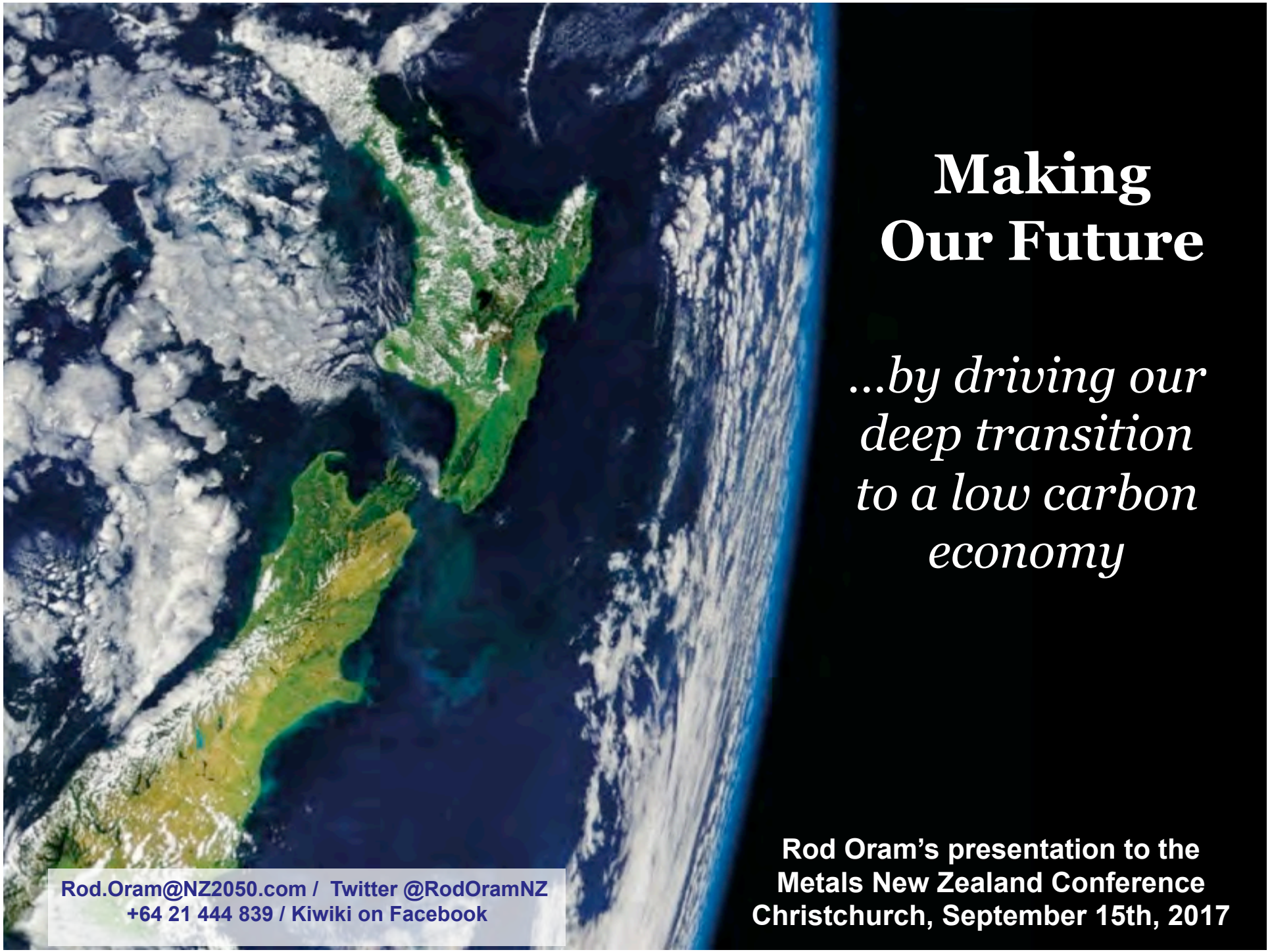


Making Our Future

...by driving our deep transition to a low carbon economy

Rod.Oram@NZ2050.com / Twitter @RodOramNZ
+64 21 444 839 / Kiwiki on Facebook

Rod Oram's presentation to the Metals New Zealand Conference Christchurch, September 15th, 2017

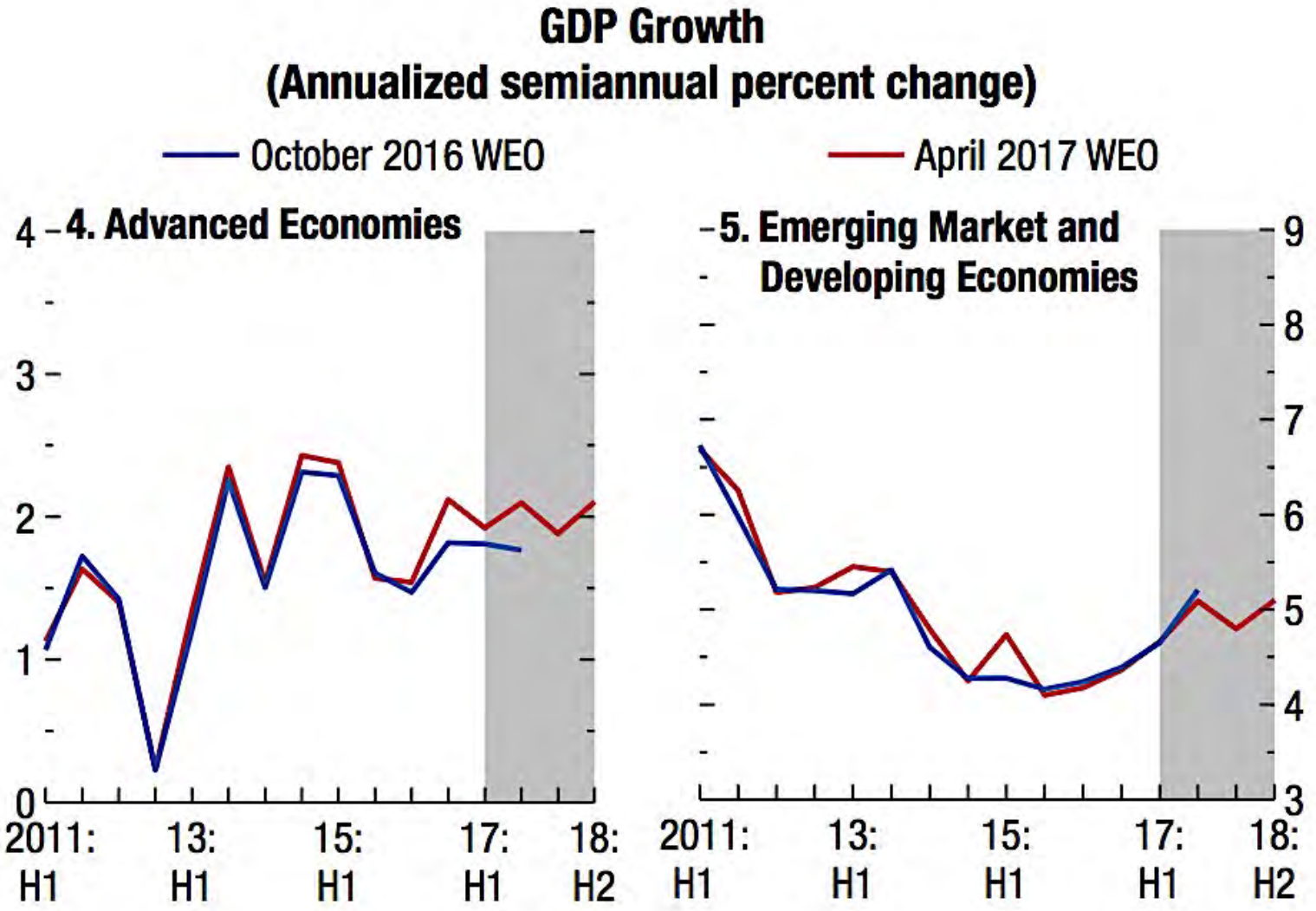
Agenda

- World
- New Zealand

- Construction
- Clean

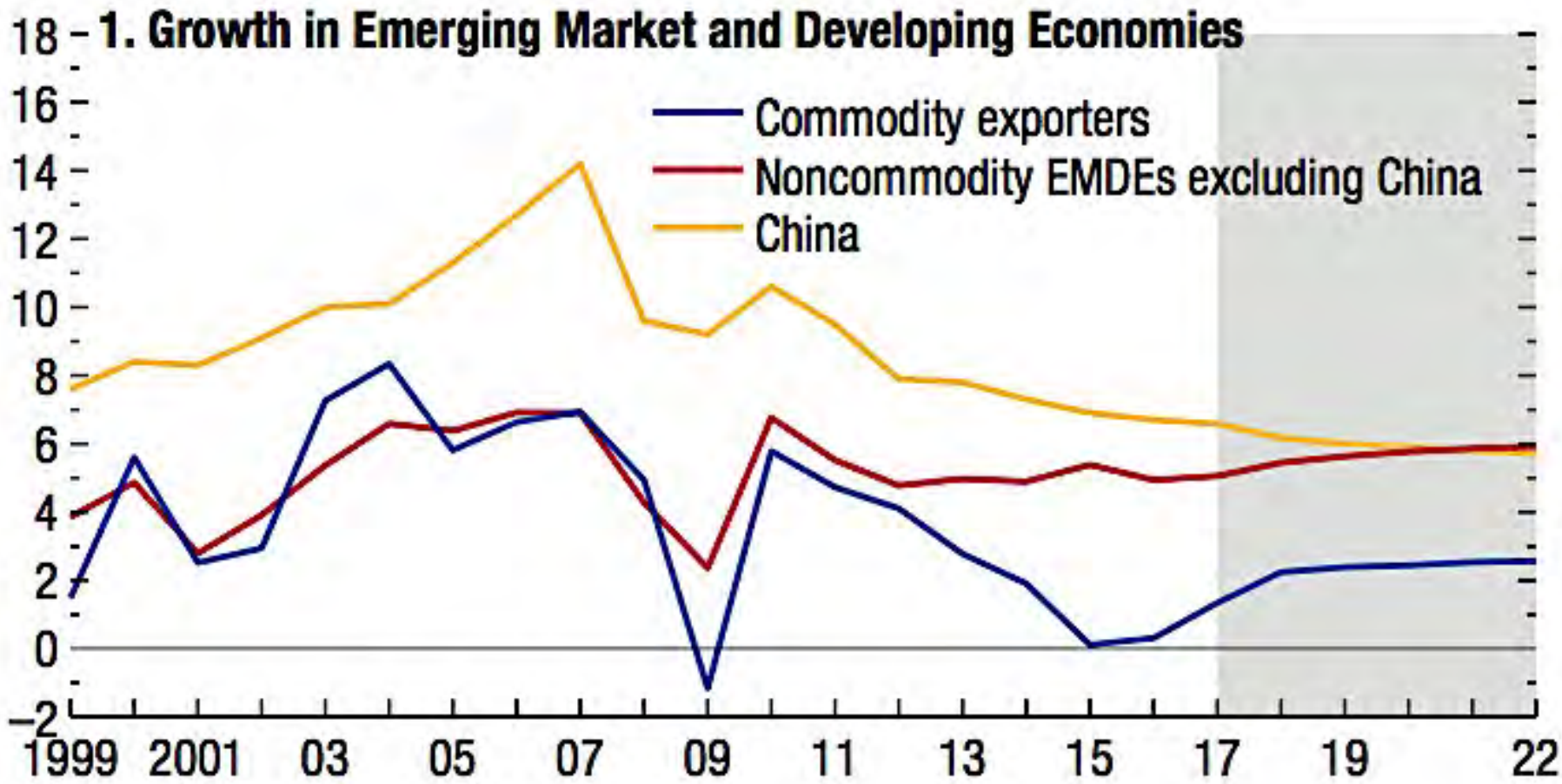
Gaining momentum?

- …yes…but, says the IMF



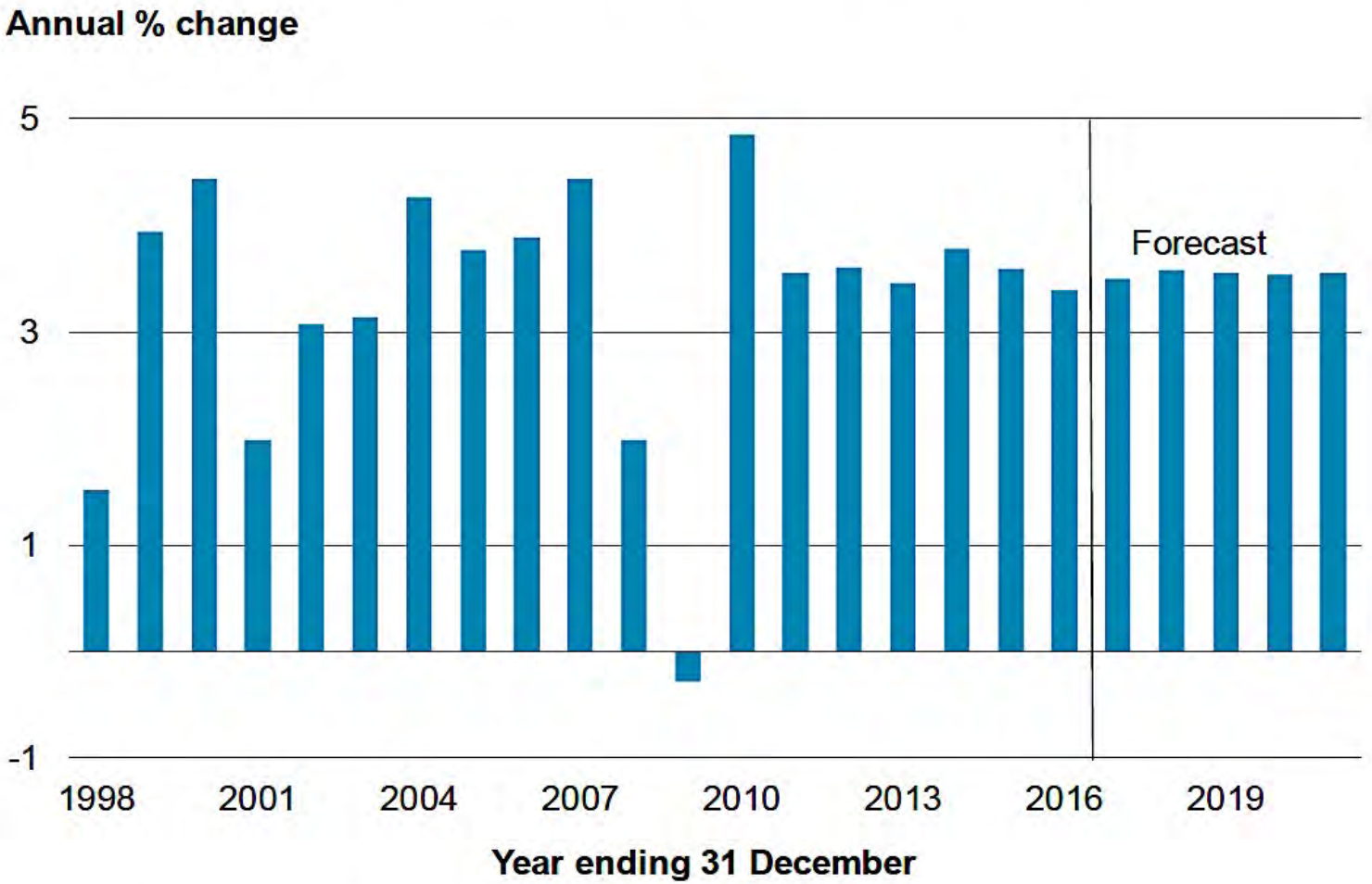
…but on a plateau

- …and developed countries are on a similar trajectory



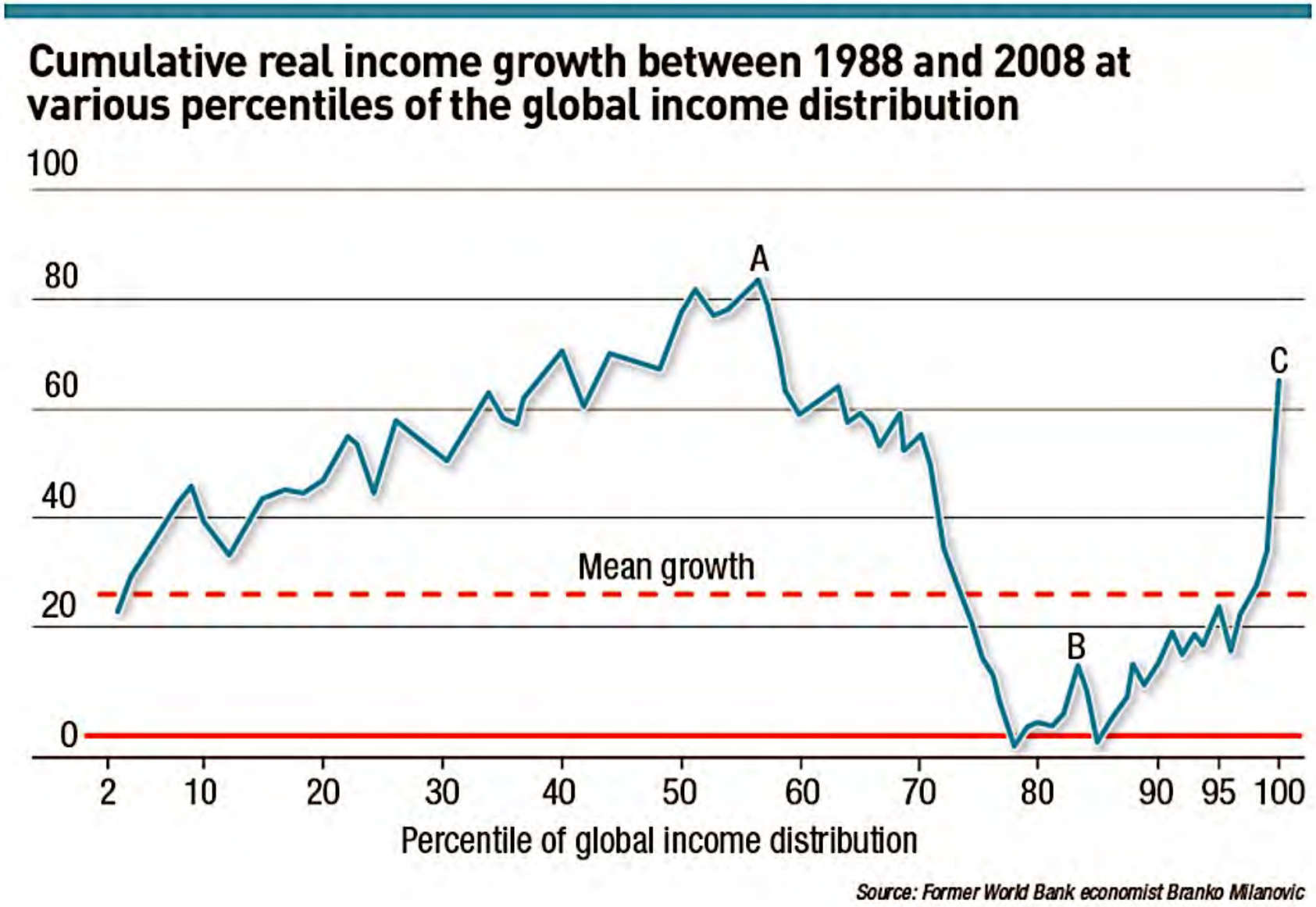
Our trading partners' growth…

- …following the world pattern



Sources: Haver Analytics, the Treasury

Middle class – big losers, worldwide



Falling incomes

- 2/3 of households in 25 advanced economies suffered flat or falling real incomes between 2005 and 2014
- Some 540 million people are affected, according to analysis by the McKinsey Global Institute

- nz2050.com/McKinseyInequality.

Time Magazine on capitalism's crisis

IDEAS CAPITALISM

American Capitalism's Great Crisis

Rana Foroohar @RanaForoohar | May 12, 2016

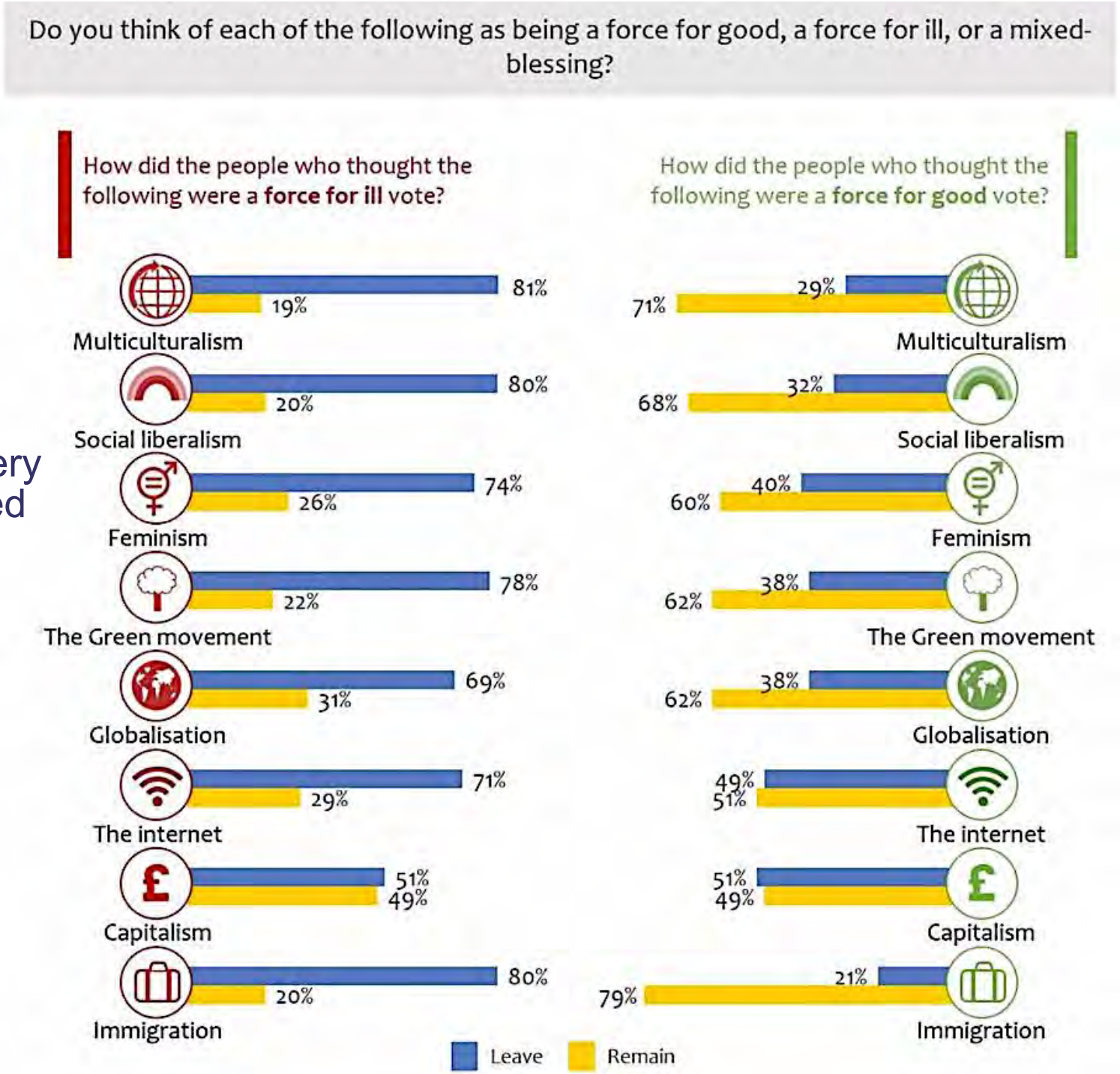
- nz2050.com/_TimeCapitalism

Trumpism

- World view: America First
- Trade: We win, you lose
- Taxes: Rich win, poor lose
- Economy: Back to the 1950s
- Foreign policy: Back to1940s
- Culture: Back to 1850s
- Politics: Divide & conquer
- Congress: Manipulate
- Judiciary: Discredit
- Temperament: Volatile

Nations divided

- UK Brexit referendum exit poll…
- …a nation very deeply divided



State of Democracy

- Economist Intelligence Unit's Democracy Index 2016
- https://infographics.economist.com/2017/DemocracyIndex/

Rank	Country	Score	Electoral process and pluralism	Functioning of government	Political participation	Political culture	Civil liberties	Category
1	Norway	9.93	10.00	9.64	10.00	10.00	10.00	Full democracy
2	Iceland	9.50	10.00	8.93	8.89	10.00	9.71	Full democracy
3	Sweden	9.39	9.58	9.64	8.33	10.00	9.41	Full democracy
4	New Zealand	9.26	10.00	9.29	8.89	8.13	10.00	Full democracy
21	United States	7.98	9.17	7.14	7.22	8.13	8.24	Flawed democracy

"A severe contest between intelligence, which presses forward, and an unworthy, timid ignorance obstructing our progress."

