



# THE FUTURE OF ENERGY AND MANUFACTURING IN AUS

WITH DAVID MORGAN



# Agenda

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- Australian Manufacturing
- Energy cost background
- Energy cost implications
- Investment Outlook



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# Iron Matrix



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# Australian Manufacturing:

## A revival on the back of robots?

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- Iron Matrix Background
- Practical implications / costs
- Government tax cuts
- Effect on industrial property



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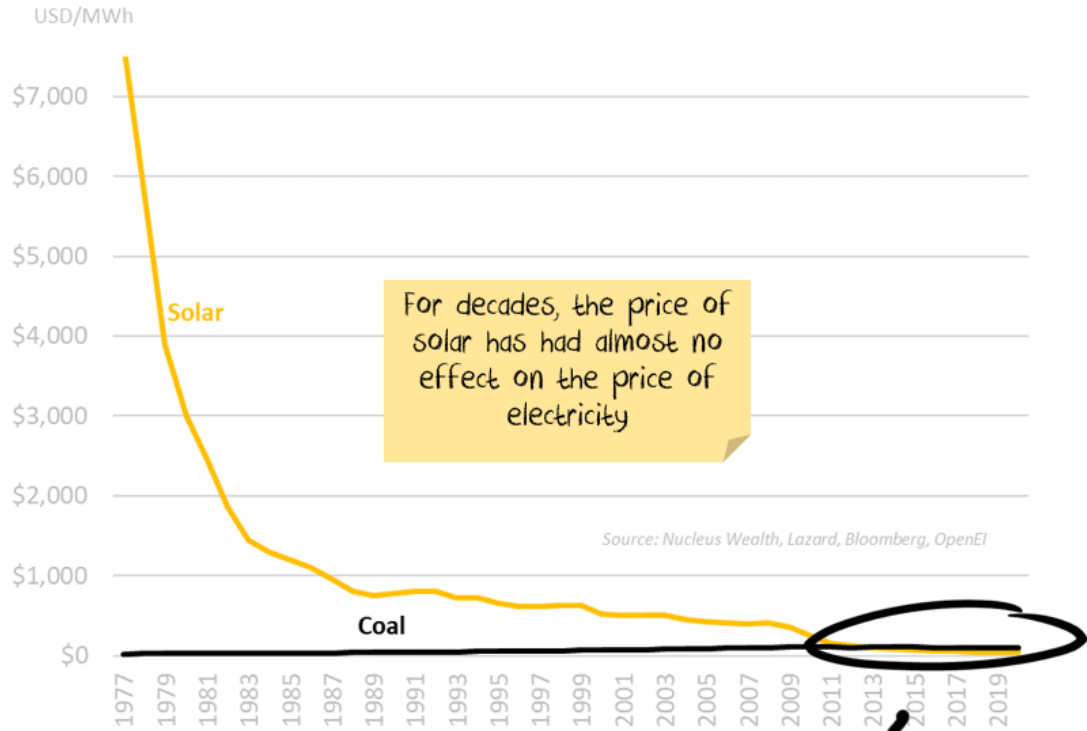
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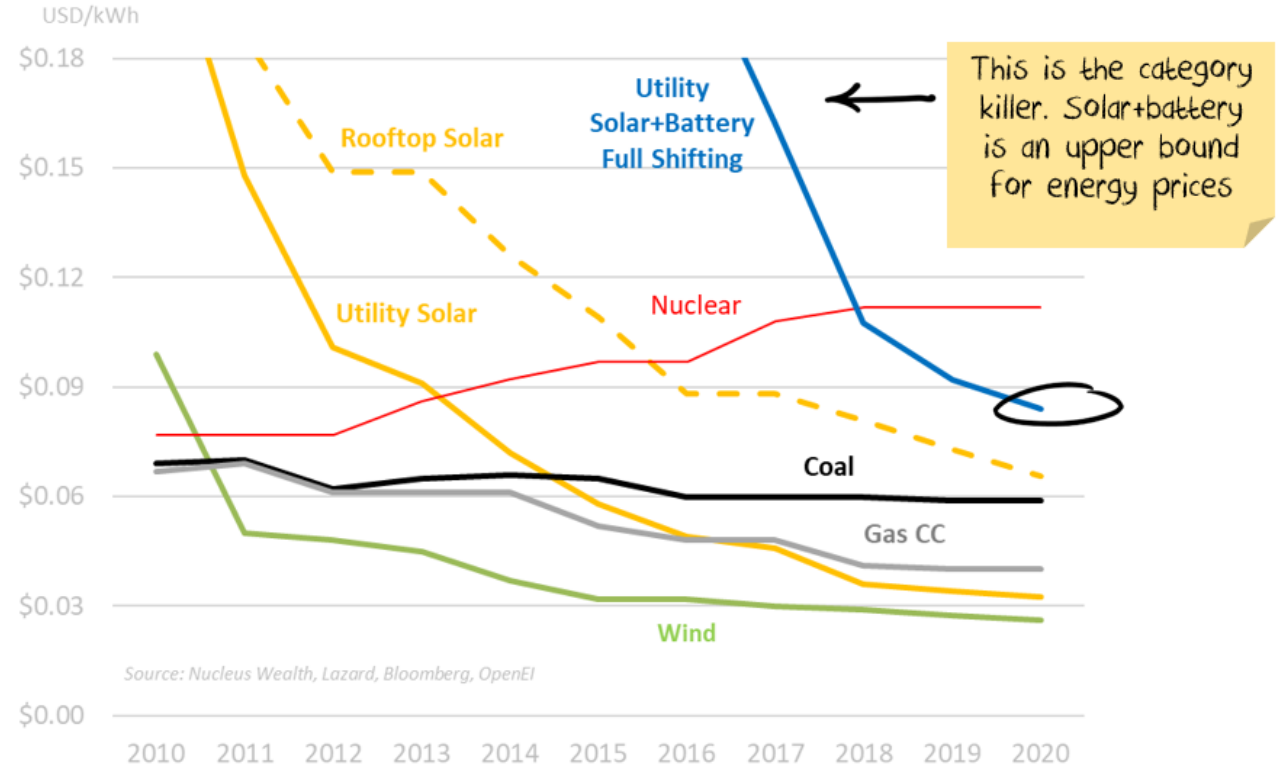
# Energy cost background:

