Future Transport

5 November 2021

Future Transport

COP26: Transport is the next big thing

Free to View
Automobiles

Global

- The UN's flagship climate conference COP26 is taking place in Glasgow with aim of getting the world to 'net zero' by 2050
- In this report, we revisit the role of xEVs and the pathway to decarbonise global transport by 81% until 2050 vs 2019
- As such, HSBC views transport as a "second frontier" and critical pathway to net zero global CO_2 emissions

HSBC pathways to net zero approach shows how to close the emissions gap

We have previously discussed potential decarbonisation pathways for the major sectors in the context of reaching global net-zero carbon dioxide (CO_2) emissions by 2050. We focused on decarbonisation across four major emitting sectors or 'pillars': power, transport, buildings and industry. Global greenhouse gas (GHG) emissions must fall to net zero by 2050/2070 to limit global warming to 1.5°C/2°C – and our modelled pathways demonstrate how to reduce global GHG emissions by 81% by 2050 vs a business-as-usual outlook. Reductions in transport account for c20% of this fall, with diverse genres of electric vehicles (xEVs) decarbonising road transport by 2040 and global regulation limiting shipping and aviation emissions.

HSBC views cleaner transport as second frontier of decarbonisation

Low-carbon power generation has been the major decarbonisation focus to date, but it is not enough to meet climate targets alone, and we see reducing emissions in the transport sector as one of the next areas of focus, including at COP26. As investors are seeking to align portfolios with a low-carbon energy transition that includes a scope beyond traditional clean-tech sectors, Sustainable Mobility and cleaner Future Transport firmly belong in decarbonisation strategies, in our view.

The EU is leading the charge against tailpipe emissions, targeting a 55% CO_2 emissions reduction by 2030 vs 2021 and a 100% reduction by 2035 (de facto Internal Combustion Engine, or ICE, ban). China is closely behind, but the US currently only targets 50% xEVs by 2030 (non-binding). Lifecycle or "well-to-wheel" and "cradle-to-grave" sustainability is also increasingly in focus. Shipping and Aviation are more technologically difficult to decarbonise than road transport, in our view, while EV batteries are a key factor in decarbonising cars.

This is a Free-to-View version of a report by the same title published on 05-Nov-21. Please contact your HSBC representative or email AskResearch@hsbc.com for more information.

Henning Cosman*
European Head of Automotive Equity Research, Future Transport Coordinator
HSBC Bank plc

Wai-Shin Chan, CFA
Head, Climate Change Centre; Head, ESG Research
The Hongkong and Shanghai Banking Corporation Limited

Sriharsha Pappu*
Head of Chemicals, Energy Transition Coordinator
HSBC Bank plc

Tarek Soliman*, CFA
Analyst
HSBC Bank plc

Andrew Lobbenberg*
Analyst
HSBC Bank plc

Kim Fustier*
Analyst, Oil & Gas
HSBC Bank plc

Sean McLoughlin*
EMEA Head of Industrials Research
HSBC Bank plc

Parash Jain*
Head of Shipping & Ports & Asia Transport Research
The Hongkong and Shanghai Banking Corporation Limited

** Employed by a non-US affiliate of HSBC Securities (USA) Inc, and is not registered/ qualified pursuant to FINRA regulations*

Issuer of report: HSBC Bank plc

View HSBC Global Research at:
https://www.research.hsbc.com

The next big thing

- HSBC's climate change research team thinks the next big focus for reducing global emissions is the transport sector
- Advances in battery electric and fuel cell technologies offer major pathways to removing oil derivatives across transport modes
- Zero road / rail emissions by 2040, and capping those from aviation and shipping, could reduce global transport CO_2 by 81% vs 2019

