



By: The HSBC Global Research ESG team

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Fragile Planet 2022

Scoring climate risks: who is the most resilient?

Our proprietary climate model ranks countries on their ability to shift from fossil fuels, adapt to climate change and profit from a cleantech transition.

The science of the climate emergency is clear, as both short- and long-term risks loom

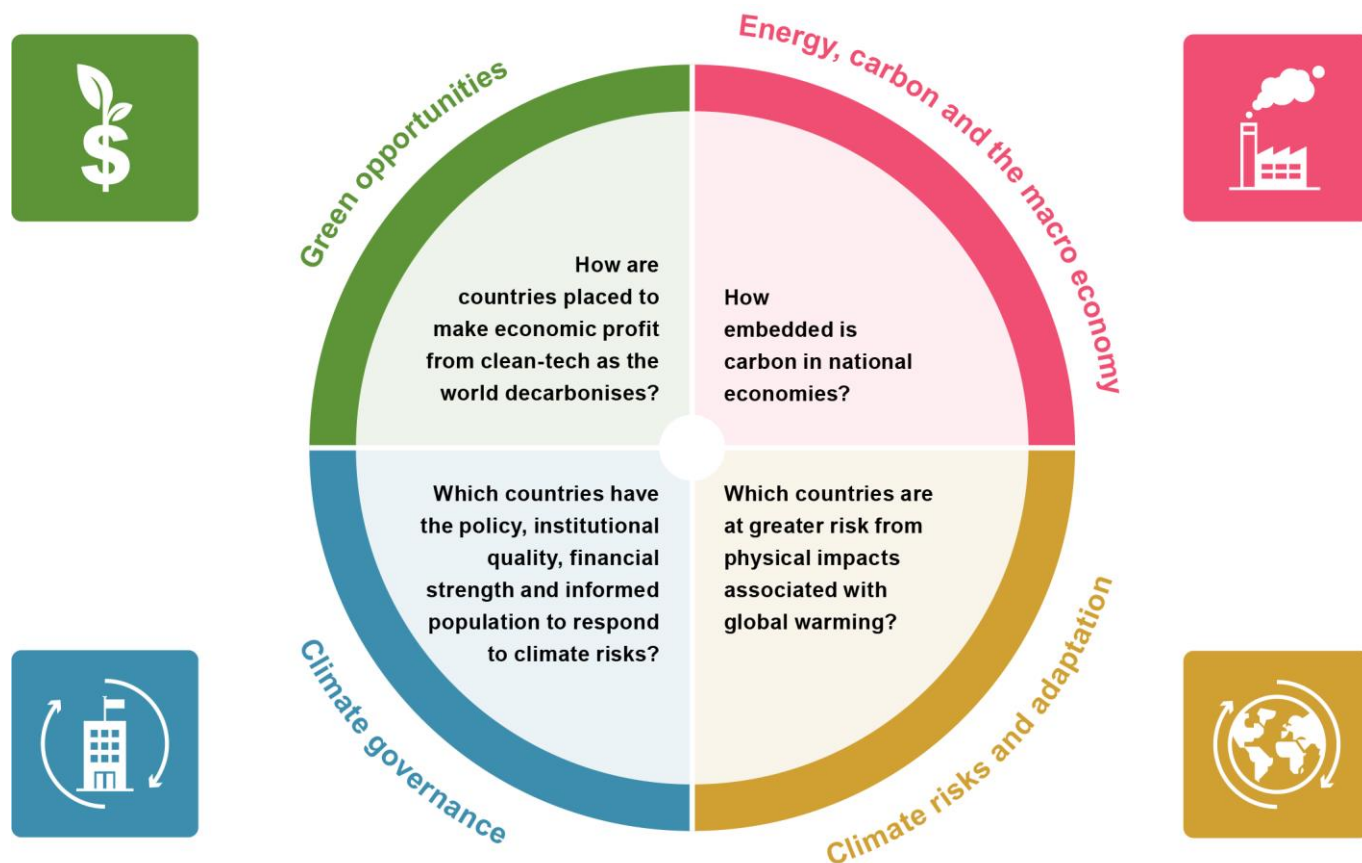
EM nations perform poorly on physical risk exposure, but demonstrate significant potential to in clean-tech opportunities

This is a Free to View version of a report by the same title published on 27 March 2022. Please contact your HSBC representative or email AskResearch@hsbc.com for more information.

