

NZ Insight: Irrigation opportunities

26 June 2020



This is not personal advice. It does not consider your objectives or circumstances. Please refer to the Important Notice.



Contact

Susan Kilsby for more details.

Achieving more with less

Key points

- New Zealand is one of the few countries which is not expected to be impacted by a scarcity of water in the future
- The benefits of irrigation are not solely economic, as social, environmental, and welfare benefits are also derived from irrigation.
- An increase in irrigation can have positive environmental benefits providing any associated intensification is well managed.

Irrigation provides choices

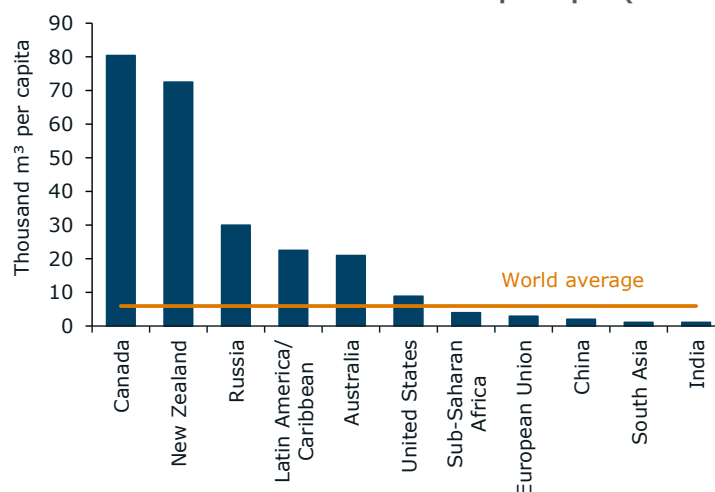
Irrigation provides an opportunity for a wider range of high-value land uses that would be too risky to invest in without a reliable water source. Increased irrigation has been associated with negative environmental outcomes due to the intensification of farming practices that has occurred on irrigated land. However, it is not so much irrigation that is to blame as a lack of understanding, and a lack of regulation of potential externalities.

Water shortages are beginning to occur across the globe, which will limit some countries' ability to feed their growing populations. New Zealand is lucky to have plenty of water available; we just don't always have water in the right places at the right times. Investing in irrigation can help mitigate the risks associated with both short-term weather events and longer term changes in climatic conditions.

New Zealand is not short of water, unlike most countries in the world. But we are short of infrastructure in which to store water so we can access this valuable resource where and when it is most needed.

On a per capita basis New Zealand has 72,510m³ of renewable freshwater available, compared to the world average of just 5,208m³. We have considerably more water available than most other major food-producing regions, including the United States, Australia and most parts of Europe and Asia. Countries with similar water resources to New Zealand include Canada, Chile and Peru, when measured on a per capita basis.

Renewable internal freshwater resources per capita (cubic meters)



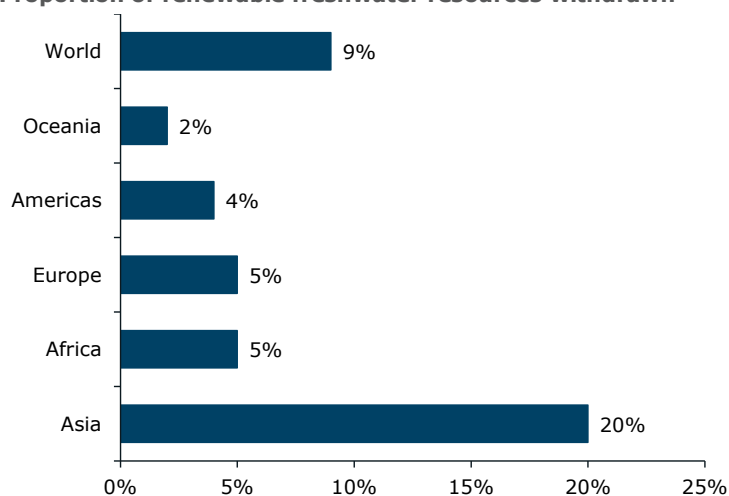
Source: Aquastat

Many other countries are using a much greater proportion of their available water for irrigation than New Zealand. In some cases the rate of use is unsustainable. The UN anticipates over half of the world's population will live in areas of water scarcity by 2050. Meanwhile the Global Water Institute estimates 700 million people could be displaced by intense water scarcity by 2030.¹

Agriculture uses 11% of the world's land surface for crop production, and accounts for 70% of all water withdrawn from aquifers, streams and lakes.²

Across the globe 40% of crop production comes from irrigated land, while just 20% of cultivated land is irrigated, indicating much greater yields are being achieved on irrigated land.

