



Fuel for thought

Understanding Decarbonisation

The drive towards a lower-emissions and more sustainable future for the global economy is gathering pace.

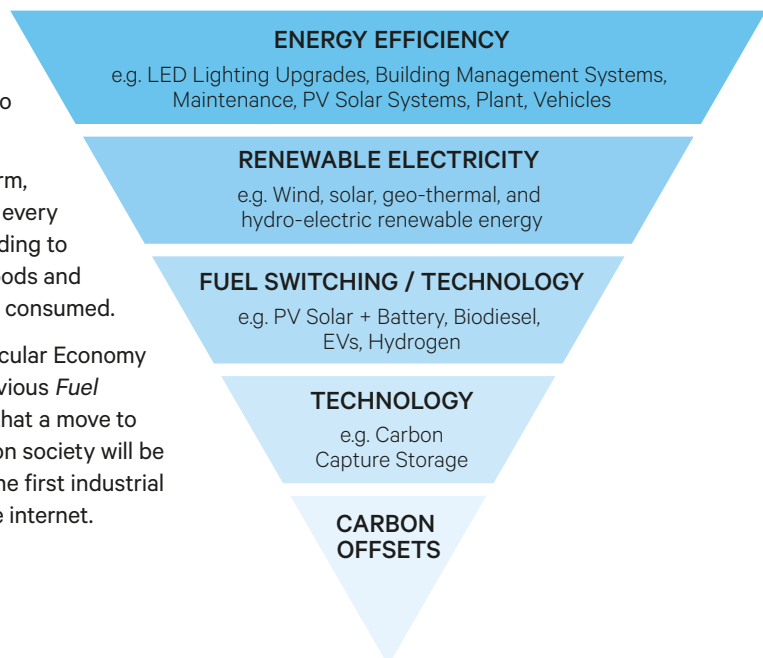
What is Decarbonisation?

Decarbonisation refers to the significant reduction of greenhouse gas (GHG) emissions through improved energy efficiency, moving towards lower-carbon sources of energy, and switching from fossil fuels to lower carbon fuels.

In the near and medium term, decarbonisation will affect every economy in the world - leading to a transformation in how goods and services are produced and consumed.

When coupled with the Circular Economy initiatives outlined in a previous *Fuel for Thought*, the changes that a move to decarbonisation will have on society will be likened to the impacts of the first industrial revolution or the rise of the internet.

Thinking about Decarbonisation is easier in terms of a hierarchy of active preventative measures:



How does it impact the Australian and New Zealand economies?

While decarbonisation of energy sources in all countries will rely upon adherence to the three pillars of energy efficiency, low carbon electricity and fuel switching. There is a fourth pillar specific for Australia and New Zealand which relates to reducing non energy emissions (emissions not caused by the combustion of fuels) in industrial processes, agriculture and waste management.

Australia's economic growth has a long association with the reliance on burning fossil fuel for transport and industrial purposes, as well as supplying the nations electricity demands. In 2015, the Australian Government signalled its commitment to reducing carbon emissions and working towards a more sustainable future. As part of this commitment, it signed up to the Paris Agreement on Climate Change and adopted the United Nations' Sustainable Development Goals. Whilst the Australian Government has subsequently implemented a range of policy measures in pursuit of 2020 and 2030 carbon emission reduction targets, the Intergovernmental Panel on Climate Change 2018 Special Report identifies that we must take greater measures to limit the risk and severity of catastrophic climate impacts.

New Zealand, similar to Australia have also relied heavily on burning fossil fuels for industrial process and transport needs. However unlike Australia, New Zealand's electricity network accounts for less than 8% of New Zealand's overall GHG emissions as it runs on renewable energy such as hydro and geothermal. The Ardern Government has enacted a Zero Carbon Bill that will be a cornerstone of New Zealand's transition to a low emission, climate resilient future. The legislation sees New Zealand put a bold new climate change target into law and establishes an independent Climate Change Commission to monitor progress toward the target.

The targets adopted by New Zealand companies aims to:

- reduce greenhouse gas (GHG) emissions in line with the latest climate science IPCC (International Panel of Climate Change);
- limit global temperatures to well-below 2°C above pre-industrial levels; and
- pursue efforts to limit warming to 1.5°C.

What are the key issues for Downer?

