

Sustainable Plant

Yokogawa's solutions for lifecycle sustainability of modern process automation systems



Strategy for long-term sustainability

Today's modern automation systems must keep up with rapid changes in technology and new innovations. Yokogawa uses these new technologies and innovations to enhance functionalities in both the hardware and software throughout the system lifecycle. Yokogawa accomplishes this while ensuring compatibility with its previous versions and maintaining high availability of the process automation system.

Yokogawa provides long-term support and sustainability services to ensure the automation systems maintain their high level of functionality over the lifecycle of the system and of the facility. Yokogawa's lifecycle plans for its automation systems provide the lowest cost of ownership for its customers.

Yokogawa's commitment

1. Providing high compatible solutions for the facility's automation systems.
2. Including timely adaptation of new state-of-the-art technologies and innovations while reusing applications developed with previous technologies.
3. Providing robust and sustainable solutions that maintain full operability, as well as interoperability with other systems that make up the process automation systems when adding or changing components.

Business efficiency

- Long-term operation
- Reduction of OPEX *1
- Advanced process operation

*1 OPEX: Operating Expense

Safe, secure, and stable

- Requirements for HSSE *2
- Loss of expertise

*2 HSSE: Health, Safety, Security & Environment

Technology innovation

- Faster networks
- Virtualization
- Open/Integrated systems
- Digitalization

Risk

- Security
- Short component lifecycle
- Experienced personnel

Yokogawa understands that an industrial process automation system is expected to perform for many years, more so than the typical lifecycle of many types of computer-based assets. During the lifecycle of the automation system, changes in technology, new innovations and incremental expansions take place. The attributes of high availability and reliability of the automation system must be maintained through the various changes in operating systems, HMI computer hardware, software revisions/versions, and others.

