Inquiry: Design of a
Sustainable Financial System

UN environment

FINANCING THE TRANSITION

How Climate Change Could Impact the Financial System

Thought Piece for the UK's Financial Conduct Authority (FCA)

Nick Robins, Co-Director, UN Environment Inquiry

The UN Environment Inquiry

The Inquiry into the Design of a Sustainable Financial System has been initiated by the United Nations Environment Programme (UN Environment) to advance policy options to improve the financial system's effectiveness in mobilizing capital towards a green and inclusive economy—in other words, sustainable development. Established in January 2014, it published the first edition of 'The Financial System We Need' in October 2015, with the second edition launched in October 2016.

More information on the Inquiry is at: *www.unep.org/inquiry* and *www.unepinquiry.org* or from: Ms. Mahenau Agha, Director of Outreach *mahenau.agha@unep.org*.

About this paper

This paper was commissioned by the UK Financial Conduct Authority's as a background think-piece for its Future Horizons conference, which is held in April 2017. The views in this paper represent the author alone

Comments on this paper are welcome and should be sent to *nick.robins@unep.org***.**

Contents

Synopsis

- Climate change is one of the most disruptive forces shaping the 21st century and will have an increasing impact on macroeconomic performance, financial system stability and capital allocation over the next 5-15 years.
- Finance ministries, central banks and financial regulators are taking action both to understand the implications and ensure that the transition to a low-carbon and resilient economy is as orderly, timely and efficient as possible.
- A number of serious barriers continue to act as brakes to mobilizing the finance required to deliver the transition, including mispricing, information asymmetries and short-termism.
- Set against these are a group of positive accelerators, notably the spillover benefits of climate action for other priorities (such as human health), rapid technological improvements and the strengthening of social norms in favour of decarbonization.
- Based on these trends, a fictional Fast Track scenario is laid out, suggesting the key features of how a rapid transition to a low-carbon, resilient economy could play out in the financial system in terms of impacts on assets as well as on financial policy.
- This scenario helps to challenge some of today's assumptions, notably that climate disruption is distant in time, largely driven by developed countries, has limited implications for financial authorities and is set apart from questions of financial culture and conduct.

1 Climate Change: the Strategic Challenge for the Financial System

In December 2015, the governments of world adopted the Paris Agreement on climate change. After more than a quarter of a century of scientific inquiry, policy action, business response and civil society pressure, the Paris Agreement represented a shared global commitment to holding the increase in global average temperatures to "well below 2°C above pre-industrial levels", with the aspiration to pursue "efforts to limit temperature increase to 1.5°C".

The practical implication of this is the need to bring net emissions of greenhouse gases (GHGs), notably carbon dioxide from fossil fuels, down to zero well before the end of the century, perhaps as early as 2060.[1] In a net-zero world, for every ton of carbon dioxide released, a ton must be permanently removed from the atmosphere. Decarbonization was thus introduced as a mega-trend that would reshape both the global economy and financial system in the decades ahead. In practical terms, this means the effective end of fossil fuels as the energy basis for the global economy – with far-reaching implications for macroeconomic performance, financial system stability and capital allocation.

The driving force behind this historic commitment is the recognition that climate change caused by the uncontrolled release of GHGs will have a catastrophic impact on human well-being, reversing decades of economic progress, particularly in developing countries. According to the World Bank, climate change will put US$158 trillion in assets at risk from river and coastal floods by 2050.[2] Indeed, the impacts of climate change in terms of disrupted weather patterns – floods, droughts, storms – are already visible. According to the Vulnerable 20 (V20) group of developing countries, climate shocks are currently exceeding their national capacity to respond, with annual losses from climate change of at least 2.5% of GDP. These losses were estimated at US$45 billion a year since 2010 – a number expected to increase to

US$400 billion for the V20 by 2030.[3] Across the world, this prospect of increasing loss is driving efforts to build resilience to climate impacts, particularly in terms of agriculture, the built environment and water.

