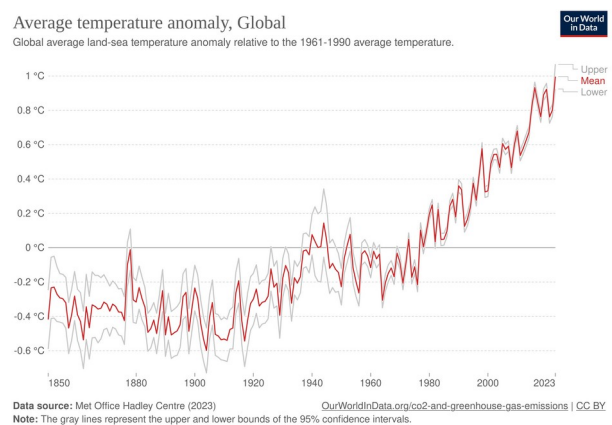
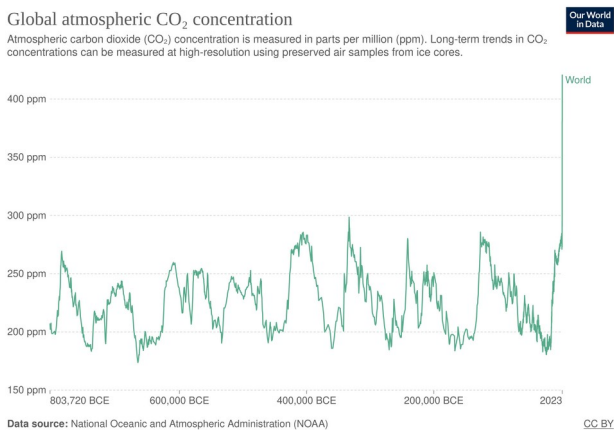


## The Rationale for Sustainable Futures Festival

The world is living through dramatic climate change at the moment as evidenced by the frequent severe heat related events witnessed on our TV screens. For 50 years climate scientists have been advising our leaders that this will occur and that it is caused by rising levels of Carbon Dioxide in the atmosphere, largely due to the burning of fossil fuels for energy but also industrial manufacture especially plastics. This pollution from the fossil fuels is causing Global warming, the consequences are fully described by [IPCC \(https://www.ipcc.ch/\)](https://www.ipcc.ch/) reports, based on the best scientific data available and consolidated into reports at 5 yearly intervals. Global warming threatens the futures of younger generations. Actions we all take now can significantly reduce the worst impacts of climate change. This is what Sustainable Futures Festival is about; **act now for a better future.**

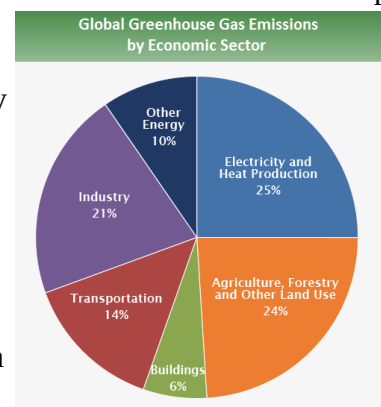
### Global Warming Cause

The first chart below shows the long term changes in global atmospheric CO<sub>2</sub> Concentrations. The pre-industrial revolution level average was 280 ppm or less. It now sits at around 420 ppm and still rising. The last time the world had this level of atmospheric CO<sub>2</sub> was over 3 million years ago and the temperature was 2.5 to 4°C higher. The trend towards higher temperatures is shown in the second chart. The world is now over 1.4°C warmer than historical levels. Consequentially, there is an urgent need to curb emissions. Our leaders have ignored the advise of scientists for 50 years and now we are on the brink of both human and ecological catastrophes due to our continued use of fossil fuels. **We need to reduce atmospheric CO<sub>2</sub> levels urgently.**



The importance of fossil fuels in our economy is huge. Australia is one of the top five exporters of fossil fuels in the world due to our coal and natural gas reserves. These are used worldwide for both energy and industrial processes especially steel manufacture. However, the best way to reduce emissions is to stop the use of fossil fuels. This is a harsh reality that Australia has to face. World wide the global emissions by economic sector are shown in this chart from IPCC . Energy and transportation make up 49 %, followed by Agriculture Industry and Buildings. Technology to avoid greenhouse emissions exist.

Energy is increasingly produce by renewable sources. Steel can be produced without coke, and world wide there are moves to do this using renewable sources of energy. Lately there have been new ways to manufacture concrete without emissions have been patented. Despite these developments, fossil fuel rich countries including Australia continue to develop new mines. This ensures the world will continue down the fossil fuel path for decades to come and this makes the reduction of atmospheric CO<sub>2</sub> levels more difficult going forward.



