



Thoughts, Reflections and Perspectives on the 26th UN Conference of the Parties (COP26)

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Loughborough
University



University of
Sheffield



UKRI Interdisciplinary
Centre for Circular
Chemical Economy

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1. Introduction

COP26

The Conference of the Parties 26th meeting (COP26) was the 2021 United Nations (UN) Climate Change Conference that ran from 31st October to 12th November 2021 in Glasgow, Scotland in the United Kingdom (UK). COP26 was the 26th meeting of the UN Climate, with 196 Parties in attendance (i.e. countries who signed, or acted as signatories, at the United Nations Framework Convention on Climate Change (UNFCCC) treaty at the first COP meeting in 1994). The COP26 conference was also held shortly after the publication of the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment report in August 2021, which stated it was “*unequivocal that human influence*” has led to an increase in global surface temperatures, global average precipitation, global mean sea levels and a change in land biosphere.¹

During the opening conference speech, COP26 president Alok Sharma MP said “*COP26 is our last best hope to keep 1.5 °C in reach*” and hoped that this conference would follow on from the promises made six years ago at COP21. In 2015, the 196 parties present at COP21 agreed to the Paris Agreement and to therefore limit global warming to below 2 °C, with the intention to limit global warming to 1.5 °C. The UK Prime Minister Boris Johnson also stated in his opening address that “*It’s one minute to midnight on that doomsday clock and we need to act now*”.

The Circular Chemical Centre and COP26

The vision of the UKRI Circular Chemicals Centre (CircularChem) is to transform the UK chemical industry into a greener economy, avoiding new fossil carbon entering the supply chain. The ambition is to achieve this by creating new circular pathways to reuse and recover chemicals from their end-of-life materials. This will eliminate waste, reduce the need for fresh resources and ensure the long-term competitiveness of the sector. The CircularChem Centre hope to transform the UK’s chemical industry into a fossil-independent, climate-positive and environmentally-friendly circular economy. This will be achieved by creating novel circular resource flows of olefins and their complementary feedstocks, such as

¹ Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment report; IPCC; IPCC official website; 2021; <https://www.ipcc.ch/report/ar6/wg1/>; Last accessed 02/02/2022.



hydrogen (H₂), methanol, carbon monoxide (CO) and alkanes etc., to replace the current linear olefins supply-demand network. Our work also ties with net zero and carbon dioxide (CO₂) emission targets, as our work aims to reduce the carbon footprint of producing chemicals from olefins, as well as using waste CO₂ as a resource and utilising biomass resources sustainably, by creating alternative routes such as hydrothermal conversion of mixed plastic and biomass wastes, hydrogenolysis of pure plastic wastes and electrochemical reduction of CO₂ into syngas and olefins.

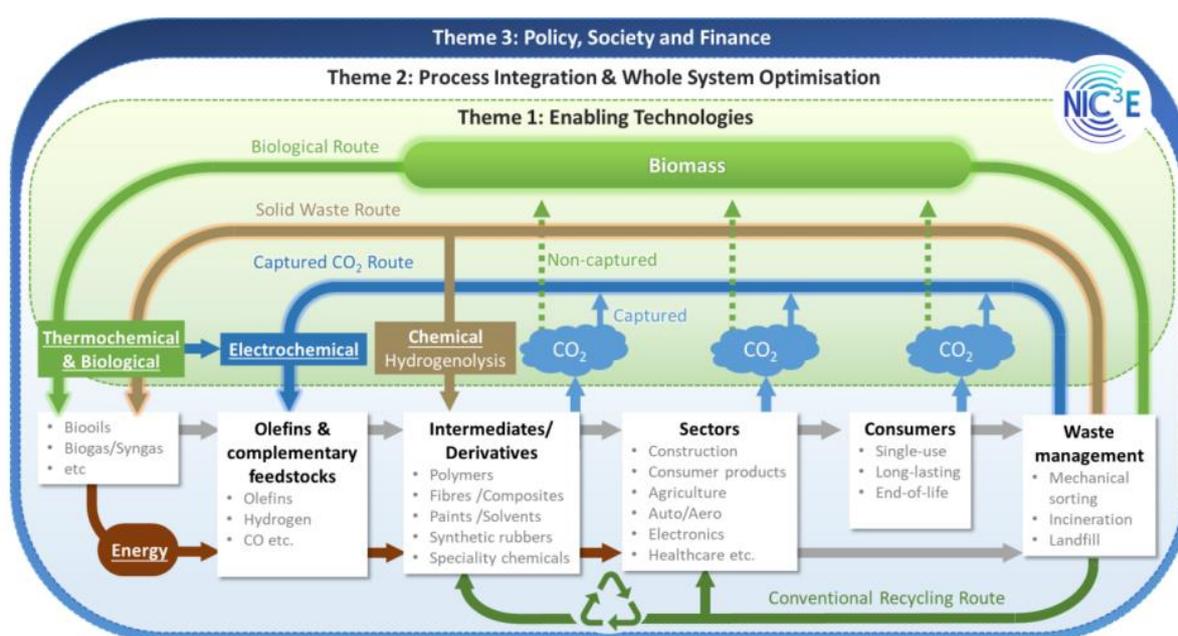


Figure 1: The CircularChem Centre's research themes and areas of interest

Alongside creating enabling technologies for a circular chemical economy, CircularChem will also aim to develop new evidence-based policies, which will implement an effective, sustainable, and economically feasible circular economy in the UK chemical sector. As the research themes of CircularChem tie in closely with some of the key themes discussed at COP26, including waste prevention and management, supply chain security and maintenance, and carbon emission reduction, the CircularChem policy team paid close attention to the conference. Any goals set at this conference will undoubtedly dedicate the future aims and goals of the UK Government, and impact and influence any future policies and guidelines developed at CircularChem. The themes and initiatives of COP26 also provide



areas of opportunity for CircularChem, include developing and implementing green energy technologies, and creating innovative technologies towards a circular economy.

Following on from the new initiatives, aims, guidance and ambitious goals that were set at COP26, these are our thoughts and reflections on the initiatives and ambitions involving the UK Government at COP26, in terms of its strengths and weaknesses.²



"[Boris Johnson launch of COP26](#)" by [UK Prime Minister](#) is licensed under [CC BY-NC-ND 2.0](#).

² As CircularChem are currently focussing on developing future policies in the UK, only goals, initiatives and ambitions that were either set by the UK Government, or that the UK pledged to achieve at COP26, will be discussed.



2. Key Themes of COP26

At COP26, the UK mantra and four key themes that became associated with the conference was “*Cash, Coal, Cars, and Trees*”. In the overall discussions at COP26, 12 key initiatives and declarations were launched or agreed by the UK Government and global leaders within these themes and other areas.

Cash

1. The UK announced the launch of the ‘*Clean Green Initiative (CGI)*’ to help developing countries bridge the infrastructure gap, whilst tackling climate change and working towards achieving the UN Sustainable Development Goals (SDGs).
2. The UK announced support for Small Island Developing States (SIDS) along with £40 million of funding.
3. The UK committed to a long-term ‘*Just Energy Transition Partnership*’ to help South Africa achieve decarbonisation.



"[Cash Money](#)" by [athrasher](#) is marked with [CC0 1.0](#).

Coal

4. The UK committed to an end of coal ambition, along with other countries around the world, in the ‘*Global Coal to Clean Power Transition Statement*’.



[coal | Openverse \(wordpress.org\)](https://www.coal.org.uk/)

Cars

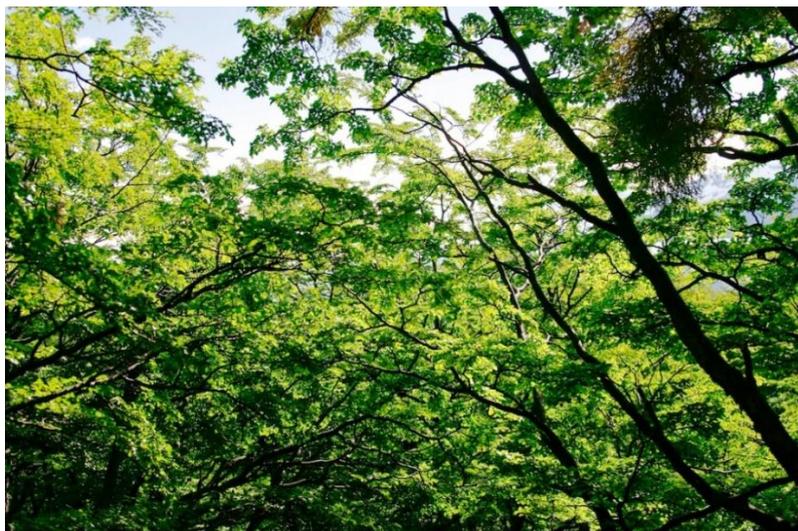
5. The UK launched a declaration to transition towards 100% zero emission cars, with only 100% zero emission vehicles available to purchase in the UK by 2035 and globally by 2040.



"[MM07A-0706 CAR TIGRA ROAD LEX FZ7 OP](#)" by [Marsel Minga](#) is marked with [CC0 1.0](#).

Trees

6. The UK led 45 Governments to sign pledges towards protecting nature, farmers, agriculture and food systems, whilst ensuring that food systems and land become more sustainable.
7. The '*Glasgow Leaders' Declaration on Forest and Land Use*' was set, with over 140 countries agreeing to this commitment.