## Solar = An upper bound for daytime energy costs

Long Term



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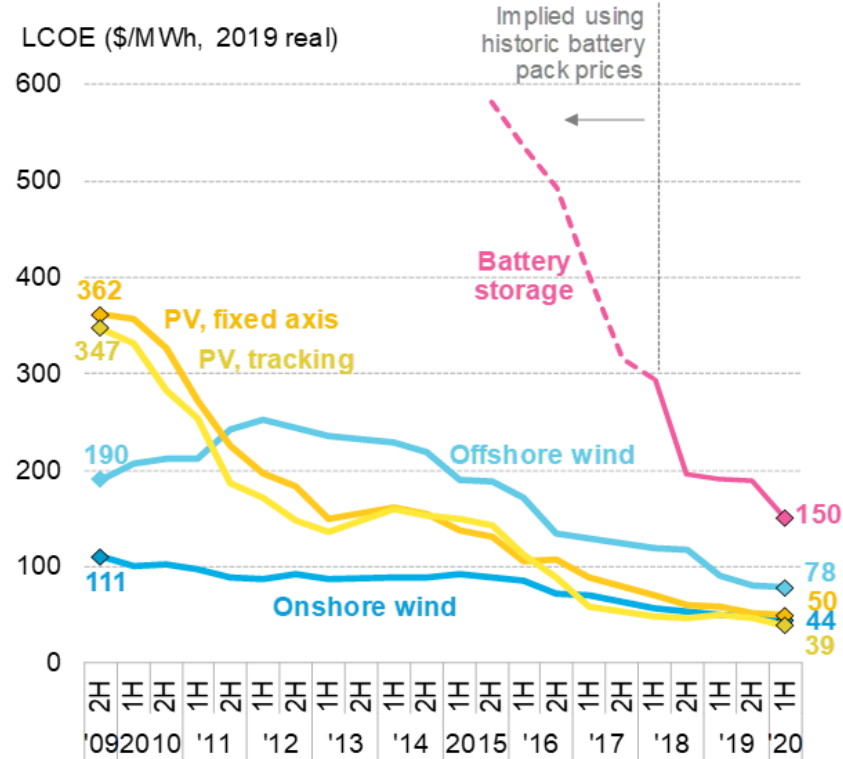
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# Energy cost background:

## Solar + battery = An upper bound for night-time energy costs

Figure 2: Global LCOE benchmarks – PV, wind and batteries



Source: BloombergNEF. Note: The global benchmark is a country weighted-average using the latest annual capacity additions. The storage LCOE is reflective of utility-scale projects with four-hour duration, it includes charging costs.



