

CLIMATE CHANGE – AN UNSTOPPABLE FORCE?

As the world experiences more extreme weather patterns and climate-related incidents, pressure is mounting to curb greenhouse gas emissions.

Carbon budget, 2C, 1.5C, the Paris Agreement, Transition Risk and Task Force on Climate-related Financial Disclosures – these are terms increasingly bandied about mainstream investor conversations. In this paper, we briefly explain where global climate action stands in relation to the key terms, with climate science speak in parentheses.

Carbon budget in a 2 degree scenario

Climate-related impacts refer to events caused or aggravated by a rise in global average temperature. This rise in temperature is due mainly to human (or “anthropogenic”) activities emitting greenhouse gases.

A 2C increase relative to preindustrial levels is set as a goal, in fear of likely non-linear, irreversible and catastrophic changes. Contrary to popular belief, this widely cited figure came from a Yale climate economist, William Nordhaus, and not the climate science community. The basic concept of the carbon budget is simple. Total emissions since the industrial revolution must be kept below a certain amount – hence, the “budget” - to achieve the 2C target. At the current pace, the ‘budget’ will be used up in less than 20 years.¹

The challenge is first to have annual emissions reach a maximum (or “peak”) and then fall, in order to stay within the budget. If the peak is delayed, there will be too little time to decarbonize.



Source: IPCC Fifth Assessment Report: Synthesis Report- IPCC Intergovernmental Panel on Climate Change. December 7, 2015

Since 2011 another 300GtCO₂ has been used, so less than 700GtCO₂ remain.

Costs of inaction

One Citi estimate expects a loss of global GDP of US\$44 trillion by 2060 in a do-nothing scenario.² There are sharply higher climate losses as the scale and number of very large climate disaster events climbs. Over the last four decades, in the U.S., the number has increased between three and five times as economic losses increased around five times to over \$80 billion on average, recently exceeding \$300 billion in 2017, a historical record.³

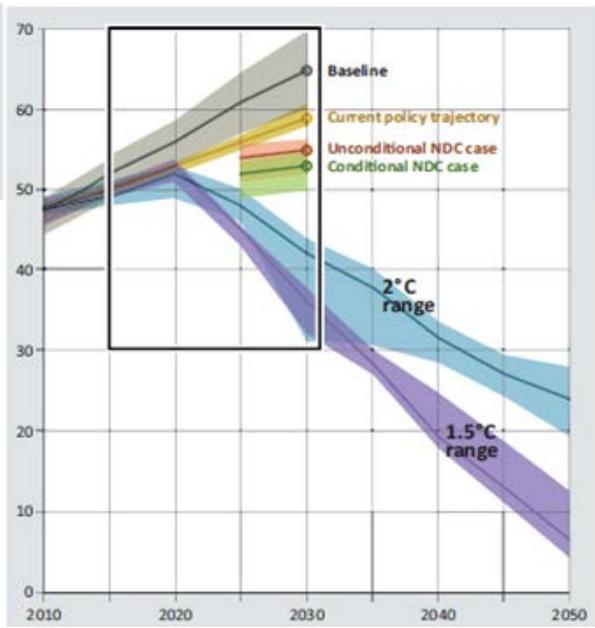
There will be more frequent extreme heat days, ‘five-sigma’ heat waves that will be ‘devastating and irreversible.’⁴ In addition, water is considered one of the primary medium in which climate-related impacts are felt. This could be through a clean water crisis in cities, rising pollution health risks, drought and degraded arable land, damage to marine ecosystems and an unstoppable rise in sea levels. All of which could lead to large-scale involuntary migration, multiplying geopolitical and, most likely, global risks.⁵

What about the Paris Agreement?

If we meet the targets set out in the Paris Agreement, are we not safe? Unfortunately not. Annual emissions have not, and do not peak under the Paris Agreement. It was lauded as a success for near global consensus for action, but the aggregate of nationally determined contributions (NDCs) are not adequate to achieve the 2C target.

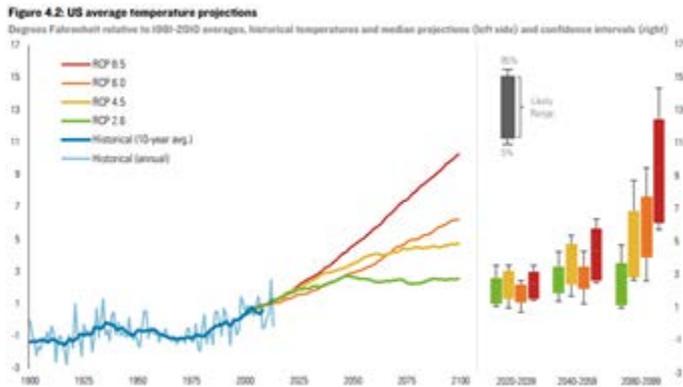
Many targets are based on energy intensity, on a per GDP basis, instead of absolute emissions. The carbon budget however is based on absolute emissions - physical forces do not care about GDP.

