

# RESTORING SCIENTIFIC INTEGRITY

The Onus is on Parliament to Scientifically Justify  
Climate Policies Costing Trillions of Dollars



# Contents

Foreword.....	1
Executive summary .....	2
Robust scientific evidence must underpin sound policy development.....	3
Examining CSIRO’s scientific claim.....	4
Summary of Discussions .....	5
1. Introduction .....	5
2. CSIRO relies on discredited and poor quality papers for “evidence” .....	5
Marcott’s 2013 paper explained.....	5
Lecavalier (2017) paper explained .....	6
3. CSIRO cites poor quality papers on the effect of CO2 from human activity.....	6
Harries (2001) & Feldman et al (2015) papers explained .....	6
4. CSIRO showed little to no understanding of their chosen scientific papers.....	7
5. CSIRO resorts to unvalidated models that give unverified projections, as evidence .....	7
6. CSIRO admits to no due diligence of data from external agencies.....	8
7. CSIRO allows politicians to mis-represent CSIRO science without correction.....	8
8. CSIRO misleads the parliament.....	8
9. World-leading scientists confirm CSIRO’s sloppy “climate science” .....	9
10. CSIRO has never quantified any specific impact of carbon dioxide from human activity .....	9
Chief Scientist.....	9
11. Unfounded political claims and unfounded policy .....	9
Conclusions .....	11
Recommendations .....	12
References .....	13
Appendix A.....	13
Appendix B .....	13

## Foreword

### Examining the scientific validity for climate policies

As a private citizen, I spent eleven years trying to hold politicians and agencies accountable for their unsubstantiated and unscientific claims that carbon dioxide from human activity is causing global warming and needs to be cut.

Many politicians of all major parties told me, and told the public generally, that climate policies are based on CSIRO's advice.

From cross-examining CSIRO prior to entering the senate, it was clear that CSIRO's reports and claims lacked empirical evidence of human causation.

My election as a senator in 2016 gave me the opportunity to ask questions of CSIRO directly, thanks to former Senator Arthur Sinodinos as Minister for Science who arranged our meetings.

In 2016 Senator Ian Macdonald, father of the senate, said there had never been a parliamentary debate on climate science in the Senate. Despite this, climate policies costing billions of dollars and leading to trillions of dollars in economic losses had been supported through the parliament.

In 2016/2017 I held meetings with the head of the CSIRO, Dr Larry Marshall, and his entire senior climate science team. This included executives who managed CSIRO's climate research team and who report directly to Dr Marshall, as well as the heads of the climate research team and various CSIRO administrative and public relations personnel, together with representatives from the relevant government departments.

\*\*\*\*\*

With an Honours degree in Mining Engineering, my education covered atmospheric gases, including carbon dioxide. Engineers apply what scientists discover and my management and leadership roles in industry included responsibility for hundreds of people's lives based on my knowledge of atmospheric gases. Keeping people working safely and productively in hazardous underground conditions requires the application of scientific principles and the scientific method. I have followed the scientific method in my examination of the empirical evidence proving the cause of climate variability.

My Masters study in Business at the University of Chicago Graduate School of Business and my study of engineering included courses on statistics that are essential for understanding data.

## Executive summary

This report provides a summary of the discussions and transcripts from meetings with CSIRO. Additional links in the References section give an in-depth appreciation of analysis of the evidence provided by CSIRO.

In the context of seeking CSIRO's empirical evidence to justify climate policies, I know that CSIRO:

- a) has never stated that carbon dioxide from human activity is dangerous.
- b) admitted that temperatures today are not unprecedented.
- c) withdrew discredited papers that it had cited as evidence of unprecedented rate of temperature change and then failed to provide supporting empirical evidence.
- d) has never quantified any specific impact of carbon dioxide from human activity.
- e) relies upon unvalidated models that give unverified and erroneous projections as "evidence."
- f) relied on discredited and poor quality papers on temperature and carbon dioxide.
- g) admits to not doing due diligence on reports and data from external agencies.
- h) revealed little understanding of papers it cited as evidence.
- i) allows politicians and journalists to misrepresent CSIRO science without correction.
- j) misled parliament.

Seventeen internationally respected climate scientists from Australia and five other nations verified our conclusions about CSIRO.