At the heart of the Paris Agreement was the commitment to "making financial flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development".[4] Over the coming 15 years, the world will need to invest around US$90 trillion in sustainable infrastructure assets, more than twice the current stock of global infrastructure.[5] Estimates suggest that over US$1.1 trillion per year would need to be invested in clean energy alone (most notably in energy efficiency).[6] To mobilize these sums, Paris delivered a 'networked solution' involving three key elements:

- first, market reforms in the real economy to attract capital;
- second, innovative commitments by financial institutions; and
- third, actions by key financial rule-makers, such as central banks and regulators, to align the financial system with the transition.[7]

A key tool to attract capital was the presentation prior to Paris of national climate plans by nearly every country, known as the Intended Nationally Determined Contributions (INDCs). In many cases, these built on long-standing policy frameworks, such as the UK's 2008 Climate Change Act, which commits the country to an 80% reduction in GHGs by 2050. Through a variety of measures, these climate plans aimed to drive low-carbon investments by reforming market prices to internalize externalities (for example, through taxation or trading systems) and also by incorporating climate performance standards and incentives in the agricultural, buildings, energy, industrial and transport sectors (for example, through targets for renewable energy and energy efficiency). Public finance would also be essential to enable this process, particularly in developing countries. In Paris, developed countries reaffirmed their commitment to mobilize US$100 billion a year in climate finance to support developing countries in their transition. In addition, the Paris package placed considerable emphasis on policy measures to extend and deepen insurance coverage to improve resilience to natural hazards, for example, through new climate risk pooling mechanisms.[8]

Alongside this, Paris represented a new phase in the climate finance agenda by actively involving the private finance community. Institutional investors such as pension funds and insurance companies are perhaps most advanced. Investors with more than US$24 trillion gave their backing to an ambitious deal in Paris, part of a wider shift towards responsible investment among asset owners and asset managers.[9] A key driver was growing concern about the consequences of 'business as usual' for long-term returns. According to an assessment made by the Economist Intelligence Unit, a worst-case scenario of 6°C warming could lead to a present value loss of US$13.8 trillion of manageable financial assets, roughly 10% of the global total.[10] And if investment patterns ignored the shift to a low-carbon economy, then the financial system could be left with as much as US$100 trillion in 'stranded' fossil fuel assets by 2050, according to US investment bank Citigroup.[11]

In response, institutions with more than US$10 trillion in assets committed themselves to publishing a 'carbon footprint' of their portfolios, a basic step in risk assessment and transparency. And investors also started to reallocate capital. Annual issuance of labelled "green bonds" rose from just US$3 billion in 2012 to US$81 billion in 2016.[12] In all, a recent survey of leading asset owners identified US$138 billion in dedicated low-carbon investments – a small proportion of the US$100 trillion in global investment assets and likely to be an underestimate due to poor data quality.[13]

The final part of the Paris package on climate change was the growing involvement of financial policy and regulatory agencies, in responding to climate change and wider sustainability challenges. UN Environment's Inquiry into a Sustainable Financial System has identified a 'quiet revolution' in the ways in which environmental factors are being addressed by rule-makers internationally across banking, capital markets, insurance and investment. In all, UN Environment estimates that policy efforts to green the financial system have more than doubled in the past five years to over 200 measures across 60 countries.[14] At the Paris climate conference, the Financial Stability Board launched its new Task Force on Climate-related Financial Disclosures (TCFD), the first time that the FSB had ever looked at the environmental agenda. Its recommendations were published in December 2016 and broke new ground by underscoring the critical importance of both reporting on past performance as well as future risks.[15]

2 Responding to Climate Change: The Financial Policy Toolbox

Improving disclosure is just one part of a wider toolbox of approaches that finance ministries, central banks and regulators are starting to deploy to ensure that the transition is as orderly, timely and efficient as possible. This new and emerging toolbox can be summarised as the 5Rs: reallocation; risk; responsibility; reporting; and roadmaps.

- ***Reallocation:*** Financing the transition will require improved access to green finance (e.g. small and medium enterprises), capital raising for sustainable infrastructure (e.g. energy, housing, transport, urban design) and financing critical areas of clean tech innovation. This can be facilitated by the creation of open, liquid markets governed by trusted norms. In the green bond arena, for example, market-driven principles and standards are emerging, increasingly supported by policy frameworks. Financial centres from Casablanca to Hong Kong, London and Paris have launched plans to become key hubs in this reallocation process. The City of London's Green Finance Initiative, for example, is private sector-led and focused on improving the role of London as a green finance centre and supported by the government, including the UK Treasury.[16]

