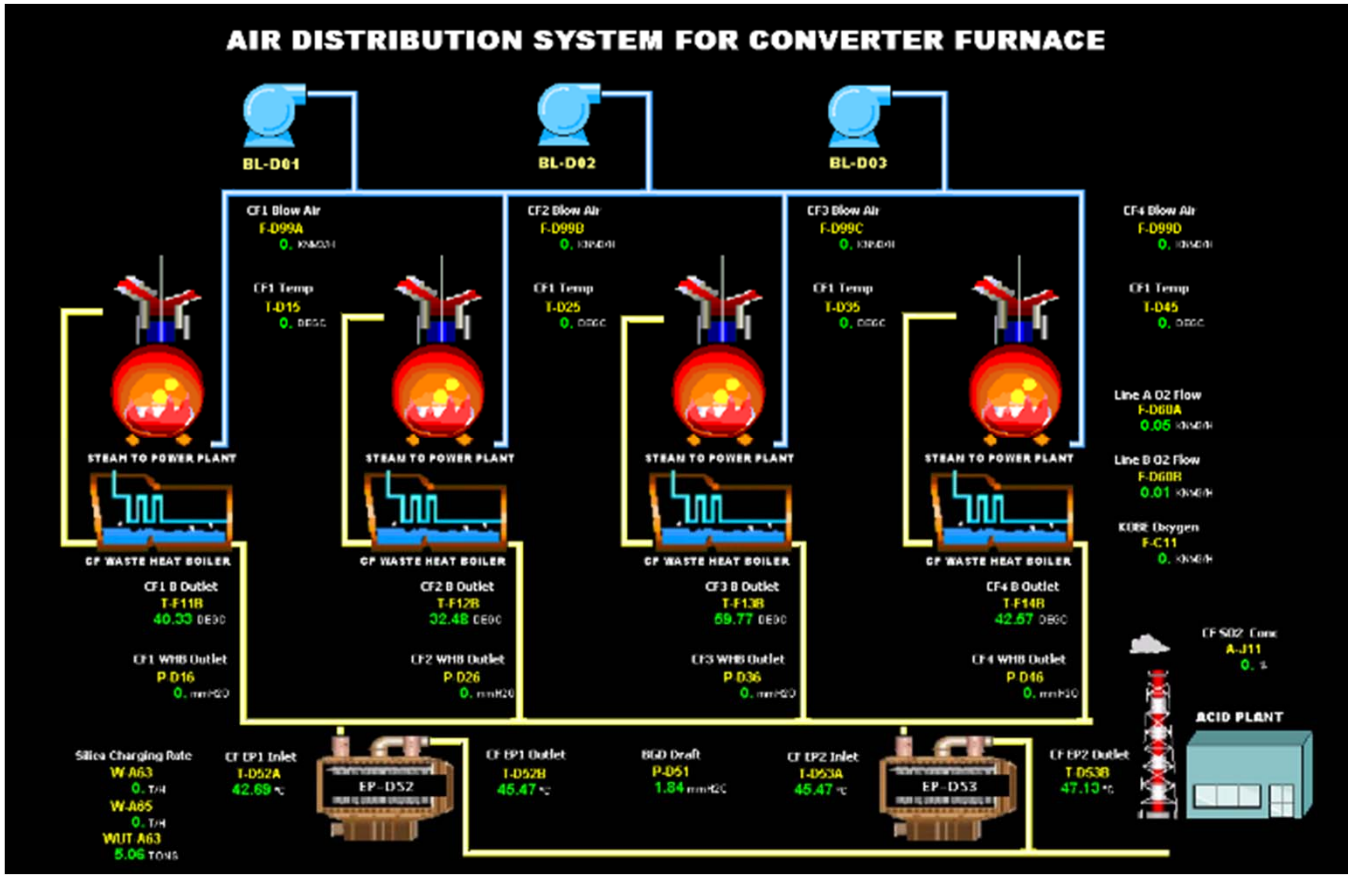

**Provides easy configurable interface for developing process displays. Enables PASAR's non-programming personnel to author process control visualization tools.**

# Smelter Displays using PI Processbook



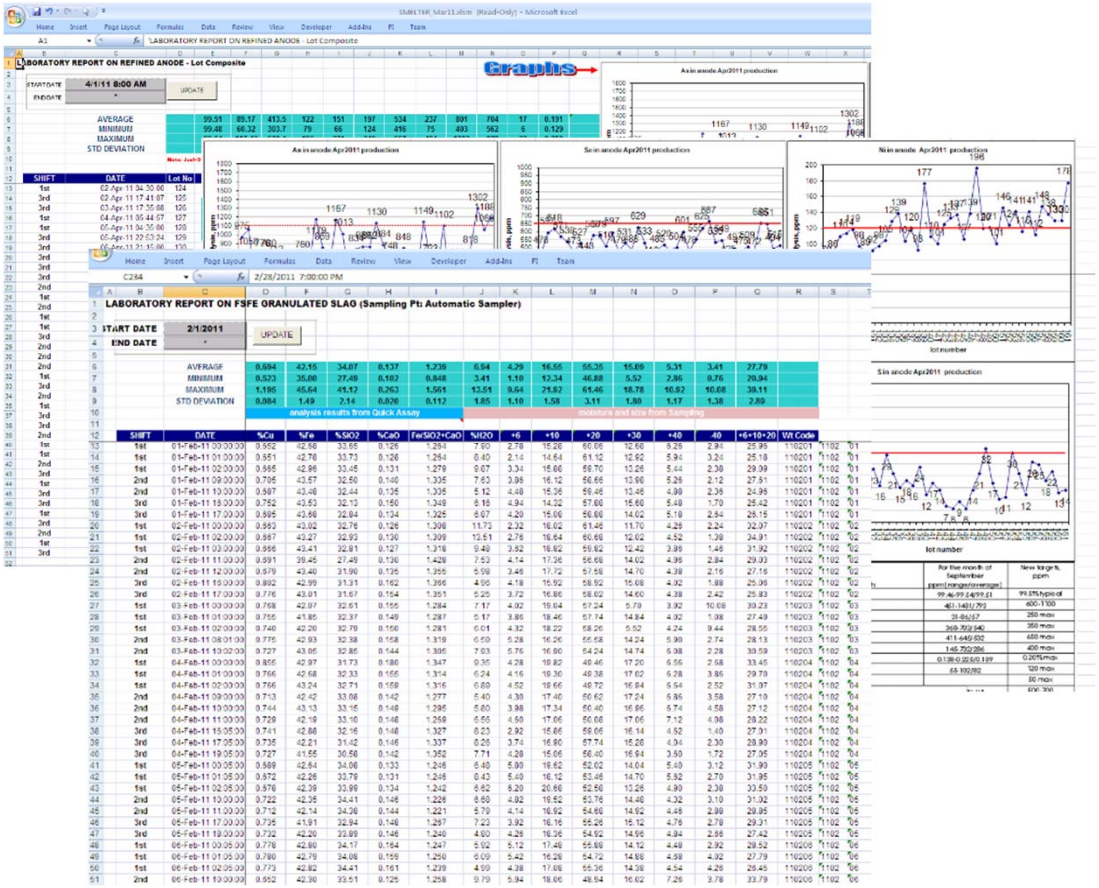

**Provides a unified platform in combining production parameter information with LIMS data and manual entry information.**