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Figure 1.

Scoring climate risks



Source: HSBC

This is an abridged version of a report by the same title published on 27-Mar-22.

The full note is available to clients of HSBC Global Research and contains a further look at the topic at hand.

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Figure 2. Top and bottom performers

Greater resilience

Sweden



- ◆ Overall top on Energy, Carbon and the Macroeconomy quartile
- ◆ Awarded top score for decarbonisation policy
- ◆ Good performance on media independence and cost of capital

Finland



- ◆ Top rank for Climate Risks and Adaptation quartile
- ◆ Strong performance on temperature, air pollution and water risks
- ◆ Highest level and biggest increase in climate revenues as a share of GDP

Norway



- ◆ Renewables make up >50% of primary energy consumption
- ◆ Poor performance on fossil export exposure
- ◆ Extremely low exposure to extreme events (currently)

More vulnerable

Bangladesh



- ◆ 4th most vulnerable for Climate Governance quartile
- ◆ 3rd most vulnerable for Green Opportunities quartile
- ◆ Particularly low performance on gender equality and government effectiveness

Nigeria



- ◆ Extremely high levels of air pollution and associated fatalities
- ◆ 5th most vulnerable on Climate Governance quartile
- ◆ 2nd most vulnerable for Green Opportunities with no corporate climate revenues and poor industrial potential

Tunisia



- ◆ Extremely high cost of capital vs peers
- ◆ Vulnerabilities surrounding food security
- ◆ Low ranking on regulatory quality

The full list note contains rankings for all 77 countries. For more details, please contact your HSBC representative. Questions? Please email AskResearch@hsbc.com.

Fragile Planet 2022

Climate change is “*a threat to human wellbeing and health of the planet*”, reports the UN’s climate science body. We believe the scope and severity of current and expected climate impacts point to wide scale investment risks and opportunities, even under the most moderate of scenarios. Thus we model the vulnerability and resilience of markets around the world according to four key areas of climate analysis; physical risks, transition risks, political economy and cleantech opportunities. The full note contains a ranking of 77 markets based on the above criteria.

Time is running out. This is the clear message from the UN’s climate science body (the IPCC). Our carbon budget is closing up. In 2021, annual energy emissions hit an all-time high. Simultaneously, we now know with high confidence that the global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2,000 years (IPCC, [IPCC climate science](#), 10 August 2021). Warming brings with it Arctic ice melt and rising sea levels, ocean acidification, disruption to hydrological cycles, desertification and higher risks from extreme weather events. This presents serious systematic risks to economies, businesses and societies around the world.

And so, with unabated emissions and temperature increases, we are rapidly descending towards climate disaster and a situation where the impacts of climate change will be too baked in for us to avoid, and too severe for us to adapt to, in a way that would protect life as we know it ([IPCC: Impacts & adaptation](#), 1 March 2022).

“ The cumulative scientific evidence is unequivocal: climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to a security a liveable and sustainable future for all

IPCC Sixth Assessment Report: Impacts, Adaptation and Vulnerability

Response requires mitigation and adaptation strategies

A successful climate response requires urgency and scale, and covers two key areas: climate mitigation, and climate adaptation. Climate mitigation involves altering energy systems and economies such that we produce fewer emissions, for example by reducing our reliance on fossil fuels by building out renewables capacities. At the latest climate negotiations, COP26, held in Glasgow in November 2021, there was pressure to keep the world on track for a 1.5°C

trajectory, which requires a significant transition of all economies around the world ([COP26: Glasgow Pact](#), 15 November 2021). Despite progress on this, there is already serious concern that global 2030 emissions are still on track for a 13.7% increase (vs the 45% decrease required) and as a result, countries have been asked to strengthen climate pledges yet again in advance of COP27 in November.

