

LISTEN.
THINK.
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**Real-time Environmental
Management
(REM)
for Greenhouse Gas
Mandatory Reporting Rule**

Compliance Monitoring and Reporting
for Air Applications

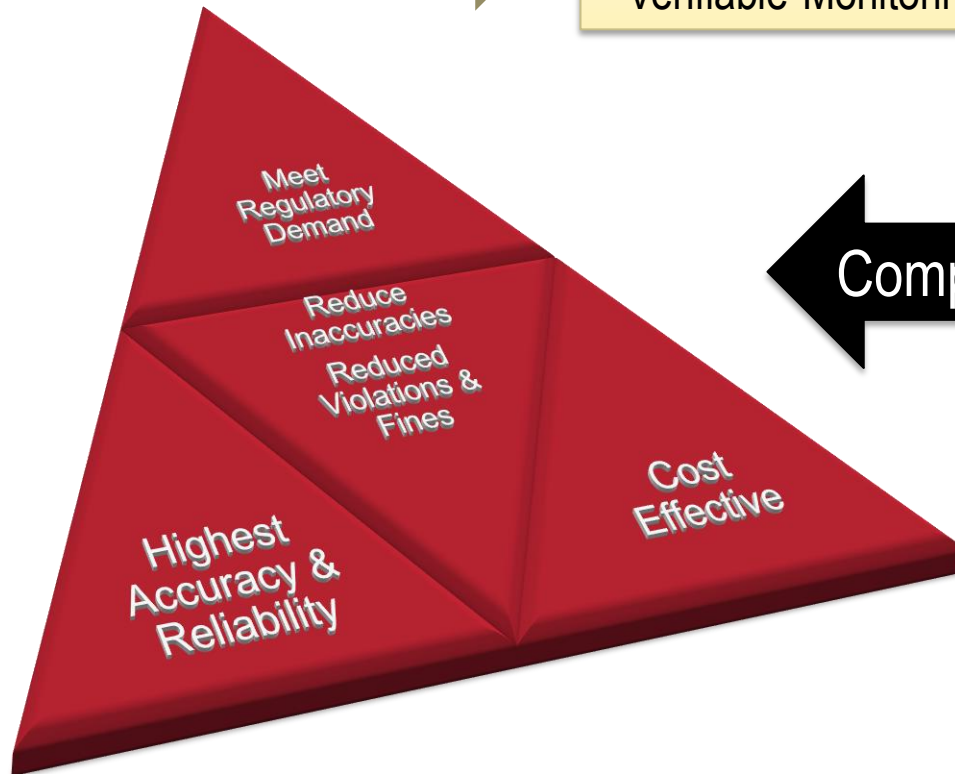
Industry Challenges

Stringent Regulations

- Regional
- National
- Global

Emissions Trading Markets

- Accuracy
- Consistency
- Verifiable Monitoring, Record Keeping, Reporting



Companies look for Solutions

Mandatory Greenhouse Gas Reporting Rule Challenges

Purpose of the Rule



- Provide accurate and timely data to inform future climate change policies and programs
 - Better understand relative emissions of specific industries, and of individual facilities within those industries
 - Better understand factors that influence GHG emission rates and actions facilities could take to reduce emissions
- Does not require control of GHG

Electronic Data Reporting System



- Electronic format and system under development
- Web-based system
 - Will guide reporters through data entry and submission
 - Built-in emissions calculations
- Mechanism to submit file directly using standard format (e.g., XML)
- Continued stakeholder input during system development
- Outreach, training, and hotline to assist reporters using the system

How Will Emissions Be Verified?



- Self certification
 - Designated representative certifies and submits report
 - Rule allows one designated representative for each facility and supplier
- EPA verification
 - Reports submitted through an electronic system
 - Built-in calculation and completeness checks for reporters
 - Electronic QA and consistency checks
 - On-site audits

Industry Solution

PAVILION8® Real-time Environmental Management (REM)

Environmental Compliance and Reporting application, providing “active compliance” continuously, in real-time.