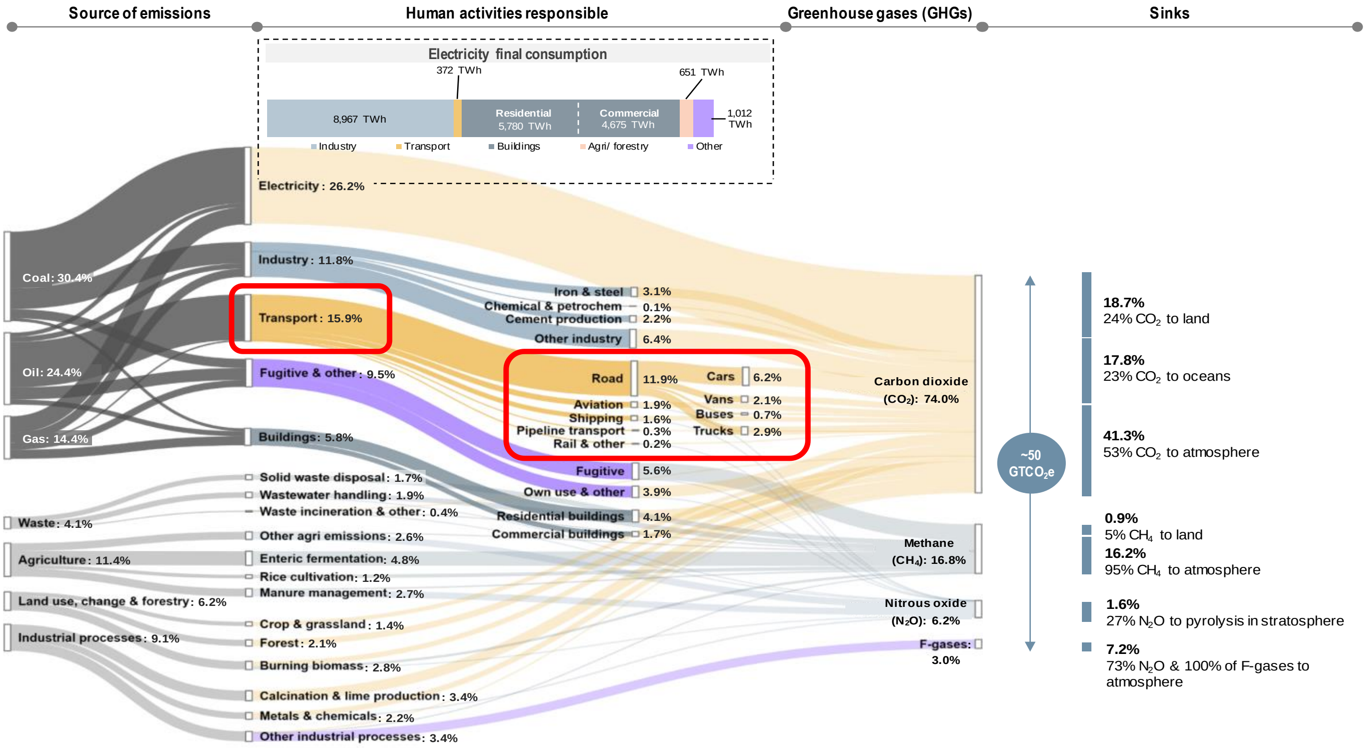
Decarbonisation across sectors

COP26 is the latest push to reach 'net zero' emissions by 2050

In 2015, the Paris Agreement was adopted, bringing in a new era of global focus on addressing climate change risks. And now, COP26 (the "conference of parties" in its 26th round) brings together world leaders again to discuss how to set the world on a course to reaching 'net zero' by 2050 to limit global warming to 1.5ºC above pre-industrial levels by 2100.

As the chart above illustrates, emissions come from a wide range of human activities, across the global economy. In 2017, total GHGs were at around 50 $GTCO_2e$ (or billion tonnes of carbon dioxide equivalent). Within this number lie many contributory factors, but broadly speaking, global GHGs can be broken down into power, transport, industry, buildings and agriculture, with around 70% of GHGs come from the use of fossil fuels for energy and industrial activity.

Mapping our footprint – global GHG emissions in 2017



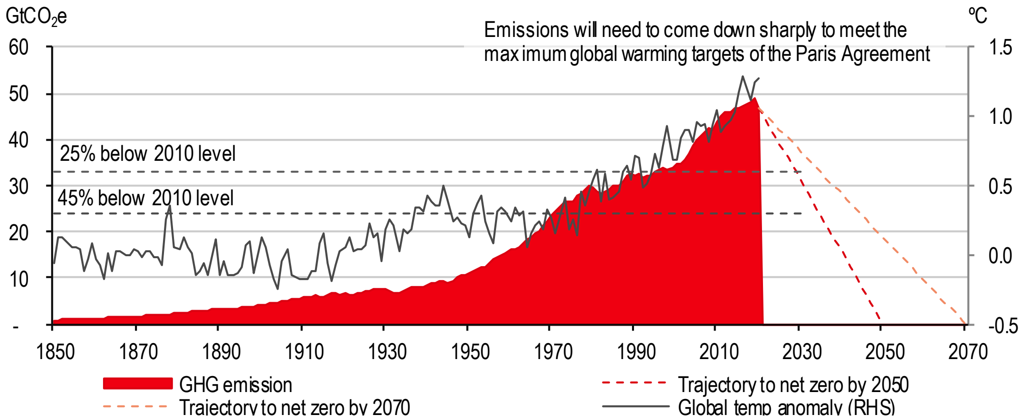
Source: HSBC, IEA, EDGAR, Global Carbon Project; values for sinks adjust calc. error; F-gases sources are not shown here but typically include refrigeration, air conditioning, aerosols and high voltage switchgear ; LUCF is Land Use Change and Forestry; data for LUCF values are inherently uncertain and may show variations based on accounting; Own use & other includes losses and agricultural use of energy; Other agri emissions includes direct emissions and emissions from agri waste burning & other indirect emissions; Other industry includes non-ferrous metal, paper & pulp and mining & quarrying;; Energy and process emissions from calcination and cement production is nearly 2.5 $GtCO_2$. production of coke for iron & steel, feedstock for chemicals and petrochemicals, and some parts of oil & gas refining are classified as other industry.

