



# Integrated Power and Process Management (IPPM)

Improving operational performance through a convergence of power, process, and safety systems

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“

Few suppliers offer true capability to integrate the worlds of power, motor controls/drives, and automation systems in a single environment that allows end user to make intelligent decisions about energy management.”

- ARC Advisory Group

## Transforming the future of Oil & Gas with IPPM

The Oil & Gas industry has been facing turbulent times over the last few years. The drop in oil prices, poor demand, and weak economic growth around the world has made decreased production costs the need of the hour. What Oil & Gas companies require are not temporary cost-cuts but sustainable long-term solutions that optimize the existing architecture to improve production efficiency.

Turning the tide with the power of convergence.

Oil & Gas companies are ready to move away from traditional operations and embrace change. Traditional models based on separate systems are growing increasingly complex and expensive to maintain. The lifecycle of a system with multiple vendors and technology platforms is also susceptible for security risks and more plant downtime. What companies are looking for today is a standardized solution that overcomes organizational barriers that typically exist between process and power departments. Companies now want to team up with a technology partner capable of integrating multiple disciplines in order to simplify project planning and execution. They are recognizing the benefit of an integrated platform with a common system architecture and asset management strategy that will reduce project risks, avoid unnecessary commissioning delays and preserve project budgets while guaranteeing process quality, safety and security.

Process management and power management, two of the most integral components of Oil & Gas installations have traditionally been designed and operated separately despite a significant overlap in functions. A lack of common architecture and communication platforms as well as separate operation, administration and maintenance departments have resulted in increased project costs and complexities. The convergence of power and process management, into one agile plant control system has been a dream of the Oil & Gas industry. With the Integrated Power and Process Management (IPPM) system, Schneider Electric™ is making that dream a reality.



## Leading the way to profitability through integration

Today, integration is driving the industry forward, and Schneider Electric is leading the way. As a global leader in Power Distribution, Process Control and Security, Schneider Electric is uniquely positioned to help the industry evolve and adopt an integrated process automation and power management system. Schneider Electric partners closely with engineering, procurement and construction (EPC) contractors and end users so that they can achieve their goals.

### Meeting industry goals:

#### EPC objectives

- Lower total delivered project cost
- Lower risk to schedule and quality
- Faster commissioning of the facility

#### End user objectives

- Increased profit
- Reduced downtime and lower lifecycle costs
- Increased safety and reliability
- Increased security
- Lower energy cost

# Staying ahead with state-of-the-art technology

Schneider Electric has a vast experience and an extensive portfolio of solutions and pioneering technology to help Oil & Gas companies optimize operations, reduce risk and improve their bottom line.

IPPM facilitates a seamless integration of power, process control, and safety systems, while complying with international open standards. In order to streamline operations, IPPM enables the unification of various systems in a plant by organizing them in a simplified, flexible architecture:

- Unified HMI platforms across plant systems to enable better collaboration between departments.
- Enable unified cybersecurity policy deployment from plant network to enterprise level.
- Integrated power management systems react to real time process demands, while ensuring availability of electrical power across critical plant systems.
- Native integration of LV devices and ICSS (Integrated Control and Safety System) to make them cost-effective.
- Enable vertical and horizontal integration of MV equipment with the ICSS using IEC61850 technology to control and stabilize MV loads more efficiently.
- Facilitate the monitoring of UPS through a common control network, ensuring the continuity of critical process operations. Thus reducing cable and networking architecture and optimizing the system and remote building's footprint, leading to improved plant availability.
- High performance gateways are designed to connect to the ICSS system with minimum configuration to bridge a number of protocols (IEC61850, MODBUS, IEC60870-5-101-104, DNP3.0, Modbus, Profibus DPV1).
- Detailed and powerful post-mortem situation analysis is possible through alarm management and sequence of event (SoE) tracking, using the integrated operation center and situational awareness best practices.
- Risk of communication faults and dimensioning errors are eliminated due to the segregation of physical network with virtual networks (VLAN).
- Operator training simulators (OTS) are embedded at the front end engineering design (FEED) stage to prevent unexpected disruptions.

Rapid changes in market scenarios and technology, makes the need for a simplified convergence system more relevant than ever. Schneider Electric IPPM system's open architecture supports industry-leading technologies, thus facilitating partnerships with technology vendors to create an expanded solutions portfolio that promotes interoperability.

