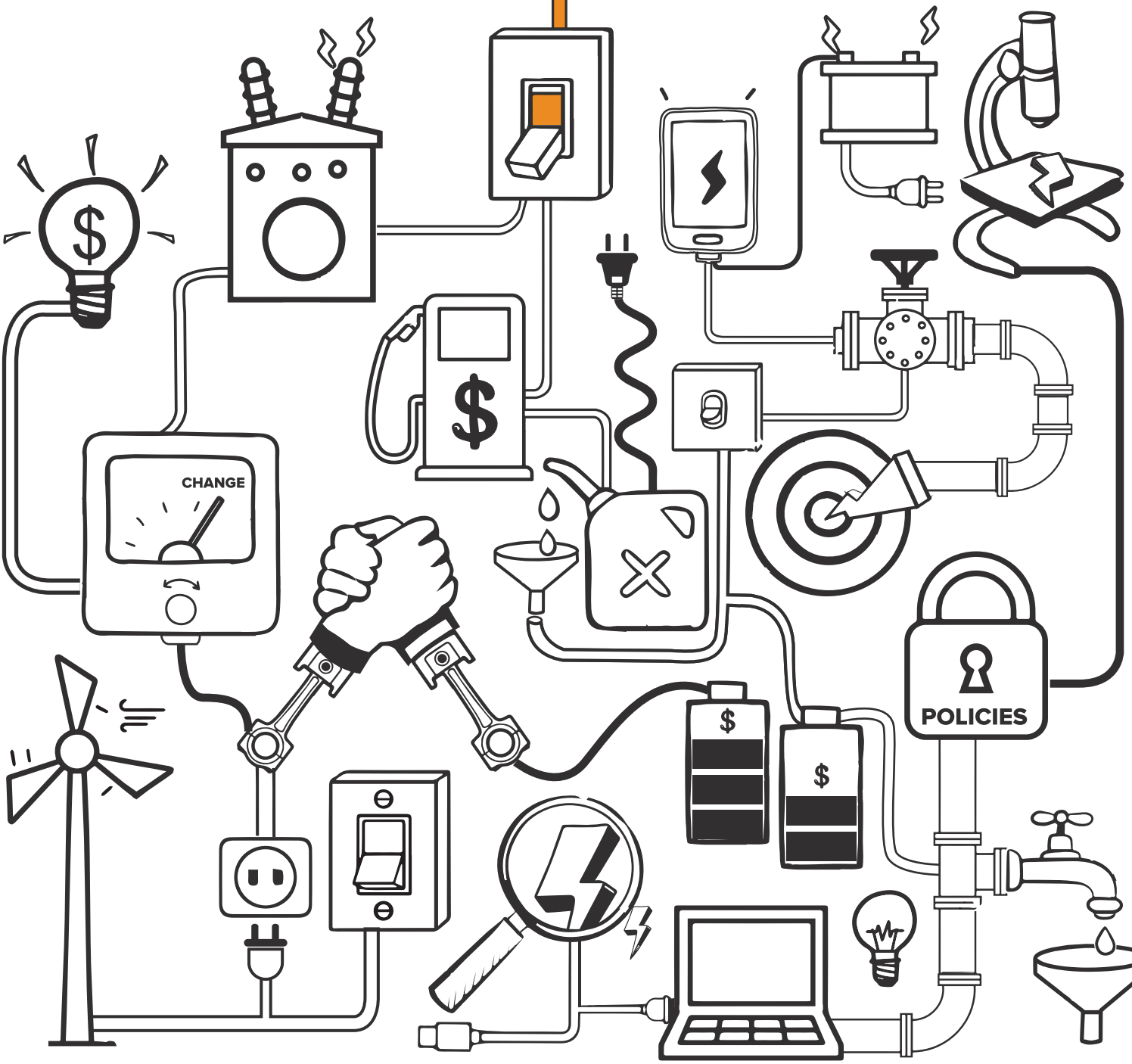
WORLD ENERGY COUNCIL | BusinessNZ Energy Council

2017 ENERGY BRIEFING



Foreword

The 'energy trilemma', the balancing of affordability, security and environmental sustainability outcomes, has been successfully embedded into the New Zealand energy conversation since we raised it in our 2014 Energy Briefing. It serves as a useful lens through which to view the effectiveness of past policies and a way to think about new challenges and opportunities. The energy sector is being transformed at an unprecedented pace by three reinforcing trends affecting the supply and demand of energy – decarbonisation, digitalisation and decentralisation - opportunities that allow policy makers and investors to address the energy trilemma.

