

Report on the State of New Zealand's Future

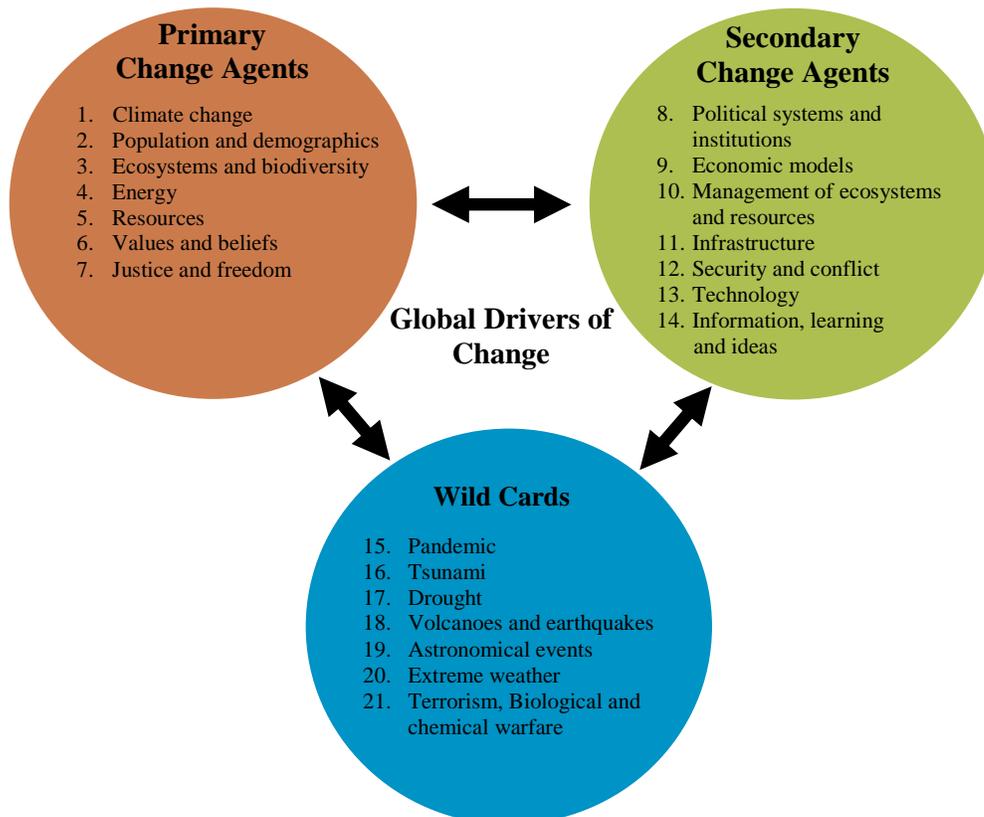
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What follows is work in progress for an upcoming Report titled *The State of New Zealand's Future*. This paper is part of a four-year work programme called *Project 2058*, which aims to develop a National Sustainable Development Strategy for New Zealand. It takes a closer look at global drivers of change as they relate to the New Zealand context. This aims to provide more clarity over the current state of New Zealand's long-term future.

In late 2008, this work programme led us to prepare four scenarios relating to New Zealand's future. The matrix method was adopted; the two axes represented the quality of management of strengths, weaknesses, opportunities and threats by (i) New Zealand and (ii) the world. The optimal and most desirable potential future was clearly the one in which both New Zealand and the world were 'well-managed'. Notably, the other three scenarios show the inevitable negative ramifications for New Zealand if either New Zealand and/or the world do not manage themselves well.

These scenarios indicate how significant global drivers may drive change in the future. In total, 21 global drivers of change were found, which were further broken down into 14 change agents and seven wild cards. We consider two types of change agents exist; those that tend to initiate a crisis or a chain of events (primary) or those that often produce change by responding to a primary change agent or wild card (secondary). The inter-relationship between these sets of global drivers is reflected in Figure 1.

Figure 1 Global Drivers of Change (SFI, 2008: 2)



Our upcoming report considers these 21 global drivers in the context of 2010. Until its release, please see the latest *Project 2058 Methodology* (SFI, 2009) and Report 6, *Four Possible Futures for New Zealand in 2058* for more information (SFI, 2008).

Below is a brief outline of obstacles and opportunities for each of the 21 global drivers of change. Many of these obstacles and opportunities are not unique to New Zealand, but are provided here to provide context for further discussion and investigation. These drivers must either be addressed or used as tools to help New Zealanders pursue our preferred future.