Climate adaptation is an increasingly critical area of focus which involves preparing nations, industries and populations for a more volatile climate. Quite different from climate mitigation, adaptation considerations are typically location specific in nature. The more the climate changes, the more we are likely to have to adapt; and the less that is done on mitigating greenhouse gases, the more climate change accelerates - as such the two strategies to the climate response are linked and can be self-re-enforcing ([A race on two fronts](#), 23 September 2021).

Some countries will respond better than others – but who?

Invariably, some countries will fare better than others at responding to the climate crisis. Some need to urgently prioritise climate mitigation, while for others climate adaptation is particularly critical given their exposure to physical climate impacts. And so, in our model, we look at which countries are more vulnerable, and which are more resilient, in the face of climate risks. The crux of our model is centered on one key question:

◆ **Which countries are more resilient in the face of rising climate risks?**

The full report, the 6th of this series, assesses the performance of 77 developed, emerging and frontier market economies, organised into four sections, each seeking to answer a single question, which together feed into the main question above. The four section-related questions are as follows:

- ◆ How embedded is carbon in national economies? (14 datapoints)
- ◆ Which countries are at greater risk from physical impacts associated with global warming? (24 datapoints)
- ◆ Which countries have the policy, institutional quality, financial strength and informed population to respond to climate risks? (15 datapoints)
- ◆ How are countries placed to make economic profit from cleantech as the world decarbonises? (7 datapoints)

Level and change of indicators considered

We use a range of publically available datapoints (a complete list of indicators and datapoints can be found on page 8, Figure 3 of the full note), as well as our proprietary HSBC Climate Solutions Database in the final quadrant of this analysis. In some cases, we use the level *and* the change of a datapoint for the analysis, to provide a more dynamic picture.

We include a new indicator in this iteration of our model; *projected change in labour productivity by 2035 (vs baseline)*. This is the first predictive indicator we have used in our model and we have included it because of the strong link the indicator creates between physical climate risks, social risks and the economy. This is a form of analysis that we believe will need to be considered as the impacts of climate change begin to have a tangible impact on the ability of economies to continue to function as we know it.

We believe climate considerations are increasingly vital for the reasons outlined at the start of this section. We articulate the different avenues via which we can expect to notice climate change impacts in the full note. We believe this model provides an important framework for considering these risks, even before the overall rankings and country level performance is considered.

DM generally performs better

The best-placed countries – the most resilient - are some of the wealthy, European nations. **Sweden** ranks first (as it did in last year's model), followed by **Finland**, and **Norway**. The highest ranking non-European nation in our model is the **United States**, which ranks 7th. The highest ranking EM nation is **Chile**, which performs fairly well across some of the indicators in the physical risks section (other than water risks), and the cleantech opportunities section.

A lack of cleantech opportunities holds back EM and FM

The other end of the country ranking is dominated by EM and FM nations, with African, Middle Eastern and South East Asian nations particularly vulnerable, albeit for different reasons.

Bangladesh performs worst of all, with poor results on the cleantech opportunities and climate governance front, followed by **Nigeria** and **Tunisia**. In many cases a lack of clean tech opportunities, and poor performance on transition risks is contributing to this ranking.

