

Philippe Fonta, Scrum Consult

The New International Carbon Economy (NICE): An opportunity for cement and concrete

In the face of accelerating climate change, the world needs a new approach to reducing CO₂ emissions. Scrum Consult's Philippe Fonta presents the New International Carbon Economy (NICE) concept.



Above: Philippe Fonta, Founder and CEO - Scrum Consult.

The heatwaves that struck western Europe in mid-2019 have demonstrated that climate change is no longer a forecast. It is a reality, the consequences of which are already here. However, beyond the extreme temperatures, water scarcity, violent hailstorms, floods and health issues, some new effects are emerging. In France, for instance, nuclear plants were closed or slowed down because cooling water supplies could not be guaranteed. This is not ideal when demand for air-conditioning spikes, resulting in the potential for powercuts. Train operator Thalys had to halt its network on 25-26 July 2019 due to high temperatures and extreme weather.

As nuclear energy and high-speed trains are often promoted as low-CO₂ solutions, their frailty in the face of extreme heat is concerning. This may result in a trend towards more flexible options, like road transport and thermal energy generation, both of which produce massive amounts of CO₂.

Decarbonation: The only game in town?

According to the International Energy Agency (IEA), global energy-related CO₂ emissions hit a new record in 2018, a year-on-year increase of 1.7%. Energy consumption grew by 2.3%, nearly *twice* the average growth rate since 2010.

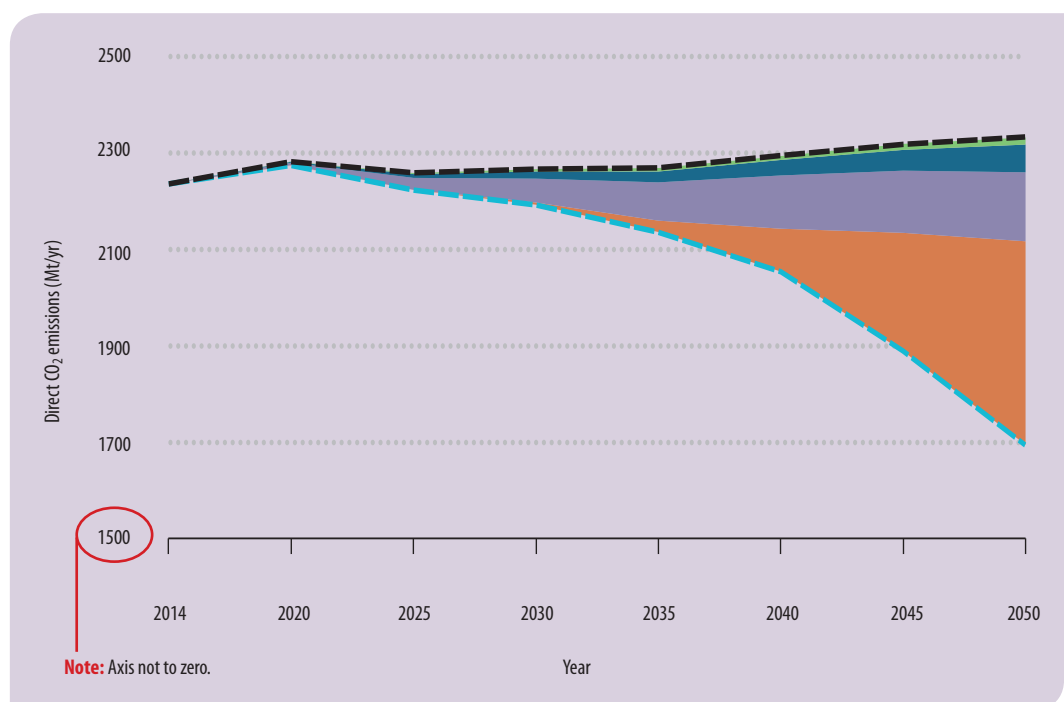
Much more needs to be achieved and decarbonation should be part of the solution. However, there are various reasons that the economy cannot be completely decarbonised, at least for now. Some sectors, notably cement, steel, aviation and fertilisers, are hard to decarbonise. Others, for example fine chemicals, need carbon as a feedstock. Electric motors, while promising, cannot replace internal combustion-engines overnight.

More problematically, growing economies are often dependent on cheap and easily-available fossil fuels. The financial community still supports fossil fuels and, although there has been some

Right - Figure 1: Global direct CO₂ emissions reductions between the reference technology scenario (RTS) and the 2°C scenario (2DS) by mitigation lever.

Source: CSI-IEA Technology Roadmap: Low-Carbon Transition in the Cement Industry, 2018.

- Reference Technology Scenario (RTS)
- Thermal energy efficiency (3%)
- Fuel switching (12%)
- Lower clinker ratio (37%)
- Innovation (inc. CO₂ capture) (48%)
- 2°C scenario





disengagement of late, higher average oil prices in 2018 pushed global fossil fuel consumption subsidies to US\$400bn, a level last seen in 2014.