In conclusion, CSIRO's science on the matter of climate for policy making, amounts to a gross misleading of Parliament. The onus of proof is now on Parliament to provide the empirical scientific evidence proving that carbon dioxide from human activity needs to be cut, and until that is provided, government must immediately stop wasting billions of dollars on climate policies.

## Robust scientific evidence must underpin sound policy development

Australian politics has been seduced into endorsing policies aiming at decarbonising and consequently deindustrialising our economy from 2050.

At the core of the climate claims that push policies to cut the human use of hydrocarbon fuels like natural gas, coal and oil, is the claim that the output of carbon dioxide from burning those fuels is warming our planet, and that warming is a danger to humans and to our planet.

Fundamentally, “hydro-carbon” fuels contain atoms of hydrogen (H) and carbon (C). When burned in air that is rich in oxygen (O) the hydrogen atoms combine with oxygen atoms to form H<sub>2</sub>O, water vapour and the carbon atoms combine with oxygen to form CO<sub>2</sub>, carbon dioxide. Both CO<sub>2</sub> and H<sub>2</sub>O are entirely natural and essential to life on earth. Further details are provided in the link to *Appendix B* in References.

Politicians have the highest duty of care to base all policies on rigorous scientific evidence, especially policies that bring about radical change with severe consequences for people’s livelihoods and lifestyle. Expensive policies need justification, with impacts specified and quantified before implementation, and this can only be achieved when based on the solid scientific evidence that proves causation.

Our nation’s productive capacity, economic sovereignty and economic resilience have been decimated by climate policies and we are on the slide from independence to dependence on other nations.

Climate policies and renewables subsidies are already costing households \$13 billion per year on their electricity; \$1,300 for each Australian household. High electricity prices are dismantling our productive economy. Manufacturing, agriculture, small and large businesses cannot flourish under increasing electricity prices. Energy intensive industries and value-added processing of food and minerals are moving to countries with cheap energy.

China, India and Asia use Australia’s high-quality clean coal to generate affordable power, while electricity from the same coal under Australian climate policies, has a price three times as high. Australia once had the world’s cheapest electricity. Now electricity prices are among the world’s highest.

For a country that produces 75% more food than it can consume, our food is becoming more expensive and food security is at risk due to climate policies ravaging agriculture. Farmers have not only lost some of their rights to use their land, government intervention monitors almost all farming inputs, requiring layers of expense passed onto the consumer.

## Examining CSIRO's scientific claim

### **CSIRO's First Presentation** – Monday 26 September 2016 – Sydney

I requested CSIRO provide empirical scientific evidence proving carbon dioxide from human activity affects temperature and climate and needs to be cut.

CSIRO confirmed they rely entirely on unvalidated and erroneous climate models.

### **CSIRO's Additional Two Presentations** – Wednesday 10 May & Wednesday 26 July 2017 – Canberra

In May 2017 I requested CSIRO to present the empirical scientific evidence showing anything unprecedented in climate during the last 10,000 years.

CSIRO presented their choice of scientific evidence. Discussions raised many contentious issues and outcomes of those discussions are in section 2 – *CSIRO relies on discredited and poor quality papers*.

### **CSIRO's Attendance at Senate Estimates** - Thursday 24 October 2019 & Wednesday 4 March 2020

At Senate Estimates in March I asked CSIRO for the empirical scientific evidence proving that there has been a statistically significant change in climate, including any statistical change at all in any climate factor such as temperature, rainfall, drought, storm activity and ocean alkalinity. The CSIRO representatives stated CSIRO evidence was in the correspondence already provided. That statement is false.

Details of CSIRO's first, second and third presentations and our responses are available in Appendix A.

Australia's federal parliament Hansard provides a full transcript of our fourth exchange in Senate Estimates.

## Summary of Discussions

### 1. Introduction

CSIRO is Australia's premier research institution and as politicians we need to have unequivocal confidence in the quality of its research, scientific process and scientific evidence. We need to know that CSIRO are deeply committed to due diligence, knowing that its work forms the basis of wide-ranging policy decisions.

With more than a decade of research and analysis and of questioning experts worldwide, I found CSIRO, in terms of climate research, did not meet the high standards we expect of our premier research institution.

In terms of climate science, following are the key themes that emerged from our examination of CSIRO on its "evidence" that is used to justify a current investment of tens of billions of dollars into climate policies, and a fundamental restructuring of our economy that will cost Australians trillions of dollars.