- ***Risk:*** Climate change represents a new trigger for financial risks for assets, institutions as well as the financial system as a whole. In its review of the implications of climate change for the insurance sector, the Bank of England identified three key risk factors: *physical* (e.g. direct threats from extreme events), *transition* (e.g. indirect threats to existing assets by responses to climate change) and *liability* (e.g. indirect threats created by litigation against financial institutions).[17] In France, the government is introducing a new requirement to incorporate climate factors into stress testing models for the banking sector. A key challenge is how to extend the time frame of risk analysis to overcome the 'tragedy of horizon' that afflicts financial institutions and regulators.[18]

- ***Responsibility*:** Climate change has potentially profound implications for the core responsibilities and cultures of financial institutions. An international review of the practical links between fiduciary duty and sustainability concluded in 2015 that "a failure to consider long-term drivers of investment value including environmental, social and governance issues in investment practice is a failure of fiduciary duty".[19] South Africa, the UK and the US have clarified their pension and other regulations to make clear that consideration of sustainability factors is part of prudent practice. More broadly, this points to the importance of ensuring that relevant expertise on climate change is part of 'fit and proper' assessments of financial professionals from the board downwards.

- ***Reporting:*** Enhanced reporting is a foundational element for sustainable financial systems – enabling consumers to choose the right financial products, investors to make informed choices and

regulators to assess the threat to the resilience of the financial system.[20] The FSB task force is the latest expression of a market- and regulatory-driven effort to ensure that effective information is available on climate change as part of a wider move towards more integrated reporting of long-term value drivers.[21] An important new dimension is that disclosure is not just focused on issuers of financial assets – such as listed companies and issuers of bonds – but also on financial institutions themselves, with new requirements in France for investors to report their exposure to climate related risks and the alignment of their portfolios with the 2°C target.[22]

- ***Roadmaps:*** The far-reaching nature of the climate challenge for the financial sector is prompting a growing number of countries to conduct strategic planning exercises to identify system-wide needs, barriers and priority actions. Insurance giant Aviva calls these 'capital raising plans', covering both climate and broader sustainability goals; others call them 'climate investment plans'.[23] China is perhaps the furthest advanced, issuing a 35-point programme in September 2016 for greening its financial system.[24] The European Union is also drawing up a comprehensive strategy on sustainable finance as part of its Capital Markets Union programme, supported by a high-level expert group.[25] In addition, Italy has just launched the results of a year-long dialogue on how to mobilize its financial system.[26]

Internationally, the G20 has started to incorporate these issues of confronting climate risk on the one hand and mobilizing green finance on the other into its core financial policy agenda. In September 2016 at the Hangzhou Summit, for example, G20 heads of state for the first time recognized the need to 'scale up green finance' setting out a series of steps to make this happen.[27]

3 A Climate Reality Check: Key Brakes and Accelerators

The Paris package marks an important step forward in confronting climate change. But by its own admission, it is inadequate. Even if fully implemented, the world's national climate plans will fail to deliver the 2°C goal, let alone the 1.5°C ambition. Instead, analysis produced by UN Environment suggested that full implementation of current commitments would result in 3°C of warming. This is a substantial improvement on the 4°C feared when the Paris process began – and for the financial world, the divergence from a 'business as usual' pathway is clear.[28] One estimate suggested that by 2030, even the insufficient pledges contained within the INDCs could deliver a 5% contraction in global coal demand by 2030 from 2012 levels.[29]

Yet, to keep global warming below the 2°C target agreed in Paris, "a sharp ramp up in investment into lower- and zero-carbon energy sources will be required over the next decade", according to Bloomberg New Energy Finance.[30] Global clean energy investment, for example, would need to climb almost four-fold from US$1.2 trillion between 2010-2014 to US$4.4 trillion between 2021 and 2025. Furthermore, long-term climate security depends on the deployment of technologies such as carbon capture and storage that remain far from mass commercialization.

Stepping back, it is clear that a number of fundamental challenges act as material brakes to mobilizing the finance required to deliver a clean and secure global economy:

- *Mispricing*: Inadequate pricing of carbon pollution tilts the risk:reward ratio towards high-carbon assets. The external costs of carbon are still not adequately reflected in market prices for the bulk of emissions: only around 11% of global energy-related CO_2 emissions arise in areas that operate a carbon market, where the average price is US$7 per ton of CO_2 – far lower than the damage costs of carbon. Fossil fuels also continue to be perversely subsidized to the tune of US$452 billion a year among G20 nations.[31] The consequence is that 13% of energy-related CO_2 emissions take place in markets where fossil

fuel consumption subsidies are equivalent to US$115 per ton of CO_2, on average: in effect, people are being paid to pollute.[32]