Founding principle of The Economist, 1843

Timid no more…the fight is on

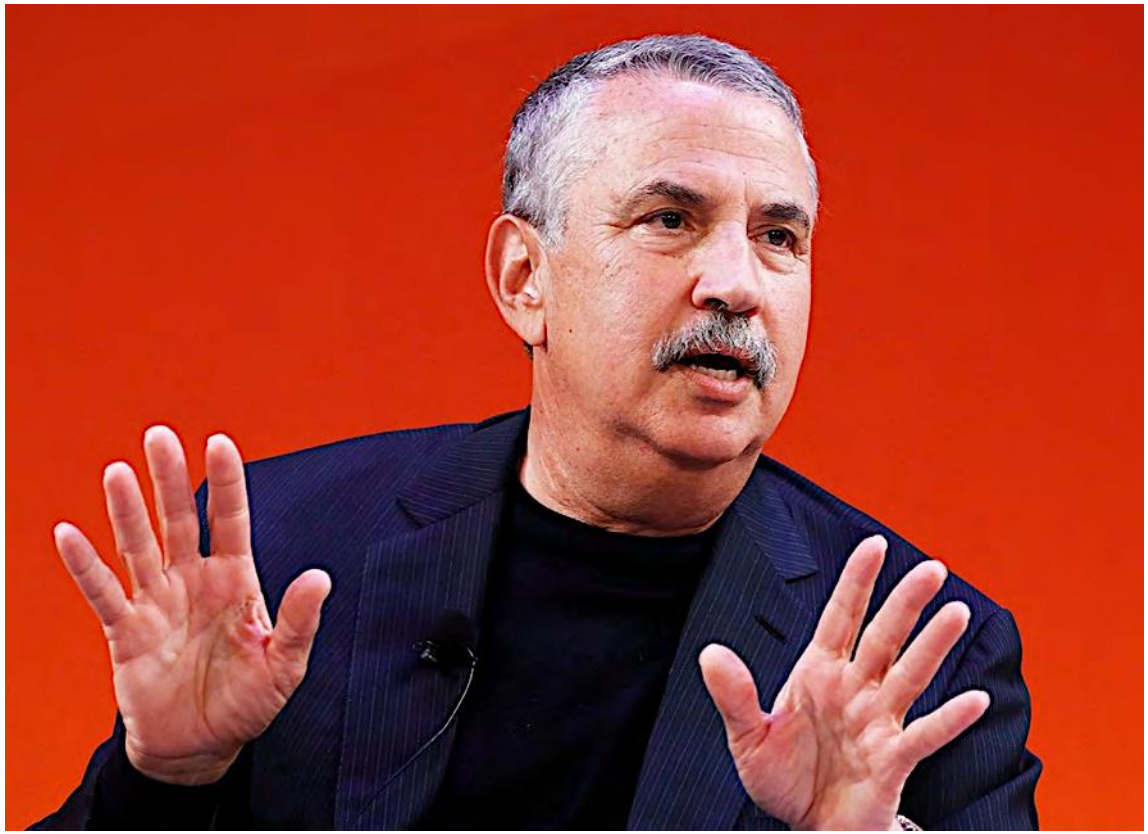
- New world order is unfolding with astonishing speed
- Gone are the economic & political certainties of past 70 years
- Neo-nationalism is on the rise…Trumpism and Brexit just two of the powerful manifestations and drivers of it
- But countervailing forces are rallying themselves
- …they may create new economic, political and environmental practices to the benefit of the many

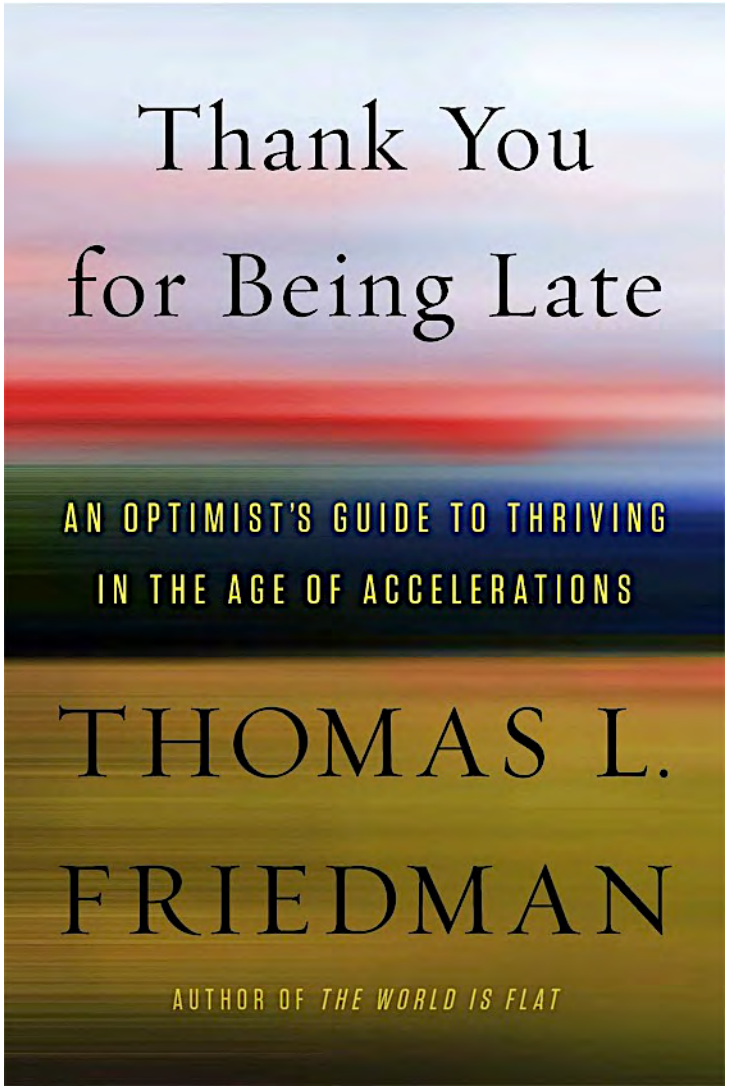

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
THE GLOBAL GOALS
For Sustainable Development
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE AND JUSTICE STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

Friedman

- Lots and lots about tech…
- …but he's not quite a techno-utopian

- …he includes a manifesto for "Mother Nature's Political Party"

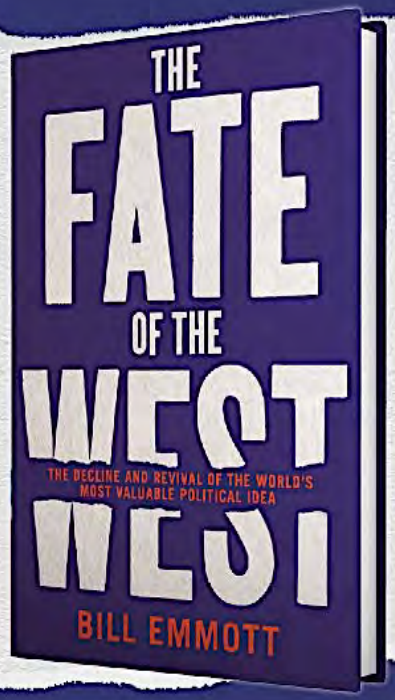




Emmott

HOW TO SAVE THE WORLD'S MOST SUCCESSFUL POLITICAL IDEA

- Reinvent welfare systems
- Redefine the working age
- Reimagine education
- Embrace automation
- Read this book



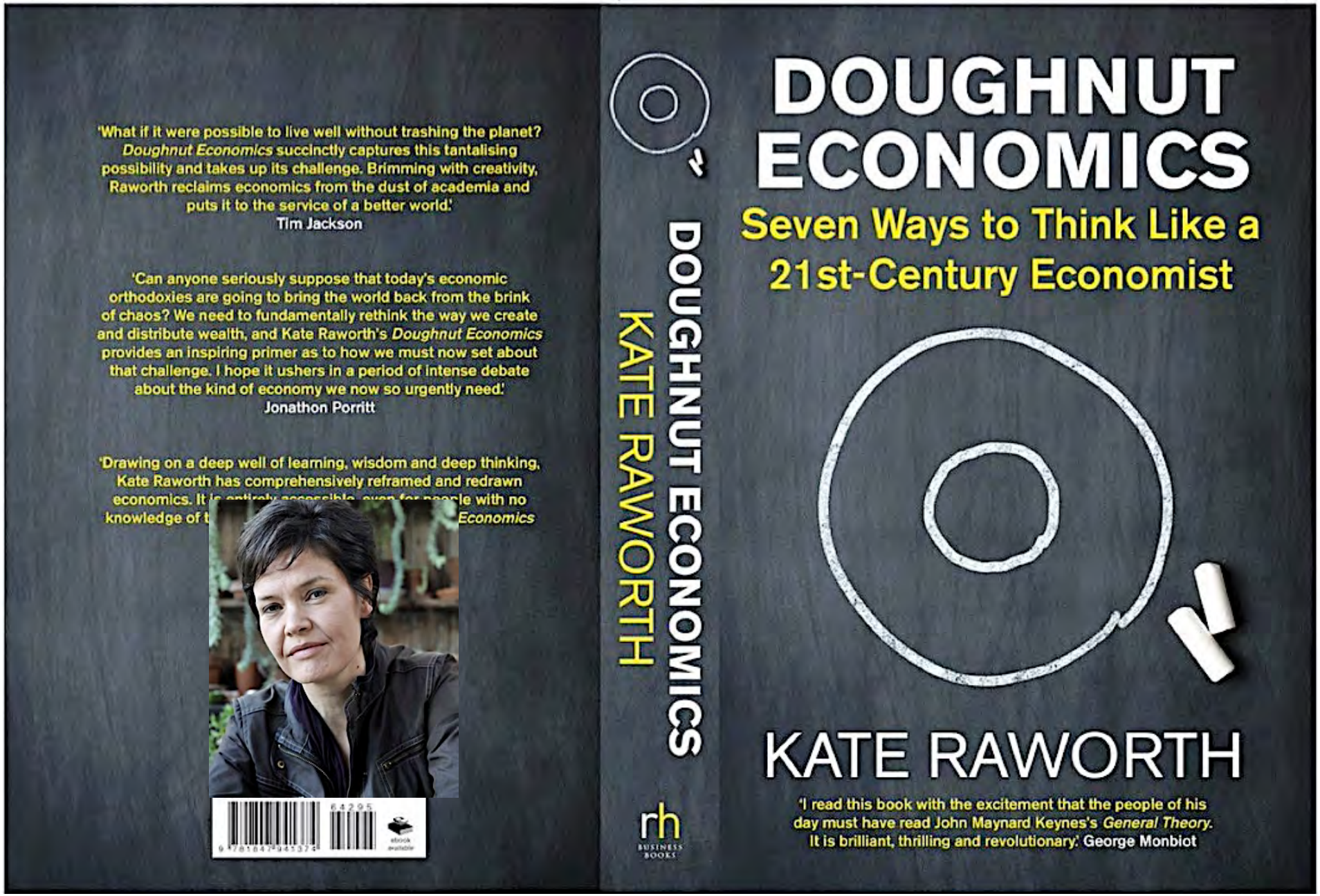
By BILL EMMOTT, former editor of *The Economist*

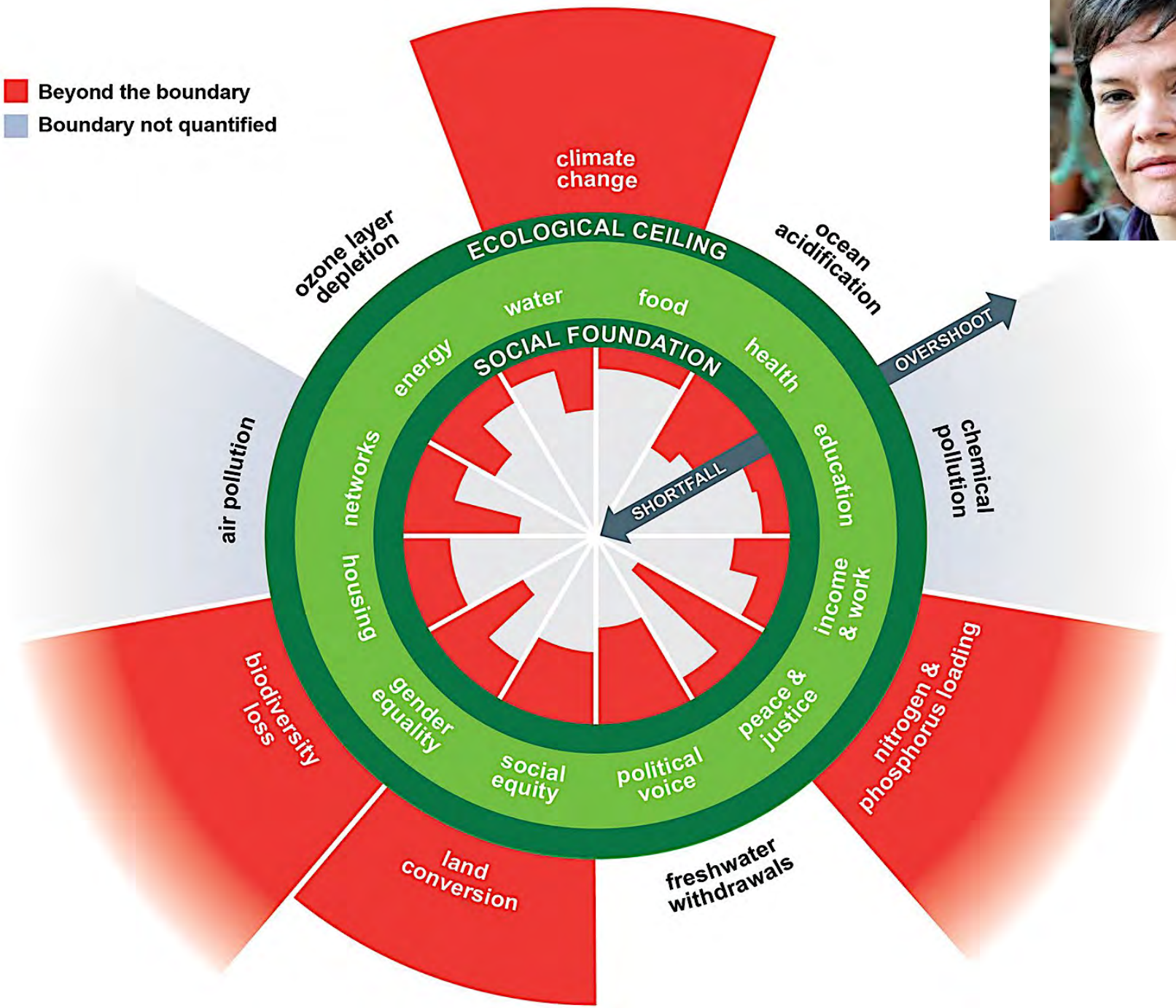
PROFILE BOOKS

#TheFateoftheWest

The Economist Books

Raworth


'What if it were possible to live well without trashing the planet? *Doughnut Economics* succinctly captures this tantalising possibility and takes up its challenge. Brimming with creativity, Raworth reclaims economics from the dust of academia and puts it to the service of a better world.'
Tim Jackson
'Can anyone seriously suppose that today's economic orthodoxies are going to bring the world back from the brink of chaos? We need to fundamentally rethink the way we create and distribute wealth, and Kate Raworth's *Doughnut Economics* provides an inspiring primer as to how we must now set about that challenge. I hope it ushers in a period of intense debate about the kind of economy we now so urgently need.'
Jonathon Porritt
'Drawing on a deep well of learning, wisdom and deep thinking, Kate Raworth has comprehensively reframed and redrawn economics. It
knowledge of t
Economics
DOUGHNUT ECONOMICS
KATE RAWORTH
rh
BUSINESS BOOKS
DOUGHNUT ECONOMICS
Seven Ways to Think Like a 21st-Century Economist
KATE RAWORTH
'I read this book with the excitement that the people of his day must have read John Maynard Keynes's *General Theory*. It is brilliant, thrilling and revolutionary.' George Monbiot


Beyond the boundary
Boundary not quantified
climate change
ozone layer depletion
ocean acidification
chemical pollution
nitrogen & phosphorus loading
freshwater withdrawals
land conversion
biodiversity loss
air pollution
ECOLOGICAL CEILING
SOCIAL FOUNDATION
OVERSHOOT
SHORTFALL
water
food
health
education
income & work
peace & justice
political voice
social equity
gender equality
housing
networks
energy

The Aims of the OECD shall be to promote policies designed to…

1960

…achieve the highest sustainable rate of growth and employment and a rising standard of living in member countries.

2020

…create regenerative and distributive economies that enable humanity to thrive, whether or not they grow.

For 21st century progress, pick your paradigm. Neither is easy, nor proven.

"Today's uber-capitalism demands maximum growth"

(as summed up by Branko Milanovic)

- People are greedy, insatiable & competitive.
- The metric of success is money and everyone wants more of it.
- This can't be changed in any foreseeable future.
- Hence pursuing wellbeing calls for maximizing GDP growth.
- Achieving this depends upon overcoming environmental limits to growth – and, thanks to technology, it can be done.

"Tomorrow's thriving future must be growth agnostic"

(as summed up by Kate Raworth)

- People are greedy and generous, competitive and collaborative – and it's possible to nurture human nature.
- The metric of success is to meet the needs of all within the means of the planet (aka get into the Doughnut)
- This is essential for humanity's common future.
- Hence pursuing wellbeing calls for distributive and regenerative economies – with GDP adjusting in response.
- Achieving this depends upon overcoming today's financial, political and social addictions to GDP growth – by no means easy, but it can be done.

Agenda

- World
- **New Zealand**

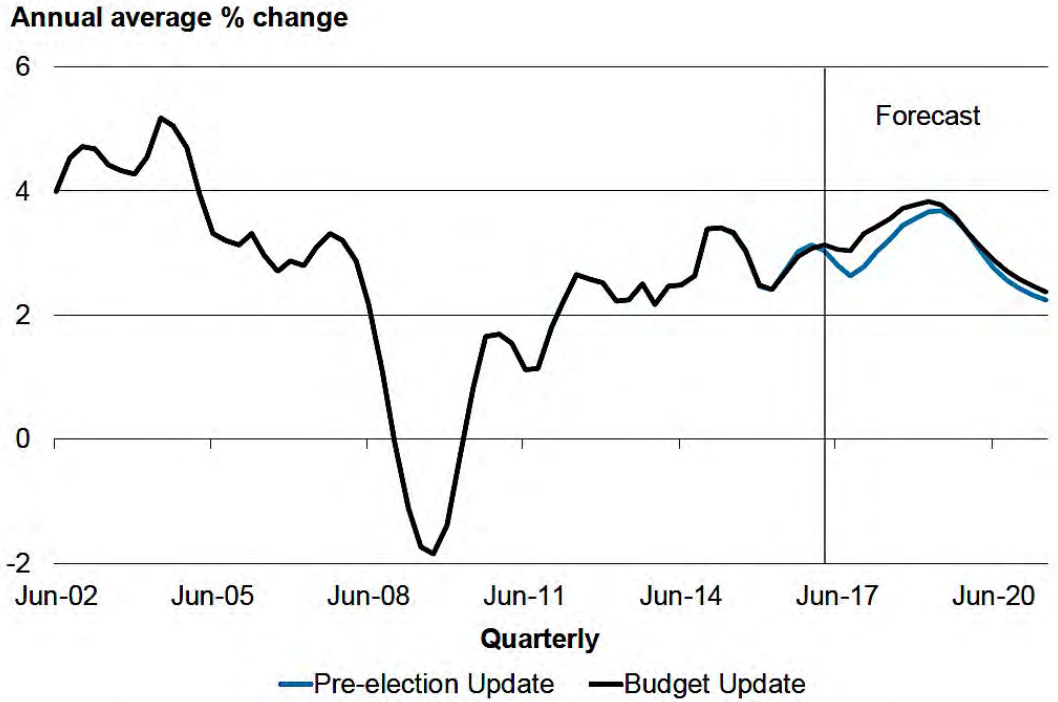
- Construction
- Clean

NZ's GDP growth

- Peaks next year near 4%
- …then declines to just above 2% by 2020

- …says Treasury and the Reserve Bank

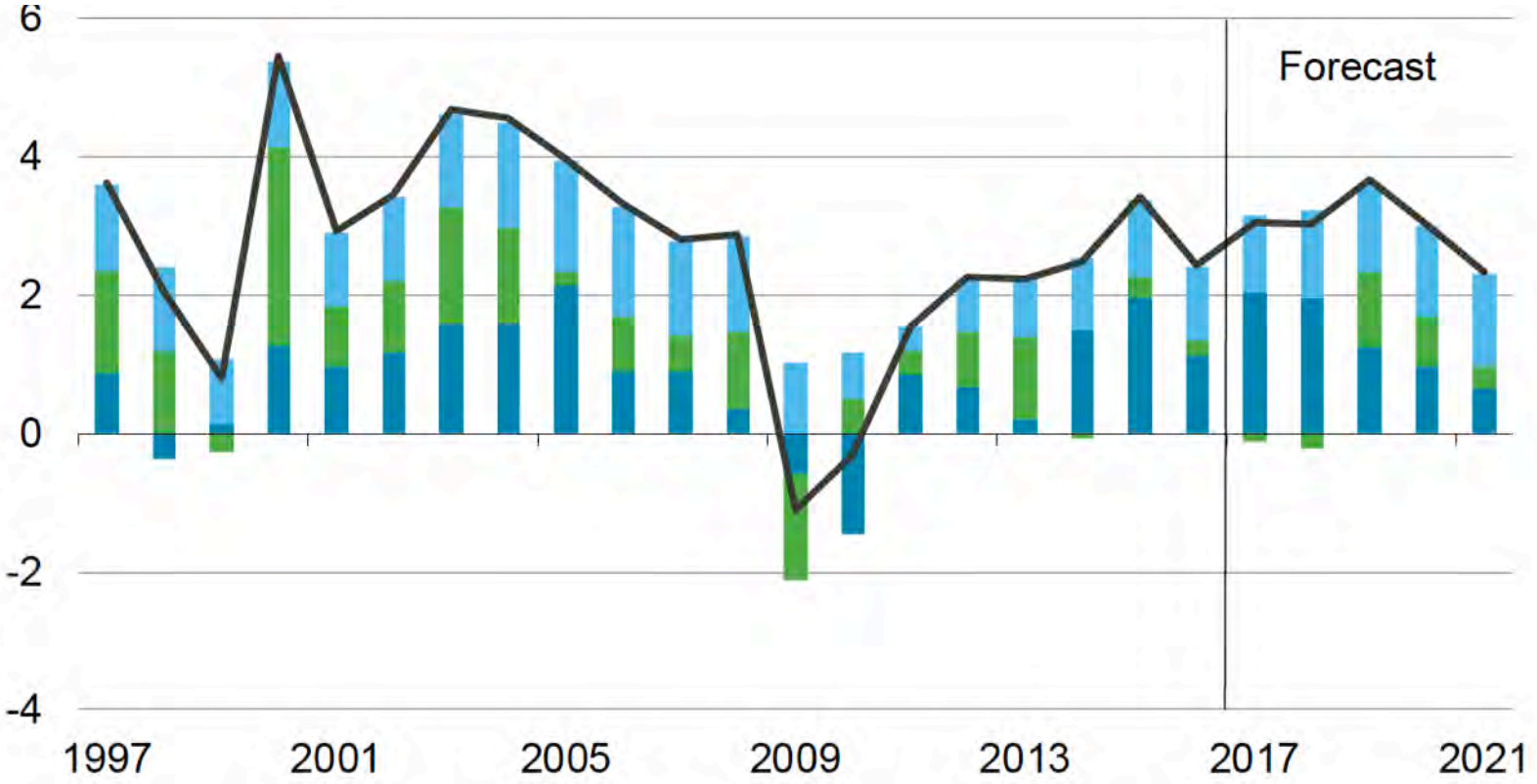
Figure 1.8 – Economic growth (production GDP)



Sources: Statistics New Zealand, the Treasury

...but

- Multifactor productivity falls for the next two years
- …then grows very slowly
- We will remain near the bottom of the OECD on this key measure of innovation and competitiveness



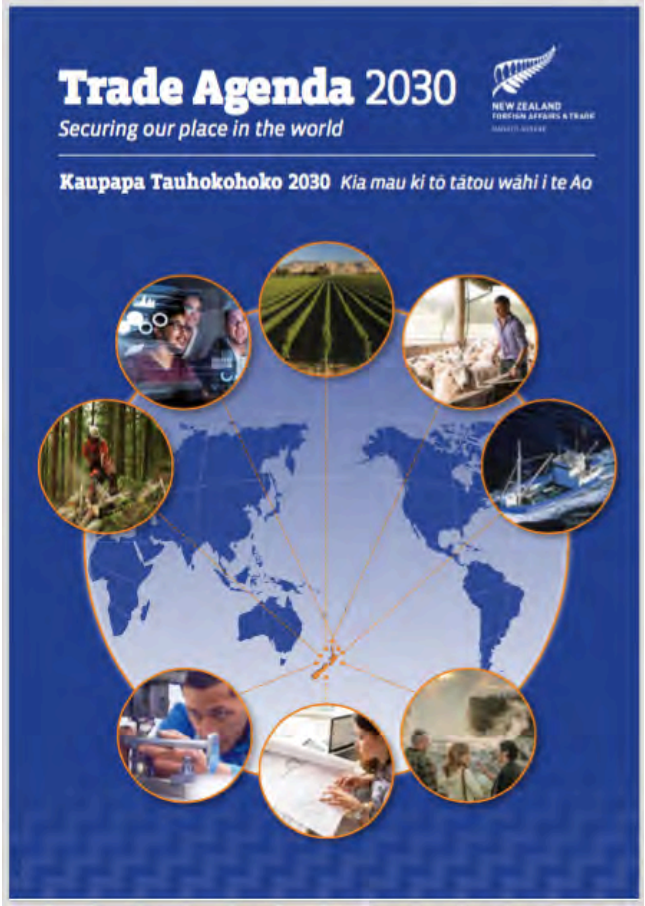
Sources: Statistics New Zealand, the Treasury

Trade policy "refresh"

- 90% of NZ's exports covered by FTAs by 2030, up from just over 50% now.
- Greater focus on reducing non-tariff barriers, such as government import regulations
- More emphasis on trade in services & digital products
- Helping more NZ exporters develop
    - …only 267 companies export > $25m a year

- New Ministerial Advisory Group – mainly business
- A bit more money for "transparency and public engagement"

