

# Yokogawa in the Oil & Gas Industry

Yokogawa's VigilantPlant delivers visibility, predictability and agility for reducing project costs and risk, and enhancing enterprise efficiency and connectivity.



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# vigilantplant.®

## The clear path to operational excellence

Envision a plant where people are watchful and attentive while your business responds to change quickly and efficiently. Now picture an operation that delivers non-stop production while confidently expanding your capabilities into the future. Imagine no further. This is the vision and promise behind VigilantPlant, the clear path to operational excellence.

## *Making critical plant information fully visible is just the beginning of the vigilant cycle.*

Seeing clearly gives you the knowledge necessary to anticipate the changes required in your process. Knowing in advance brings you the speed and flexibility to optimize your plant in real time. And by acting with agility, you are able to adapt to the ups and downs of the Oil & Gas industry.

VigilantPlant excels at bringing out the best in your plant and your people - keeping them fully aware, well informed, and ready to face the next challenge.



### **ACT WITH AGILITY**

#### **Free of bottlenecks**

Reduce delays, lost opportunities, knowledge silos



### **SEE CLEARLY**

#### **Less blind spots**

Avoid guesswork, instability, sub-optimization



Minimize reactive measures, unexpected downtime, quality variations  
**Fewer surprises**  
**KNOW IN ADVANCE**



# Operational excellence starts with vigilance

## See Clearly

"We had some alarms on the safety instrumented system last night. Fortunately, I was already working on the problem, as the safety and DCS functions on this new production control system are fully integrated on one screen, and some previous events made the connection obvious.

Some time before the safety alarms started, a pump had begun to cut in and out. So, I wasn't worried, I just reduced the flow rate temporarily and emailed the duty engineer. He logged into the wellhead control system remotely, ran some diagnostics, and restored the system - allowing us to continue production. The engineering team is currently looking at the historical database with its integrated sequence of safety and DCS events, to see if they can build in any new safeguards."

"At my last job, the safety instrumented system was displayed on a separate screen to the DCS, and we operators didn't touch it. Only the chief engineer really understood this part of the system and if there was a problem we phoned him. If it started to generate alarms in the middle of the night we typically played safe and simply isolated the problem, and let the safety system shut the process down."

"With this latest system, we're entering a new era."



## Know in Advance

3.12am, Sunday ... The night shift DCS operator receives an alarm from one of the unmanned offshore production platforms. The impulse lines to a pressure transmitter are becoming plugged - the prediction is that they will be fully blocked in several days. The operator checks the maintenance schedule, and sees that a visit is planned for four days' time. He forwards the information to the maintenance team, and acknowledges the alarm.

9am Monday ... The maintenance supervisor logs the task, queries the asset management database with the tag number to identify the installation, and adds the job to the work schedule. Hopefully, the problem can be rectified with cleaning.

## Act with Agility

"We met our energy buyer's requirements today to an accuracy of less than 0.1%. Just three months ago we were lucky to get within two or three percent of the daily targets. It's all thanks to continuing upgrades of the SCADA control program that controls our distributed wellhead and pipeline network. Our engineering team has introduced refinement after refinement to the control algorithms."

"Modifications are easy because the control program is written in an object oriented programming language. As we understand more about the behaviour of each well and the local control elements, we simply refine the objects and then load the new version online. And with each change, our control is getting better."



**This is the way all plants should run - allowing you to See Clearly, Know in Advance, and Act with Agility. It should run like a VigilantPlant.**

**Everything's well under control - as expected**

The foundations for such informed and intelligent approaches to operational management were laid several years ago. At the formative stage of each project, Yokogawa devised an automation concept with wide-ranging visibility and integration of the plant's instrumentation, control, safety and information infrastructure. So today, the owner has the tools to assure an agile response to problems - and to opportunities.

# Real Stories in the Oil & Gas Industry

There are hundreds of Yokogawa systems installed worldwide. We are present in every major sphere of the global upstream oil and gas business. We continue to set the agenda for the contribution that control technology makes to project efficiency and profitability.



## Offshore production

The first installation in the North Sea of FOUNDATION fieldbus™ instrumentation - as part of a control and safety and fire & gas upgrade – is giving **Shell Exploration and Production** the real-time plant data and diagnostics information it needs to manage the Brent Alpha platform remotely, and cut OPEX.