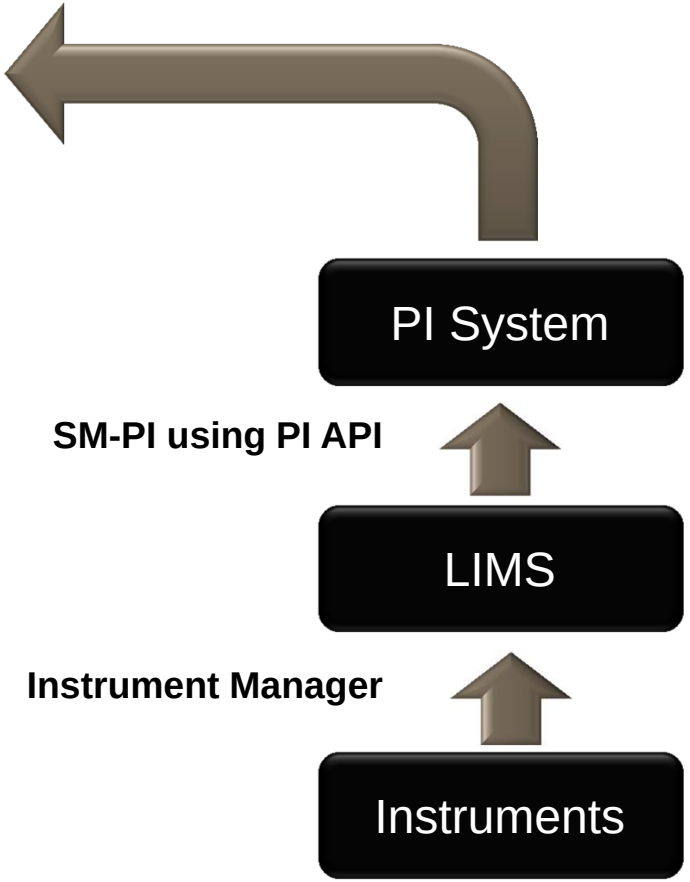
# Smelter Displays using PI Processbook




**Provides a more distributed and secure access to the same information; accessible from PASAR Makati office and plantsite.**

# LIMS Analysis Reports using PI Datalink




**Uses DATE SAMPLED as timestamp of PI analysis result tag**

# Power Monitoring System

# Project Objectives


- Composed of a phase-by-phase installation and implementation of digital power meters plant wide. Currently includes 154 power meters located plantwide
- Realtime data capture and monitoring of KW and KWH parameters as basis of periodic power consumption reports
- Reports generation of actual power consumption reports and financial & cost-group distributed analysis reports

# Datalink Report
# Distribution per Cost Center

PASAR

**DISTRIBUTION PER COST CENTER**

| COST CENTER | AREA/EQUIPMENT | CONSUMPTION KWH | | | |
|---|---|---|---|---|---|
| | | September ACCRUAL | 26-25 CUT- OFF | October ACCRUAL | Oct 01 to 31 2012 |
| TOTAL POWER CONSUMED (COMML POWER AND SELF GENERATED) | | 10 | 11 | 12 | |
| 1111, 1832 (137.8 | For A S/S 440V CONSISTS: ESA25A/ AND Sampling Cor | 11,528.45 | 36,748.26 | 9,054.65 | 34,274.47 |
| 1111 | Blending House For AA S/S ES-A23.SWGR 440V Coml | 2,999.06 | - | - | (2,999.06) |
| 1111 | Blending House For AA S/S ES-A24.SWGR 220V Coml | 6,678.37 | 31,247.43 | 7,400.97 | 31,970.02 |
| 1111 | For A S/S 220V CONTROL RM AND ELECTRICAL LIGITHI | 2,917.78 | 24,547.70 | 6,033.85 | 27,663.77 |
| 1112, 1321, 1323 | [B S/S (ESB20 MCC)], [FD/FSFE/AF Gas Handling (ESF | 90,291.80 | - | - | (90,291.80) |
| 1112 | [FSFE Lightng], [Superheater], [Reheater area], [Pow | 573.98 | 6,005.90 | 476.46 | 5,908.38 |
| 1112 | [Smelter Welding], Power Supply Consists of: AF Are | 2,007.23 | - | - | (2,007.23) |
| 1112 | [Street Lightng], [FD EP Lighting], [FSFE Hoist & Vent | 3,721.37 | - | - | (3,721.37) |
| 1112 | FD EP West Rectifier 440V Emrgncy | - | - | - | - |
| 1112 | For BL-B22 WH19 3.3KV Coml | - | - | - | - |
| 1112 | For BL-C01 WH# 4A Loc. H S/S | 16,872.25 | 76,381.38 | 19,834.13 | 79,343.25 |
| 1112 | For BL-C02 WH# 4B Loc. H S/S | - | - | - | - |
| 1112 | For BL-C56 [F] 3.3KV Emrgncy | 11,941.63 | 61,070.50 | 23,967.50 | 73,096.38 |
| 1112 | For BL-C57 [F] 3.3KV Emrgncy | - | - | - | - |
| 1112 | For BL-M05 WH18 3.3KV Coml | 20,572.13 | 212,739.24 | 212,732.41 | 404,899.52 |
| 1112 | For BL-M06 WH18 3.3KV Coml | - | - | - | - |
| 1112 | For BL-M51 [F] 3.3KV Emrgncy | 18,442.50 | 68,232.75 | 22,700.50 | 72,490.75 |
| 1112 | For CM-B12.M WH16 3.3KV Coml | 13,595.16 | 129,501.52 | 80,180.75 | 196,087.11 |
| 1112 | For FD EP ES-F29 MCC WH35 440V Coml | 1,282.83 | 6,762.81 | 2,297.84 | 7,777.83 |
| 1112 | For FD REC CP1-2 ES-F29 WH36 440V Coml | 1,544.41 | 6,005.63 | 2,024.84 | 6,486.06 |
| 1112 | For FSFE EP ES-F28MCC WH33 Emrgncy | 43.50 | 173.60 | 48.47 | 178.57 |
| 1112 | For New FSFE Cooling System ES-W200TR | 43,096.50 | 204,607.50 | 46,499.50 | 208,010.50 |
| 1112 | For PU-W22A WH# 5A Loc. H S/S | - | 12,941.68 | - | 12,941.68 |
| 1112 | For PU-W22B WH# 5B Loc. H S/S | 23,225.00 | 98,543.00 | 23,248.75 | 98,566.75 |
| 1112 | FSFE Control Room Aircon 220V Emrgncy 31.4KW*24H | 6,577.71 | 68,826.72 | 5,460.13 | 67,709.13 |
| 1112 | FSFE WHB, Hammering Devices | 328.13 | 2,209.72 | 766.59 | 2,648.19 |
| 1112 | FSFE/FD Indoor Lightng 220V Emrgncy 30.5KW*24HRS | 6,389.18 | 66,853.98 | 5,303.63 | 65,768.43 |
| 1112 | Trim Bin Screw Conveyor 440V Emrgncy | 547.00 | 89.43 | 59.40 | (398.17) |
| 1112V | FSFE Electrodes For C S/S ES-C02A.SWGR WH21 22KV | 228,047.77 | 971,813.59 | 270,347.50 | 1,014,113.32 |
| 1113 | For BL-H26 WH20 3.3KV Coml | 7,307.81 | 44,436.50 | 16,961.38 | 54,090.06 |
| 1121 | [Blower & Comp House Lightings], [AC220 Power Dis | 1,768.34 | 14,900.56 | 1,860.99 | 14,993.22 |
| 1121 | CF Welding Power Supply 3.3KV Coml | 1,270.49 | 61,902.72 | 1,713.60 | 62,345.82 |
| 1121 | CF WHB, Hammering Devices | 328.13 | 2,209.72 | 766.59 | 2,648.19 |