Emissions are still rising and so is the temperature

Emissions must fall to net-zero by 2050 or 2070 to limiting global warming to 1.5°C or 2°C by 2100

But despite increased ambition, annual emissions have continued to rise, as the chart below illustrates (notwithstanding a 2020 dip due to the COVID-19 pandemic). And moving in tandem with emissions has been a rise in the temperature, up over 1°C since the mid-19th century. The chart below also shows the implied rapid rate at which emissions must fall to reach net-zero emissions by 2050 or 2070; broadly aligned with limiting warming to 1.5°C or 2°C. This includes the need for medium-term 2030 cuts of 25% and 45%, respectively, vs 2010 levels which the UN says are necessary (UN synthesis report – way, way off the 1.5°C track, 4 March 2021).

Rapid rate of emission reduction required to reach net-zero emissions by 2050 or 2070



Source: PRIMAP, UK Met; Note: GHG emissions for 2018 and 2019 are based on CAGR from 2007 to 2010 and 2010 has been estimated based on CO_2 emission reduction in 2020 compared to 2019. In a 2021 report, UN Climate Change put out 2030 target levels of 25% below 2010 for 2°C alignment, and 45% lower for 1.5°C alignment

COP26 the world's last chance to get to net zero emissions

Many enhanced climate pledges over 2021, but only a small number of parties have formally communicated mid-century decarbonisation strategies

The Paris Agreement remains a key driver of national climate policy agendas

Through 2021, there has been a continuous flow of national level climate action announcements made by countries (nationally determined contributions or NDCs), with a view to increasing the ambition level. These typically entail a combination of medium (2030) and long-term (2050 onwards) emissions reduction targets and can cover a wide range of actions, policies and strategies.

Do existing pledges close the emissions gap? The UN Environment Programme's (UNEP) 2021 Emissions Gap Report 2021 shows that new national climate pledges combined with other mitigation measures (as at the date of publication) still put the world on track for a global temperature rise of 2.7°C by the end of the century – "well above" the goals of the Paris climate agreement and leading to "catastrophic changes in the Earth's climate". The report suggests that annual global GHGs need to halve by 2030 to keep global warming below 1.5°C this century.

If implemented effectively, net-zero emissions pledges could limit warming to 2.2°C, closer to the well-below 2°C goal of the Paris Agreement. However, many national climate plans delay action until after 2030.

The reduction of methane emissions from the fossil fuel, waste and agriculture sectors could help close the emissions gap and reduce warming in the short term, the report finds. Carbon markets could also help slash emissions. But that would only happen if rules are clearly defined and target actual reductions in emissions, while being supported by arrangements to track progress and provide transparency – all which are therefore key discussion points at COP26.

'Net zero' concept has taken hold as a driver of strong policy action on climate change

The rise of 'net zero emissions'

The concept of 'net zero' emissions has, in recent years, taken hold as a driver of intent to act on climate change across governments, companies and investors. The United Nations Framework Convention on Climate Change (UNFCCC) has set up a Race to Zero Campaign to mobilise Parties but also non-state actors (cities, regions, businesses, etc.) to commit to achieving net zero emissions by mid-century. An increasing number of countries have announced net zero targets, with varying dates scopes in the last year, these pledges now cover a majority of global CO_2. However, many of these are currently not yet backed up by policy or legislative framework.

