



## Closed-loop Energy Management Solutions with ArchestrA Workflow Software

### The Invensys Solution for Corporate Energy Management

Authors: Bill Schiel and Sudeep Charles, Invensys Operations Management

#### What's Inside:

1. Meeting the Need for Timely Action
2. Current State of Energy Management
3. About Wonderware Corporate Energy Management
4. Energy Management Scenarios Enabled by ArchestrA Workflow Software
5. Inside ArchestrA Workflow Software
6. Connectors and Accelerators
7. Summary

# Closed-loop Energy Management Solutions with ArchestrA Workflow Software

## The Invensys Solution for Corporate Energy Management

### 1. Meeting the Need for Timely Action

Energy and its dynamic forms play a crucial role in maintaining operational excellence and efficiency in manufacturing. Enterprises today face a number of issues in meeting sustainability goals in their manufacturing operations. Some of these challenges include:

- High cost or limited availability of energy resources.
- Open-loop systems, dependent upon timely information for effective energy practices.
- Energy waste from equipment left running, because it is no longer needed, or has started long before its intended use.
- Exceeding the maximum energy demand limits, due to sudden surges of demand across the manufacturing unit, thus incurring unplanned cost.
- Leaving doors open in a controlled atmospheric area, resulting in heat/cooling losses and a subsequent surge in energy consumption.
- Equipment selected like motors, transformers, heating coils, chillers and drives which are not optimized for their load, resulting in over design or under design — both causing energy inefficiencies.
- Poor maintenance of equipment and assets from lack of, or manual, paper-based maintenance procedures.
- Typical energy management systems display discrete, disconnected energy parameters. There are no automated event-based decision making systems readily available.



Open-loop energy management systems do not support proactive and sustainable energy reduction and energy cost savings. Ad hoc energy management solutions that most companies implement — like switching to more efficient motors, installing VFDs, installing intelligent lighting, implementing spot checks and manual reporting of energy usage etc. may have some effect on the overall energy usage. However, there are limited options in ensuring that these mechanisms work and remain working over time. There may be unintended consequences that result in more energy consumption, which negates the practices. Additionally, manual or people-centric ways of energy management may not be effective, from variances in execution or from a dynamic workforce.

Organizational-based implementations, including Energy Management software and sub-metering, give more in-depth knowledge of energy consumption patterns. Investments in new efficient equipment can be made, based on return of investment. Weekly, daily, and shift reports can be generated, with real-time notification of success, deviations, and failures established with these reports. The challenge is to meet the demand for more meaningful data with respect to the staff's responsibilities, so that the right information goes to the right person. They can then manage energy usage within the span of their control.

Implementation of a Corporate Energy Management (CEM) system ensures stakeholders in the organization will know both energy usage and deviations in the financial performance of an organization. The responsibility is not just with plant level engineers, but can be shared with higher level management, sales, marketing, and purchasing executives so that everyone in the organization makes business decisions based additionally on the energy criterion and its effect on COGS. Energy is then managed as a variable cost, and used by ERP for planning as if it were an item on the Bill of Materials. There can be an impetus to sustain this energy conservation year after year. Automation systems could be implemented to prevent deviations, and technologies like Smart Grid can be implemented to gain competitive advantages. But here too, the changes being implemented may cause disruptions, so the challenge here is to implement these continuous improvements without dire impact to the organization.

# Closed-loop Energy Management Solutions with ArchestrA Workflow Software

## The Invensys Solution for Corporate Energy Management

### 2. Current State of Energy Management

- Most industrial companies have initiatives for sustainability, and are in various stages of maturity.
- Ad-hoc Energy Management systems are the default practice for organizations.
- Meter manufacturers are evangelizing the necessity and benefits of sub-metering for energy consumption, which is good for the industry.
- Most plants are doing some level of metering for power, water, gas, chilled medium, steam, and air to get a fair idea of energy usage.
- Plants have lots of data on time-based energy usage, but cannot correlate it to operational information.
- Most solutions available from performance contracting vendors are expensive to implement and are very vague about the intended benefit. The monetary savings are often negated by performance guarantee fees.
- Continuous improvement, based on time-based data and accountability, is difficult to achieve.

For Proactive Energy Management, there is a need to monitor, detect and act on the intelligence already received, so that there is a continuance of synergy between people, systems and control that already exists in the enterprise.

ArchestrA® Workflow Software, coupled with the Wonderware® CEM Application, provides a 'Closed-loop' solution for Proactive Energy Management. Let's look at these components.

### 3. About Wonderware Corporate Energy Management

This application, built on the ArchestrA System Platform, collects and contextualizes energy usage data. It is used by managers and operations to understand and manage the use of all forms of energy in the context of their business.