- *Information Asymmetries:* The invisibility of carbon costs in asset prices is compounded by inadequate disclosure: a majority (63%) of the world's large listed companies are still not disclosing their GHG emissions. By market capitalization, that equates to US$24 trillion (or 39% of total large company market capitalization).[33] This has hampered routine assessment by investment analysts and credit rating agencies of the financial implications of climate change – although agencies such as Moody's and Standard & Poor's have considerably scaled up their assessment of climate factors in the past year. Equally important is the absence of consistent data on stocks and flows of 'green finance' from banks, investors and capital markets: without this basic understanding it is hard to scale up the market.

- *Time Horizons:* Distance in time and space between carbon pollution and impacts – and the irreversibility of these impacts – makes climate particularly hard for the finance community to address. This creates a 'tragedy of horizon' in the words of Bank of England Governor Mark Carney. Market short-termism can further relegate the importance of climate drivers of long-term value for both practitioners and policymakers

The net result of these brakes is that financial cultures across the world have yet to develop the skills, capabilities, innovations or behaviours that are consistent with a smoother transition. Furthermore, overcoming these constraints will invariably require policy reform, with the risk that political forces may block the necessary changes to improve market functioning.

Set against these constraints, however, are a series of accelerators that could make the prospects far more promising.

- *Positive Spillovers:* Climate change is only one among a range of serious 'planetary boundaries' to the global economy. Along with the Paris Agreement, 2015 also saw the adoption of a new set of Sustainable Development Goals that address environmental, economic and social challenges in a systematic way. In the energy sector, chronic air pollution in urban centres, increasing water stress and the need to connect more than 1 billion people to modern energy sources are all pushing towards substantially increased energy efficiency and the accelerated roll-out of renewables – in other words, decarbonization.

A look at the UK's energy history shows that carbon emissions peaked in the early 1970s well before the onset of climate policy, due to action to tackle smog, increase energy security as well as through broader industrial restructuring (see Annex). The same forces are now impacting emerging economies such as China and India – but at a much larger scale. Globally, around 6.5 million premature deaths a year are attributed to poor air quality. According to the International Energy Agency, 3.3 million deaths a year could be avoided by 2040 – a major advance in human well-being that would also bring an early peak in carbon emissions.[34] This time around the countries that are decarbonizing for non-climate reasons have the benefit of much cheaper technological alternatives that were not available in the 1970s.

- *Technology:* At the end of 2014, just 3.6% of the global energy supply came from zero-carbon wind, water and solar technologies. But deployment is proceeding far faster than forecast on the back of much greater than expected cost reductions.[35] The learning curve for solar suggest that every doubling of installations generates a 25% reduction in costs: since 1975, costs have fallen 115 times and costs are estimated to decline by a further 60% through to 2040.[36] Already new investment in renewable energy exceeds fossil fuel power generation. New scenarios now suggest that existing technologies are now

capable of delivering an 80% switch to renewables by 2030 and 100% conversion of all countries by 2050.[37] In the transport sector, positive signs are also emerging, with striking upward revisions to the roll-out of electric vehicles (EVs): India has now committed to having a fully electric vehicle fleet by 2030 – if realized this would close off one of the few growth markets for oil.[38] Between 2015 and 2016, Bloomberg's forecast for EV sales in 2040 grew 90-fold.[39] And alongside this technological disruption in energy markets, financial technology ('fintech') offers the prospect of more efficient capital intermediation, particularly suited to the distributed nature of a zero-carbon energy system.

- *Social norms:* Ultimately, responses to climate change are based on social norms – the importance we place on correcting market failures, protecting vulnerable communities, respecting future generations and sustaining the environment itself. In the case of climate change, the interplay of these norms has combined with policy and technological shifts to generate profound changes in financial behaviour. Divestment from high carbon assets such as coal is a case in point. In 2011, Carbon Tracker highlighted that 80% of fossil fuel reserves could not be commercialized if the 2°C goal was to be achieved, pinpointing the need to reallocate capital to avoid 'stranded assets'. Civil society campaigners used this evidence to press investors to divest of their fossil fuel assets.