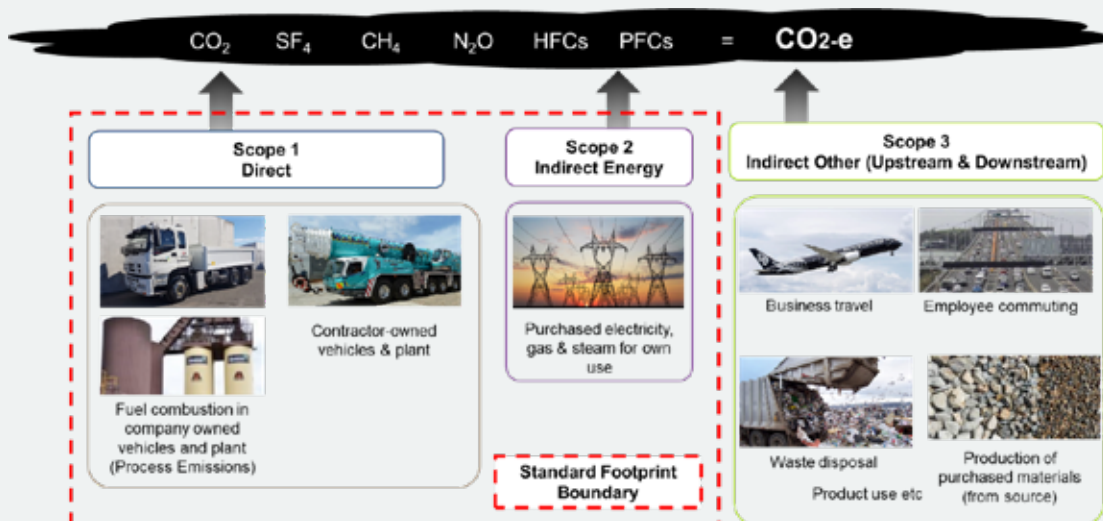
The key reasons why decarbonisation is important to Downer have been identified below:

Coal transition: The International Energy Agency has signaled that global demand for thermal coal is likely to remain a part of the energy mix beyond 2040, although its use as the main energy source will continue to decline. A transition away from coal will have impacts for Downer, however it is well positioned to continue supporting its customers who require efficient contract mining services in the coal market. Downer will continue to provide ongoing shutdown and maintenance services to extend the life and efficiencies of ageing thermal coal generation plants. In acknowledging this risk, Downer sees the opportunity to leverage its asset base and capabilities to service new and growing markets in the resources and industrial space – most notably in the mining of base metals to support renewable technology and servicing the natural gas industry. Downer will continue to support the adoption of emerging technologies – such as electric and autonomous vehicles, hydrogen technology and carbon capture and storage – across consumer, business and industrial markets.

Energy transition: The key focus is to commence the process of substituting out carbon (fossil fuels) from Downer's current energy mix. At present, Downer's energy profile comprises 62% liquid fuels used for transport and stationary plant. Downer is supporting a logical decarbonisation transition which includes switching light vehicles and small trucks up to 20 tonnes over to electric energy sources; working with OEMs to develop haulage solution that reduce fuel consumption, and; investigating new technologies required for processing heat in our energy intensive industries like asphalt manufacturing and laundries. Downer also has the opportunity to participate in emergent green energy markets like renewables and hydrogen, as well as supporting customers across a broad range of markets who are introducing electrification and the increased application of control devices to monitor energy consumption.

What are the common types of GHG emissions

The most common sources of greenhouse gas emissions for Downer are outlined in the image below.

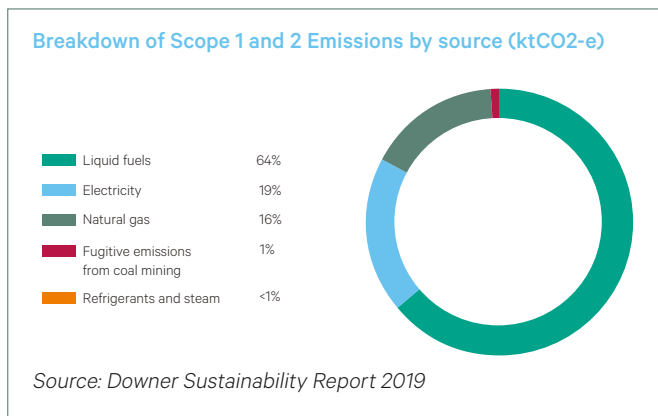
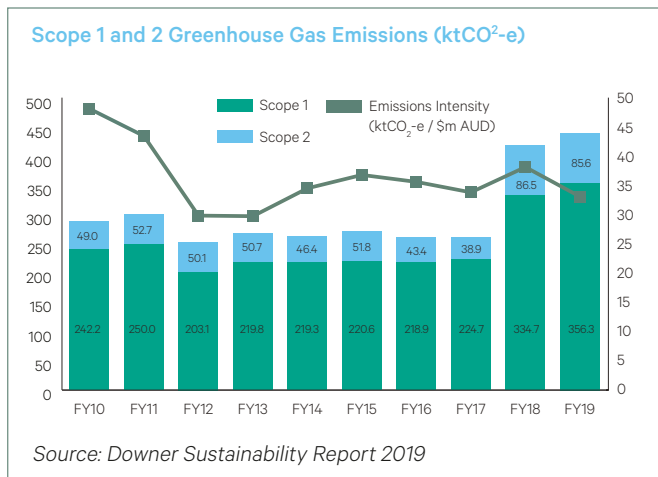


