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Open Source SCADA Innovation Project

SCADA Systems Background

26 SCADA Systems

National Grid own and operate a fleet of 26 compressor sites, with each site containing at least one supervisory control and data acquisition (SCADA) system.

Increasing Cyber Risks

Cyber-attacks around the world are increasing along with the requirements from National Grid for remote data access to each site, which is leading to an increased risk to the compressor fleet. The global cyber security costs are estimated to be $450 Billion in 2020 and $6 Trillion in 2025.

SCADA Target

SCADA systems are exposed and at the centre of the cyber risks.

SCADA Differences

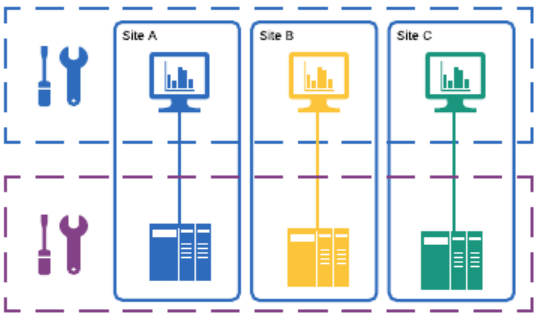
Historically, the SCADA systems on National Grid's compressor fleet have been designed and engineered independently on each site, which has resulted in differences between each site, despite the use of common design specification, commonality of plant equipment, configuration and operation across all sites.

The Needs

Common Cyber Security Solution

National Grid have a need to develop and implement a common cyber security solution across the compressor fleet which is currently being assessed by project Euston. As a result of this there is also a need to align the SCADA system with the cyber security requirements.

Independent SCADA System & Control System Upgrades



National Grid also have a need to upgrade or replace legacy SCADA systems and control systems independently from one another.

Common SCADA Strategy

National Grid also have a need to consider future works under a common strategy.

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The Challenges

Cyber Security

Existing SCADA systems do not meet the required cyber security standards, legislative and governmental requirements.

A common cyber security solution would be complex and costly to implement across all sites due to the bespoke, non-standardised and unsupported SCADA systems.

SCADA Upgrade

SCADA upgrades are complex and costly due to a lack of independence from control systems, consist of unsupported systems (hardware and software) and they require site specific upgrade solutions as SCADA systems are bespoke on each site and non-standardised.

Repeated SCADA Build

New SCADA system builds are costly due to repeated design activities that could instead be common design activities across all sites.

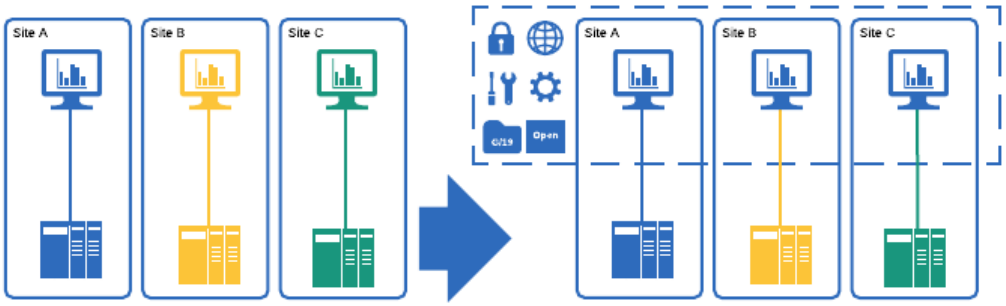
SCADA HMI

Existing SCADA system HMIs are prone to human factor issues and require site specific operator training.

Existing SCADA system HMIs do not fullycomply with alarm management standards.

The Proposal

Standardised SCADA Open Source Technology



The overall proposal is to design and develop a standard SCADA system using open source technology that removes the complexity and reduces the costs and is:

Cyber secure, compliance with IEC 62443 and aligned with project Euston

A common strategy / solution across National Grid's compressor fleet

Upgradable / maintainable independently from the control systems

A modularised package to perform common design activities once only

G/19 type approved that would be owned and managed by National Grid

An open source platform for retained interlectual property rights by National Grid, reducing reliance on OEM and vendors

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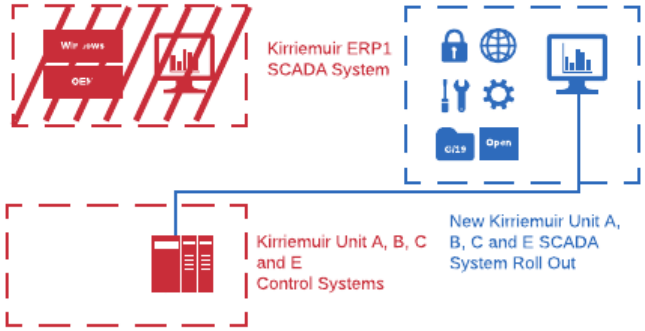
Phase 1
Research & Development of Open Source Platform with Kirriemuir Pilot

Phase 1 will demonstrate the open source technology and the cyber security abilities and will carry out the research and development of:

- Open source platform
- Cyber security to IEC 62443

with a Kirriemuir pilot replicating the existing ERP1 SCADA system functionality. The pilot SCADA will run in parallel to the existing ERP1 SCADA.