"Trees" by [@Doug88888](#) is licensed under [CC BY-NC-SA 2.0](#).

Other noticeable initiatives

8. The UK announced a joint British and French initiative, called '*MicroCarb*', dedicated to monitoring atmospheric CO₂ levels.
9. The UK launched an international plan to deliver clean and affordable energy everywhere by 2030, titled '*The Breakthrough Agenda*'.
10. The '*International Aviation Climate Ambition Coalition*' was also launched, with the UK promising to join this coalition.
11. The UK launched the '*Clydebank Declaration*' towards creating a zero-emission shipping world.
12. The '*Glasgow Climate Pact*', the overall pact for the conference, was also launched.



"Hand Shake - Man and Woman" by [amtec_photos](#) is licensed under [CC BY-SA 2.0](#).



3. Analysis of UK COP26 Themes and Promises

Cash

Tackling climate change will be expensive and an overall global effort to increase funding towards tackling this cause. The UK has reported that it will promise funding support through various schemes, such as £3 billion for the 'Clean Green Initiative (CGI)' over the next five years and to contribute towards approx. £6 billion worth of funding promised for the 'Just Energy Transition Partnership'. Not only will funding be provided for schemes in the UK, but finance to support developing countries to deal with the impacts of climate change, and implement ambitious emission reduction plans, was also promised by the UK and other countries. As an example, the Infrastructure for Resilient Island States (IRIS) facility was launched, a joint initiative by the Coalition for Disaster Resilient Infrastructure (CDRI) and SIDS. This new IRIS fund will help small islands to develop resilient and sustainable infrastructure to withstand the effects of climate change. World leaders from the UK, Jamaica, Fiji, Mauritius and Australia were in attendance at this launch, with the UK promising to contribute an initial £10 million to this fund, along with technical assistance. It was also agreed that further global efforts would be made to push towards the \$100bn (approximately £82.5 billion) goal set back in 2009 at COP15.



"[Youth from the Vashon Green School at Vashon DivestTheGlobe Action at Chase BankDSC_2588](#)" by [Backbone Campaign](#) is licensed under [CC BY 2.0](#).



Strengths and Positives

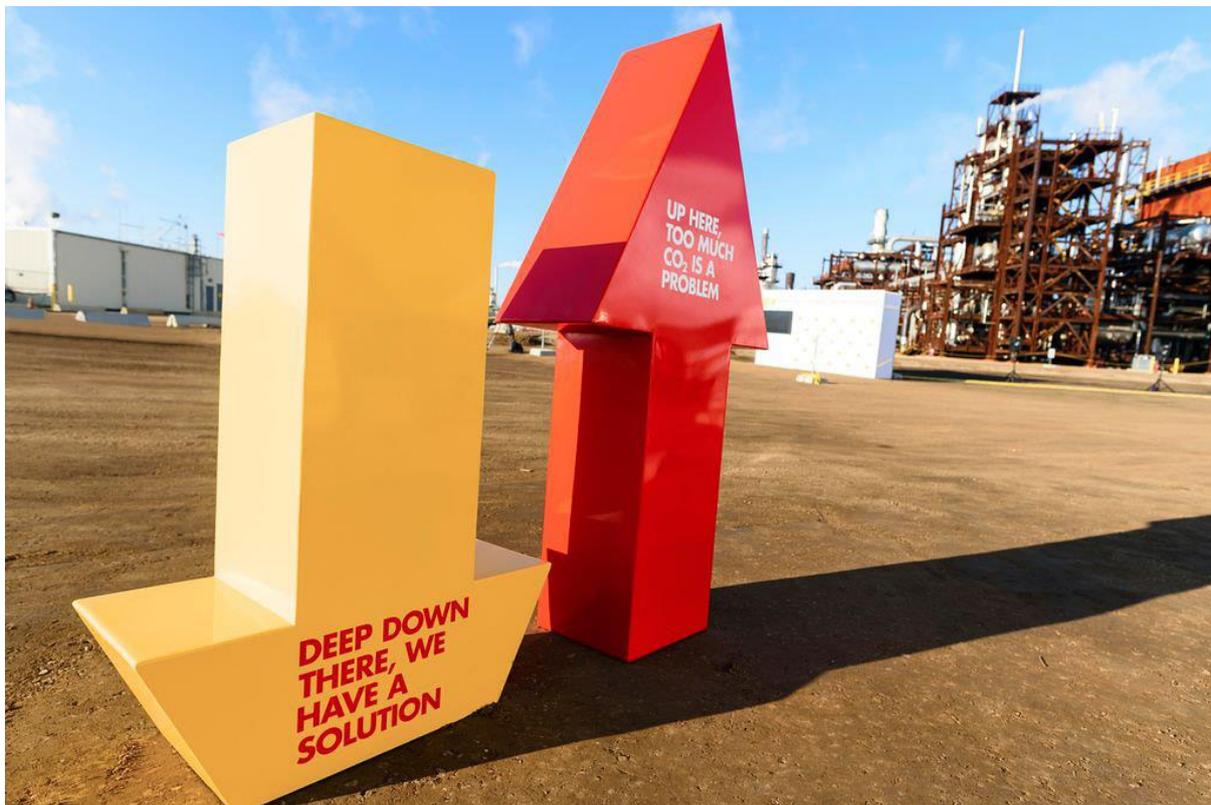
- True sustainability cannot come from one country alone. The ambition of the UK Government to provide further funding to other countries to work together towards a global growth in sustainability is extremely positive.
- The openness of the UK Government and others to comment on their failure to meet previous targets, and willingness to strive to meet these targets, is welcomed.

Weaknesses and Negatives

- The estimated costs of tackling climate change globally have varied over the years, with estimates ranging from \$300 billion to \$50 trillion (approx. £200 billion to £35 trillion), due to differences in opinion in how climate change should be tackled and different results from different economic and predictive models.
 - Whilst the amount of money promised is a step in the right direction, it may not be enough to make significant changes.
 - The ability of the UK Government to contribute more money as a result of recent and current difficult economic times, and UK and global issues, (e.g., cost of living crisis, the COVID-19 pandemic, increased inflation, Ukraine invasion etc.) may be unrealistic.
 - The financial and global implications of recent and current global issues will impact countries' ability to provide financial contributions. As a result, overall public and Governmental willingness to provide further funding towards sustainability targets will be hindered.
 - Poor public acceptance of funding towards tackling climate change, whilst the public are experiencing tough financial times, and thus increased pressure to send more money to those in crises, may hinder the UK Government's ability to deliver on this promise.
 - In reality there will always be conflicting events and crises occurring that need addressing alongside climate change. Resilient, adaptable and flexible policies must therefore be created to ensure climate change is tackled regardless.
- There were no clear goals and guidelines stated as to how this funding will be provided, how long the funding will be available, or details specifically about where and how the funding will be spent. Goals towards achieving longer term funding were also unaddressed.
- Providing funding towards tackling climate change and increasing sustainability globally has had limited success in the past. During COP26, the UK Prime Minister highlighted the lack of



promises that were achieved from the Paris Agreement treaty in terms of funding, stating that "\$100 billion of climate finance each year was promised in Paris by 2020 but which we won't deliver until 2023". The UK itself has also withdrawn funding numerous times from projects and schemes that could contribute towards climate change and net zero goals, such as abandoning plans in 2015 to provide the final set of funding towards UK-based Carbon Capture and Storage (CCS) projects, right at the end of a four year long project. Therefore, a systematic change towards how the UK (and other countries) provide funding, and ensure funding goals are met, needs to be implemented to ensure that future promises are not broken.



"[Quest Carbon Capture \(CCS\) Canada 2015](#)" by [Alberta Newsroom](#) is licensed under [CC BY-NC-ND 2.0](#).

- A lot of funding promised by the UK seems more concerned with adaptation and resilience rather than mitigation. For example, the UK has promised £40 million of funding for the CLimate Adaptation and Resilience REsearch programme (CLARE) and promised support to build climate adaptation projects and resilience-buildings across Africa, as part of the Africa Adaptation Acceleration Program (AAP). Whilst this funding is essential and fundamental, adaption and resilience to climate change will only go so far without mitigation and prevention tools in place.



Signatures

39

Out of 196 Parties (39 were countries)

Global GDP covered by net
zero commitments

> 90%*

*According to NDCs submitted at COP26

Estimated money promised
from COP26 pledges per year

\$96 billion (£69 billion)

Money already pledged per
year in 2009

\$100 billion (£72 billion)†

† Now promised for 2023 instead of 2020

Figure 2: Data from the 'Clean Energy Statement' and cash based pledges at COP26.³



"clean energy" by [scottjlowe](#) is licensed under [CC BY-NC 2.0](#).

³ Statement on International Public Support for the Clean Energy Transition; COP26 official website; 4 November 2021; <https://ukcop26.org/statement-on-international-public-support-for-the-clean-energy-transition/>; Last accessed 30/06/2022.