2C and 1.5C



Source: UN Environment Programme (UNEP). The Emissions Gap Report 2017: A UN Environment Synthesis Report. November 2017

The Intergovernmental Panel on Climate Change reported that based on current trajectories, the world is to reach a 2C by 2050 and 4C by 2100. In 2016, we have reached a 1C increase; the chart below shows average temperature projections for the US.



Source: Solomon Hsiang, Robert Kopp, Amir Jina, Michael Delgado, James Rising, Shashank Mohan, Robert Muir-Wood, D. J. Rasmussen, Michael Mastrandrea, Paul Wilson, Kate Larsen and Trevor Houser. "American Climate Prospectus: Economic Risks in the United States" October 2014 (version 1.2)

Aggressive climate action needed

Much more aggressive action is needed, and the next five to 10 years is critical. Economic transition is still in the early stages, with annual emissions rising.

The IPCC’s special report just released last month laid out the benefits of limiting warming to 1.5C but also the ‘far-reaching’ and ‘unprecedented in terms of scale’ industrial transitions required to do so. Confirming that the Paris Agreement NDCs will not limit warming to 1.5C, and the benefits to keeping warming to 1.5C or below, we anticipate a re-doubled effort to strengthen policy response.

The report is, further, very suggestive of the importance and likely central role of limiting climate change to achievement of the UN Sustainable Development goals.⁶

If it’s 1.5C, 2C, or 4C, how much does it matter? A group of Stanford University researchers in a study earlier this year estimated that by 2100 per capita output would be 15-25% lower under the current Paris based commitments (2.5-3°C warming), as much as 30% lower under a 4C warming scenario, and that the world would be some \$20 trillion cumulatively better off achieving the 1.5C target relative to 2C target, compared to the growth otherwise achievable if temperatures were at the 2000-2010 level.⁷

There continues to be evidence that the public and private sectors’ will to address climate risk continues to build. We especially note the following--The Task Force on Climate-related Financial Disclosures (TCFD) launched in 2016, set to be a game-changer, requires companies to disclose their governance, strategy, risk and performance in relation to climate change.

The recent Global Climate Action Summit in San Francisco saw a series of announcements made. Almost a fifth of Fortune Global 500 companies are committed to Science Based Targets initiative (SBTi), which is based on a carbon budget aligned to the 2C goal.

Economic growth and greenhouse gas emissions are decoupling. About 27 cities, including London, New York and Sydney, have reached peak emissions while their populations and economies grew by an average of 1.4% and 3% per year, respectively. The Global Green Bond Partnership was also launched to scale green bond issuances mainly by sub-national entities and corporations, as the green bond market rapidly grew from annual issuance of US\$3.4 billion in 2012, to US\$161 billion in 2017.

About 400 investors with US\$32 trillion in assets under management are involved in one or more areas under The Investor Agenda, an umbrella of investor initiatives relating to Climate Change. Evaluating climate change risks and opportunities in business and investment decisions will be the new norm. Some climate change impacts are likely to be unavoidable, but as we see it, climate action certainly is unstoppable.

Nikko Asset Management is proud to be one of about 50 global investors - and the first one of only two asset managers headquartered in Asia - to be supporting all four areas under The Investor Agenda.

References:

- 1 IPCC, 2015
- 2 Energy Darwinism II Why a Low Carbon Future Doesn't Have to Cost the Earth, August 2015, Citi GPS Jason Channell et al
- 3 NOAA National Centers for Environmental Information <https://www.ncdc.noaa.gov/billions/time-series>
- 4 BaML & World Bank, 2014
- 5 World Economic Forum, 2017
- 6 IPCC Global Warming of 1.5C, Headline Statements October 2018
- 7 Large potential reduction in economic damages under UN mitigation targets. M Burke, W. M Davis, N S. Diffenbaugh. Nature May 23, 2018

Important Information

This document is prepared by Nikko Asset Management Co., Ltd. and/or its affiliates (**Nikko AM**) and is for distribution only under such circumstances as may be permitted by applicable laws. This document does not constitute investment advice or a personal recommendation and it does not consider in any way the suitability or appropriateness of the subject matter for the individual circumstances of any recipient.