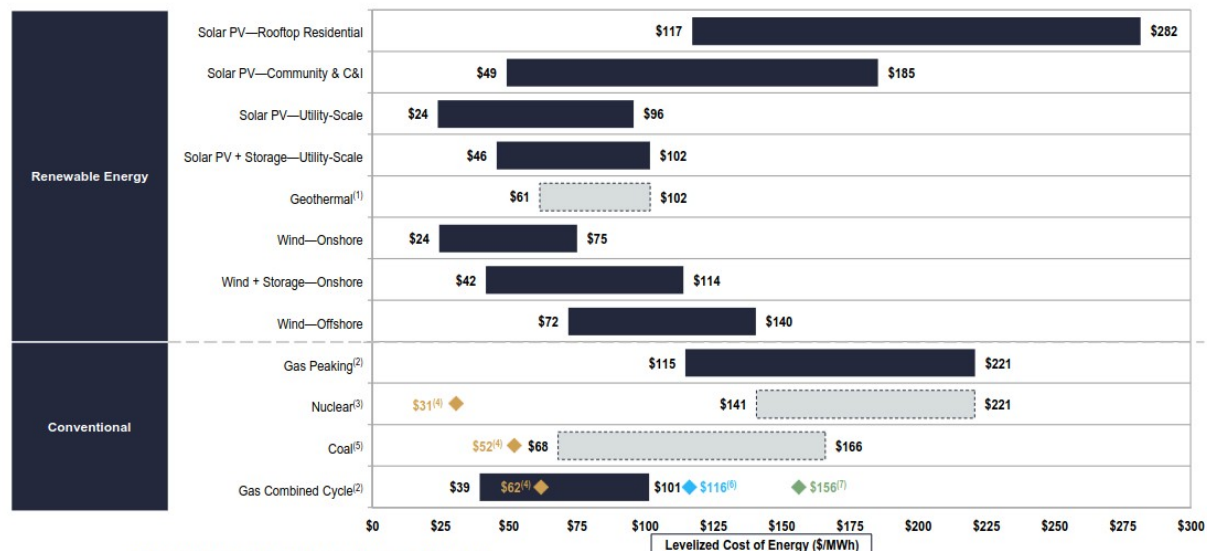
**However, there are plenty of reasons to be optimistic the worst impacts of global warming can be avoided.**

The technologies to reduce our fossil fuel use for Energy and Transport already exist and for energy at least, they are the lowest cost options for energy generation. This is clear from the Lazard Levelized Cost of Energy analysis below. This does not include any cost for pollution or it's worldwide consequences.



## Levelized Cost of Energy Comparison—Unsubsidized Analysis

Selected renewable energy generation technologies are cost-competitive with conventional generation technologies under certain circumstances



Source: Lazard and Roland Berger estimates and publicly available information.  
 Note: Here and throughout this presentation, unless otherwise indicated, the analysis assumes 60% debt at an 8% interest rate and 40% equity at a 12% cost. See page titled "Levelized Cost of Energy Comparison—Sensitivity to Cost of Capital" for cost of capital sensitivities.  
 (1) Given the limited data set available for new-build geothermal projects, the LCOE presented herein represents Lazard's LCOE v15.0 results adjusted for inflation.  
 (2) The fuel cost assumption for Lazard's unsubsidized analysis for gas-fired generation resources is \$3.45/MMBTU for year-over-year comparison purposes. See page titled "Levelized Cost of Energy Comparison—Sensitivity to Fuel Prices" for fuel price sensitivities.  
 (3) Given the limited public and/or observable data set available for new-build nuclear projects and the emerging range of new nuclear generation strategies, the LCOE presented herein represents Lazard's LCOE v15.0 results adjusted for inflation (results are based on then-estimated costs of the Vogtle Plant and are U.S.-focused).  
 (4) Represents the midpoint of the unsubsidized marginal cost of operating fully depreciated gas combined cycle, coal and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper- and lower-quartile estimates derived from Lazard's research. See page titled "Levelized Cost of Energy Comparison—Renewable Energy versus Marginal Cost of Selected Existing Conventional Generation Technologies" for additional details.  
 (5) Given the limited public and/or observable data set available for new-build coal projects, the LCOE presented herein represents Lazard's LCOE v15.0 results adjusted for inflation. High end incorporates 90% carbon capture and storage ("CCS"). Does not include cost of transportation and storage.  
 (6) Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Blue" hydrogen, (i.e., hydrogen produced from a steam-methane reformer, using natural gas as a feedstock, and sequestering the resulting CO<sub>2</sub> in a nearby saline aquifer). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is \$5.20/MMBTU, assuming \$1.40/kg for Blue hydrogen.  
 (7) Represents the LCOE of the observed high case gas combined cycle inputs using a 20% blend of "Green" hydrogen, (i.e., hydrogen produced from an electrolyzer powered by a mix of wind and solar generation and stored in a nearby salt cavern). No plant modifications are assumed beyond a 2% adjustment to the plant's heat rate. The corresponding fuel cost is \$10.05/MMBTU, assuming \$4.15/kg for Green hydrogen.  
 This study has been prepared by Lazard for general informational purposes only, and it is not intended to be, and should not be construed as, financial or other advice. No part of this material may be copied, photocopied or duplicated in any form by any means or redistributed without the prior consent of Lazard.