1. Climate change

Obstacle: Mitigating and adapting to climate change requires a unified global effort. Achieving international consensus on what measures to take to reduce the impacts of climate change is necessary but arduous. If climate change impacts are severe, of concern for New Zealand is the need to adapt food production and manage increased levels of immigration, particularly from low lying Pacific Island nations.

Opportunity: Climate change provides a moral imperative for the rapid adoption of innovative technologies that reduce greenhouse gas emissions. As a small nation New Zealand has the ability to rapidly adopt new technologies and techniques as they become available. This ability could prove to be particularly helpful and important in efforts to shift New Zealand's energy production to 100% renewable sources (see 4, energy below). The New Zealand Ministry for the Environment states 'agriculture productivity is expected to increase in some areas but there is a risk of drought and spreading pests and diseases' (MfE, 2009). The climate is not expected to change up and down the country but from east to west, rather, the west coast is expected to get wetter and the east coast dryer. Arguably, in the short term, with more rain on the west coast dairy farmers will be happy, and with dryer conditions on the east coast winegrowers will be happy. The impact of extreme weather is discussed as a separate wild card below.

2. Population & demographics

Obstacle: Extensive population growth in developing countries is placing an increased strain on world resources. In 2010 New Zealand's population is just under 4.4 million, with just under 1 million living or travelling over seas – one of the largest expatriate populations. By 2026 the ethnic population composition will remain primarily of European descent (70%), Māori (16%), Asian (16%), and Pacific (10%) (Note that people may identify as belonging to more than one ethnic group so total adds to over 100%). Assuming New Zealand's population does not increase significantly due to climate change refugees; by 2026 we are expected to pass 5 million, growing to about 5.75 million by 2061 (Statistics NZ, 2009: series 5, 1). The 65+ age group in New Zealand is projected to increase from 12% in 2005 to 25% by the late 2030's. The size and shape of our service infrastructure will need to increase and be revised to accommodate the growing demand for age care related services, while being supported by a changing work force. Notably, the Māori, Pacific and Asian populations are likely to remain younger than that of European descent, resulting in a higher proportion of the workforce being made up of these ethnicities (Statistics NZ, 2006: 1, 21).

Opportunity: As New Zealand's population ages, we may experience declining crime rates, increasing consumption and demand for health care; and be better able to offer full employment for the young.

3. Ecosystems and biodiversity

Obstacle: Ecosystems and biodiversity are increasingly vulnerable to changing patterns of resource use. Use of hazardous substances, the introduction of invasive species and the possibility of harm arising from genetically modified organisms (GMOs) all pose risks to our native biodiversity which New Zealand is dependent on maintaining. Trends such as growing international trade, greater mobility and climate change mean that New Zealand's border is becoming increasingly vulnerable to pests and diseases (Biosecurity Council, 2003: 1). There are numerous examples where flora and fauna introduced to New Zealand have become weeds and pests. In addition, it is important to note that New Zealand is dependent on the quality of our ecosystems. In 2003 60% of our exports and 20% of our GDP depended on primary production (Biosecurity Council, 2003: 5).

Opportunity: As the last nation in the world to be discovered, New Zealand still contains many areas which are relatively unspoiled, for example New Zealand's large exclusive economic zone, continental shelf and portion of Antarctica. New Zealand's ecosystem is unique and our biodiversity is of great value both nationally and internationally. The opportunity is therefore to showcase and capitalise on our ecosystem and biodiversity through revenue from sustainable tourism, produce and technology.