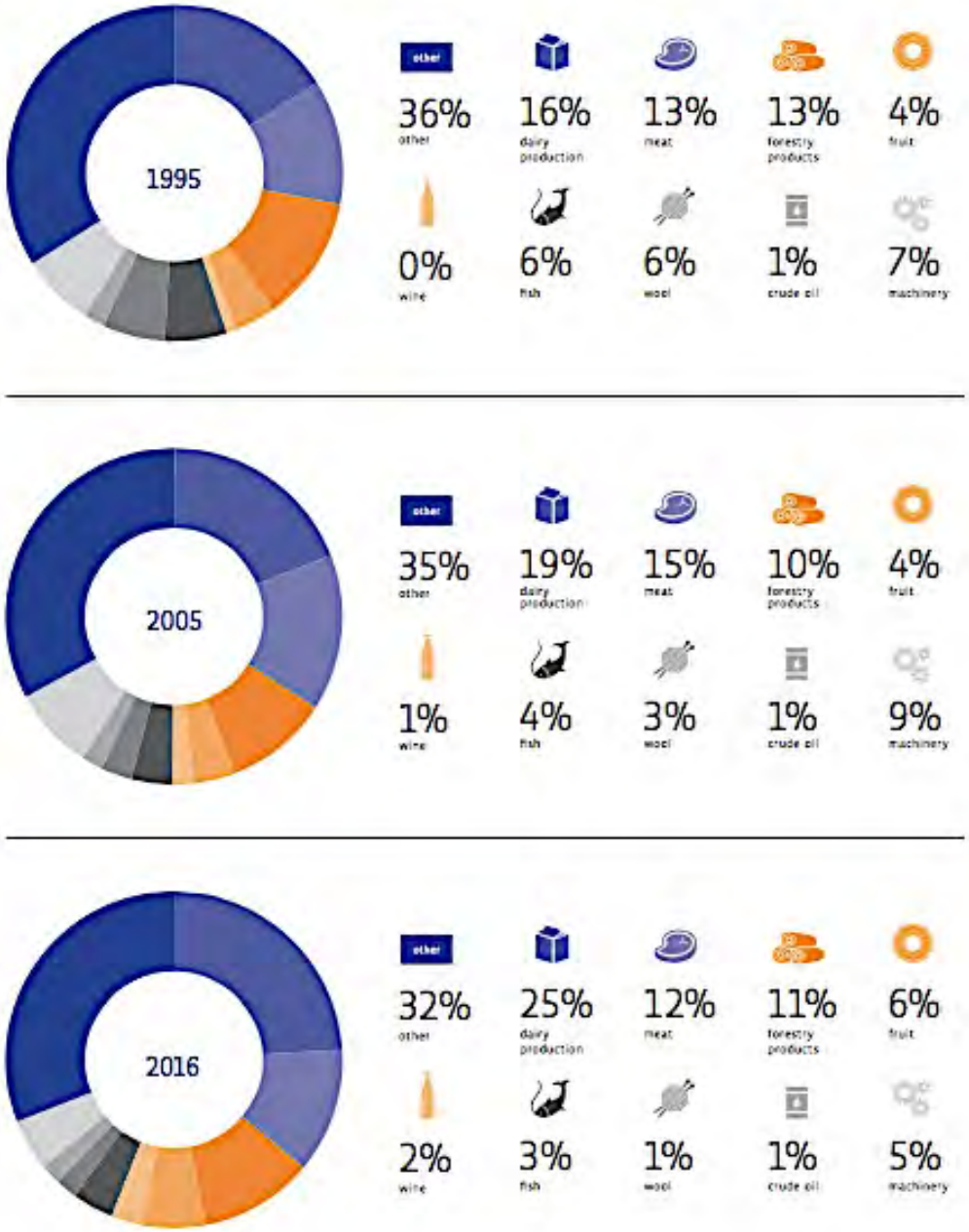
- What the "refresh" didn't do"
    - Analyse shifts in big trade policy, and political and public attitudes to trade around the world
    - Analyse the leading edge of new types of trade agreements
    - Set a bold agenda that influences trade negotiations worldwide
        - …as did NZ's 1993 trade strategy reforms



...barely changed

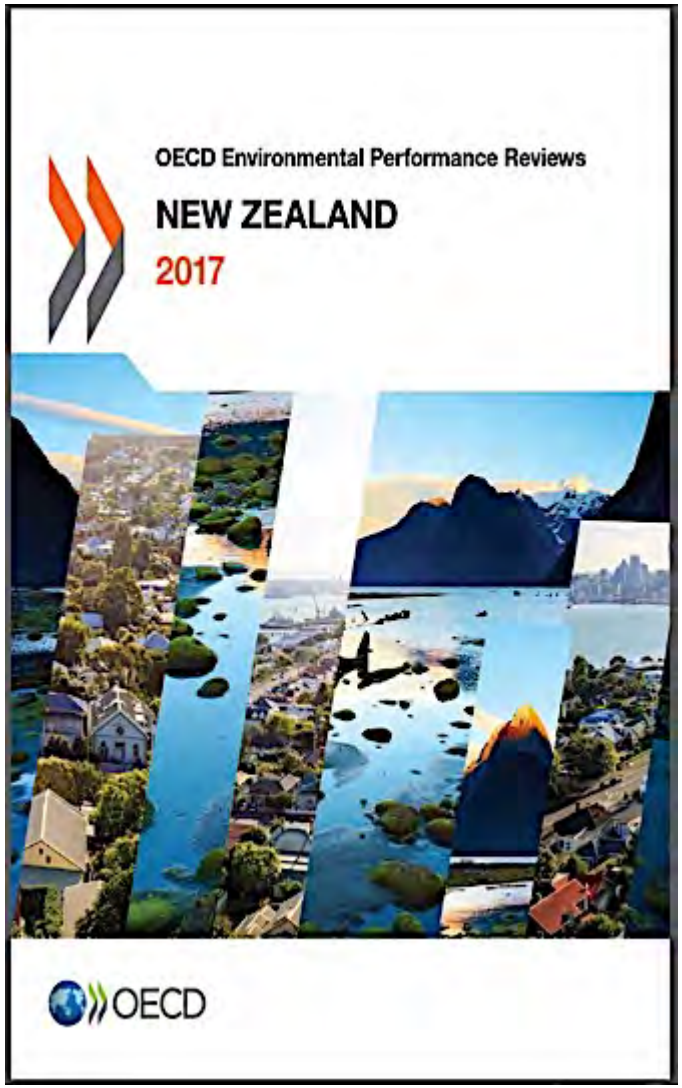
- Composition of our exports has barely changed in past 20 years
- More volume…
- …not much more value
- This government set 2025 goals of:
  - Lift exports from 30% to 40% of GDP
  - Double value of exports
- We're missing both goals by miles
  - Exports now = 28% of GDP

Figure 2: New Zealand's goods exports by sector in 1995, 2005 and 2016
(Source: Statistics NZ)



OECD's verdict

- "New Zealand's growth model...has started to show its environmental limits, with increased GHG emissions, freshwater contamination and threats to biodiversity.
- "Addressing GHG emissions from agriculture, and especially dairy farming, should remain a priority...
- "...the need to further explore the economic opportunities that more sustainable uses could yield.
- "Developing a long-term vision for a transition towards a low-carbon, greener economy would help New Zealand defend the "green" reputation it has acquired at an international level."



"…the shift…will be profound and widespread"

- "…the shift from the old economy
  to a new, low-emissions economy
  will be profound and widespread,
  transforming land use, the energy system,
  production methods and technology,
  regulatory frameworks and institutions,
  and business and political culture."

- New Zealand Productivity Commission
  Low carbon economy, August 2017
- http://www.productivity.govt.nz/inquiry-content/3254?stage=2

- Final report, with recommendations due June 30, 2018

What we say…is not what we do

- We’re missing our Paris commitments by miles

Figure 3 **New Zealand's net emissions from 1990 to 2013, future projections and current emission targets for 2020, 2030 and 2050**

Source: MfE (2015a)

NZ construction…peaks, eases

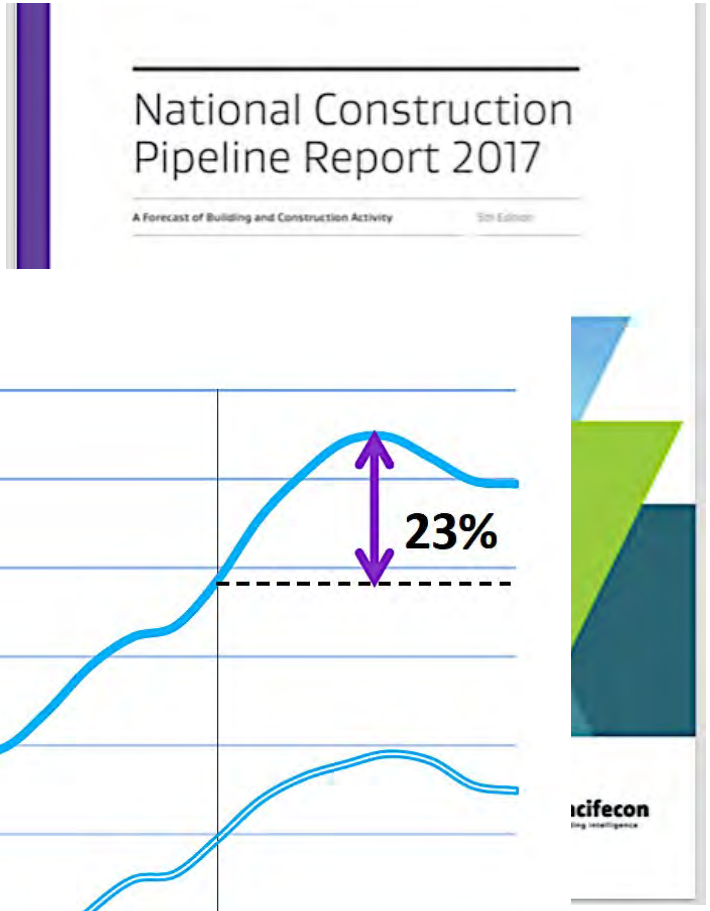
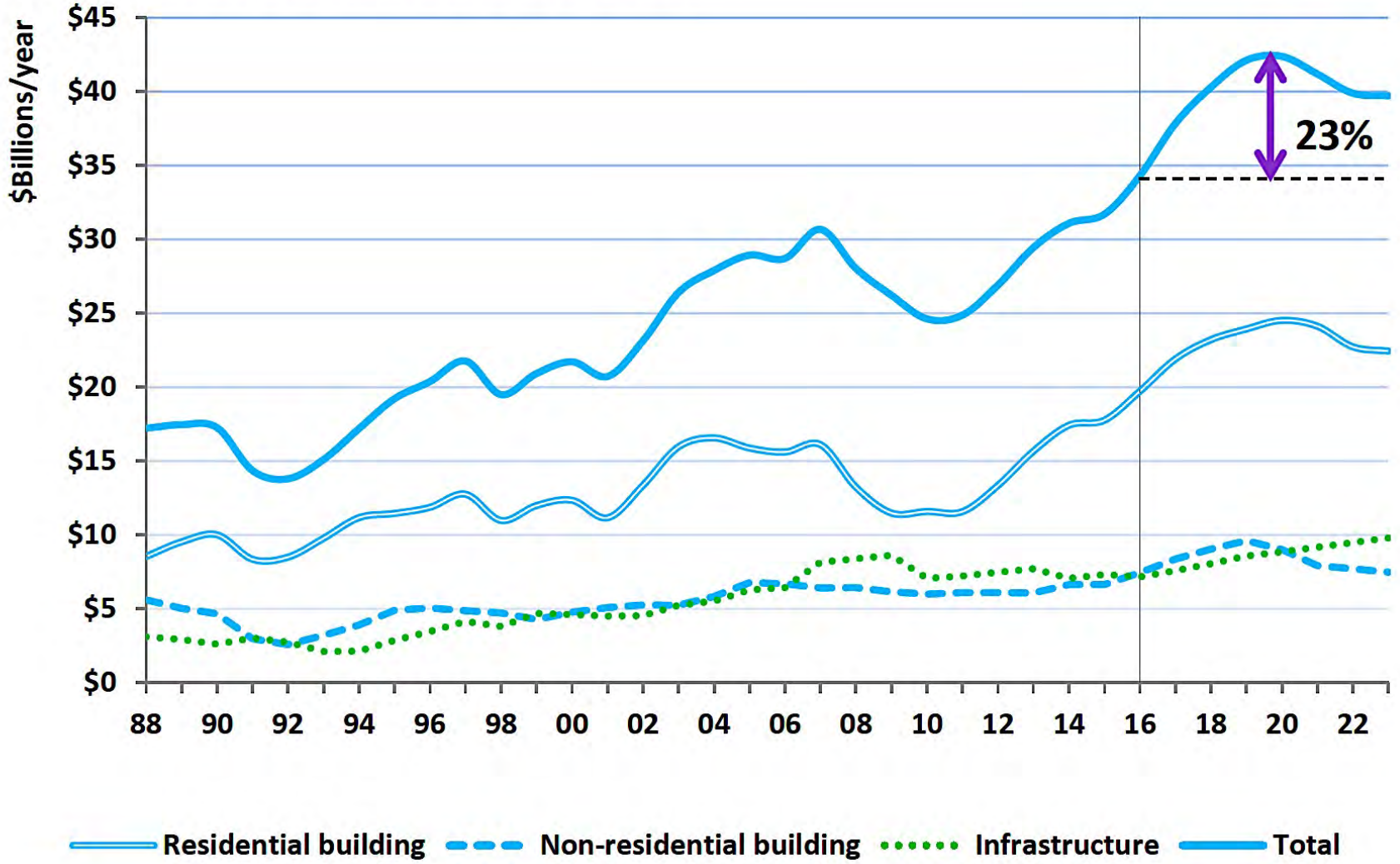
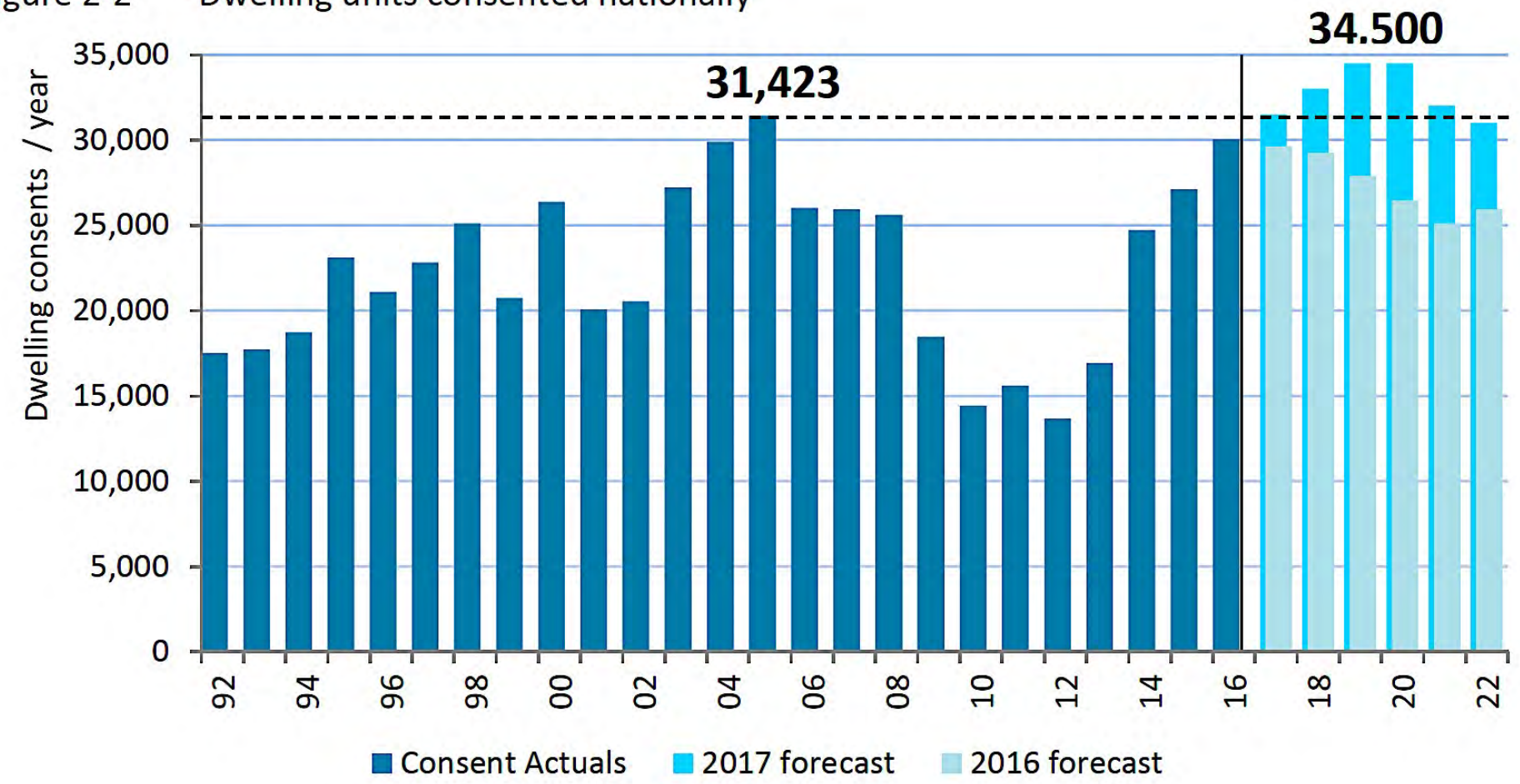


Figure 3-1 All construction nationally, by value



NZ dwelling consents…peak, then ease

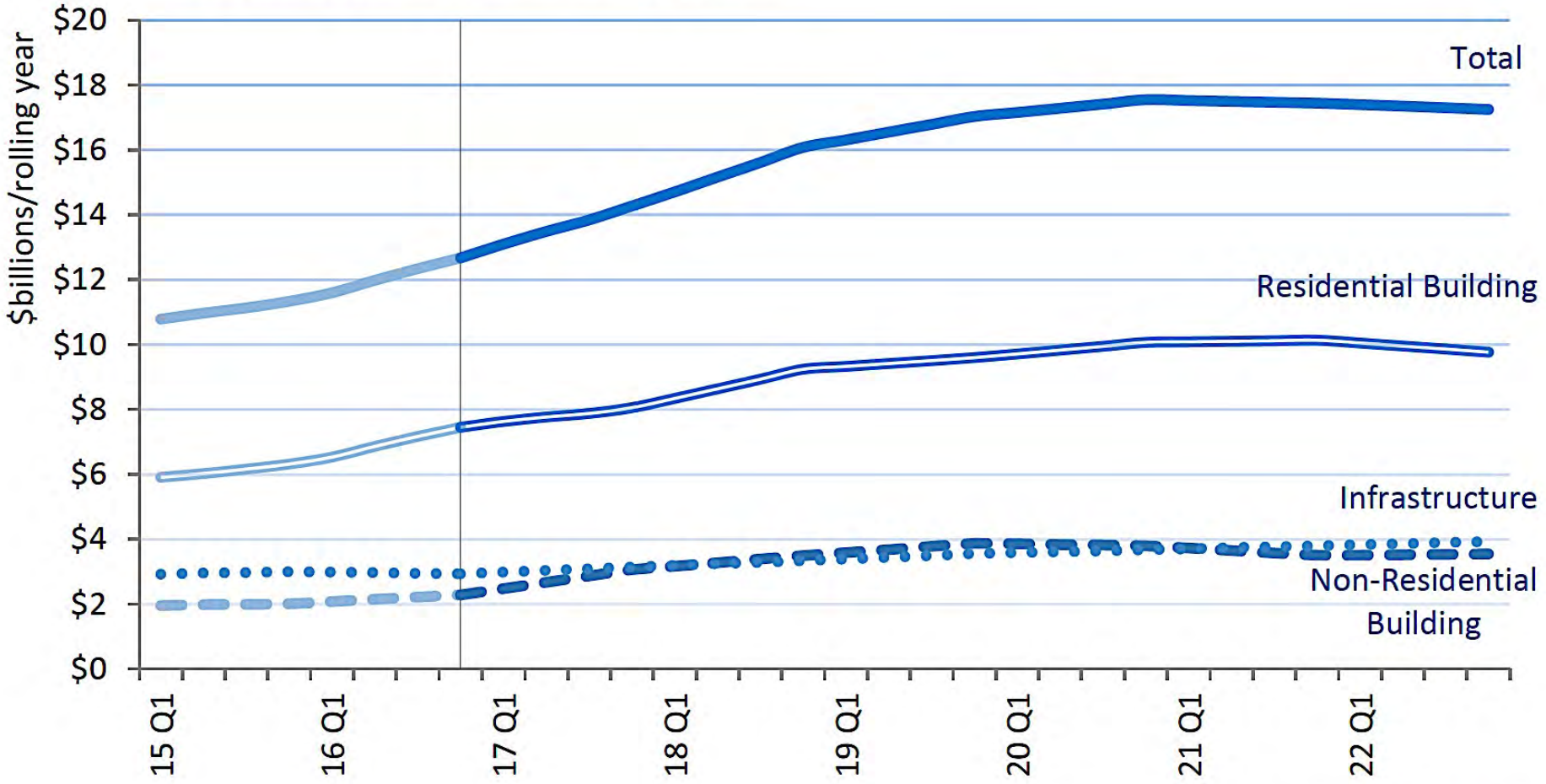
Figure 2-2 Dwelling units consented nationally



Source: Statistics NZ / BRAN

Auckland construction…plateaus

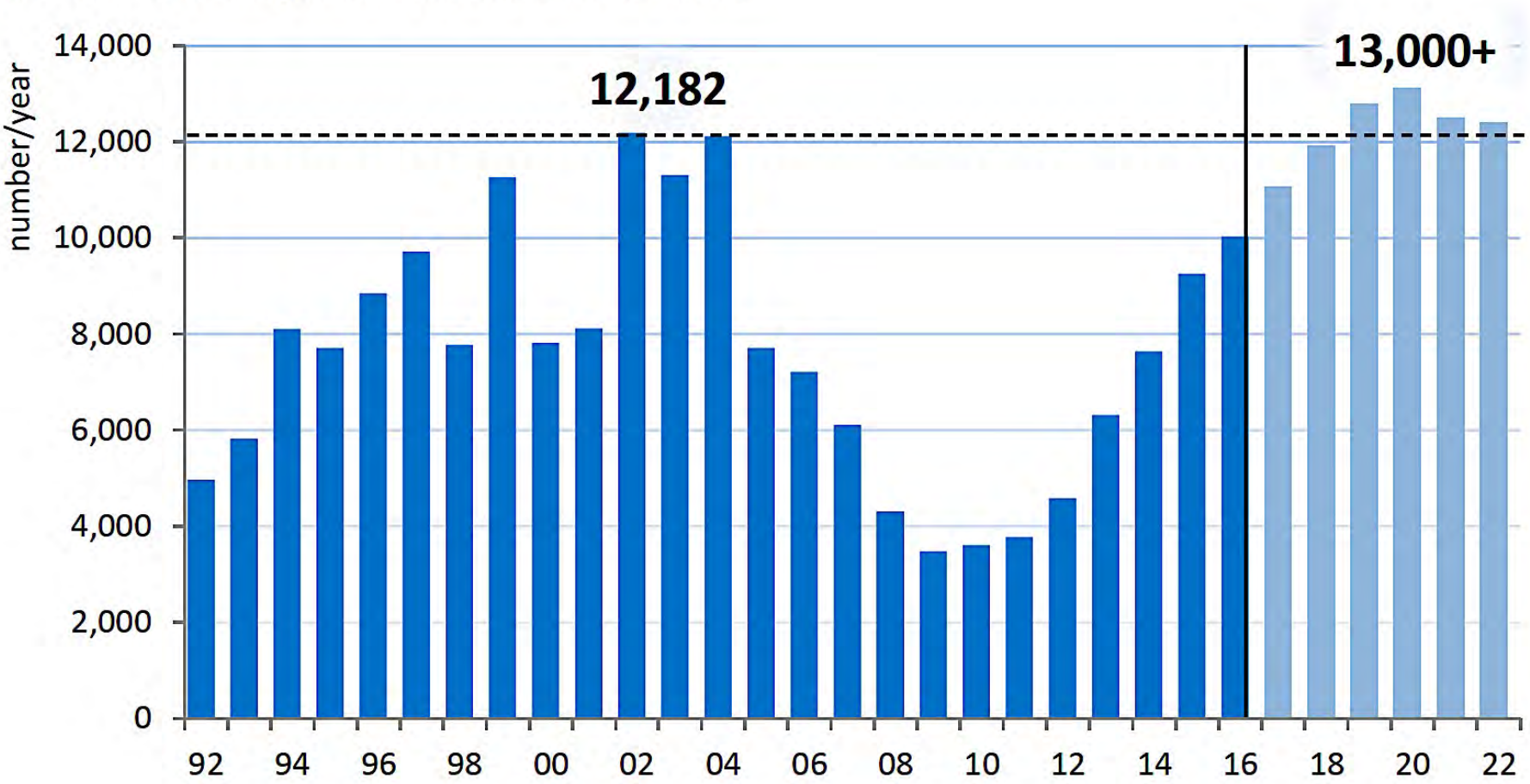
Figure 4-1 All construction in Auckland, by value