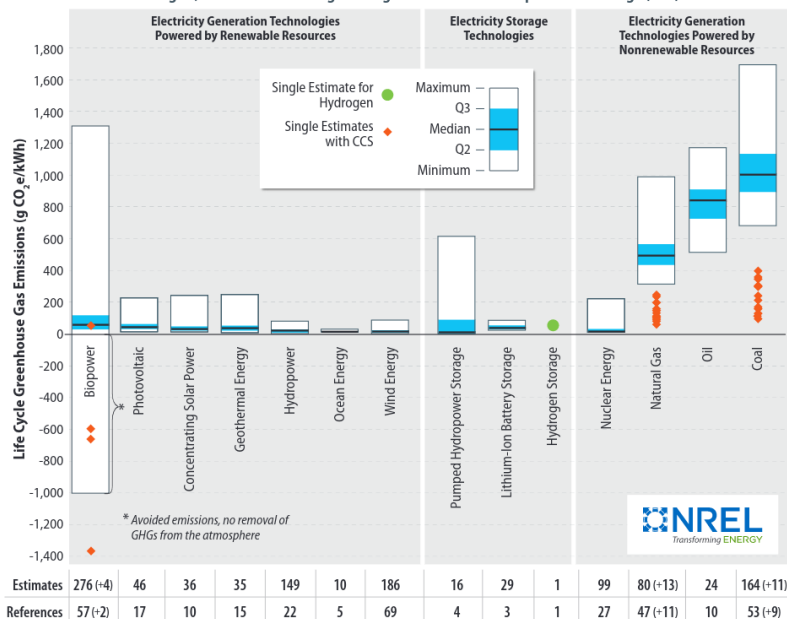


There are some who promote Nuclear, but this is very expensive and there are no Small Modular Nuclear Reactors that are in operation as yet. They will not be available for useful deployment for a decade or more. This is too late for our world. And who wants a nuclear waste dump in their back yard? There is no vacant land in Australia; all of the empty lands does belong to people who do not want a waste dump in their back yard, just like people in Gympie or any other urban zone.

The Lifecycle emissions of various energy generation systems is shown in the NREL chart below.

Any fossil fuel energy generation contributes to the massive cost of devastation we are now experiencing around the world which is exacerbated by climate change. This is caused by the CO<sub>2</sub> pollution associated with these fuels. The adoption of Carbon Capture

Figure 2. Life cycle greenhouse gas emission estimates for selected electricity generation and storage technologies, and some technologies integrated with carbon capture and storage (CCS).



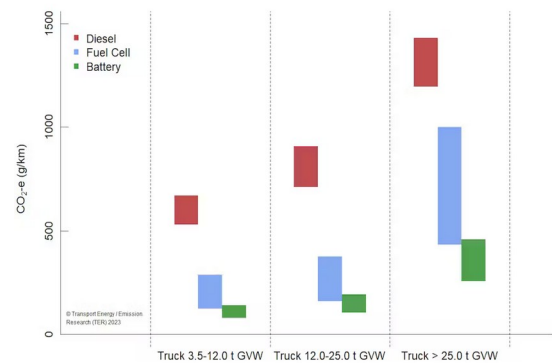
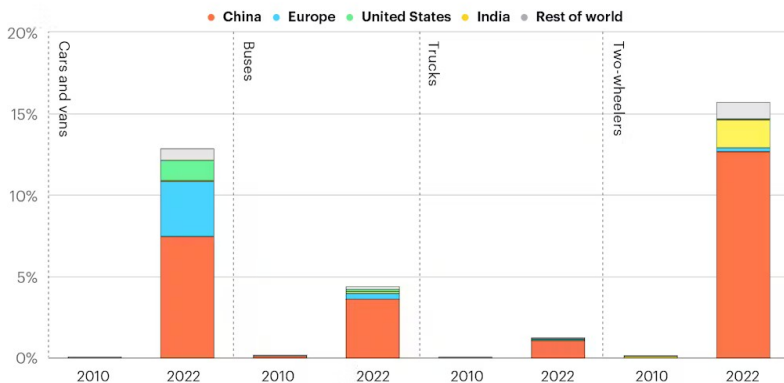
Notes for Figure 2: The number of estimates is greater than the number of references because many studies considered multiple scenarios. Numbers reported in parentheses pertain to additional references and estimates that evaluated technologies with CCS.

and Storage (CCS) has not been achieved successfully to date and must be considered as a speculative and unproven technology.