COP26 is seen as last chance to get onto the net zero emissions trajectory by 2030 and keep temperature rises below 1.5°C…

COP26

The last climate negotiations, COP25, held in December 2019 left a number of loose ends to be tied up. COP26, in Glasgow from 31 October to 12 November 2021, is arguably the most important COP since the Paris Agreement was adopted in 2015. This is because it is to focus on raising (post-2020) ambition levels i.e. getting countries to agree increased ambition in terms of setting targets and implementing them through actions.

COP26 is widely seen as the world's last chance to get onto the net zero emissions trajectory by 2030 and limit temperature rises to 1.5°C. The task has been made more urgent by increased scientific evidence of human-induced climate change and the volume of record-breaking extreme weather events recently. There is pressure from all sides as politicians juggle the pandemic, the global energy crunch and the balance between long-term climate preparedness and votes. And while there has been a flurry of climate-related announcements in the run-up to COP26 from governments, businesses, investors and civil society, the details of how this will be implemented are mostly lacking.

…and a successful COP26 may result in accelerated climate policies and unlock incentives for investment to reduce emissions

Implications for investors and business: Investors and businesses want visibility on longer-term climate mitigation and adaptation policies and clarity on the speed of the low-carbon transition. We believe a **successful COP26** would result in an acceleration of climate policies – unlocking incentives for investment to reduce emissions as well as build resilience. This would drive more disclosure, more targeted regulation, and the integrity of corporate climate strategies (i.e. avoid "greenwashing"). **Failure at COP26** would mean even more uncertainty over the prospects for avoiding the severest impacts of climate change, irreversible damage, and the climate response becoming ever costlier to address.

Decarbonisation of Transport is the "second frontier"

The use of oil derivatives (petrol and diesel) in transport sub-sectors is typically the next sector in line for decarbonisation, globally, after power generation.

Future Frontiers scenario models how zero road/rail emissions by 2040, and capping those from aviation and shipping, could reduce global transport CO_2 by 81% vs 2019

We apply our Future Frontiers scenario to demonstrate the role that a cleaner transport sector can play in reaching Paris Agreement targets through the following steps:

Land-based transport: **Cars, buses, vans, trucks, motorcycles and railways. The use of oil derivatives is eliminated by 2040, in a linear trajectory. This decarbonises a large part of the transport sector, currently representing around 75% of transport emissions.**

Ships: **Emissions from this sector come through burning bunker fuel (a heavy oil distillate). We reduce this by half on 2008 levels by 2050, reflecting the targets of the international regulations of the International Maritime Organisation.**

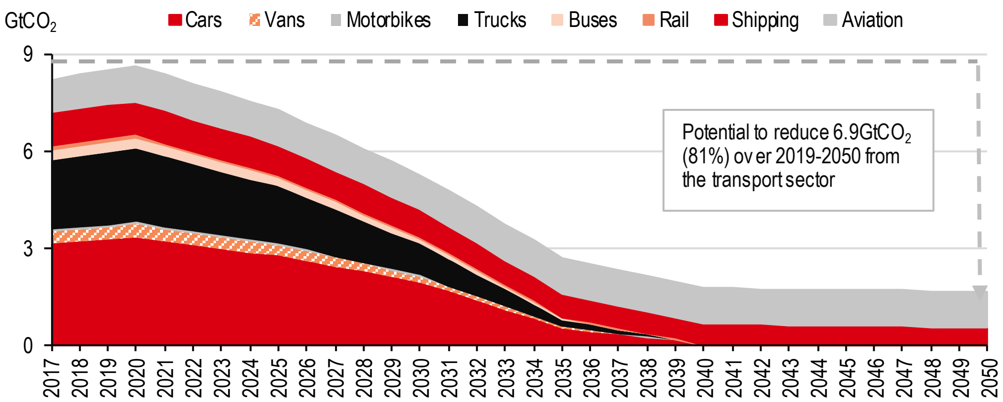
Aviation: **Aircraft burn kerosene, an oil derivative, thus generating CO_2 – we assume the International Civil Aviation Organisation's CORSIA regulations are met, capping global emissions at 2019 levels into perpetuity.**

Overall, these decarbonisation pathways across transport reduce sectoral emissions by 81% by 2050.

No differentiation between DMs and EMs due to leapfrog effect

We do not differentiate between developed markets and other countries in our modelling of the transition towards cleaner transport. This is because, although more developed countries may have greater economic ability to effect transition, they are likely also to have greater embeddedness of existing transport infrastructure – effectively sunk costs. Meanwhile, countries with less capital to invest, or a higher cost of capital, may nevertheless have the ability to build clean transport infrastructure in the first place, without building and then closing existing transport networks – the 'leapfrog effect'.