While the final rankings are interesting, we believe digging into the detail is more illuminating; i.e., the value in this report can be found in specific areas of risk and individual indicators. For example, focusing just on the final rankings would miss some of the below findings, including:

- ◆ Six countries in our sample set derive 0% of their final energy consumption from renewable sources as of 2018 – **Kuwait, Oman, Saudi Arabia, Bahrain, Qatar and Botswana**
- ◆ 43% of **Kuwait's** GDP consists of fossil fuel rents
- ◆ 19 countries of our sample of 77 are net exporters of fossil fuels, in economic terms
- ◆ In a decarbonised world, where some fossil fuels are still consumed, **Saudi Arabia** has the most favourable ratio of reserves to breakeven price of production
- ◆ **Saudi Arabia** spends an estimated USD1,544 a head on explicit fossil fuel subsidies
- ◆ There is a clear regional risk from rising temperatures; of the 20 countries experiencing the largest increases in temperature in our sample set, nineteen of them are European. The decadal average temperature in the **Czech Republic** rose by 0.85°C (vs the decade 2001-2010).
- ◆ **Côte d'Ivoire, Ghana** and **Brazil** are likely to see the largest impact on labour productivity from heat stress by 2035
- ◆ **Cote d'Ivoire** has only 36% of the forested area that the country had in 1990
- ◆ 56% of the land area in the **Netherlands** lies below 5m of elevation, with 59% of the total population living there
- ◆ The **United States** is one of the ten most vulnerable markets when it comes to the number of people affected and inflation adjusted dollar damage costs associated with extreme weather events in the past decade. There was a 300% rise in the number of people affected by extreme events in the country in 2002-11 vs 2012-21
- ◆ **Egypt** performs worst in our sample set on our proprietary decarbonisation policy scoring, with no quantitative emissions target in place, no net zero plans and no carbon pricing
- ◆ **China** is the majority producer (>50%) of five of 16 commodities we have identified as key to the cleantech transition, and holds over 25% of the reserves of four of them

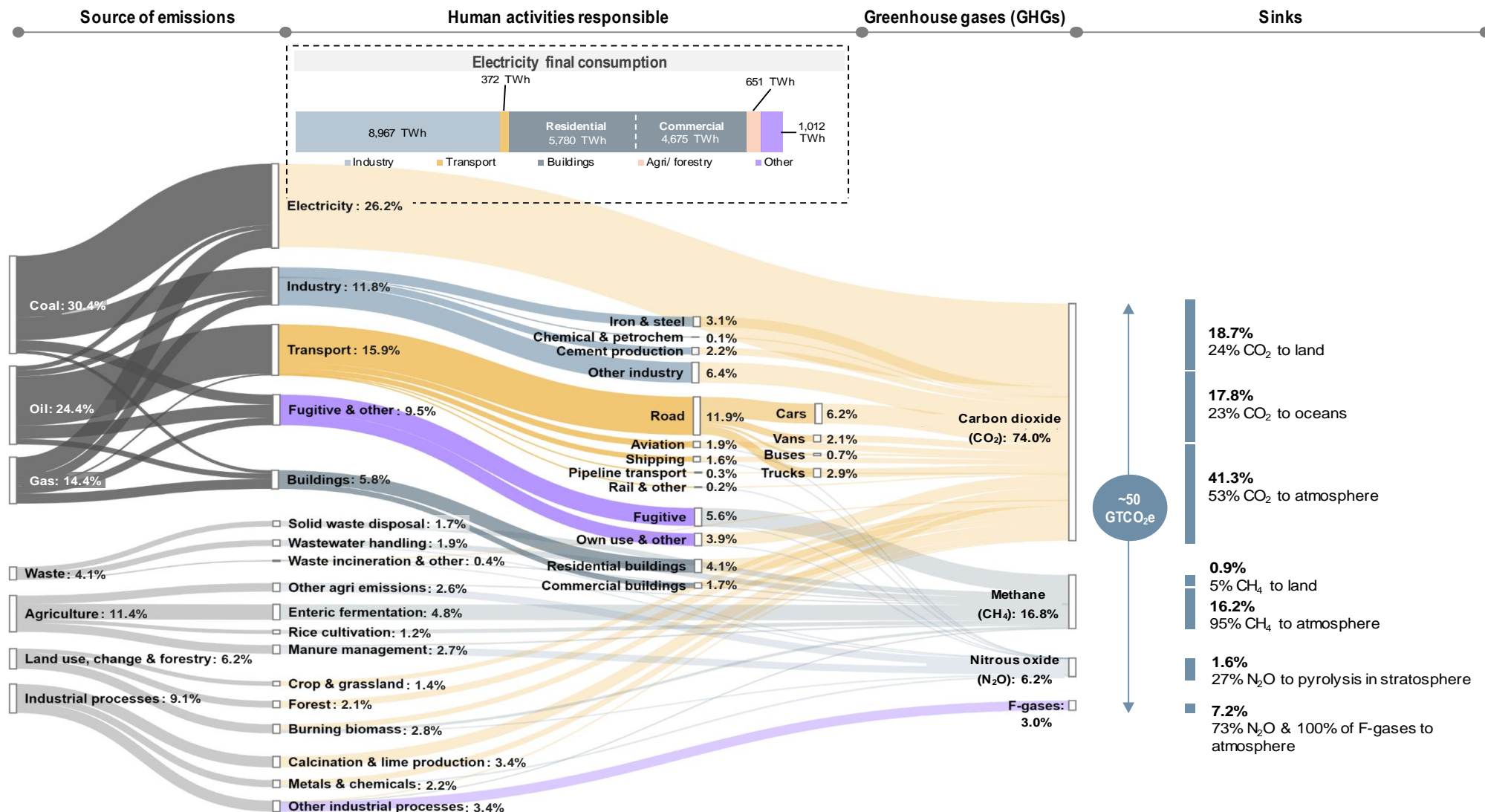
We acknowledge the contribution of Payal Negi and Anushua Chowdhury, climate change analysts, Bangalore, in the preparation of this report