- Data Validation
- Secure Metadata Repository
- Secure Audit Trail

Independent, real-time visualization and reporting package with a browser-based user interface.

System operates on independent server providing maximum security

REM/GHG configuration

Independent Server

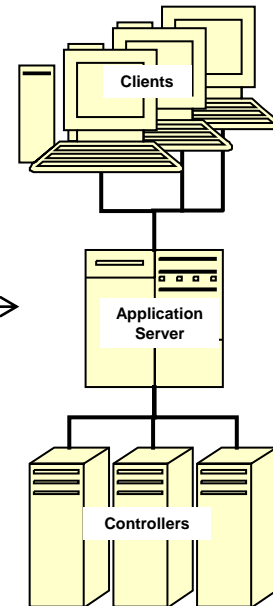
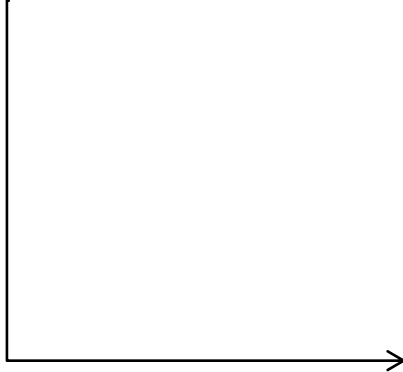
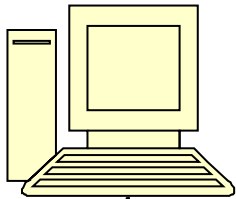
- All calculations reside in REM/GHG server
- EPA eReporting resides on REM/GHG server
- Optional independent historian on REM/GHG server for complete security from plant system

Installation of system operates as a 'shell' over plant operating system

- No downtime for installation, testing and verification
- System operates independently from plant operating system

REM/GHG - Plant Configuration

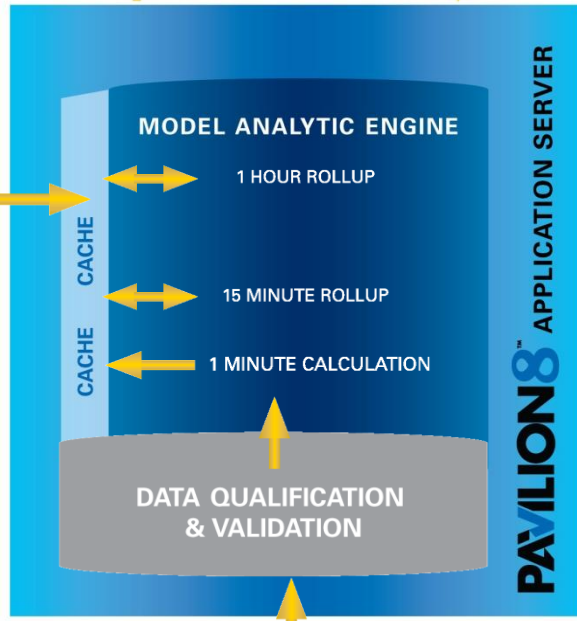
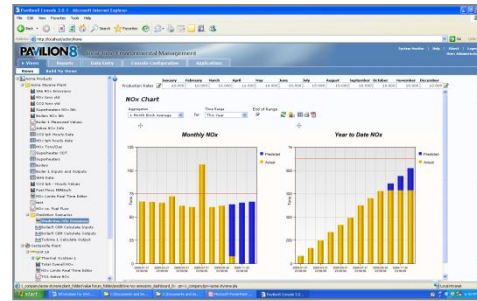
REM/GHG Reporting System



Plant Operating System

Min. Hardware	Min. Software	Pavilion8 Software
Pentium IV	Win 2000/2003/XP, Server or Pro	Console
2 to 3 GHz	Internet Explorer 6.0 SP1	Application Server
1 to 2 GB RAM		REM/GHG reporter
20 to 40 GB Disk Space		eReport –EPA/xml

Active Data Management Strategy



Two overlapping screenshots of the software interface. The top one is titled 'Greenhouse Gas Emission Report' and shows a 'Reporting Period' of 1/1/07 to 12/31/07. The bottom one is titled 'Site Emission Totals' and shows a table of CO2 totals and an overview of activities.