While all three of the trilemma dimensions are important there is work to be done in specific areas. Having joined with others in the Paris Agreement, New Zealand now needs to make the necessary adjustments to a low emissions and ultimately carbon-neutral world. This will involve making many difficult choices. The task for business and policy makers is to identify and leverage energy production and consumption opportunities in ways that allow greater consumer choice, businesses to thrive on the global stage, and the economy to grow in an environmentally responsible way – all while a new reality is already upon us – serving empowered consumers.

We believe we are well positioned to meet this challenge without the need for major adjustments in policy or support institutions. However, we cannot afford to be complacent.

This document is designed to highlight the key issues from across the energy sector, as identified by our members. We seek to collaboratively and constructively address how rules, incentives and markets can best be harnessed to shape evidence-based policy informed by our scenario modelling. Together we can achieve the necessary transition to facilitate greater diversity of market participants and technologies without undermining the energy system we have. No system is perfect and while the platform from which we start is not broken, its ongoing development is something for which we all need to take responsibility.

Hon David Caygill
Chair, BusinessNZ Energy Council

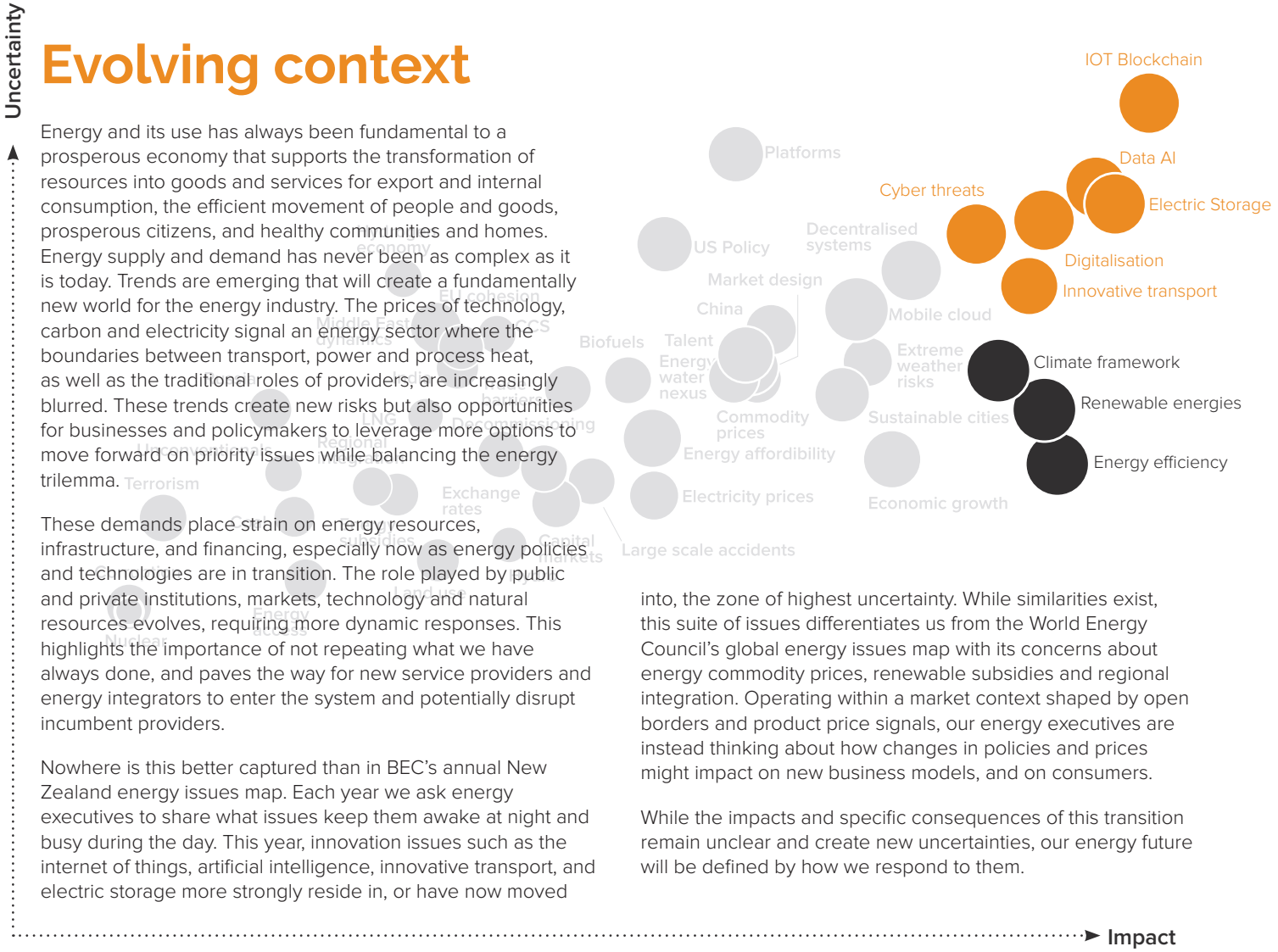
Evolving context

Energy and its use has always been fundamental to a prosperous economy that supports the transformation of resources into goods and services for export and internal consumption, the efficient movement of people and goods, prosperous citizens, and healthy communities and homes. Energy supply and demand has never been as complex as it is today. Trends are emerging that will create a fundamentally new world for the energy industry. The prices of technology, carbon and electricity signal an energy sector where the boundaries between transport, power and process heat, as well as the traditional roles of providers, are increasingly blurred. These trends create new risks but also opportunities for businesses and policymakers to leverage more options to move forward on priority issues while balancing the energy trilemma.