Future Frontiers scenario: Transport trajectory to 2050



Source: HSBC, ICAO, IMO, IEA, WRI

Currently, the transport sector uses oil derivatives (mostly diesel and gasoline) for 77% of its fuel consumption, and bunkers – the heavy, residual oil left over after gasoline, diesel and other light hydrocarbons are extracted from crude oil during the refining process – for another 15%. Thus, overall, the transport sector relies on oil for around 92% of its total feedstock.

Overall, Transport is a major emitter but also, theoretically, presents a major decarbonisation opportunity

As the global population has increased, and affluence has risen in many geographies, so have transport oil consumption and emissions, both due to increased personal and business travel and given increased trade volumes with greater enabling laws, globalisation and infrastructure. And in economies where transport emissions have decreased in absolute levels, they have often increased in terms of their relative share of the total. Transport is a major emitter, but, also, theoretically, presents a major decarbonisation opportunity.

The full note contains a deeper look at the future of *Cars & Vans*, including analysing the high global EV penetration and the knock-on effects on components demand from semiconductors to batteries, *trucks and other heavy goods vehicles (HGVs), Aviation* and the progress that Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) seeks, *and Shipping, including a look at the IMO Energy Efficiency Design Index (EEDI)*

For the full note, please contact your HSBC representative or email AskResearch@hsbc.com for more information.

Disclosure appendix

Analyst Certification

The following analyst(s), economist(s), or strategist(s) who is(are) primarily responsible for this report, including any analyst(s) whose name(s) appear(s) as author of an individual section or sections of the report and any analyst(s) named as the covering analyst(s) of a subsidiary company in a sum-of-the-parts valuation certifies(y) that the opinion(s) on the subject security(ies) or issuer(s), any views or forecasts expressed in the section(s) of which such individual(s) is(are) named as author(s), and any other views or forecasts expressed herein, including any views expressed on the back page of the research report, accurately reflect their personal view(s) and that no part of their compensation was, is or will be directly or indirectly related to the specific recommendation(s) or views contained in this research report: Henning Cosman, Wai-Shin Chan, CFA, Sriharsha Pappu, Tarek Soliman, CFA, Andrew Lobbenberg, Kim Fustier, Sean McLoughlin and Parash Jain.

Important disclosures

Equities: Stock ratings and basis for financial analysis

HSBC and its affiliates, including the issuer of this report ("HSBC") believes an investor's decision to buy or sell a stock should depend on individual circumstances such as the investor's existing holdings, risk tolerance and other considerations and that investors utilise various disciplines and investment horizons when making investment decisions. Ratings should not be used or relied on in isolation as investment advice. Different securities firms use a variety of ratings terms as well as different rating systems to describe their recommendations and therefore investors should carefully read the definitions of the ratings used in each research report. Further, investors should carefully read the entire research report and not infer its contents from the rating because research reports contain more complete information concerning the analysts' views and the basis for the rating.

From 23rd March 2015 HSBC has assigned ratings on the following basis:

The target price is based on the analyst's assessment of the stock's actual current value, although we expect it to take six to 12 months for the market price to reflect this. When the target price is more than 20% above the current share price, the stock will be classified as a Buy; when it is between 5% and 20% above the current share price, the stock may be classified as a Buy or a Hold; when it is between 5% below and 5% above the current share price, the stock will be classified as a Hold; when it is between 5% and 20% below the current share price, the stock may be classified as a Hold or a Reduce; and when it is more than 20% below the current share price, the stock will be classified as a Reduce.

Our ratings are re-calibrated against these bands at the time of any 'material change' (initiation or resumption of coverage, change in target price or estimates).

Upside/Downside is the percentage difference between the target price and the share price.

Prior to this date, HSBC's rating structure was applied on the following basis:

For each stock we set a required rate of return calculated from the cost of equity for that stock's domestic or, as appropriate, regional market established by our strategy team. The target price for a stock represented the value the analyst expected the stock to reach over our performance horizon. The performance horizon was 12 months. For a stock to be classified as Overweight, the potential return, which equals the percentage difference between the current share price and the target price, including the forecast dividend yield when indicated, had to exceed the required return by at least 5 percentage points over the succeeding 12 months (or 10 percentage points for a stock classified as Volatile*). For a stock to be classified as Underweight, the stock was expected to underperform its required return by at least 5 percentage points over the succeeding 12 months (or 10 percentage points for a stock classified as Volatile*). Stocks between these bands were classified as Neutral.