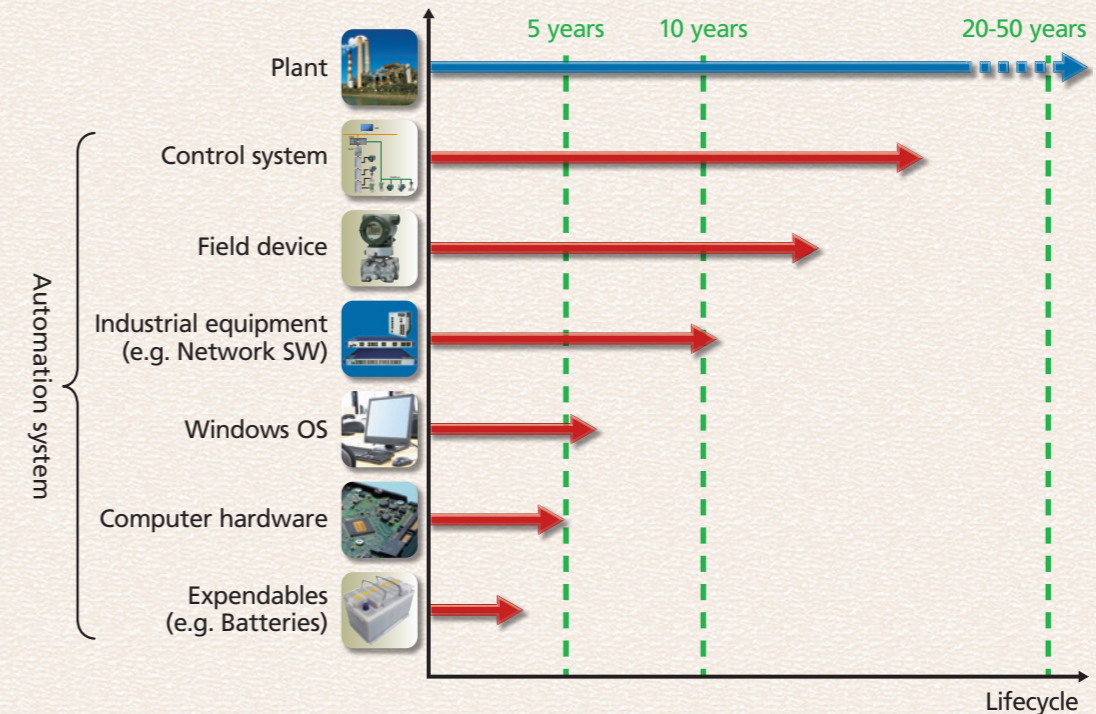
Key points for long-term sustainability

- **Continuous plant operation**
Plant automation systems require high availability for 24/7/365 operation. Many plant processing units now require increasing longer term operation without shut down for maintenance.
- **Open, integrated, and secured plant**
By adopting open technology and integration of multiple systems, plant automation systems require interoperable and secured environment as well as increased functionality.
- **Short lifecycle of component**
By adopting IT technology like computers and network devices, each component of an automation system becomes smaller, smarter and more diversified. However, its lifecycle becomes shorter and software updates occurs more frequently.

Present circumstances around automation systems

Automation system components lifecycle

The average lifecycle of most components of a process automation system is longer than 15 years. In many cases, systems are maintained by replacing individual components.



Periodic updates to operating systems such as Microsoft Windows OS, vendor software in the form of revisions/versions, upper level historians, and other components of the automation system occur at ever shorter intervals than the average lifecycle of the automation controller and I/O components. When the automation system is updated the following factors should be taken under consideration.