**Wind and Solar energy are clearly cost effective and must be adopted to replace coal and gas generators to reduce greenhouse gas emissions.**

In Transport, battery electric (BEV) vehicles are rapidly approaching lifetime cost parity with internal combustion engines (ICE) but also have a much lower lifecycle emissions. The charts below show the relatively slow adoption of BEVs over the 12 year period to 2022 and contrasts the emissions of heavy vehicles of different sizes in the Australian trucking environment.

Electric vehicle sales share by vehicle type and country, 2010 vs. 2022  
Global EV Outlook 2023



Plausible range in life-cycle emissions from Australian trucks separated by size and technology in the decarbonised scenario.

It is clear that BEV uptake has commenced but is highly variable around the world. The emissions advantage of BEV over both hydrogen fuel cell and diesel trucks is clear in the second chart above. Again, when the environmental and catastrophe costs are added to the fossil fuel costs, the decision to adopt BEV trucks should be clear. **Australians must adopt BEVs urgently to reduce the adverse impacts of global warming caused by using fossil fuels.**

Global warming is causing the following impacts:

- Increased frequency and severity of heat related climate impacts, i.e. floods, droughts, fires, heatwaves, which impact people by destroying lives, livelihoods, infrastructure. These may cause the spread of diseases, and certainly impacts our medical and hospital services due to increased need for help.
- Increased ocean temperatures which has already resulted in increased sea levels, but accelerated ice melt of the worlds ice fields in Greenland and Antarctica could cause sea levels to rise by up to 30 m and displace hundreds of millions of people, inundating many coastal cities and productive agricultural land.
- Disruption of the biological ecosystems, leading to [biodiversity losses](#) as many biota are restricted by human modified landscapes, minimising their chances of migration to alternative habitats. Also human food production systems could be jeopardised by the loss of pollinators of vital crops and production systems need to move to higher latitudes to maintain their productivity.

These impacts are world wide, and Gympie and Australia have not been immune. Heard the words unprecedented, worst in living memory, to describe some severe heat related events lately. It is extremely difficult to relate an individual weather event to global warming. But the increasing frequency of such things is evidence of the impact of global warming on our current climate.

**Gympie Regional Council’s (GRC) Environment Strategy** “will seek to achieve the following four outcomes:

- Council’s operations incorporate leading environmental practices
- biodiversity is conserved and enhanced and water quality is improved
- greenhouse gas emissions are minimised and our region is resilient to climate change

- community partnerships support a thriving environment.”

Sustainable Futures Festival will show visitors options they should adopt to reduce the impact of humanity on the world under the GRC objectives above:

“greenhouse gas emissions are minimised and our region is resilient to climate change”

- display technologies that we all can adopt to reduce our personal greenhouse gas emissions and displace fossil fuels from our economy, e.g. rooftop solar and battery systems, battery electric vehicles.
- improve the building energy efficiency of all houses to meet the latest standard to make these more suitable for the future climate we will endure, while reducing energy consumption. About 53.9 % of homes in GRC have solar, but many more could be fitted, especially in rental and social housing sectors.
- encouraging the adoption of sound waste sorting to facilitate recycling, reuse or re-purposing of unwanted goods, while organic matter can be mulched or composted enriching local gardens and diverting this material from GRC’s landfill, GRC’s largest single source of greenhouse gas emissions.

“biodiversity is conserved and enhanced and water quality is improved”

- encouraging the use of native plants in gardens to make the urban zone more friendly for our local wildlife, increasing our urban areas resilience and reducing the water required to maintain these areas.
- encouraging the protection of natural environments and enhancing degraded environments to support biodiversity
- encouraging water conservation by adopting water conservation strategies and household water tanks and reducing demand on the Mary River’s water.
- promoting the adoption of best practice land management so that soils and productivity are protected or improved and water quality is maintained.

“community partnerships support a thriving environment”

- The community is behind this event, Gympie and District Sustainability Alliance and Gympie Landcare Group are making it happen, but most other local conservation groups are also attending.
- We anticipate 1000+ will visit this free event to look, learn, listen and discuss options that they may be able to adopt to make a positive difference.
- Feedback from prior events (EnviroTech Gympie) has been positive from visitors and stallholder, with one local BEV retailer observing that people understood BEV as they has been to Envirotech Gympie events.

Sustainability Futures Festival will support the GRC environmental strategies and help the world minimise the worst impacts of Global warming. Everyone can make a difference. Take action now to make a better future.