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Banks, bonds and petrochemicals

Greening the path from the Copenhagen Agreement, through Covid and Beyond

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Abstract

The petrochemical sector is a high-emitting industry that is a crucial middle-ground between multiple sectors and is often touted as the producers of the ‘building blocks of life’ because of its omnipresence in everyday life. Despite this, however, petrochemicals slip under the radar in discussions on alleviating the impacts of climate change and the necessity for rapid decarbonisation, where focal points often centre on energy production, transport, and food. This paper maps the finance flows in the petrochemical industry since 2009 with the aim of identifying potential leverage points in the world of public and private finance that could help hasten the rate of decarbonisation for a sector that is hard-to-abate, given its dependency on the fossil fuel industry and the necessity for high-levels of heat and energy in its production processes. The findings aim to help contribute to debate given the growing number of governments and industries that have pledged to low-carbon or even zero-carbon strategies.

Chemical and plastics production, although inextricably connected with the extractivist fossil fuel industry at our current standpoint, do not have to be solely derived from fossil fuel feedstocks. Bioplastics and bio-based chemical innovations are hitting the market, but they continue to account for a negligible fraction of the overall output of the industry. This paper assesses the state-of-play in the financing of these niche-level innovations and identifies potential manners in which the re-direction of existing capital flows connected to the industry could harness the momentum of a green transition and realise an equitable pathway for decarbonisation.



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Introduction

This paper reports recent trends in finance to the fossil fuel, petrochemical and plastics economy, with a particular focus on public and so-called “green” sources of finance. It tracks the gradual decline in financial flows over the last decades against a surprising counter-trend increase in financing in the last Covid period, which is at odds with the commitments from governments, industry and civil society to reduce CO₂ emissions and plastics pollution to meet the climate-sensitive needs of the 21st century. Public finance in particular has been on a squarely downward trend and the latest rise is due to private financial flows, but none the less the continued State support for this sector is significant. Not all government support is necessarily a clash if it is helping the industry transform to more sustainable processes and products or if it is guiding a just transition, and there needs to be room for this in the debate; however, support to the status quo will not help this aim. Equally complex is the world of green finance, which appeared to offer enormous potential and is already measured in the trillions of dollars; however, it is also associated with claims of greenwashing amid other issues (Fancy, 2021; *TDR 2021*:Ch V). Much needs to be done to improve transparency and better align these new financial instruments with the growing concern about the environment on the part of the investment community and civil society.

More positively, the challenge is not insurmountable. Firstly, sustainability goals are not limited to governance and public institutions, as private sectors and civil society are joining the push for decarbonisation with net-zero pledges and emissions reductions from energy and industry to the world of finance (Ciplet & Roberts, 2017; Ampersand Partners & NZE, 2020). There is also strong investment interest in the search for new and less problematic alternatives to fossil fuel, petrochemicals and conventional forms of plastics. Secondly, some governments are already, even if in a small way, starting to promote alternative pathways and much more could be done if they resumed their catalytic and developmental roles of the past (*TDR 2016*; Mazzucato 2011). Third, a lot can be achieved by governments simply reappraising their financial support of the sector, even without taking the next step to turn it around, and if the new and emerging “green bond” universe joined in too. This third more modest element is where this paper is focused.

Why it matters: Petrochemicals, pollution, and climate change

While most attention in the climate debate typically goes to the fossil fuels sector, in fact petrochemicals and plastics have long been considered extremely problematic for their impact on pollution and now their contribution to global warming. CO₂ emissions are set to rise by 50% if the world continues to use plastic at current trends (CIEL 2019, WWF, 2019). Plastic also absorbs a surprisingly large proportion of the total carbon budget – it is forecast to account for 20% of total oil consumption and 15% of the annual carbon budget by 2050 (Barra et al., 2018; WEF, 2017; CIEL, 2017). Plastic-related emissions are estimated to reach 1.34 gigatons per year, equivalent to emissions released by more than 295 new 500-megawatt coal-fired power plants. By 2050, estimates are that plastic’s emissions could account for over 56 gigatons (CIEL, 2019). While plastic raises attention because it is the single largest component of petrochemicals financing, the global production of chemicals is also predicted to double in the next decade, with subsequent concerns for human and environmental health. There are therefore very high opportunity costs associated with the current practices.