### 2. CSIRO relies on discredited and poor quality papers for "evidence"

Marcott's 2013 paper explained<sup>1</sup>

At CSIRO's second presentation where I requested evidence for anything unprecedented in climate, CSIRO after almost 50 years of climate research, provided one sole paper; Marcott (2013). This paper purported temperatures as unprecedented.

Under further examination, CSIRO admitted that today's temperatures are NOT unprecedented. In addition, CSIRO representatives were surprised to learn from my team that within two weeks of the release of Marcott paper in 2013, its flaws had been comprehensively exposed. Marcott was forced to admit that and said, quote: "the 20<sup>th</sup> century portion of our paleo-temperature stack is not statistically robust, cannot be considered representative of global temperature changes."

The Marcott 2013 paper declared that his process could not be used to detect any event, including temperature variability, in periods shorter than 300 years. It is perplexing that CSIRO chose this paper to demonstrate that temperature is unprecedented, when Marcott himself, declared that it could not.

In summary the Marcott process could not have detected a past occurrence similar to the current climate cycles we measure today. It is therefore impossible to know from Marcott's paper whether current cycles are unprecedented or not. In other words, *the current warming in the climate cycle cannot be known to be unprecedented.*

Marcott's original PhD thesis did not show the recent warming in Marcott 2013 that CSIRO presented. This warming uptick was added later when two UN climate body authors joined him, and they altered (without documentation) some of the critical data from the referenced papers. This resulted in a fabricated temperature uptick based on using one point that is an extreme outlier. This is unscientific and further invalidates the paper.

This led to CSIRO withdrawing Marcott's paper as CSIRO representatives agreed that his paper did not scientifically justify their claim and was scientifically discredited.

---

<sup>1</sup> For technical details refer to Checkvist link in Appendix A



Lecavalier (2017) paper explained<sup>2</sup>

CSIRO's request for an additional meeting (July), was an opportunity to provide evidence for claiming an unprecedented rate of recent warming. After the Marcott debacle, CSIRO representatives presented a Lecavalier (2017) paper. In that paper the conclusion of recent warming is based on only two wildly and obviously erroneous data points in one short ice-core reported in the paper.

Comparison of Lecavalier's 1960 and 1985 temperature data points with the four global temperature series, shows that these two temperatures points are wildly inaccurate. Calculating any rate of change from these two points could not be more wrong; in fact, it is unscientific. CSIRO seemed unaware of the inaccurate points on which Lecavalier relied and unaware of the resultant unscientifically fabricated process used to calculate that rate of change.

The paper's lead author withheld the raw data that may have helped determine whether changes similar to the current changes could have been detected in the long cores.

Lecavalier used the data from two different instruments in his report; one that detects small changes in temperatures over small timeframes (showing spikes) and another that detects average temperatures over a longer period (not showing high/low spikes). It is ludicrous to claim times of unprecedented rates of change in temperature in a chart that has been created from two different data sets from two different instruments.

Despite glaring breaches of scientific integrity and of process, CSIRO relied upon Lecavalier to make a CSIRO claim of unprecedented rate of temperature change. This is verifiably nonsense and unscientific.

### 3. CSIRO cites poor quality papers on the effect of CO<sub>2</sub> from human activity

Harries (2001) & Feldman et al (2015)<sup>3</sup> papers explained

Harries (2001) was the sole paper cited for CSIRO's claim of an unprecedented level of atmospheric carbon dioxide, yet this paper could not support CSIRO's claim.

CSIRO has stated that the current CO<sub>2</sub> concentrations are unprecedented, yet there are gaps of up to 6,000 years in the data that Harries used. Under those circumstances, the current blip in atmospheric carbon dioxide levels rising 0.009 per cent over the last 60 years would not be detectable. CSIRO seemed unaware of the flaws of the Harries' paper due to the unscientific and statistically invalid methodology used.

After the failure of Harries' paper to support CSIRO's CO<sub>2</sub> claims, CSIRO offered the Feldman et al (2015) paper. Incredibly the Feldman paper refutes the Harries paper, and ongoing discussions raised even more objections to the Harries' paper.

CSIRO then shifted focus to ozone, not at all relevant to a point being made on carbon dioxide. CSIRO then cited two additional papers spanning just 10 years or less. Neither paper specified the amount (if any) attributed to carbon dioxide from human activity.