Physical impacts: As one of Australia's largest non-government employers, Downer needs to consider the impacts of extreme weather (e.g. heat, rainfall) events on the workforce when entering new contracts, particularly in regional and remote areas. Additionally, as a large deliverer of infrastructure we have an opportunity to incorporate sustainable design principles (sustainability rating tools e.g. ISCA, Green Star, Green Roads) into new assets and the upgrade / replacement / disposal of existing operational assets. Wherever possible we should be cognisant of and develop strategies that support <2 degree warming scenario as a minimum baseline.

Participating in and promoting a <2 degree world provides considerable opportunities for Downer which outweighs identified risks. Transitioning to decarbonisation will assist Downer to obtain a lower cost of capital when securing new funding sources; potentially increasing margins due to improved productivity and providing more premium services; and improving our reputation as a leading environmentally conscious and sustainable Australian and New Zealand business.

What is Downer's current GHG emissions

Under the National Greenhouse Energy and Reporting Act (2007 NGER), Downer is responsible for the reporting and disseminating of information about its greenhouse gas (GHG) emissions, energy production and energy consumption. At the end of each financial year this information is presented in Downer's Sustainability Report. Downer's Environment and Sustainability team within the Group Zero Harm function undertakes the mammoth task of consolidating data from across Downer's operations and calculating the Group's greenhouse gas emissions. The following graph shows FY19 data and the trend for previous years.



The challenge for Downer and the industry, is to decarbonise in a pragmatic and affordable manner that enables productivity and growth whilst lowering our carbon intensity. We believe this will involve incremental step changes over time that will be influenced by government policy, availability and affordability of new technologies and alternative fuel sources such as hydrogen, biofuels and electrification.”

Ricky Bridge, Group GM Environment and Sustainability, Downer

Reporting under the NGER Act reveals that liquid fuels for plant and light vehicles are the single largest contributor to Downer's scope one and two greenhouse gas emissions, accounting for 64% of the total. The second largest contributor is electricity consumption (19% of total emissions) largely attributable to our offices and site-based facilities.

CONTACT

For more information please contact:

Christian Porter, Group EGM Corporate Strategy,
Christian.Porter@downergroup.com

Ricky Bridge, Group GM Environment and Sustainability,
Ricky.Bridge@downergroup.com

Downers Commitment to Decarbonisation

To demonstrate our commitment, Downer has leveraged the Science Based Target Initiative's framework and set an ambitious target that aligns with the 2015 Paris Agreement goals to “pursue efforts to limit the temperature increase to <2.0°C.

Downer commits to the decarbonisation of its absolute Scope 1 and Scope 2 GHG emissions b 45-50 per cent by 2035 from FY18 base year and being net zero in the second half of this century.

Downer's approach is aligned with many of our key customers, who have responded to the challenges of decarbonisation through the implementation of strategies and targets aimed at reducing their carbon emissions, these include:

BHP: Achieve net zero operational GHG emissions in the latter half of this century, consistent with the Paris Agreement.

South32: Review its emission reduction approach every five years from 2021, in line with IPCC updated scientific reports, to ensure it makes a pragmatic and affordable transition toward the global goal of achieving net zero emissions by 2050.

Origin Energy: Commits to reduce Scope 1 and 2 GHG emissions 50% by 2032 from a 2017 base-year and reduce Scope 3 emissions 25% over the same time period.

Auckland Airport: Commits to reduce Scope 1 and 2 GHG emissions 45% per m2 by 2025 from a 2012 base-year.

Downer continues to work with its customers to develop innovative solutions which assist in the reduction of GHG emissions from their operations, leveraging our broad experience and capabilities from across a broad range of industries.