# Datalink Report
# Daily Power Consumption

PASAR

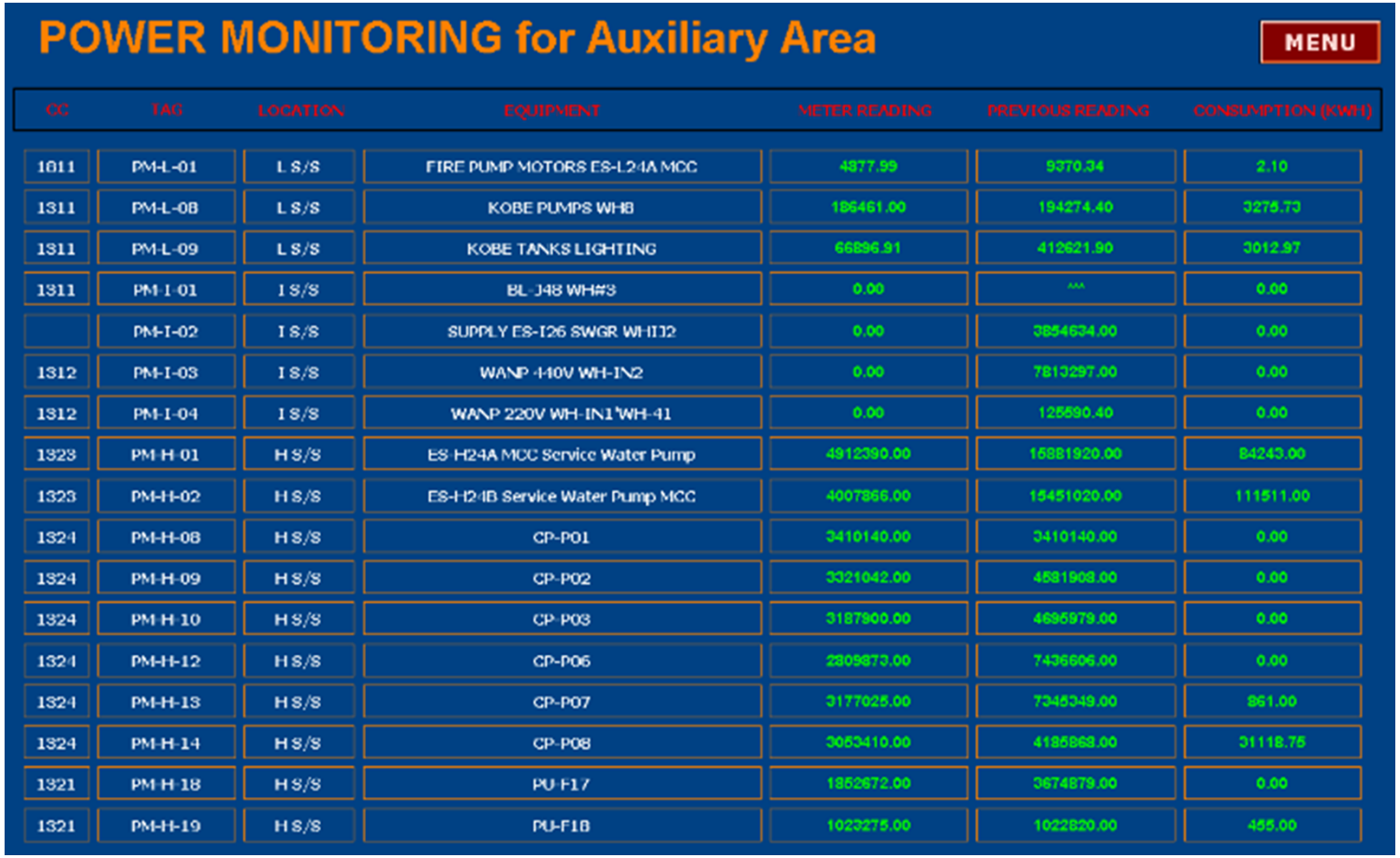
FROM Sep 26, 2011 00:00:00
TO Oct 31, 2011 00:00:00

| COMMERCIAL POWER CONSUMPTION BILLED | |
|---|---|
| LINE 1 | 7,308,000.00 |
| LINE 2 | 7,308,000.00 |
| TOTAL | 14,616,000.00 |