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# Energy cost background:

## Peak costs?

Levelized Costs (USD/kWh)	Levelised Cost Ex Fuel	Fuel	Total
Onshore Wind	\$ 0.03		\$ 0.03
Utility Solar	\$ 0.04		\$ 0.04
Natural Gas @\$3/mmmBtu	\$ 0.02	\$ 0.02	\$ 0.04
Natural Gas @\$6/mmmBtu	\$ 0.02	\$ 0.04	\$ 0.06
Coal @ \$50/Ton	\$ 0.04	\$ 0.02	\$ 0.06
Coal @ \$75/Ton	\$ 0.04	\$ 0.02	\$ 0.07
Utility Solar + partial battery	\$ 0.07		\$ 0.07
Coal @ \$100/Ton	\$ 0.04	\$ 0.03	\$ 0.07
Natural Gas @\$9/mmmBtu	\$ 0.02	\$ 0.06	\$ 0.08
Utility Solar + full battery	\$ 0.09		\$ 0.09
Offshore Wind	\$ 0.10		\$ 0.10
Nuclear	\$ 0.10	\$ 0.01	\$ 0.10

Utility solar and wind  
the cheapest option

And adding a partial  
battery to offset the  
evening load is now at  
parity with other costs

Source: Nucleus Wealth, Lazard, Bloomberg, Open EI



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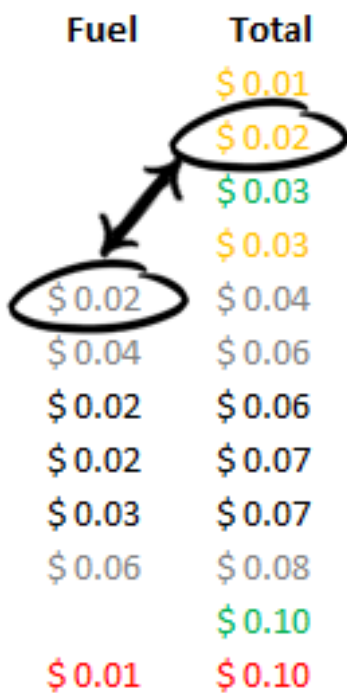


# Energy cost background :

## Peak costs?

Prices if solar+battery costs fall 20% p.a. for 5 years (USD/kWh)

	Levelised Cost Ex Fuel	Fuel	Total
Utility Solar	\$ 0.01		\$ 0.01
Utility Solar + partial battery	\$ 0.02		\$ 0.02
Onshore Wind	\$ 0.03		\$ 0.03
Utility Solar + full battery	\$ 0.03		\$ 0.03
Natural Gas @\$3/mmBtu	\$ 0.02	\$ 0.02	\$ 0.04
Natural Gas @\$6/mmBtu	\$ 0.02	\$ 0.04	\$ 0.06
Coal @ \$50/Ton	\$ 0.04	\$ 0.02	\$ 0.06
Coal @ \$75/Ton	\$ 0.04	\$ 0.02	\$ 0.07
Coal @ \$100/Ton	\$ 0.04	\$ 0.03	\$ 0.07
Natural Gas @\$9/mmBtu	\$ 0.02	\$ 0.06	\$ 0.08
Offshore Wind	\$ 0.10		\$ 0.10
Nuclear	\$ 0.10	\$ 0.01	\$ 0.10



If costs decline at 20% per annum (like they have for the last ten years) then in five years time, the cost of running new solar will be cheaper than the fuel cost of an existing power plant

Source: Nucleus Wealth, Lazard, Bloomberg, Open EI



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# Energy cost background :

## Peak costs?

Prices if solar+battery costs fall 10% p.a. for 5 years (USD/kWh)

### Retail Electricity Prices (USD/kWh)

Rooftop Solar (8% discount rate)

US

Rooftop Solar + partial battery

Rooftop Solar + full battery

Japan

Australia

European Average

Germany

Total

\$ 0.08

\$ 0.15

\$ 0.16

\$ 0.21

\$ 0.28

\$0.20-0.30

\$ 0.30

\$ 0.37

If costs decline at 10% per annum then networks will have to compete with consumers going "off grid"

Prices if solar+battery costs fall 20% p.a. for 5 years (USD/kWh)

Rooftop Solar (8% discount rate)

Rooftop Solar + partial battery

Rooftop Solar + full battery

US

Japan

Australia

European Average

Germany

Retail Electricity

\$ 0.04

\$ 0.09

\$ 0.12

\$ 0.15

\$ 0.28

\$0.20-0.30

\$ 0.30

\$ 0.37

If costs decline at 20% per annum then there will be major disruptions in retail electricity markets

Source: Nucleus Wealth, Lazard, Bloomberg, Open EI, Global Petrol Prices



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# Energy cost implications:

Losers easier to find than winners

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- Energy deflation
- When do batteries + solar fall below fuel cost
- Oil & Gas
- Land cost vs solar potential
- Exported energy
- Hydrogen
- Future demand for energy



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# Investment Implications:

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- Coal is done
- Large undeveloped reserves very suspect
- May be some short term demand/supply imbalances
- Unconvinced on nuclear
- Positive for economic growth
- Positive for energy intensive process (subject to pricing power)
- Some benefits in semis
- Robots tough
- Services interesting



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Coming up:

**Martin North**

**Principal, DFA, Walk The World**

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next

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# Viewer question of the week:

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**Do you believe Renewables will topple Fossil Fuels in the next decade?**

**Drop your answers in the comments**



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