Australian Climate Roundtable Workshop 2:3

What do successful transitions to net zero emissions look like in industry?

November 10, 2020

This is a record of the presentations and discussion at a workshop held by the Australian Climate Roundtable with their respective members on 10 November 2020. The views stated were those of the presenters; the ACR will make its own statement on successful transition to a net zero emissions economy in due course following the completion of this series of workshops. Subsequent workshops in this series will address successful transitions in the agricultural sector and the social and regional impacts of the transition to net zero emissions.

Toward low carbon concrete: Findings from the development of Australia's first ready-mix concrete Environmental Product Declaration
Evan Smith, Environment Manager and Sustainability Lead at Holcim (Australia) Pty Ltd

Holcim Australia is a leading supplier of construction materials in Australia. Their parent, LafargeHolcim, is a global leader in construction materials.

Materials are a significant contributor to climate change. Concrete is a big part of this due to the quantity used. Concrete is the second most used material in the world by weight after water. Concrete is comprised of cement, gravel, sand and water.

A Holcim product, ViroDecs, provides data on environmental impacts and certifications of concrete sold in Australia. This includes Australia wide life cycle assessment data from Holcim's operations; it covers a range of different concrete products that serve general markets and special purposes like infrastructure.

In the process of developing this product we found that Holcim's ViroDecs Triple blend is up to 57% lower-emissions than the Australian average. This is compared against three different ways of estimating average emissions;

Not all concretes are the same. Substituting a lower-CO_2 blend for the average concrete product for a hypothetical 100,000 cubic meter construction project could save 37kt CO_2.

We've sought Climate Active certification in Australia for a zero-carbon concrete product, which combines lower-than-average emissions with full offsetting of the remaining product emissions. We saw this as an opportunity to be an industry leader and Australian first; target additional value in construction projects with higher Green Star or Infrastructure Sustainability Points; align with our organisation's Decarbonisation goals; and align with the Green Building Council of Australia roadmap.

Strong data collection and analysis is important to avoid the risk of 'greenwashing'.

Life cycle assessment is critical. In use and at its end of life, it is estimated that concrete can absorb up to 30% of the emissions from its production. Low-cement concretes require other inputs that can have impacts of their own, some times higher

Concrete – the World's most widely used material – targets carbon neutral future
Ir. Claude Loréa, Cement Director, Global Cement and Concrete Association (GCCA)

GCCA is the global industry body and has Australian affiliates. We've developed a global tool for environmental product disclosures to prevent greenwashing.

Our Climate Ambition Statement is a commitment from members to drive down CO_2 in their operations and products, and to aspire to deliver carbon neutral concrete by 2050.

Concrete plays an essential role in modern economies, including in clean energy infrastructure like hydroelectric dams, wind turbine foundations and more. However it does produce significant emissions at present, and this is a challenge for the industry.

Sustainability wise, concrete is a durable material and contributes to passive heating and cooling of buildings. Concrete roads can reduce emissions from cars and trucks. It is fully recyclable. And concrete reabsorbs part of the CO_2 emitted in its lifetime.

Today cement production is 19.2% below the average emissions intensity in 1990. Emissions comes from process emissions (60%) and energy (40%). Energy emissions can be addressed by energy efficiency and substitution of fossil fuels with clean energy. On process emissions, carbon capture and storage is a key tool. Material efficiency is also important: reducing the amount of 'clinker' in cement, reducing the amount of cement in concrete, and being more efficient in the use of cement in construction. Education of architects and constructors is essential to the latter. Recycling of concrete can help greatly. And finally, the ability of concrete to absorb CO_2 is an important focus for innovation.

GCCA is building partnerships among its members. Policy settings to support the transition are important. We are working on a global roadmap for delivery by the end of 2021. This will identify the levers across the concrete value chain, from basic materials to end of life, to reach our carbon neutral aspiration.

We have built an innovation network that is launching 50 projects on reducing the CO_2 footprint of concrete. And we are developing a policy framework for action on cement and concrete. This includes measures which:

- Promote investment in state-of-the-art technology for new and retrofit plants;
- Support innovation and R&D on breakthrough technologies
- Build demand for low-CO_2 concrete
- Support life-cycle assessment
- Recognise in national policies the CO_2 uptake by existing concrete

The performance requirements for infrastructure are a barrier for innovation; new binders or other elements need to be consistent with requirements that may be very strict, depending on context. For example bridges are required to be durable for two centuries in some jurisdictions.

CCS is a challenge for investment due to its costs. Greater demand for low-carbon products would be helpful for this investment. Combining CCS, material substitution and CO_2 uptake does have the potential to lead to negative-emissions concrete in the long term.

Symmetrical carbon measures support investment, but unilateral or uneven measures create the risk of carbon leakage. Some regions have been struggling with this for a long time. Now the commitments to net zero emissions by so many jurisdictions create the hope that this concern will fade in the medium term.

The European Union's proposed Carbon Border Adjustment Mechanism is likely relevant to cement and concrete. The challenge is how to fairly measure and account for the emissions embodied in imported product.

Aluminium transition: global perspective from an electricity-intensive industry
Miles Prosser, Secretary-General of the International Aluminium Institute

Aluminium is not the biggest source of emissions, but big enough that we need to play our part. There is both a debit and credit side - there are significant emissions reductions through the use of aluminium, for instance to lightweight motor vehicles.