Concurrent engineering development allowed Yokogawa to turn an engineering outline into a detailed control architecture for the **Total** Girassol FPSO's topside and subsea control - during the platform's construction and installation. Equipment was provided in parallel to other suppliers to allow validation up to the operator interface level.



## Onshore field

Cost of ownership is critical to **Nederlandse Aardolie Maatschappij's** operation of one of the world's largest gas fields in The Netherlands. Yokogawa's reliable SCADA system ensures high-availability control for this critical project which operates with minimal human intervention. Over 750 km of pipelines with 14 intermediate compressor stations and well over 100 RTUs are remotely monitored to deliver the gas on time and to the correct specification.



Technical risks fully reduced using a Main Instrument Vendor approach for the development of the Integrated Control and Safety System on **In Salah Gas**, the largest natural gas development in Algeria – "When we plugged the system in, it worked first time!".



## Pipeline

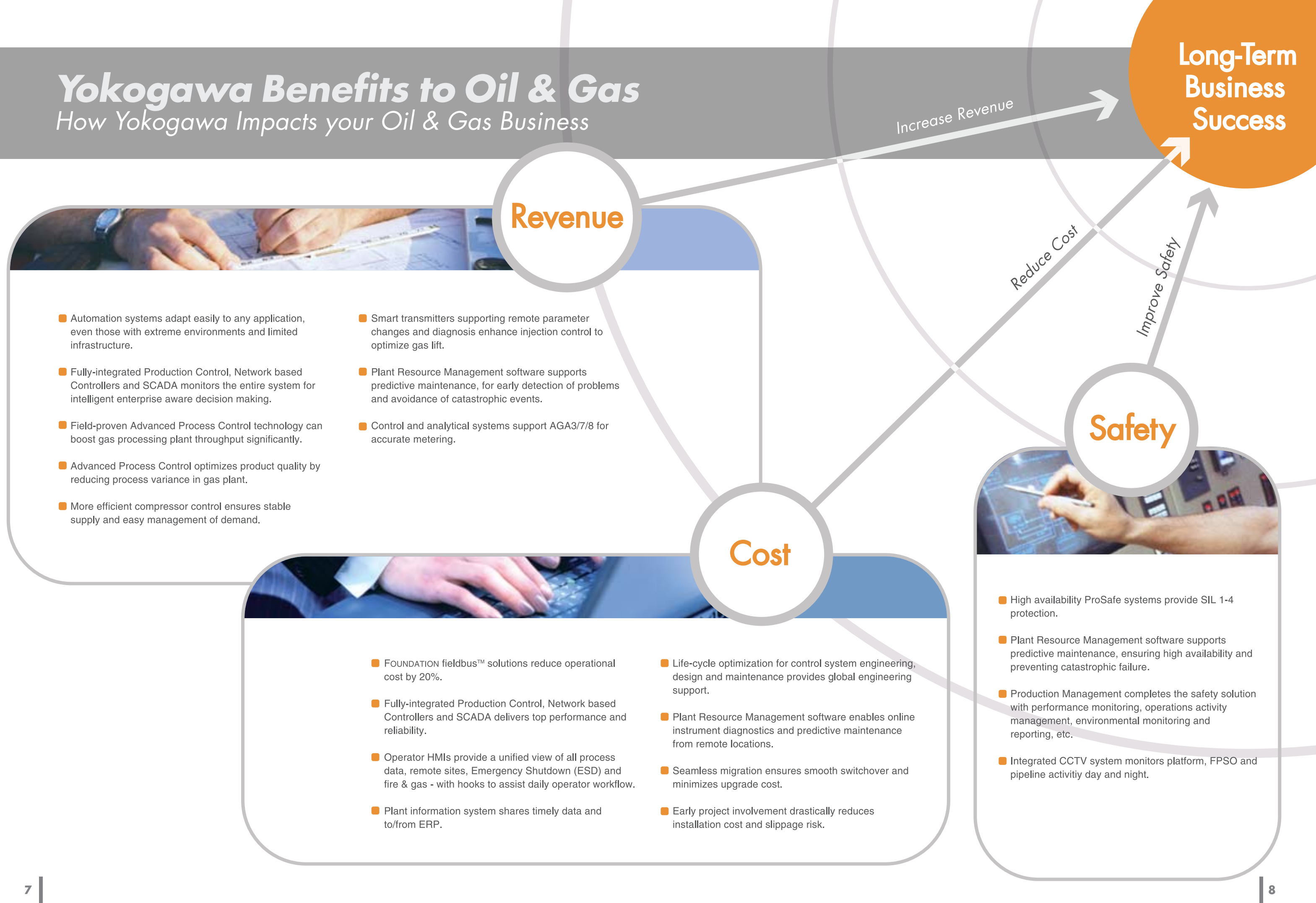
The openness of Yokogawa's Ethernet TCP/IP-based components was a key factor for **SembCorp Gas** when implementing the pipeline SCADA, RTU, safety and communications automation to support its 22-year supply contract to deliver gas to Singapore.





