Yield Accounting Management

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OMV PETROM SA – ARPECHIM Refinery
OMV PETROM: leading oil & gas player in SEE, high degree of physical integration

**Exploration & Production**
- 4.6 mn t Group crude oil and NGL production
- 5.2 bcm Group gas production
- 832 mn boe Group proved reserves

**Refining and Marketing**
- Upstream integrated refining capacity
- 801 filing station at Petrom Group level
- 4.16 mn t Petrom Group marketing sales
- 39% Romanian market share

**Gas and Power**
- 4.9 bcm Group gas sales
- Strong position on the Romanian gas market, covering all gas market segments
- First power project operational in 2011 (power plant in Brazi and wind farm Dorobantu)
Yield Accounting is...

...the business process of measuring, validating, reconciling and publishing all the flows and inventories into, within, and out of a plant.

Benefits of using a state of the art Yield Accounting Management Application:

- Provide plant information in a timely manner
- Detect operational problems rapidly
- Reduce time for site-wide balancing
- Provide reconciled data for optimizers and ERP systems
- Monitor plant/unit performance
- Monitor and identify losses
- Provide predictive instrument maintenance
Yield Accounting Management System: Initial Situation -> Scope -> Deliverables

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<th>Initial Situation</th>
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<tr>
<td>▶ Poor analysis of deviations between official reporting data and inventory recorded</td>
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<td>▶ Reasons for unexplainable changes of the stock level not analyzed</td>
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<td>▶ No cross checks between pumping from tanks to loading ramp and loaded quantity</td>
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<td>▶ Two out-of-date mass balance solutions lacking functionality to help identify losses</td>
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<th>Scope / Objectives</th>
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<td>▶ Accurate and timely overview of deviations (metering differences, technical losses, unexplainable losses)</td>
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<td>▶ Unexplainable differences to be identified and adequate actions can be defined immediately</td>
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<td>▶ Consistent and reliable mass balance</td>
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<td>▶ Sustainable industry-standard solution with reliable long-term support</td>
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<th>Deliverables</th>
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<td>▶ <strong>Visiant Pimsoft Sigmafine</strong> implementation and configuration of mass balance models for Arpechim and Petrobrazi refineries</td>
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<td>▶ End-to-end business processes</td>
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Yield Accounting Project was very complex and challenging for the team, due to the short time of implementation, deadlines, and diversity of the team involved.

**Teams:** PETROM ARP/PBZ, support from OMV, Visiant PimSoft
- Change Management,
- Technical Realization ARP/PBZ,
- Visiant Pimsoft Team

**FDS:** Functional Design Specification
**FAT:** Factory acceptance test (model validation)
**Integration Test and Tuning:** Prepare system for successful SAT
**SAT:** Site Acceptance Test (full validation incl. calculations)
Main benefits of this architecture:

► **Refinery decoupling:**
  - in case of critical/general failure of one refinery YAM production’s system, the other refinery can continue to work without any issue

► **WAN independence:**
  - in case of WAN unavailability both refineries can continue to work without any issue, since IP21, PIMS reports and YAM smart clients (for IMM, Manual Entry and modeling) are located in the same refinery LAN

► **Unique management procedures**

► **Intensive use of LAN, low WAN usage**
Refineries Arpechim / Petrobrazi models
Refinery model

- There are two different models built in accordance with the specific characteristics of each PETROM refinery → Arpechim & Petrobrazi

- Sigmafine models for both refineries have been configured to run on a daily basis:
  - **Mass balance** → The scope of the Mass Balance Analysis Rule is to resolve the initial imbalance, due to the imprecision of the measurement provided to the system around all the balance points defined in the model (nodes, units and tank). At the end of the reconciliation process, the corrected/reconciled values, the original measured values, and a set of quality indicators are stored in the system for analysis purpose.
  - **Composition Tracking** → The primary scope is to calculate the contents for all the configured products tanks within the refinery. The Composition Tracking Analysis Rule uses inventory mixing models and the results from a mass balance on a Sigmafine model to compute the composition of flows, transfers, and inventories.
  - **Gross error analysis** → Using Sigmafine Gross Error analysis the user can identify problems in a model due to modeling errors, missing values, data entry errors, and instrument failures.

- YAM system also contains the **IMM (Intelligent Movement Management)** module which has been implemented at both Petrom refineries to support the recordkeeping of refinery movements and the automated transfers of the movement information into Sigmafine
Standard web reports

- Was created a set of 30 reports
- The reports can be accessed by any YAM data users
- Reports have the possibility to be generated daily/monthly/yearly
- Plan data (PIMS) are uploaded and used in comparisons: actual vs. plan production data
Main performances and achievements

- By full integration of the data from RTDB (Real Time Data Base), LIMS (Laboratory Information Management System) with the new Mass Balancing System and due to the improved and maintained accuracy of measurement systems, the outcome of the project, only in ARPECHIM refinery is ~ 4 Mio. Euros savings from three months of operation only.

- This is coming from decreasing of the actual F&L reported to the crude input by ~ 0.6 %

- The percentage of manual inputs in the new Mass Balancing System decreased by 80 % compared to the old system.

- Time for closing the balance was reduced substantially, almost with ½ day

- We are in the position to provide Reconciled production data faster

- within ARPECHIM Refinery – Production Planning Dept. as the new Mass Balancing system was implemented it become possible also the personnel reorganization and reduction.
OMV PETROM – Driving values

Pioneers
► teams initiated a different way of thinking regarding the mass and yield accounting in PETROM Refineries, as well as a new and complex approach related to refinery mass balance.

Partners
► the multicultural and diverse team of technicians, accountants, and IT people involved in the project collaborated and communicated in a very effective and efficient way.
► the team had to deal also with other stakeholders in the refinery and performed this task in a collegial and convincing way

Professionals
► the milestones and deadlines were achieved as it was scheduled.
► during the project roll out, state of the art solutions have been identified and implemented in the customized refinery model.
► evaluation and implementation of the ideas were done in a well organized and professional way.
Thank You!