Reporting Period:	1/1/07 12:00:00AM to 4/1/07 12:00:00AM		
Condition:	PRIVATE		
Company Name:	Stappa Chemical Corp		
Site Name:	EU Site		
Operator Site:	EU Site		
Site Details:			
Name:	EU Site		
Emission Permit:	NA-200600044		
E-PRTR ID:	NA/CA code 40.00		
Veil address:	501 Loop 100 Township Forest 32098		
Postal Address:	10000 Industrial Blvd Tomball, Netherlands 2000		
Telephone:	00316-2344-310 115 7894102		
Coordinates:	1258 5723		
Report Notes:	All emissions are calculated.		
Type of Activity:	Description	BPC_Category	CO2 Unit
Activity 1	Combustion Units		

CO2 Totals	Quantity	Units
Greenhouse gas emission:	477,434.55	ton CO2
Biomass used for combustion:	477,434.55	TJ
Emissions from discontinuous farming:	167,287.16	ton CO2
Transformed CO2:	238.59	ton CO2
CO2 emission Total:	1,122,595.00	ton CO2
CO2 allocation (reporting period):	40,972.79	ton CO2
Balance CO2 credit:	-4,008,533.35	ton CO2

Activity	Unit	CO2 Emissions	CO2 Emissions
Combustion emissions	ton CO2		
Process emissions	ton CO2		
Total			

Applicability for Direct Emitters is Facility-based



A facility is defined as...

- Physical property, plant, building, structure, source, or stationary equipment;
- in actual physical contact or separated solely by public roadway or other public right of way; and
- under common ownership or common control

Military installations may be classified as more than one facility.

Assessing Applicability to the Rule



- A facility can have multiple source categories.
- You must evaluate each source category separately to assess applicability to the rule.
 - “All-in” source categories
 - Threshold categories
 - Stationary fuel combustion
- If rule applies, report emissions for all source categories for which methods are provided in the rule.

Cement is an “All-in Source”



Table 1: All-in Source Categories*

Electricity Generation if report CO₂
year-round through Part 75

Adipic Acid Production

Aluminum Production

Ammonia Manufacturing

Cement Production

HCFC-22 Production

HFC-23 Destruction Processes that
are not collocated with a HCFC-22 production
facility and that destroy more than 2.14
metric tons of HFC-23 per year

Lime Manufacturing

Nitric Acid Production

Petrochemical Production

Petroleum Refineries

Phosphoric Acid Production

Silicon Carbide Production

Soda Ash Production

Titanium Dioxide Production

Municipal Solid Waste Landfills
that generate CH₄ equivalent to 25,000
metric tons CO₂e or more per year

Manure Management Systems
with combined CH₄ and N₂O emissions
in amounts equivalent to 25,000 metric
tons CO₂e or more per year.

*Source categories are defined in each subpart.

Real-time Environmental Management

Active Compliance Assurance

- Real-time assessment of environmental performance
- Proactively implement process improvement measures
- Unparalleled accuracy & timeliness of emission performance
- Forecast emissions and need to buy or ability to sell

Verifiable and Auditable System of Record

- Quality assurance of input data reducing reporting errors and rework
- Minimize unauthorized manipulation of results for economic gains
- Provides single version of the truth
- Promotes best practices and insure consistency

Scalable Foundation for the Future

- Essential information for emissions trading
- Scalable to thousands of data sources and calculations
- Flexibility to add or modify as required by changing regulations



“All-in” Cement requirements



Reporting, Monitoring, and Recordkeeping Requirements



What are the Reporting Requirements?