Table 1: SWOT analysis of COP26 initiatives and schemes around ‘Cash’

Strengths	Weaknesses	Opportunities	Threats
More money has been promised to tackle climate change	Despite the large volume of cash promised, this may still not be enough to mitigate climate change affects	This incentive increases the ability of poor countries to tackle climate changes and have a stake at future COP negotiations.	Short-term global uncertainty and civil unrest may prevent money being delivered to tackle climate change in the long-term
Encourages global collaborations to tackle climate change	Adaption and resilience of climate change effects was the main focus, rather than mitigation and prevention	New innovations and creative ideas to tackle climate change could be identified from a fresh perspective	Poor societal financial stability and high living costs will lead to poor public acceptance of cash going towards climate change
Increases aid and money given to less economically developed countries	The success of previous cash based initiatives launched at COP meetings is poor		
Potential actions	<ol style="list-style-type: none"> 1. A clear action plan must be set out to meet these cash goals. 2. Flexible and adaptable financial policies must be implemented to ensure the cash promised is delivered towards tackling climate change, despite other global issues. 3. A UK tax plan to support these promises must be developed to avoid carbon leakage and set up appropriate carbon taxes and Carbon Border Adjustment Mechanisms (CBAM) 		



Increasing the amount of money dedicated towards tackling climate change is a step in the right direction, but will be difficult to achieve due to the current difficult financial situation, in the UK and globally. CircularChem believe that resilient, adaptable and flexible policies must therefore be created to ensure climate change is tackled, and that these promises are made, without there being a cost or downside to the poorest in society.

Coal

Coal is a vital fossil fuel used to create essential petrochemicals and thus vital everyday commodities. Coal can undergo combustion to provide energy, emitting CO₂ in the process. Coal has the highest carbon to hydrogen ratio compared to other fossil fuel sources (i.e. crude oil and natural gas), and therefore has the biggest carbon intensity (i.e. kilograms of carbon emitted to the atmosphere as CO₂ per year per Watt of power produced from the fuel) of all fossil fuel resources.⁴

At COP26, 46 countries and 26 organisations made commitments for the first time to phase out coal power, including 5 of the world's top 20 coal power-using countries, as part of the 'Global Coal to Clean Power Transition Statement'. The UK also reinforced its commitment, as part of the UK Net Zero Strategy, to completely phase out coal power in the UK by 2024. Countries who signed up to this statement committed to end all investment in new coal power generation (domestically and internationally); increase deployment of clean power generation; phase out coal power by 2030s for major economies and globally by 2040s; and to transition away from coal power in a responsible and just manner that benefits workers and communities. If successful, it is estimated that phasing out coal could end the generation of over 40 gigawatts of energy from coal, which is equivalent to over half of the UK's electricity generating capacity.

⁴ N. S. Lewis, D. G. Nocera; Powering the Plant: Chemical Challenges in Solar Energy Utilization; *PNAS*; 2006; **103**; 43; 15729-15735; DOI: [10.1073/pnas.0603395103](https://doi.org/10.1073/pnas.0603395103)



"Coal" by [batsy40](#) is licensed under [CC BY 2.0](#)

Strengths and Positives

- Coal emits the most CO₂ per gram (or kilogram) of fuel compared to any other fossil-derived fuels. Phasing out the use of coal as an energy resource will therefore have a real impact on current global CO₂ emissions.
- The short timeframe set to obtain these goals highlights the ambition of countries to achieve this goal, and hopefully will encourage countries to take immediate and swift action towards phasing out coal.
- During the press release of this statement launch, the UK Government highlighted the '*Biomass Policy Statement*', indicating how the UK plans to use biomass in the electricity, heat, transport, and industrial sectors, as part of the UK '*Ten Point Plan for a Green Industrial Revolution*'. This highlights the UK Government is already considering alternative sources of energy, with biomass one of their top priorities.

Weaknesses and Negatives

- Whilst CircularChem are pleased at the ambition and focus of phasing out coal as an energy resource and use in the energy sector, it is unclear if the true impacts of removing coal from the chemical and energy sector have been considered.
- Any analysis or thought into how phasing out coal will change the demand for other energy resources, fossil fuels and global supply chains was unclear.



- In 2006, coal resources were predicted, if used in a “business as usual” scenario, to last for another 1000-2000 years. Crude oil and natural gas were only estimated to last for 40-80 and 60-160 years, respectively.⁵ These estimates were made off 1998 consumption levels. It is therefore likely that these global supplies may last for an even shorter time period, due to increased consumption levels.
- Once the production and use of coal is phased out, more natural gas and crude oil will need to be used in the energy and chemical sector, for example in methanol production.
- More sustainable routes to produce methanol and other valuable chemicals will have to be created, in order to minimise an increase in demand for other fossil fuel-based sources.
- If renewable and less carbon intensive energy resources are not implemented correctly and used to replace coal, the use of crude oil and natural gas will go up, which could lead to a faster depletion of these fossil fuel and energy sources.
- Reliance on biomass is problematic given the speed of cultivation and identification of truly sustainable sources. Clear and transparent boundary conditions will be required if true life cycle assessments are to be created.



"Global Supply Chain Resilience: Visual" by World Economic Forum is licensed under CC BY-NC-SA 2.0.

⁵ N. S. Lewis, D. G. Nocera; Powering the Plant: Chemical Challenges in Solar Energy Utilization; *PNAS*; 2006; 103; 43; 15729-15735; DOI: [10.1073/pnas.0603395103](https://doi.org/10.1073/pnas.0603395103)



- The declaration contains 77 signatories, 46 of which came from countries at COP26. Therefore, only around 23% of parties present at COP26 agreed to sign the 'Global Coal to Clean Power Transition Statement'. Some countries only agreed to certain clauses within this statement or, e.g. Hungary, the Republic of Indonesia, and the Republic of Philippines etc.⁶
- Some of the world's biggest users of coal, such as the US and China, did not sign up to this statement.
- The wording of this clause was changed from "phase out" to "phase down" at the last minute. This change of wording weakens the strength of this clause and may not encourage countries to drastically change their use of coal.
- A detailed pathway and set of goals with a clear timeframe need to be developed to reach these targets, and to achieve them by the deadlines set by the UK Government.

<p>Signatures</p> <p>77</p> <p>Out of 196 Parties (46 were countries)</p>	<p>Predicted change in global coal consumption by 2024 compared to 2021</p> <p>+125 million tonnes</p>
<p>Percentage of global emissions currently produced by coal use</p> <p>40%</p>	<p>Money pledged to transition from coal to green energy schemes</p> <p>\$20 billion (£14 billion)</p>

Figure 3: Data from the 'Global Coal to Clean Power Transition Statement' and coal based schemes at COP26.^{7,8}

⁶ For all country signatories and percentage statements, the number of signatories received for each Pact, Declaration, Initiative or Agreement were compared to the total number of parties present at COP26 (196). The number of signatories were taken according to COP26 conference or GOV.UK website numbers and were last checked on June 2022.

⁷ Coal 2021, Analysis and Forecast to 2024; International Energy Agency; OECD Library; January 2022; https://www.oecd-ilibrary.org/energy/coal-2021_ba0095c1-en; Last accessed 30/06/2022.

⁸ Global Coal to Clean Power Transition Statement; COP26 official website; November 2011; <https://ukcop26.org/global-coal-to-clean-power-transition-statement/>; Last accessed 30/06/2022.



Table 2: SWOT analysis of the COP26 ‘Global Coal to Clean Power Transition Statement’

Strengths	Weaknesses	Opportunities	Threats
Tackles the biggest CO ₂ emitter of all fossil fuel resources (on a CO ₂ emitted per gram basis)	No clear timeframe and action plan on how to achieve these goals was created	Decreasing the use of coal provides an opportunity to increase the use of alternative green resources in numerous sectors	Coal is still a vitally important community to many companies and countries. Phasing down its use may causes stability issues, in terms of economics and job security etc.
The short deadline planned to achieve this goal will speed up innovation and creativity in reducing coal demand	Signatures from some of the highest emitting countries and companies globally were not received	Funding towards using alternative energy resources may increase, thus creating new innovations and technologies	Subsequent changes on global supply chains and alternative energy resources (especially fossil fuel reserves) could have adverse consequences
More countries agreed to tackle the use of coal globally compared to previous COP meetings			Poor global stability and trade will hinder the ability to deliver on this statement
Potential actions	<ol style="list-style-type: none"> 1. A clear analysis of how supply chains and energy demand will be effected, when coal use is reduced or ceases, must be performed. 2. Alternative routes to satisfy UK energy and chemical sector demands must be researched and analysed. 		



*The declaration to phase down coal is a step in the right direction, but changing the declaration to "phase **down**" rather than "phase **out**" coal may cause issues. CircularChem believe that a strong emphasis towards "defossilization" as well as "decarbonisation" needs to be in place across the UK. Coal should not be the only fossil fuel source tackled in the hope to achieve greater sustainability and a lower carbon footprint.*

Cars

A declaration on creating, implementing, and increasing the use of zero emission cars and vans was signed by 39 countries, with the aim to reach 100% zero emission vehicle sales by 2035 (at the latest in leading markets), and globally by 2040. This ties in the UK's ambition to end the sale of new diesel and petrol vehicles in the UK by 2030.



"Zero Emission" by OregonDOT is licensed under [CC BY 2.0](#).

Strengths and Positives

- Reducing emissions from personal and work-based car, vans and vehicles will contribute significantly towards reducing greenhouse gas emissions.



- Reducing the use of petrol and diesel run cars will complement other sustainability goals, such as producing cleaner air in major cities and congested areas, whilst reducing our reliance on the fossil fuel derived resources petrol and diesel.
- If performed wisely, this declaration could also provide the opportunity to encourage and increase the use of public transport, such as walking, cycling, or using a bus, tram, or underground.