A growing number of values-based investors, such as churches and universities, have taken action. But so have mainstream institutions such as AXA and the Norwegian Pension Fund, who saw the threat of a 'carbon bubble' fusing with other factors, such as tightening local air pollution standards and slowing demand in China, to create a material risk to the coal sector. In January 2016, the Insurance Commissioner of California took divestment into the regulatory arena when he made a request to insurance companies to divest from thermal coal on the basis of his "statutory responsibility to make sure that insurance companies address potential financial risks in the reserves they hold to pay future claims". Over the coming years, one can expect other examples of social norms evolving in light of climate change, shifting the balance of investor preferences as well as regulatory expectations.

4 Fast Track – A Scenario of a Rapid Shift to a Low-carbon, Resilient Economy

For a complex adaptive system such as finance, responses to a 'wicked' problem like climate change will not be linear. Scenarios can therefore be useful to test assumptions and reveal blind spots. What follows is the sketch of a scenario suggesting how the climate change story could play out – and the implications for the financial system.[40] The scenario is wholly fictional, but is hopefully a possible extrapolation of existing trends.

It is late 2025, a few weeks before COP31. As governments prepare to gather for the next round of climate talks, the results of the first stocktake of the historic Paris Agreement have provided some unexpected results:

1. Global carbon emissions have now plateaued for a number of years. Global coal demand has been in steady decline for nearly a decade; listed coal companies are a thing of the past in Western equity markets, and coal itself has been phased out in the UK. Oil consumption has also peaked, with oil companies diversifying into alternative assets.[41]
2. A worldwide 'clean air' campaign has spurred mass deployment of electric vehicles, with cooperation between China and India creating a combined EV market catering for nearly 3 billion people. This is financed by green bonds, notably a range of asset-backed securities held by global asset owners, such as insurance firms, pension funds and sovereign wealth funds.

3. The introduction of carbon risk surcharges for bank credit in the eurozone had had a powerful signalling effect, changing risk appetite among EU banks and in other OECD countries.[42]
4. In its third annual report, the FSB's Climate Resilience Committee has noted the growing concern about the financial systems of major oil and gas producing countries, impacting asset values of state owned enterprises, fiscal balances and exchange rates.[43]
5. The first downgrade of a sovereign bond as a result of a natural disaster exacerbated by climate change has prompted governments, investors and credit rating agencies to introduce a trillion dollar resilience investment programme, as calls for litigation grow.[44]
6. The green 'peer-to-peer' investment market is providing steady cross-border flows of capital for the rapid roll-out of decentralized renewables in Africa. In the developed world, it is providing a new asset class for pension markets.
7. The combination of high-profile scandals involving mainstream funds failing to adjust to climate trends and the mis-selling of green financial products has led to environmental factors being integrated into financial conduct regimes for G20 financial professionals.
8. In the most recent release of the Global Green Financial Centres Index, Paris and Shanghai are neck and neck in the race to be the global hub, with Nairobi and Sao Paulo emerging as key regional players.

Even though carbon emissions have peaked, atmospheric concentrations continue to rise and the prospect of staying below the 2°C target remains uncertain. The shift to a zero-carbon economy is now irreversible – the question is whether it will happen in time.

5 Challenging Assumptions: How the Future Will Be Different than Expected

This sketch of a Fast Track scenario challenges a number of prevailing assumptions about the relationship between climate change and the financial system:

- first, it challenges the assumption that the transition to a zero-carbon, resilient future is distant in time and marginal in impact to the financial system. It is already influencing asset prices and these could shift further in the near future.