*A stock was classified as volatile if its historical volatility had exceeded 40%, if the stock had been listed for less than 12 months (unless it was in an industry or sector where volatility is low) or if the analyst expected significant volatility. However, stocks which we did not consider volatile may in fact also have behaved in such a way. Historical volatility was defined as the past month's average of the daily 365-day moving average volatilities. In order to avoid misleadingly frequent changes in rating, however, volatility had to move 2.5 percentage points past the 40% benchmark in either direction for a stock's status to change.

Rating distribution for long-term investment opportunities

As of 04 November 2021, the distribution of all independent ratings published by HSBC is as follows:

Buy	60%	(42% of these provided with Investment Banking Services in the past 12 months)
Hold	34%	(40% of these provided with Investment Banking Services in the past 12 months)
Sell	6%	(38% of these provided with Investment Banking Services in the past 12 months)

For the purposes of the distribution above the following mapping structure is used during the transition from the previous to current rating models: under our previous model, Overweight = Buy, Neutral = Hold and Underweight = Sell; under our current model Buy = Buy, Hold = Hold and Reduce = Sell. For rating definitions under both models, please see "Stock ratings and basis for financial analysis" above.

For the distribution of non-independent ratings published by HSBC, please see the disclosure page available at http://www.hsbcnet.com/gbm/financial-regulation/investment-recommendations-disclosures.

To view a list of all the independent fundamental ratings disseminated by HSBC during the preceding 12-month period, please use the following links to access the disclosure page:

Clients of Global Research and Global Banking and Markets: www.research.hsbc.com/A/Disclosures

Clients of HSBC Private Banking: www.research.privatebank.hsbc.com/Disclosures

HSBC and its affiliates will from time to time sell to and buy from customers the securities/instruments, both equity and debt (including derivatives) of companies covered in HSBC Research on a principal or agency basis or act as a market maker or liquidity provider in the securities/instruments mentioned in this report.

Analysts, economists, and strategists are paid in part by reference to the profitability of HSBC which includes investment banking, sales & trading, and principal trading revenues.

Whether, or in what time frame, an update of this analysis will be published is not determined in advance.

Non-U.S. analysts may not be associated persons of HSBC Securities (USA) Inc, and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with the subject company, public appearances and trading securities held by the analysts.

Economic sanctions imposed by the EU, the UK, the USA and certain other jurisdictions generally prohibit transacting or dealing in any debt or equity issued by Russian SSI entities on or after 16 July 2014 (Restricted SSI Securities). Economic sanctions imposed by the USA also generally prohibit US persons from purchasing or selling publicly traded securities issued by companies designated by the US Government as "Chinese Military-Industrial Complex Companies" (CMICs) or any publicly traded securities that are derivative of, or designed to provide investment exposure to, the targeted CMIC securities (collectively, Restricted CMIC Securities). This report does not constitute advice in relation to any Restricted SSI Securities or Restricted CMIC Securities, and as such, this report should not be construed as an inducement to transact in any Restricted SSI Securities or Restricted CMIC Securities.

For disclosures in respect of any company mentioned in this report, please see the most recently published report on that company available at www.hsbcnet.com/research. HSBC Private Banking clients should contact their Relationship Manager for queries regarding other research reports. In order to find out more about the proprietary models used to produce this report, please contact the authoring analyst.

Additional disclosures

1. This report is dated as at 05 November 2021.
2. All market data included in this report are dated as at close 04 November 2021, unless a different date and/or a specific time of day is indicated in the report.
3. HSBC has procedures in place to identify and manage any potential conflicts of interest that arise in connection with its Research business. HSBC's analysts and its other staff who are involved in the preparation and dissemination of Research operate and have a management reporting line independent of HSBC's Investment Banking business. Information Barrier procedures are in place between the Investment Banking, Principal Trading, and Research businesses to ensure that any confidential and/or price sensitive information is handled in an appropriate manner.
4. You are not permitted to use, for reference, any data in this document for the purpose of (i) determining the interest payable, or other sums due, under loan agreements or under other financial contracts or instruments, (ii) determining the price at which a financial instrument may be bought or sold or traded or redeemed, or the value of a financial instrument, and/or (iii) measuring the performance of a financial instrument or of an investment fund.