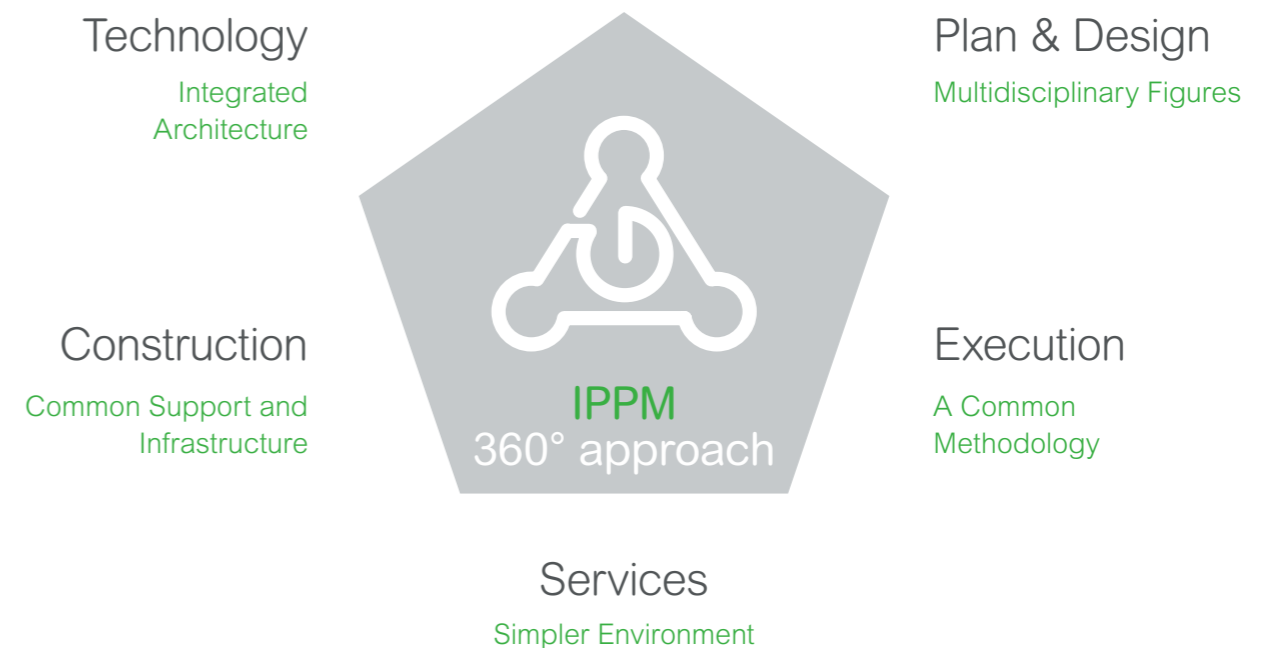
## IPPM Benefits: Technology

- Simple architecture and reduced footprint
- Unified system platform provides functionality from field-level to C-level  
Organized and time synchronized data for reliable process knowledge
- Scalable platform with more operational flexibility

IPPM is not only about technology. IPPM requires a deep change in people approach. Such a change must involve all aspects of automation lifecycle.

Technology is important but we can start developing the other four topics. Actually technology alone is not enough to secure adoption and success. IPPM is a 360 degree approach, that cover the life cycle of a plant system starting from the Plan & design phase and covers technology, construction, execution and services “

# An all-inclusive approach integrating power, process, and safety





## Introducing convergence at the planning and design phase to avoid silos

IPMM sets out to eliminate the traditional silos between electrical and process project management. System integrations are best introduced in the planning and design phase to reduce the complexity and enable better unification of systems.

The plant design is based on template libraries that have been tested and validated in our factory. It provides guidance to the design team to propose proven solutions, allowing the team to spend more time on project specificities, leading to the identification of risks at an early stage.

### Pre-FEED activities

Pre-FEED activities add extra value by introducing expertise at the early stages of the project. Load flow calculations, short-circuit calculations, electrical network stability studies, and grid code compliance analysis allow planners to design smarter electric networks that prevent unstable conditions. They can also prevent blackout and motor crawling, and increased process availability.

### FEED safety and cyber security activities

Activities like functional analysis, risk analysis, and Design Failure Mode and Effect Analysis (DFMEA) enable experts to evaluate and foresee automation and electrification risks. The unification of ICSS and energy management control systems (EMCS) allows for a more standardized and coherent view of the whole plant, reducing duplication of activities and enhancing safety.