Source: BRANZ / Pacifecon

Auckland dwelling consents…peak, ease

Figure 4-2 Dwelling units consented in Auckland



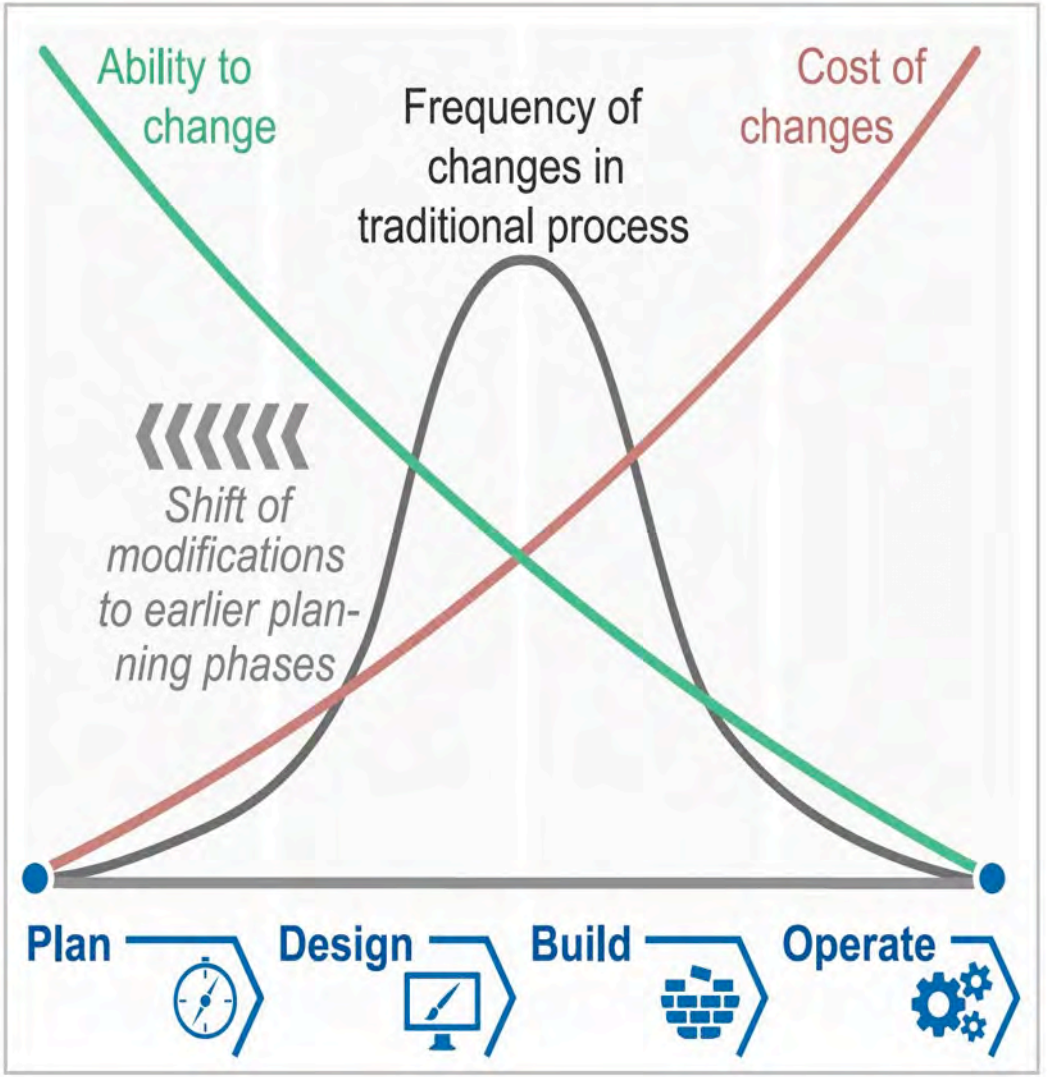
Problems

- The pressure on the construction sector to build much more is causing some deeply adverse developments

- Rocky relationships between:
  - Clients & contractors
  - Contractors & designers
  - Contractors & sub-contractors
  - Contractors & suppliers

- Resulting in:
  - Waste, inefficiency
  - Loss of productivity
  - Loss of quality
  - Higher costs
  - Long-term liabilities

Figure 10: Cost of Changes in the Construction Life Cycle



Source: World Economic Forum; The Boston Consulting Group

Agenda

- World
- New Zealand

- **Construction**
- Clean

Construction's global challenge

- Insightful reports from:
  - McKinsey Global Institute
  - World Economic Forum & Boston Consulting Group
- Our government has failed
  - Binned the sector's productivity working party
- Sector is fighting back
  - Construction Strategy Group is preparing a manifesto for the incoming government
  - Building Advisory Panel in MBIE is reasserting itself

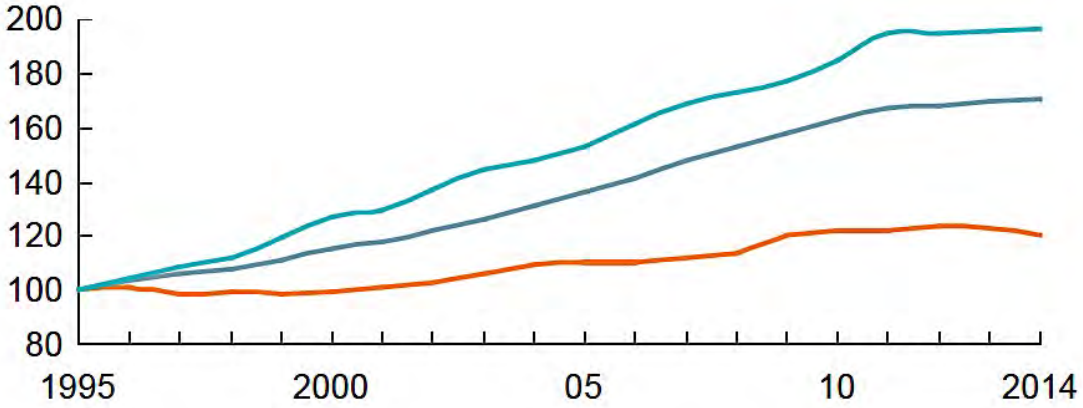
Poor productivity – global problem

Globally, labor-productivity growth lags behind that of manufacturing and the total economy

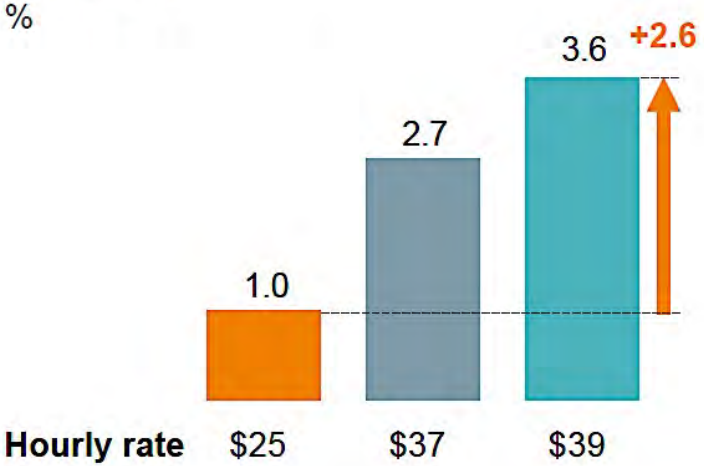
Global productivity growth trends[1]

Construction Total economy Manufacturing

Real gross value added per hour worked by persons engaged, 2005 $
Index: 100 = 1995



Compound annual growth rate, 1995–2014
%



1 Based on a sample of 41 countries that generate 96% of global GDP.

SOURCE: OECD; WIOD; GGCD-10, World Bank; BEA; BLS; national statistical agencies of Turkey, Malaysia, and Singapore; Rosstat; McKinsey Global Institute analysis

Smaller trades trail on productivity levels and growth

NOT EXHAUSTIVE

US example

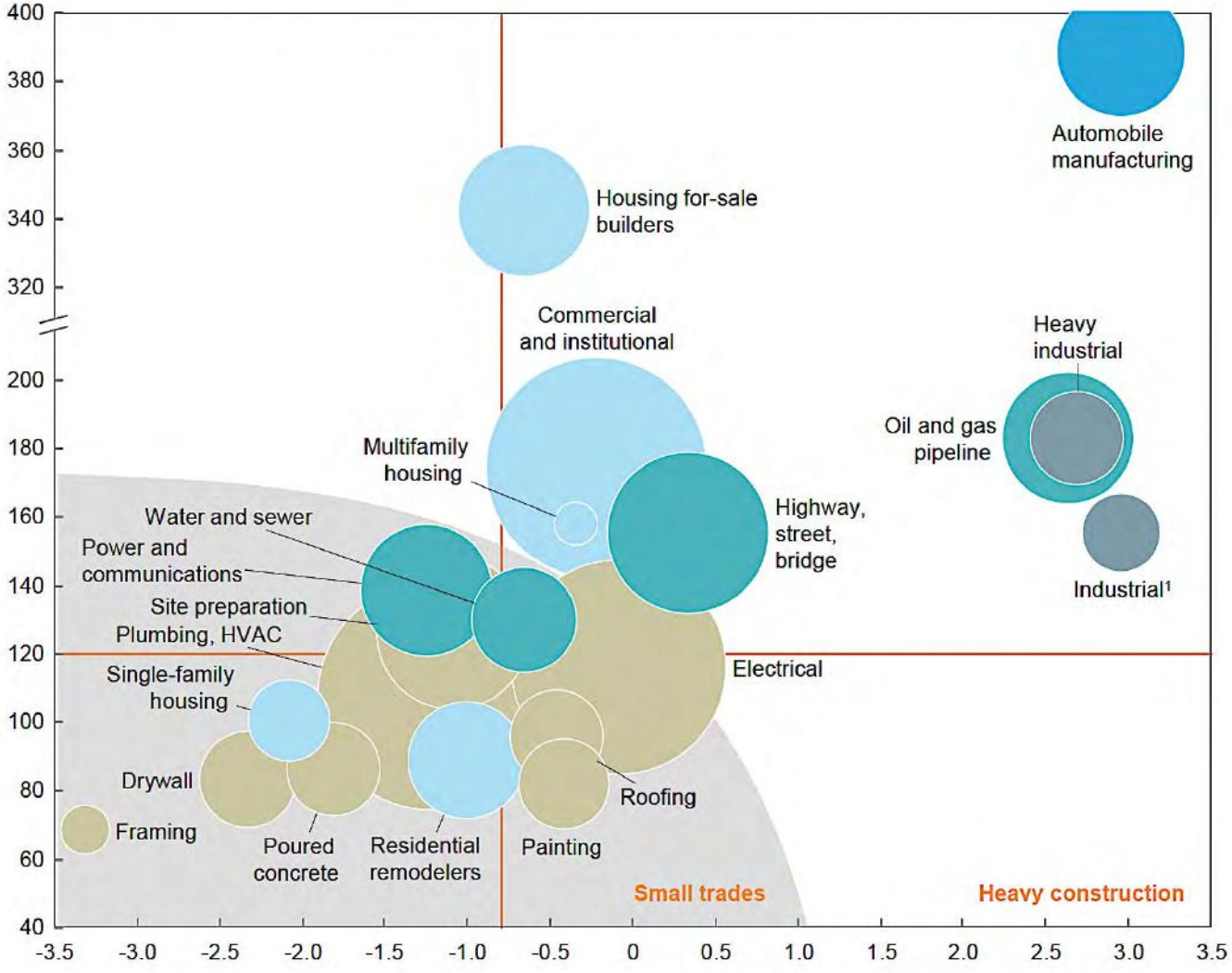
Specialty
Civil
Building
Industrial

Size indicates economic value added, 2012
2015 $ million

20

US construction average

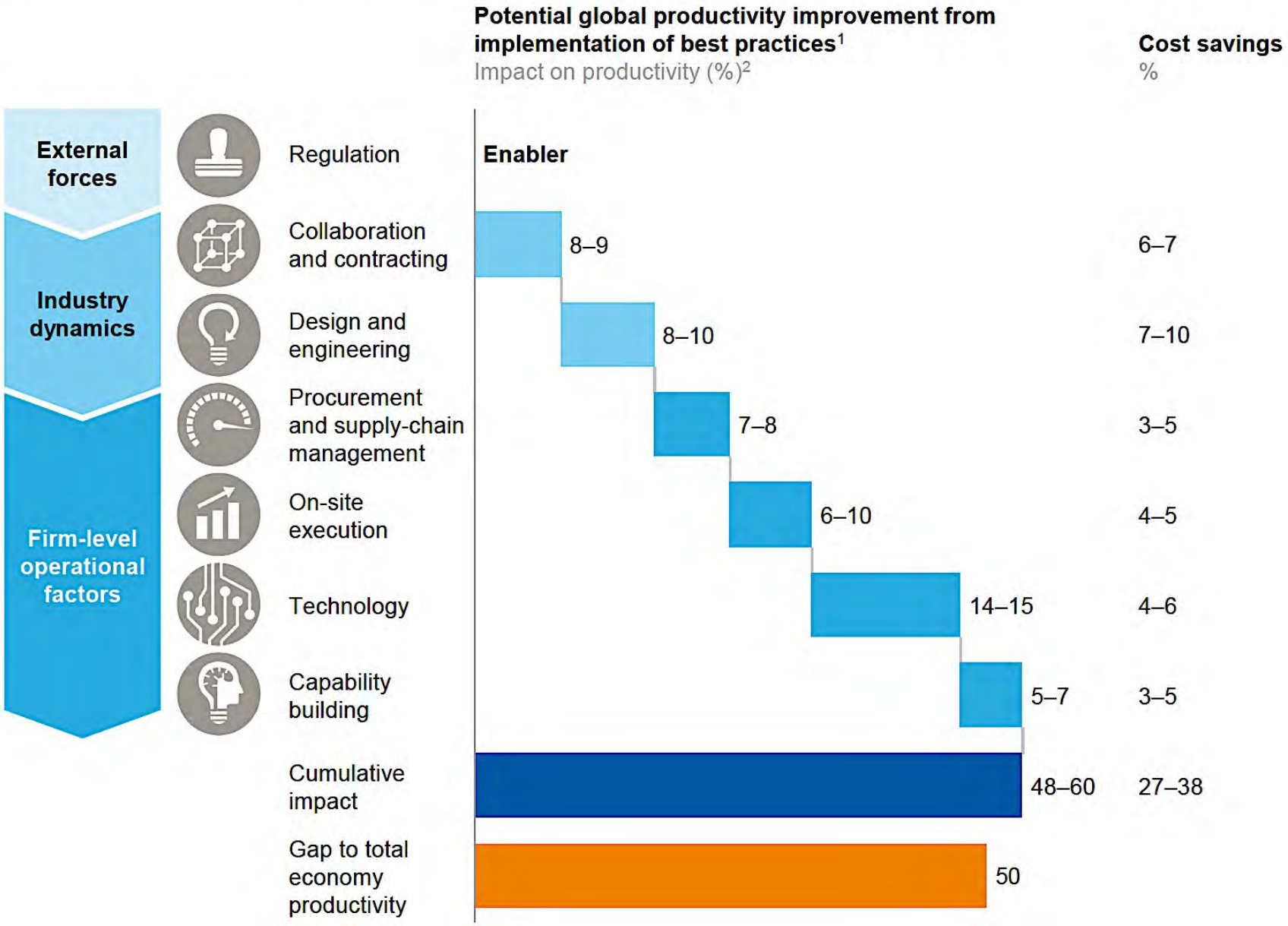
Productivity, 2012
$ thousand per person employed, 2015 $



Productivity compound annual growth rate, 2002–12
Annual growth in real gross value added per person employed, %[2]

Construction can catch up with total economy productivity by taking action in seven areas

Cascading effect
Regulation changes facilitate shifts in industry dynamics that enable firm-level levers and impact



The productivity opportunity in construction

Construction matters for the world economy

... but has a long record of poor productivity

Construction-related spending accounts for

13% of the world's GDP

...but the sector's annual productivity growth has only increased

1% over the past **20 years**

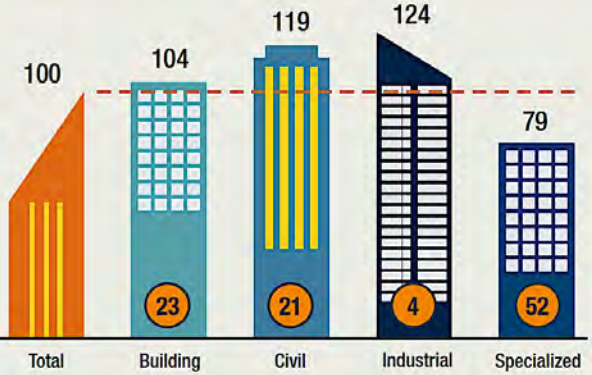
$1.6 trillion **of additional value added** could be created through higher productivity, meeting **half the world's infrastructure need**

Construction is a sector of two halves

Fragmented specialized trades drag down the productivity of the sector as a whole

Construction productivity by subsector
Value added per employee, indexed total sector=100, 2013

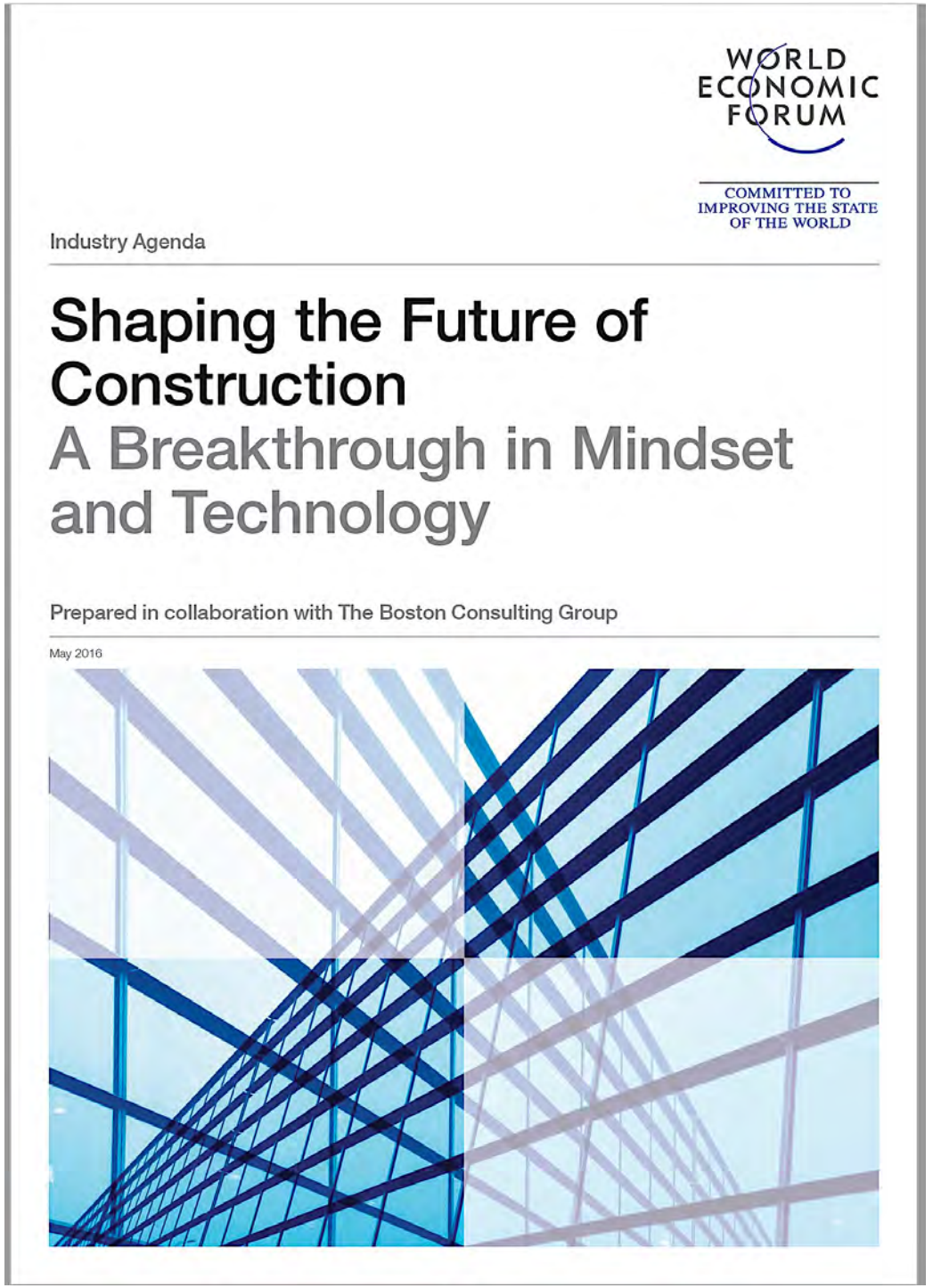
● % of construction value added



Action in seven areas can boost sector productivity by 50–60%

- Reshape regulation
- Rewire contracts
- Rethink design
- Improve procurement and supply chain
- Improve onsite execution
- Infuse technology and innovation
- Reskill workers

WEF & BCG


WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD
Industry Agenda
Shaping the Future of Construction
A Breakthrough in Mindset and Technology
Prepared in collaboration with The Boston Consulting Group
May 2016

US productivity

Figure 3: US Industry Productivity and Performance 1964-2012[28]

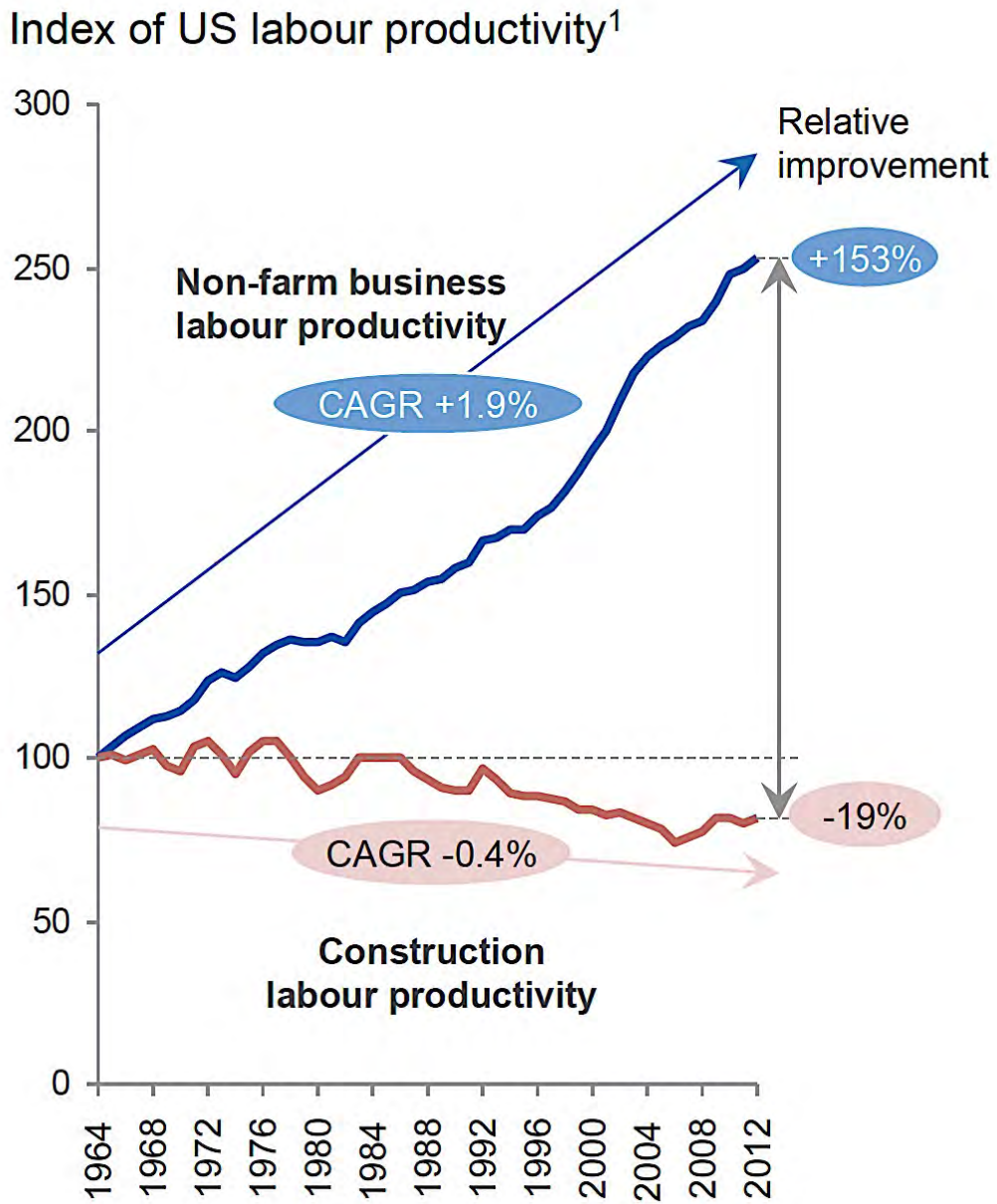
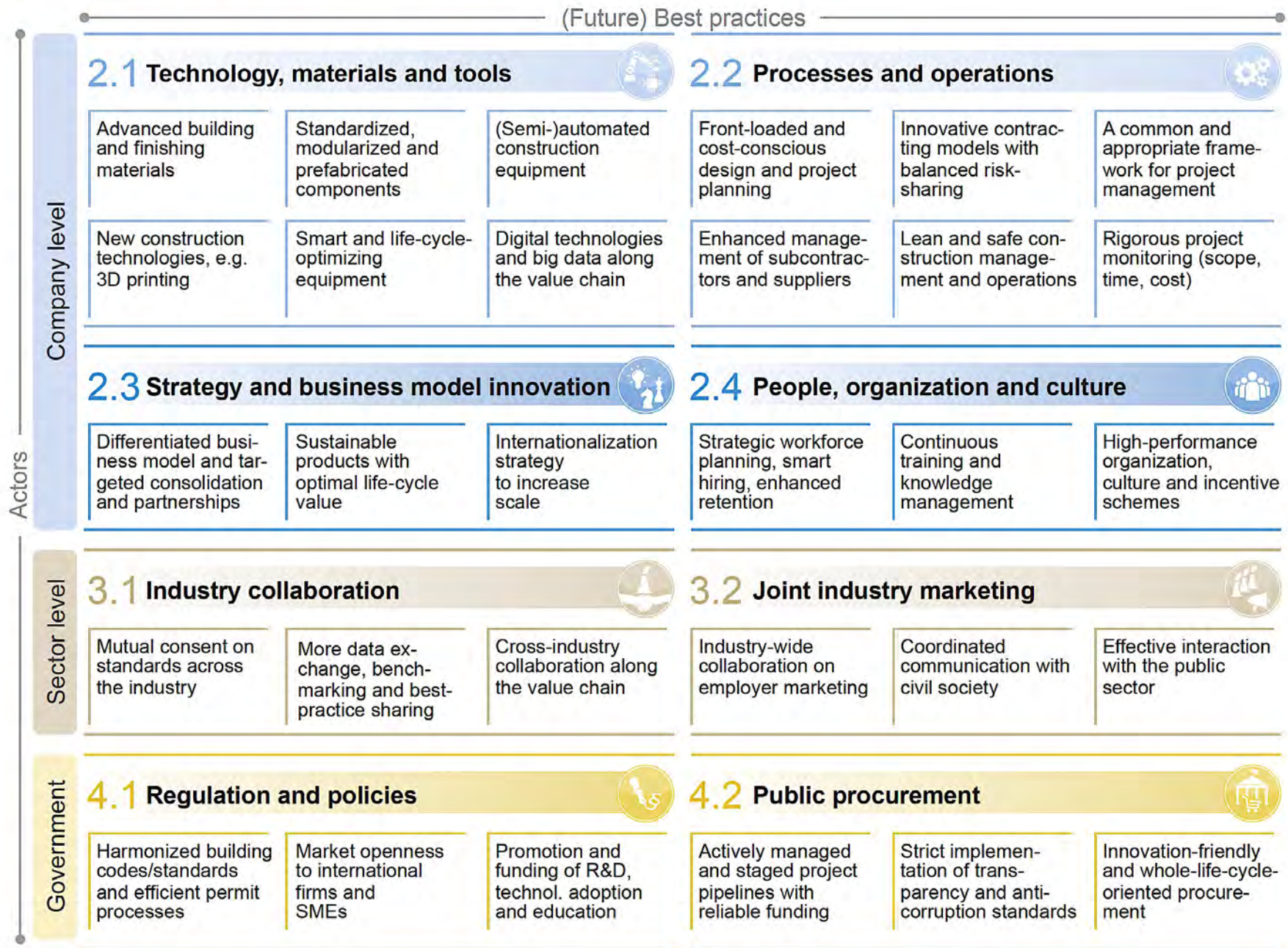