Why is this important?

Monitoring individual country vulnerability to climate change factors is, in our view, important for reasons including:

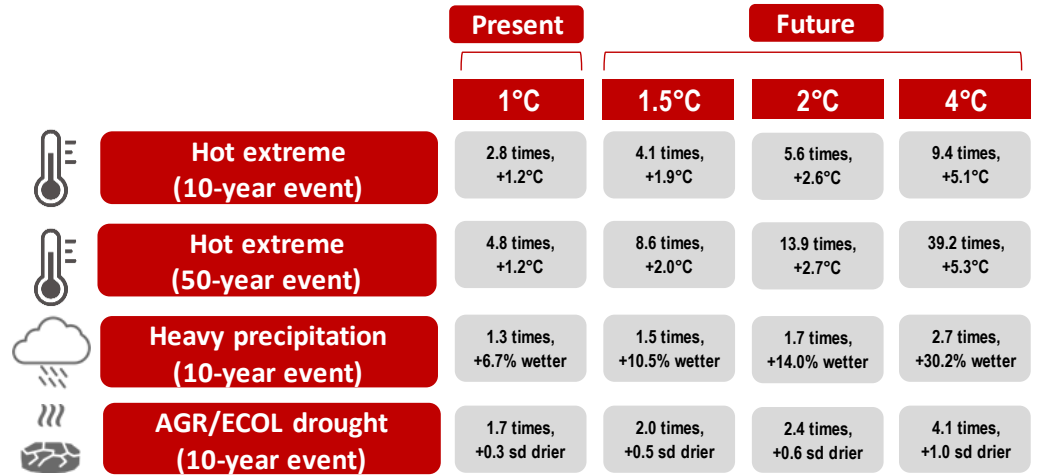
Inflation <p>Climate effects could impact food or energy output, driving up prices.</p>	Attractiveness of foreign direct investment (FDI) <p>Smarter globalised companies are incorporating climate factors into operational growth strategies. Regions with low vulnerability to extreme events driven by climate change carry less risk.</p>
Balance of payments <p>Countries with high exposure to climate factors could face higher trade deficits as companies choose to source goods from other countries where climate risks are lower to mitigate supply chain disruption.</p>	Short-run growth <p>Damage costs from extreme climate events are a drag on economic growth, and create extra growth volatility. According to NOAA (National Oceanic Atmospheric Administration), climate events in the US alone in 2021, cost USD145bn.</p>
Long-run growth <p>The depletion of natural capital hurts overall productivity (eg, water depletion can increase the cost of energy), and thus affects a country's ability to generate long-term sustainable growth.</p>	Supply chain disruption <p>Provision of goods and services may be disrupted, putting pressure further along production chains.</p>
Infrastructure investment requirements <p>Countries will need to invest in power, transport, waste and buildings infrastructure to be resilient to high probability extreme weather events and slow-onset climate-driven physical factors. Water infrastructure is also very important. The consequences of 'water stress' depend to a great extent on how efficiently the resource is managed.</p>	Social risks <p>Climate change has been given as one factor behind incidences of large-scale migration and conflict, such as in Syria and Mali, highlighting the requirements to understand the nature of exposure to countries where social impacts occur.</p>
Inequality <p>The poorer regions of the world, concentrated in the tropics, are more susceptible to climate impacts. Poorer populations within countries are also likely to be less able to adapt. Evidence shows that women are often more affected by climate impacts in many developing nations.</p>	Health issues <p>Higher temperatures and changing water patterns increase the public health risk.</p>
Opportunities <p>Some countries are well placed to earn revenues as the world decarbonises, by producing the products and technologies that will drive the transition. Certain countries are already producing cleantech today or have the diverse industrial base to do so in greater quantity in the future.</p>	Co-Benefits <p>Effectively addressing climate risks is likely to indirectly catalyse other benefits. This is likely to include more social stability and inclusion as the knowledge of local and Indigenous communities is leveraged. It is also likely to have a positive impact on other environmental challenges the world is grappling with, such as nature and biodiversity related risks.</p>

