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Sustainable energy solutions



'unicorn" Energy success story no

Modelling the transition to renewables

Today's energy networks are interconnected and interdependent, which means that a decision made in one place can affect the economics and reliability of supply many kilometres away. The global transition to renewables thus involves complex planning beyond building a solar farm or wind turbine in isolation.

That transition must be swift and sustainable. According to the International Energy Agency, around 90 per cent of new energy demand will need to be met by clean energy by 2050 if global greenhouse gas abatement targets are to be achieved

Along the way, planners need to ensure that the existing and future energy infrastructure is fit for purpose, requiring considerable capital investment. In the US alone, power is transmitted from 7700 power plants across 1.1 million kilometres of high-voltage lines and more than

10 million kilometres of standard "poles and wires". According to the US CEO network Business Roundtable, \$US25 billion to \$US40 billion of energy infrastructure will be required by 2025, merely to comply with current renewable plans.

Given that, optimising the performance of the world's vast, complex and interconnected energy systems is crucial.

"In the past, it was possible to look at a single part of the energy puzzle and understand what was happening, but that's not the case now," says David Wilson, CEO of home-grown tech "unicorn" Energy Exemplar

"That has changed fast, especially in Australia with the rapid emergence of distributed solar panel production and domestic storage."

Wilson describes Adelaide-based Energy Exemplar as a "remarkable Australian success story no one has ever heard of.

Founded in the late 1990s when energy markets were deregulating, the company has become the world's biggest energy modelling simulation platform for parties such as utilities, grid system operators, energy traders and governments.

"Our business is about supporting the energy transition, ensuring that players can move with confidence, speed and reliability," Wilson says.

The company's cloud-based software suite, headlined by PLEXOS and Aurora, allow organisations to run simulations that simplify decisions and facilitate a seamless switch to renewables

'By building models, or 'digital twins', in effect we provide a look into future scenarios to help people understand what the future could look like for complex energy systems under different assumptions," Wilson says

The company's tools allow clients to plan across multiple time horizons, such as long-term capital allocation requirements, mid-term maintenance scheduling and hour-by-hour dispatch decisions.

Millions of computing hours are currently devoted to "resource adequacy": ensuring the lights can be kept on when the sun is not shining and the wind is not blowing.

Wilson says sophisticated modelling can help to overcome global "scaremongering" about the reliability of large-scale renewable power.

"Critics once claimed that having 10 per cent of renewables in the mix was not doable and later

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said the same about a 50 per cent balance," he says. "They have been proven wrong systematically, but you need the right tools, methodologies and processes in place to manage these systems.

With 400 staff across offices in the US, Europe, South America, and Asia, Energy Exemplar now has more than 500 customers across 80 countries. Clients include the Eastern Interconnection in the US - the world's biggest electricity network, with more than 250,000 separate assets

In 2022, UK National Grid ESO selected PLEXOS to replace its legacy software, enabling the utility to gauge the extent to which interconnectors could be relied on to provide energy capacity during tight periods. Among other projects, Energy Exemplar's platform enabled the ESO to

develop the Electricity Capacity Report 2023, containing recommendations to the UK government on meeting its energy policy.

Locally, the federal Department of Treasury drew on PLEXOS modelling to build its national decarbonisation model, a roadmap for carbonheavy industries looking to achieve net-zero emissions targets. The company has worked directly with high-emitting sectors such as mining and water utilities.

Energy Exemplar is also involved in the nascent green hydrogen sector, modelling the entire hydrogen supply chain in collaboration with Profas Energy Consult and launching the first offthe-shelf PLEXOS hydrogen dataset last month.

"We are doing a lot of work in Europe, where hydrogen is being looked at for inter-seasonal storage using excess renewables generated in summer," Wilson says.

Founded by scientist Glenn Drayton as Drayton Analytics, the company was renamed Energy Exemplar in 2006 and was acquired by private equity firm Riverside Company in 2017. In October this year, private equity funds Blackstone and Vista Equity Partners agreed to acquire the company.

"When I started with Energy Exemplar six years ago, I knew that great things were possible but couldn't have imagined the massive impact the company would have in such a short time,' Wilson says, adding that the company is "agnostic" about the various emerging renewable and storage technologies

"It's fascinating to watch what's coming," he says. "There's a lot of change and a lot of possible futures to explore and to understand.

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