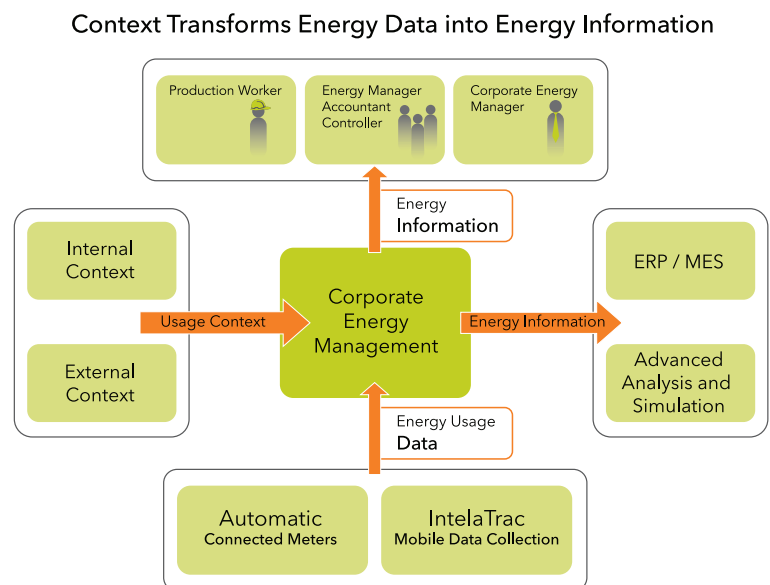
Wonderware CEM transforms energy data into the information energy that managers need, addressing real-time management of energy usage in an operation. This information becomes essential for energy consumption awareness and cost reduction efforts.

#### Business Value Added by Wonderware CEM:

- Reduce overall energy cost and detect wasteful energy situations.
- Ensure equipment or procedural changes are successful and sustained.
- Easily determine what causes variance in budgeted energy.
- Enable a business to take advantage of smart grid opportunities.

#### Jumpstart Your Energy Efficiency Program

Energy Management is a continuous improvement activity. Achieving and sustaining improvements in energy efficiency require reliable information. Wonderware CEM is a source of comprehensive and reliable information that the entire organization can use to prove that new equipment and procedures have a positive impact, and continue to deliver results. When deviations to plan occur, the richly contextualized information enables the root-cause to be quickly determined. Once the procedural or equipment changes are made, the application is used to make sure the correction was effective and sustained.



# Closed-loop Energy Management Solutions with ArchestrA Workflow Software

## The Invensys Solution for Corporate Energy Management

### Components Of Wonderware Corporate Energy Management

CEM provides the industrial-grade infrastructure to execute the specific objects and components provided with the application:

- **Configuration Objects** – to Configure the application options.
- **Point of Energy Use Objects** – Linked to the device or automation that accumulates units of energy usage and other available values. Typical devices are meters for power, water, steam, air, gas and chill. Also contains the dynamic rate schedule for smart grid integration.
- **Energy Event Object** – Configured to collect energy usage for specific events in the operation. Complements the time-based interval data collection. Leverages the connectivity of the System Platform to industrial and commercial automation.
- **Database Service Object** – A key component to link the above objects to the Energy Database and implement “store and forward” if the database connection is unavailable.
- **Real-time Energy Viewer** – Gives workers and supervisors a real-time view of energy usage, including cost, so they can be part of the energy management team in their daily tasks.
- **Pre-configured reports** – Web reports automatically adapt to additions of meters and energy events. Provides historical usage and cost of energy by cost center, energy event, asset, physical zone or other meaningful business context.
- **The Energy Database** – An advanced data model implemented on Microsoft® SQL Server — a veritable gold mine of rich, pre-contextualized data for use in web reports and to be shared with other enterprise systems.

## 4. Energy Management Scenarios Enabled by ArchestrA Workflow Software

Combining CEM with ArchestrA Workflow Software will allow you to achieve:

- **Maximum Demand Penalty Avoidance**
  - Avoid “stacking demands” caused by energy intensive equipment running concurrently.
  - Switch on emergency power supplies like diesel generators and synchronize them for load sharing until the Maximum Demand subsides.
- **Automated Demand Response in Complex Operations**
  - Smart Grid Technologies can be enabled for energy management using ArchestrA Workflow Software.
  - Create a dashboard of various consumption patterns. Use this information to purchase energy from the grid during off-peak hours, and delay energy intensive parts of production, like cold firing a furnace, to be done during this period.
  - Using application connectors, get updates directly from the utility on flexible tariffs in advance, and have the option to opt in or out on a daily basis depending on requirements.
- **Co-Generation vs. Buying**
  - Depending on the power pricing, companies can automate the selection of their power source. Using modeling, organizations can assess the economical viability of co-generation.
  - There might be times when wholesale prices for natural gas may offer better value than electricity brought off the grid. This is especially useful in making co-generation decisions.
- **Energy Usage-based Maintenance**
  - Detect clogged filters, failing motors and sub-performing equipment based on energy consumption patterns.
  - Notify maintenance personal and confirm corrections, or escalate issues if resolution is delayed.
- **Ensure Energy Data Collection Systems Work Properly**
  - Notify maintenance to investigate and fix meters that fail to report or report data errors.
  - Notify Energy Managers that data gaps exist so backup data collection can occur.
- **Comprehensive Knowledge Management to Help with Workforce Integration**
  - Repair and maintenance procedures, and other SOP's can be linked to workflows, so that information is available on demand for responsible employees.
  - Digitize SOP's and work instructions so as that manpower imbalance won't effect energy management roadmaps.