These demands place strain on energy resources, infrastructure, and financing, especially now as energy policies and technologies are in transition. The role played by public and private institutions, markets, technology and natural resources evolves, requiring more dynamic responses. This highlights the importance of not repeating what we have always done, and paves the way for new service providers and energy integrators to enter the system and potentially disrupt incumbent providers.

Nowhere is this better captured than in BEC's annual New Zealand energy issues map. Each year we ask energy executives to share what issues keep them awake at night and busy during the day. This year, innovation issues such as the internet of things, artificial intelligence, innovative transport, and electric storage more strongly reside in, or have now moved into, the zone of highest uncertainty. While similarities exist, this suite of issues differentiates us from the World Energy Council's global energy issues map with its concerns about energy commodity prices, renewable subsidies and regional integration. Operating within a market context shaped by open borders and product price signals, our energy executives are instead thinking about how changes in policies and prices might impact on new business models, and on consumers.

While the impacts and specific consequences of this transition remain unclear and create new uncertainties, our energy future will be defined by how we respond to them.



Nine facts you should know

No sector can claim to be satisfied with its performance. There are always improvements that can be made and the New Zealand energy sector is no exception. But it is important to keep things in perspective. While context is always important, especially when making comparisons, our energy sector performs well across a range of dimensions.

1. ENERGY POLICY BALANCE

NZ 9th best country in the world in achieving balanced energy policy (Only non-EU country in the top 10)

2. ELECTRICITY PRICE

NZ 11th lowest in the OECD for residential electricity & residential energy only costs flat since 2011 (real per kWh)

3. ENERGY SECURITY

US Chamber of Commerce ranks **NZ 3rd best** for energy security - **amongst the top 25 energy users in the world**

4. RENEWABLE ELECTRICITY GENERATING CAPACITY

7065 MW installed
2813 MW consented

5. WORLD LEADERS IN DIGITALISATION

NZ has been recognised as **one of the top digital economies in the world** in the 2017 Digital Evolution Index

6. RENEWABLES

40% renewable energy **NZ 4th highest** renewable primary energy supply **in the OECD**

85% renewable electricity **NZ 3rd highest** renewable electricity percentage **in the OECD**

7. GEOTHERMAL

NZ 4th largest installed **geothermal** power operating **capacity in the world** & 40 years involvement in developing geothermal resources in international markets

8. SOLAR UPTAKE

NZ total capacity installed solar:
2013: 5.27 MW
2017: 58.96 MW
⬆1019%

9. EV UPTAKE UNDERWAY

EV registrations are increasing:
Sep 2015: 913 EVs
Sep 2017: 4909 EVs
⬆438%

OECD Household Electricity Prices PPP Measure 2016[1]

- **Germany** 0.38 $US cent/KWh
- **Denmark** 0.30 $US cent/KWh
- **UK** 0.21 $US cent/KWh
- **New Zealand** 0.20 $US cent/KWh
- **Australia** 0.19 $US cent/KWh
- **USA** 0.13 $US cent/KWh
- **Norway** 0.09 $US cent/KWh

[1]IEA (2017), Energy Prices and Taxes, Volume 2017 Issue 3: Third Quarter 2017, IEA, Paris

The energy trilemma

New Zealand's record in achieving balanced policy has been patchy. Much of our energy policy has focused on energy security. Some initiatives – most notably the 'Think Big' era schemes – were intended to protect us from external shocks, while another example, the Crown's purchase and operation of the diesel-fired Whirinaki power station, was designed to minimise dry-year risk. While understandable at the time, a one-dimensional focus without consideration of the longer term implications of the other two trilemma dimensions created unacknowledged risks. Experience suggests that enduring performance gains will be best achieved if policy interventions addressing a specific energy trilemma dimension provide a clear path to better outcomes across all of the dimensions.