### FEED thermal management

The thermal integration of equipment and packages at the solution level can be quite difficult. Activities such as thermal design analysis in natural/ventilated systems, thermal and fluid dynamics, and power usage effectiveness evaluation ensure the efficiency of this integration. This solution allows companies to consider process behavior and create FLEX (Flexible Lean Execution) rules for the configuration of the control and safety system to achieve the required constraints.

### FEED electrical dependability specification

You can gain a better understanding of the impact of electrical failures on your process through activities like architecture optimization, FMEA or availability study, and by determining mean time to failure (MTTF) and mean time to recovery (MTTR) requirements for the equipment. It not only helps define tender technical requirement, but also prevents over specifications and useless redundancies.

Ultimately, such close engineering integration increases the confidence in the design as a whole, while ensuring that the system will operate according to the specified design requirements.

### IPPM Benefits: Planning & Design

- Addresses design challenges in the early project stages
- More robust (less risky) FEED
- Design to simplify, make safer, reusable, modular, available, and reliable

# Coming together to achieve more: collaborative leadership between process and power teams



With the merging of process and power into one cohesive unit, Schneider Electric IPPM approach has brought down the barriers between process and power engineers, encouraging them to collaborate and work towards common goals. The sharing of time tables, targets and performance criteria between teams has facilitated better technical coordination between ICSS, EMCS, LV, and MV. With a single point of accountability, the EPC is exposed to shorter data exchanges with fewer variation orders.

Through IPPM's innovative approach, the standardization of control modules and implementation of best practices, an IPPM system delivers faster execution with lower investments and project risks.

## Risk management

While selecting automation and electrical suppliers, Schneider Electric can be named as both main automation contractor (MAC) and main electrical vendor (MEV).

- During the design and execution phase, producer and consumer centers should be defined and revenue/cost allocations should be decided
- The plant's underutilized potential should be explored using the project teams' knowledge, best practices, and templates
- An integrated approach enables the dimensioning of the alarm, historian and maintenance databases

## IPPM Benefits: Execution

- Accelerated execution that ensures project delivery on time
- Validation and training by a team of domain experts

# Proficient project construction through common infrastructure

IPPM provides plants with construction support and efficiency by enabling process and power automation equipment to share common infrastructure. Adopting an integrated E+A house (Electrical + Automation) approach facilitates the management of spare space and infrastructure, while making it easy to reconfigure protection and control schemes without any rewiring.

This simpler design is easier to implement, commission, and maintain, resulting in reduced operating costs. A convergence of power and process has led to better management of substation voltage profiles and generation of fuel saving from reduced transformer load losses.

## IPPM Benefits: Construction

- Increase commissioning efficiency through pretested and validated modular units
- Optimized footprint and capital costs
- Use of agile solutions, applied only in case of plant expansion

# Facilitating stability with best-in-class service

Asset management is crucial to the health and performance of plant systems. Modern IEDs (Intelligent Electrical Devices) gather extensive data and monitor equipment health in real-time. While all this data is regularly available it is not often utilized due to a lack of tools, manpower or access. An integrated asset management strategy facilitates contextual information, providing valuable indication when equipment downstream, or upstream of an asset results in degraded performance. With quicker detection and analysis of failures through integrated asset monitors, technicians can know what the problem is and have a plan of action even before they reach the plant to start repairs.

## The advantage of using asset monitors:

- Capturing work force knowledge of equipment and plant condition.
- Analyzing the root cause of the problem.
- Enabling predictive maintenance strategies, instead of preventive (time-based).
- Improving overall equipment effectiveness (OEE).
- Reducing downtime and unscheduled shutdowns.
- Early diagnostics to avoid costly repairs.
- Reducing process-critical faults.
- Optimizing maintenance costs and schedule.
- Data for planning of maintenance.

## CMMS integration

Converging power and process systems enable the plant to maintain a single centralized interface point for the back office computerized maintenance management system (CMMS). An integrated maintenance system is a more efficient maintenance system. With maintenance activities now streamlined, paperwork and administration efforts are also reduced. Maintenance planning becomes efficient and less time-consuming, leaving more time for actual maintenance work.