# Closed-loop Energy Management Solutions with ArchestrA Workflow Software

## The Invensys Solution for Corporate Energy Management

Workflow-enabled energy management gives stakeholders, like operators and plant managers, a choice. Stakeholders can access information from enterprise level sources such as ERP about pending work orders, deadlines to meet production demand etc. so that they can make informed decisions. Intelligence and guidance to make these decisions can be facilitated through ArchestrA Workflow Software.

## 5. Inside ArchestrA Workflow Software

ArchestrA Workflow is industrial Business Process Management (BPM) software that enables companies to Model, Execute, Analyze and Improve processes inside and outside of their organization to drive higher levels of collaboration, productivity and innovation. Core components of the ArchestrA Workflow-enabled energy management solution are:

### Process Designer

- Intuitive, visual modeling environment
- Out-of-the-box configurable workflow activities for common workflow tasks
- Processes can be imported from Microsoft Visio® BPMN
- Supports complex branching and decision trees
- Business Process Modeling Notation (BPMN) compliant

### Forms Designer

- Model complex forms to collect or visualize data
- WYSIWYG editor enables end-users to create new forms or maintain existing forms
- Forms can be linked to, or initiate, workflows
- Supports use of Microsoft InfoPath BPMN forms

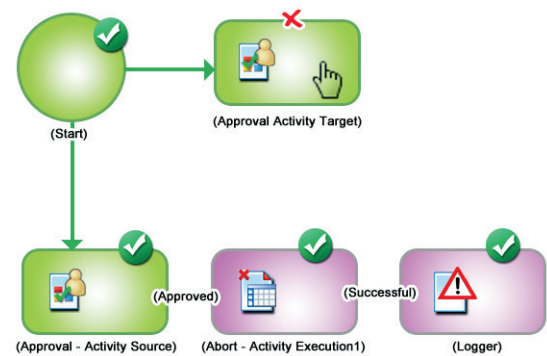
### Workflow Execution

- Workflow task execution is seamlessly integrated with Invensys applications
- End-users interact with workflow tasks via Wonderware InTouch BPMN, web browser, smart phones, PDA, email, voice and IM
- Sophisticated human workflow management, calendar management and task escalation
- Comprehensive Microsoft Outlook® integration
- Extensive 3rd-party application integration capabilities

### Business Activity Monitoring (BAM)

- Out-of-the-box activity reporting and activity monitoring views
- Associate workflows with BAM events
- Customizable Key Performance Indicators (KPIs)
- Standard out-of-the-box performance analysis
- Visibility to workflow instances and genealogy
- Proactive alerts of business exceptions and KPIs

Specifically for CEM, an Audit Trail of the steps taken to respond to an energy management incident is created. There is a record of all decisions taken, with comments documented on those decisions. The time taken to respond, investigate, and resolve events is also noted.



# Closed-loop Energy Management Solutions with ArchestrA Workflow Software

## The Invensys Solution for Corporate Energy Management

## 6. Connectors and Accelerators

### BizTalk Connector

- Invokes workflows from BizTalk orchestrations for human workflow integration
- Invokes BizTalk orchestrations from workflows for advanced system integration

### SharePoint Accelerator

- Provides advanced workflow capability that seamlessly integrates SharePoint with your manufacturing processes

## 7. Summary

An energy management solution without workflow provides half a solution — because the decisions that may be taken are not based on total environmental, cost, and manpower conditions. The combination of ArchestrA Workflow Software with Wonderware CEM offers manufacturers a real-time energy management system, based on actual data generated by the plant.

CEM's Dashboards offer viewing current status, and options to manage energy consumption based on multiple factors, such as time of day, cost of energy, and resource allocations. Coupled with ArchestrA Workflow Software, decisions taken for remediation can be standardized and consistently executed, ensuring that your Standard Operating Procedures, and profitability, are maintained.

For more information on Wonderware Corporate Energy Management and ArchestrA Workflow Software, please visit [iom.invensys.com](http://iom.invensys.com), or contact your local Invensys or Wonderware sales representative.



Invensys Operations Management • 5601 Granite Parkway III, #1000, Plano, TX 75024 • Tel: (469) 365-6400 • Fax: (469) 365-6401 • [iom.invensys.com](http://iom.invensys.com)

Invensys, the Invensys logo, ArchestrA, Avantis, Eurotherm, Foxboro, IMServ, InFusion, SimSci-Esscor, Skelta, Triconex, and Wonderware are trademarks of Invensys plc, its subsidiaries or affiliates. All other brands and product names may be the trademarks or service marks of their representative owners.

© 2012 Invensys Systems, Inc. All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, broadcasting, or by any information storage and retrieval system, without permission in writing from Invensys Systems, Inc.

Rev. 04/15 PN WW-4138