Proportion of renewable freshwater resources withdrawn



Source: FAO

China and India each have nearly 70 million hectares of land under irrigation. Asia also uses a much greater portion of its available water for irrigation. Many parts of Asia are expected to have water shortages in the future and will either have to become more efficient at using water, or will need to import more food.

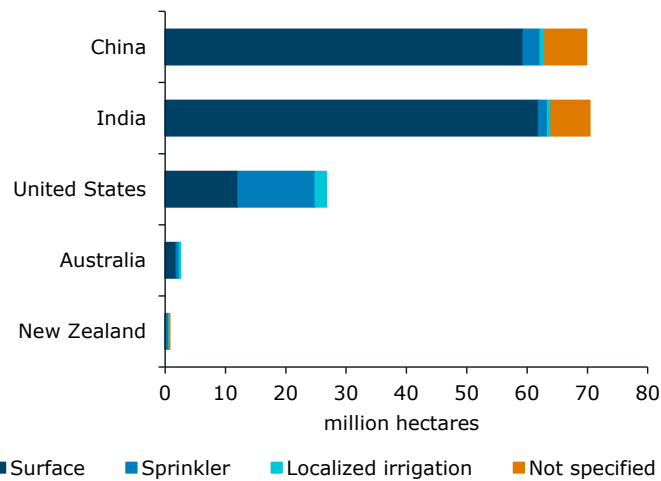
Global farming practices are unsustainable

Current farming practices will not sustain the world's future population. The FAO estimates China is already irrigating nearly all of the land it potentially can. India is only irrigating about 50% of the area of land that could be irrigated but water shortages are expected to limit further expansion. The majority of the irrigation in both countries is surface irrigation, which is less efficient than other methods of irrigation. Therefore both countries could potentially save water by investing in more efficient irrigation systems.

¹ Hameeteman, E., Future Water (In)security: Facts, Figures and Predictions, Global Water Institute, 2013

² FAO, The state of the world's land and water resources for food and agriculture (SOLAW) - Managing systems at risk, FAO & Earthscan, 2011

Land under irrigation by type



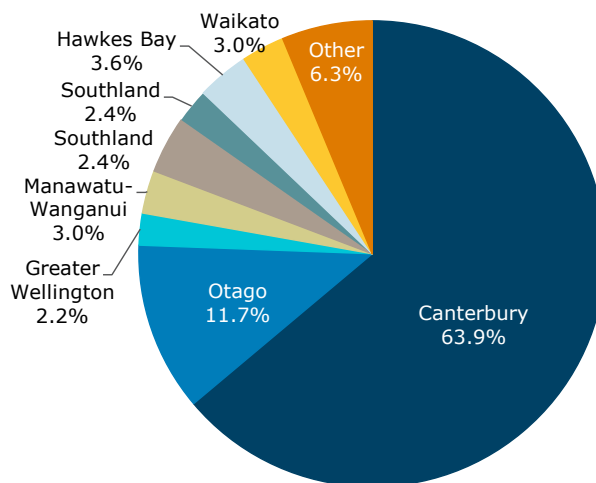
Source: FAO, ANZ Research

The 2020 United Nations World Water Development Report states: “Combining climate change adaptation and mitigation, through water, is a win-win proposal as improving the provision of water supply helps combat both the causes and impacts of climate change”.

Potential to increase irrigation in New Zealand

New Zealand has 747,000 hectares of land under irrigation, or approximately 3% of our total land area. The area under irrigation nearly doubled between 2002 and 2017. Approximately 45% of the land in New Zealand is used for farming, meaning just over 6% of our farm land is currently irrigated. Approximately 14.5% of New Zealand’s total land area is classified as land class 1–3 – a rough proxy for land most suited to irrigation. While this is only an approximation, it does indicate there is potential to apply water to much more land than is currently irrigated.

Irrigation by region



Source: Stats NZ

Canterbury and Otago collectively account for approximately 75% of the total area irrigated. Less than 17% of the land under irrigation is in the North Island. Of the land that is irrigated, 59% is used for dairy farming, while horticultural and arable uses collectively account for 24% of the irrigated land.