Disclaimer

Legal entities as at 1 December 2020

'UAE' HSBC Bank Middle East Limited, DIFC; HSBC Bank Middle East Limited, Dubai; 'HK' The Hongkong and Shanghai Banking Corporation Limited, Hong Kong; 'TW' HSBC Securities (Taiwan) Corporation Limited; 'CA' HSBC Securities (Canada) Inc.; 'France' HSBC Continental Europe; 'Spain' HSBC Continental Europe, Sucursal en España; 'Italy' HSBC Continental Europe, Italy; 'Sweden' HSBC Continental Europe Bank, Sweden Filial; 'DE' HSBC Trinkaus & Burkhardt AG, Düsseldorf; 000 HSBC Bank (RR), Moscow; 'IN' HSBC Securities and Capital Markets (India) Private Limited, Mumbai; 'JP' HSBC Securities (Japan) Limited, Tokyo; 'EG' HSBC Securities Egypt SAE, Cairo; 'CN' HSBC Investment Bank Asia Limited, Beijing Representative Office; The Hongkong and Shanghai Banking Corporation Limited, Singapore Branch; The Hongkong and Shanghai Banking Corporation Limited, Seoul Securities Branch; The Hongkong and Shanghai Banking Corporation Limited, Seoul Branch; HSBC Securities (South Africa) (Pty) Ltd, Johannesburg; HSBC Bank plc, London, Tel Aviv; 'US' HSBC Securities (USA) Inc, New York; HSBC Yatirim Menkul Degerler AS, Istanbul; HSBC México, SA, Institución de Banca Múltiple, Grupo Financiero HSBC; HSBC Bank Australia Limited; HSBC Bank Argentina SA; HSBC Saudi Arabia Limited; The Hongkong and Shanghai Banking Corporation Limited, New Zealand Branch incorporated in Hong Kong SAR; The Hongkong and Shanghai Banking Corporation Limited, Bangkok Branch; PT Bank HSBC Indonesia; HSBC Qianhai Securities Limited; Banco HSBC S.A.

Issuer of report
HSBC Bank plc
8 Canada Square
London, E14 5HQ, United Kingdom
Telephone: +44 20 7991 8888
Fax: +44 20 7992 4880
Website: www.research.hsbc.com

In the UK, this publication is distributed by HSBC Bank plc for the information of its Clients (as defined in the Rules of FCA) and those of its affiliates only. Nothing herein excludes or restricts any duty or liability to a customer which HSBC Bank plc has under the Financial Services and Markets Act 2000 or under the Rules of FCA and PRA. A recipient who chooses to deal with any person who is not a representative of HSBC Bank plc in the UK will not enjoy the protections afforded by the UK regulatory regime. HSBC Bank plc is regulated by the Financial Conduct Authority and the Prudential Regulation Authority. If this research is received by a customer of an affiliate of HSBC, its provision to the recipient is subject to the terms of business in place between the recipient and such affiliate.

HSBC Securities (USA) Inc. accepts responsibility for the content of this research report prepared by its non-US foreign affiliate. The information contained herein is under no circumstances to be construed as investment advice and is not tailored to the needs of the recipient. All U.S. persons receiving and/or accessing this report and wishing to effect transactions in any security discussed herein should do so with HSBC Securities (USA) Inc. in the United States and not with its non-US foreign affiliate, the issuer of this report.

In the European Economic Area, this publication has been distributed by HSBC Continental Europe or by such other HSBC affiliate from which the recipient receives relevant services

In Singapore, this publication is distributed by The Hongkong and Shanghai Banking Corporation Limited, Singapore Branch for the general information of institutional investors or other persons specified in Sections 274 and 304 of the Securities and Futures Act (Chapter 289) ("SFA") and accredited investors and other persons in accordance with the conditions specified in Sections 275 and 305 of the SFA. Only Economics or Currencies reports are intended for distribution to a person who is not an Accredited Investor, Expert Investor or Institutional Investor as defined in SFA. The Hongkong and Shanghai Banking Corporation Limited, Singapore Branch accepts legal responsibility for the contents of reports pursuant to Regulation 32C(1)(d) of the Financial Advisers Regulations. This publication is not a prospectus as defined in the SFA. This publication is not a prospectus as defined in the SFA. It may not be further distributed in whole or in part for any purpose. The Hongkong and Shanghai Banking Corporation Limited Singapore Branch is regulated by the Monetary Authority of Singapore. Recipients in Singapore should contact a "Hongkong and Shanghai Banking Corporation Limited, Singapore Branch" representative in respect of any matters arising from, or in connection with this report. Please refer to The Hongkong and Shanghai Banking Corporation Limited Singapore Branch's website at www.business.hsbc.com.sg for contact details.