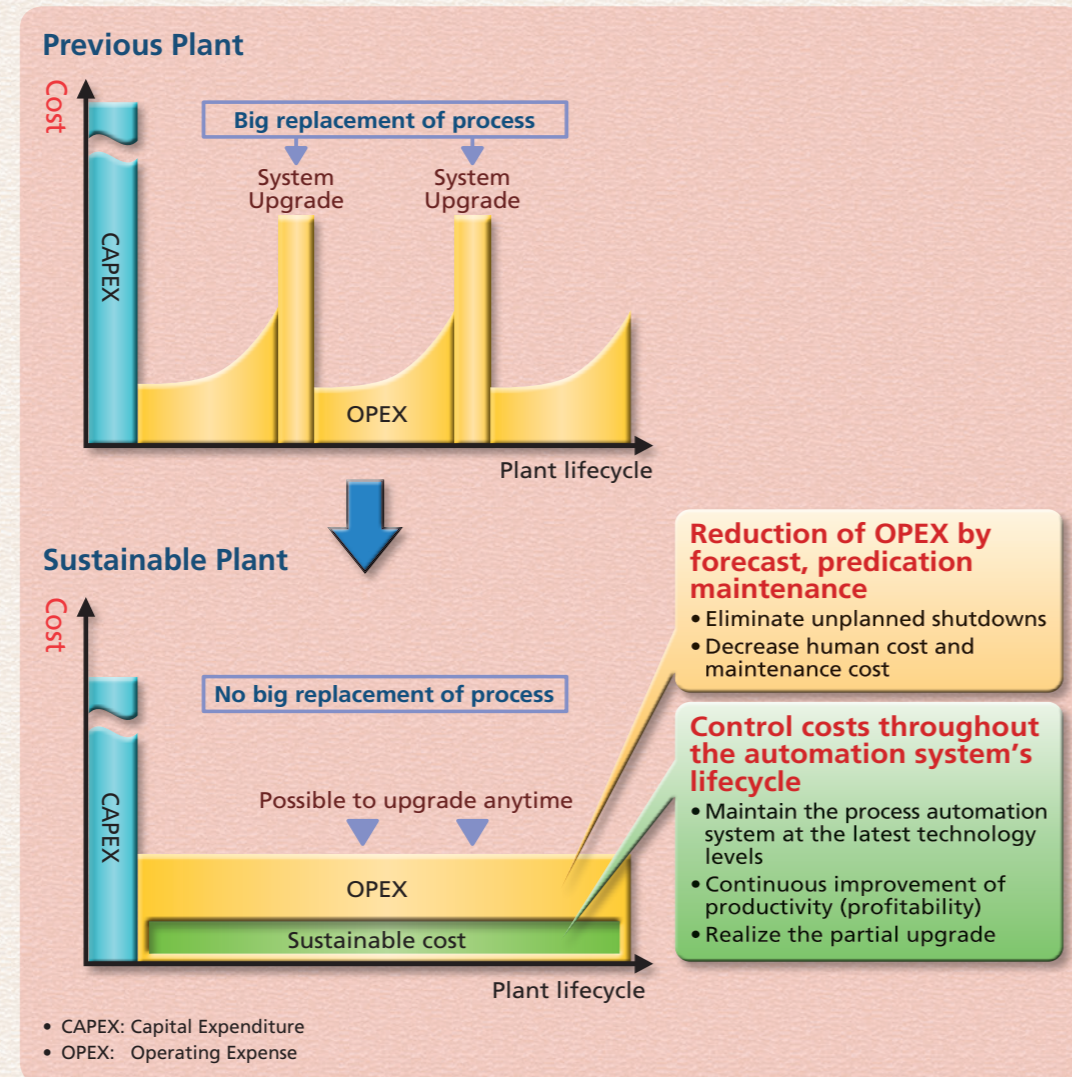
Key points for components lifecycle

1. **Cost**
Component costs of hardware and software, and costs of engineering and validation upgrade labor.
2. **Functionality**
Difference between the before and after operation of the updated automation system.

Some customers do not update their automation system for many years due to those factors listed above or for other reasons. Often when a system goes without updating for a long period of time, finding these older software and hardware components at a reasonable cost becomes difficult. When a decision to upgrade is finally reached, the cost could be significantly higher than having kept the system periodically updated through a sustainable lifecycle program. At a minimum upgrading after an extended period would require a spike in a one-time OPEX expenditure.

Achieving "Sustainable Plant"

For the "Sustainable Plant", Yokogawa provides a sustainable approach for the process automation system that provides a safe, secure, and robust installation at the lowest possible lifecycle cost. Yokogawa does this while maintaining compatibility with its older systems.



Extending automation system lifecycle at the lowest cost

As a critical part of an industrial plant's infrastructure the automation system is expected to perform for the long term. As such, it is important to maintain and update the system to achieve optimum performance for both the system and the process.

Yokogawa continuously researches and develops solutions focused on maintaining their automation systems with the goal of achieving a sustainable plant for many years.

Concept of Sustainable Plant

Yokogawa's concept is to maintain and improve the installed automation system regularly, in an effort to eliminate unplanned shutdowns and improve the entire system. This structured and proactive approach provides ease and consistency in budgeting through the long lifecycle.

Sustainable Plant requirements

Addition and improvement of functionality

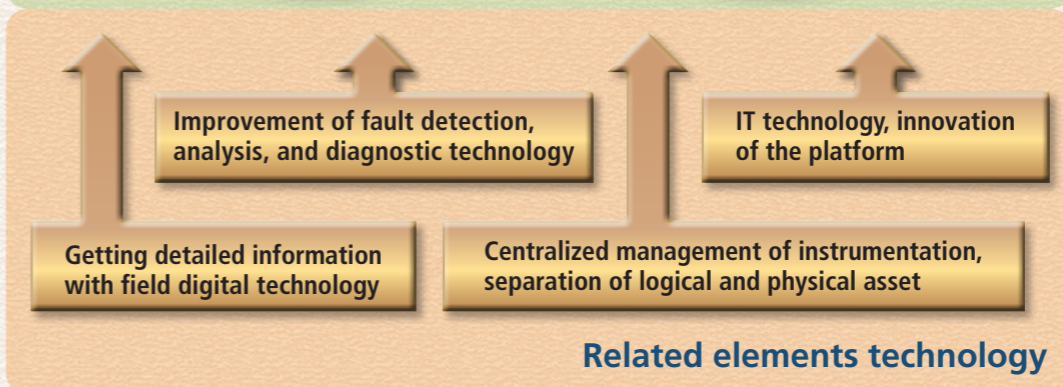
- Step-by-step/seamless change and continuous operation
- Maintain the latest design information