# Yokogawa Benefits to Oil & Gas

## How Yokogawa Impacts your Oil & Gas Business



# Total Integration for Oil & Gas Industry

## Exploration & Production



Image Credit: Courtesy of Oil & Gas Journal

## Processing



## Compressor / Block Valve Station



Image Credit: Courtesy of Oil & Gas Journal

## Pipeline / SCADA



### Field Sensing and Actuation

"Install it and forget it" digital field instruments deliver stable and accurate process measurement with low installed cost and near zero maintenance.



### Network based Control

STARDOM offers a new paradigm in distributed control with TCP/IP and fieldbus connectivity, for autonomy combined with remote visibility and reconfigurability.



### Safety Management

High availability of ProSafe-RS Safety Management Systems and its family offer truly integrated control system solutions with SIL1-4 certification.



### Harsh-environment CCTV

The FIELDEYE system provides explosion-proof CCTV for remote visual monitoring of operations day and night.



### Production Control

CENTUM VP integrated control systems offer 'uptime only' performance to secure your plant for uninterrupted operations, and boost profitability.



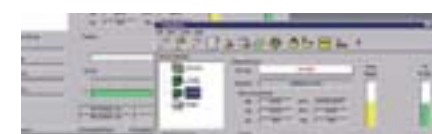
### High-reliability SCADA

The FAST/TOOLS package's pedigree provides optimized performance for upstream applications. Among its features are support for high availability and high performance, and online configuration - supporting extended lifecycle systems.



### Intelligent Production Management

Real-time visibility of the performance of all assets allows intelligent production management decisions to be made.



### Asset Management

Plant Resource Manager (PRM) makes predictive maintenance easy. Early detection of system and device failure can help prevent catastrophic failure.



# Oil & Gas control and instrumentation: Yokogawa covers the spectrum

## Pipeline efficiency

The right pipeline control and instrumentation can make a huge difference to performance and profitability. Yokogawa has dedicated technology that can optimize the performance of all elements of a pipeline system - compressors, pumps, valves and intermediate storage and distribution facilities.



- Compressor monitoring**  
 Our dedicated controllers combine high-speed control algorithm execution with fast-response I/O modules to help avoid surges. The result? Superior control that maximizes availability and energy savings.
- Gas metering/metering systems**  
 Yokogawa composition analysis equipment delivers flow calculation according to industry standards; compensation equations can automatically be applied to show flow at reference pressure and temperature with reports and calculation tools at SCADA system level to advise the operator.
- Network flexibility**  
 The communications network adapts easily to suit the application, the infrastructure and available resources. An event-driven structure means that even low-bandwidth communication links can be used, and data is never lost: in the event of a problem, data is stored locally and resent when the link is restored. The SCADA system automatically presents the data in a meaningful, sequential form.

*Yokogawa has the tools - and experience - to build control and instrumentation solutions offering tangible benefits for upstream operators. Our state-of-the-art technology will deliver exceptional visibility and control of your assets - for lower operating costs and higher quality production. System elements interact to provide high-level benefits including problem prediction, real-time alarms, remote diagnostics, device upgradeability, 24/7 data and on-demand management reports. By providing better information, at the optimum time, Yokogawa automation truly puts users in charge of the process. Here are a few examples:*

## Onshore and offshore solutions


Yokogawa's investment in a dedicated and integrated range of instruments, controllers and software actively mitigates against the spiralling risks and costs of onshore and offshore production.