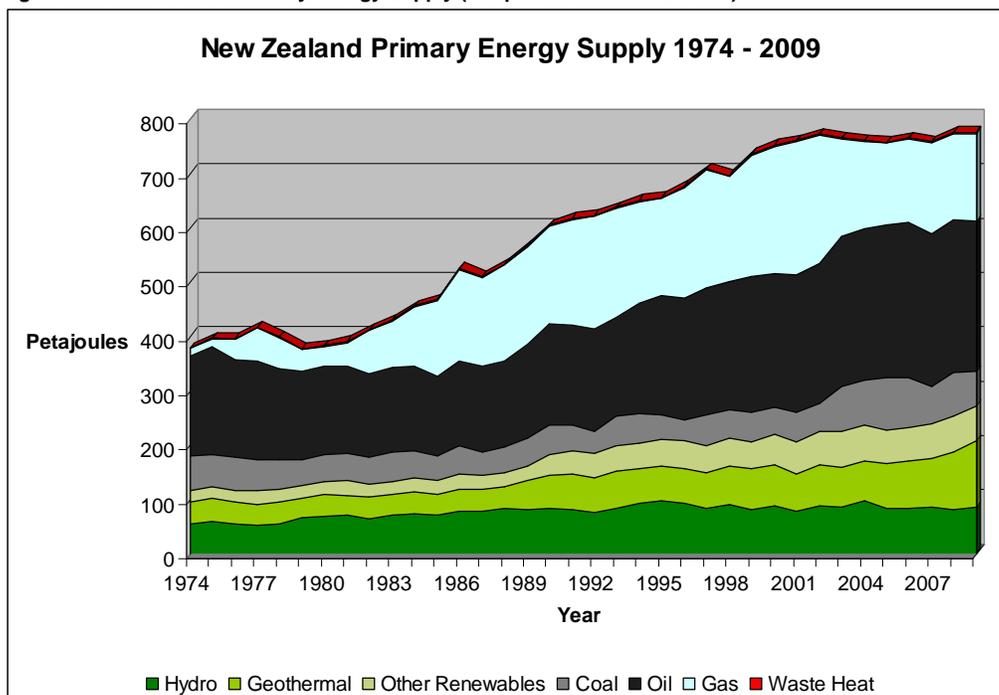
4. Energy

Obstacle: From the peak oil crisis to developing alternative forms of energy production, a stable energy supply is vital for our future. Figure 2 indicates that New Zealand's primary energy supply has grown substantially over the past 35 years, almost doubling in total energy. For the most part this growth has occurred across the range of energy supply options. Gas and geothermal have seen the greatest growth whilst hydro has remained relatively static and the proportion supplied from coal has shrunk. To understand this graph, footnotes provide definitions of key terms.^{1,2}

¹ **Petajoules (PJ)** - The joule is the Système International (SI) derived unit of energy and heat. A joule is the energy required to heat 1 millilitre of water by about a quarter (0.239) of a degree Celsius. A PJ is 10^{15} (1,000,000,000,000,000) joules (B. Field, personal communication, July 16, 2010).

² **Total Primary Energy Supply (TPES)** - The amount of energy available for use in New Zealand for energy transformation (i.e. for electricity generation) and end use (i.e. combusting coal for heat). For all energy sources, total primary energy supply is calculated as indigenous production, plus imports, less exports, less stock change, less international transport (B. Field, personal communication, July 16, 2010).

Figure 2: New Zealand's Primary Energy Supply (Adapted from MED 2010: 11)



Given the abundance of hydro, wind and tidal options afforded by our unique geography, New Zealand might be able to transition to 100% renewable energy within the medium term. Obstacles however exist: the continual growth in energy demand, technological hurdles and an increasing scarcity of prime sites for wind and hydro generation. Political will also remains an obstacle to the adoption of renewable energy.

Opportunity: New Zealand has an opportunity to become a world leader in renewable energy given the abundant natural resources available for the development of renewable generation facilities. Through the adoption of new renewable energy solutions, old dependencies on environmentally detrimental energy sources can be broken. Notably, in 2007, then Prime Minister Helen Clark set a target of 90% renewable energy by 2025 (Clark, 2007).

5. Resources

Obstacle: Recording and reporting on quality and quantity of resources requires a long-term vision and work programme. Arguably New Zealand's three year political election cycle calls for short-term practices and policies. For example, huge quantities of water are being used in our dairy and mining industries (MfE, 2006: ix; Heiler, 2009). Internationally, it is thought that the production of 1 litre of milk is estimated to require 1000 litres of water (Water Footprint Network, 2010). It would therefore be useful to complete more research into the New Zealand experience, such as; how much water does a New Zealand cow need to produce 1 litre of milk? A report in progress, currently titled the *State of New Zealand's Resources* indicates there are significant gaps in data (SFI, In Press [c]).

Opportunity: New Zealand's range and abundance of resources has a large and unique economic potential for trade that can be realised through effective sustainable management of resources. Our natural resources also attract sightseers and outdoor adventurers, increasing revenue from our tourism industry. Lastly, when including New Zealand's extensive economic zone and continental shelf, about 94%³ of New Zealand is actually under the ocean. A recent report indicates this may be as high as 96% (IPS, 2010: 17). This fact, combined with New Zealand's share of Antarctica, provide unique opportunities for the sustainable use and preservation of these unique resources.