Figure 3. How do we emit? Global GHG emissions in 2017



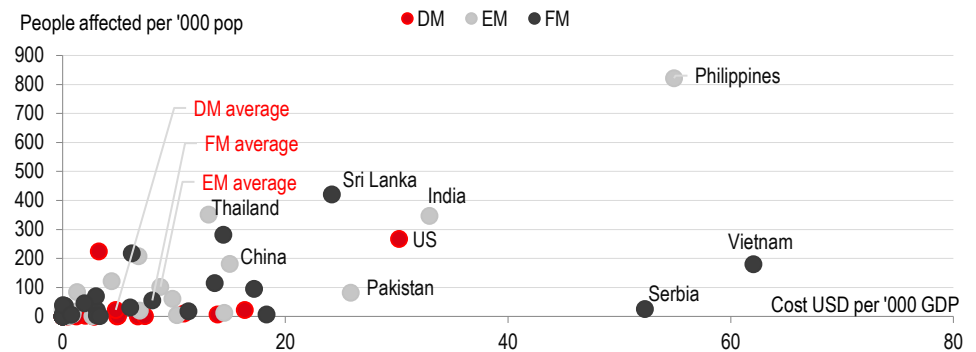
Source: HSBC, IEA, EDGAR, Global Carbon Project; values for sinks adjust calc. error; F-gases sources are not shown here but typically include refrigeration, air conditioning, aerosols and high voltage switchgear; LUCF is Land Use Change and Forestry; data for LUCF values are inherently uncertain and 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 GtCO₂; production of coke for iron & steel, feedstock for chemicals and petrochemicals, and some parts of oil & gas refining are classified as other industry.

Figure 4: The effect of warmer temperatures on extreme events



Source: IPCC, AR6 SPM. Note: AGR/ECL refers to "agricultural" or "ecological" drought which depends on the "affected biome"

Figure 5. People affected per 000pop vs cost per 000GDP (2012-2021)



Source: EMDAT, World Bank; UN population data. Note: some sample countries are not named

Figure 6: Net zero targets in the G20 by time bound



Note: Includes net zero and carbon neutrality targets that have been proposed/announced/legislated/in policy
Source: HSBC (based on country announcements)



