LUCID
CONSULTING AUSTRALIA

ADELAIDE | ALICE SPRINGS | BRISBANE | CANBERRA | DARWIN | MELBOURNE | PERTH | SYDNEY

The all-electric hospital

Lessons from designing Australia's first 100% electrified hospital and global experiences.

As if healthcare is not complex enough, *you must save the planet too.*

For hospital planners, operators, and maintenance teams, healthcare is already a complex field, and now hospitals have another layer of responsibility: leading the way in reducing emissions and saving the planet.

With so many competing priorities, it can be challenging to meet clinical functionality and service goals while also adopting environmentally friendly practices in highly regulated environments.

Here is where experienced, thoughtful and smarter engineering can help your hospital to align with policies, political promises and community expectations.

Lucid is a vital member of a large consortium tasked with delivering the crucial electrical and hydraulic engineering components for Australia's groundbreaking all-electric hospital, the new Women's & Children's Hospital in Adelaide.

Through close collaboration with other global leaders in the field, our team has gained invaluable expertise in solving the unique challenges presented by 100% electric hospitals.

This document shares expertise that's been created nationally by the team of +300 building services engineers across a range of projects to offer insights into how hospitals can meet budget constraints, integrate new technologies, and save the planet.

The future of gas is uncertain. Electrification solves uncertainty.

Electrification of hospitals allows energy use to be decoupled from direct fossil fuel usage for heating, hot water generation and systems that sterilise reusable medical equipment. 100% electric hospitals are also enabled for a Net carbon zero future as electricity grids transition to renewable generation.

'All electric' hospitals are compatible with future on-site renewable energy generation, energy storage, 'island mode' operation, infrastructure resilience and protection against disruptions.

Generation and storage also allows facilities, tenants and asset owners to be insulated from energy price escalation and uncertainly, while being prepared for the future of energy generation that connects with surrounding communities.

But if it was easy, everyone could do it.

The conversion of an existing hospital from existing legacy energy sources to go 'all electric' requires careful first principles consideration of the infrastructure design.

Here's a summary of what you'll be facing and what we can help you with:

- Incoming authority electrical supply negotiation, including maximum demand and augmentation with respect to the 'new electrical load'. Careful system configuration should result in a minimal increase to site maximum demand but with the new peak demand shifting from summer to winter.
- Hot water generation for both heating and drinking via electric heat pumps is an alternative technology and requires design for heat (energy) recovery, system redundancy and legionella risk management.
- Augmentation of standby power systems to ensure adequate capacity for additional equipment loads, thus providing opportunities for island mode operation.
- Electrical safety and battery lifecycle assessments.
- Replacement of other gas fired equipment with electric alternatives such as kitchen cooking equipment, steam generators and the like.
- 'Mothballing' and decommissioning of Co and Tri-generation equipment and resetting the strategies for hot water recovery and stand-by power.
- The effective planning of plant space and equipment access for maintenance and replacement.
- Renewable energy system design, licencing and approvals.
- Holistic energy efficiency and carbon footprint planning, including HVAC operation, lighting, waste and supply chains.
- Greater reliance on an embedded energy metering system to track equipment loads and trends.

Global insights on benefits

Less global warming: We have taken a macro view and built international connections, because it will take global collaboration to solve this one hospital at a time. The knowledge and insights we deliver are the result of leaders in the field knowing how to anticipate very specific engineering challenges for hospital electrification.

Improved public health: Healthier hospitals are ones with more budget to spend on services, creating less emissions and contribute more to local energy resilience.

Stable energy prices: And talking of power, you are decoupled from rapidly increasing gas prices and supply, which makes budgeting and delivery of services more certain.

Reliability and resilience: Retro-fitting and conversions are challenging projects, to which we apply over 20 years of brown field expertise. We have a large library of design IP and a team of specialists to balance sweating assets, new CAPEX along with plant & equipment maintenance costs.

Jobs and other economic benefits: Our collaborative culture drives us to build strong local relationships with local suppliers and people to future-proof your opportunities. Electrification demands new skills which we gladly train or educate so local companies and trades benefit too!

100% electric hospitals open up more options to lower and control costs. From buying cheaper energy, avoiding gas to taking greater advantage of off-peak energy pricing.

You gain a new level of self-reliance by generating and storing energy for your own consumption.

The steps to transition to 100% electricity power.

Lucid listens to your needs and creates a complete solution to meet the intent of what you want to achieve. Our advisory covers resources, budgeting, time, risk, policy making and your public reputation.

We operate a vertically integrated Asset Advisory and engineering services model, ensuring our reporting is followed through with robust and well planned delivery.

Typical deployment strategy

1. Audit the existing plant generation sources, equipment, electric configuration, energy flow, usage profile. Delivered as an 'all electric' options study.
2. Engage with facility stakeholders such as building management & engineering, user groups, utilities, and tenants.
3. Budget and business case planning.
4. Risk management associated with facility disruption, change in functionality, shutdowns, capacity, resiliency and redundancy and staging.
5. Detailed design and delivery.
6. Performance monitoring and reporting.

Global examples of projects we have found interesting.

St. Luke Hospital – Wolisso, Ethiopia

The hospital would experience power cuts around 50 percent of the time, forcing them to rely on diesel-powered generators. The decision to go 100% electric uses a solar array system delivering 320 kWh of electricity, and the plant can manage the flows of energy in real time to guarantee a constant power supply. This enables the hospital to provide more effective care for the roughly 79,000 outpatient visits, 15,000 hospitalisations, and 4,000 births that they handle every year. What's more, the integration of solar power has resulted in cost savings—money that the hospital can now reinvest in health care services for the community.

Children's Hospital – Pittsburgh, USA

Awarded two LEED certifications for not just energy efficiency but other initiatives such as public transportation, benefits for those sharing vehicles, water efficient landscaping, better parking for carpoolers and recycled water and materials.

Mount Elizabeth Novena Hospital – Novena, Singapore

Awarded the Singapore Building and Construction Authority's Green Mark Platinum Award. Sustainable elements include carefully managed, high-efficiency water systems that afford savings of around 30 percent when measured against standard buildings and also features a green roof, which helps to maintain a constant temperature, while prime positioning of its facades produces a cooler environment for patients.

University Hospital of South Manchester, Wythenshawe – Manchester, U.K.

Received an Ashden Award for its energy efficiency program that saw carbon dioxide emissions reduced by 28 percent since its implementation. It has also been awarded the Carbon Trust Standard for its work towards reducing its carbon footprint and implements a host of green initiatives, from supporting local business traders to a carpooling scheme.

The 100% electrification of hospitals is a core capability with a specialised team and is a key component of our Better World mission. Our people, systems and corporate strategy are aligned with a Better World mission.

Lucid is actively reducing our carbon foot print to carbon neutral by 2030 and apply our engineering talent to help our clients enjoy a competitive advantage when they reduce theirs.

Nick Adcock.
Director of health
0431 006 445
nick.adcock@lucidconsulting.com.au

LUCID
CONSULTING AUSTRALIA

www.lucidconsulting.com.au

ADELAIDE | ALICE SPRINGS | BRISBANE | CANBERRA | DARWIN | MELBOURNE | PERTH | SYDNEY