One challenge is that the petrochemicals and plastics sector is huge, deeply rooted, employing large numbers of people and powerful. It will not be easy for governments to transform their economies away from the excessive reliance that has arisen over decades, and to do it in a way that is just and sustainable. This

must however be done if countries are to meet their commitments and pledges to the Paris Agreement and the Agenda 2030 (Atteridge & Strambo, 2020; Jenkins et al, 2020) Sustainable Development Goals (SDGs).

Another challenge is that petrochemicals are so ubiquitous in daily existence. Sometimes described as the “building blocks of life”, given their use in an incredibly diverse range of products from fertilisers and pharmaceuticals to plastic carpets, pipes, fishing lines and synthetic clothes. Their production and use have created jobs and income generating opportunities through economic diversification and trade that raised living standards across the globe through the latter half of the 20th century. Plastics are at the heart of much light manufacturing; exports of food products; and the synthetic clothing business, for example. However, given petrochemicals’ dependency on fossil fuels as a primary feedstock, their use is under greater scrutiny as the world looks to decouple economic growth from the nagging increase in GHG emissions.

Despite growing recognition of the problem, things are going in the wrong direction. A significant increase in petrochemical production is expected over the next decade (IEA, 2018).¹ Via efficiency improvements in energy production, decarbonising areas of transport and energy, and a projected increase in demand for petrochemical-derived products given an increase in global population and living standards (S&P Global Platts, 2021), the percentage of petrochemical driven oil demand is projected to rise to more than a third by 2030, and nearly half by 2050 (ibid). If the absolute global emissions are falling, one may argue that the proportional increase in petrochemical demand is not a problem in itself. However, if petrochemicals continue to be dependent on fossil fuel derived feedstocks – this will contribute to a carbon lock-in scenario (Janipour et al., 2020). There are ongoing improvements in recycling and successes in phasing out of products like single-use plastics, but these incremental reductions will be far outstripped by sharp increases in demand and consumption for petrochemical products in emerging economies, where demand is still at a low level compared to the advanced economies but is expected to rise. The petrochemical industry is renowned for being a hard-to-abate sector (Åhman, 2020), similar to the production of steel and cement, given its carbon-intensive lifecycle. If it is unable to decarbonise in a timely manner, it will continue to guarantee future emissions, hindering any meaningful attempt to achieve net-zero commitments by 2050.

1.5Gt of CO₂ stems from the chemical industry on an annual basis, accounting for 18% of all industry related emissions (IEA, 2018). These emissions are primarily related to the production of energy when fuel is combusted for the generation of heat, this accounts for 85% of the emissions (1.3Gt) (ibid). There are already significant advances being made in the research and development of electrifying heat generation and other means of zero-emissions heat (Thiel & Stark, 2021), which will have a large impact on reducing the overall emissions of the industry, providing that integrated electricity grids are also decarbonised along a similar timeline. Dow, Shell, Sabic, and BASF, for example, are developing ethylene crackers that run on renewable electricity. Heavy quantities of emissions are sadly not the only negative externality linked with petrochemicals; there are also multiple causes of concern linked to pollution, environmental racism, and climate justice issues.

Steps Towards Transition? – Corporate and Public Pledges

As with other sectors across the world economy, actors in the petrochemical and plastics sector have made pledges to shift to lower-carbon processes and product. This is of course one of the hardest to abate sectors and it is not at all clear what such a transition would mean in practical terms – whether it means fundamental changes in terms of core activities or on the periphery, for example. Nonetheless, at present at least 19 of the world’s top 50 petrochemical actors by sales have already made public pledges to reach net-zero carbon emissions. These 19 firms’ tally up to \$728.84bn in total capitalisation value (author’s calculations on

¹ International Energy Agency.

MarketScreener data, 2021). They include the firms shown in Section 4 below². Some of these firms still have a significant state involvement (such as China's Sinopec, or Saudi Arabia's SABIC, or the government of Austria's joint venture with the UAE in Borealis) (see Section 2) while in others direct state involvement is now either rather small, or through private sector investment funds or financial institutions including pension funds.