---

<sup>2</sup> For technical details refer to Checkvist link in Appendix A

<sup>3</sup> For technical details refer to Checkvist link in Appendix A

#### 4. CSIRO showed little to no understanding of their chosen scientific papers

How can CSIRO offer up four scientific papers and show limited understanding of them? Instead CSIRO made a series of assertions and conclusions that were imprecise, weak and unscientific.

CSIRO is a federally funded body and members of parliament rely, unreservedly, on the quality of CSIRO's science to inform policy development. CSIRO have a duty of care to exercise scientific integrity and politicians have a responsibility to ask questions to verify the data and claims.

CSIRO's appearance at these meetings with the four papers discussed in this report, which CSIRO had not read nor understood in their entirety, is reprehensible. It may be that the academic and intellectual arrogance of CSIRO prevented them from appropriate preparation and expected that we would glaze over at the sight of a few scientific papers. Or more likely, that CSIRO could not genuinely offer any empirical evidence for climate policies, hence their poor performance at these meetings.

#### 5. CSIRO resorts to unvalidated models that give unverified projections, as evidence

Science is the study of the physical and natural world through observation and experiment. The ability to verify observations and replicate experiments is required, or the results are not of sufficient integrity to be used in public policy.

For the Anthropogenic Global Warming hypothesis to be scientifically accepted, it must be based on physical data. During the first meeting it was confirmed that CSIRO relies on unvalidated computerised climate models, not physical data.

##### **This is an admission of CSIRO's lack of empirical evidence proving causation.**

There are many aspects of our climate that are not fully understood, including clouds and updrafts which we simply do not understand at any level. Without a more complete understanding of the factors that can affect the global climate, models provide an incomplete and limited understanding of carbon dioxide's role in the global climate system.

Climate model failures are demonstrated by their output which consistently over-predict warming trends compared to the physical data and observations. The erroneous results are not only the result of having limited knowledge of the factors affecting global climate, but due to the fact that modellers are trying to show carbon dioxide to be the main factor in driving temperature, which is blatantly false.

The sensitivity of climate feedbacks on the climate systems are tested using Forcing Feedbacks Models (FFM). These model projections show the upper troposphere will be warmer and more humid, when the reverse is true: the upper troposphere is now cooler and less humid. This is important because the upper troposphere emits more than half of all the heat the Earth loses to space, and when this result is the reverse of reality the model cannot be correct.

CSIRO has allowed policy makers to have confidence in climate models and that has led to economically destructive policies to be placed on the Australian economy.

CSIRO has failed to uphold its scientific integrity and has become complicit in unnecessary and destructive policies that have been implemented on CSIRO's advice.

## 6. CSIRO admits to no due diligence of data from external agencies

When CSIRO's chosen papers were unable to definitively support its claims, CSIRO then offered the UN's Intergovernmental Panel on Climate Change (UN IPCC) report, which also relies on unvalidated and inadequate climate models. This climate report has no empirical data within a logical scientific framework proving that carbon dioxide from human activity affects climate.

Alarming, and despite relying on the UN's climate reports, CSIRO admitted that it has never done due diligence on the UN IPCC or its reports. The UN IPCC has never provided empirical evidence proving carbon dioxide from human activity affects climate and needs to be cut. The UN IPCC relies entirely on unvalidated and erroneous computerised numerical models that reflect a poor understanding of climate. It's well known in the climate science community that the conclusions reached in UN IPCC reports are both highly contentious and highly politicized.

CSIRO admitted doing no due diligence on the Bureau of Meteorology's (BOM) temperature data, on which it initially relied on in our first meeting, before withdrawing discussion on that data. Consider the controversy around BOM, in which scientists have empirical evidence to prove that BOM adjusts their data; including cherry picking and omitting data, corrupting temperature measurements and manipulating the temperature record to increase warming trends, and removing periods of flat unchanged temperature. Failing to do due diligence on BOM data is not prudent and not scientific.

## 7. CSIRO allows politicians to mis-represent CSIRO science without correction

As previously mentioned, during CSIRO's first presentation I asked about the widely held perception in the community and among politicians that human CO<sub>2</sub> is dangerous. Dr Alex Wonhas (Executive Director, Environment, Energy & Mineral Resources) refused to say there is any danger from carbon dioxide from human activity, and suggested we ask ministers and politicians to state the source of their claims of danger. According to CSIRO, they have never advised politicians that CO<sub>2</sub> is dangerous.

