

# Toyota Implements Software-Based Process Orchestration for Improved Connectivity and Visibility in Hydrogen Facility

## RESULTS

- Combined multiple data sources into one balance-of-plant system
- Automated reporting process
- Enabled easy energy production monitoring via web interface



## APPLICATION

Toyota Australia transforms part of its Altona, Victoria site into a demonstration-scale hydrogen production, storage, and refueling plant incorporating a proportion of renewable power generation methods.

## CUSTOMER

As Australia's leading automotive company, Toyota Australia continuously strives to contribute to the sustainable development of society and the planet in its business operations.

## CHALLENGE

The Emerson project team needed to connect a wide array of third-party systems, all using a variety of communications protocols. Engineering connections between the systems ran the risk of building a complex, cumbersome infrastructure that increased costs, while potentially delaying the project and impeding efficient maintenance across the lifecycle of the plant.

## SOLUTION

Toyota Australia transformed an area of the Altona site in Melbourne, Australia into a demonstration-scale hydrogen plant. The project at Toyota's Center of Excellence will help demonstrate the technical and economic feasibility of producing, storing, and delivering hydrogen gas utilizing a level of renewable energy.

The project team collaborated with Emerson to create a process orchestration layer connecting a system consisting of power meters, an electrolyser, a fuel cell, a hydrogen refueler, solar & battery inverter system, and instrumentation to easily collect data for system monitoring and reporting. Much of the data collected will also be used to demonstrate compliance to the Australian Renewable Energy



*DeltaV Distributed Control Systems (DCS).*



*PACSystems™ RX3i CPL410 edge controller.*

Agency (ARENA), which requires specific levels of sustainability performance in areas such as green energy use. ARENA provided approximately 40 percent of the Toyota project's funding.

Toyota used Emerson's DeltaV™ software and automation to more easily integrate the various third-party systems needed to run the hydrogen system effectively and efficiently. The project team selected the DeltaV™ distributed control system (DCS) and safety instrumented system (SIS) to safely control system operations such as differentiating between deep and normal cycle drawdown of the hydrogen storage vessels, ultimately helping to extend their lifespan.

The DCS and SIS are natively integrated with Emerson's DeltaV PK Controller to eliminate complex configuration between the automation equipment, managing orchestration for the many skids and systems running across the plant. The Toyota team converted a wide variety of communication protocols from the many third-party systems to a common protocol—Ethernet IP—and directly terminated them on the DeltaV PK Controller to reduce communication complexity, lowering project costs and shortening the project.

The project team also saved significant time and effort in integration by using the DeltaV DCS and SIS with the PACSystems™ RX3i CPL410 edge controller to gather data from various third-party devices via WebAPI. The WebAPI interface saved Toyota the cost and time of purchasing additional hardware and running cable to install physical connections in the plant. WebAPI connections provide access to renewable energy data, system energy efficiency calculations, and data from the site's existing 500kW solar array. Rosemount™ infrared flame detectors will help keep personnel and operations safe.

Toyota's highly connected architecture readies the plant for future expansion, enabling the organization to add future requirements such as remote operations and data analytics more easily, without the need for complex engineering.

### RESOURCES

**DeltaV M-series Hardware** ([http://emerson.com/DeltaV\\_m-series](http://emerson.com/DeltaV_m-series))

**Programmable Automation Control Systems (PLC/PAC)** ([http://emerson.com/RX3i\\_edgecontrollers](http://emerson.com/RX3i_edgecontrollers))

**Rosemount™ 975HR Multi-spectrum Infrared Hydrogen Flame Detector** ([http://emerson.com/H2\\_flamedetector](http://emerson.com/H2_flamedetector))



*Rosemount™ 975HR Multi-Spectrum Infrared Hydrogen Flame Detector.*

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