- Wellhead monitoring and control**  
 Yokogawa's remote wellhead monitoring and control solutions substantially reduce cost of ownership, with the aid of novel capabilities such as controllers with web server, network connectivity and email capability, and software upgradeability.
- Subsea production**  
 Our Network based Control System and FOUNDATION fieldbus™ technology provide a high degree of visibility, diagnostics and upgradeability - the result is an ultra-reliable solution for subsea wells that reduces the need for maintenance visits.
- Subsea HIPPS**  
 The application of high-integrity ESD logic on subsea wellheads provides the means to eliminate millions of dollars in flow line costs. By ensuring fail-safe prevention of over pressure, this pioneering High Integrity Pressure Protection System (HIPPS) innovation provides the valuable savings that can transform marginal projects into exploitable opportunities.

- Management Information Systems (MIS)**  
 A fully integrated production control and information solution extending up to the ERP layer is available. These solutions are increasingly being deployed in upstream applications, such as a recent system that combines production monitoring of offshore and onshore facilities with data collection and reporting from all of the key control systems (DCS, ESD, SCADA, fire & gas, condition monitoring ...) to provide a 'holistic' view of events for a fully integrated approach to production management.
- Unmanned operations**  
 We offer both SCADA and DCS platforms that are easily configured for remote unmanned operations to deliver safe and economic monitoring and control solutions to match the application's requirements. Combined with asset management software and the predictive intelligence built into many system elements, such networks are easily maintained in their optimum condition.



VigilantPlant=*The clear path to operational excellence*



**Revamp and Expansion**  
Online Expansion,  
Hot Cutover



**Maintenance and Upgrade**  
Asset Optimization,  
Online Upgrade,  
Lifecycle Solution Support

Plant-wide integration

Optimize ERP

**Production Management**

Plant Information Management,  
Advanced Process Control

**Asset Management and Operational Efficiency**

Plant Resource Management,  
Operational Efficiency Improvement



Control

**Production Control and Safety Management**

Production Control, Safety Management,  
SCADA and Network-based Control

**Data Acquisition and Logic Control**

Recorders, Data Acquisition, IT Machine  
Control, Single Loop Control



Measure

**Analysis and Quality Control**

Process Gas, Process Liquid, Stack Gas,  
City Water, Waste Water Analysis

**Sensing and Actuation**

Pressure, Temperature, Flow, Level Measurement,  
Final Control Elements,  
Primary Elements and Auxiliaries



**Design and Engineering**

Front-End Engineering & Design  
(FEED), Main Instrumentation  
Vendor (MIV) Services



**Installation and Commissioning**

Site Engineering, Integration  
Tests, Turn-Key Services



**Operation and Optimization**

Optimization Consulting,  
24/7 Operation Support,  
Online Diagnosis Support



Life-cycle optimization



**vigilantplant.**<sup>®</sup>

The clear path to operational excellence

SEE  
CLEARLY

KNOW  
IN ADVANCE

ACT  
WITH AGILITY

VigilantPlant is Yokogawa's automation concept for safe, reliable, and profitable plant operations. VigilantPlant aims to enable an ongoing state of Operational Excellence where plant personnel are watchful and attentive, well-informed, and ready to take actions that optimize plant and business performance.

**YOKOGAWA ELECTRIC CORPORATION**  
**World Headquarters**

9-32, Nakacho 2-chome, Musashino-shi, Tokyo 180-8750, Japan  
<http://www.yokogawa.com/>

**YOKOGAWA CORPORATION OF AMERICA**

2 Dart Road, Newnan, Georgia 30265, USA  
<http://www.yokogawa.com/us/>

**YOKOGAWA EUROPE B.V.**

Databankweg 20, 3821 AL Amersfoort, The Netherlands  
<http://www.yokogawa.com/eu/>

**YOKOGAWA ENGINEERING ASIA PTE. LTD.**

5 Bedok South Road, Singapore 469270, Singapore  
<http://www.yokogawa.com/sg/>

**YOKOGAWA CHINA CO., LTD.**

3F Tower D Cartelo Crocodile Building  
No.568 West Tianshan Road Changning District, Shanghai, China  
<http://www.yokogawa.com/cn/>

**YOKOGAWA MIDDLE EAST B.S.C.(c)**

P.O. Box 10070, Manama  
Building 577, Road 2516, Busaiteen 225, Muharraq, Bahrain  
<http://www.yokogawa.com/bh/>

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