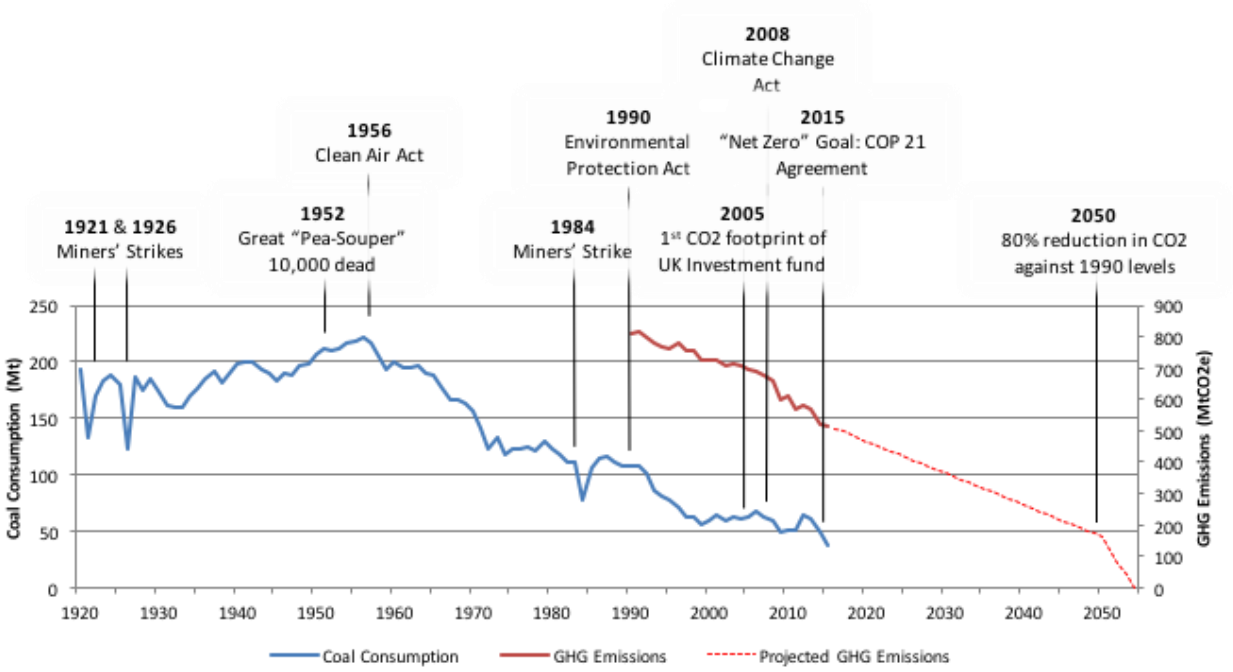
- second, it challenges the assumption that the most powerful drivers for action on climate change lie in the developed countries. China is already the most committed country in terms of green finance – and the convergence of climate with wider environmental factors (such as air pollution) is driving financial and technological innovation.

- third, it challenges the assumption that there is a limited role for action in the financial system, and that reforms in the real economy are sufficient to ensure an orderly transition. Financial policymakers are starting to work through the implications of climate change for their core prudential and market development goals – and this trend is set to become the norm.

- and fourth, it challenges the assumption that prevailing financial culture in terms of capabilities, behaviours and incentives will be immune to the effects of the climate transition. A critical dimension of professionalism for the financial sector is likely to be how individuals respond to growing client needs for expertise to manage climate change implications, whether in banking, insurance or institutional investment.