1. Empowered and connected consumers . . .

No consumer – large or small – has ever before had such choice in participating in the energy value chain. With the increasing uptake of more sophisticated wholesale electricity market tools, large-scale batteries, electric vehicles, solar panels and home energy management, the role of the consumer is shifting from passive user to electricity storage provider, energy producer and energy aggregator. This change, driven by new technology data utilisation and changing scale economies – and underway without specific government guidance – gives rise to a series of opportunities with far-reaching impacts across the sector. But it also introduces cyber risks – a growing concern highlighted in our energy issues map – and privacy issues.

Technology advances in real time management and data management systems facilitate the democratisation of energy. As seen in other sectors, this enables innovation by non-traditional, third-party vendors of technology and services. In response to changing consumer preferences, technology is emerging that will allow for intelligent grids and support the interconnectedness of devices. Technology such as Blockchain will support peer to-peer trading and open up the market to households. Consumers could buy and sell energy without a power company. This signals the need for greater communication and co-ordination as transmission, distribution and consumers combine to form an increasingly interdependent system that will improve the wellbeing of consumers and maintain system security.

Digitalisation will allow the consumer, as an energy and capacity provider, to help balance the system in real time. It should also lower market entrance barriers for services which have previously been provided only by energy retailers. BEC's electricity retail and distribution members are at the forefront of these innovations. According to the 2017 Digital Evolution Index, New Zealand is well-placed to leverage off its competitive advantage, driving innovation built on our existing advantages. However, maintaining momentum over time is challenging and policy makers and regulators must ensure their operating frameworks can deliver appropriate levels of digitalisation.

BEC says for New Zealand to stay ahead it must continually search for and implement new opportunities arising from digitalisation.

2. ...need efficient price signals...

The rapid emergence of new technologies is being facilitated, not hindered, by market signals. There is significant innovation occurring with new market offerings and the costs of new technologies rapidly reducing. Under the right regulatory framework, competitive markets work best if investors and consumers have the flexibility to form their own views of future demand, supply costs, system needs and technologies. But to unlock greater consumer choice and participation requires efficient price signals that fully internalise and reflect costs. Without this, innovation cannot hope to deliver the outcomes sought, nor can appropriate investment decisions be made, including how to maintain system security.

Tariff reform is a current regulatory focus and is important to ensure consumers face the right signals in making technology choices. More widely, energy sector regulators and policy makers are considering whether current regulatory frameworks are fit for purpose in a world with increasing consumer participation and engagement in energy service provision. All consumers will benefit most where prices reflect costs and the widest possible competition for new energy products and services is encouraged.

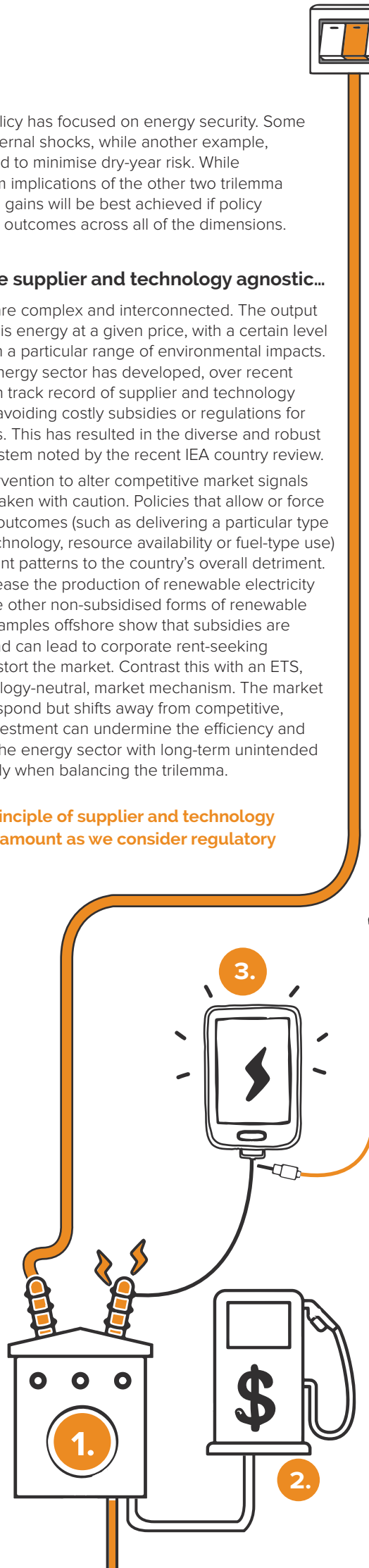
BEC says that inefficient price signals harm innovation, investment and job creation.

3. ...that are supplier and technology agnostic...

Energy systems are complex and interconnected. The output of these systems is energy at a given price, with a certain level of reliability within a particular range of environmental impacts. New Zealand's energy sector has developed, over recent years, a hard-won track record of supplier and technology neutrality and of avoiding costly subsidies or regulations for new technologies. This has resulted in the diverse and robust energy supply system noted by the recent IEA country review.