Weaknesses and Negatives

- Whilst this is an ambitious and global declaration, it is not a legally binding document. The opportunity for countries and companies to perhaps under deliver or fall back on these promises is a possibility.
- The declaration contains 182 signatories, 39 of which came from countries who attended the event. Whilst therefore the number of signatories is high and was one of the most signed declarations made at COP26, the number of countries who signed the declaration is low, as only approx. 20% of parties in attendance signed this declaration.
- Whilst the transport sector is a major contributor towards CO₂ emissions, perhaps a greater emphasis towards targeting airplane emissions, which contribute more to global CO₂ emissions than cars, should have been made.⁹
- Achieving this declaration will involve increasing the manufacture and sales of electric vehicles (EVs). The demand for electric charging ports at home and at petrol stations will therefore increase. Further funding and investments into increasing the ability to access electric charging points across the whole of the UK must be provided. This will ensure there is a UK wide coverage of charging points and thus prevent the creation of a transport and opportunity divide, between cities and rural areas across the UK and within the UK population. It has been stated that the UK will need 2.3 million new charging points by 2030.¹⁰ At the present time there are 32,312 devices in 19,945 locations providing a nominal 53,719 connectors (without counting home and workplace charging locations).¹¹ However, this assumes that all connectors are operational and compatible.
- It was unclear if the installation of new charging points will be addressed in a sustainable manner and with a low carbon footprint.

⁹ The launch of the '*International Aviation Climate Ambition Coalition*' at COP26 is discussed later.

¹⁰ UK needs millions more charging points, says car industry; T. Leggett; BBC News website; June 2021; www.bbc.co.uk/news/business-57647237; Last accessed 07/06/2022.

¹¹ EV Charging Stats 2022; Zap-Map; June 2022; www.zap-map.com/statistics/; Last accessed 07/06/2022.



- EVs are likely to be heavier than petrol and diesel cars due to their design and the weight of the battery. The curb weight (weight of the car with all the fluids necessary for operation, including a 90% full tank of fuel for petrol/diesel cars, without cargo or passengers) of EVs will have a greater impact than petrol/diesel vehicles. For example, the New European Driving Cycle (NEDC) energy requirements and fuel consumption of EVs overall increases linearly with vehicle curb weight.¹² It may therefore be more pragmatic and fair to judge vehicle sales and bans depending on their curb weight, with caveats to minimise abuse or circumventing, and fair treatment for agricultural requirements.
- This declaration states in small print that only emissions at the **tailpipe** will be considered, when analysing whether vehicles produce zero greenhouse gas emissions. This means that grid electricity containing a high proportion of fossil fuel generated power can still be used in an EV which can then claim to be a zero (tailpipe) emitter. This is an inconsistency that needs to be addressed.
 - Whilst this goal is understandably easier to achieve, and is the first hurdle to tackle when dealing with carbon emissions from vehicles, carbon emissions from creating, manufacturing, shipping and repairing vehicles must also be analysed.



"[BMW Boxer Cup race bike, tailpipes](#)" by [FurLined](#) is licensed under [CC BY-NC-SA 2.0](#).

¹² L. A. Ellingsen, B. Singh, A. H. Strømman; The size and range effect: lifecycle greenhouse gas emissions of electric vehicles; *Environ. Res. Lett.*; 2016; **11**; 10; 054010; DOI: [10.1088/1748-9326/11/5/054010](https://doi.org/10.1088/1748-9326/11/5/054010)



- Focusing on this problem with a 'carbon tunnel vision', i.e. only tackling CO₂ emissions, will lead to other environmental consequences and problems.
 - Potential supply chain issues when transitioning from fuel and diesel run cars and HGVs to lithium-ion battery-based cars must also be considered. Otherwise, car manufacturing will lead to further environment damage and unintended consequences.
 - Lithium, nickel, manganese, and cobalt are key battery materials, but are also critical metals, used for EV batteries.¹³ Nickel itself has more than doubled in cost from March 2020 to March 2022, whilst global London Metal Exchange (LME) stocks have decreased from approx. 650 metric tonnes to approx. 250 metric tonnes in the same time period.¹⁴ In 2018, 65% of global cobalt supplies were provided by the Democratic Republic of the Congo (DRC), a geopolitically unstable country.¹⁵ The price of cobalt in China also surged in early 2022 due to supply chain issues and shipment delays from the DRC. Careful consideration of potential supply chain shortages and geopolitical issues must be considered, as well as knock-on effects such as increased material costs.
 - If fossil-fuel derived electricity is used to power EVs during their use phase, the lifecycle and carbon emissions of these vehicles increases dramatically.¹⁶ Decarbonisation of the UK National Grid, and increases in the production of electricity from green energy resources, must occur before the ban of petrol/diesel vehicles and EVs sales increase.

¹³ L. A. Ellingsen, G. Majeau-Bettez, B. Singh, A. K. Srivastava, L. O. Valøen, A. H. Strømman; Life Cycle Assessment of a Lithium-Ion Battery Vehicle Pack; *J. Ind. Ecol.*; 2013; **18**; 1; 113-124; DOI: [10.1111/jiec.12072](https://doi.org/10.1111/jiec.12072)

¹⁴ Cobalt Statistics and Information, Mineral Industry Surveys for Cobalt March 2022; US National Minerals Information Center; March 2022; <https://www.usgs.gov/centers/national-minerals-information-center/cobalt-statistics-and-information>; Last accessed 28/06/2022.

¹⁵ Cobalt for Batteries; The Globalist; November 2018; <https://www.theglobalist.com/batteries-mining-cobalt-democratic-republic-of-congo/>; Last accessed 28/06/2022.

¹⁶ L. A. Ellingsen, B. Singh, A. H. Strømman; The size and range effect: lifecycle greenhouse gas emissions of electric vehicles; *Environ. Res. Lett.*; 2016; **11**; 10; 054010; DOI: [10.1088/1748-9326/11/5/054010](https://doi.org/10.1088/1748-9326/11/5/054010)

Carbon Tunnel Vision

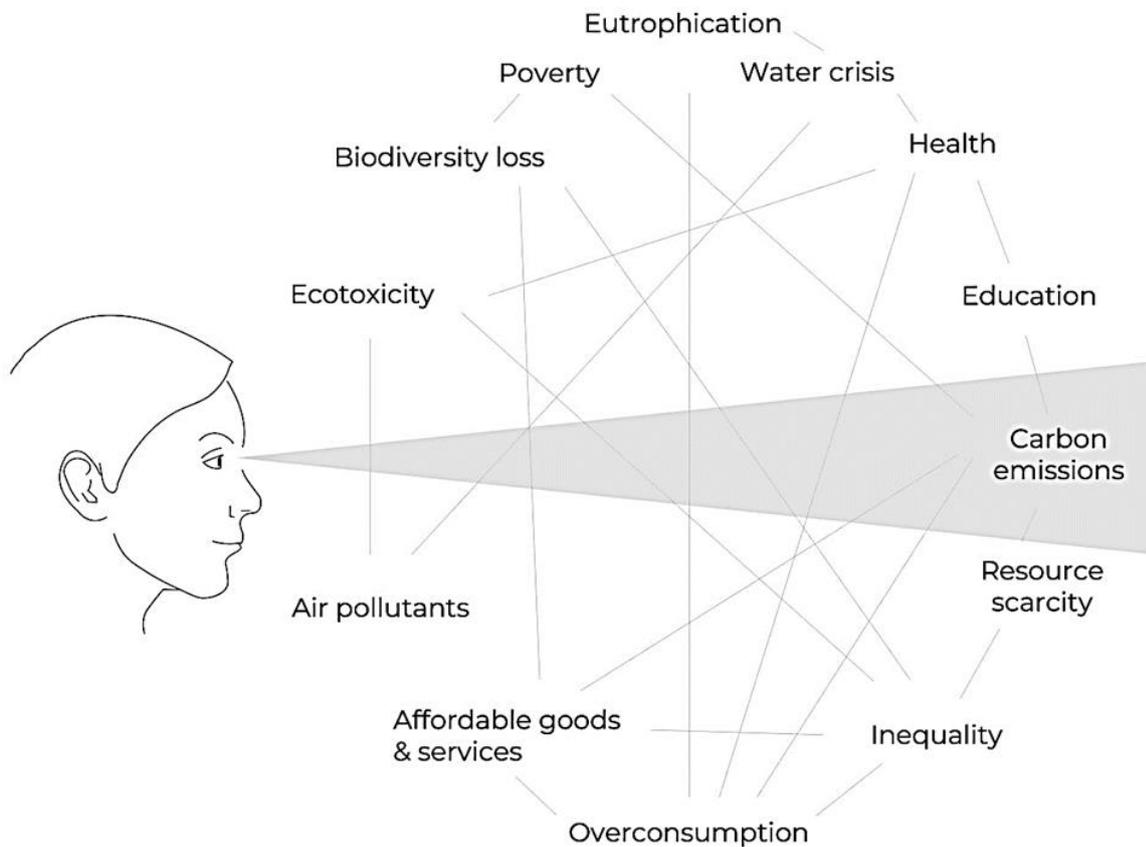


Figure 4: The potential issue of employing a “carbon tunnel vision.” We have to tackle CO₂ emissions, but it must not be our only focus. We need to consider social responsibility, social impact factors, and other sustainability metrics. This figure was produced and adapted with permission from Jan Konietzko.¹⁷

- In the future, reducing the demand for buying new cars, whilst creating more and new ‘ad hoc’ car-based services and enabling behavioural and consumer changes with cars, will need to be addressed.
- Older petrol and diesel cars can be less efficient compared to modern cars. Banning the sale of new petrol and diesel cars may therefore inadvertently encourage an increase in second-hand cars sales. A higher emphasis should therefore be placed on demand reduction, via car-pooling, car-rental, public transportations. Just focussing on using circular resources to ‘greenify’ cars may not alter the consumptive issues.

