



THE UNIVERSITY
of ADELAIDE

MINE ELECTRIFICATION INDUSTRY TRANSITION

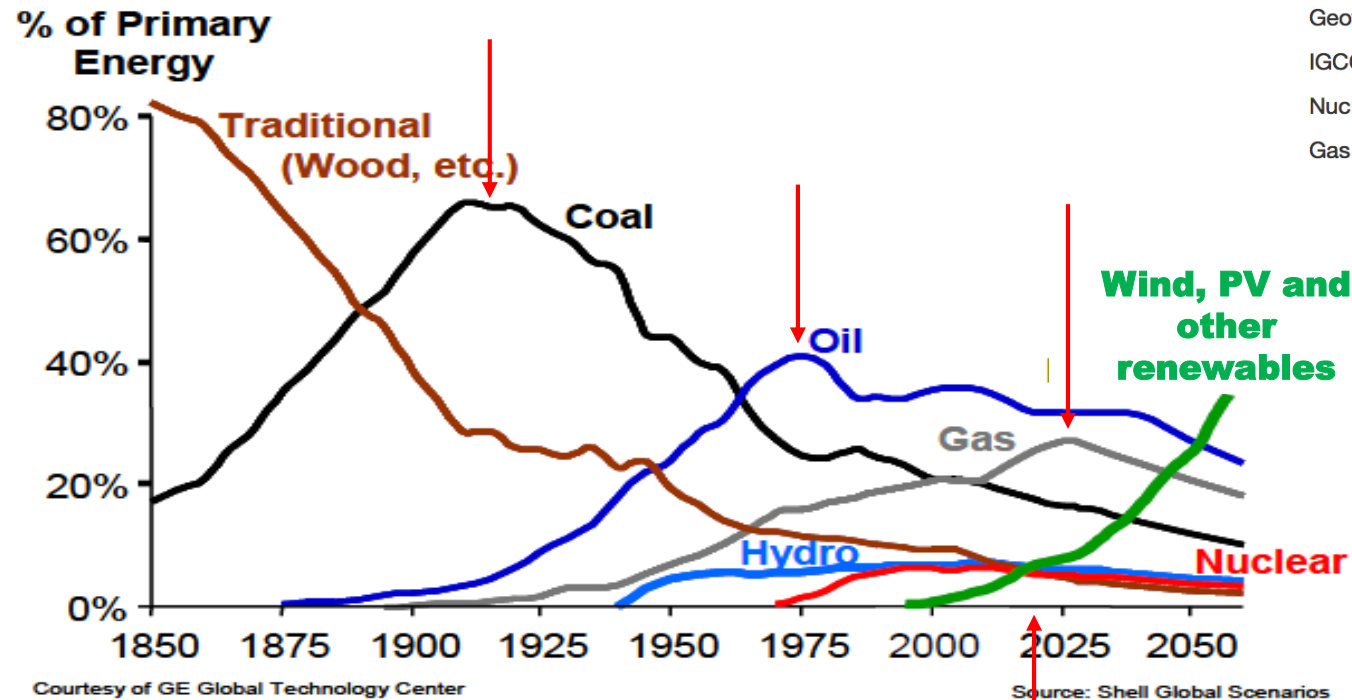
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adelaide.edu.au