Irrigation allows for diversification

Irrigation provides an opportunity to increase productivity, allows more diverse uses of land, and is a tool that can be used to manage weather and climatic risks.

Producing more with less is becoming increasingly important as the agricultural sector faces limits and costs associated with greenhouse gas and nutrient emissions. Maintaining production and profitability, whilst reducing emissions, is a massive challenge for our primary sectors. Farming practices are starting to evolve to meet this challenge and irrigation will have a role to play.

Scientists are working on ways to reduce the methane that ruminants emit, but at this stage there is no silver bullet to fix the issue. We are all hopeful that the work being done by the science community in this area will eventually bear fruit, but in the interim what we can focus on to reduce methane emissions is improved productivity.

Productivity gains can be made through genetics and evolving farming practices. Traditionally genetic gains were targeted at improving milk production efficiency, growth rates, or improved rates for reproduction and longevity. But geneticists are now also targeting lower methane and nitrogen emissions.

Productivity gains can also be achieved by improved feeding. Having sufficient feed available to fully feed livestock means a greater portion of feed can be utilised for production versus maintenance. During feed shortages, growth rates for young livestock such as lambs and calves can be severely impacted if the quantity of feed available is only sufficient to cover maintenance requirements or the quality of feed is poor.

Irrigation reduces the risk of not being able to efficiently finish livestock, enables more flexible farming systems, and reduces the risk of having to off-load stock during dry periods when market prices are typically low, or cut short the milk production season.

Intensification of systems, whether due to irrigation or not, can result in a higher nutrient loading, coming either directly from the extra livestock being carried or from increased use of fertilisers. However, irrigation done well reduces nitrogen run-off, by ensuring that the water is delivered to dissolve the fertiliser at precisely the time that the plant requires it and is able to absorb it. If rain is forecast on dryland pasture, fertiliser is spread, but if the rain doesn't arrive, that fertiliser will dissolve at some later date which may not be the optimal time for the plant to adsorb it. Too much rain and/or a lack of uptake by the plant and the nutrients will leach through the soil into waterways.

Education is critical

Upskilling farmers about the optimal times and quantities at which to apply fertiliser to different pastures and other crops is therefore a win for not only reducing nutrient leakage, but also for maximising profit by not wasting fertiliser.

It is also important that any planned intensification occurs in the areas where soils are suited to intensive uses, to reduce the risk of nutrient losses to water ways. Tightening freshwater regulations will help ensure future intensification does not occur in regions which are already suffering from excess nutrient loadings.

Producing the same quantity of meat or milk from fewer stock, or finishing stock more quickly, will help to reduce total nutrient emissions, but it is not a simple linear relationship. Reduced stocking rates appear to be a simple answer to reduce both nutrient and greenhouse gas emissions, but emissions

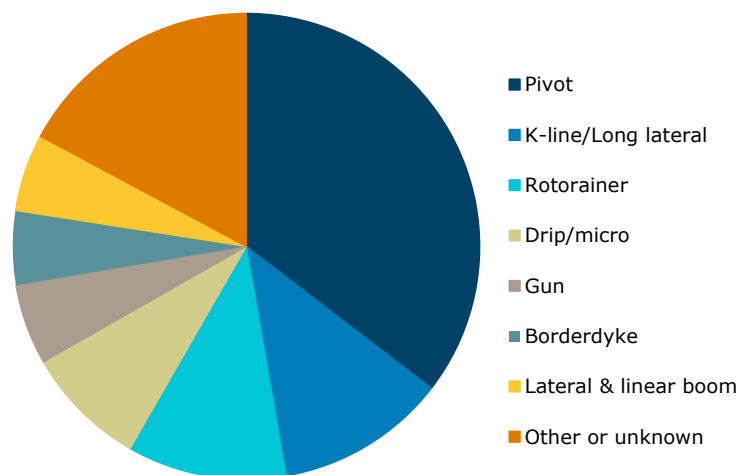
are also influenced by the quantity of feed consumed by each animal, and lower stocking rates can make it more difficult to control fluctuating pasture growth rates. Irrigation systems can help even out the quantity of feed available throughout the season.

Efficient production will minimise environmental impacts

To meet our environmental challenges there is a need to increase production in the areas which have soils that can handle higher stocking rates, without excessive leaching of nutrients, and limit stocking rates on more porous soils and steeper slopes.