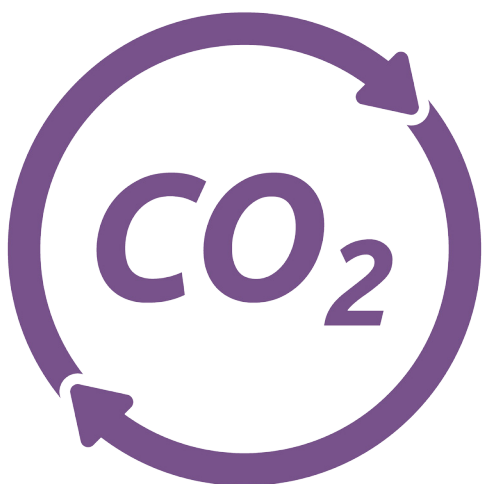
Towards capture, storage and use

As existing technologies do not allow sufficient reduction in CO₂ emissions and as CO₂ remains in the atmosphere for 100 years, CO₂ capture and utilisation / storage (CCUS) will be essential. Indeed, the IEA states that 'Paris' targets cannot be met without it. By 2060, the IEA says that 14% of cumulative emission reductions must come from CCUS to meet the 2°C scenario (2DS) and 32% for more than 2°C.

A number of CCUS analyses and roadmaps have been developed. For instance, a report by the Energy Transition Commission (ETC), a global coalition of 30 leading executives from across the energy landscape, identified that even if fossil fuel use declined immediately and fell by 33% by 2040, the world might still need to sequester 7-8Bnt of CO₂ per year. This coalition also identified carbon utilisation as an avenue that should be developed and that CO₂ capture would be essential to achieve full decarbonation in the cement sector. In the words of the Carbon Dioxide Utilisation (CO₂U) roadmap from the Innovation for Cool Earth Forum, "Many see CO₂U as a way to offset the cost of CO₂ capture, which is the costliest part of the CCS chain." It expands to suggest that non-fossil CO₂ could replace traditional sources of carbon as a feedstock. This could provide a new route to fuels and durable materials like plastics and encourage a circular economy.

CCUS for cement

CCUS is the only technology capable of decarbonising major industries like cement production. The recent low-carbon technology roadmap for the cement sector, developed by the IEA and the Cement Sustainability Initiative (CSI) in 2018 (See Figure 1) identified that 48% of global direct CO₂ emissions reductions would come from innovative technologies like CCUS.



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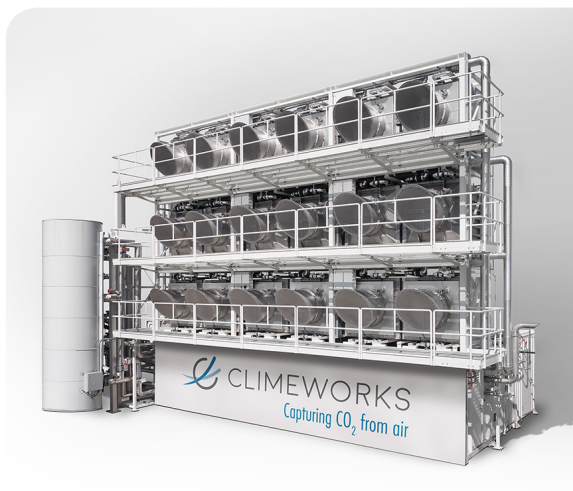
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Right: A Climeworks Direct Air Capture (DAC) plant. Such facilities could open up new opportunities in the NICE economy.
Source: Climeworks website.



Immediate action is required by the cement sector to achieve the commercial scale demonstration of oxy-fuel CCUS technologies in cement production by 2030, as well as to gain experience of operating large-scale post-combustion technologies in cement plants. Even if the electrical intensity of cement production rises as a result, estimated by 19% by 2050, this extra power would certainly come from renewable sources by that time.

The New International Carbon Economy

We cannot afford to exclude any technology, including Direct Air Capture (DAC) of CO₂ from the atmosphere. As the production of and consumption of CO₂ is unavoidable in certain sectors, like cement, a New International Carbon Economy (NICE) should be set up. In this system, carbon reserves progressively come from captured CO₂ and no longer from fossil fuel resources, with the aim of an eventual circular economic model. NICE should not substitute the objective of global decarbonisation but would complement it in two ways. First, it would assist the transition. Secondly, it acts as a mechanism for sectors that cannot fully decarbonise by likely future technologies. The NICE concept is valid, as CO₂ is: abundant and increasing year-on-year; Equally distributed around the world if DAC becomes possible; Affordable, if initial incentives, research and development for cheaper technologies and market demand increase, as has been seen in the photovoltaic solar sector.

This is already happening. In the US, CCUS is being incentivised via tax credits and, in May 2019, the Carbon Capture Coalition released the first-ever


national policy blueprint that outlined a comprehensive set of policy priorities to promote economy-wide deployment of CCUS.

Setting up NICE

In order to set-up this new economy, an international platform should be established, gathering all key stakeholders: These include: Pioneering industry stakeholders that emit CO₂ and/or need carbon-based products; Universities and institutes that can improve knowledge regarding storage capacity and identify additional CCU opportunities; Standard-making bodies to develop appropriate new standards for CO₂-absorbing products and measure the actual quantity of CO₂ saved or removed;

Governments and policy-makers to finance research and development, to incentivise CCUS solutions, support life-cycle analyses and industrial standards and to impose a minimum of permanent storage for captured CO₂ in order to achieve CO₂ removal (negative emissions), and; Financial communities that can channel existing fossil fuel investments towards CCUS enhancement.

Concluding remarks

All stakeholders need to raise awareness, build capacity and competences, including new jobs, to enhance the acceptability of CCUS. Cement producers can play a key role, as CO₂ management will be one of the prime elements to consider in the future, especially if a price for CO₂ is finally established. Reducing emissions, capturing unavoidable emissions and using some CO₂ in the production of CO₂-absorbing concrete would make the sector a leader in climate change mitigation and adaptation. 

Right: Is the sun setting on the fossil fuel sector? In the NICE economy, fossil fuels are no longer needed as a source of carbon.