## IPPM Benefits: Service

- Optimize energy efficiency and plant uptime
- Respond to unexpected events more quickly and confidently
- Defer capital expenses through the extended life cycle of system and assets



# The IPPM advantage

## Enhanced operator effectiveness and decision-making

Plant operators have always had access to immense data, but separate systems meant that data quantity did not always translate to quality decision-making. With an IPPM system, operators now have access to process data, safety data, and electrical data on one unified interface, facilitating greater data assimilation. The result is better collaboration, quicker operator decision-making, and an integrated, more effective workflow.

## Reduced risk of operator errors

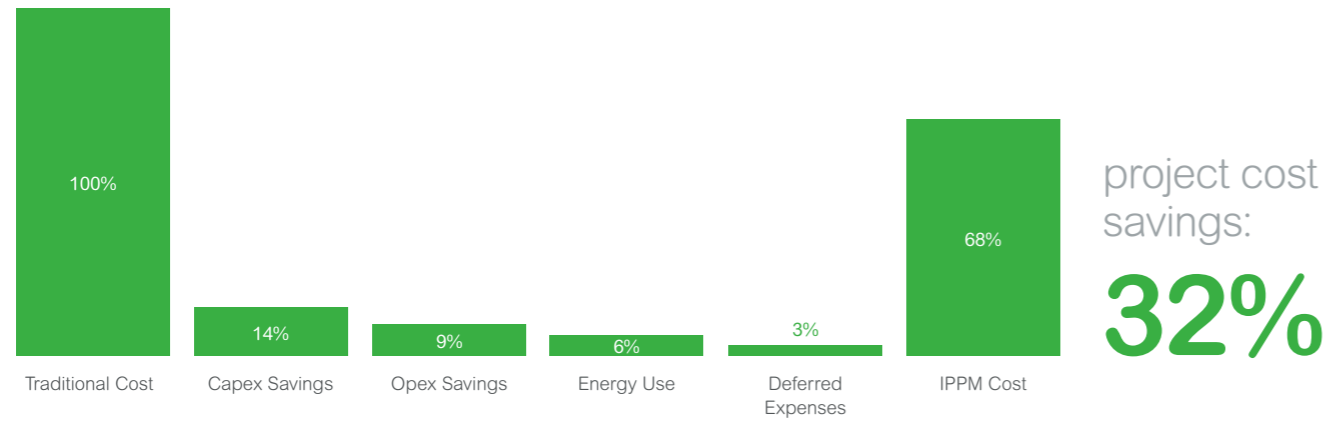
With systems growing complex and more evolved today, operators can no longer afford to operate in silos. They are often unaware of electrical system events and inadequately prepared to respond to unexpected failures. An IPPM system helps operators to see beyond their process area and gain an overview of the system as a whole. This not only helps avoid process load errors that could disrupt the network, but also enables operators to use alternative sequences to ensure smooth continuity in operations.

### Reduced plant downtime

Most Oil & Gas plants use intelligent Fast Load Shedding (iFLS) systems to ensure the stability and production continuity. An IPPM system allows operators to have better visibility of the fast load shedding (FLS) system so that they are aware of which process loads are pre-selected to shed in case of an electrical disturbance. Integrated systems also give operators real-time feedback of how their actions are impacting the power system stability, so that they can adjust their processes to a safe operation set point. This goes a long way in ensuring that the process load can still be operated without losing it, thus preventing plant downtime.

According to technology research firm ARC Advisory Group, electrical equipment maintenance has always had high value but low adoption. This is because electrical devices couldn't provide asset management systems with the necessary information. IPPM will now bridge this gap.