¹⁷ J. Konietzko; How can we embrace the complexity of the sustainability transition, without getting stuck in carbon tunnel vision?; December 2021; <https://www.linkedin.com/feed/update/urn:li:activity:6859418054867083264/>; Last accessed 14/12/2022



- The long-term recycling and repairing opportunities for old cars and new EVs also needs to be considered, to avoid creating further waste and using the standard linear model of vehicle use that exists today. The lifecycle perspective of EVs must be considered, not just the tailpipe emissions.¹⁶ If considered carefully, this will lead to an effective implementation of a circular economy in the UK.
- If alternative bio-based fuels are also developed and used to run vehicles, there must be enough material to satisfy demand, replace the current demand for petrol and diesel, and ease the potential strain and demand for future electric charging ports and new EVs. Further investigations as to whether current supply chains and infrastructures are in place to support the development and growth of alternative fuels must also be addressed by this declaration.
- As there a hard deadline is proposed to end the sale of new petrol/diesel vehicles, similar deadlines should be placed in terms of innovation and research, to ensure that sustainable developments in vehicle maintenance, efficiency and performance etc. are achieved by the time this ban comes into force.
- Synthetic aviation fuels (SAFs), synthetic transport fuels (STFs), e-fuels and renewable fuels of non-biological origin (RFNBOs) will play a major role in transportation defossilisation (refs to RS and Duckworth papers). Such fuels are less-polluting and have significantly lower carbon emissions over the whole lifecycle.

<p>Signatures</p> <p>182</p> <p>Out of 196 Parties (39 were countries)</p>	<p>Estimated global CO₂ reductions per year if road transport is decarbonised</p> <p>2.6 Gt(CO₂)e</p>
<p>Estimated contribution of road transport to global greenhouse emissions</p> <p>10%</p>	<p>Percentage of global vehicle manufactures who agreed to phasing out fossil fuel vehicles</p> <p>30%</p>

Figure 5: Data from zero emission cars declaration and other car based schemes at COP26.^{18,19}

¹⁸ COP26 declaration on accelerating the transition to 100% zero emission cars and vans; GOV UK website; 28 June 2022; <https://www.gov.uk/government/publications/cop26-declaration-zero-emission-cars-and-vans/cop26-declaration-on-accelerating-the-transition-to-100-zero-emission-cars-and-vans>; Last accessed 30/06/2022.

¹⁹ The Glasgow Climate Pact; COP26 Official Website; 2021; <https://ukcop26.org/the-glasgow-climate-pact/>; Last accessed 30/06/2022.



Table 3: SWOT analysis of COP26 initiatives and schemes around ‘Cars’

Strengths	Weaknesses	Opportunities	Threats
Tackles carbon emissions from personal and private travel, both huge contributors to transport based emissions	Only tailpipe emissions will be considered.	A decrease in petrol and diesel usage may increase the production and implementation of alternative and sustainable fuels	Decreases in metal availability and supply chain disruptions will heavily impact battery, and thus EV, production
EVs are capable of achieving net zero emissions (in terms of tailpipe emissions)	Increasing EV use, over petrol and diesel based vehicles, may encourage employing a ‘carbon tunnel vision’ and ignoring other sustainability metrics	Implementing a hard deadline towards innovation and research could lead to quick large scale changes in the transport sector	The high cost of EVs may lead to the creation of a new underclass, and make cars a luxury rather than a commodity
		Lower car use may also increase the global use of public transport	
Potential actions	<ol style="list-style-type: none"> 1. More steps to prevent the general use of vehicles overall need to be implemented, alongside no further sales or petrol/diesel cars. 2. Research towards sustainable fuels and alternative supply chain routes needs to increase. 3. Increasing the abundance and reliability of public transport to replace personal vehicles use would contribute towards mitigation steps. 		



Whilst a push towards less petrol and diesel cars being sold is welcomed, CircularChem advises that a detailed and thoughtful approach, with an appreciation of other sustainability metrics, must be considered when increasing the use and sale of EVs. A greater emphasis towards changing consumption behaviours and reducing car use in the first place, whilst increasing the use of public transport, must also occur. Diesel and petrol engines are not the problem; fossil diesel and gasoline are the problem.

Trees

Currently almost a quarter (23%) of global emissions come from land use activity, such as logging, deforestation, and farming. Protecting forests and ending damaging land use is one of the most important things the world can do to limit catastrophic global warming, while also protecting the lives and futures of 1.6 billion people worldwide (nearly 25% of the world's population) who rely on forests for their livelihoods.

In total, 141 countries at COP26, covering 90% of the world's forests accounting (approx. 3.7 billion hectares and 14 million square miles of forest), agreed to end deforestation by 2030 and to commit to efforts to reverse deforestation, as part of the '*Glasgow Leaders' Declaration on Forest and Land Use*'. This will include protecting large forest areas, such as the northern forests of Canada and Russia, and the tropical rainforests of Brazil, Colombia, Indonesia and the Democratic Republic of the Congo.

Other pledges and promises were also made by the UK and other countries at COP26, to protect forests, agriculture, land and food systems for years to come. In total, 45 nations pledged to take urgent action and to provide investment towards protecting nature and shifting to more sustainable ways of farming. Over 100 countries also signed up to protect at least 30% of the global ocean by 2030. Large amounts of financial contributions to support the protections of forests were promised, including \$12 billion towards a new Global Forest Finance Pledge, which will run from 2021-2025 to help restore degraded land, tackle wildfires, and protect indigenous people in developing countries.

Global institutions were also devoted to tackling these issues in the long-term by changing current financial systems that deal with forests and commodities. For example, the '*Lowering Emissions by Accelerating Forest Finance*' (LEAF) coalition will provide financial aid to tropical and subtropical countries that successfully reduce emissions from deforestation and



degradation. Private finance will also only be provided by companies committed to cutting emissions in their own supply chains.

The general trade of agricultural goods will also be changed. As part of this, 28 Governments, representing 75% of global trade in key commodities that threaten forests, have signed up to the new '*Forest, Agriculture and Commodity Trade*' (FACT) statement. This statement provides a roadmap of actions towards delivering sustainable trade, reducing pressure on forests, support for smallholder farmers and improving transparency of supply chains. Alongside this, 12 of the largest companies in the world, managing over half of global trade in forest-risk commodities, such as palm oil, beef, and soy announced that they will lay out a shared roadmap to ensure these supply chains head towards a 1.5 °C pathway.



"forest" by barnyz is licensed under [CC BY-NC-ND 2.0](https://creativecommons.org/licenses/by-nc-nd/2.0/)

Strengths and Positives

- Trees can act as CO₂ sinks and therefore provide a natural way of capturing and re-using CO₂ emissions and CO₂ already present in the atmosphere.
- The large amounts of financial contributions promised will have a significant impact on deforestation research and is a promising figure.
- The ambition to think long term about deforestation and to change how companies and countries handle their supply chains is a very forward thinking and welcomed approach.



Weaknesses and Negatives

- Whilst the large financial support provided to implement these measures are positive, perhaps more action towards prevention is needed rather than focussing on just adaptation.
- Whilst planting trees can be used to capture CO₂ emissions and remove it from the atmosphere, the scale of emissions, time needed for trees to grow and thus sequester CO₂, and the large scale of land mass required to capture any significant volume of CO₂, means that relying on planting trees only is not enough to deal with climate change.²⁰
 - A single tree can sequester 1.66 kg of CO₂ per year in its first year of growth. An average diesel car, with a CO₂ emission rate of 122.1 g of CO₂ per km, travelling 10,000 miles annually, will emit approximately 1,965 kg of CO₂. It would take 1,180 trees to offset these emissions each year, for just one car. In 2021, there were over 38 million UK registered private cars. Therefore, to offset UK private car emissions alone, over 45 billion trees would need to be planted annually. To plant that many trees, a land area of 22.5 million Ha would be needed. As the UK land area is approximately 24.3 million Ha, over **93%** of UK land would need to be covered by trees to meet this demand. This is simply not possible.
- Care needs to be taken to ensure that afforestation is managed sustainably, introducing the appropriate species to an individual region. Poor forestry management can actually increase emissions overall, including methane emissions with GWP 25 times greater than CO₂.

Signatures 145 Out of 196 Parties (all signatures were from Countries)	Global forests covered by signatures > 90%
Hectares of forest covered 3.6 billion	Square miles of forest covered 14.2 million

Figure 6: Data from the 'Glasgow Leaders' Declaration on Forest and Land Use' and other Tree based pledges at COP26.²¹

²⁰ P. Styring, E. L. Duckworth, E. G. Platt; Synthetic Fuels in a Transport Transition: Fuels to Prevent a Transport Underclass; *Front. Energy Res.*; 2021, Sec. Sustainable Energy Systems and Policies; **9**; 707867; DOI: [10.3389/fenrg.2021.707867](https://doi.org/10.3389/fenrg.2021.707867).