**PMS - DAILY CONSUMPTION REPORT**

| DESCRIPTION | CONSUMPTION SUMMARY | | | | DAILY CONSUMPTION KWH | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | September ACCRUAL | 26-25 CUT- OFF | October ACCRUAL | Oct 01 to 31 2012 | Sep 26, 2011 | Sep 27, 2011 | Sep 28, 2011 | Sep 29, 2011 | Sep 30, 2011 | Oct 01, 2011 | Oct 02, 2011 |
| | Oct 25, 2011 | Oct 25, 2011 | Oct 26, 2011 | Oct 01 to 31 2012 | Sep 26, 2011 | Sep 27, 2011 | Sep 28, 2011 | Sep 29, 2011 | Sep 30, 2011 | Oct 01, 2011 | Oct 02, 2011 |
| **COMMERCIAL LINES** | | | | | | | | | | | |
| NGCP L1 Main S/S 22KV | 1,852,061.95 | 7,308,000.00 | 2,262,395.37 | 7,718,333.42 | 449,954.95 | 457,318.51 | 454,730.71 | 453,597.86 | 449,244.13 | 398,287.82 | 348,542.10 |
| NGCP L2 Main S/S 22KV | 1,884,830.26 | 7,308,000.00 | 2,262,395.37 | 7,685,565.11 | 449,954.95 | 457,318.51 | 454,730.71 | 453,597.86 | 449,244.13 | 398,287.82 | 348,542.10 |
| **TOTAL COMMERCIAL POWER** | 3,736,892.21 | 14,616,000.00 | 4,524,790.74 | 15,403,898.53 | 899,909.89 | 914,637.02 | 909,461.42 | 907,195.71 | 898,488.27 | 796,575.63 | 697,084.20 |
| **TRANSFORMERS** | | | | | | | | | | | |
| TX1 Main S/S 22KV | 1,131,840.00 | 1,942,720.00 | 16.00 | 810,896.00 | 225,712.00 | 230,384.00 | 229,712.00 | 231,056.00 | 228,000.00 | 202,896.00 | 174,960.00 |
| TX2 Main S/S 22KV | 1,125,840.00 | 1,932,016.00 | - | 806,176.00 | 224,368.00 | 229,072.00 | 228,288.00 | 229,600.00 | 226,704.00 | 201,776.00 | 174,016.00 |
| TX3 Main S/S 22KV | 1,472,456.00 | 6,653,216.00 | 4,088,032.00 | 9,268,792.00 | 198,128.00 | 199,360.00 | 197,088.00 | 192,800.00 | 192,480.00 | 169,104.00 | 153,136.00 |
| **TOTAL TRANSFORMERS** | 3,730,136.00 | 10,527,952.00 | 4,088,048.00 | 10,885,864.00 | 648,208.00 | 658,816.00 | 655,088.00 | 653,456.00 | 647,184.00 | 573,776.00 | 502,112.00 |
| **MAIN FEEDERS** | | | | | | | | | | | |
| F S/S Main 22KV | 1,061,808.00 | 3,735,232.00 | 692,976.00 | 3,366,400.00 | 145,440.00 | 156,464.00 | 153,472.00 | 164,960.00 | 143,616.00 | 194,784.00 | 196,176.00 |
| F2 S/S Main 22KV | 1,125,840.00 | 307,750.00 | 267,884.00 | (550,206.00) | 17,160.00 | 17,388.00 | 17,288.00 | 17,185.00 | 17,164.00 | 5,888.00 | - |
| H S/S WH-30A Main S/S 22KV | 425,624.00 | 1,746,528.00 | 674,696.00 | 1,995,600.00 | 111,080.00 | 109,280.00 | 106,672.00 | 106,240.00 | 112,992.00 | 49,320.00 | 27,856.00 |
| I S/S WH-40A Main S/S 22KV | 396,592.00 | 2,223,656.00 | 800,464.00 | 2,627,528.00 | 129,056.00 | 128,664.00 | 133,184.00 | 125,304.00 | 133,912.00 | 100,592.00 | 66,376.00 |
| Linde O2 Main S/S 22KV | 354,656.00 | 1,289,560.00 | 377,568.00 | 1,312,472.00 | 62,832.00 | 63,408.00 | 63,096.00 | 62,720.00 | 62,592.00 | 58,064.00 | 55,464.00 |
| Main SS Service Load (15KW day time, 26KW ni | 2,952.00 | 14,760.00 | 2,952.00 | 14,760.00 | 492.00 | 492.00 | 492.00 | 492.00 | 492.00 | 492.00 | 492.00 |
| PSA O2 S/S 22KV | 85,852.00 | 489,406.00 | 196,404.00 | 599,958.00 | 32,330.00 | 31,868.00 | 32,070.00 | 31,138.00 | 32,004.00 | 8,876.00 | 332.00 |
| L S/S WH-10 Main S/S 22KV | 1,051,616.00 | 3,082,632.00 | 802,064.00 | 2,833,080.00 | 122,016.00 | 121,760.00 | 118,608.00 | 121,376.00 | 119,216.00 | 120,184.00 | 114,840.00 |
| L2 S/S. OKO Refinery Main S/S 22KV | 336,330.00 | 990,576.00 | 265,488.00 | 919,734.00 | 37,504.00 | 37,468.00 | 37,568.00 | 37,308.00 | 36,876.00 | 36,712.00 | 36,576.00 |
| **TOTAL FEEDERS** | 3,715,430.00 | 13,880,100.00 | 4,080,496.00 | 14,245,166.00 | 657,910.00 | 666,792.00 | 662,450.00 | 666,723.00 | 658,864.00 | 574,912.00 | 498,112.00 |