Figure 1: Industry Transformation Framework



Source: World Economic Forum; The Boston Consulting Group

Figure 2: Megatrends Shaping the Construction Industry's Future

Market and customers

Demand in developing countries

65% of the next decade's growth in construction will happen in emerging countries

Globalized markets

1 in 2 E&C companies plan to move into new geographies

Bigger, more complex projects

123km (76 miles) is the length of the Undersea tunnel that will connect Dalian and Yantai in China

Ageing infrastructure

1 in 3 German railway bridges are more than 100 years old

Massive financing need

$1tn annual investments are needed to close the global infrastructure gap

Sustainability and resilience

Resource scarcity

No. 1 consumer of global raw materials is the construction industry

Sustainability requirements

50% of the solid waste in the United States is produced by the construction industry

Energy and climate change

30% of global greenhouse gas emissions are attributable to buildings

Resilience challenges

3× as many disasters were reported last year as in 1980

Cyberthreats

90% of firms agree that information controls have an impact on front-line employees

Society and workforce

Urbanization and housing crisis

200k people are added daily to urban areas and need affordable and healthy housing

Health/comfort needs of citizens

2-5× higher than outside are the levels of volatile organic compounds found inside US homes

Talent and ageing workforce

50% of general contractors are concerned about finding experienced crafts workers for their workforce

Stakeholder pressure and organization

67k signatures were collected opposing the construction of the Stuttgart train station

Politicization of construction decisions

In 2011 the Portuguese government cancelled a 165km (103 mile) high-speed train line project as an austerity measure

Politics and regulation

Complex regulatory requirements

25 different procedures are required for a typical warehouse construction permit in India

Stricter HSE and labour laws

10% of the workforce in a public project in California had to come from the "otherwise unemployable"

Slow permit and approval process

$1.2tn of infrastructure could be added by 2030 if all countries committed to specific time limits for approvals

Geopolitical uncertainty

18 Turkish construction workers were kidnapped by militants in Baghdad in September 2015

Corruption

49% of survey respondents believe corruption is common in a Western European construction market

Source: Press reports; World Economic Forum; The Boston Consulting Group

Figure 4: Unique Construction Environment

The industry has unique characteristics ...

Multiple stakeholders with diverse interests/needs

— Three different project owners are involved in the construction of the Berlin airport. Delays of 10 years and cost overruns of about €5 billion are expected.

Project business and on-site construction

— According to the corporate strategy director of a major global E&C firm:
"Our product output is in the unit of 1."

High industry fragmentation

— The United States has 710,000 E&C companies; only 2% of them have more than 100 workers and 80% have just 10 workers or fewer.

Low profitability and capitalization

— Global listed E&C companies have a weighted average total shareholder return of only 5% and are consistently outperformed by most S&P 500 companies.

Highly cyclical and volatile business

— The Spanish construction market declined from a peak of €151 billion in 2006 to just €70 billion in 2012, and has still not fully recovered.

Unstable workforce

— In Canada, about 25% of workers whose construction jobs are terminated find their next job in sectors outside construction.

Unique construction environment

... and operates in a complex client context

Immature project definition and technical assessment

— Construction costs of the Hamburg Elbphilharmonie increased from €241M to €789M. "Almost all the extra cost resulted from planning that was insufficiently progressed at tendering time."

Over-preference for lowest price bid

— The launch of a 17km (11 mile) highway segment in Germany was delayed by six months, as one bidder raised objections to the tendering process – the lowest bid had not been chosen.

Insufficient or incremental funding

— Many US government contracts have an Availability of Funds clause that limits the government's liability to pay the full amount claimed.

Conservative clients

— A minor problem with an innovative rapid-hardening concrete during a night shift almost brought a public road project to a halt, as the project owner lost faith in the new material.

Increased risk transfer to contractors

— Emerging-market infrastructure investments with private participation, which often involve a transfer of risk to contractors, have tripled since 1995 and totalled $108 billion in 2014.

Complexity of contracts and dispute resolution

— 25 years ago, a typical contract consisted of about 50 pages; today it can easily exceed 1,000 pages and is packed with legal complexities.

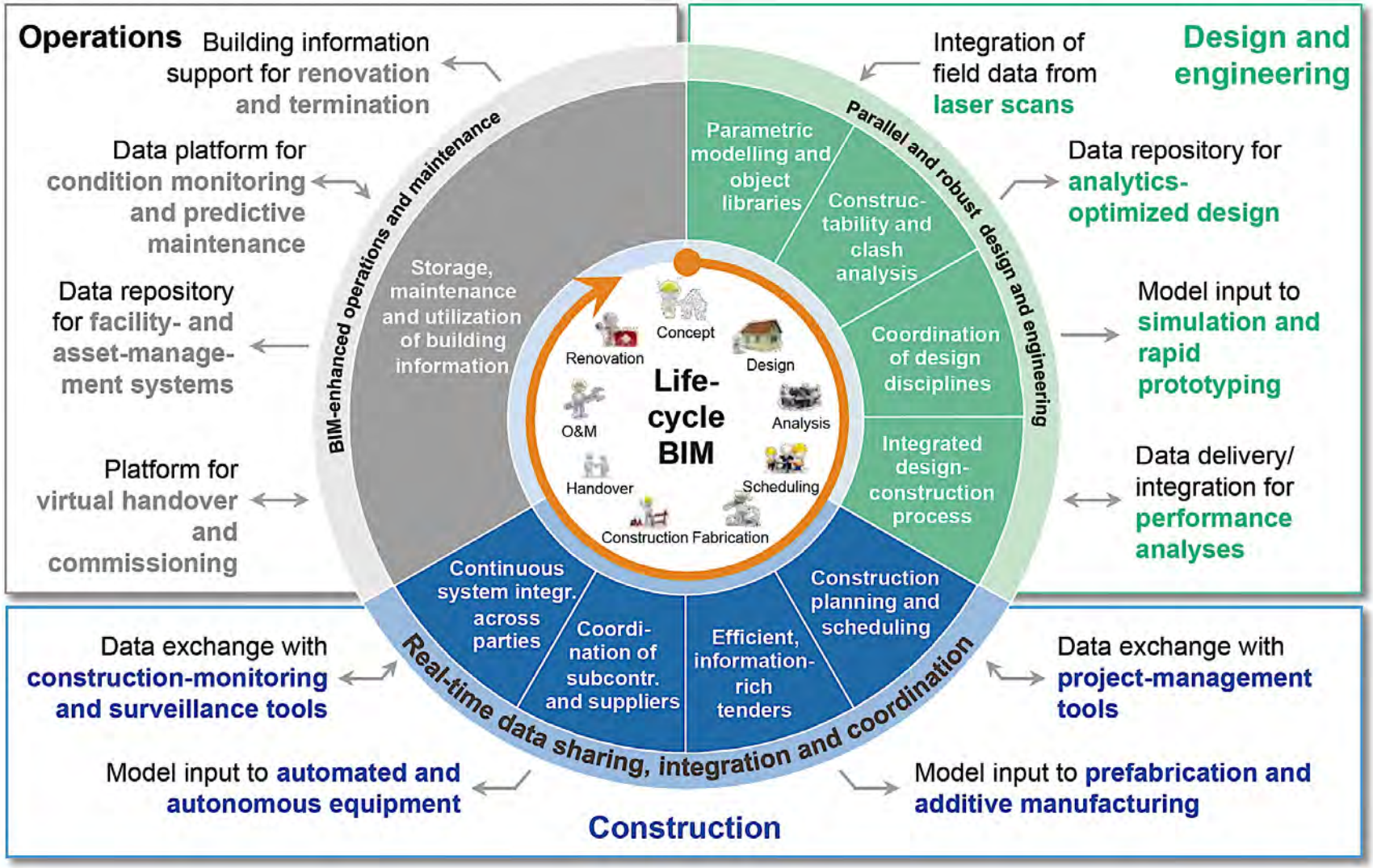
Source: World Economic Forum; The Boston Consulting Group

Incremental innovation → Radical innovation

Advances on traditional materials and existing characteristics	New material combinations and multi-functional characteristics	Innovative materials with entirely new functionality
— *iQ Natural*, an advanced vinyl flooring, is 100% recyclable, using a bio-based plasticizer. The product has **TVOC[1] values 100 times below the strictest European standards.**	— *Lixil's* super-lightweight ceramic sidings combine fast-hardening cement with organic fibre to **meet the required performance at half the weight**	— Rain-absorbing roof-mats, imitating the process of perspiration, considerably **reduce air-conditioning costs**
— *Neopor* is an enhanced styropor, offering up to **20% efficiency improvement in insulation**	— Self-healing concrete, generated through the addition of bacterial spores, is estimated to **reduce lifetime costs by up to 50%**	— *Micronal*, a micro-encapsulated phase-change material incorporated into building materials, enables **intelligent temperature management**
— *ArcelorMittal* has launched organically coated steel that achieves **30-year guaranteed durability** and does not contain genotoxic, hexavalent chromium	— Concrete admixed with special construction chemicals **achieves 50% faster curing times**	— Slippery liquid-infused porous surfaces constitute **super-repellent surfaces** inspired by the carnivorous nepenthes pitcher plant

Higher recyclability/reusability
Reduced material costs
Higher energy efficiency
Early development/pilot phase[2]
Reduced life-cycle costs
Faster construction process
Improved health/well-being
Market-ready[2]

Figure 9: Applications of BIM along the E&C Value Chain[50]



Source: The Boston Consulting Group

Figure 11: Elements of a Cooperative Partnership[61]

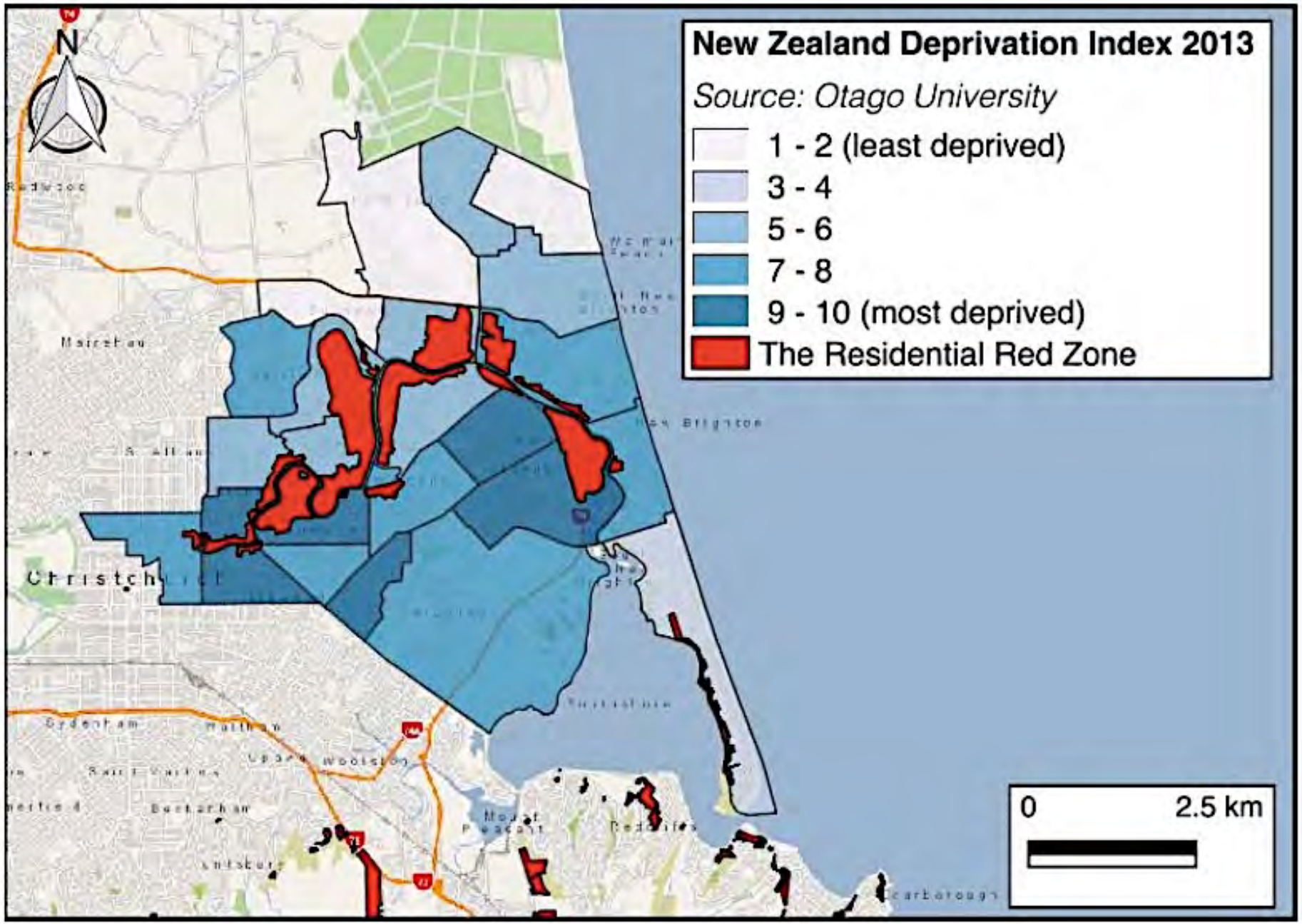
Project culture		Project charter with common project goals	Transparent financials ("open books")	Co-location of teams ("big rooms")	Common data platform (e.g. BIM)
Tendering and contract		Choosing most efficient, not cheapest	Multi-party contract with clear accountabilities	Early involvement of key participants	Prudent management and appropriate allocation of risk
Incentive mechanisms		Alternative cost models, such as target cost	Incentives for cost optimization	Premium for early project delivery	Shared risk/reward ("pain share, gain share")
Conflict resolution		Collaborative decision-making and control[1]	Internal dispute resolution via negotiation	Third-party mediation and conciliation	Decision by adjudicator or arbitrator

[1] Potentially including liability waivers among participants
Source: World Economic Forum; The Boston Consulting Group

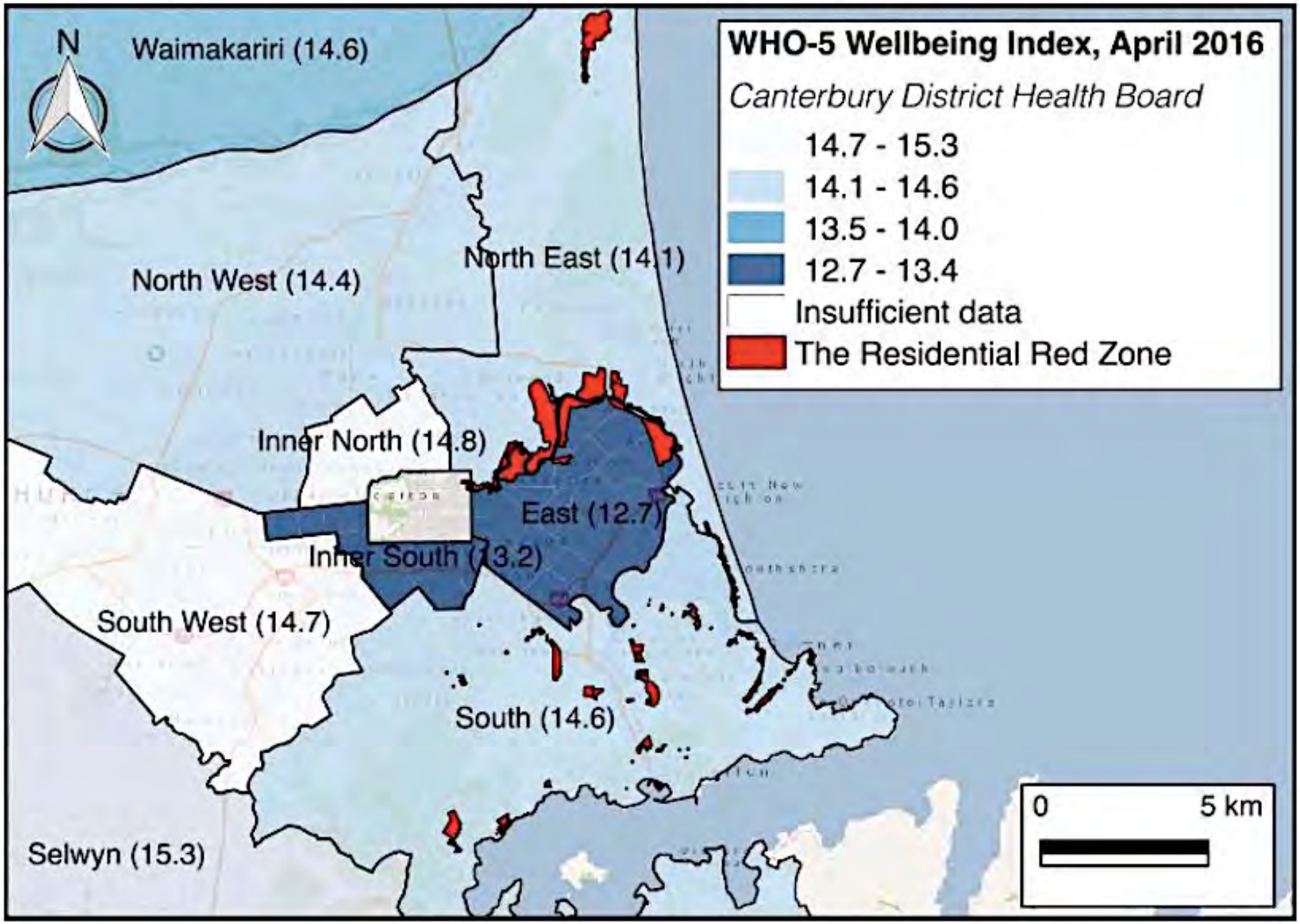
Ōtākaro Avon…from city to sea

- …an umbilical cord reconnecting people and ecosystem
- …healing many great hurts and injustices

Map Five: New Zealand Deprivation Index, 2013.

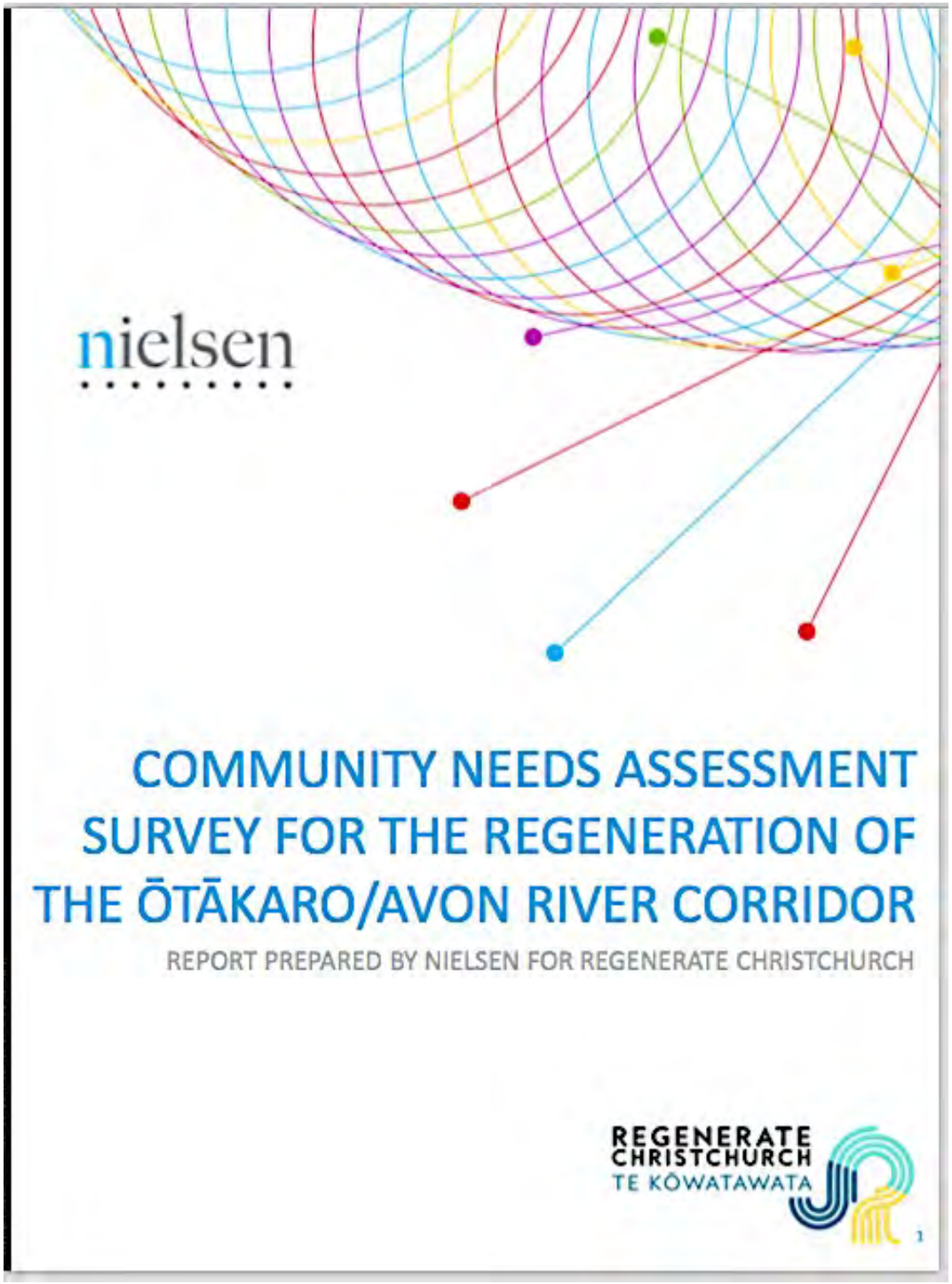


Map Eight: Mean WHO-5 score by geographic area, 2016.