ENERGY AND MINES
AUSTRALIA VIRTUAL SUMMIT
AUGUST 4-6, 2020

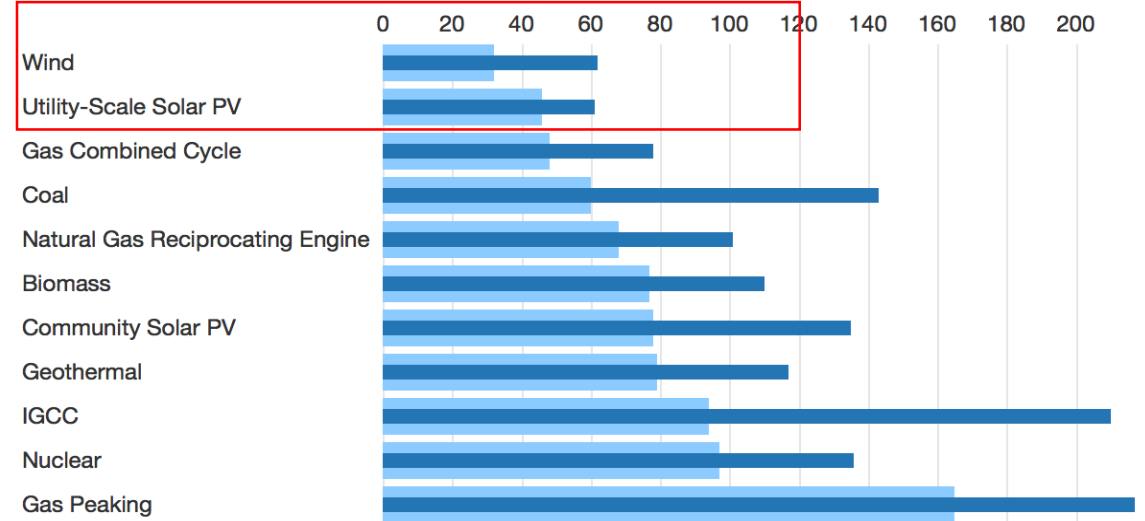
seekLIGHT

The writing on the wall

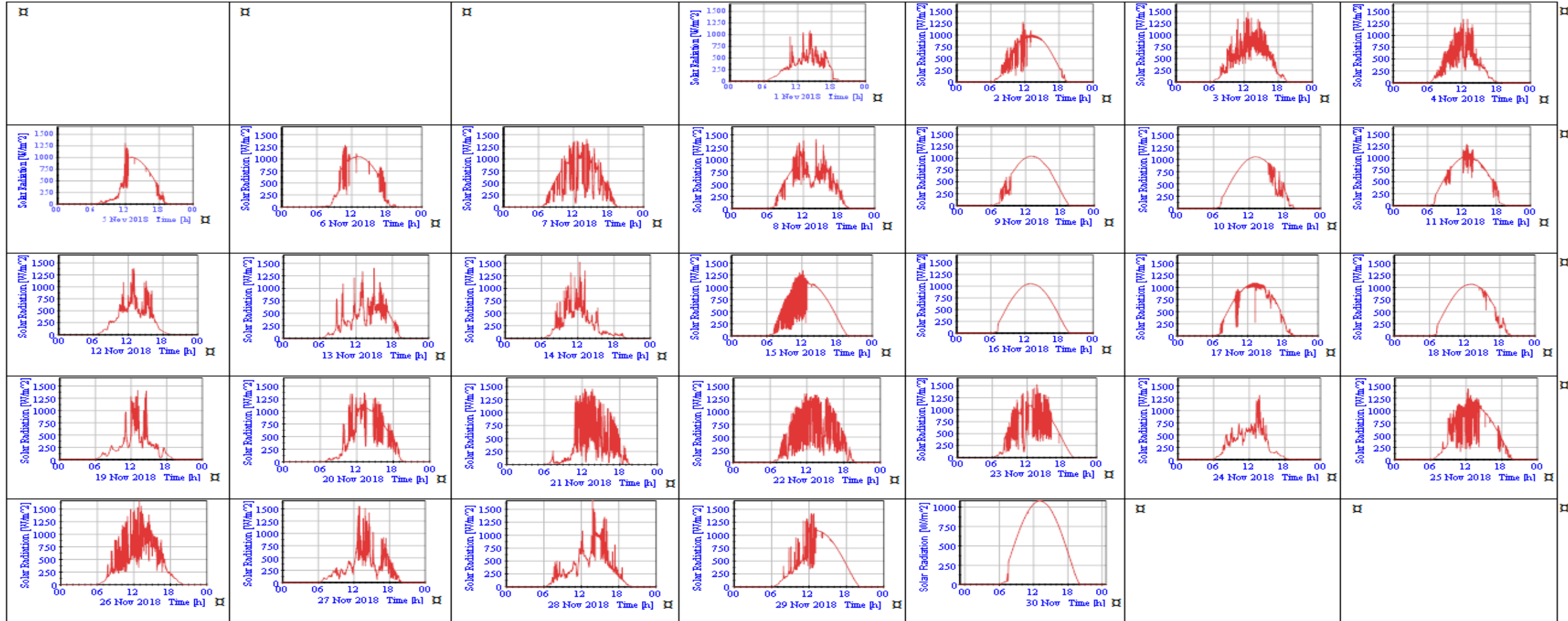


US Unsubsidized Levelized Cost of Energy (Figures by Lazard)

Light blue = low estimate. Dark blue = high estimate.