Annex: Decarbonization Is Much Bigger than Climate Change

Decarbonization: The Case of the UK

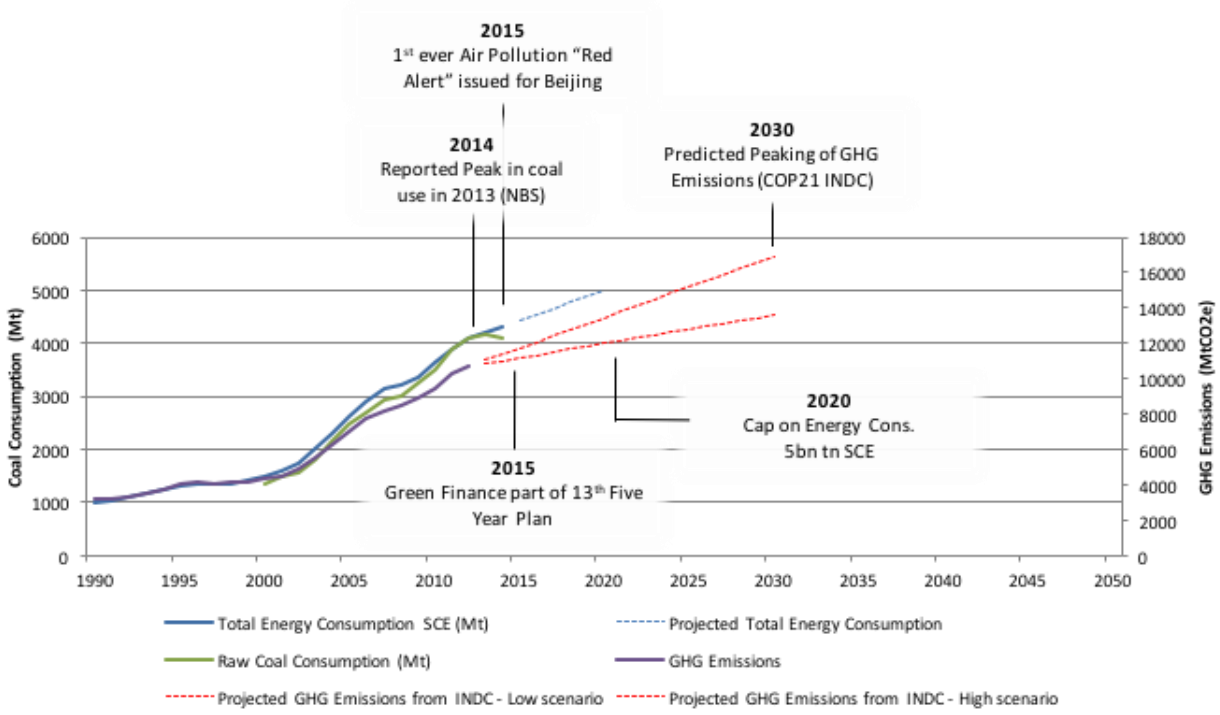


Sources: DECC UK Energy Trends, UK ONS

In the UK, coal consumption peaked in 1956 (221 Mt), with peak CO_2 emissions in 1970 (685mt) and peak GHG emissions in 1991 (818 Mt). The shift from peak coal to peak carbon in the UK was driven by a range of factors, including:

- **Human Health**: Major death toll from "pea-souper" smog in the 1950s lead to the implementation of the Clean Air Act in 1956;
- **Economic Restructuring**: Scaling back of heavy industry, including domestic coal mining industry, alongside take off in offshore oil and gas;
- **Energy Security:** Major oil price shocks from the 1970s onwards;
- **International Trade**: offshoring of about one third of emissions to other countries; and
- **Environment and Climate Policy**, with binding emissions reductions targets with 2008 Climate Change Act, setting carbon budgets out to 2027.

Decarbonization: The Case of China



Sources: China National Bureau of Statistics, 13th Five-Year Plan

In China, peak coal may have already been reached – with peak carbon targeted for 2030, but likely much earlier. Here, a diverse range of factors is driving this shift beyond climate concerns – with a top priority being abating air pollution:

- **Human Health**: Urban air pollution causing significant human health impacts, social issues;
- **Industrial Policy**: Cutting capacity in coal-fired electricity generation, coal production, heavy industry facilities (aim to eliminate up to 500 Mt coal capacity by 2020);
- **13th Five-Year Plan**: Aim to keep energy consumption within 5 billion tons of standard coal equivalent by 2020; and
- **Energy and Carbon Intensity**: Energy intensity to be cut 15%, carbon intensity to be cut 18% by 2020 from 2015 levels.

References

[1] Net global emissions of carbon dioxide must reach zero stabilize global temperatures whether at +2°C, +3°C or any other level. See Oxford Martin School (2015). Working Principles for Investment in Fossil Fuels. http://www.oxfordmartin.ox.ac.uk/publications/view/2073

[2] https://www.gfdrr.org/sites/default/files/publication/Riskier%20Future.pdf

[3] See V20 Communique, October 2015 http://www.v-20.org/v20-communique/

[4] Paris Agreement, Article 2c

[5] Brookings, New Climate Economy & LSE (2015), Driving Sustainable Development through Better Infrastructure http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/07/Bhattacharya-et-al.-2015.pdf

[6] UN Environment Inquiry (2015). The Coming Financial Climate. http://unepinquiry.org/wp-content/uploads/2015/05/Aligning_the_Financial_System_with_Sustainable_Development_4_The_Coming_Financial_Climate.pdf

[7] See Robins, N. (2016). How Paris became the capital of climate finance. http://unepinquiry.org/publication/how-paris-became-the-capital-of-climate-finance/

[8] Paris Agreement, Article 8

[9] See for example http://www.iigcc.org/files/publication-files/Investor_statement_on_a_global_agreement_2008.pdf

[10] EIU (2015). Recognising the cost of inaction. http://www.economistinsights.com/financial-services/analysis/cost-inaction

[11] Citigroup (2015). Energy Darwinism II http://climateobserver.org/wp-content/uploads/2015/09/Energy-Darwinism-Citi-GPS.pdf

[12] All global data quoted in this paragraph are provided by CBI, while China data are sourced from China Green Finance Committee.