²¹ Glasgow Leaders' Declaration on Forests and Land Use; COP26 official website; November 2021; <https://ukcop26.org/glasgow-leaders-declaration-on-forests-and-land-use/>; Last accessed 30/06/2022.



Table 4: SWOT analysis of COP26 initiatives and schemes around 'Trees'

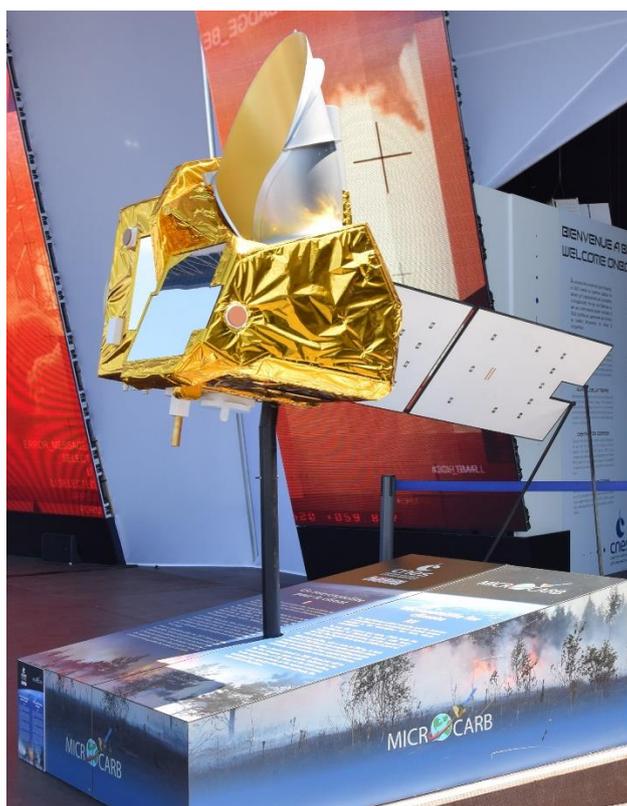
Strengths	Weaknesses	Opportunities	Threats
Trees are a natural carbon sink and can lead to increased forestation	Trees themselves cannot capture large volumes of CO ₂ quickly	Other green initiatives alongside tree planting could increase across the UK	Increased demand for housing may lead to these trees being removed overtime
Long-term deforestation issues are considered and will be tackled	Trees will only truly act as a carbon sink if planted for many years	Changes made to tackle deforestation could lead to positive changes in current global supply chains that rely on trees and agriculture	Poor forestry management could lead to increased emissions and species competition
			Trees near houses can cause unintentional damage
Potential actions	<ol style="list-style-type: none"> 1. Further research and innovation towards large scale and more feasible CO₂ mitigation, capture and use technologies must be implemented. 2. A more circular approach towards implementing a circular carbon cycle within the UK chemical sector (and others) needs to be implemented 3. Deforestation mitigation and carbon dioxide capture technologies need to be addressed simultaneously. 		

CircularChem advises that whilst planting trees will overall have some benefits, it will not provide a long-term and large scale solution towards tackling climate change. A stronger focus should be given to prevention and mitigation of CO₂ emissions, and techniques such as carbon dioxide utilisation (CDU) and carbon capture and storage (CCS), to lower global CO₂ emissions.



Other notable initiatives

- Over 100 countries agreed to cut their methane emissions by 30% by 2030.
- Acknowledgements were made that overall global inequality needs to be tackled and considered with these initiatives, such as protecting and acknowledging concerns of indigenous people and those from less economically developed countries, who are more likely to suffer the consequences of climate change. Addressing gender inequality and allowing 40,000 young climate leaders to express their views and concerns to ministers, negotiators and officials is a step forward in the right direction.
- One interesting initiative launched at COP26, which was highlighted by the UK Government, was the joint British and French initiative 'MicroCarb' which will be dedicated to monitoring atmospheric CO₂ levels and to "characterise greenhouse gas fluxes on Earth's surface and gauge how much carbon is being absorbed by oceans and forests, the main sinks on the planet." The 'MicroCarb' satellite is due to launch in December 2022.



"[File:MicroCarb.jpg](#)" by [Tiraden](#) is licensed under [CC BY-SA 4.0](#).

'The Breakthrough Agenda'

During COP26, the UK announced a new international plan to ensure that the world has access to clean and affordable technology by 2030. This plan was backed up by over 40 fellow



world leaders, including the United States of America (US), India, the European Union (EU), China and others. This represents around 70% of the world's global economy. This agenda will be modelled off the UK's '*Net Zero Strategy*' and will aim to coordinate and work with countries across the world to increase the availability of clean, sustainable, and affordable energy, particularly in developing countries. This Agenda also aligns with the UK Government's '*Ten Point Plan for a Green Industrial Revolution*'.

As part of this plan, 5 goals were set to tackle 5 key sectors that account for 50% of global emissions:

- Power
 - Clean power will become the most affordable and reliable option for all countries to meet their power needs by 2030.
- Road Transport
 - Zero emission vehicles will be the new norm and will be accessible, affordable, and sustainable for everyone by 2030. There is a caveat here that this is defined as zero 'tailpipe' emissions.
- Steel
 - Near-zero emission steel production and manufacturing will be established by 2030.
- Hydrogen (H₂)
 - Affordable and renewable low carbon H₂ will be globally available by 2030. Here there is a caveat that this needs to be considered alongside clean water availability and security.
- Agriculture
 - Climate-resilient, sustainable agriculture will be widely available and globally utilised by farmers everywhere by 2030.

World leaders agreed to commit to meet and discuss global progress every year in each sector starting in 2022, with annual reports from the International Energy Agency (IEA), International Renewable Energy Agency (IRENA) and the UN High Level Champions. It was also claimed at COP26 that countries representing more than 70% of the world's economy are committed to delivering clean and affordable technology everywhere by 2030.



Strengths and Positives

- The ambition for the UK Government to tackle these 5 sectors is vital, as all of them contribute significantly to current UK CO₂ emissions.
- The announcement of yearly meetings with the IEA and other agencies, to check, monitor and evaluate progress, will hopefully keep these aims on track.

Weaknesses and Negatives

- Energy itself was not listed as a main theme by the UK Government at COP26. Whilst *'The Breakthrough Agenda'* is more detailed compared to other agendas, declarations and promises launched at COP26, and overlaps with the declaration to transition towards 100% zero emission cars, the urgency of this agenda should have been stressed more.
- The recent issue of the energy and gas crisis across the UK, as well as the UK acting as a major importer of natural gas and thus relying on global supply chains to meet the UK demand for gas, may hinder aspects of this agenda.
- Future strategies, policies, roadmaps and plans to tackle each of the five sectors, alongside a clear timeline of action, must be developed effectively and released soon, in order to successfully guide UK sectors and the UK population towards achieving these ambitious goals.
 - At a recent Policy Exchange Virtual event titled "Small Businesses and Net Zero", Professor Peter Styring from CircularChem highlighted that *"the Ten Point Green Industrial Revolution plan is an ambition rather than true legislation."* In response, Andrew Griffith MP for Arundel and South Downs and the UK Net Zero Business Champion, stated that the *"Ten Point Green Industrial Revolution Plan is a plan that alongside the decarbonisation of transport strategy, the hydrogen strategy paper and other papers, will turn those into a set of series of actions and detailed plans"*. Hopefully this will be the case.
 - Professor Peter Styring also queried about the reality of small businesses gaining access to, and receiving the benefits of, clean energy, highlighting CCS as an example. Peter stated that *"we're looking to achieve 20 megatonnes per annum carbon capture by around 2030. That's more than the current global capacity at the moment, and in Britain we don't have a pipeline. How do I decarbonise using CCS when the infrastructure doesn't exist?"* Andrew Griffith MP also responded by stating *"you can now rely on the fact that about half the energy" small businesses are using "is coming to clean, renewable energy, and that's happening semi magically ... while you sleep. So*



if you are a small business owner, then that's just taken care of for you". Hopefully this is also another promise that the Government will deliver on.

- More focus overall needs to be placed on the material aspects of society as well. The carbon footprint of materials and chemicals was not really discussed or highlighted in any of the initiatives or agreements launched at COP26. The chemical sector, and the general production, use and recycling or reuse of chemicals, really needs to be addressed and considering moving forward.



"[02-13-06 Chemical Plant and suffocating tree](#)" by [Picture taking fool](#) is licensed under [CC BY-NC-ND 2.0](#).



The '*International Aviation Climate Ambition Coalition*' and '*Clydebank Declaration*'

The '*International Aviation Climate Ambition Coalition*' and '*Clydebank Declaration*' were launched at COP26 to tackle carbon emissions from airplanes and shipping (including fuels), respectively.

For the '*International Aviation Climate Ambition Coalition*', member states committed to support the adoption of a global goal to reduce international aviation CO₂ emissions alongside the International Civil Aviation Organization (ICAO). By working with the ICAO, countries hope to "*address emissions from international aviation through in-sector and out-of-sector measures, and to implement short-, medium- and long-term goals, including the development of a global sustainability framework, to support the deployment of Sustainable Aviation Fuels (SAFs) and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).*"

As part of this, countries signed to commit to make the industry achieve net zero by 2050 and to work together to fight against a 1.5 °C rise in average global mean temperatures. They also want to maximise the effectiveness of CORSIA, create and distribute SAFs in line with the UN SDGs and lead to new innovations in low- and zero-carbon aircraft technologies.