Explaining the HSBC Climate Solutions Database

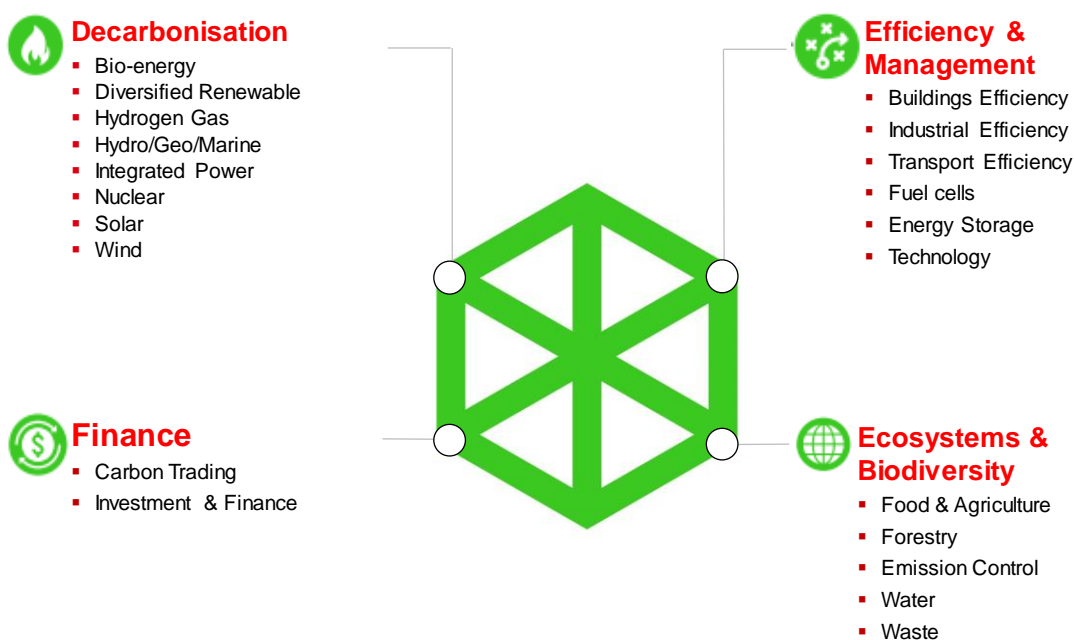
The HSBC Climate Solutions Database comprises global companies that are focussed on addressing, combatting and developing solutions to offset and overcome the effects of climate change, thus enabling the transition towards a low carbon economy. The Database includes companies with varying levels of exposure to climate-related businesses and defines investment opportunity set within the climate change space. We believe companies in the Database are best-placed to profit from the challenges of climate change.

We can then use our framework to screen the Database for companies that offer solutions – products and services – which have significant exposure to climate change solving activities. In the past, we've pulled together various stock screens offering exposure to a number of thematic ideas, including clean transport, smart cities. We've also created screens focussed on specific markets or regionals, including emerging markets, the US and LatAm. And we've focussed on styles, including screens which look at high dividend paying climate stocks and those which also perform well on change in revenue or in other environmental metrics.

The Database was launched in 2007 and currently consists of over 3,000 global companies across all regions and markets. The climate exposure of companies in the Database is determined based on the proportion of revenues that these companies derive from climate change related solutions, using our proprietary HSBC Climate Solutions Framework. The framework maps climate revenues across four climate sectors, 21 climate themes, over eighty climate subthemes and almost 250 fourth level classifications. Last year, we made a number of significant changes in the framework. We discuss the methodology of the database in more detail in this [brochure](#).

Companies' revenues are monitored on an annual basis and their climate exposure factors are revised, if necessary, depending on changes in their relevant exposure to climate change related activities. The database allows for identifying trends in climate integration across various climate themes as well as across regions and countries. The Database therefore enables screening for markets based on their highest and lowest share of climate revenue as proportion of macroeconomic variables, such as GDP. It also helps in identifying countries with relatively higher or lower rate of change in climate integration compared to other markets.

Figure 7. HSBC Climate Solutions Framework



Source: HSBC

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