Thinking to the future: A hydrogen Economy

With its potential to decarbonise a broad spectrum of industries, hydrogen as an alternative energy source is currently receiving renewed attention from a cross section of stakeholders, including from the Australian Government's own CSIRO and Chief Scientist. This is largely due to improvements in hydrogen production technologies and the declining cost of renewable energy, meaning that large scale zero-emissions hydrogen production may be more viable now than ever before. With excellent sources of renewable energy and proximity to large potential export markets in Asia, both Australia and New Zealand are well positioned to become leaders in this emerging industry. The International Hydrogen Council estimates investment of at least US\$ 3 billion annually to stimulate the hydrogen market.

The diagram below outlines the key processes in using hydrogen as an alternative energy storage solution.

What are the potential applications for hydrogen fuel cells

Hydrogen as an energy source can be used in a number of residential, commercial and industrial settings. Furthermore, hydrogen can be blended up to a percentage in the existing gas distribution network and exported as an energy product in a similar manner to the way we export coal and LNG. The key applications where we could see high take-up of hydrogen fuel cells are outlined below:

- **Domestic applications:** Replacement for natural gas in the home for heating, cooking, hot water, and industrial applications. Replacement of liquid energy sources on the road with hydrogen fuel cells.

- **Energy system resilience:** Electrolysis as flexible load, stored hydrogen for dispatchable electricity generation, and greater usage of hydrogen for fuel diversification.
- **Commodity Export:** Liquefied hydrogen or hydrogen in ammonia form to large potential export markets (Japan, China, South Korea, and Singapore). By 2030, Australia's potential hydrogen exports could reach AUD \$2.2 billion (502,000 tonnes of hydrogen) (ACIL, Allen for ARENA).

Considering batteries vs hydrogen as sustainable energy sources

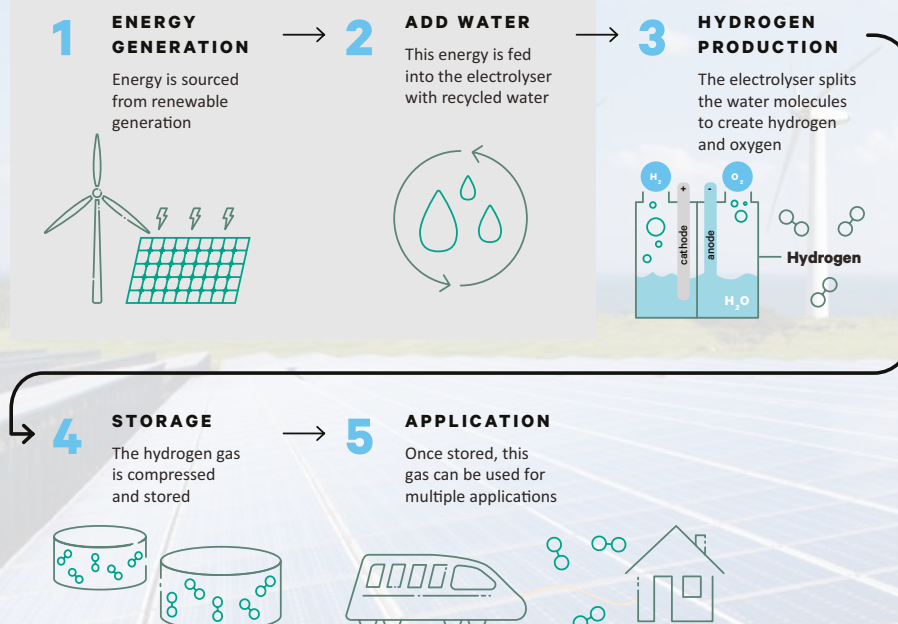
While the efficiency and cost benefits of batteries and hydrogen are often compared, the two technologies have different characteristics and therefore different advantages and potential end-uses.

Batteries are heavy, highly efficient and are best suited for use in passenger vehicles and to supply high volumes of power over short timescales. In contrast, hydrogen in gaseous form is light weight, energy dense and has great potential for use in large-scale, long-distance transport, as a replacement for household natural gas applications and thermal-peaking generators, and as a back-up energy source for lengthy periods (ten hours or more).

To achieve a zero-emissions future, a variety of energy storage technologies are required. Based on its versatile characteristics, hydrogen could play a key role in decarbonising many applications where other energy storage technologies are unsuitable.

Given the integrated services Downer offers to its customers we are in strong position to capitalise in providing solutions that will enable our existing and new customers to meet their decarbonisation commitments.

Proposed sustainable hydrogen supply chain model which uses renewable energy and recycled water



Source: Hydrogen White Paper - May 2019