There is a broader sustainability agenda in aluminium, of which climate is currently the biggest part.
We are optimistic - and the International Energy Agency's analysis corroborates - that deep global emissions constraints will drive higher aluminium consumption than today. Thus our challenge is to decrease aluminium emissions on the same timeline.

Recycling is common in aluminium for economic reasons - this requires only 5% of the energy of smelting primary aluminium - and has environmental benefits. However even at high recycling rates we will continue to need primary metal at higher rates than today.

Over the last 25 years, aluminium production has grown dramatically - mostly in China, and mostly powered by coal. There has also been some growth of gas-fired production of aluminium in the Middle East, and more recent expansion in hydro-based capacity in China.

Overall, aluminium emissions are dominated by smelting, and within smelting by electricity emissions. The majority of electricity supply to all smelters is from stable sources like coal, gas, hydro or nuclear.
Aluminium also has direct process emissions, largely from consumption of the carbon anodes used.
Refining alumina also has emissions, predominantly from the generation of heat.

Looking globally, there is a difference of 10-15 tonnes of CO_2 per tonne of aluminium produced between the most and least CO_2-efficient facilities in the world. The biggest source of variation is the source of electricity.

This variability has led to market differentiation and interest from buyers and sellers in low-carbon aluminium products. We have an independent third party verification scheme. But the London Metals Exchange is also exploring the potential for market trading of a low-carbon aluminium product category. However there is already significant low carbon supply; demand would have to increase significantly to drive new low-carbon production, and customers are largely unwilling to pay a premium at present. The differentiation is positive, but unlikely to be a strong driver on its own for reduction in emissions.

The industry can track regional material flows worldwide, allowing it to confirm that 3/4 of the aluminium ever made is still in use. This database is publicly accessible.

The International Aluminium Institute is working on data and standards; building collaboration; defining pathways for emissions reduction; informing the public, customers, regulators, investors, and market initiatives; and encouraging ambition among our members. IAI does not set targets; that is a role for organisations with the financial resources and operational control to meet them.

We have examined a full carbon footprint for aluminium under an IEA Below 2 Degrees scenario, which would send emissions from 1.1 gigatonnes today to 250mt by 2050, rather than 1.6gt in a business-as-usual scenario.

So far we have seen average world emissions intensity pushed down by greater efficiency, and up by the growth of coal-intensive production in China. The net result has been a small decline.

Whether aluminium should target net zero by 2045, 2050, or 2060 is a bit of a distraction. What is clear is that we need to substantially change the existing trajectory of emissions to achieve goals.

Historic and geographic factors affect current emissions intensities and are also a distraction - getting to a two degree scenario requires deep changes that are challenging for all players.

The first step to decarbonisation is to clean up the electricity supply. This could reduce BAU emissions by 1Gt. Technology needed is already available (for instance hydroelectric), but reengineering and recapitalising electricity will require significant investment.

Carbon capture and storage could also help power emissions by around 0.8Gt, but the technology is less mature and costly.
Energy efficiency offers further gains of 0.15Gt at low cost.

With respect to direct emissions, CCS can help here by around 0.5Gt; inert anodes are exciting and imminent, if not quite here; and could offer 0.25Gt reductions at moderate cost

Recycling cannot solve everything, because of growing demand, but could reduce 0.25Gt; much is cheap, but more elaborate circular economy changes will require significant investment.

To get there, we need more technological innovation; major industry investment and collaboration; and policy changes that change incentives, reverse first mover disadvantage and support investment.

Q&A:

- Is regulatory policy needed to increase demand for low-carbon metals?
    - A price premium for clean metals is not the only way to stimulate production, but it is very important. Regulatory policy could contribute to this but is not the only way.
- What is the state of play in Australian aluminium and its future?
    - Australia has some obvious natural advantages in future electricity supply, if we can find ways to make wind and solar compatible with aluminium production. But commercial viability is the key constraint: the industry has been very competitive in the past, but how does it get through a period of global change to a prosperous future?
    - Another participant adds: The value of smelters to the Australian grid can be reassessed, based on their ability to absorb shocks to the system. This can also be enhanced.
- What about nuclear energy?
    - It's already used in some areas, subject to social license. But realistically we need to look at broader options. Greater ability to absorb variable supply and modulate smelter production more easily are important areas for innovation - not viable yet, but likely to kick in over the next few decades.
- What's the relevance of hydrogen to aluminium?
    - As low carbon power supply and as a direct fuel for thermal energy. Companies are looking at it; the tech looks close but is not yet price competitive - if you moved now, you would not be able to compete.
    - Another participant adds that green electricity would be more efficient to use directly for heat than to turn into hydrogen and back.
- Skills - what is likely to change?
    - Another participant answered: In some ways a clean smelter today would have similar needs to an existing smelter. But the whole industry will be affected by technological change, digitalisation and automation over coming decades, and the workforce will evolve.

Summary of key points across the workshop:

- There are a lot of technical options and pathways, but **innovation** remains necessary for Industry deep decarbonisation.
- **Demand** for low, zero or negative carbon products is essential to underpin investment in production.
- **Trade competitiveness** is very important. More widespread commitments to net zero emissions are positive over the medium term.
- Investment investment investment! **Policy needs to be investable**.
- **Data and confidence** are essential for low-carbon products to be viable and competitive.
- **Skills** need attention. Training new workers and updating existing worker skills are needed for new technology and growth. But broader trends of digitalization and automation may change industry workforce skills needs as much or more than cleantech uptake.