Government intervention to alter competitive market signals should be undertaken with caution. Policies that allow or force non-competitive outcomes (such as delivering a particular type of generation, technology, resource availability or fuel-type use) will shift investment patterns to the country's overall detriment. Subsidies to increase the production of renewable electricity will likely displace other non-subsidised forms of renewable electricity and examples offshore show that subsidies are never durable, and can lead to corporate rent-seeking behaviour and distort the market. Contrast this with an ETS, which is a technology-neutral, market mechanism. The market will, of course, respond but shifts away from competitive, market-based investment can undermine the efficiency and effectiveness of the energy sector with long-term unintended impacts, especially when balancing the trilemma.

BEC says the principle of supplier and technology neutrality is paramount as we consider regulatory changes.

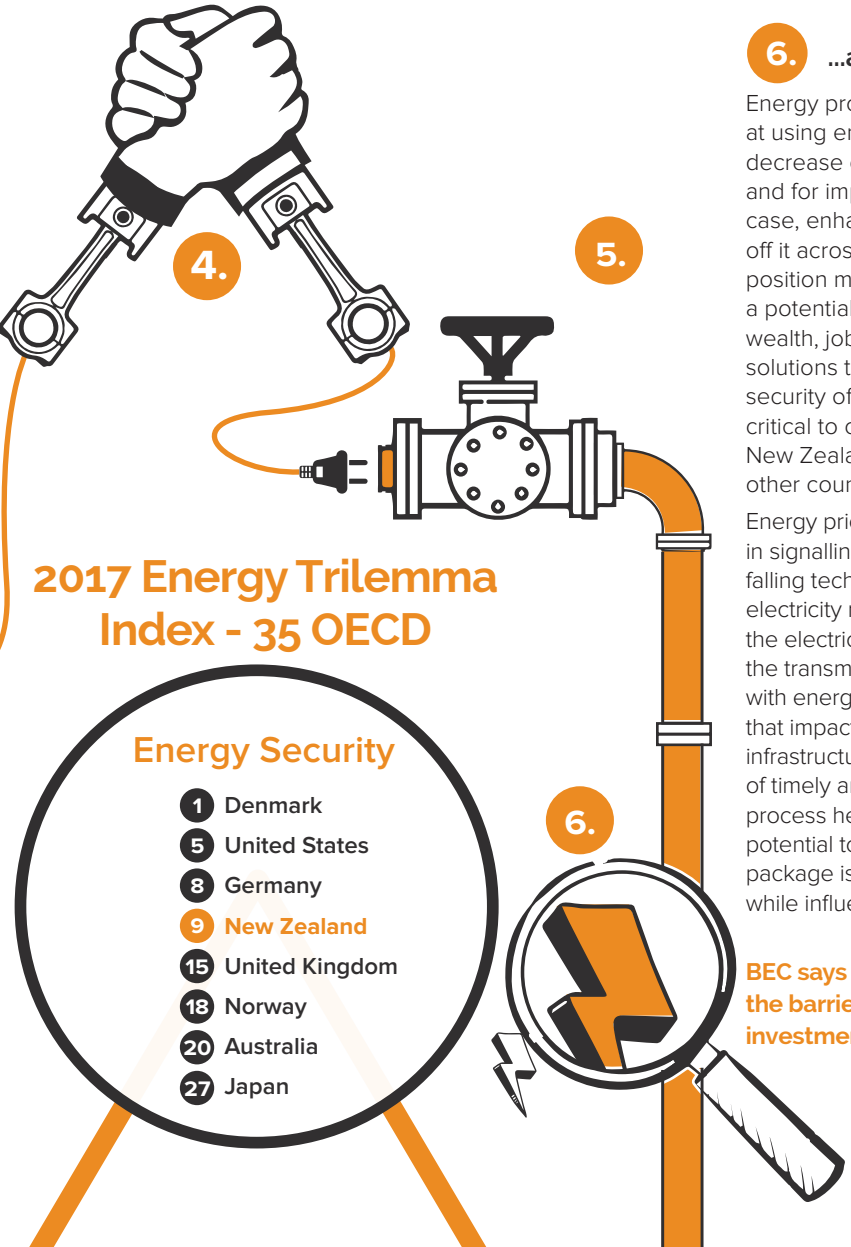


4. ...based on open, competitive markets...

BEC believes competitive energy markets are the best means to deliver secure and reliable energy supplies at efficient prices, and that competition works best when barriers to market entry and exit are minimised. Competitive discipline drives firms to adopt the most efficient supply arrangements in order to offer consumers cheaper and better products. Innovation can provide firms with above average returns in the short-run, rewarding innovative and risk-taking activity, and providing the incentive for other firms to imitate or innovate.