Our farming and orchard management systems are becoming increasingly complex and sophisticated, including our irrigation systems. Water and nutrients are increasingly being applied in a more precise manner based on soil data readings and/or sophisticated modelling. The need to place water more efficiently onto the land, and in a more automated way, is reflected in the move away from flood irrigation to centre pivot irrigators.

Irrigation by type



Source: Stats NZ

Irrigation has a role to play in enabling alternative land uses. The ability to apply water when required means land can sustain a wider range of enterprises, particularly more intense arable and horticultural uses. Without access to water it would be too risky to invest in a number of these higher-value crops. Some crops don't require a large quantity of water, relative to pastures, but they do require water at strategic times.

Canterbury has the highest regional output of milk per cow and milk per hectare, with North Canterbury outperforming the national average by approximately 33%. Production in Canterbury also tends to be more consistent from season to season than other regions. It is no coincidence that Canterbury also has the most land under irrigation. Irrigation helps to ensure livestock are fully fed, which tends to equate to a consistently longer milking season. Lambs and cattle can also be finished more quickly.

Using irrigation solely as a risk management tool is rarely financially viable. Justifying the capital costs associated with accessing and reticulating water generally requires a higher-returning land use or more intensification of an existing land use. Strategic use of irrigation on part of a property can provide more management options and flexibility.

The cost to access and reticulate water varies considerably between water schemes. The reliability of access to water and the duration for which water access rights are granted are also important factors to weigh up when evaluating the financial benefits of irrigation.

Public benefits from irrigation

The benefits of irrigation are not solely economic, as social, environmental, and welfare benefits can also be derived from irrigation. Evaluating these benefits can be challenging, particularly when they apply to public goods rather than private goods. Welfare benefits include reducing stress on livestock during feed shortages and also reducing the mental stress farmers are subjected to during drought. Water storage facilities often have recreational uses as well, which provide public benefits to local residents.

Analysis of the value of any irrigation proposal, whether it be at the scheme level or the individual user level, requires analysis that takes into consideration both the immediate and future costs and benefits. These factors will vary considerably and in some areas are difficult to accurately quantify due to uncertainty as to how land will be able to be used in the future. Indirect costs and benefits are even harder to quantify and will be a highly subjective process. These challenges aside, at the macro level there are clear benefits from irrigation, and it is clear the world is going to require more food in the future.

New Zealand has an opportunity to continue to grow our role as a reliable supplier of high quality, ethically produced food. Used appropriately, irrigation can enable a wider range of crops to be grown, improve animal welfare, and reduce greenhouse gas and nutrient emissions, but used inappropriately it can enable negative environmental outcomes. We have to do this right.



Contact us

Meet the team

We welcome your questions and feedback. Click [here](#) for more information about our team.



Sharon Zollner
Chief Economist

Follow Sharon on Twitter
[@sharon_zollner](#)

Telephone: +64 27 664 3554
Email: sharon.zollner@anz.com

General enquiries:
research@anz.com

Follow ANZ Research
[@ANZ_Research](#) (global)



David Croy
Senior Strategist

Market developments, interest rates, FX, unconventional monetary policy, liaison with market participants.

Telephone: +64 4 576 1022
Email: david.croy@anz.com



Susan Kilsby
Agricultural Economist

Primary industry developments and outlook, structural change and regulation, liaison with industry.

Telephone: +64 21 633 469
Email: susan.kilsby@anz.com



Liz Kendall
Senior Economist

Research co-ordinator, publication strategy, property market analysis, monetary and prudential policy.

Telephone: +64 27 240 9969
Email: elizabeth.kendall@anz.com



Miles Workman
Senior Economist

Macroeconomic forecast co-ordinator, fiscal policy, economic risk assessment and credit developments.

Telephone: +64 21 661 792
Email: miles.workman@anz.com



Kyle Uerata
Economic Statistician

Economic statistics, ANZ proprietary data (including ANZ Business Outlook), data capability and infrastructure.

Telephone: +64 21 633 894
Email: kyle.uerata@anz.com



Natalie Denne
PA / Desktop Publisher

Business management, general enquiries, mailing lists, publications, chief economist's diary.