In the UK, there is also the Jet Zero Council (JZC); a partnership between industry and government to bring together ministers and chief executive officer-level stakeholders, with the aim of delivering zero-emission transatlantic flights within a generation, driving the ambitious delivery of new technologies and innovative ways to cut aviation emissions.²²

The '*Clydebank Declaration*' was also established in order to increase the presence of green shipping corridors globally. This declaration sits within the '*Zero-Emission Shipping Mission*' and is designed to complement work at the International Maritime Organization (IMO) to enable zero-emission shipping. "*In supporting the establishment of green corridors, signatories recognise that fully decarbonised fuels or propulsion technologies should have the capability to*

²² UK Government Groups, Jet Zero Council, Delivery Groups; GOV.UK website; May 2022; <https://www.gov.uk/government/groups/jet-zero-council#delivery-groups>, Last accessed 07/06/2022.



not add additional GHGs (greenhouse gases) to the global system through their lifecycle, including production, transport or consumption".



"[Wind Farm off Cromer with passing ship](#)" by [Martin Cooper Ipswich](#) is licensed under [CC BY 2.0](#).

Strengths and Positives

- The aviation and maritime transport sectors are both major contributors of CO₂ emissions. Creating and developing sustainable and greener fuels for airplanes and creating green shipping corridors will contribute significantly to reducing carbon emissions.²³
- Countries who signed the '*International Aviation Climate Ambition Coalition*' agreed to "*prepare up-to-date state action plans, detailing ambitious and concrete national action to reduce aviation emissions ... in advance of the 41st ICAO Assembly*", which will run from 27th September to 7th October 2022. This deadline shows the ambition to tackle this issue quickly. "*Convening periodically*" to check on progress was also set, which will be key to ensure these goals are met.
- In the '*Clydebank Declaration*', the statement that shipping corridors will "*not add additional GHGs to the global system through their lifecycle*" demonstrated awareness that whole supply chains and the lifecycle of ships and other sectors must be considered when reducing emissions.

²³ S. Ahmad, B. Xu; A cognitive mapping approach to analyse stakeholders' perspectives on sustainable aviation fuels; *Transp. Res. Part D: Transp. Environ.*; 2021, **100**; 103076; DOI: [10.1016/j.trd.2021.103076](https://doi.org/10.1016/j.trd.2021.103076)



Weaknesses and Negatives

- Overall, the publicity towards tackling these transport sectors seemed less of a priority for the UK at COP26 in comparison to tackling emissions from cars.
 - The '*International Aviation Climate Ambition Coalition*' only received a total of 28 signatories from the 196 countries that attended COP26, with therefore approx. 14% of countries at COP26 agreeing to this coalition.
 - In a similar vein, the '*Clydebank Declaration*' only received a total of 24 signatories, accounting for approx. 12% of countries who attended COP26.
- A clear set of plans and goals, set to a clear timeframe, are yet to be developed and established alongside these agreements.
- The '*Clydebank Declaration*' states that only green shipping corridors between 2 ports will be established and is therefore small scale at the moment. The declaration states that more can be developed, but only 2 were promised as a bare minimum.
- The same declaration also states that all vessels using a green corridor would not be required to be a "zero emissions" based vessel. This is understandable in the early stages of setting up these green corridors, as clear targets will need to be set to truly achieve net zero emissions. This perhaps though contradicts the statement that the whole lifecycle of green corridors and vessels will be considered, and will give countries the ability to cop out of ensuring their vessels comply with net zero goals.

The '*Glasgow Climate Pact*'

At the end of the conference, the '*Glasgow Climate Pact*' was signed with countries committing to keep their promises made at COP26, "*aiming to turn the 2020s into a decade of climate action and support*". As part of this Pact, countries reaffirmed the long-term goal to keep the global average temperature below 2 °C, and ideally below 1.5 °C. A total of 153 countries submitted their Nationally Determined Contributions (NDCs), and thus their new 2030 emission targets. In 2015, the 196 parties present at COP21 agreed to the Paris Agreement, which involved a commitment to outline and communicate their post-2020 climate actions (i.e. their NDCs) by 2020. Out of the 196 countries at COP21, 156 submitted their NDCs, meaning 78% of the countries at COP21 kept some of the key promises of the Paris Agreement. Countries who signed the pact also agreed to revisit and strengthen their



current emissions targets of 2030 in 2022 at COP27, which was held in Egypt in November 2022.



"Day 3 at COP27 (cop27 0164) (52488901578)" by [AEA Imagebank](#) is licensed under [CC BY 2.0](#)

Strengths and Positives

- The high submission rate of countries submitting their NDC's at COP26 is promising and highlight the global determination to tackle climate change.

Weaknesses and Negatives

- This pact is again not a legally binding document, with the Pact urging and encouraging countries to reduce their carbon footprint. Whilst it is technically difficult to make this



document legally binding, this provides the opportunity for countries to not meet their targets.

- In the NDC submitted for the UK in 2020, it was stated interestingly that “emissions from International Aviation and Shipping are not included in the scope of this NDC, in line with advice from the Climate Change Committee (CCC) the UK’s independent advisors”. As these areas are both major contributors of CO₂ emissions, and the UK agreed to the ‘International Aviation Climate Ambition Coalition’ and ‘Clydebank Declaration’, this seems contradictory.
- The ambitions and goals set by this pact and countries’ NDCs need to be delivered and evaluated over a clear time frame, to ensure that promises made in these NDCs are kept and that any problems tackled along the way are addressed sooner rather than later.

Estimated global warming increase from COP26 pledges by 2100	Predicted global CO ₂ emission reduction from COP26 pledges
2.4 °C	2.6-3.9 Gt(CO ₂)e
Estimated global temperature increase if all countries achieve net zero goals	Extra global CO ₂ emissions needed to reach 1.5 °C goal
1.8 °C	20-23 Gt(CO ₂)e

Figure 7: Data from ‘Glasgow Climate Pact’ and general effectiveness of COP26 pledges.²⁴

All of these initiatives and promises launched by the UK Government are welcomed by CircularChem, as they tackle high CO₂ emitting sectors of society. Many of these promises though need to be more ambitious in order to seriously tackle the large scale issue of global CO₂ emissions. Clear actions of how these promises will be achieved need to set out. A greater emphasis and focus towards tackling the carbon footprint and impact of chemicals and materials also needs to be placed. CircularChem are actively working to achieve this goal.

²⁴ 1.5 °C to survive, Evidence from the IPCC Special Reports; Climate Analytics; May 2021; <https://climateanalytics.org/publications/2021/15c-to-survive-evidence-from-the-ipcc-special-reports/>; Last accessed 30/06/2022.



4. Overall thoughts

Initiatives from COP26 were set to tackle numerous sectors and areas of everyday life, such as green technology, green construction, transport, cars, aviation, fuels, good deliveries, trees, land protection, helping developing countries and striving against inequality. Many of these initiatives can stimulate and provide opportunity for investment across the UK, and contribute towards achieving the research goals and aims of CircularChem.

Admitting and openly discussing that goals from the Paris Agreement were not being met at COP26 highlights a willingness to truly reflect and analyse whether climate change goals are being fulfilled. Perhaps an even more critical approach is needed though to truly ensure COP26 goals (and any in the future) are realistic and achievable and as quick as possible.

Acting immediately has always seemed to be the message at COP meetings, especially at COP26 following the stark reality of the IPCC Sixth Assessment report. Whilst understandably everything and anything on a global scale takes time, the speed at which global goals are created and set to be achieved is still too long. Countries were given 5 years since the Paris Agreement was set at COP21 to develop and set their NDCs by 2020. The promise of setting up a global framework to then monitor and report on efforts towards tackling climate change will not occur until 2024. Almost a decade will therefore have passed, after setting the Paris Agreement, until any realistic analysis and quantifications are made on how well countries are delivering on these promises. Waiting another ten years after COP26 before starting to truly implement any of these promises is too late. Countries are also only required to submit updated NDCs every 5 years, which is still a long time. There is also no punishment for countries that do not meet these targets, or arguably real financial incentive to deliver on their promises, though the reality and possibility of setting punishments or sanctions on countries that fail to deliver on their treaty targets is low.

Some important aspects must also be considered moving forward. Policymakers need to consider how we can optimally combine trade and the environment policies, so that one complements the other. In the context of globalisation, trade could help companies accept better environmental standards and regulations by giving them financial inducements. This can stimulate the use of climate positive manufacturing technologies as well as encouraging innovation in the value chain. More coherent policies need to be created which complement



one another in general, in order to avoid creating overlapping, confusing and conflicting policies across sectors. Many UK incentives launched before and after COP26 have focussed primarily around energy carbon emission, with little mention or focus towards chemicals and their production and supply chains. This must be considered more in the future, as carbon emissions towards producing items we use in our everyday lives must be considered as well as energy.