This document is for information purposes only and is not intended to be an offer, or a solicitation of an offer, to buy or sell any investments or participate in any trading strategy. Moreover, the information in this material will not affect Nikko AM's investment strategy in any way. The information and opinions in this document have been derived from or reached from sources believed in good faith to be reliable but have not been independently verified. Nikko AM makes no guarantee, representation or warranty, express or implied, and accepts no responsibility or liability for the accuracy or completeness of this document. No reliance should be placed on any assumptions, forecasts, projections, estimates or prospects contained within this document. This document should not be regarded by recipients as a substitute for the exercise of their own judgment. Opinions stated in this document may change without notice.

In any investment, past performance is neither an indication nor guarantee of future performance and a loss of capital may occur. Estimates of future performance are based on assumptions that may not be realised. Investors should be able to withstand the loss of any principal investment. The mention of individual stocks, sectors, regions or countries within this document does not imply a recommendation to buy or sell.

Nikko AM accepts no liability whatsoever for any loss or damage of any kind arising out of the use of all or any part of this document, provided that nothing herein excludes or restricts any liability of Nikko AM under applicable regulatory rules or requirements.

All information contained in this document is solely for the attention and use of the intended recipients. Any use beyond that intended by Nikko AM is strictly prohibited.

Japan: The information contained in this document pertaining specifically to the investment products is not directed at persons in Japan nor is it intended for distribution to persons in Japan. Registration Number: Director of the Kanto Local Finance Bureau (Financial Instruments firms) No. 368 Member Associations: The Investment Trusts Association, Japan/Japan Investment Advisers Association.

United Kingdom and rest of Europe: This document constitutes a financial promotion for the purposes of the Financial Services and Markets Act 2000 (as amended) (FSMA) and the rules of the Financial Conduct Authority (the FCA) in the United Kingdom (the FCA Rules).

This document is communicated by Nikko Asset Management Europe Ltd, which is authorised and regulated in the United Kingdom by the FCA (122084). It is directed only at (a) investment professionals falling within article 19 of the Financial Services and Markets Act 2000 (Financial Promotions) Order 2005, (as amended) (the Order) (b) certain high net worth entities within the meaning of article 49 of the Order and (c) persons to whom this document may otherwise lawfully be communicated (all such persons being referred to as relevant persons) and is only available to such persons and any investment activity to which it relates will only be engaged in with such persons.

United States: This document is for information purposes only and is not intended to be an offer, or a solicitation of an offer, to buy or sell any investments. This document should not be regarded as investment advice. This document may not be duplicated, quoted, discussed or otherwise shared without prior consent. Any offering or distribution of a Fund in the United States may only be conducted via a licensed and registered broker-dealer or a

duly qualified entity. Nikko Asset Management Americas, Inc. is a United States Registered Investment Adviser.

Singapore: This document is for information only with no consideration given to the specific investment objective, financial situation and particular needs of any specific person. You should seek advice from a financial adviser before making any investment. In the event that you choose not to do so, you should consider whether the investment selected is suitable for you. Nikko Asset Management Asia Limited is a regulated entity in Singapore.

Hong Kong: This document is for information only with no consideration given to the specific investment objective, financial situation and particular needs of any specific person. You should seek advice from a financial adviser before making any investment. In the event that you choose not to do so, you should consider whether the investment selected is suitable for you. The contents of this document have not been reviewed by the Securities and Futures Commission or any regulatory authority in Hong Kong. Nikko Asset Management Hong Kong Limited is a licensed institution in Hong Kong.

Australia: Nikko AM Limited ABN 99 003 376 252 (**Nikko AM Australia**) is responsible for the distribution of this information in Australia. **Nikko AM Australia** holds Australian Financial Services Licence No. 237563 and is part of the Nikko AM Group. This material and any offer to provide financial services are for information purposes only. This material does not take into account the objectives, financial situation or needs of any individual and is not intended to constitute personal advice, nor can it be relied upon as such. This material is intended for, and can only be provided and made available to, persons who are regarded as Wholesale Clients for the purposes of section 761G of the Corporations Act 2001 (Cth) and must not be made available or passed on to persons who are regarded as Retail Clients for the purposes of this Act. If you are in any doubt about any of the contents, you should obtain independent professional advice.

New Zealand: Nikko Asset Management New Zealand Limited (Company No. 606057, FSP22562) is the licensed Investment Manager of Nikko AM NZ Investment Scheme, the Nikko AM NZ Wholesale Investment Scheme and the Nikko AM KiwiSaver Scheme.