The people speak

- Clear expression of all that's important to them
- But weaving those together into a coherent and powerful purpose is an enormous challenge



Agenda

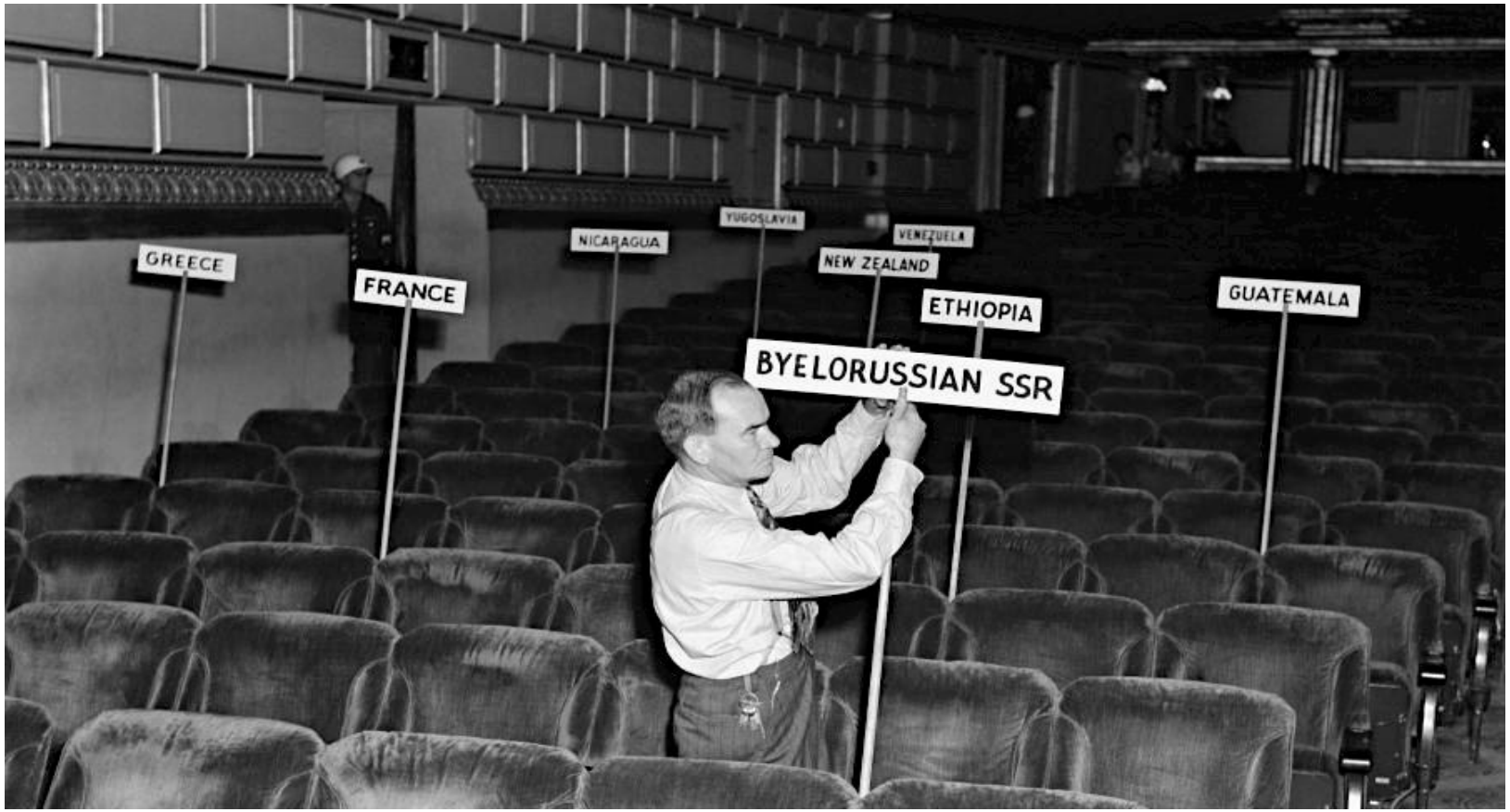
- World
- New Zealand

- Construction
- **Clean**


Nations Unies
Conférence sur les Changements Climatiques 2015
COP21/CMP11
Paris France
SECRETAIRE EXECUTIVE CCNUCC
PRESIDENT
SECRETAIRE

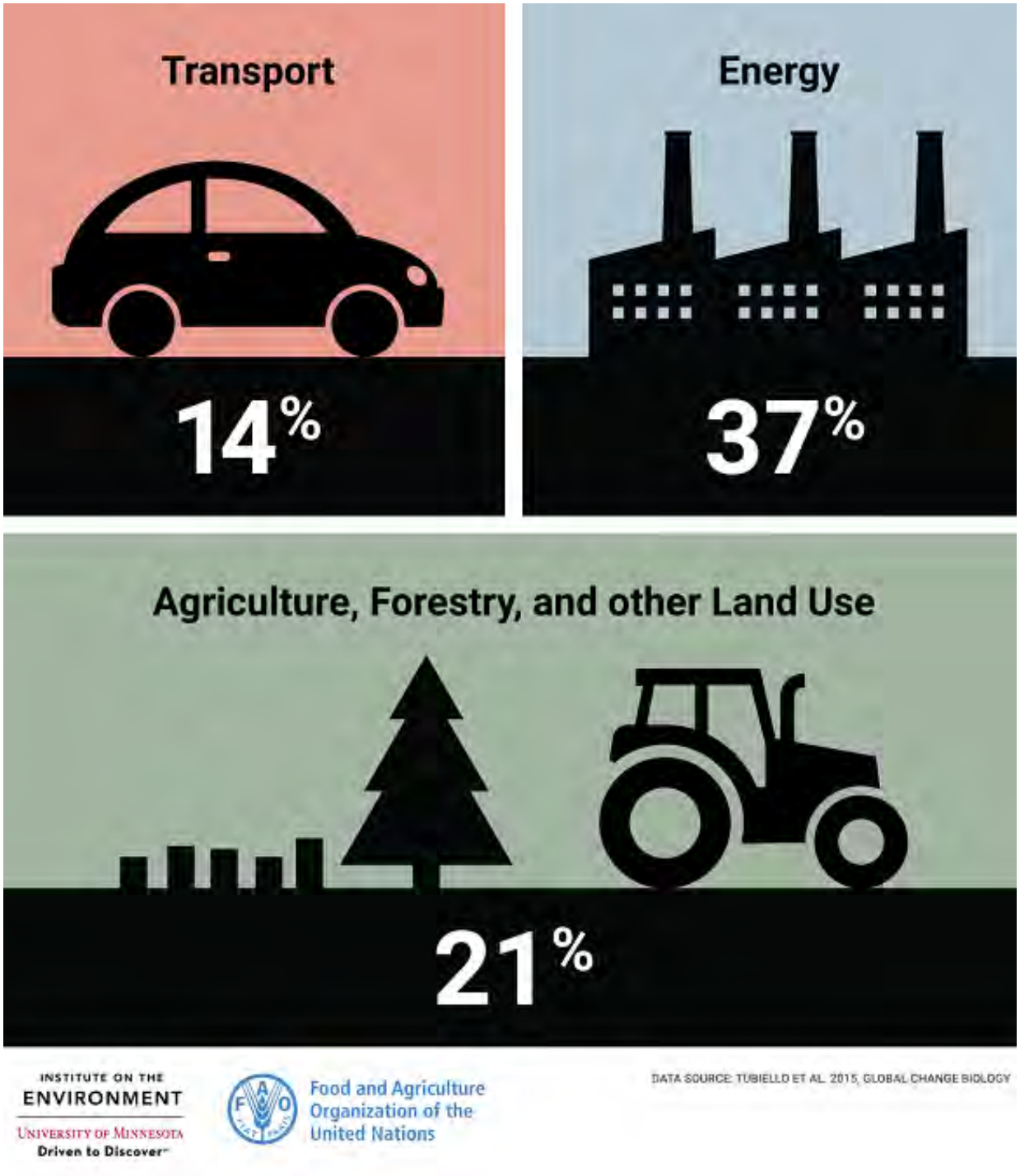
NZ's crucial contribution to Paris…

- …we proposed the concept of each country determining its own contribution to reducing carbon – this broke the years-long deadlock in global climate negotations
- We are very useful in such global forums...as we were e.g. at founding of the UN in San Francisco in 1945
- ...but we have to live up to the standards we expect of others

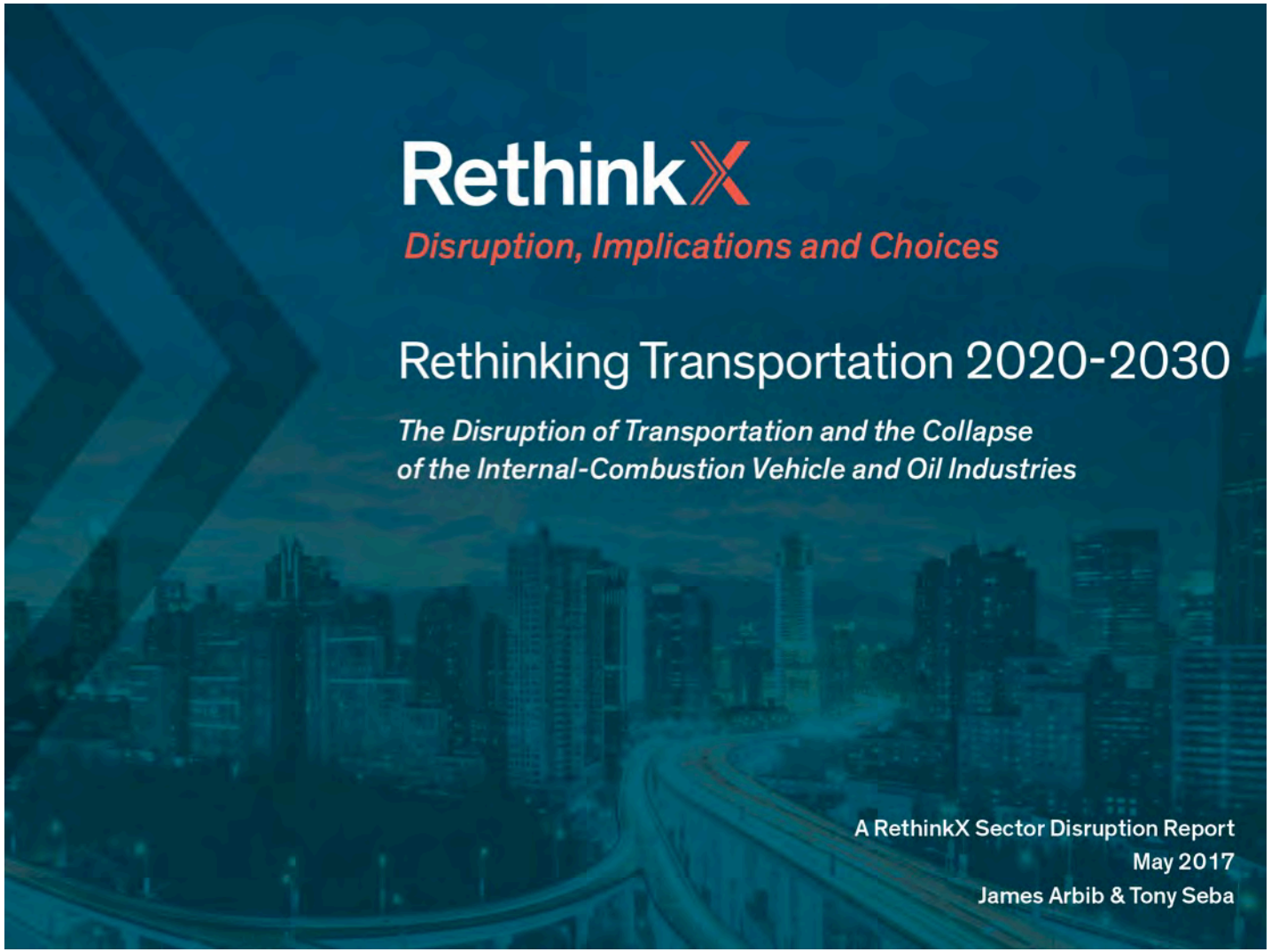


Monumental global challenges

- Are there technological and economic pathways for big cuts in global emissions in next 20 years?
- …driven by massive R&D and business investment?
- Electricity? Yes!
- Transport? Yes!
- Industry & buildings? Yes!
- Agriculture? No!
- …but NZ should be a global leader to turn this around...and we aren't yet

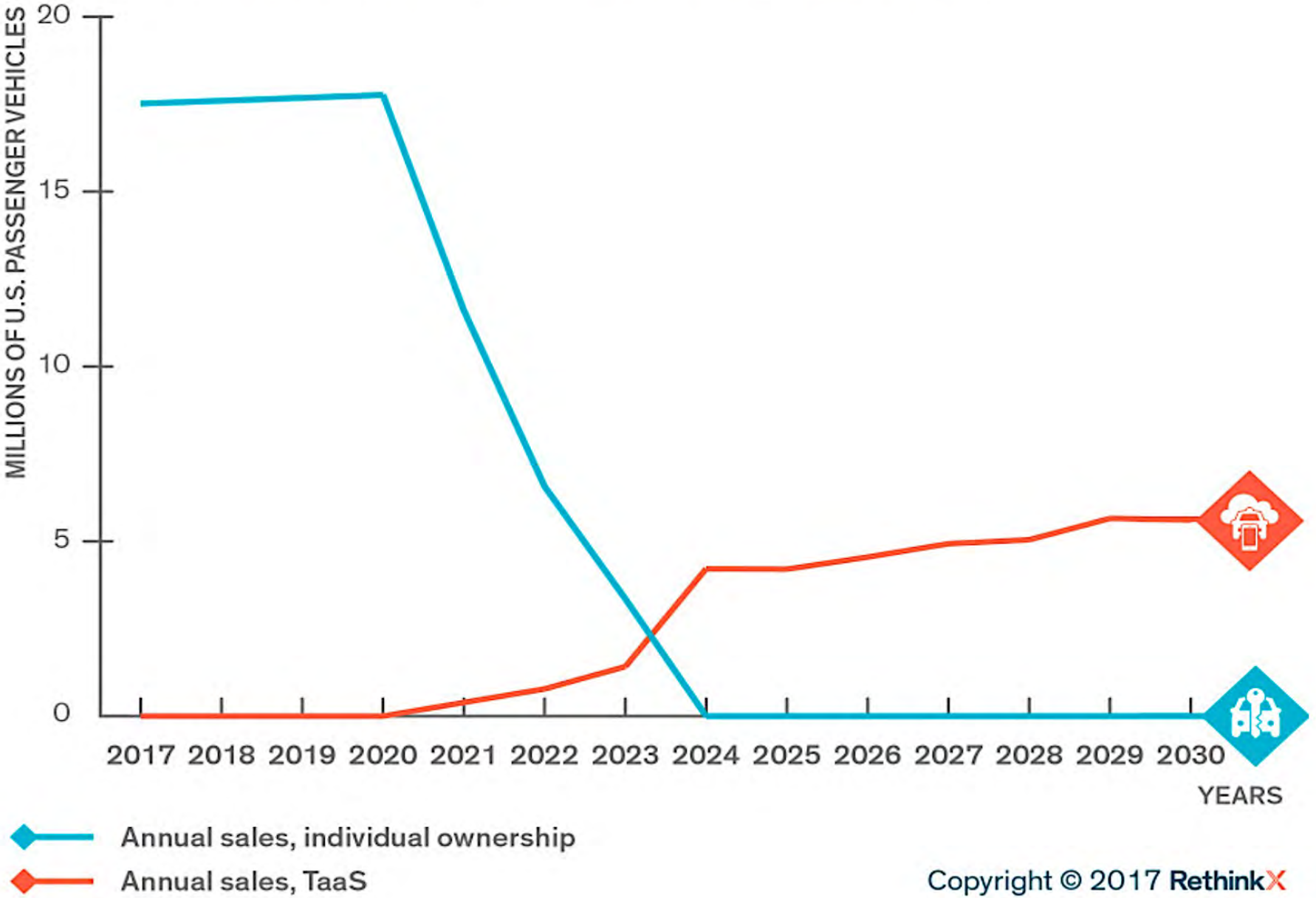


Rethinking transport

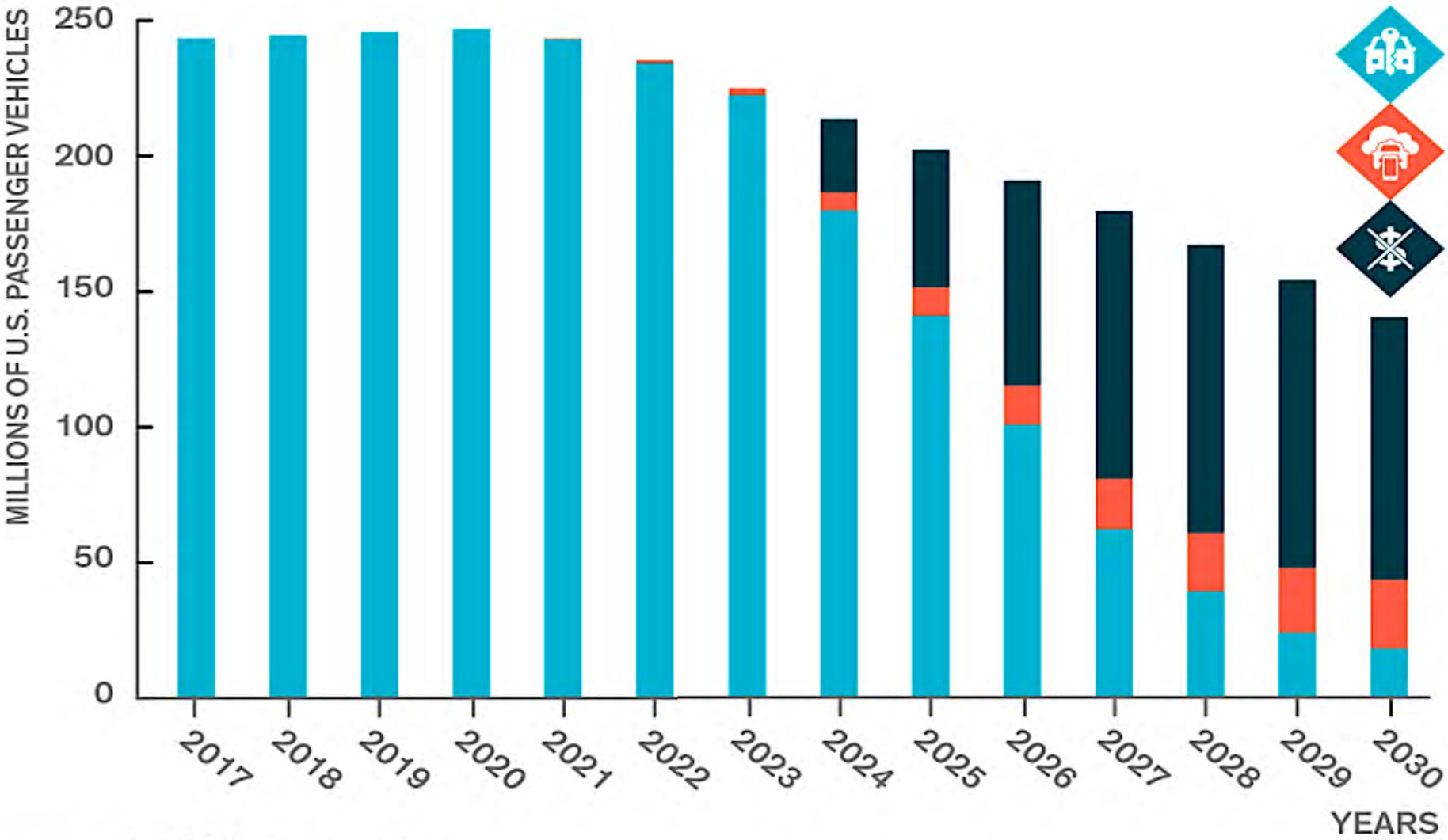


- https://static1.squarespace.com/static/585c3439be65942f022bbf9b/t/591a2e4be6f2e1c13df930c5/1494888038959/RethinkX+Report_051517.pdf

» ICE vs. TaaS: Projected trends in annual sales



» Projected trends in fleet size and composition



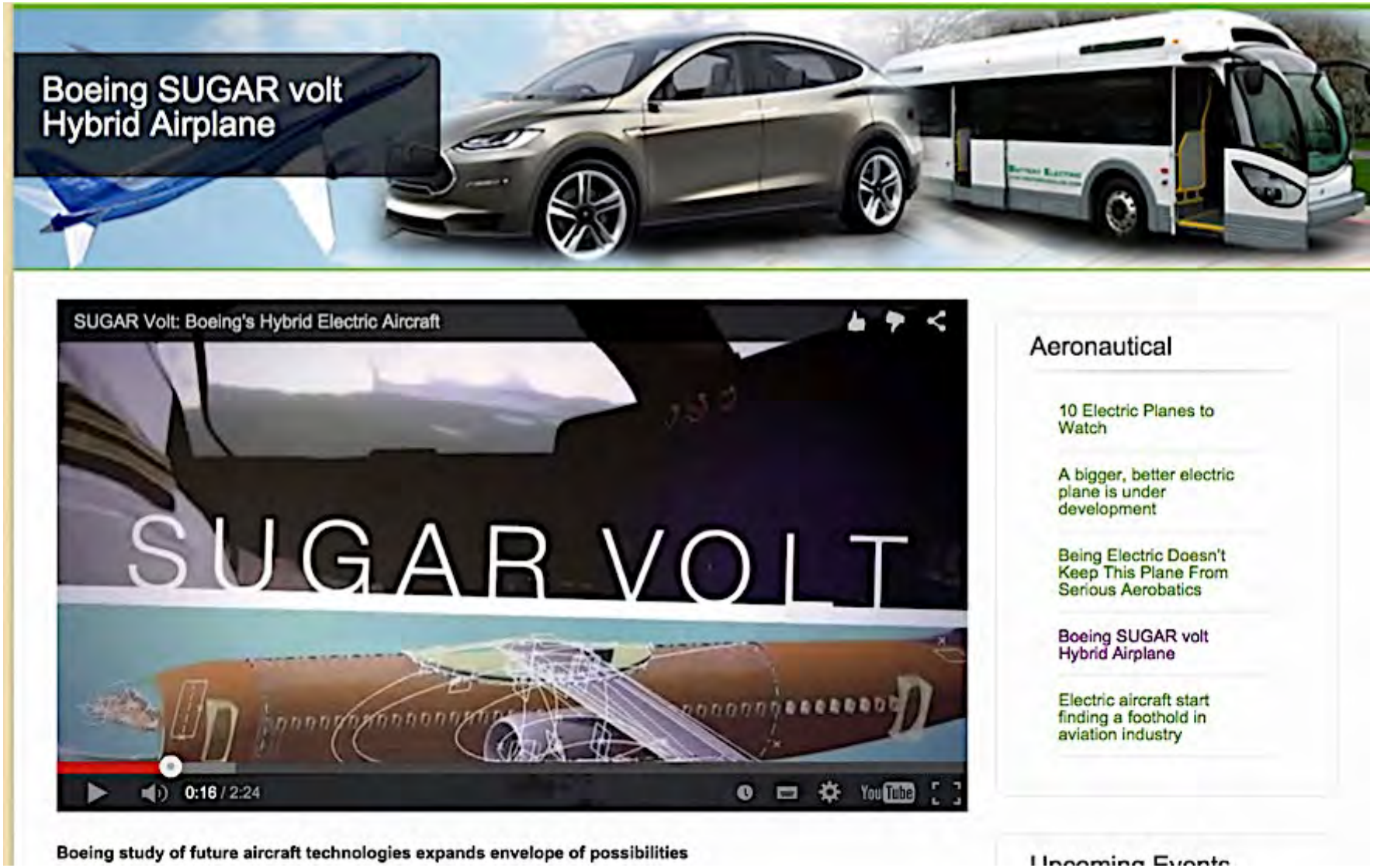
Airbus E-Fan

- Electric planes?
- Unthinkable a few years ago
- Now small e-planes are flying…
- …and Airbus and Boeing have potential technology pathways to commercial passenger aircraft

Electric planes by 2030?

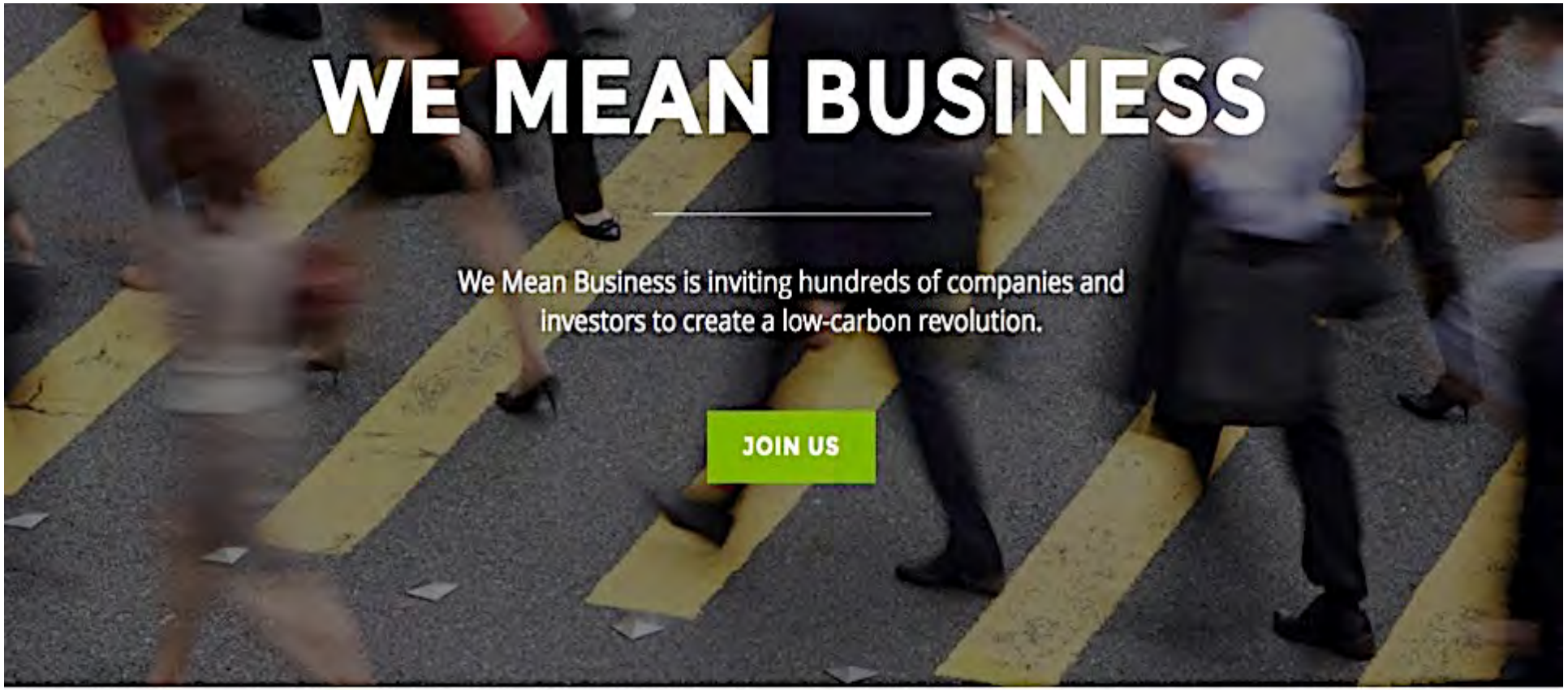
Boeing's research on hybrid and electric planes

- http://tec.ieee.org/aeronautical/boeing-sugar-volt-hybrid-airplane/



Transportation Electrification Community

- http://tec.ieee.org/ US Institute of Electrical and Electronics Engineers



467
Companies

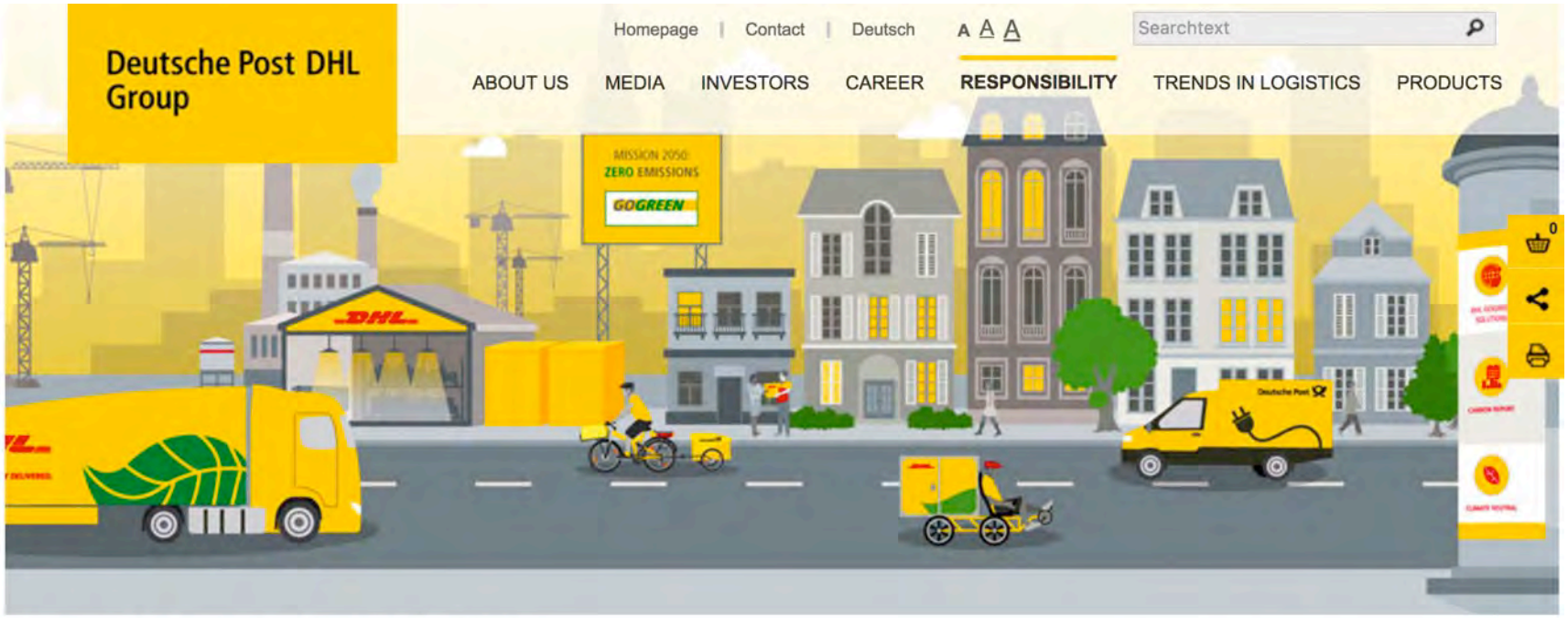
>US$8.1Trillion
Total Revenue

183
Investors

>US$20.7Trillion
Assets Under Management

1065
Commitments

RECENT COMMITMENTS FROM: Amalgamated Bank, AMD, Apple, Bank of America, CA Technologies, CEWE, CNH Industrial NVCovestro, Ltd., DNB, Facebook, Hongbo, Inditex, Interface, Mahindra Holidays and Resorts, Novo Nordisk, Philips Lighting, Rackspace, SIG Combibloc, Tetra Pak, Verbund AG, VF Corporation, VMware, Wells Fargo, Workday



Homepage › Responsibility › Environment and solutions

- http://www.dpdhl.com/en/responsibility/environmental-protection.html

Start reading

Group-wide environmental protection program GoGreen defines new global target: zero emissions by 2050

Sustainability has long since become one of the most important issues of our time. Our contribution to greater sustainability around the world is green logistics. To realize a more sustainable future we think it's important to think big. Our new climate protection target is to reduce all logistics-related emissions to zero by the year 2050.