# Processbook Display
# Current Consumption per Division

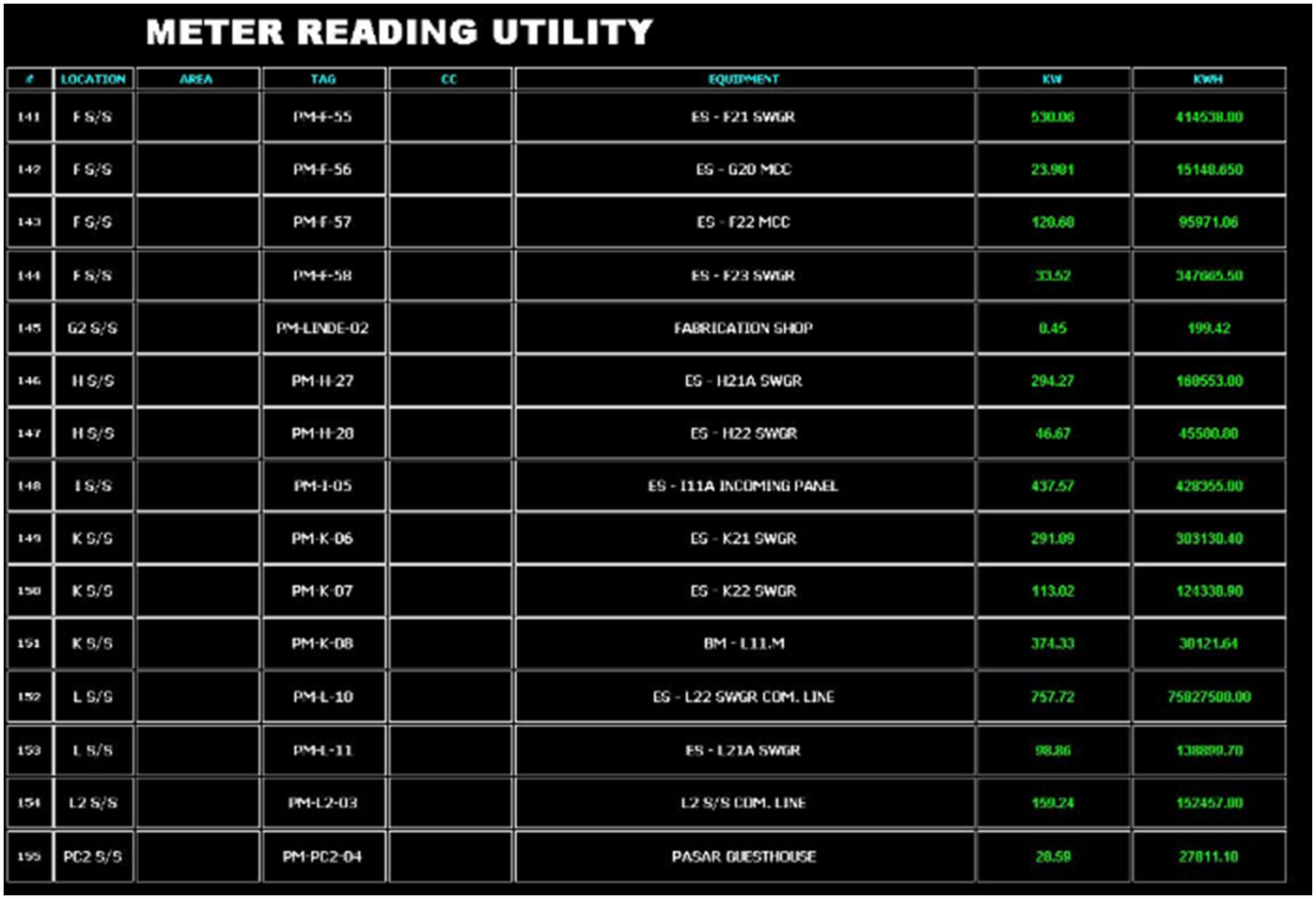


POWER MONITORING for Auxiliary Area

MENU

| CC | TAG | LOCATION | EQUIPMENT | METER READING | PREVIOUS READING | CONSUMPTION (KWH) |
|---|---|---|---|---|---|---|
| 1311 | PM-L-01 | L S/S | FIRE PUMP MOTORS ES-L24A MCC | 4877.99 | 9370.34 | 2.10 |
| 1311 | PM-L-08 | L S/S | KOBE PUMPS WH8 | 196461.00 | 194274.40 | 3275.73 |
| 1311 | PM-L-09 | L S/S | KOBE TANKS LIGHTING | 66896.91 | 412621.90 | 3012.97 |
| 1311 | PM-I-01 | I S/S | BL-J48 WH#3 | 0.00 | ^^ | 0.00 |
| | PM-I-02 | I S/S | SUPPLY ES-I26 SWGR WH-II2 | 0.00 | 3854634.00 | 0.00 |
| 1312 | PM-I-03 | I S/S | WANP 440V WH-IN2 | 0.00 | 7813297.00 | 0.00 |
| 1312 | PM-I-04 | I S/S | WANP 220V WH-IN1 WH-41 | 0.00 | 125590.40 | 0.00 |
| 1323 | PM-H-01 | H S/S | ES-H24A MCC Service Water Pump | 4912390.00 | 16881920.00 | 84243.00 |
| 1323 | PM-H-02 | H S/S | ES-H24B Service Water Pump MCC | 4007866.00 | 15451020.00 | 111511.00 |
| 1324 | PM-H-08 | H S/S | CP-P01 | 3410140.00 | 3410140.00 | 0.00 |
| 1324 | PM-H-09 | H S/S | CP-P02 | 3321042.00 | 4581908.00 | 0.00 |
| 1324 | PM-H-10 | H S/S | CP-P03 | 3187900.00 | 4695979.00 | 0.00 |
| 1324 | PM-H-12 | H S/S | CP-P06 | 2809873.00 | 7436606.00 | 0.00 |
| 1324 | PM-H-13 | H S/S | CP-P07 | 3177025.00 | 7345349.00 | 861.00 |
| 1324 | PM-H-14 | H S/S | CP-P08 | 3053410.00 | 4185868.00 | 31118.75 |
| 1321 | PM-H-18 | H S/S | PU-F17 | 1852672.00 | 3674879.00 | 0.00 |
| 1321 | PM-H-19 | H S/S | PU-F18 | 1023275.00 | 1022820.00 | 455.00 |

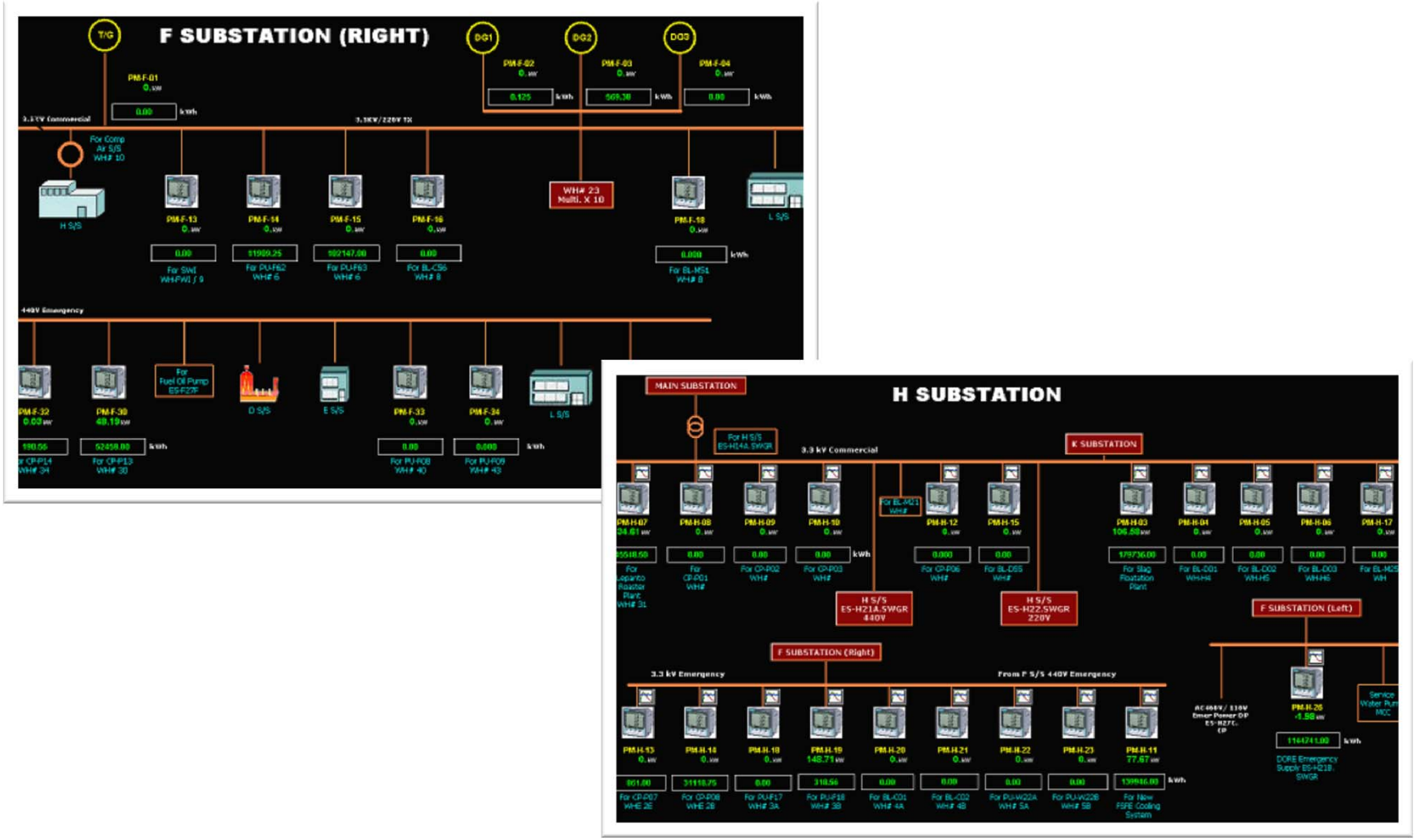
# Processbook Display
# KW and KWH Readings