6. Values & beliefs

Obstacle: New Zealand's population will become increasingly ethnically diverse. By 2026, the Asian and Māori populations are each projected to make up around 16% of New Zealand's population, with the Pacific Island peoples reaching 10% (Statistics NZ, 2010). Arguably, New Zealand's race relations suffer from a lack of clarity over the role of the Treaty of Waitangi within New Zealand's constitution (SFI, 2010a).

Opportunity: New Zealanders generally share values around their natural resources, parks and landscape. Diversity in ideas and opinions can encourage and enhance tolerance and understanding while providing insights into alternative and improved ways of living. New Zealand has distinct potential to improve and diversify its beliefs and values by embracing ideas from its extensive Pacific population and growing Asian community.

7. Justice & freedom

Obstacle: Internationally there is significant evidence that unequal societies have higher levels of social problems such as poor health and violence. New Zealand has alarmingly high levels of disparity, which are reflected in social indicators of mental illness and unplanned teen pregnancies (Wilkinson & Pickett, 2009: 67, 125). High levels of inequality are also known to impact on a vast array of other social issues including: level of trust, mental illness (including drug and alcohol addiction), life expectancy and infant mortality, obesity, children's educational performance, teenage births, homicides, imprisonment rates and social mobility (Wilkinson & Pickett, 2009). Table 1 below shows that New Zealand is 72nd in the Human Development Index for Disparity of income (ratio of richest 10% to poorest 10%) (UNDP, 2009).

³ See calculation on accompanying PowerPoint.

Table 1: Benchmarking Human Development

Total Human Development Index	Includes Education Index	Disparity of income (ratio of richest 10% to poorest 10%)	Includes RST expenditure (% GDP)	Includes GDP (per capita)
(UNDP Human Development Report, 2007/2008)	(UNDP Human Development Report, 2007/2008)	(UNDP Human Development Report, 2009)	(UNDP Human Development Report, 2007/2008)	(UNDP Human Development Report, 2007/2008)
1. Iceland (0.968)	1= Australia (0.993)	1. Azerbaijan(2.9)	1. Israel (4.46)	1. Luxembourg (60 228)
3. Australia (0.962)	1= New Zealand (0.993)	2. Japan (4.5)	20. Australia (1.70)	16. Australia (31 794)
16. United Kingdom (0.946)	6. Norway (0.991)	34. India (8.6)	25. Russia(1.17)	27. UAE (25 514)
19. New Zealand (0.943)	12. Iceland (0.978)	72. New Zealand (12.5)	26. New Zealand (1.16)	28. New Zealand (24 996)
20. Italy (0.941)	18. UK (0.970)	94. United States (15.9)	27. Ukraine (1.16)	29. Greece (23 381)
177. Sierra Leone (0.336)	177. Burkina Faso (0.255)	142. Namibia (106.6)	91. Peru (0.10)	174. Malawi (667)

Interestingly, New Zealand is one of three countries without a written, codified constitution (SFI, 2010a), which may be considered an obstacle by some New Zealanders and an opportunity to others.

Opportunity: A universal definition of individuals' rights and responsibilities may not be necessary in eliminating inequalities and the lack of such a definition in a codified national constitution may instead increase our tolerance for diversity. New Zealand's history provides an opportunity for tolerance: we were one of the few countries colonised with a vision of not replicating past class systems. Due to our relatively small population and stable economy, we have greater ability to rapidly implement social and economic policy that will reduce levels of inequality and increase social cohesion.

8. Political systems and institutions

Obstacle: New Zealand has been fortunate to have one of the oldest democracies, however, since the signing of the Treaty of Waitangi in 1840, there have been ongoing concerns about the Crown's inability to settle past injustices (currently Government hopes to complete the settlement process in 2014). This coupled with New Zealand not having a written codified constitution and a short election cycle locks New Zealanders into a three year planning cycle and creates obstacles to effective representation and political harmony (SFI, 2010a).

Opportunity: New Zealand may have a unique opportunity in using the 2014 settlement date as a moral imperative to define the rights and responsibility of New Zealanders in a written codified constitution.

9. Economic models

Obstacle: Current economic models seem unsustainable, heavily focused on growth and consumption. Notably, although central government's Crown Balance Sheet shows low levels of public debt, the low savings rate of New Zealanders translates to low investment rates and arguably restricts economic growth.