Telephone: +64 21 253 6808
Email: natalie.denne@anz.com



Important notice

This document is intended for ANZ's Institutional, Markets and Private Banking clients. It should not be forwarded, copied or distributed. The information in this document is general in nature, and does not constitute personal financial product advice or take into account your objectives, financial situation or needs.

This document may be restricted by law in certain jurisdictions. Persons who receive this document must inform themselves about and observe all relevant restrictions.

Disclaimer for all jurisdictions: This document is prepared and distributed in your country/region by either: Australia and New Zealand Banking Group Limited (ABN11 005 357 522) (**ANZ**); or its relevant subsidiary or branch (each, an **Affiliate**), as appropriate or as set out below.

This document is distributed on the basis that it is only for the information of the specified recipient or permitted user of the relevant website (**recipients**).

This document is solely for informational purposes and nothing contained within is intended to be an invitation, solicitation or offer by ANZ to sell, or buy, receive or provide any product or service, or to participate in a particular trading strategy.

Distribution of this document to you is only as may be permissible by the laws of your jurisdiction, and is not directed to or intended for distribution or use by recipients resident or located in jurisdictions where its use or distribution would be contrary to those laws or regulations, or in jurisdictions where ANZ would be subject to additional licensing or registration requirements. Further, the products and services mentioned in this document may not be available in all countries.

ANZ in no way provides any financial, legal, taxation or investment advice to you in connection with any product or service discussed in this document. Before making any investment decision, recipients should seek independent financial, legal, tax and other relevant advice having regard to their particular circumstances.

Whilst care has been taken in the preparation of this document and the information contained within is believed to be accurate, ANZ does not represent or warrant the accuracy or completeness of the information. Further, ANZ does not accept any responsibility to inform you of any matter that subsequently comes to its notice, which may affect the accuracy of the information in this document.

Preparation of this document and the opinions expressed in it may involve material elements of subjective judgement and analysis. Unless specifically stated otherwise: they are current on the date of this document and are subject to change without notice; and, all price information is indicative only. Any opinions expressed in this document are subject to change at any time without notice.

ANZ does not guarantee the performance of any product mentioned in this document. All investments entail a risk and may result in both profits and losses. Past performance is not necessarily an indicator of future performance. The products and services described in this document may not be suitable for all investors, and transacting in these products or services may be considered risky.

ANZ expressly disclaims any responsibility and shall not be liable for any loss, damage, claim, liability, proceedings, cost or expense (Liability) arising directly or indirectly and whether in tort (including negligence), contract, equity or otherwise out of or in connection with this document to the extent permissible under relevant law. Please note, the contents of this document have not been reviewed by any regulatory body or authority in any jurisdiction.

ANZ and its Affiliates may have an interest in the subject matter of this document. They may receive fees from customers for dealing in the products or services described in this document, and their staff and introducers of business may share in such fees or remuneration that may be influenced by total sales, at all times received and/or apportioned in accordance with local regulatory requirements. Further, they or their customers may have or have had interests or long or short positions in the products or services described in this document, and may at any time make purchases and/or sales in them as principal or agent, as well as act (or have acted) as a market maker in such products. This document is published in accordance with ANZ's policies on conflicts of interest and ANZ maintains appropriate information barriers to control the flow of information between businesses within it and its Affiliates.

Your ANZ point of contact can assist with any questions about this document including for further information on these disclosures of interest.

Country/region specific information: Unless stated otherwise, this document is distributed by Australia and New Zealand Banking Group Limited (**ANZ**).

Australia. ANZ holds an Australian Financial Services licence no. 234527. For a copy of ANZ's Financial Services Guide please [click here](#) or request from your ANZ point of contact.

Brazil, Brunei, India, Japan, Kuwait, Malaysia, Switzerland, Taiwan. This document is distributed in each of these jurisdictions by ANZ on a cross-border basis.

Cambodia. This document is distributed in Cambodia by ANZ Royal Bank (Cambodia) Limited (**ANZ Royal Bank**). The recipient acknowledges that although ANZ Royal Bank is a subsidiary of ANZ, it is a separate entity to ANZ and the obligations of ANZ Royal Bank do not constitute deposits or other liabilities of ANZ and ANZ is not required to meet the obligations of ANZ Royal Bank.

