



# Essential Energy Lowers Costs and Carbon Footprint across Australia's Energy Sector

OpenUtilities<sup>®</sup> Enables Substation Intelligent Digital Design, Reducing Environmental Impact and Saving 50% in Costs

## EXTENDING INTELLIGENT DIGITAL DESIGN TO SMALL CAPITAL PROJECTS

With a network spanning 737,000 kilometers, covering approximately 95% of New South Wales, Australia, Essential Energy distributes electricity services to more than 870,000 homes and businesses in 1,500 regional, rural, and remote communities. Despite their large coverage area, Essential Energy has a small customer density of 1.7 customers per square kilometer, resulting in a significantly higher operational cost to customer ratio than many other distribution network service providers. With a minimal customer base to finance the maintenance and support of over 184,000 kilometers of power lines held up by 1.4 million poles, and pressure to lower operating costs, Essential Energy needed to assess their capital works projects to find a low-cost, low-resource solution.

"How do we lower energy costs but unlock value across our complete portfolio of works?" asked Matthew Turvey, senior electrical engineer with the substation design team at Essential Energy. The company embraces going digital, so they wanted to create an intelligent digital design system (IDDS). While intelligent digital design has been available for several years, it has only been predominantly used on large-scale projects with capital budgets exceeding AUD 100 million.

Essential Energy's substation design team is comprised of less than 15 members who are responsible for managing the design of all capital investments related to the refurbishment, replacement, and construction of substation assets. This team had a goal to bridge the gap between large-budget projects, extending the same end-to-end benefits of IDDS to small capital works. "There are tens of thousands of design teams like ours working with state or private utilities that need

a low-cost, low-resource solution so they can also take the next step to unlock value that an intelligent digital design system can offer," said Turvey.

## INVESTIGATING SUBSTATION DESIGN PROCESSES

Committed to improving design performance and digital efficiency across their portfolio of works, Essential Energy and their substation design team selected the Brewarrina Substation to investigate the substation design process and the feasibility of using digital technologies to replace time-consuming manual tasks. A 22- to 66-kilovolt rural site with total capacity of approximately 5 megavolt amperes, the area is prone to severe weather events, including flooding, lightning, strong winds, and dust storms. These site conditions presented data acquisition challenges, making traditional on-site surveys dangerous and inefficient in terms of time and accuracy. Several options, including ground scanning and LiDAR, were trialed, and the captured images were converted to 3D models and used as the basis of new designs.

## STREAMLINING DIGITAL WORKFLOWS

Already familiar with Bentley applications, Essential Energy initiated their IDDS workflow for Brewarrina by creating digital reality models of the site using ContextCapture. "The digital reality model is then copied into ProjectWise and forms the foundation to create both primary and secondary drawings for the project using Bentley's OpenUtilities Substation," said Jess Hammond, senior drawing officer at Essential Energy. All reality models, CAD drawings, and related documents were stored and shared via ProjectWise, using links instead of manually sharing drawing files, which led to eliminating uncontrolled versions. The team used OpenUtilities Substation for all design and drafting tasks. As a result, Essential

## PROJECT SUMMARY ORGANIZATION

Essential Energy

## SOLUTION

Grid

## LOCATION

Port Macquarie, Australia

## PROJECT OBJECTIVES

- ◆ To lower operating costs and minimize the carbon footprint within Australia's energy sector.
- ◆ To establish an intelligent digital design system for small capital projects.

## PROJECT PLAYBOOK

ContextCapture, OpenUtilities, ProjectWise<sup>®</sup>

## FAST FACTS

- ◆ Essential Energy explored the feasibility of using an intelligent digital design system (IDDS) to lower network operating costs and unlock value across small capital energy projects.
- ◆ They investigated the substation design process at their rural Brewarrina site, digitizing previous manual survey, design, and construction workflows.
- ◆ Bentley's applications provided an intelligent reality modeling-based solution to overcome challenges related to data acquisition, compatibility, and construction drawing accuracy.

## ROI

- ◆ EE's IDDS reduced environmental impact, lowered project design costs by 50%, and cut design-related travel by 80%.

“A completely intelligent digital end-to-end solution has enabled us to reduce costs, increase safety, and remain agile, while increasing transparency and reducing our carbon footprint.”

– Matthew Turvey, Senior Electrical Engineer, Substation Design Team, Essential Energy

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Energy used Bentley's applications to create an IDDS, enabling virtual design reviews, and streamlining the design and drawing approval process.

The interoperability between Bentley's applications and Microsoft 365 allowed Essential Energy to automate conversion of the approved drawings into PDF copies that were immediately accessible to the on-site construction crews via their mobile devices, ensuring all relevant parties always had the most up-to-date information. “It wasn't until we could take advantage of Bentley's partnership with Microsoft 365 that we were able to formulate a working system, [an] end-to-end solution,” said Rogers. Upon completion of construction, Essential Energy sent drones to capture photos of the site and generate an as-built model with ContextCapture, closing the loop by performing a post-construction audit against the initial design.

### DRIVING SMART SOLUTIONS IN THE ENERGY SECTOR

By automating previously manual processes, Essential Energy significantly reduced substation design hours. The implementation of their Bentley-based IDDS has reduced project costs for design at Brewarrina by 50%. “We now believe we have bridged the gap in making IDDS not just financially viable for large-scale budget projects, but [now we can] also offer the same end-to-end project benefits in a low-cost solution,” said Turvey.

Using low-cost 3D reality models, clash detection, and automated workflows rather than traditionally manual methods improved quality and efficiencies, reduced rework associated with design and construction errors, minimized travel, enhanced safety, and decreased Essential Energy's carbon footprint. “IDDS and reality models provide accurate information and revolutionary viewing angles, which enable quick and safe design decisions and allow construction crews to reduce outage times, resulting in a resilient network,” said Rogers.

Essential Energy has achieved numerous benefits moving to an IDDS, which has also helped position Essential Energy to transition to a more comprehensive digital twin and adopt new technologies. With the increasing push to lower operating costs across the energy sector, Essential Energy is on an asset management journey to transform their view on capital works projects and how they use technology. They aim to integrate bidirectional data flows and real-time visualization between their IDDS and asset management system and identify high-risk assets, driving improved operations and maintenance processes across Australia's energy sector. “As for the digital future, as Essential Energy builds its data lake of reality models, we will be able to use artificial intelligence to help identify defects in assets and use historical data to show time lapse visual conditioning models,” said Rogers.



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