Chief Executive Dr Marshall has neglected to fulfil his responsibilities to ensure that CSIRO addressed inaccurate climate claims and advice that Ministers, the public and media had attributed generally, yet falsely, to CSIRO. CSIRO appears to not correct politicians, academics or journalists who make false, alarmist or exaggerated statements on climate, and allow CSIRO reports to be misrepresented.

## 8. CSIRO misleads the parliament

Broadly speaking, the "evidence" CSIRO provided as a basis for climate policy development and coming from inadequate climate modelling or discredited scientific papers, is a gross misleading of the Parliamentary process.

Quite specifically at Senate Estimates (October 2019 & March 2020), in the presence of Dr Larry Marshall, Dr Peter Mayfield, (CSIRO's Executive Director Environment, Energy and Resources) stated falsely to the panel of senators that CSIRO had provided me with the statistically significant data proving there has been climate change outside of natural, cyclical variation.

The examination in Appendix A of the data CSIRO provided clearly shows that there has been no statistically significant data provided, and I question Dr Mayfield's conduct, competence and integrity in making that claim.

The Parliamentary Library has provided a heavily redacted copy of correspondence dated 9 August 2017 from Dr Larry Marshall, CSIRO Chief Executive, to Minister Sinodinos that came to light under a third-party Freedom of Information request. This raises serious questions of Dr Marshall.

## 9. World-leading scientists confirm CSIRO's sloppy "climate science"

World-leading atmospheric climate scientists, climatologists and geologists who are experts in understanding the earth's climate, were shocked at the calibre of CSIRO's work. In recent months I have interviewed 17 scientists and made many video recordings.

They confirm the following:

- computerised numerical climate models are based on poor understanding of real-world climate and are misleading and not adequate to justify policy;
- the Marcott paper is exceptionally poor and provides no evidence of unprecedented temperatures nor of unprecedented rate of temperature change; similarly, Lecavalier and Harries.

Previously over the years I have consulted many scientists from around the world and read the work of many others, who are all highly concerned about the work of CSIRO and/or the UN's climate body. These include retired senior CSIRO scientists concerned about CSIRO's abandonment of science due to politicisation as a result of CSIRO's dependency on government funding.

## 10. CSIRO has never quantified any specific impact of carbon dioxide from human activity

CSIRO acknowledged the need for empirical data within a causal framework that proves cause-and-effect, yet failed to prove that carbon dioxide from human activity causes significant global warming or climate change.

CSIRO never specified the amount of temperature changes attributed to carbon dioxide from human activity.

CSIRO did offer a six-point causal chain, yet none of the six points specified the amount of change that humans allegedly caused. CSIRO has not even claimed that any of its stated points caused one hundredth of a degree of temperature rise. Thus, there is no basis for policy.

### Chief Scientist

The Chief Scientist, Dr Alan Finkel, has made many strong public statements on climate, however in our meeting with him on Monday 27 March 2017, he admitted that he is not a climate scientist and does not understand climate science in detail. On that basis, the Chief Scientist agreed to a further meeting, which he did not attend, and Minister Sinodinos sent CSIRO in his place.

In our March 2017 meeting Dr Finkel failed to provide the empirical scientific evidence proving CO<sub>2</sub> from human activity needs to be cut.

## 11. Unfounded political claims and unfounded policy

During the examination of CSIRO's "evidence" to justify the cutting of carbon dioxide CSIRO cited the discredited Marcott (2013) and later the Lecavalier (2017) papers as its best evidence. Apart from the unscientific approach in both papers, we need to ask what evidence was being used prior to 2013 that served as the basis for:

- a) Prime Minister Bob Hawke's policies in the 1980's aimed at cutting carbon dioxide from human activity;
- b) Prime Minister John Howard's introduction of the Renewable Energy Target, and his government's policy of compliance with the 1996 UN Kyoto Climate Protocol and the consequential stealing of farmers' rights to use their land for compliance with the UN's Kyoto Protocol.

The apparent issue of climate and the evidence being used for policies and spending, inherited from one prime minister to the next, has never had the benefit of parliamentary scrutiny to justify policy development, until now.