In Australia, this publication has been distributed by The Hongkong and Shanghai Banking Corporation Limited (ABN 65 117 925 970, AFSL 301737) for the general information of its "wholesale" customers (as defined in the Corporations Act 2001). Where distributed to retail customers, this research is distributed by HSBC Bank Australia Limited (ABN 48 006 434 162, AFSL No. 232595). These respective entities make no representations that the products or services mentioned in this document are available to persons in Australia or are necessarily suitable for any particular person or appropriate in accordance with local law. No consideration has been given to the particular investment objectives, financial situation or particular needs of any recipient.

This publication has been distributed in Japan by HSBC Securities (Japan) Limited. It may not be further distributed, in whole or in part, for any purpose. In Hong Kong, this document has been distributed by The Hongkong and Shanghai Banking Corporation Limited in the conduct of its Hong Kong regulated business for the information of its institutional and professional customers; it is not intended for and should not be distributed to retail customers in Hong Kong. The Hongkong and Shanghai Banking Corporation Limited makes no representations that the products or services mentioned in this document are available to persons in Hong Kong or are necessarily suitable for any particular person or appropriate in accordance with local law. All inquiries by such recipients must be directed to The Hongkong and Shanghai Banking Corporation Limited. In Korea, this publication is distributed by The Hongkong and Shanghai Banking Corporation Limited, Seoul Securities Branch ("HBAP SLS") for the general information of professional investors specified in Article 9 of the Financial Investment Services and Capital Markets Act ("FSCMA"). This publication is not a prospectus as defined in the FSCMA. It may not be further distributed in whole or in part for any purpose. HBAP SLS is regulated by the Financial Services Commission and the Financial Supervisory Service of Korea. This publication is distributed in New Zealand by The Hongkong and Shanghai Banking Corporation Limited, New Zealand Branch incorporated in Hong Kong SAR. In Canada, this document has been distributed by HSBC Securities (Canada) Inc. (member IIROC), and/or its affiliates. The information contained herein is under no circumstances to be construed as investment advice in any province or territory of Canada and is not tailored to the needs of the recipient. No securities commission or similar regulatory authority in Canada has reviewed or in any way passed judgment upon these materials, the information contained herein or the merits of the securities described herein, and any representation to the contrary is an offense. In Brazil, this document has been distributed by Banco HSBC S.A. ("HSBC Brazil"), and/or its affiliates. As required by Instruction No. 598/18 of the Securities and Exchange Commission of Brazil (Comissão de Valores Mobiliários), potential conflicts of interest concerning (i) HSBC Brazil and/or its affiliates; and (ii) the analyst(s) responsible for authoring this report are stated on the chart above labelled "HSBC & Analyst Disclosures".

This document is not and should not be construed as an offer to sell or the solicitation of an offer to purchase or subscribe for any investment. HSBC has based this document on information obtained from sources it believes to be reliable but which it has not independently verified; HSBC makes no guarantee, representation or warranty and accepts no responsibility or liability as to its accuracy or completeness. The opinions contained within the report are based upon publicly available information at the time of publication and are subject to change without notice. From time to time research analysts conduct site visits of covered issuers. HSBC policies prohibit research analysts from accepting payment or reimbursement for travel expenses from the issuer for such visits. Past performance is not necessarily a guide to future performance. The value of any investment or income may go down as well as up and you may not get back the full amount invested. Where an investment is denominated in a currency other than the local currency of the recipient of the research report, changes in the exchange rates may have an adverse effect on the value, price or income of that investment. In case of investments for which there is no recognised market it may be difficult for investors to sell their investments or to obtain reliable information about its value or the extent of the risk to which it is exposed.

HSBC Bank plc is registered in England No 14259, is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority and is a member of the London Stock Exchange. (070905)

If you are an HSBC Private Banking ("PB") customer with approval for receipt of relevant research publications by an applicable HSBC legal entity, you are eligible to receive this publication. To be eligible to receive such publications, you must have agreed to the applicable HSBC entity's terms and conditions for accessing research and the terms and conditions of any other internet banking service offered by that HSBC entity through which you will access research publications ("the Terms"). Distribution of this publication is the sole responsibility of the HSBC entity with whom you have agreed the Terms. If you do not meet the aforementioned eligibility requirements please disregard this publication and, if you are a customer of PB, please notify your Relationship Manager. Receipt of research publications is strictly subject to the Terms and any other conditions or disclaimers applicable to the provision of the publications that may be advised by PB.

[1181670]