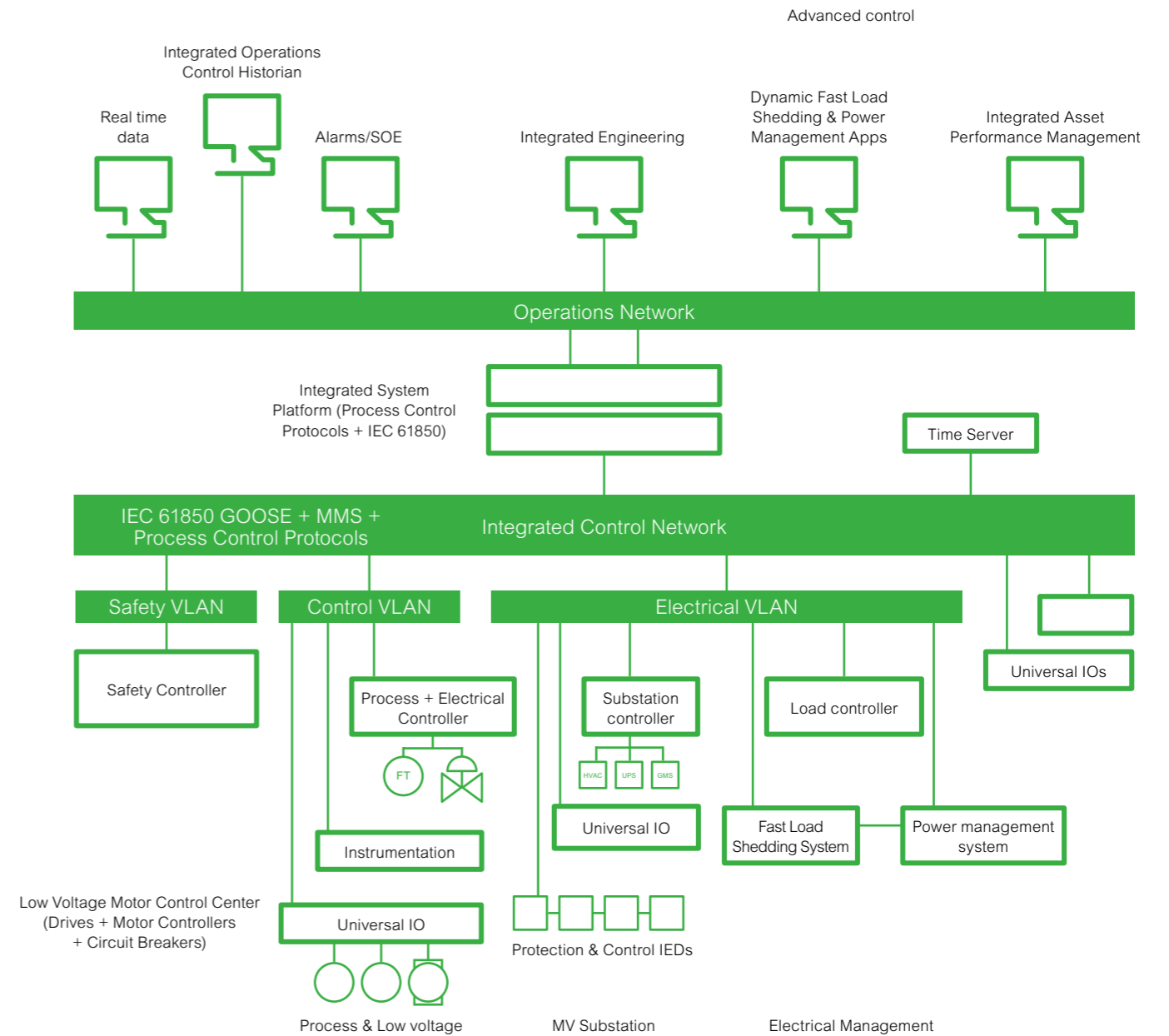
### Reduced manufacturing lifecycle costs



The Schneider Electric IPPM approach has an impact on the whole life cycle of the process plant. A convergence of operations allows for architecture optimization, reduced duplication of equipment, talent optimization, and lower training costs. All this leads to more efficient project execution, resulting in greater project savings.

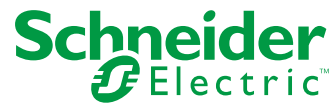
CapEx Savings: 14%	Deferred Expenses: 13%	OpEx Savings: 9%	Energy Savings: 6%
<ul style="list-style-type: none"> <li>Project execution</li> <li>Architecture optimization</li> </ul>	<ul style="list-style-type: none"> <li>Wearing rotary machines</li> <li>Reactive power boxes</li> <li>Transformer load &amp; temperature</li> </ul>	<ul style="list-style-type: none"> <li>Training costs</li> <li>Asset management</li> <li>Talent optimization</li> <li>Cybersecurity accident avoidance</li> <li>Risk reductions</li> </ul>	<ul style="list-style-type: none"> <li>Power gets aware of process</li> <li>LV iPMCC</li> </ul>

# Proposed architecture





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