To help realize this vision of zero emission logistics, we have established a number of ambitious interim goals across the main action areas of our sustainability strategy.

By the year 2025, we want to:

1. Increase our carbon efficiency by 50% compared to 2007 levels. This new target is based on the approach taken by the Science Based Targets Initiative.
2. Reduce local air pollution emissions by operating 70% of our own first and last mile services with clean pick-up and delivery solutions, such as bicycles and electric vehicles.
3. Have more than 50% of our sales incorporate Green Solutions. In this way we also make our customers' supply chains greener.
4. Certify 80% of our employees as GoGreen specialists and get them involved in our environmental and climate protection activities. This includes joining partners to plant one million trees every year to protect our forests.

Delivering Tomorrow

Mission 2050: Zero Emissions

After achieving a significant improvement in our carbon efficiency in recent years, we are once again setting the bar high for our industry: We intend to reduce all transport-related emissions to zero by 2050.

read Frank Appel's blog post ›

Downloads

OUTLINE OF A CIRCULAR ECONOMY

PRINCIPLE

1

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows
ReSOLVE levers: regenerate, virtualise, exchange

PRINCIPLE

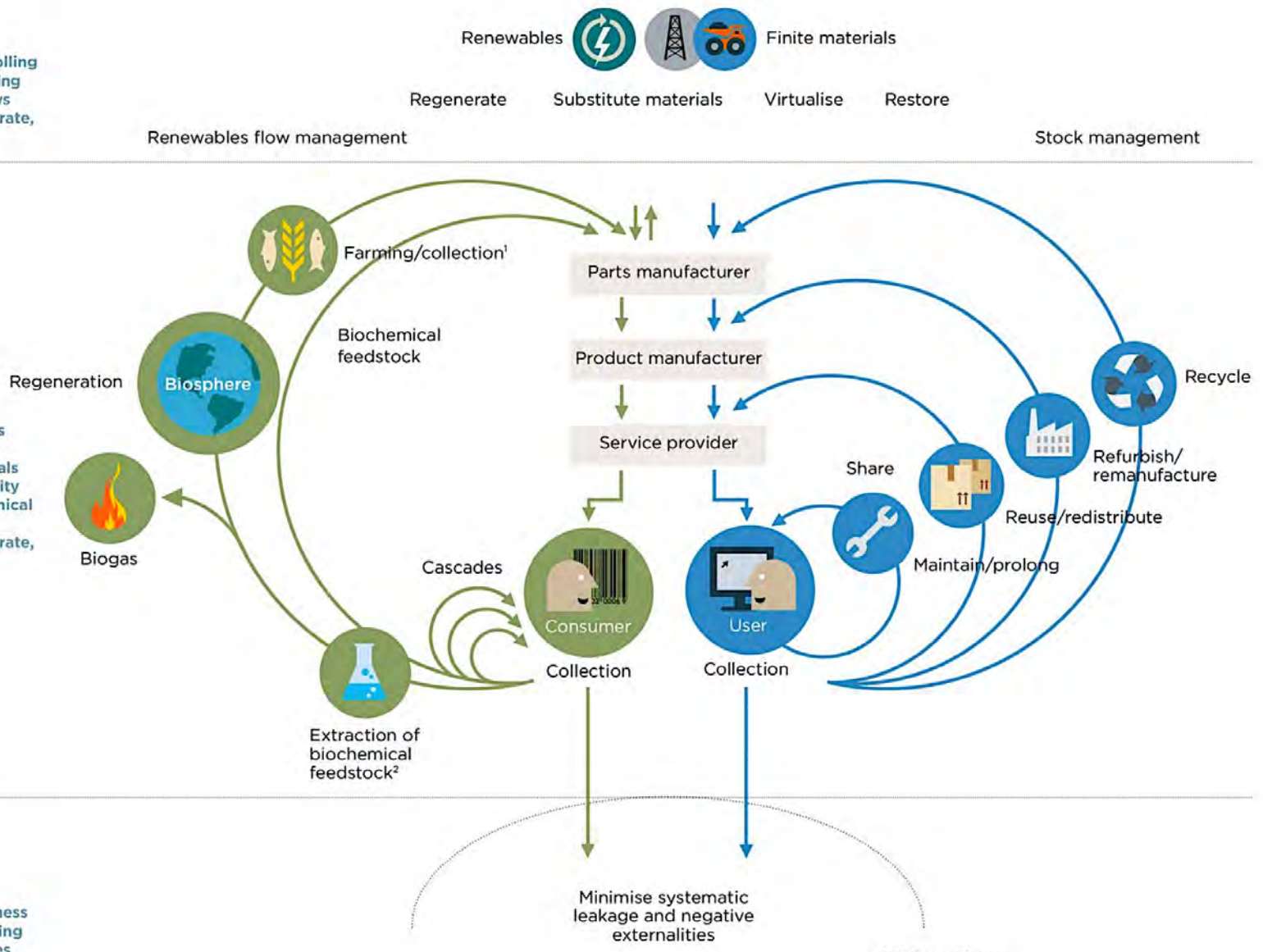
2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles
ReSOLVE levers: regenerate, share, optimise, loop

PRINCIPLE

3

Foster system effectiveness by revealing and designing out negative externalities
All ReSOLVE levers



1. Hunting and fishing
2. Can take both post-harvest and post-consumer waste as an input

Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).

WE NEED A REVOLUTION OF CAPITALISM

Peter Bakker
President, WBCSD;
Former CEO of TNT

Peter Bakker
CEO, *World Business Council for Sustainable Development*

Revolution

- Led by John Elkington and others
  - www.breakthroughcapitalism.com/

John Elkington
Co-Founder and Executive Chairman
Volans

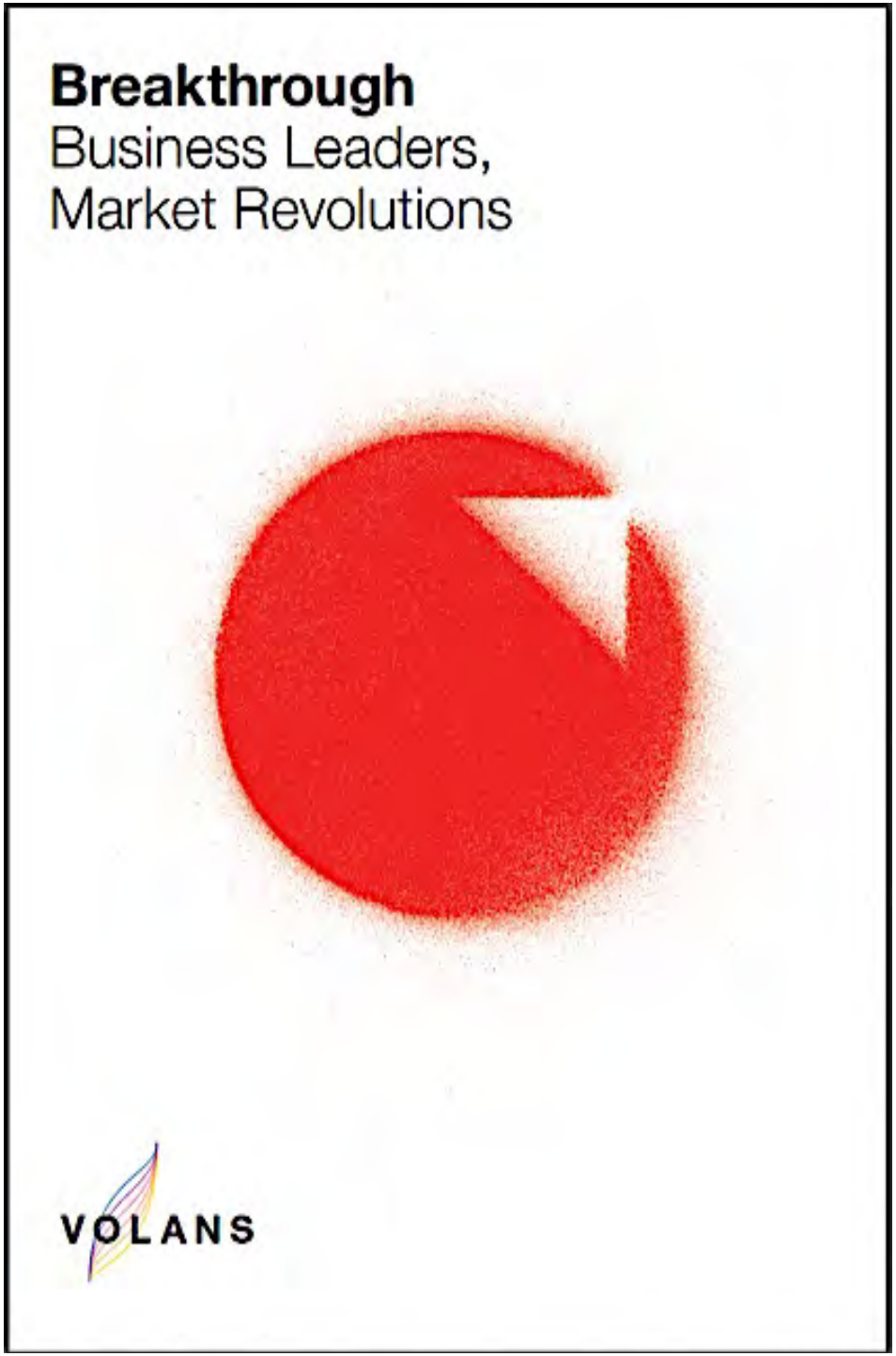
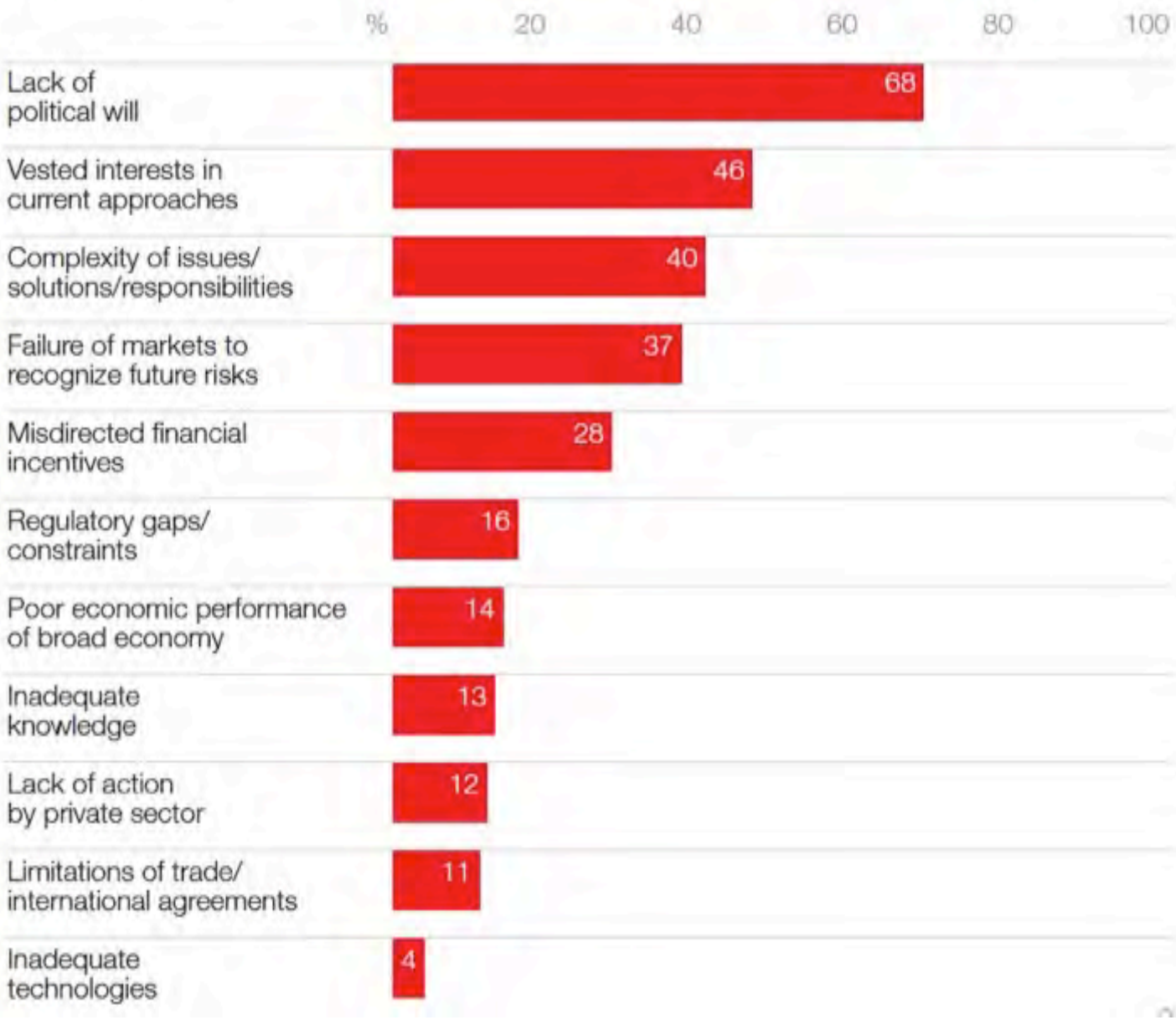


Figure 1.1
Barriers To Breakthrough Change
Source: GlobeScan and SustainAbility

Based on a 2012 survey of 1,660 experts in 117 countries. The original question related to progress in implementing 1992 Earth Summit's Agenda 21, sadly still a reasonable proxy for Breakthrough change.[16]



Breakthrough Criteria

- **Future Ready**
  - Ecological foot printing – Global Footprint Network
  - Planetary Boundaries – Stockholm Resilience Institute
  - Stranded Assets - Carbon Tracker

- **Ambitious**
  - Environmental Profit & Loss – Puma with PricewaterhouseCoopers
  - Zero emissions – Interface Zero Mission

Breakthrough Criteria

- **Fair**
  - Sustainable Living – Unilever
  - Social innovation & entrepreneurship – Skoll Centre for Social Entrepreneurship
  - Fair Trade

- **Disruptive**
  - Biomimicry – Janine Benyus & Associates
  - Circular Economy – Ellen Macarthur Foundation
  - Cradle-to-Cradle – McDonough Braungart Design Chemistry
  - Collaborative / sharing economy – Uber, Airbnb, Yerdle

Social enterprises

- ..delivering social and sustainable outcomes in business-like ways

Cellular agriculture

- … growing meat from stem cells = zero emissions

Our competition

- Food sources with zero environmental impact
- www.new-harvest.org

NEW HARVEST

The 501(c)(3) research institute accelerating breakthroughs in cellular agriculture.

New Harvest 2016: Conference

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BEEF WITHOUT COWS

And much more...

We strategically fund and conduct open, public, collaborative research that reinvents the way we make animal products - without animals.

Vertical farming

- ...an example in New Jersey: AeroFarms, http://aerofarms.com
- *New Yorker* magazine Jan 2017 http://www.newyorker.com/magazine/2017/01/09/the-vertical-farm

AeroFarms®

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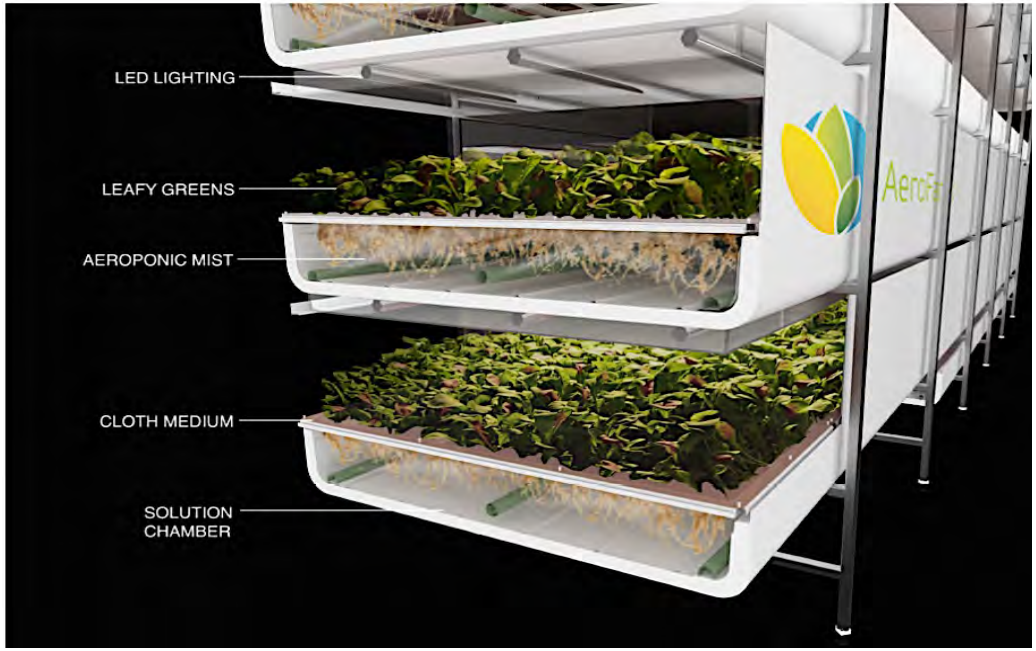
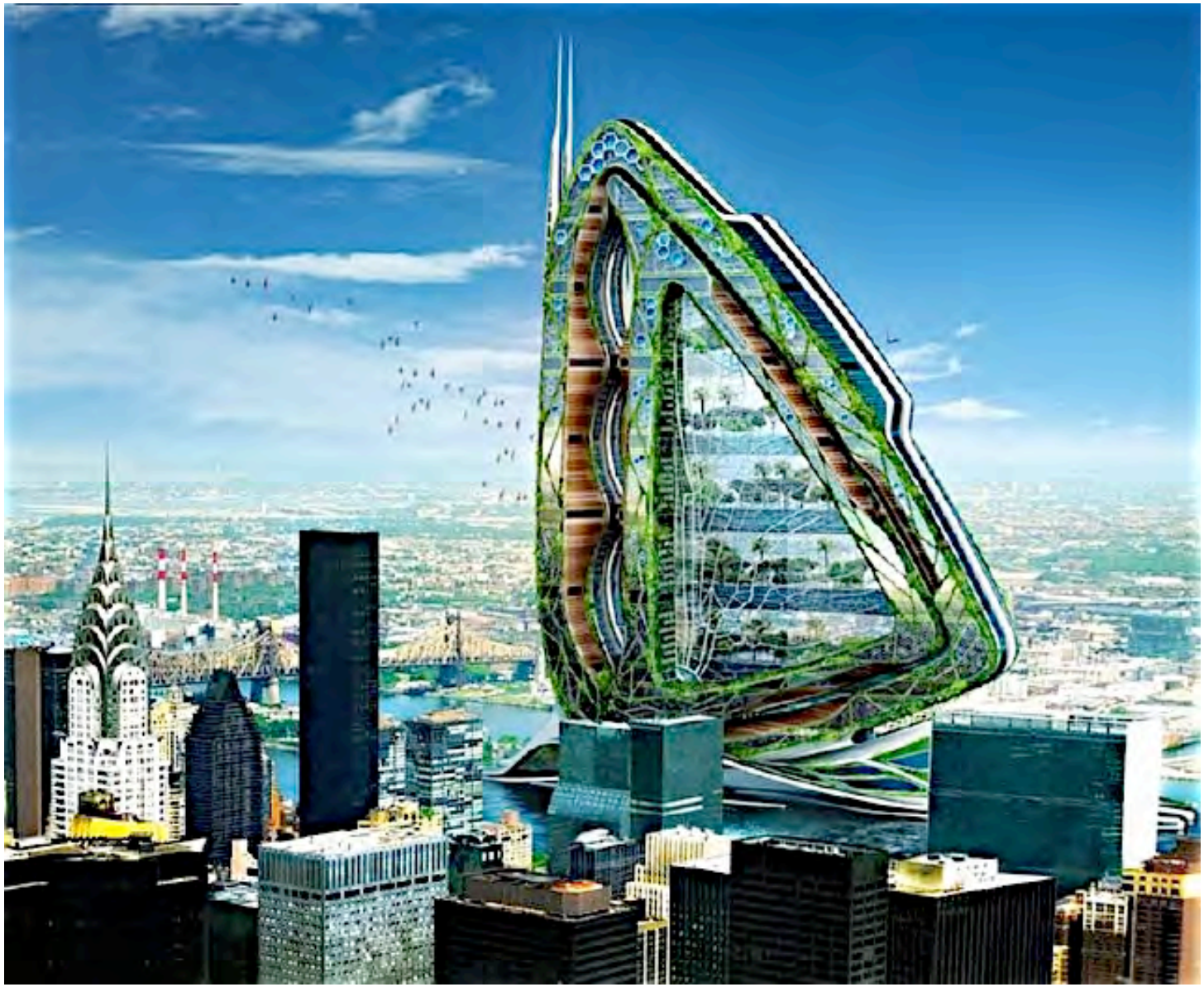
We Are Transforming Agriculture

We grow delicious, nutritious leafy greens and herbs without sunlight, soil, or pesticides. Our crops get the perfect amount of moisture and nutrients misted directly onto their roots in a completely controlled environment. With our patented technology, we take indoor vertical farming to a new level of precision and productivity with minimal environmental impact and virtually zero risk.



Cities will have to change fundamentally

- …bringing nature back into cities
- …making them largely self-sufficient for energy, food and other resources
- …be delightful, inspiring places to live and work
- …to restore our relationship with the ecosystem



Smart cities

- nz2050.com/McKinseySmartCities

NZ's agribusiness agenda 2017

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Home › Insights › Agribusiness Agenda 2017: The Recipe for Action

Agribusiness Agenda 2017: The Recipe for Action

14 June 2017

Focus on consumers of food critical to the success of NZ economy

Highlights

· What action do industry leaders want to take?