This drive for supply chain and cost efficiency has not only characterised the electricity market, but also the downstream fuels market in New Zealand. Similar to the electricity market, there are multiple brands competing in the retail fuel market with approximately 70% of all service stations independently owned and operated, setting their own prices. Discounting has become a feature of the market. There is insufficient evidence to support a case for monopoly or anti-competitive behaviour in either the electricity or the fuels markets and in the case of the fuels market, this is supported by the Commerce Commission's clearance of Z Energy's purchase of the Caltex assets.

BEC says we support open and competitive markets that deliver efficient long-run price signals to invest and innovate.



5 ...durable over time...

Energy resides at the top of any list of critical infrastructure. A well-functioning, vibrant economy relies on investment for a secure and reliable supply of energy. Our history of stable market frameworks has positioned us well as a good place to do business, and creates opportunities we can leverage off both domestically and internationally. But growing global uncertainty, combined with rapidly evolving technology in the drive to decarbonise and decentralise, create risks and opportunities and have implications across the energy value chain – including how the energy system might be managed to ensure sufficient security levels are maintained.

Features such as long-term policy coherence, credibility and accountability, while critical in capital intensive industries with long-life assets, become even more important as the energy system (especially the electricity system) evolves from a focus on hardware to software. These features can be undermined in a structure where there is no durable consensus around key market fundamentals such as respect for private property rights, or where regulators are subject to short-term and non-transparent political objectives which may differ from long-term goals. In the absence of safeguards against regulatory appropriation, businesses will protect themselves from such risks by under-investing or by requiring higher rates-of-return, making New Zealand's exported goods and services less internationally competitive.

BEC says durable policy signals about market fundamentals make New Zealand exporters more competitive.

6. ...and enhance our energy productivity.

Energy productivity requires us to think about whether we get better at using energy to create wealth, not just whether we increase or decrease consumption. It can act as a trigger to lift standards of living and for improved energy use decisions including, in New Zealand's case, enhancing our renewable electricity endowment by leveraging off it across the energy sector. Our renewable generation choices position manufacturers well for a low emissions future, and make us a potentially attractive place for large electricity users to turn this into wealth, jobs and export revenue. Investing effort in low carbon energy solutions to support greater productivity will not only help to enhance security of supply, but also reduce emissions. Energy productivity is critical to our international competitiveness and innovation. However, New Zealand's energy productivity is improving at a slower rate than other countries such as the US, UK and Australia.

Energy pricing, including a price on carbon, plays an important role in signalling efficient responses by business and consumers. Rapidly falling technology costs, greater technology choices and a more vibrant electricity market are opening up options for consumers across both the electricity and transport sectors, but more efficient tariffs, both at the transmission and distribution levels are also needed. However, as with energy hardship, there is a range of non-electricity market factors that impact on choices and decision-making, such as capital and infrastructure constraints, business capability issues and the availability of timely and cost-effective technology. EECA has identified industrial process heat, transport and electricity as areas with the greatest potential to raise energy productivity. The electric vehicle policy package is notable for being relatively benign and non distortionary, while influencing uptake levels.

BEC says it's important to work closely with business to address the barriers preventing the removal of inefficient equipment and investment in best practice energy efficient technology.

13. Institutional arrangements

As the energy market evolves so too must the arrangements that support it. Current arrangements, underpinned by independence from the government of both the Electricity Authority and the Commerce Commission, as well as the co-governance arrangement at the Gas Industry Company, have largely converged to a stable and predictable set of regulations necessary to support the long-life investments needed. We are not advocating a significant change to these arrangements. The former two authorities have different objectives which are clear and should not be made opaque or difficult to achieve. For example, the Electricity Authority has helped deliver an environmentally sustainable outcome as we head towards achieving the 90% renewable electricity target, but the idea that it should have a role in encouraging energy efficiency would return us to the duplication of effort (with EECA) that existed under the Electricity Commission.

As technology evolves more quickly, with shorter payback periods, it is important to ensure that the sector's regulatory and commercial frameworks remain fit for purpose. For example, our scenarios suggest that renewable electricity levels above 90% will require changes to current market design, including a more formal approach to rewarding demand-side responses from industrial consumers. It is also unclear whether MBIE is adequately resourced to address growing market complexity or whether EECA is appropriately structured and resourced to be used more extensively as government's primary climate change programme delivery agent for energy issues.

BEC says retain institutional independence but ensure regulatory arrangements remain fit for purpose for today's challenges.