Some of these companies are attempting to partially reach their climate goals through the construction or procurement of renewable energy infrastructure to lessen the emissions intensity of their overall operations, BASF and Braskem for example. There are also examples of companies issuing green bonds to raise capital for innovations in low-carbon chemical production, renewable energy, and areas of conservation that can be used for offsetting purposes, Asahi Kasei, BASF, and SK Innovation have all issued green bonds (Bloomberg, 2021) in their bid to decarbonise across the value chain.

Since making their bold climate pledges, some companies have made investments in new oil and gas facilities (such as Sinopec or Reliance Industries) which may be adding directly to the level of absolute emissions or, if new and more efficient processes are envisaged, there could be significant improvements in emissions intensity when compared to old facilities. However, at least ten of these companies maintain stakes in projects that are either already existing or under-development such as fossil fuel power stations, exploitation of oil and gas fields, and distribution pipelines (Authors' research based on IJ Global data, 2021).

The remaining 31 firms in the top 50 either had no official pledge beyond 2030, or their sustainability commitment was for a lesser quantity than 50% reduction in carbon emissions.³

There have also been bold climate pledges made in the public sphere, including some of the world's main public and development banks. For some of these banks, financing the investments needed for climate change has been central to their mandate since inception, such as the new Southern-led banks that emerged in the last decade, the Asian Infrastructure Investment Bank (AIIB) and former BRICs bank; the New Development Bank (NDB). Other banks with a longer history that began before climate awareness have evolved to include climate adaptation and sustainability in their mandates to varying degrees – such as the European Central Bank, which recently announced it would include climate change considerations in its strategies, or the Asian Development Bank, which pledged that 75% of its projects will address climate change mitigation and adaptation by 2030. The World Bank pledged not to finance any new fossil fuel facilities.

On the other hand, some of the world's largest and most high profile banks have not adopted any quantitative climate goals or commitments that they could be held accountable to, including the US Federal Reserve (the Chair stated that the Fed did not seek to set climate policy for the USA); the Bank of England (which has for many years raised climate awareness but without setting quantitative targets for bank practices); and Korea's KEXIM bank (which issued green bonds but holds no official stance on climate). The continued support for the petrochemical industry from these Public Finance Institutions (PFIs) is mapped and assessed in Section 2 of this paper, and broader issues discussed in Section 4.

² BASF, Sinopec, Dow Inc, LG Chem, Reliance Industries, Evonik Industries, Braskem, Lotte Chemical, Bayer, DSM, Asahi Kasei, Eastman Chemical, Borealis, Ecolab, Johnson Matthey, Umicore, SK Innovation, Lanxess, DIC.

³ These included SABIC, INEOS, Formosa, Exxon Mobil, Mitsubishi Chemicals, Linde, PetroChina, DuPont, Toray Industries, Sumitomo Chemical, Shin-Etsu Chemical, Covestro, YARA, Solvay, Mitsui Chemicals, Hengli Petrochemical, Indorama, Syngenta, Wanhua Industrial, Arkema, Chevron Phillips, Air Products, Mosaic, Hanwha Chemicals, Westlake Chemical, Sasol, Nutrien, PTT Global Chemical, and Tosoh.

Structure of the paper

Section 1 describes recent trends in the geographical dispersal of petrochemical finance, and its purposes, showing the predominance of plastics production and fertiliser feedstocks. The scale of the petrochemical industry will become even more significant as the world starts transitioning away from fossil fuels for energy production and transport. *Section 2* digs deeper into the recent finance flows to the petrochemical industry, tracing the declining path from the Copenhagen Agreement, through the Paris Accord and then the shock to the global economy caused by Covid-19. It teases out the different contributions of public and private financial flows, including the role of equity holdings and loans by development banks and public institutions. It shows that private finance is now taking the lion's share when it comes to financial flows such as bonds and loans; although public funds are still significant and potentially with symbolic value that belies the monetary value. Finally, it shows the state is still significantly involved in equity holdings, specifically in countries with generous fossil fuel reserves.