- **Subpart A: General Provisions**
 - Applicability provisions
 - Schedule
 - Reporting and recordkeeping requirements common to all reporters
 - Definitions
 - Report submission procedures
 - Other (e.g., calibration procedures, monitoring plan)
- **Subparts C-PP: Source-Specific Requirements**
 - Definition of source category
 - GHG to report
 - Calculation methods
 - Monitoring and QA/QC
 - Missing data procedures
 - Reporting and recordkeeping elements unique to each subpart

General Monitoring Approaches



- Continuous emission monitoring systems (CEMS)
 - Required if already used (e.g., NSPS, Acid Rain Program) and meet specified criteria
 - Optional for other sources
- Source category-specific GHG calculation methods
 - Monitor process parameters, fuel use
 - Calculate GHG using equations in applicable subparts
 - Example approaches (varies by source category)
 - Mass balance calculation
 - Site-specific emission factors
 - Default emission factors

GHG Gases

Required Gases for Reporting

- CO₂
- N₂O
- CH₄

Tier 3 Reporting

- Company records
- Fuel usage
 - Measured
- Fuel analysis – High Heating Value (HHV)

Tier 4 Reporting

- Installation of GHG hardware analyzers, or
- Installation of Rockwell Software GHG SoftSensors[®]
 - Acceptable EPA alternative technology
 - Flexibility to add or modify as required by changing regulations



SoftSensor[®] Technology

Pavilion8 SoftSensor[®] solution is fully compliant with PS-16 performance specification for PEMS.

- Tier 4 requires an existing Hardware CEM. An alternative is a Rockwell Software SoftSensor[®] solution for measurement.
 - CO₂
 - N₂O
 - CH₄

SoftSensor[®] Capabilities

- Real-time predicted values for all Greenhouse gases
- Implemented off of data from existing CEM and plant operating data
- Validated using Rockwell Software's patented "sensor validation" technology



SoftSensor® - Sensor Validation

Definition

An algorithm imbedded in the emissions model to:

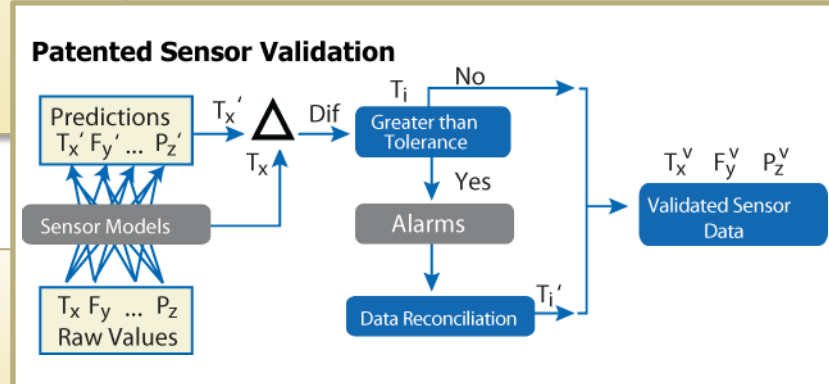
- Check raw inputs for validity
- Reconstruct variables that are out of specification or missing
- Predict what the failed sensor value should be

Method

- Development of a model for each key input
- Model inputs accuracy with $R^2 > 95\%$

Results

- Sensor Validation is a unique patented process that provides consistent achievement of the USEPA mandated 95% uptime



Operational Sustainability from Predictive GHG Values



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Case Study

A Chemical Company

Emissions Management Goals:

Maintain company's commitment to environmental stewardship
- Proactive environmental initiatives -



Meet regulatory requirements

Participate in emissions trading

Deploy a common solution

Leverage existing IT infrastructure

Linkage with production performance

Investing \$100 million in the Harris & Brazoria Counties, Texas, to reduce NOx Emissions by 75%

A Chemical Company Project Overview

3 Sites

22 Process
Units

420 Emission
Sources



Performance & Regulations

- HRVOC (most demanding of ANY regulations)
 - Performance monitoring, recordkeeping & reporting



NO_x and CO

- Emissions specifications for Attainment Demonstrations
- Allowance Deductions



One Complex Alone

- ~ 6,500 Inputs
- ~ 10,000 Calculated Outputs/Records