This material is for the use of researchers, financial advisers and wholesale investors (in accordance with Schedule 1, Clause 3 of the Financial Markets Conduct Act 2013 in New Zealand). This material has been prepared without taking into account a potential investor's objectives, financial situation or needs and is not intended to constitute personal financial advice, and must not be relied on as such. Recipients of this material, who are not wholesale investors, or the named client, or their duly appointed agent, should consult an Authorised Financial Adviser and the relevant Product Disclosure Statement or Fund Fact Sheet (available on our website: www.nikkoam.co.nz).

Kingdom of Bahrain: The document has not been approved by the Central Bank of Bahrain which takes no responsibility for its contents. No offer to the public to purchase the Strategy will be made in the Kingdom of Bahrain and this document is intended to be read by the addressee only and must not be passed to, issued to, or shown to the public generally.

Kuwait: This document is not for general circulation to the public in Kuwait. The Strategy has not been licensed for offering in Kuwait by the Kuwaiti Capital Markets Authority or any other relevant Kuwaiti government agency. The offering of the Strategy in Kuwait on the basis a private placement or public offering is, therefore, restricted in accordance with Decree Law No. 7 of 2010 and the bylaws thereto (as amended). No private or public offering of the Strategy is being made in Kuwait, and no agreement relating to the sale of the Strategy will be concluded in Kuwait. No marketing or solicitation or inducement activities are being used to offer or market the Strategy in Kuwait.

Kingdom of Saudi Arabia: This document is communicated by Nikko Asset Management Europe Ltd (Nikko AME), which is authorised and regulated by the Financial Services and Markets Act 2000 (as amended) (FSMA) and the rules of the Financial Conduct Authority (the FCA) in the United Kingdom (the FCA Rules). This document should not be reproduced, redistributed, or sent directly or indirectly to any other party or published in full or in part for any purpose whatsoever without a prior written permission from Nikko AME.

This document does not constitute investment advice or a personal recommendation and does not consider in any way the suitability or appropriateness of the subject matter for the individual circumstances of any recipient. In providing a person with this document, Nikko AME is not treating that person as a client for the purposes of the FCA Rules other than those relating to financial promotion and that person will not therefore benefit from any protections that would be available to such clients.

Nikko AME and its associates and/or its or their officers, directors or employees may have or have had positions or material interests, may at any time make purchases and/or sales as principal or agent, may provide or have provided corporate finance services to issuers or may provide or have provided significant advice or investment services in any investments referred to in this document or in related investments. Relevant confidential information, if any, known within any company in the Nikko AM group or Sumitomo Mitsui Trust Bank group and not available to Nikko AME because of regulations or internal procedure is not reflected in this document. The investments mentioned in

this document may not be eligible for sale in some states or countries, and they may not be suitable for all types of investors.

Oman: The information contained in this document neither constitutes a public offer of securities in the Sultanate of Oman as contemplated by the Commercial Companies Law of Oman (Royal Decree 4/74) or the Capital Markets Law of Oman (Royal Decree 80/98), nor does it constitute an offer to sell, or the solicitation of any offer to buy non-Omani securities in the Sultanate of Oman as contemplated by Article 139 of the Executive Regulations to the Capital Market Law (issued by Decision No. 1/2009). This document is not intended to lead to the conclusion of any contract of whatsoever nature within the territory of the Sultanate of Oman.

Qatar (excluding QFC): The Strategies are only being offered to a limited number of investors who are willing and able to conduct an independent investigation of the risks involved in an investment in such Strategies. The document does not constitute an offer to the public and should not be reproduced, redistributed, or sent directly or indirectly to any other party or published in full or in part for any purpose whatsoever without a prior written permission from Nikko Asset Management Europe Ltd (Nikko AME). No transaction will be concluded in your jurisdiction and any inquiries regarding the Strategies should be made to Nikko AME.

United Arab Emirates (excluding DIFC): This document and the information contained herein, do not constitute, and is not intended to constitute, a public offer of securities in the United Arab Emirates and accordingly should not be construed as such. The Strategy is only being offered to a limited number of investors in the UAE who are (a) willing and able to conduct an independent investigation of the risks involved in an investment in such Strategy, and (b) upon their specific request.

The Strategy has not been approved by or licensed or registered with the UAE Central Bank, the Securities and Commodities Authority or any other relevant licensing authorities or governmental agencies in the UAE. This document is for the use of the named addressee only and should not be given or shown to any other person (other than employees, agents or consultants in connection with the addressee's consideration thereof).

No transaction will be concluded in the UAE and any inquiries regarding the Strategy should be made to Nikko Asset Management Europe Ltd.