Monthly Solar Irradiance on a Site



The electrified mine

University of Adelaide is positioned as a thought leader in this space and is available for partnerships

- Recently released “Mine Electrification Report” (available on request and in our virtual booth)
- Proven capability and expertise in:
 - Renewable Energy
 - Microgrids
 - Electric Vehicles
 - Power System Operations
 - Automation and robotics
- **How we can help industry**
- Deploy microgrid test systems to support mine specific studies,
- Work with both end users and system suppliers/operators to safely and efficiently design and deploy electrified mining systems



MINING ELECTRIFICATION

Towards an electric and renewables mining future –
University of Adelaide vision capabilities and research

The electrification of mining operations is rapidly emerging as a central issue for the resources sector and its efforts to reduce carbon emissions.

The reliance on fossil fuel-generated electricity is a significant proportion of current mining operational costs and the prevalence of diesel fuel usage is a significant health and safety concern. The use of electric vehicles and machinery is a potential or stand-alone solution.

The transition to an electric mining future is complex and will require substantial investment in infrastructure, technologies, and hardware as well as newly skilled workforce.

Realising this future will be benefited by the collaboration between the mine operators and their service industries, research organisations and regional, State and Federal governments.

The following discussion highlights the capabilities and research drivers within the University of Adelaide as it looks to help shape the resource industries transition to an electric and renewables future.



aeskb.com.au

How we can help industry make the transition

Program A

Detailed understanding of the energy needs of a mine site - towards more renewable integration

- evaluate consumption patterns
- identify mine specific features
- assess the impacts of the transformation

Procedures and guidelines for energy management towards more-electric more-renewable mining



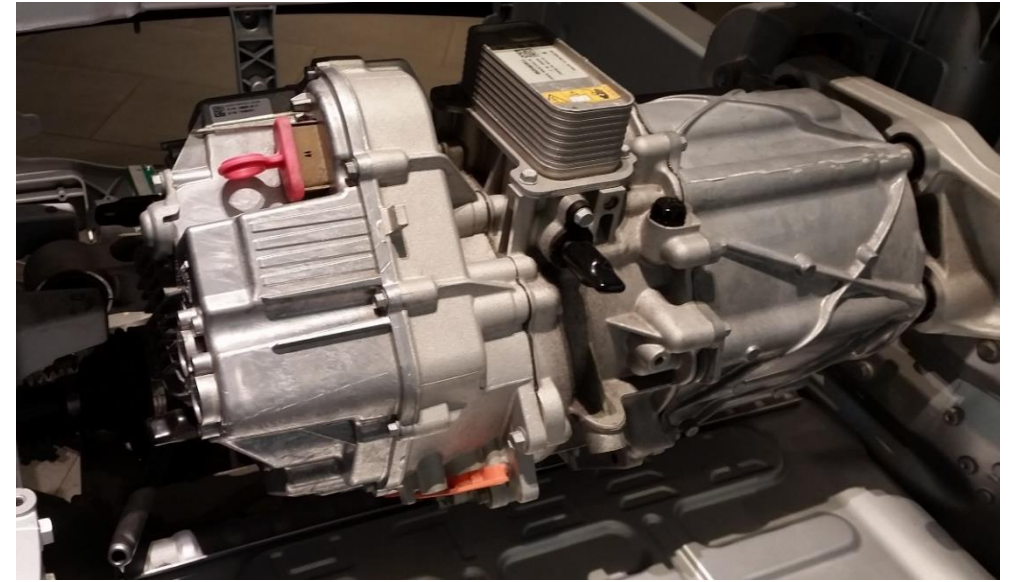
How we can help industry make the transition

Program B

Optimal design of charging and discharging infrastructure

- understand the existing fleet operation
- data collection and analysis
- considering 2nd life of batteries in stationary mining applications
- considering renewable sources in mining-towns as well as vehicle-to-grid operation

