OMV Petrom

Gas Metering Station and SCADA System

Bucharest, 23.06.2011
Content

► OMV Petrom SA
► Gas Metering Stations and SCADA System
  Business Division Gas
  Metering and Gas Quality Department
Petrom: leading oil & gas player in SEE, high degree of physical integration

**Exploration and 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 filling stations at Petrom Group level
- 4.16 mn t Petrom Group marketing sales
- ~40% Romanian market coverage

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

All figures as of December 2010; figures refer to Petrom Group, unless otherwise specified
*Arpechim refinery closed in March 2011*
Gas Metering Stations and SCADA System

Overview
Gas Metering Station (GMS) - OMV Petrom Philosophy
GMS System Architecture
GMS Communications and Data Transmission
SCADA System
SCADA On-Line Presentation
On 2006 OMV Petrom started the modernization of the main Gas Metering Stations

The new Gas Metering Stations and SCADA represent an integrated system dedicate to:

► Measure gas volume and energy
► Gas quality monitoring – WDP & HCDP
► Data transmission
► Remote control of the gas metering station

OMV Petrom is the first company in Romania that has installed, operate and maintain this integrated system.
To build this system there were used equipments and systems at the highest technical level in Europe.
Benefits

The main advantages of redundant gas metering stations:

- High accuracy of the gas volumes measurement, better than ±0,5%
- Fiscal measurement is controlled on line or periodically by control measurement
- High availability of the metering station, better than 99,9%
- High degree of confidence in gas measurement
- Safe operation of gas metering stations
- Shorter time between alarms and reaction/intervention
- Allow maintenance and calibration of metering systems without flow interruption
- A DAS (Data Acquisition System) perform diagnostic and supervise the station
- Alignment to the Romanian and European requirements
Overview 3/3

Gas metering stations components:

- Turbine gas meters
- Ultrasonic gas meters
- Gas chromatograph on line
- Electrically / hydraulic operated valves
- UPS and diesel electrical generator
- Automatic odorization system
- Control system
- Communication, remote control and data transmission
Old Gas Metering Station
New Gas Metering Station
OMV Petrom Philosophy - Gas Metering Stations - Type 1

Q > 25,000 Sm³/h (600,000 Sm³/day) according with Petrom Standard

Measuring point for gas quality, water dew point, HC dew point, pressure and temperature

Control measurement

Fiscal measurement

Meter

Flow computer

Registration

CPU

Regulator

Type 1
OMV Petrom Philosophy - Gas Metering Stations - Type 2

140 Sm³/h < Q < 25.000 Sm³/h (3.360 Sm³/day < Q < 600.000 Sm³/day) according with Petrom Standard

Measuring point for gas quality, water dew point, HC dew point, pressure and temperature
GMS System Architecture

**Diagram:***
- **HMI (Human Machine Interface)**: Station controller
- **PLC (Programmable Logic Controller)**: Station controller
- **Data modem**: Ethernet switch
- **Gateway**: Modbus
- **Ethernet Switch**: GC / HCDP
- **DSfG Gateway**: FC
- **Printer**

*Note: The diagram represents a gas metering station system architecture with various components interconnected through communication protocols.*
GMS Communication and Data Transmission

Stakeholder

Accounting manager

Maintenance engineer

Part of PETROM Solution

HP 380s Server
DSFG Software

Existing Ethernet Network

Gateway

Internet

Data Modem
ETH. Switch

Metering station

DSfG DATA BUS

FC1
FC2
FC3

GATEWAY

PLC

STATION CONTROLLER

FIELD INSTR.

Data Modem

DSfG Gateway

Petrom office

VODAFONE
SCADA System: Overview including Interfaces

- **E&P Gas Pipeline System Management**
  - Manages **SUPPLY** (Production)
  - Production Forecast
  - Re-nominations

- **Gas Management System**
  - Manages **DEMAND** (customers, NTS, storage)

- **Central SCADA Server**
  - SCADA, Alert system, Engineering, Operating

- **Integration Server**
  - Online Alerts + value + counters
  - Online Alerts, + actual flow values + counters

- **Gas Management System**
  - Online Alerts + value + counters
  - Actual Values + counters

- **Fiscal Datastream**
  - Fiscal Metering Data (daily/hourly)

- **Metering Station**
  - APROL, DSFG
  - Webclient
  - DSFG Server

- **Common Database (DSFG)**

The diagram illustrates the flow of data and interfaces between the various components of the SCADA system, including online alerts, actual values, fiscal data, and production forecasts.
SCADA: Petrom Central Control System

SCADA: Supervisory Control and Data Acquisition System for Gas Metering Stations
Thank You!