12. Competing pressures for water

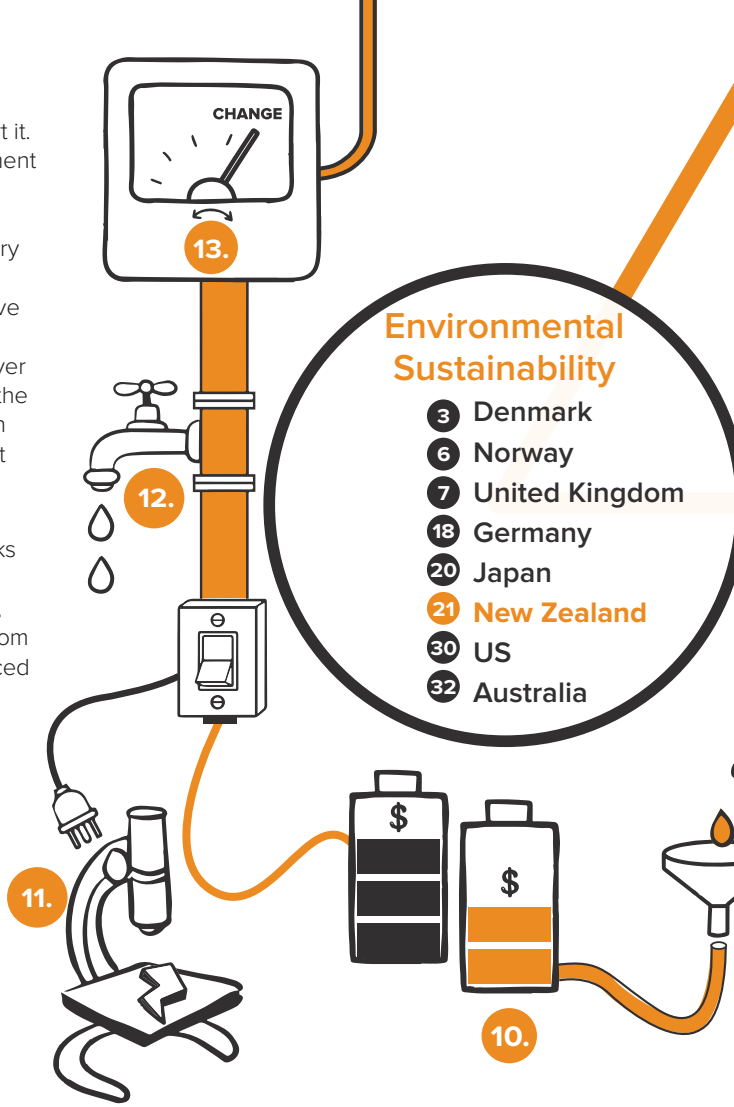
From a global perspective, New Zealand has a significant advantage in its existing hydro generation capacity, (delivering 55-60% of overall national generation capacity) and its flexibility to integrate further quantities of solar, geothermal and wind generation, reducing the need for fossil fuel-fired thermal plants. Therefore the regime under which water is managed is of critical importance to the electricity sector. As economic and environmental pressures grow, decisions over water use, food production and energy generation are becoming more significant. Current environmental and social concerns relating to water and water charging are predominantly about deterioration in water quality. These pressures have highlighted a lack of cohesion between energy, water and environmental legislation, including consenting processes that are ill-equipped to future-proof infrastructure. This potentially places the flexibility of these hydro assets under threat from regulatory changes to water allocation and use. Without recognition of the key role of existing hydro-generation in transitioning to a low emissions economy, New Zealand will face greater risks, costs, emissions, and a slower transition.

BEC says we need better co-ordination to achieve water, energy and climate change outcomes.

11. Energy research

In light of the need to position the economy towards high productivity, high income and low emissions outcomes, we strongly support a greater emphasis on investing in medium-term energy research (i.e. beyond the research horizon of most businesses). Given the challenges we face around disruptive technologies, rising gross emissions and the concentrated nature of the emissions risks in transport, industrial processing and the electricity sector, these issues need to be addressed. We support efforts to ensure that new technologies are market ready. Pilot trials, for example, enable innovation by providing data and customers with early insights. Government can do much to catalyse market activity through research programmes, for example, the GREEN Grid project has played an important role in focusing the dialogue and research across academia and industry on the technical challenge of integrating more productive distributed technologies into the New Zealand electricity system.

BEC says use the Strategic Science Fund Programmes for encouraging medium term energy research.