I have asked many politicians - Prime Ministers, Ministers, former Ministers, MPs, public servants and others - the basis of Australian government climate policies. They state they rely on CSIRO. Yet documents from Freedom of Information searches, parliamentary library research and public cross-examination of CSIRO, reveal that CSIRO has never produced any empirical data proving that carbon dioxide from human activity affects climate and needs to be cut. Nor does it appear that CSIRO has ever presented such evidence to politicians.

The onus of justifying climate and energy policies is now on federal and state governments.

This start of a parliamentary cross-examination has revealed the publicly funded CSIRO climate group has demonstrated a shameful lack of due diligence, competence and scientific integrity.

CSIRO's descent into political advocacy is destroying the reputation of the once-respected premier research institution.

## Conclusions

1. CSIRO's evidence for unprecedented change was easily refuted and a major breakdown of the peer-review system was revealed in Marcott and Lecavalier.
2. CSIRO provided no quantified evidence that humans are responsible for any particular amount of change, in any climate factor, nor climate variable.
3. CSIRO would not attribute danger to carbon dioxide from human activity and have not provided evidence to allow any politicians, including ministers, to attribute danger.
4. CSIRO stated that the determination of danger was a matter for the public or for politicians.
5. Australian climate policies have never been based on empirical evidence and logical scientific reasoning.
6. After reviewing the peer-reviewed papers that CSIRO cited, it is inconceivable that government policy should be based on the unverified assumption that a peer-reviewed paper is accurate, and contains the best available research. That is particularly so when key data has been unscientifically fabricated.
7. As Australia's premier government-funded climate science agency, CSIRO's gross deficiencies need to be investigated to establish reasons for CSIRO's deterioration.
8. The fact that CSIRO abrogated claims of danger to government ministers reveals that it has been afraid to speak out about obvious politically-driven deviations from science.
9. Integrity and accountability need to be restored for both research and for presenting scientific conclusions, as well as for scrutinising political claims and policies supposedly based on science.
10. The CSIRO climate group's pathetic and inadequate case does not justify spending tens of billions of dollars, nor does it justify the destruction of trillions of dollars of wealth as a result of climate policies that hurt families, export Australian jobs and erode national security.
11. The onus is now on the federal parliament to scrap climate policies unless CSIRO can provide accurate, repeatable and verifiable empirical scientific evidence, within a logical scientific framework, that proves carbon dioxide from human activity detrimentally affects climate variability and needs to be cut. Further, the proposed cuts need to be specified in terms of the amount, the impact and effects, together with the costs of making and not making the cuts.

## Recommendations

1. Until the government provides scientific proof of specific quantified effects of human carbon dioxide, all climate policies need to stop immediately.
2. Australia needs a Royal Commission into climate science to restore scientific integrity into all government-funded climate-related science.
3. Australia needs to consider measures to ensure ongoing scientific integrity, including an Office of Science Integrity. Such an office would:
  - a) ensure scientific accuracy and robustness of all science used as a basis for policy development;
  - b) present a more accurate picture of science and guard the people of Australia against political interference in science and against vested interests misinterpreting science for personal gain;
  - c) establish a mechanism to fact check and review the science being used to establish policy;
  - d) manage the mandatory public posting of the science supposedly justifying policy that is claimed to be based on science. This is a policy proposal from America's administration to ensure public scrutiny in the same way that transparency portals have been successful in increasing public service accountability for expenditure in American states.
4. The employment of CSIRO's Chief Executive, Dr Larry Marshall and of Dr Peter Mayfield, needs to be reviewed. Both these executive officers contributed to tarnishing CSIRO's reputation for scientific integrity. Scientific integrity needs to be restored and given the behaviour of Drs Marshall and Mayfield and their failure of oversight as a minimum they would seem not capable of restoring scientific integrity.
5. The parliamentary debate that has never been held, needs to start with parties that are advocating climate policies by presenting to parliament their empirical evidence in a framework proving causation and justifying their climate policies with specific quantified targets and impacts.

## References

### Appendix A

The cross-examination of CSIRO's climate case with a description of the process we followed with CSIRO and containing peer-reviewed scientific references is at:

<https://checkvist.com/checklists/635622>

### Appendix B

Properties of CO<sub>2</sub> is at: <https://www.malcolmrobertsqld.com.au/properties-of-carbon-dioxide/>