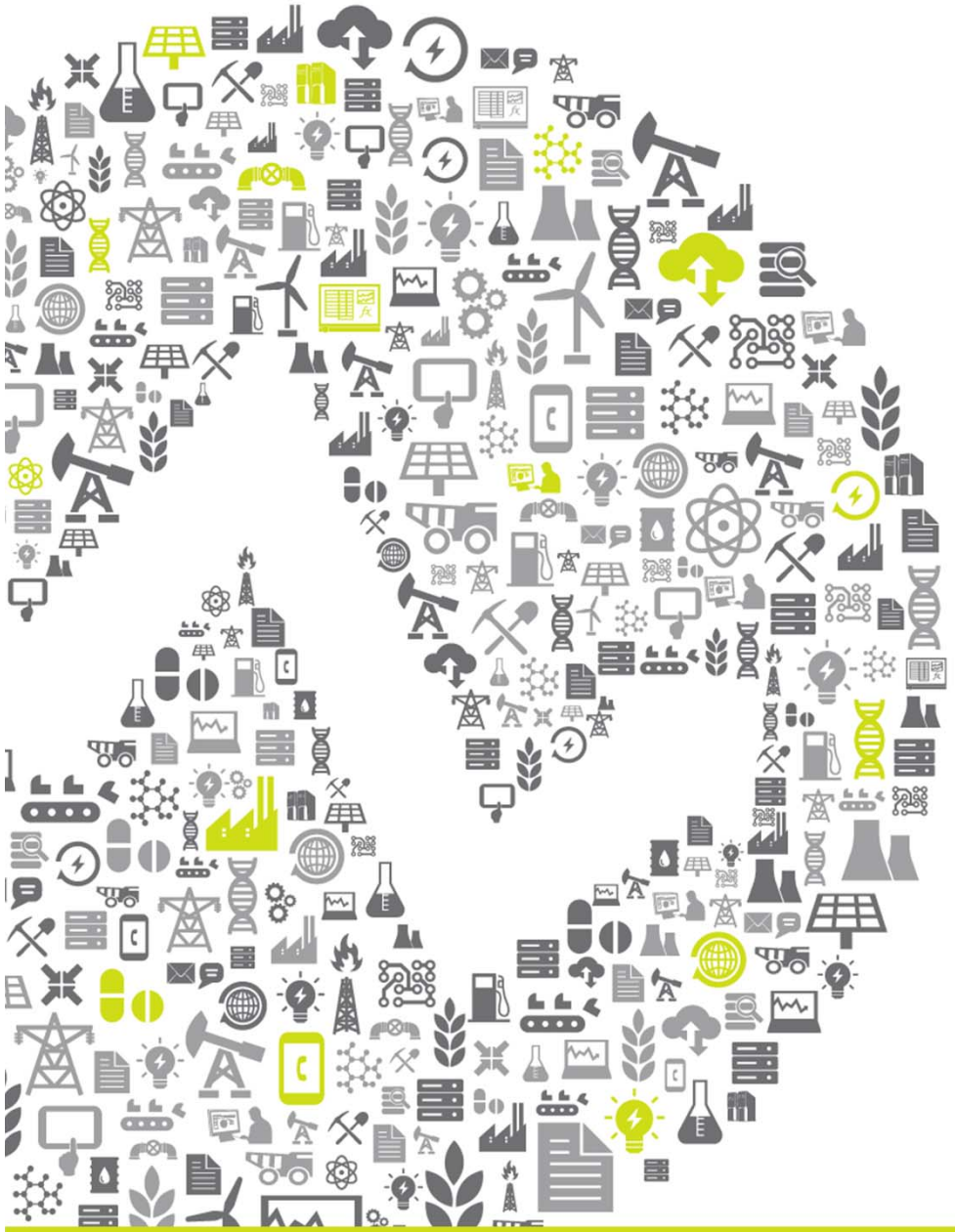


METER READING UTILITY

| # | LOCATION | AREA | TAG | CC | EQUIPMENT | KW | KWH |
|---|---|---|---|---|---|---|---|
| 141 | F S/S | | PM-F-55 | | ES - F21 SWGR | 530.06 | 414538.00 |
| 142 | F S/S | | PM-F-56 | | ES - G20 MCC | 23.901 | 15148.650 |
| 143 | F S/S | | PM F-57 | | ES - F22 MCC | 120.60 | 95971.06 |
| 144 | F S/S | | PM-F-58 | | ES - F23 SWGR | 33.52 | 347665.50 |
| 145 | G2 S/S | | PM-LINDE-02 | | FABRICATION SHOP | 0.45 | 199.42 |
| 146 | H S/S | | PM-H-27 | | ES - H21A SWGR | 294.27 | 180553.00 |
| 147 | H S/S | | PM-H-28 | | ES - H22 SWGR | 46.67 | 45500.00 |
| 148 | I S/S | | PM-I-05 | | ES - I11A INCOMING PANEL | 437.57 | 428955.00 |
| 149 | K S/S | | PM-K-06 | | ES - K21 SWGR | 291.09 | 303130.40 |
| 150 | K S/S | | PM-K-07 | | ES - K22 SWGR | 113.02 | 124330.90 |
| 151 | K S/S | | PM-K-08 | | BM - L11.M | 374.33 | 30121.64 |
| 152 | L S/S | | PM-L-10 | | ES - L22 SWGR COM. LINE | 757.72 | 75827500.00 |
| 153 | L S/S | | PM-L-11 | | ES - L21A SWGR | 98.86 | 138899.70 |
| 154 | L2 S/S | | PM-L2-03 | | L2 S/S COM. LINE | 159.24 | 152457.00 |
| 155 | PC2 S/S | | PM-PC2-04 | | PASAR GUESTHOUSE | 28.59 | 27011.10 |