European Economic Area (EEA): United Kingdom. ANZ is authorised in the United Kingdom by the Prudential Regulation Authority (**PRA**) and is subject to regulation by the Financial Conduct Authority (**FCA**) and limited regulation by the PRA. Details about the extent of our regulation by the PRA are available from us on request. This document is distributed in the United Kingdom by Australia and New Zealand Banking Group Limited ANZ solely for the information of persons who would come within the FCA definition of "eligible counterparty" or "professional client". It is not intended for and must not be distributed to any person who would come within the FCA definition of "retail client". Nothing here excludes or restricts any duty or liability to a customer which ANZ may have under the UK Financial Services and Markets Act 2000 or under the regulatory system as defined in the Rules of the Prudential Regulation Authority (**PRA**) and the FCA. ANZ is authorised in the United Kingdom by the PRA and is subject to regulation by the FCA and limited regulation by the PRA. Details about the extent of our regulation by the PRA are available from us on request.

Fiji. For Fiji regulatory purposes, this document and any views and recommendations are not to be deemed as investment advice. Fiji investors must seek licensed professional advice should they wish to make any investment in relation to this document.

Hong Kong. This publication is issued or distributed in Hong Kong by the Hong Kong branch of ANZ, which is registered at the Hong Kong Monetary Authority to conduct Type 1 (dealing in securities), Type 4 (advising on securities) and Type 6 (advising on corporate finance) regulated activities. The contents of this publication have not been reviewed by any regulatory authority in Hong Kong.

India. If this document is received in India, only you (the specified recipient) may print it provided that before doing so, you specify on it your name and place of printing.

Myanmar. This publication is intended to be general and part of ANZ's customer service and marketing activities when implementing its functions as a licensed bank. This publication is not Securities Investment Advice (as that term is defined in the Myanmar Securities Transaction Law 2013).



Important notice

New Zealand. This document is intended to be of a general nature, does not take into account your financial situation or goals, and is not a personalised adviser service under the Financial Advisers Act 2008 (**FAA**).

Oman. ANZ neither has a registered business presence nor a representative office in Oman and does not undertake banking business or provide financial services in Oman. Consequently ANZ is not regulated by either the Central Bank of Oman or Oman's Capital Market Authority. The information contained in this document is for discussion purposes only and neither constitutes an offer of securities in Oman as contemplated by the Commercial Companies Law of Oman (Royal Decree 4/74) or the Capital Market 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 Oman as contemplated by Article 139 of the Executive Regulations to the Capital Market Law (issued vide CMA Decision 1/2009). ANZ does not solicit business in Oman and the only circumstances in which ANZ sends information or material describing financial products or financial services to recipients in Oman, is where such information or material has been requested from ANZ and the recipient understands, acknowledges and agrees that this document has not been approved by the CBO, the CMA or any other regulatory body or authority in Oman. ANZ does not market, offer, sell or distribute any financial or investment products or services in Oman and no subscription to any securities, products or financial services may or will be consummated within Oman. Nothing contained in this document is intended to constitute Omani investment, legal, tax, accounting or other professional advice.

People's Republic of China (PRC). This document may be distributed by either ANZ or Australia and New Zealand Bank (China) Company Limited (**ANZ China**). Recipients must comply with all applicable laws and regulations of PRC, including any prohibitions on speculative transactions and CNY/CNH arbitrage trading. If this document is distributed by ANZ or an Affiliate (other than ANZ China), the following statement and the text below is applicable: No action has been taken by ANZ or any affiliate which would permit a public offering of any products or services of such an entity or distribution or re-distribution of this document in the PRC. Accordingly, the products and services of such entities are not being offered or sold within the PRC by means of this document or any other document. This document may not be distributed, re-distributed or published in the PRC, except under circumstances that will result in compliance with any applicable laws and regulations. If and when the material accompanying this document relates to the products and/or services of ANZ China, the following statement and the text below is applicable: This document is distributed by ANZ China in the Mainland of the PRC.

Qatar. This document has not been, and will not be:

- lodged or registered with, or reviewed or approved by, the Qatar Central Bank (**QCB**), the Qatar Financial Centre (**QFC**) Authority, QFC Regulatory Authority or any other authority in the State of Qatar (**Qatar**); or
- authorised or licensed for distribution in Qatar,

and the information contained in this document does not, and is not intended to, constitute a public offer or other invitation in respect of securities in Qatar or the QFC. The financial products or services described in this document have not been, and will not be:

- registered with the QCB, QFC Authority, QFC Regulatory Authority or any other governmental authority in Qatar; or
- authorised or licensed for offering, marketing, issue or sale, directly or indirectly, in Qatar.