[13] Asset Owners Disclosure Project (2016). AODP 2016 Global Climate 500 Index. See also OECD (2016). Annual Survey of Large Pension Funds and Public Pension Reserve Funds.

[14] http://unepinquiry.org/wp-content/uploads/2016/09/The_Financial_System_We_Need_From_Momentum_to_Transformation.pdf

[15] https://www.fsb-tcfd.org/wp-content/uploads/2016/12/16_1221_TCFD_Report_Letter.pdf

[16] London: http://www.greenfinanceinitiative.org/ ; Paris: http://www.paris-europlace.com/sites/default/files/public/press_release_parisgreensutainablefi_2_0.pdf

[17] Bank of England (2015) Prudential Regulatory Authority: the impact of climate change on the UK insurance sector http://www.bankofengland.co.uk/pra/documents/supervision/activities/pradefra0915.pdf

[18] http://www.bankofengland.co.uk/publications/Pages/speeches/2016/923.aspx

[19] PRI, Global Compact, UNEP Finance Initiative & UNEP Inquiry (2015), Fiduciary duty in the 21st Century http://2xjmlj8428u1a2k5034l1m71.wpengine.netdna-cdn.com/wp-content/uploads/Fiduciary-duty-21st-century.pdf

[20] See SDG12.6

[21] For an overview of Integrated Reporting, see http://integratedreporting.org/what-the-tool-for-better-reporting/

[22] http://www.novethic.fr/breves/details/le-decret-de-larticle-173-de-la-loi-de-transition-energetique-est-publie.html

[23] https://sustainabledevelopment.un.org/content/documents/10574avivabooklet.pdf

[24] http://www.pbc.gov.cn/english/130721/3133045/index.html

[25] http://europa.eu/rapid/press-release_IP-16-4502_en.htm

[26] http://unepinquiry.org/publication/financing-the-future/

[27] http://unepinquiry.org/wp-content/uploads/2017/01/2016-09-04-g20-communique-en.pdf

[28] See UNFCCC (2015). Synthesis report on the aggregate effect of the INDCs. http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf and also UNEP (2015). The Emission Gap Report. http://uneplive.unep.org/media/docs/theme/13/EGR_2015_301115_lores.pdf

[29] Spencer, T. (2015). The future of coal: the long comedown http://www.energypost.eu/future-coal-long-comedown/

[30] CERES & Bloomberg New Energy Finance (2016), Mapping the Gap: the Road from Paris http://www.ceres.org/resources/reports/mapping-the-gap-the-road-from-paris/

[31] ODI & Oil Change International (2015). Empty Promises. http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9957.pdf

[32] IEA (2015). World Energy Outlook Special Report on Energy and Climate Change. http://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf

[33] Corporate Knights (2015)

[34] IEA (2016). World Energy Outlook

[35] Carbon Tracker (2015). http://www.carbontracker.org/wp-content/uploads/2015/10/Lost-in-transition_Clean_Draft.pdf

[36] BNEF (2016). New Energy Outlook

[37] Jacobsen (2016)

[38] http://economictimes.indiatimes.com/industry/auto/news/industry/india-aims-to-become-100-e-vehicle-nation-by-2030-piyush-goyal/articleshow/51551706.cms

[39] BNEF (2016). New Energy Outlook

[40] See Carlota Perez for the links between technological innovation and financial markets

[41] http://www.carbontracker.org/report/expect-the-unexpected-disruptive-power-low-carbon-technology-solar-electric-vehicles-grantham-imperial/

[42] See European Systemic Risk Board (2016). Too Late, Too Sudden. https://www.esrb.europa.eu/pub/pdf/asc/Reports_ASC_6_1602.pdf

[43] See EBRD (2016). Government Assets: Risks and Opportunities in a Changing Climate Landscape *http://www.ebrd.com/publications/government-assets-climate-policy*

[44] See UN Environment Finance Initiative (2016). ERISC Phase 2.: *http://www.unepfi.org/fileadmin/documents/ERISC_Phase2.pdf*

Inquiry: Design of a Sustainable Financial System
International Environment House
Chemin des Anémones 11-13
Geneva,
Switzerland
Tel.: +41 (0) 229178995
Email: inquiry@unep.org - Twitter: @FinInquiry
Website: www.unep.org/inquiry/