# Processbook Display
# Power Distribution Diagram

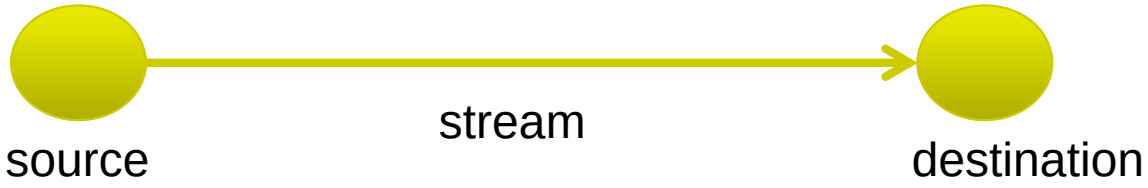




# Metal Balance System

# System Requirements

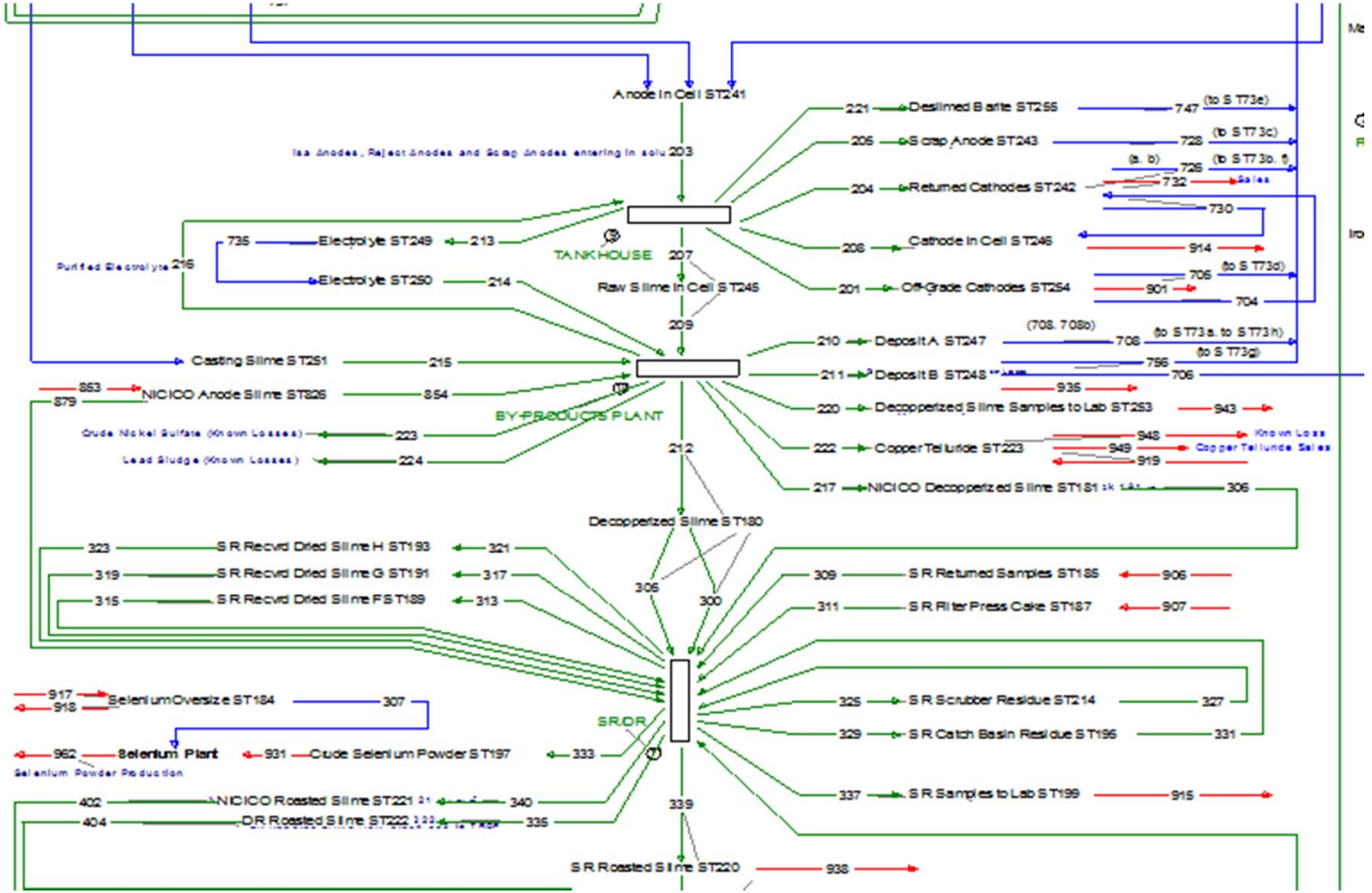
- Data capture of all daily/periodic Material weights and material assays for all stream flows defined in Metal Balance System



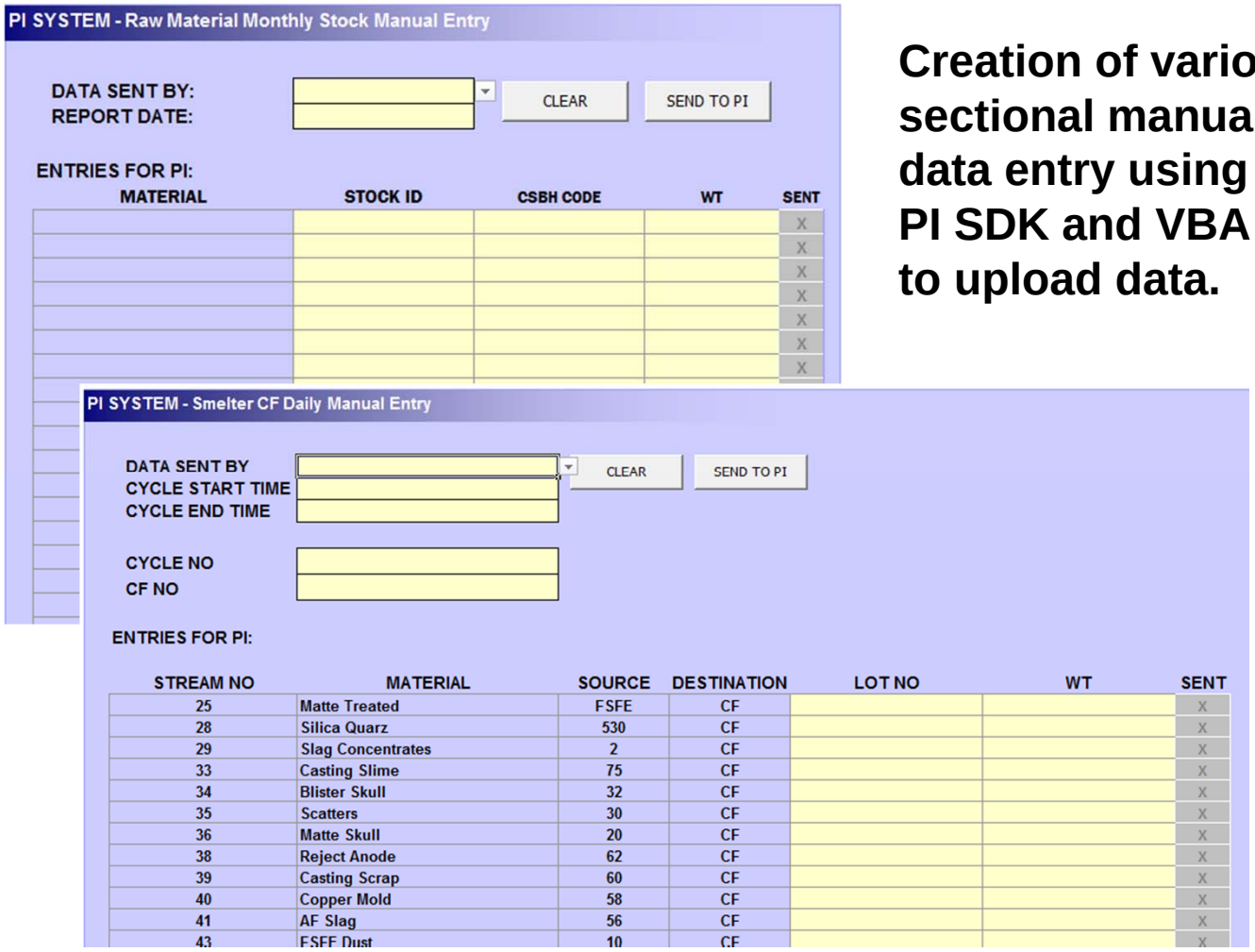

- Generation of Raw Data for Processing of Data Reconciliation
- Reports Generation of Streams and Stocks status on month-end and month-beginning