Accordingly, the financial products or services described in this document are not being, and will not be, offered, issued or sold in Qatar, and this document is not being, and will not be, distributed in Qatar. The offering, marketing, issue and sale of the financial products or services described in this document and distribution of this document is being made in, and is subject to the laws, regulations and rules of, jurisdictions outside of Qatar and the QFC. Recipients of this document must abide by this restriction and not distribute this document in breach of this restriction. This document is being sent/issued to a limited number of institutional and/or sophisticated investors (i) upon their request and confirmation that they understand the statements above; and (ii) on the condition that it will not be provided to any person other than the original recipient, and is not for general circulation and may not be reproduced or used for any other purpose.

Singapore. This document is distributed in Singapore by the Singapore branch of ANZ solely for the information of "accredited investors", "expert investors" or (as the case may be) "institutional investors" (each term as defined in the Securities and Futures Act Cap. 289 of Singapore). ANZ is licensed in Singapore under the Banking Act Cap. 19 of Singapore and is exempted from holding a financial adviser's licence under Section 23(1)(a) of the Financial Advisers Act Cap. 100 of Singapore.

United Arab Emirates (UAE). This document is distributed in the UAE or the Dubai International Financial Centre (**DIFC**) (as applicable) by ANZ. This document does not, and is not intended to constitute: (a) an offer of securities anywhere in the UAE; (b) the carrying on or engagement in banking, financial and/or investment consultation business in the UAE under the rules and regulations made by the Central Bank of the UAE, the Emirates Securities and Commodities Authority or the UAE Ministry of Economy; (c) an offer of securities within the meaning of the Dubai International Financial Centre Markets Law (DIFCML) No. 12 of 2004; and (d) a financial promotion, as defined under the DIFCML No. 1 of 200. ANZ DIFC Branch is regulated by the Dubai Financial Services Authority (**DFSA**) ANZ DIFC Branch is regulated by the Dubai Financial Services Authority (**DFSA**). The financial products or services described in this document are only available to persons who qualify as "Professional Clients" or "Market Counterparty" in accordance with the provisions of the DFSA rules. In addition, ANZ has a representative office (**ANZ Representative Office**) in Abu Dhabi regulated by the Central Bank of the UAE. The ANZ Representative Office is not permitted by the Central Bank of the UAE to provide any banking services to clients in the UAE.

United States. Except where this is a FX-related document, this document is distributed in the United States by ANZ Securities, Inc. (**ANZ SI**) which is a member of the Financial Regulatory Authority (**FINRA**) (www.finra.org) and registered with the SEC. ANZSI's address is 277 Park Avenue, 31st Floor, New York, NY 10172, USA (Tel: +1 212 801 9160 Fax: +1 212 801 9163). ANZSI accepts responsibility for its content. Information on any securities referred to in this document may be obtained from ANZSI upon request. This document or material is intended for institutional use only – not retail. If you are an institutional customer wishing to effect transactions in any securities referred to in this document you must contact ANZSI, not its affiliates. ANZSI is authorised as a broker-dealer only for institutional customers, not for US Persons (as "US person" is defined in Regulation S under the US Securities Act of 1933, as amended) who are individuals. If you have registered to use this website or have otherwise received this document and are a US Person who is an individual: to avoid loss, you should cease to use this website by unsubscribing or should notify the sender and you should not act on the contents of this document in any way. Non-U.S. analysts: Non-U.S. analysts may not be associated persons of ANZSI and therefore may not be subject to FINRA Rule 2242 restrictions on communications with the subject company, public appearances and trading securities held by the analysts. Where this is an FX-related document, it is distributed in the United States by ANZ's New York Branch, which is also located at 277 Park Avenue, 31st Floor, New York, NY 10172, USA (Tel: +1 212 801 916 0 Fax: +1 212 801 9163).

Vietnam. This document is distributed in Vietnam by ANZ or ANZ Bank (Vietnam) Limited, a subsidiary of ANZ.

This document has been prepared by ANZ Bank New Zealand Limited, Level 26, 23-29 Albert Street, Auckland 1010, New Zealand, Ph 64-9-357 4094, e-mail nzeconomics@anz.com, <http://www.anz.co.nz>