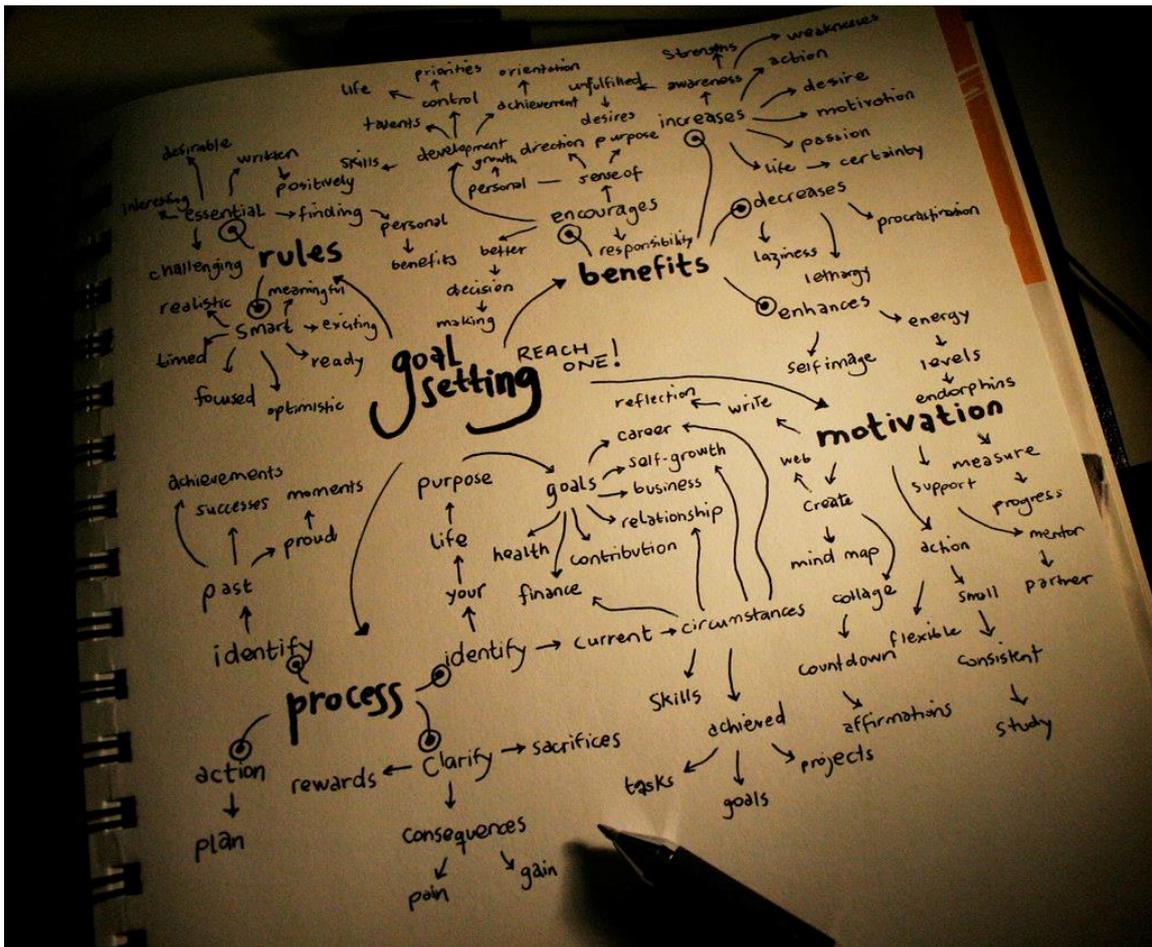
Considerations towards tackling cumulative emissions at COP26 was also unclear. Whilst countries across the world must ensure that current emission levels are reduced significantly by 2050, cumulative emissions must also be considered when reducing levels of CO₂ in the atmosphere. Direct Air Capture (DAC) of CO₂ or CCS are not as advantageous perhaps as CDU, or using CCS combined with CDU, in terms of circular economy principles. Capturing and storing CO₂ also misses the opportunity to convert (and thus re-use or recycle) carbon in the UK and global chemical sector. Despite this, we cannot simply rely on CDU alone and must use a multifaceted approach to tackling CO₂ levels.

Ultimately, there was an overall lack of focus into considering local, national, and global supply chains when making new commitments. Factors such as social responsibility and social impact factors were mentioned, but no finer details into how these factors would be measured and minimised was left unaddressed and will need to be considered across all themes of COP26. A clearer set of goals, guidelines and timeframes need to be set, rather than a final deadline, in order to effectively reach the goals of COP26.

The CircularChem Centre is striving to develop new policies that take social impact factors into account, as well as economic and environmental factors, to avoid approaching or creating new policies and technologies with a 'carbon tunnel vision'. The Centre also believes that carbon footprint of materials needs to be addressed in the future alongside the carbon footprint of energy. Research of the Centre is therefore highly focussed on increasing efforts towards 'defossilization' as well as 'decarbonisation' simultaneously, and reducing the overall carbon footprint of the UK chemical sector.



All the promises and themes of COP26 need to move from ambitions to a clear set of goals and targets urgently, in order to guide industry, businesses and the general public in how to effectively become more environmentally friendly and reduce their carbon footprint. These goals also need to be set within clear and immediate timeframes, so that targets can be measured and monitored, and adjusted necessarily sooner rather than later. As long as we keep setting only ambitions, we will never set meaningful and clear goals towards reducing CO₂ emissions and to ultimately protect our planet for future generations to come.



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5. Progress in the Context of COP27 – A Postscript

There seems to have been little progress in the year between COP26 and COP27. The main positive to emerge has been a reparation package to compensate developing nations for their ambitions to achieve a 1.5 °C temperature rise limit. However, the main tenets of climate change mitigation were not progressed. The agreed text at the end of the conference did not mention a clear strategy to phase down coal, any recognition that science-based analysis tells us that peak emissions must be reached by 2025 to enable a reversal in global warming, or the commitment to phase out all fossil fuels. Furthermore, the text on energy strategy that appeared in the final text was weakened. Again, there was no commitments or policy aimed at the move to a fossil-free chemicals sector. In the words of former COP President Alok Sharma: "Friends, I said in Glasgow that the pulse of 1.5 degrees was weak. Unfortunately, it remains on life support."²⁵

At the time of writing, the situation has been further complicated by the announcement that the UK Government have authorised the opening of a new coal mine in Cumbria, the first new coal mine in 30 years. It has been estimated that despite creating 500 new jobs, the extra pollution this will cause will be equivalent to 200,000 new cars being introduced to UK roads.^{26,27}

A serious concern is developing around the frequency of COP meetings. The associated emissions of a global annual meeting are substantial and in reality, they produce little in terms of firm commitments. Twelve months between meetings gives little time for tangible progress to be actioned, let alone enacted. It has been suggested²⁸ that COP events become biannual, or perhaps more reasonably occur every three or four years, so that realistic action plans can be developed with realistic milestones and deliverables achieved. We need to turn ambitions into actions in the drive to mitigate against climate change. More importantly, we

²⁵ C. Coleman; COP27: Progress and outcomes; House of Lords Library; November 2022; <https://lordslibrary.parliament.uk/cop27-progress-and-outcomes/#heading-7>; Last accessed 14/12/2022.

²⁶ V. Seabrook; First coal mine in decades approved - a year after UK lobbied to 'consign coal to history'; December 2022; <https://news.sky.com/story/uk-approves-new-coal-mine-one-year-after-it-campaigned-at-cop26-to-consign-coal-to-history-12762783>; Last accessed 14/12/2022.

²⁷ F. Harvey; UK's first new coalmine for 30 years gets go-ahead in Cumbria; December 2022; <https://www.theguardian.com/environment/2022/dec/07/uk-first-new-coalmine-for-30-years-gets-go-ahead-in-cumbria>; Last accessed 14/12/2022.

²⁸ K. Lamb, P. Styring; Perspectives for the circular chemical economy post COP26, *Front. Energy Res.*; 2022; Sec. Carbon Capture, Utilization and Storage; **10**; 1079010. DOI: [10.3389/fenrg.2022.1079010](https://doi.org/10.3389/fenrg.2022.1079010)



need to ensure that the creation of a circular chemicals economy becomes a key pillar of COP, and not just an afterthought in an energy dominant society.



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6. Abbreviations

AAAP: Africa Adaptation Acceleration Program

CBAM: Carbon Border Adjustment Mechanisms

CCC: Climate Change Committee

CCS: Carbon Capture and Storage

CDRI: Coalition for Disaster Resilient Infrastructure

CO₂: Carbon dioxide gas

COP26: Conference of the Parties 26

CDU: Carbon Dioxide Utilisation

CGI: Clean Green Initiative

CLARE: CLimate Adaptation and Resilience REsearch programme

CO: Carbon monoxide

CO₂: Carbon dioxide

CORSIA: Carbon Offsetting and Reduction Scheme for International Aviation

DAC: Direct Air Capture

DRC: Democratic Republic of the Congo

EU: The European Union

FACT: Forest, Agriculture and Commodity Trade

GHGs: Greenhouse gases

Gt(CO₂)e: Gigatonnes of CO₂ equivalent

H₂: Hydrogen

Ha: Hectare, used for the measurement of land, equal to 10,000 m² (1 hm²), a square area with 100 metre length sides. There are 100 hectares in one square kilometre

ICAO: International Civil Aviation Organization



IEA: International Energy Agency

IMO: International Maritime Organization

IPCC: Intergovernmental Panel on Climate Change

IRENA: International Renewable Energy Agency

IRIS: Infrastructure for Resilient Island States

JZC: Jet Zero Council

LEAF: Lowering Emissions by Accelerating Forest Finance

LME: London Metal Exchange

NDCs: Nationally Determined Contributions

NEDC: New European Driving Cycle

SAF: Sustainable Aviation Fuels

SDGs: Sustainable Development Goals

SIDS: Small Island Developing States

UK: The United Kingdom

US: The United States of America



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