Opportunity: In the past, New Zealand has demonstrated its ability to rapidly implement economic reform, and given the impetus, this could be repeated in order to develop a more sustainable economic system. There is the potential for a growing awareness of more genuine indicators of progress to be further developed.

10. Management of ecosystems and resources

Obstacle: The lack of information and knowledge to manage ecosystems and resources sustainably and efficiently over time. The currently available data is insufficient to benchmark progress or to track trends in an accurate and meaningful way. Insufficient regulation and questions surrounding resource ownership are barriers to the sustainable management of resources.

Opportunity: Although data quality remains an ongoing issue, New Zealand, as an isolated island state with controlled borders, is in a favourable position to tightly control the introduction of new and undesirable organisms. Furthermore, New Zealand has the opportunity to maintain its GE free status (to date there are no GMOs developed outdoors approved for commercial use) and to pursue organic production, in effect supporting a clean, green national brand.

11. Infrastructure

Obstacle: Redesign and expansion of infrastructure requires significant funding. New Zealand has a culture of private car ownership, a relatively low population size and density, and not surprisingly, an unsophisticated public transport system. New Zealand's broadband network is aging and in 2006 New Zealand was ranked 21 out of 30 OECD countries for percentage of households connected to broadband (OECD, 2006). Electricity supply, rail and pipelines have also proved challenging in recent years.

Opportunity: As tired infrastructure demands upgrading there is the opportunity to make long-term decisions based on principles of sustainability and cost-effective public/private partnerships for the public good. Growing awareness of resource pressures will encourage more efficient use of resources in future infrastructure developments. The concentration of commercial activity in our three major cities (Auckland, Wellington and Christchurch), eases the challenges associated with a broadband upgrade by allowing focus upon relatively small geographical areas.

12. Security & conflict

Obstacle: An inability to reach consensus on issues and governance primarily by self interest inhibits the global community from taking action for the public good. New Zealand's relatively small population and economy suggests that national decisions will be made to ensure alignment with and protection by our international allies. As resource pressures continue to grow the risk of conflict increase.

Opportunity: New Zealand has the ability to effectively manage domestic conflicts before they erupt, and to be (despite our size) proactive in the international arena with regard to humanitarian interests in security and conflict. In the Pacific region in particular, we have the potential to contribute positively to building the capacity and stability of small island states.

13. Technology

Obstacle: Technological development may pose threats to our fragile social, political and natural environment. New Zealand's regulatory systems often fall behind the commercialisation of new technologies, specifically biotechnologies (MoRST, 2003: 27 – 32).

Opportunity: Public good technology can greatly improve humanity's outlook for the future, particularly with regard to medical technology. Our Tin100 companies, the largest technology companies in New Zealand, highlight our capacity and strength in this field (Technology Investment Network, 2010).

14. Information, learning & ideas

Obstacle: New Zealand loses significant quantities of skilled workers and university graduates to other countries with higher income levels (Statistics NZ, 2007).

Opportunity: New Zealand is actually gaining in numbers of skilled workers due to immigration with an exchange, rather than a drain of skilled workers occurring (Statistics NZ, 2007). All cultures will be enriched through an improved global network, which allows for increased diffusion of ideas and generates positive collective action. Our small population means that as a country we have an increased ability to be receptive and to rapidly adopt and adapt to new ideas.

15. Pandemic

Current Situation: Like many countries, households in New Zealand are inadequately prepared for the potential of becoming suddenly housebound for a number of days or weeks. In 2008 a Statistics New Zealand survey found that only 15% of households met all the requirements for basic preparation (Statistics New Zealand, 2008).

Opportunity: Our geographical isolation means that New Zealand has the ability to quickly control its borders in the event of a pandemic. If this translates to a minimal impact on New Zealand from a global pandemic then we would have the opportunity to assist neighbouring countries. Should a pandemic strike, the funding and drive behind the development of a vaccine or treatment will be accelerated, paving the way for further medical innovation.

16. Tsunami

Current Situation: New Zealand has over 15,000km of coastline (New Zealand Tourism Guide, n.d.), which is considerable given our small land area (266,200 sq km) (New Zealand Tourism Board, n.d.). Numerous towns are situated on low-lying coastal land and would require rapid evacuation to higher ground in the event of a tsunami. Further, most of our major cities are built around harbours, increasing the potential impact on our main centres in the event of a tsunami.

