20 AUGUST 2020

DECARBONISATION FUTURES

Solutions, actions and benchmarks for a net zero emissions Australia

Monash Energy Institute Webinar
Start Your Own Net Zero Journey
Achieving net zero emissions relies on 4 pillars:

1. **Energy waste reduction**, including through energy productivity and a shift away from energy-intensive products and services.
2. **100% renewable electricity**
3. **Electrification and a shift away from fossil fuels to zero- or near-zero emissions alternatives**
4. **Non-energy emissions reductions and offsetting of residual emissions**
We have found that technology has achieved significant progress since 2014, often faster than was expected then.

- New renewables now **cheaper** than new fossil fuel generation.
- 10-storey office tower built in timber in Brisbane.
- The share price of **Beyond Meat** grew more than 700% in the 3 months following its release.
- Battery costs per kilowatt-hour **80% cheaper** than in 2010.
- 3 million **EVs** driven in the world.
- 1- and 2-person **electric planes** are beginning to enter the market.
Progress in the past five years has closed the technical gap making achieving zero emissions possible in all sectors.

<table>
<thead>
<tr>
<th>DEMONSTRATED + MATURE SOLUTIONS</th>
<th>EMERGING SOLUTIONS</th>
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<tbody>
<tr>
<td><strong>ELECTRICITY</strong> 100% renewables, storage (including batteries), demand management</td>
<td>There are sufficient demonstrated and mature solutions to decarbonise these sectors. However, emerging solutions could decrease costs and aid deployment at scale.</td>
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<td><strong>BUILDINGS</strong> Deep energy efficiency, electrification</td>
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<td><strong>TRANSPORT</strong> Electric and fuel-cell vehicles for light road transport</td>
<td>Biofuels, synfuels, electrification, ammonia or hydrogen for other transport</td>
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<td><strong>INDUSTRY</strong> Energy efficiency, circular economy, proven electrification, bioenergy and bio-feedstocks, industrial CCS</td>
<td>Material substitution, high grade heat electrification, solar thermal, hydrogen</td>
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<td><strong>AGRICULTURE + LAND</strong> Sustainable agriculture practices, plant-based substitutes, fertiliser management, carbon forestry</td>
<td>Lab food, enteric fermentation treatments (such as livestock vaccines)</td>
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Australia and the world have limited time, but we are now well placed to leapfrog to zero emissions technologies

Global total CO₂ emissions and remaining carbon budget at 01/01/2020

- **Already 1.1°C of warming accumulated**
- **For 67% chance of <1.5°C:**
  - 336 Gt (8 years worth)
- **For 67% chance of <2°C:**
  - 1,086 Gt (26 years worth)

SOURCE: IPCC, Global Warming of 1.5°C; Global Carbon Project (http://folk.uio.no/roberan/img/GCB2019/PNG/s85_2019_Total_Emissions_by_source.png)
Our scenario analysis shows that Australia can achieve trajectories compatible with the global 1.5°C and 2°C goals.

Australia’s total emissions by scenario, MtCO2e

<table>
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<tr>
<th>Scenario</th>
<th>2030 Emissions vs 2005</th>
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<tr>
<td>Historical</td>
<td>-48%</td>
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<tr>
<td>2C Deploy</td>
<td>-54%</td>
</tr>
<tr>
<td>2C Innovate</td>
<td>-74%</td>
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<tr>
<td>1.5C All-in</td>
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Widespread deployment of mature technologies can achieve much of what is needed this decade and can accelerate today.

### 2030 scenario results

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<th>2°C</th>
<th>1.5°C</th>
<th>Government projections</th>
</tr>
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<tbody>
<tr>
<td>EVs in new car sales</td>
<td>1 in 2</td>
<td>~3 in 4</td>
<td>~1 in 5</td>
</tr>
<tr>
<td>% renewables in electricity generation</td>
<td>70-74%</td>
<td>79%</td>
<td>~48%</td>
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</table>
While substantial investment in research, development and commercialisation can close the gap to zero emissions
The transition will not happen in time without strong action by government, business and individuals

<table>
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<tr>
<th>SOLUTION STATUS</th>
<th>ACTIONS</th>
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<tbody>
<tr>
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<td>GOVERNMENT</td>
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</tbody>
</table>
| MATURE          | • Standards and targets  
                  • Taxes  
                  • Financial support and/or market structure amendments  
                  • Supporting infrastructure  
                  • Information and accessibility  
                  • Targets on scope 1-3  
                  • Forward asset replacement  
                  • Shift products and services  
                  • New business models  
                  • Policy advocacy  
                  • Investors engagement  
                  • Shift in consumption  
                  • Shift in behaviour  
                  • Home upgrades  
                  • Shift in investments  
                  • Advocacy |
| DEMONSTRATION   | • Incentives  
                  • Procurement  
                  • Supporting infrastructure  
                  • Stimulate private investment  
                  • Pay price premium  
                  • Targeted procurement  
                  • Accept higher risk  
                  • Pay price premium  
                  • Community investment |
| EMERGING        | • Investment in RD&D  
                  • Incentives for private investment  
                  • Investment in RD&D  
                  • Consortium for risk sharing |

**SOLVED WORKS A USTRALIA // DECARBONISATION FUTURES**
Net zero emissions by 2050 or earlier is fast becoming the norm in support of the Paris climate goals

+ 121 countries, covering 25% global emissions
+ All 8 Australian states and territories have net zero targets in place
+ Asset owners alliance worth US$4 trillion
+ Some of Australia’s largest companies
This is the transformational decade

Research shows that the years before 2030 offer a window for action that will not stay open.
Thank you. Please contact us for more information.

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ClimateWorks Australia was co-founded by Monash University and The Myer Foundation and works within the Monash Sustainable Development Institute