Phase 2
Development of Modular Package with Kirriemuir Roll Out



Phase 2 will demonstrate the benefits of a modularised open source SCADA system and the ability to roll out a SCADA upgrade on a compressor site. Phase 2 will carry out the research and development of:

- Common strategy / solution
- Independent SCADA system upgrade
- Modularised package
- G/19 certification

with a Kirriemuir roll-out demonstration replacing / upgrading the existing SCADA systems and migrating Units A, B, C and E.

Why Lagoni?

- Over 8 years experience working on multiple National Grid compressor station SCADA systems, contol systems, process safety and functional safety domain
- Extensive experience at Kirriemuir compressor station and a strong relationship with the operations team
- High level understanding of National Grid standards and processes
- In house expertise related to SCADA systems and cyber security
- Vendor independent

Why Open Source?

Open source software is software whose code is open to the public and has the benefits of:

- Simpler to cyber secure
- Improved security through openness
- Reduced system overhead and therefore reduced hardware requirements
- Little to no costs
- Highly flexible / customisable
- No vendor lock-in
- Simpler and easier to manage software upgrade paths
- Highly supported

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The Opportunties

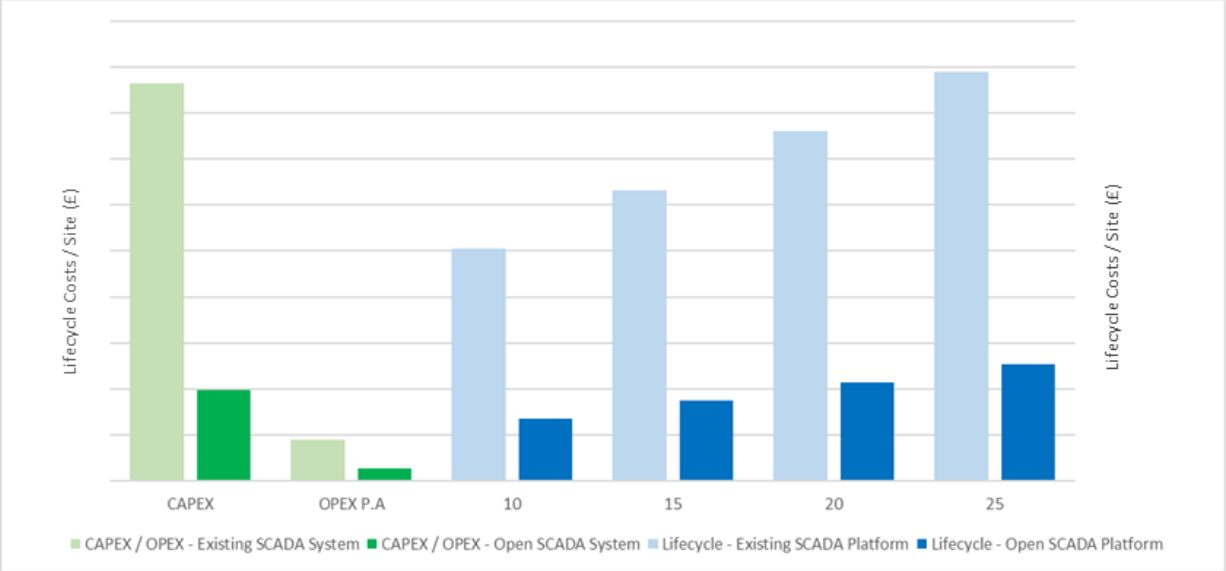
Project Euston

During the remaining short term (RIIO-T1) period, National Grid are required to implement a cyber security solution across the compressor station fleet. This is currently being researched as part of Project Euston, however it does not cover the specifics of SCADA systems and SCADA systems will be required to align to the common cyber security solution.

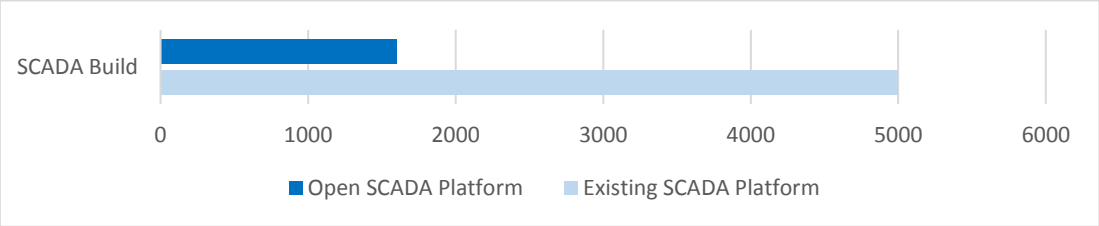
Redundant SCADA

During the long term (RIIO-T2) period, National Grid will be looking to upgrade the existing SCADA Systems and Control Systems across the compressor station fleet. Savings in excess of £30 Million could be achieved through the use of the proposed solution.

The Benefits



Reduced Delivery Time Of Single SCADA Build



Savings per SCADA build

Design Man Hrs Saved

3,400 Man Hrs

Reduction in Design Man Hrs

%68

Compliance to Cyber Security Standards

IEC 62443

For more info contact info@lagoni.co.uk I 020 (3) 095 5000 I www.lagoni.co.uk

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