Opportunity: Recent threats in coastal areas have demonstrated New Zealand's preparedness for this wildcard (TVNZ, 2009; Radio New Zealand, 2009). However, although these threats did not amount to a serious event, they did provide an opportunity to test our responsiveness, which clearly could be improved.

17. Drought

Current Situation: New Zealand's economy is highly dependent upon agricultural production, which relies on a steady input of freshwater. Should a prolonged drought affect parts of New Zealand, the economic costs would be substantial. In addition, as New Zealand generates approximately 60% of electricity from hydro stations (MED, 2006), an extended drought would result in an increase in demand for further alternative fuels.

Opportunities: To reduce the negative impacts of severe drought affecting New Zealand robust water management for agriculture and an increased range of electricity generation options should be developed. Each of these options would provide significant co-benefits to our agricultural and energy sectors even if severe drought does not eventuate. Improved water management would reduce the environmental impact of agriculture upon New Zealand rivers as a more natural water level is maintained. Diversified electricity generation could, if used to support renewable energy such as wind power, provide New Zealand with an effective way to reduce greenhouse gas emissions.

18. Volcanoes and earthquakes

Current Situation: Like Japan and other Pacific nations, New Zealand has been formed by activity along tectonic plates. Although responsible for creating much of the landscape of the country, volcanic eruptions and earthquakes are destructive to society when they occur. The position of Wellington over a fault line, Auckland over a volcanic field and the potential for earthquakes to create flow on hazards such as tsunamis places New Zealand at risk.

Opportunity: Faced with the risk of earthquakes in its major cities, New Zealand has led the way in developing earthquake proofing technologies for buildings. These have provided commercial returns through the export of the technology to other earthquake prone areas like Japan (Leung-Wai and Nana, 2004: 2).

19. Astronomical events

Current Situation: The world faces the possibility of being struck by a meteor. The potential for harm for New Zealand arises from either a direct impact or the effects of a large impact elsewhere in the world. Developing an appropriate civil defence response for a meteor impact is inherently difficult due to the high number of variables and very low frequency with which such impacts occur.

Opportunity: Reducing the impact of a meteor requires significant advanced warning. New Zealand is positioned in the Southern Hemisphere, an area with fewer ground based observatories than the Northern Hemisphere. New Zealand has particularly low levels of light pollution (such as in Tekapo, where the Mount John University Observatory is located (Earth and Sky, n.d.)). These factors combine to make the country a valuable location for the development of a ground based observatory to detect and track potentially dangerous objects. Astronomical science in this country could benefit from the development of infrastructure and expertise for this purpose.

20. Extreme weather

Current Situation: In extreme weather events New Zealand's remoteness becomes even more pronounced. The transport infrastructure linking our major cities is insufficient in the face of unusually high levels of precipitation and other extreme weather events. This is particularly prevalent in the South Island.

Opportunity: Extreme weather events provide the opportunity to adapt infrastructure to reduce future potential damage from similar events. Better public education and warning systems could be implemented, along with enhancing road and rail infrastructure.

21. Terrorism, biological and chemical warfare

Current Situation: The possibility of terrorism affecting New Zealand is sometimes dismissed given our small size and isolation. Despite this, incidents such as the bombing of the Rainbow Warrior, and the Bali and Mumbai terrorist acts, show New Zealand and New Zealanders are not immune to terrorism. New Zealand is reliant on international partnerships for defence; in the face of a sudden and immediate threat of biological or chemical warfare there will be a waiting period before foreign defence and aid can reach us.

Opportunity: Due to our geographical isolation we can quickly control our borders in the event of a potential terrorist threat. Our current political situation, highlighted by our first place ranking in the 2010 Global Peace Index (Institute for Economics and Peace, 2010), reduces New Zealand from imminent threat of terrorism and enables us to act as peacekeepers on the global stage.

To conclude, while the types of global change agents are unlikely to vary over time, how they interact and evolve will lead to new obstacles and opportunities. Hence it is critical to regularly review this terrain in order to identify weak signals and innovative solutions to complex problems. Lastly, this is the view of the Institute at this point of time, based on preliminary research. It is our intention to continue to scan the landscape, as there is a great deal to learn before completing *Project 2058*.

Note: This paper should be read along side the PowerPoint accompanying this presentation (see www.sustainablefuture.info).

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