- https://home.kpmg.com/nz/en/home/insights/2017/06/agribusiness-agenda-2017-the-recipe-for-action.html

Ian Proudfoot

Global Head of Agribusiness, Partner - Audit

RANK	ACTION
1	World-class biosecurity
2	Create NZ provenance brands
3	Food safety strategic importance
4	Deliver high speed rural broadband
5	Innovate with customers
6	Sign high quality trade agreements
7	Delivering R&D incentives
8	Increasing rural / urban understanding
9	Developing future leaders
10	Deliver market signals to producers

Top 10 priorities

- Sustainabillity and climate issues rank far outside the sector's top 10 priorities

https://assets.kpmg.com/content/dam/kpmg/nz/pdf/June/agri-agenda-2017-kpmg-nz.pdf

Sustainability: Theme 4, Priorities 11, 17 & 37

RELEVANT SURVEY RANKINGS TO THIS THEME:

2017 PRIORITY RANK NUMBER:

11th

Penalties for those that don't protect animals

2016 PRIORITY RANK NUMBER: N/A

2017 PRIORITY RANK NUMBER:

17th

Schemes to regenerate native ecosystems

2016 PRIORITY RANK NUMBER: 17

2017 PRIORITY RANK NUMBER:

37th

Implement water costing mechanism

2016 PRIORITY RANK NUMBER: 35

The impact that the agri-food sector has on our natural environment was a dominant theme in many of our conversations this year. We came away from the discussions with little doubt that the majority of our contributors recognise that the future prospects for the industry are inextricably linked to its stewardship of the environment and water. It was also apparent that, for most leaders, sustainability is a bigger conversation than just that about the land and water; it is also about the role they take in ensuring their animals live good lives, and their employees are treated respectfully and kept safe, and in contributing to making New Zealand a better place for all New Zealanders.

Recognition that the industry's licence to operate is no longer guaranteed is shaping the thinking of many of our contributors on how their organisations and industries need to act to become truly sustainable. They acknowledge that, as the contribution that the tourism sector makes to the economy increases, perception grows that the dependency on the wealth generated from agri-food is waning. The implication of this is simple; the wider community is increasingly comfortable with tougher regulations if they preserve our natural environment. They recognise this will protect the ability of the tourism sector to continue to grow its contribution to the economy.

So low, yet, "…the prospects for the industry are intextricably linked to its stewardship of the environment and water."

Climate change - Priority 48

- “New Zealand should aspire to lead the world in mitigating the impact agriculture has on human-induced climate change but to achieve this requires financial signals.

  The suggestion was made by a number of contributors that the agri-sector should welcome its early inclusion into the emissions trading scheme, with a framework of incentives and penalties to encourage the right behaviours.”

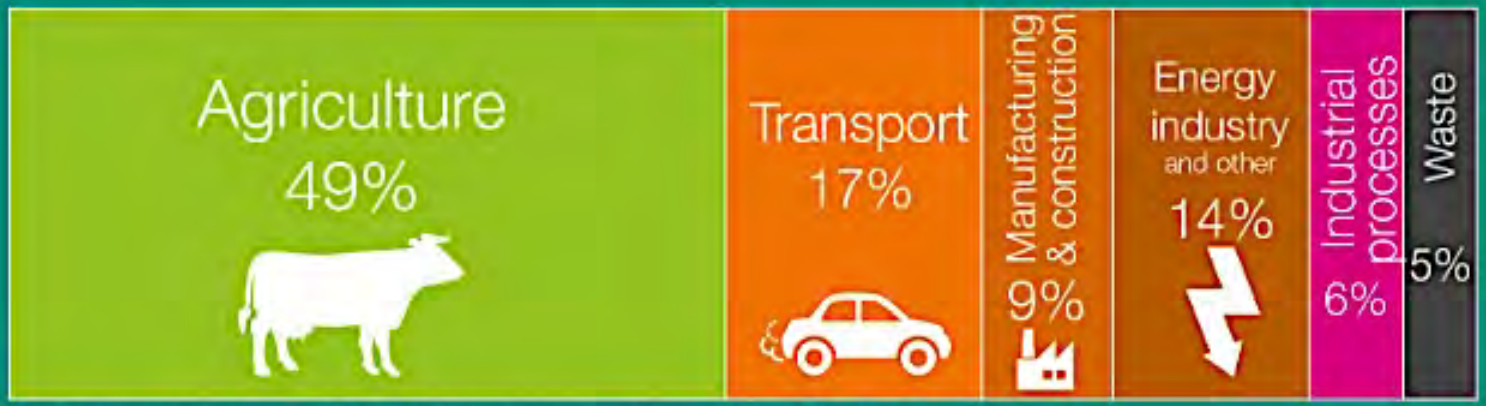
Our Paris commitment

- NZ's current target is to reduce our greenhouse gas emissions by 30% below 2005 levels by 2030.

- This target is equivalent to 11% below 1990 levels by 2030
- Yet, California's bi-partisan, mandated goal is a 40% cut from 1990 levels by 2030

Half of New Zealand's **greenhouse gas emissions** come from agriculture.

This is the highest share in the OECD.



GHG emissions by sector, 2014, excluding emissions/removals from land use, land-use change and forestry. *Source: OECD Environment Statistics* (database)
Icons by Chris Pyper, Jason Dilworth, Krisada, Edward Boatman for TheNounProject.com

OECD Environmental Performance Reviews: ***New Zealand 2017***

http://oe.cd/epr-newzealand

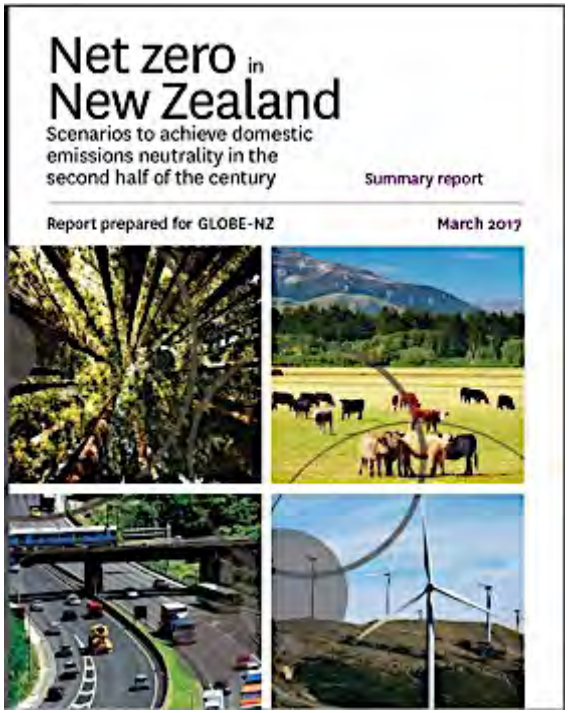
OECD

Net Zero New Zealand

- Very encouraging NZ roadmap to a low carbon economy
  - ...and the dangers of sticking where we are
- Commissioned by Compass-NZ (all-party group of MPs), business and others
- Report produced by Vivid Economics of the UK

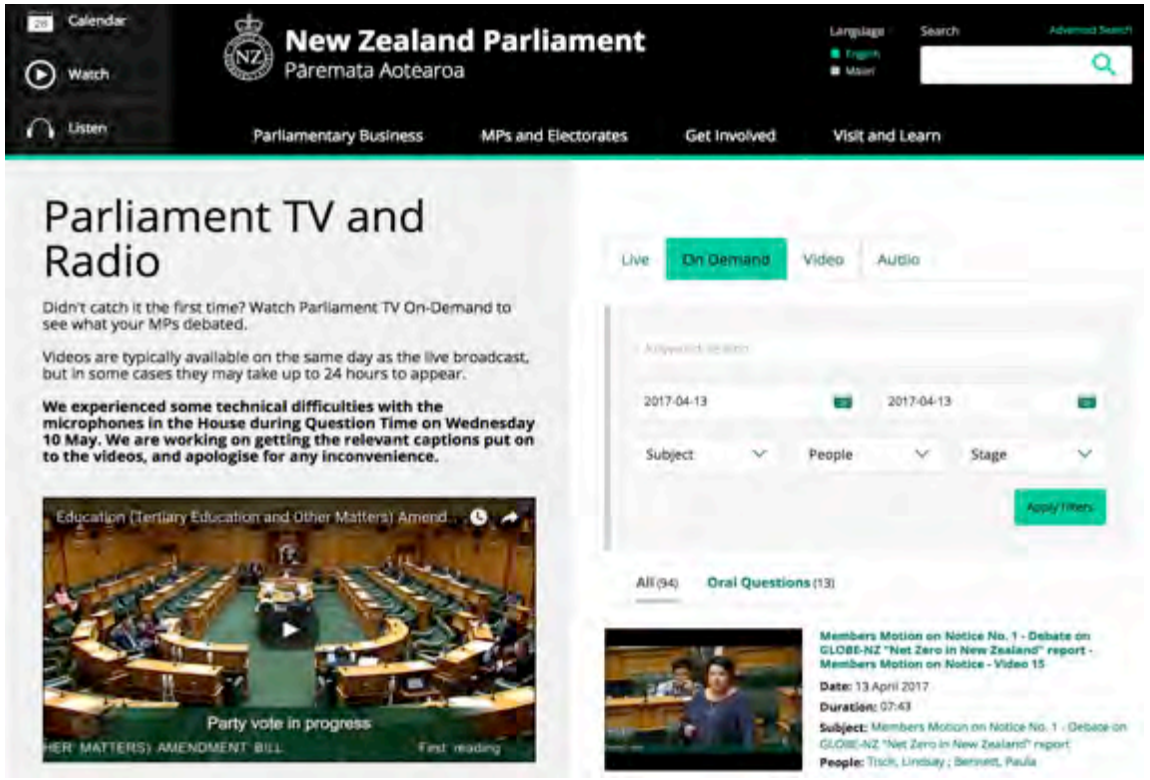
- Report: http://www.vivideconomics.com/wp-content/uploads/2017/04/Net-Zero-in-New-Zealand-Summary-Report-Vivid-Economics.pdf

- Slides from Beehive launch:
- http://www.vivideconomics.com/wp-content/uploads/2017/04/Net-Zero-New-Zealand-Beehive-launch-slides.pdf



Civil and constructive debate…

- …in Parliament?
- Yes!



- …the debate: https://www.parliament.nz/en/watch-parliament/ondemand?keyword=&from=2017-04-13&to=2017-04-13&subject=&person=&stage

Lots we can do on agricultural GHG

Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

Climate change and agriculture: Understanding the biological greenhouse gases

19 October 2016

In this report the Commissioner examines the issue of agricultural greenhouse gases – methane and nitrous oxide – which together form about half of New Zealand's greenhouse gas emissions. This high proportion of emissions coming from agriculture is a major challenge for New Zealand. The science is complex and the policy debate is polarised.

The main policy 'instrument' in New Zealand for reducing greenhouse gas emissions is the Emissions Trading Scheme (ETS). The biological gases from agriculture have not yet been included in the ETS. Some argue they should be; others make the opposite case.

This particular dispute, however, lies within a bigger question – what, if anything, should we do about the methane and nitrous oxide from agriculture? Our efforts to answer this question will be more efficient and constructive if we have a common understanding of the basic science. It is hoped that this report will help develop that understanding.

Download report

Climate change and agriculture: Understanding the biological greenhouse gases

Download Report [PDF]

Request Form

FAQs Climate change and agriculture

Download Report [PDF]

Request Form

Request a hardcopy:

Request a hard copy by emailing us at report@pce.parliament.nz or filling in the request form:

- http://www.pce.parliament.nz/publications/climate-change-and-agriculture-understanding-the-biological-greenhouse-gases

Pure Advantage

- Thought leaders on our big transition to a low carbon economy

- Business-backed advocates of
- ...clean technology
- ...low carbon
- ...deep sustainability

- http://pureadvantage.org/

PROLOGUE

As a member of the Joint Project Committee, Pure Advantage is pleased to be involved in the release of Net Zero New Zealand. The report was authored by London-based Vivid Economics under contract to GLOBE-NZ, a national chapter of GLOBE-International, the worldwide association of parliamentarians working to protect and improve the environment. The analysis included a substantial programme of engagement with stakeholders from government, business and civil society in New Zealand.

Net Zero New Zealand is one of the first attempts to use scenario analysis to help illuminate New Zealand's long-term low-emission pathways in order to meet the country's obligations under the Paris Agreement. The report identifies four domestic emission reduction scenarios through 2050 which would position New Zealand to achieve emissions neutrality later in the century. The three elaborated scenarios are: Off Track

The response from business

- There are some leaders:
  - …e.g Z Energy, Sanford, Mercury
  - ...and Air NZ, Vector, Inftratil (e.g. its NZ Bus), Tourism Holdings, Waste Management and some others
  - ...e.g. some car companies are bringing in some clean technology

- But they aren't on the leading edge internationally

- Meanwhile, a large majority of businesses are not engaged strategically
  - ...'tho some are doing some tactical things

- NZ is well behind on new international norms
  - e.g. mandatory carbon reporting for stock market listed companies
  - e.g. on the climate-related investment disciplines NZ Super Fund uses

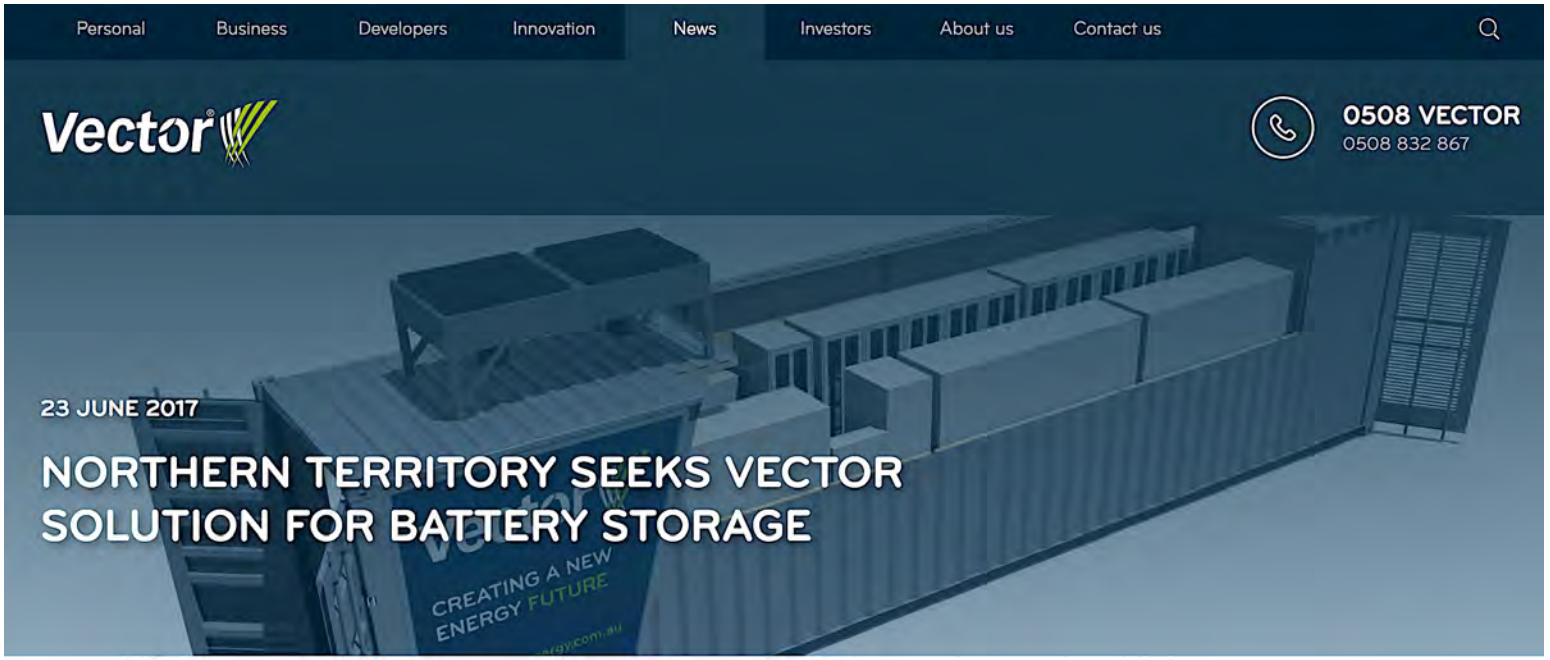
Vector – 1MW batteries in Auckland, October 2016

Today, Hon Simon Bridges, Minister of Energy and Resources, officially opened Vector's renovated Glen Innes substation, home to Asia Pacific's first grid scale Tesla Powerpack battery storage system to be integrated into a public electricity network.

With a storage capacity of 1MW/2.3MWh - the equivalent to powering 450 average homes for 2.3 hours - Tesla Powerpack allows Vector to continue to provide a secure, reliable power supply and defer a conventional upgrade to the substation.

This move represents a radical transformation in how Vector manages its electricity network and responds to the need for innovative infrastructure development to support growing communities.

Vector – 5MW batteries in Alice Springs, June 2017



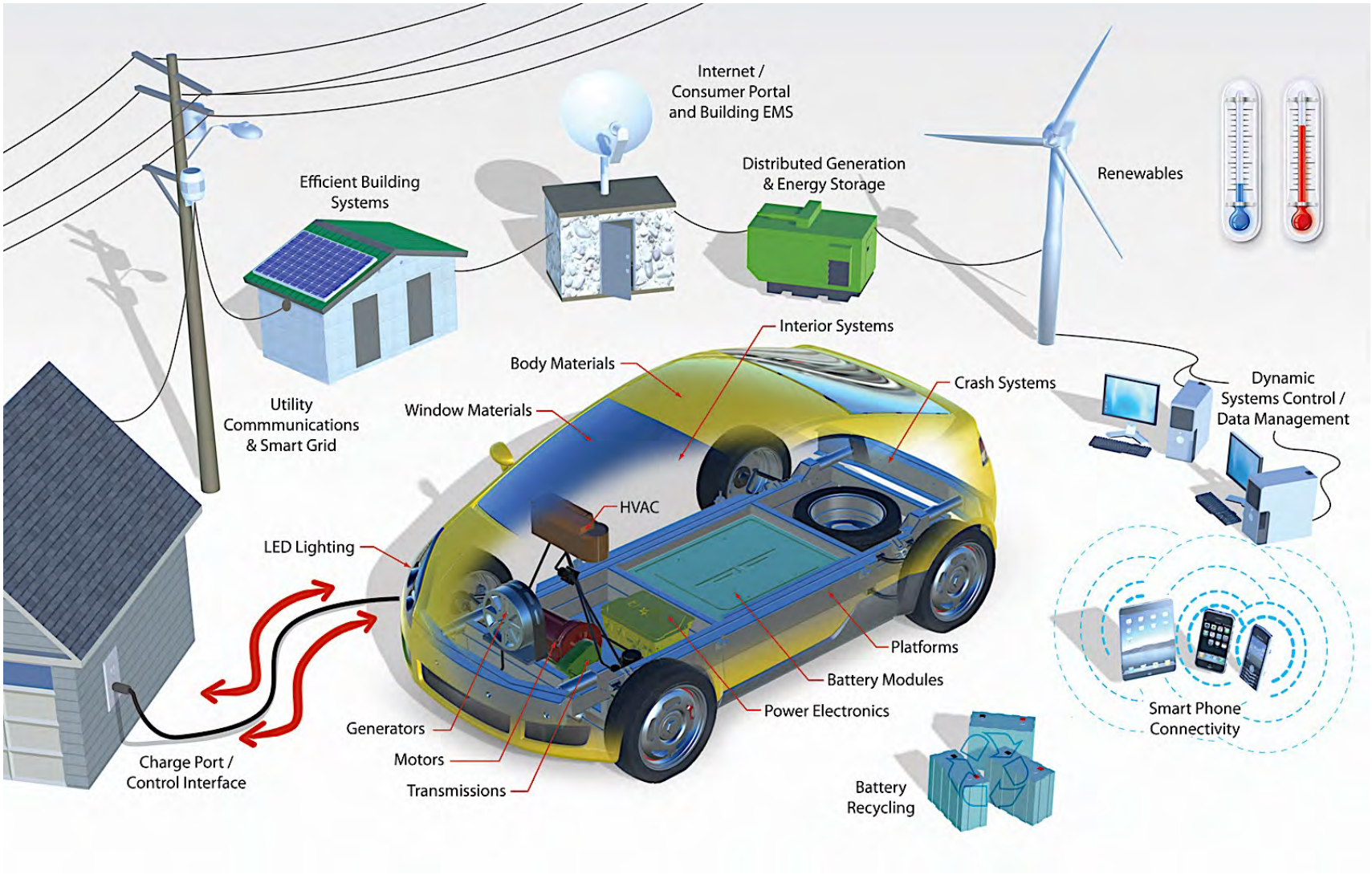
Vector has won a multi-million-dollar Australian contract to supply the Territory Generation Alice Springs Battery Energy Storage System (BESS) project.

Vector was one of a number of Australian and international firms bidding for the contract which will see it supply Australasia's largest grid-tied lithium ion battery storage solution to stabilise and enhance generation on the Alice Springs electricity network.

The **5MW battery system** will improve reliability on the network while helping smoothly switch energy use between renewable sources and the grid as needed. Vector will be responsible for the design, engineering, construction, and installation of the system and once commissioned, will also be responsible for ongoing maintenance.

Smart grid – the future of electricity

- Distributed generation, storage, trading, two-way flows, and EVs are key components

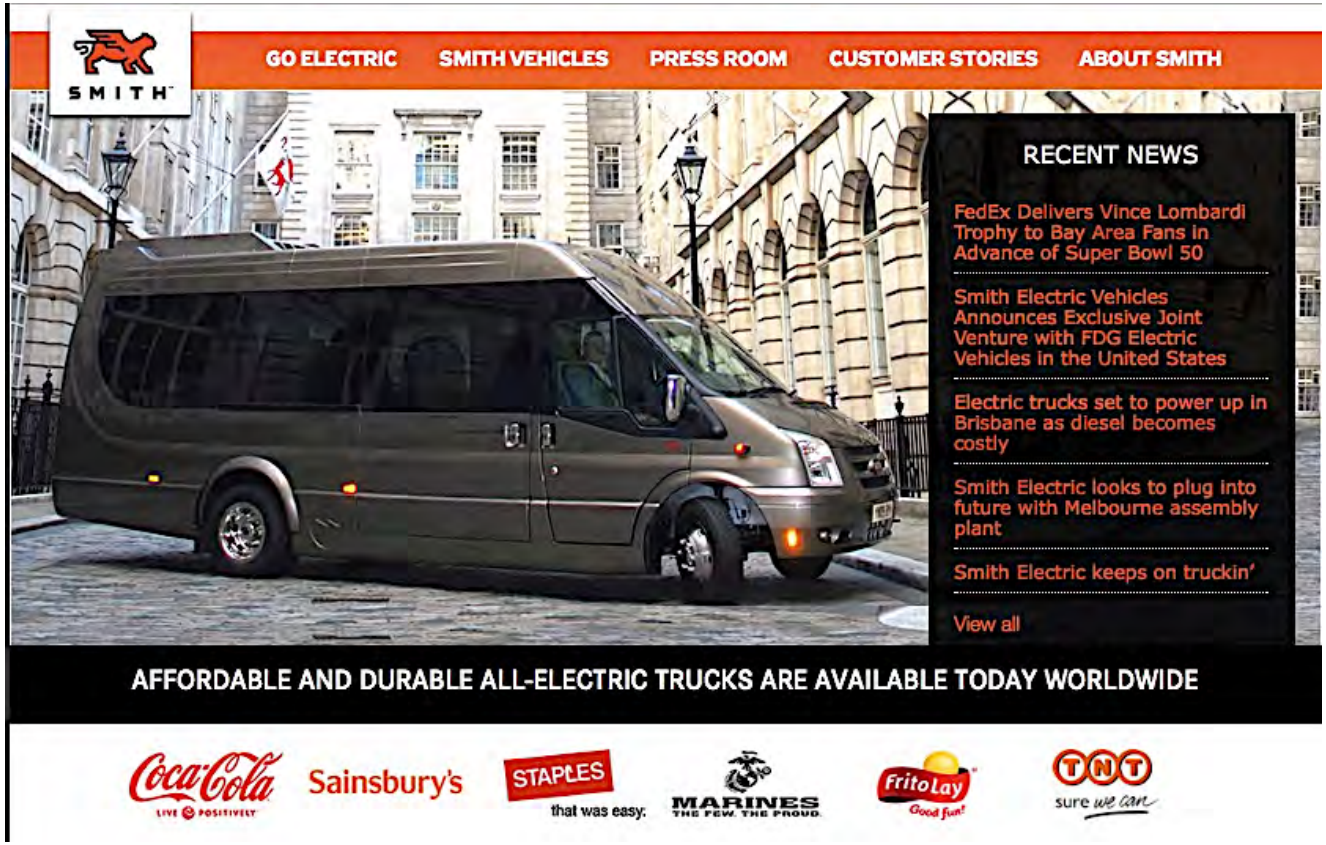


E-trucks for Christchurch

- Waste Management builds them in Auckland, using Dutch technology

E-campervans

- Tourism Holdings has two projects:
  - New-build on a European e-van chassis
  - Retrofitting diesel campervans with e-powertrains
  - …on the road to autonomous campervans
  - *(...below is illustrative: it's not using Smith chassis)*



Green imperative

Harvard Business Review

Why Sustainability Is Now the Key Driver of Innovation

by Ram Nidumolu, C.K. Prahalad, and M.R. Rangaswami

How Green Will Save Us: September, 2009 edition:
"There is no alternative to sustainable development.

"Our research shows that sustainability is a mother lode of organisational and technological innovations that yield both bottom-line and top-line returns…

…In fact, because those are the goals of corporate innovation, we find that smart companies now treat sustainability as innovation's new frontier."

Business is crucial for...

- Pushing the government to deliver strong & stable climate & environment policies
- Investing in new technology, business opportunities and business models
  - …to lead NZ's low carbon transformation
- Creating opportunities for its customers and suppliers
  - e.g. in low carbon products and services
  - …and more widely e.g. buying new EVs that they later on-sell to small businesses and consumers
- Helping the public to get involved in the new economy
- Encouraging the primary sector to get going on its low carbon opportunities
- **Business that are deeply committed to sustainability enjoy**:
  - Increased engagement and innovation from staff
  - Faster development and greater resilience
  - Stronger competitive advantage
- ***...they are making their future, rather than defending their past***


“You’ll have
no future...
...if you don’t
make one
for yourself”
Johnny Rotten