Because the sector will still need massive investment in order to transition and transform itself, *Section 3* pivots to the rapidly growing “green bonds” market. This promises a kind of middle ground between traditional publicly oriented financing from governments or development banks, and the short-term profit-maximising imperative of the private sector. Can this new and rapidly growing category of finance meet the industry's transition needs, for example through low-cost loans, venture capital or equity positions that give the industry breathing space and the tools with which to change its path? Our findings are not very encouraging.

Section 4 concludes the paper by calling for governments and public financial institutions to take more seriously the contribution of this sector to global warming, carbon emissions and pollution. By continuing to fund and buttress the status quo, it delivers the message that change is not needed. On the other hand, public financial institutions such as central banks and development banks can help to finance the transition and transformation of this sector – hence it is not necessarily a question of stopping all financial flows to this both useful and problematic sector, but rather in helping guide it.

Methodological approach - significant moments in the path from Copenhagen to Covid-19

The paper uses three broad time frames based around major international agreements on global climate governance as the lens through which to examine the trends in financing and production. The starting point is the Copenhagen Accord of December 2009, which was an important landmark for environmental regulation. It marked the closing of the UNFCCC climate negotiations, widely regarded as a failure to achieve meaningful progress on climate governance. The second frame comes six years later, with the Paris Agreement signing in December 2015. By comparison commended as a breakthrough moment for climate ambition and breaking down of political boundaries on the issue of common but differentiated responsibility (Pauw et al., 2019). The third phase begins in February 2020, an approximate timing of the start of global social, economic and financial measures undertaken to curb the economic impact of Covid-19, and the “build back better” debate linking Covid recovery with a greener future.

These governance landmarks act as timeframe bookmarks in which we have detailed the trends of finance flows being funnelled into the petrochemical industry via the financing or refinancing of major infrastructural projects. The transactions mapped as part of our analysis were provided through collaborative research with Lund University and the data was sourced from IJ Global, the largest database of project finance data in the global infrastructure market. We tracked the transactions connected to IJ Global's categorisation of the

petrochemical industry where primary financing, refinancing, or additional facility had been confirmed in relation to greenfield or brownfield infrastructural projects. Although this dataset is not indicative of the entirety of the finance flows into the industry during these timeframes, as it is only connected to specific infrastructural projects that have mostly tendered debt to achieve their realisation, it highlights the importance of external financing necessary to get petrochemical plants and complexes off the ground. For the period Copenhagen to Paris (15.12.2009 to 12.15.2015) we tracked more than 140 separate financial transactions with a total value of \$129 billion, covering 100 individual projects. For the period from Paris to Covid (12.12.2015 to 01.02.2021) we tracked more than 750 separate financial transactions, over 100 individual projects and companies. For the period Covid to present (01.02.20-15.06.2021) we tracked transactions with a total value of over \$84 billion related to 48 projects or companies). The methodology for Figure 6 on 'Active Flows' in the petrochemical industry expanded upon the IJ Global data and incorporated additional data on the commercial bond market gathered from Bloomberg, covering over 3000 bond issuances linked to the petrochemical industry. Further specific data was gathered from the websites of assorted PFIs such as Central Banks, MDBs, ECAs, and EXIMs. The amalgamation of these data allowed us to map a rough estimation of finance flows that were active at the time of analysis, mid-June 2021. The exact valuations of these flows are dynamic due to variances in reporting transparency and changeable currency exchange rates.

Our analysis of equity holdings in C&EN's list of 50 largest petrochemical companies by sales in 2020 is derived from data supplied by Orbis and MarketScreener, as well as individual company annual reports when necessary. The figures are accurate as of 19th November 2021.

Section 1: Geographical and product trends

Where does the money go in the petrochemicals sector, and for what purpose? This section uses three Sankey (inspired by Drewniok, Cullen, Cabrera Serrenho, 2020) diagrams to tease out the flows in terms of geographical trend and product space.

Copenhagen to Paris

More than 140 separate financial transactions (debt instruments relating to primary financing, additional financing and re-financing) with a total value of \$129 billion USD were instigated during the six years from signing the Copenhagen Accord and up until the Paris Agreement. These covered at least 100 individual projects and facilities (IJ Global) and were primarily destined for making plastics (accounting for the largest degree of financing flows, at 72.28%); with fertiliser related production coming in second with 14.10% of

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