# Metal Balance Model

PASAR

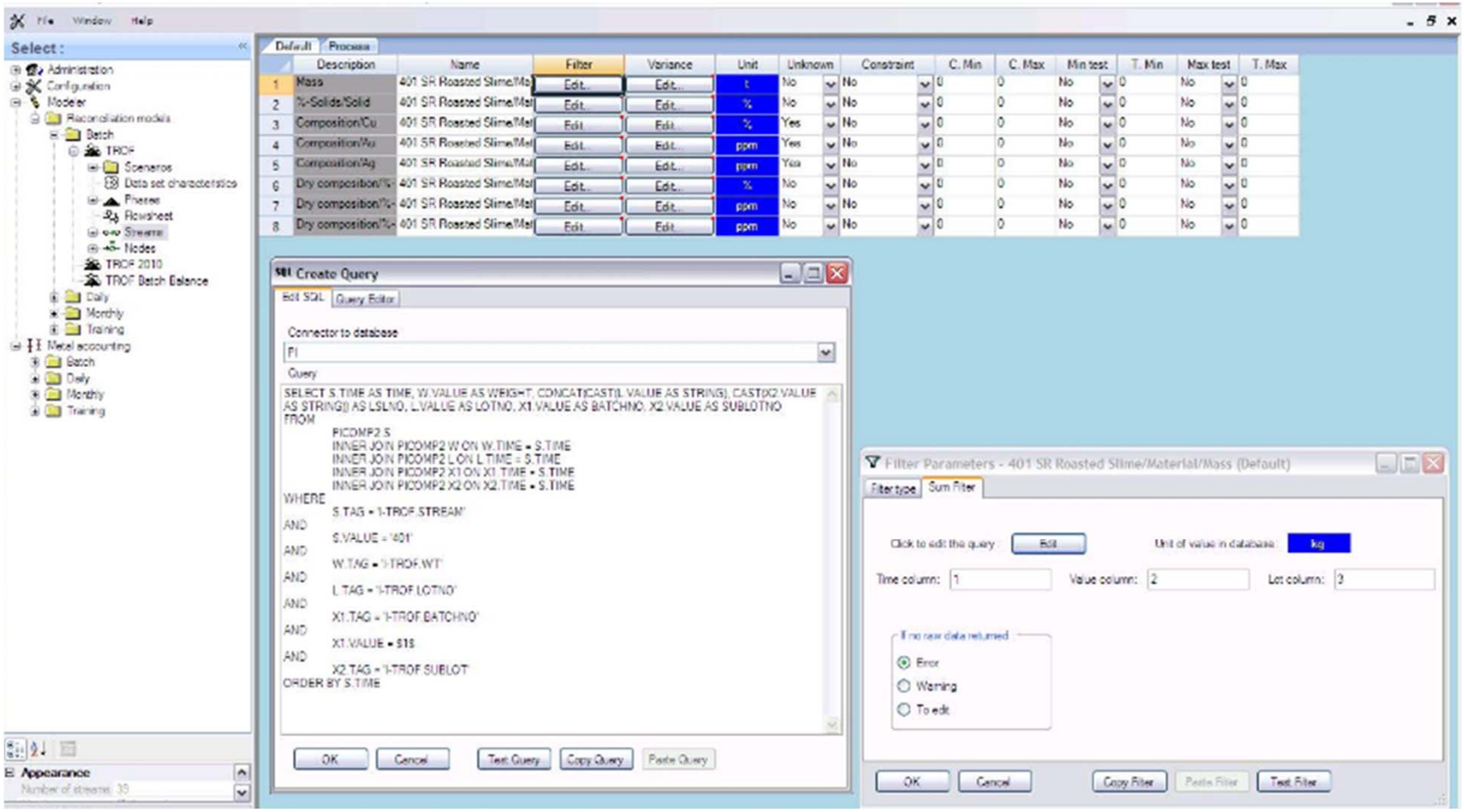


# Manual Data Entry using PI Datalink




**Creation of various sectional manual data entry using PI Datalink, PI SDK and VBA in MS Excel to upload data.**

# Metal Balance Application

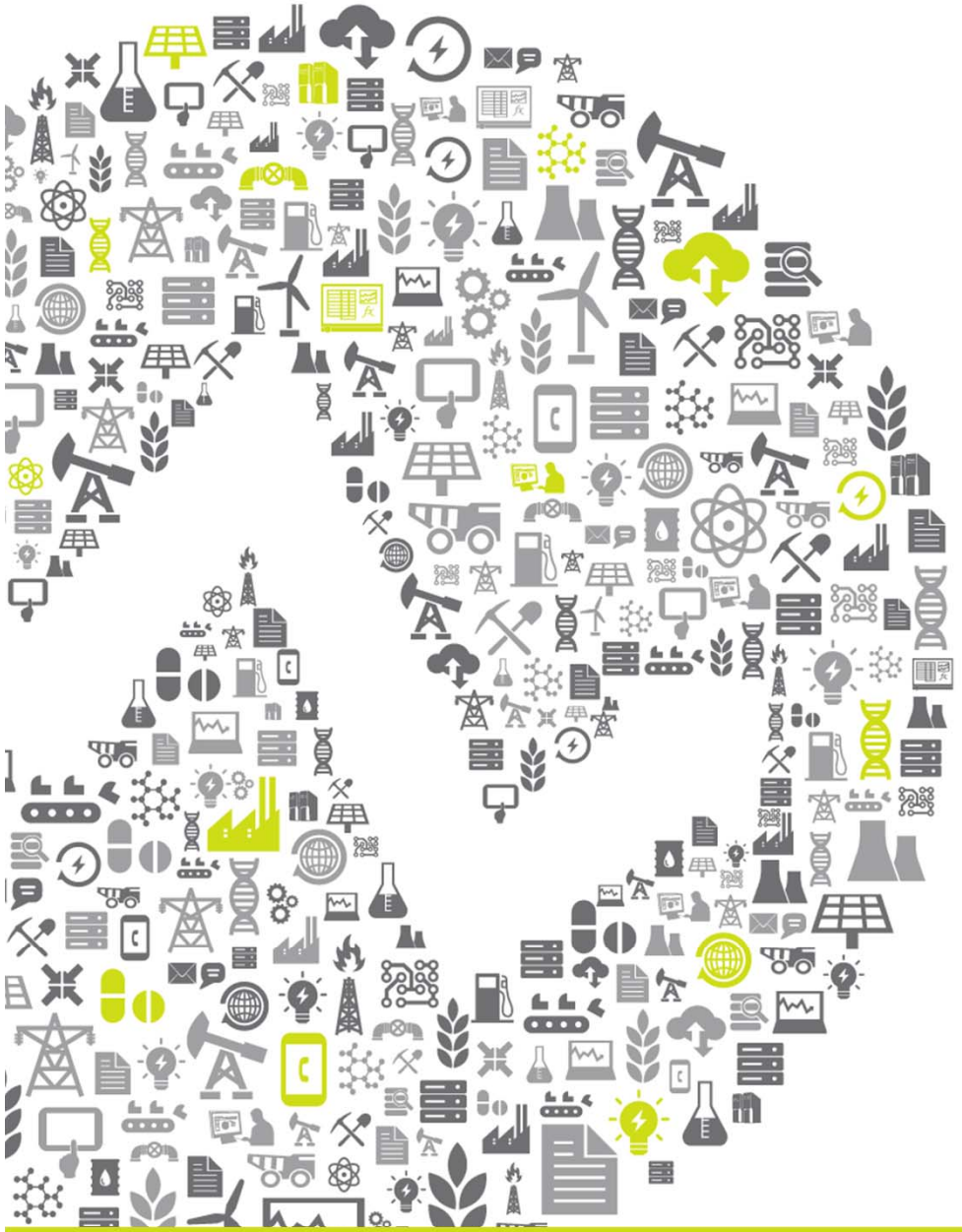


# Benefits

- Improved plant efficiency
- Increase productivity and improved process knowledge
- Lower production cost
- Complimentary tool for other optimization projects

# Future Plans

- Upgrade of PI Server
- Inclusion of additional devices into existing data source for PI system capture
- Implementation and development of PI Webparts
- Evaluation of PI Coresight
- Continued SRP Renewal



PASAR

# THANK YOU

Brought to you by OSIsoft.