Tools, options and guidelines to design and operate infrastructure



How we can help industry make the transition

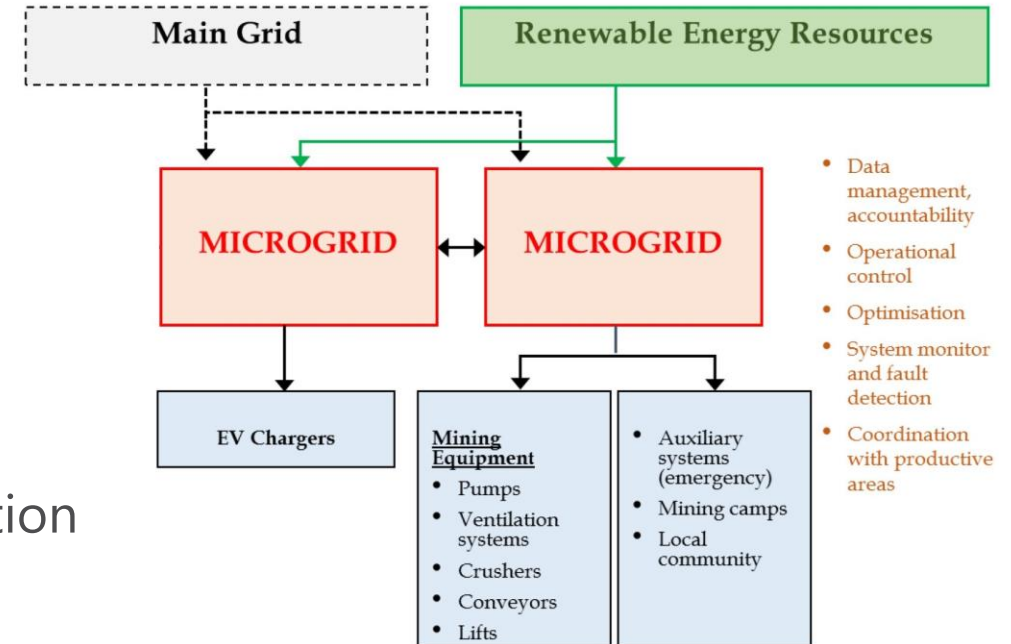
Program C

Design the backbone infrastructure for safe and continuous EV fleet operation

Integrate renewable/non-renewable energy in electricity network with sensors and communication

- designing modular and scalable solutions for 24/7 operation
- assessing multiple microgrid co-operation
- designing sensor/communication IoT network for EV monitoring and control

Tools, guidelines and designs for the infrastructure for EV fleet operation



How we can help industry make the transition

Program D

A microgrid/battery storage pilot study using the AESKB test system

Support EV fleet infrastructure using renewable resources and battery storage by

- design battery-supported EV fleet and infrastructure
- deploy AESKB microgrid/battery platform

Understanding capability of microgrid/ battery storage and future EV systems



Flexible Microgrid Test System: 270kW/270kWh



Battery energy storage system with multiple inputs

PV, wind, diesel, fuel cell and others

Proven technology: deployed for 12 months into the National Grid with full functionality and monitored operation

Available for commercial deployment for investigating specific needs of a mine site

- Renewables integration, EV charging, peak lopping, islanding, stability, starting current for large machinery & others

Hardware



(a)



(b)



(c)

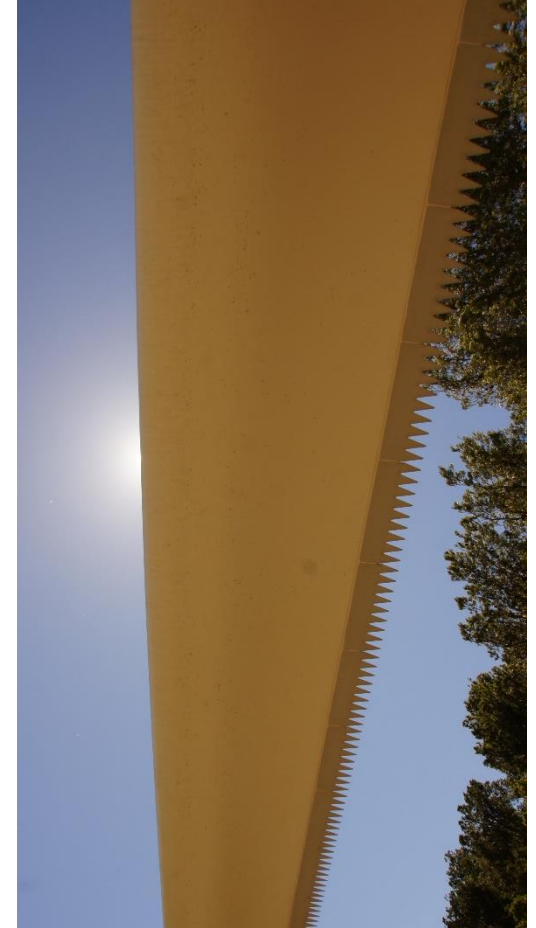
a) AC switchboard, (b) Automated circuit breaker, (c) Bi-directional Inverter.

How we can help industry make the transition

Program D

Training the workforce needed for the electrified mine

- General and bespoke training seminars
- organising specialised courses using local and international resources
- Courses ready to go





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