Forecast, Predication maintenance

- Right timing
- Right condition
- Right location

Life extension, Update

- To maintain the performance of the production, independent from physical hardware
- Facilitating replacement by component
- Life extension by virtualization



Provide long-term functional maintenance of the automation system

Providing **long-term functional maintenance** of its automation system as a sustainable activity is done by the following "Product" and "Service" practices.

<Product>

Through hardware and software development practices which maintain compatibility - inheritance of the functionality, making it possible to deliver long-term functional maintenance.

<Service>

Providing unified services globally with the following contract options.

- **Basic maintenance contract**
A contract for support and restoration. Yokogawa will give recovery support, provide product information, and trouble shoot software faults.
- **Long-term functional maintenance contract**
A contract to maintain the function of the automation system for short, medium, and long term. This provides preventive maintenance and functional maintenance of the automation system.

By entering into a service contract, customers will experience the following benefits.

Customer's benefits

1. Long-term functional maintenance of the automation system and minimization of overall maintenance costs
2. Modernization of the platform
3. Improvement of availability
4. Early recovery from problems, incidents, and accidents

Image of long-term functional maintenance

By updating obsolete components to maintain system functionality, transition can be achieved seamlessly. Maintenance activities can be applied at the same time of shutdown.



By allocating cost annually as a maintenance cost, it becomes possible to predictably update these obsolete components periodical.

Through long-term functional maintenance contracts, Yokogawa will examine and make a short-to-long-term lifecycle plan with the customer and review yearly to optimize each aspect of the automation system. Yokogawa's systems platform is designed and developed with consideration to compatibility and inheritance, so that re-engineering is minimized and down time is reduced.

Approach for long-term system maintenance

The following are the product categories of automation systems to achieve long-term functional maintenance. Yokogawa researches and develops product with taking care of adding new functionality and interoperability with existing product.

Product category

Yokogawa product

Products developed by Yokogawa. Long-term functional maintenance is Yokogawa's responsibility.

Hardware

- Adoption of alternative parts
- Design changes
- Development of compatible parts
- Parts inventory corresponding to the product life
- Functional maintenance of upward-compatible
- Follows the latest standards

Software

- Software provided with consideration of compatibility
- Software enhancements applied to counter the threat of malware and to improve cyber security

Others

Every component selected by customers.

Yokogawa Certified Product

These are third-party products which are maintained in the same manner as Yokogawa products. Long-term functional maintenance is achieved by collaborating with these Yokogawa selected program suppliers.

Global unified computer

Provides a guaranteed Yokogawa long-term maintenance period where updates are validated and compatibility verified for use on Yokogawa systems.

Global unified network switch

Provides a guaranteed Yokogawa long-term maintenance period where updates are validated and compatibility verified for use on Yokogawa systems.



Selected equipment

Third-party products verified by Yokogawa. By verifying functional compatible products, long-term functional maintenance is achieved through functional equivalency.

Third-party products based on market acceptance and customers' preferences.

Additional verification is required for these products when updates are released. Yokogawa validates these products for use with the platform.

Yokogawa's commitment

Yokogawa makes a commitment of long-term functional maintenance to customers selecting "Yokogawa product", "Yokogawa Certified Product", and long-term functional maintenance contract. Customers do not need to consider the impact on the update (exchange). Yokogawa maintains "Selected equipment" and "Others" through functional equivalency.

OpreX™ Through the comprehensive OpreX portfolio of products, services, and solutions,
Yokogawa enables operational excellence across the enterprise.

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