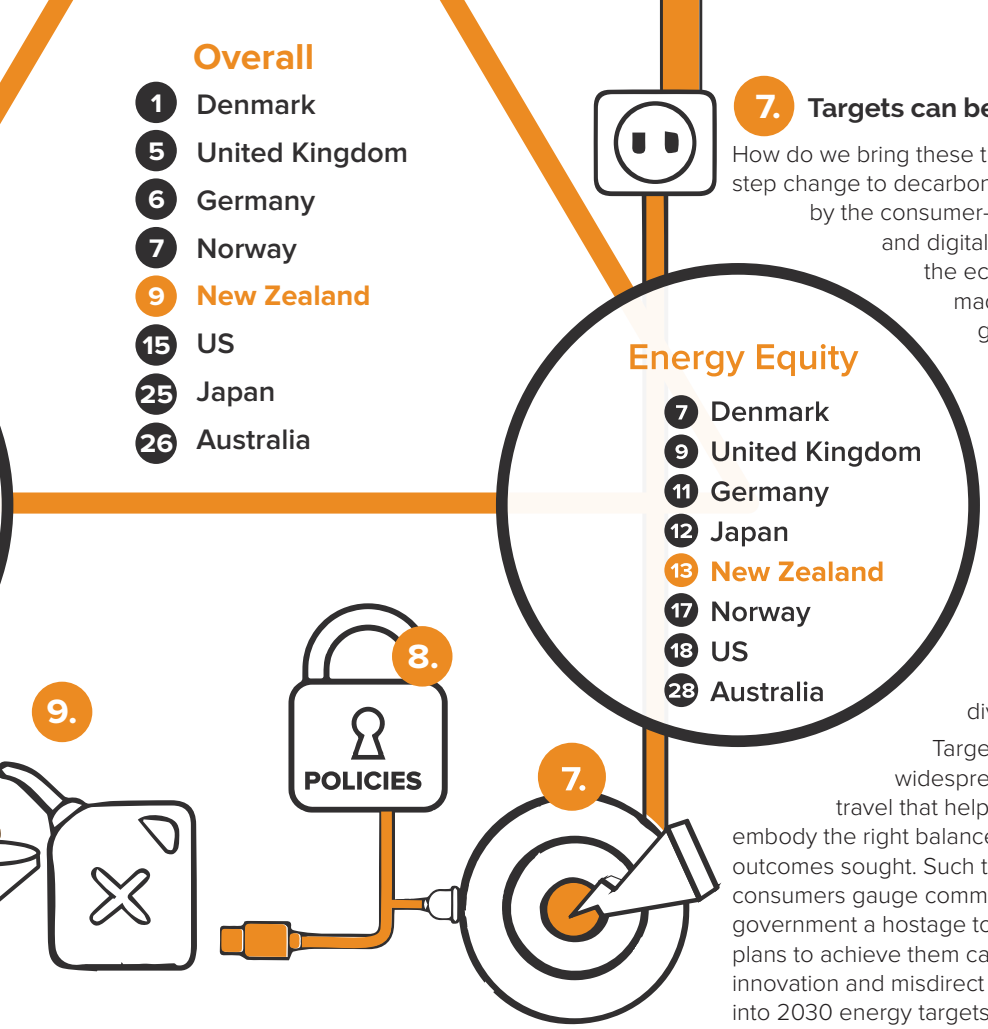


10. Energy affordability

Electricity retailers recognise that energy hardship is an issue for a segment of their consumers and that they have a role in addressing it. Steps underway include working with the Electricity Authority on Medically Dependent and Vulnerable Consumer Guidelines and the monitoring of disconnection rates, and with the Ministries of Social Development, and Work & Income, and budgeting advice NGOs to ensure customers are accessing social welfare and financial capability support where available. Pre-payment and bill smoothing options have also been implemented as well as trials of emerging technologies to understand how they might provide benefits.

But an efficient and competitive electricity market is only a partial response to the problem of energy hardship. The multi-dimensional causes of why some people live in homes that are cold and damp will not be alleviated by efficient energy prices alone. Hardship may still exist as it is not only influenced by energy prices but by income levels, household and house size, housing insulation, energy efficient appliances, prohibitions on burning solid fuels, weather, and changes in community services (for instance, more people living independently rather than in aged care or other institutions). It is an appropriate policy goal to seek to meet social or community minimums, including universal access to electricity and support for those who cannot pay via targeted mechanisms. However any successful support might be complemented by better access to information (e.g., tariff advice, online tools and calculators, energy use education and devices) and energy-efficiency measures (e.g., financial support for household efficiency tools, and minimum building and appliance standards).

BEC says we support well-targeted, non-energy market mechanisms to address welfare problems.



7. Targets can be helpful...

How do we bring these themes together in a way that delivers the step change to decarbonisation required by the Paris Agreement and by the consumer-and technology-led drive to decentralise and digitalise? Energy decarbonisation is vital to put the economy on a path to fulfilling the commitment made under the Paris Agreement. This is a growing focus and we need to make the necessary transition as an open trading nation and global citizen. As a country we have an opportunity to maintain and enhance our leadership in renewable electricity and also to look beyond to the wider energy landscape, to major sectors such as transport and industrial heat. Effort in these areas can improve our trilemma performance and help New Zealand remain internationally competitive and adaptive in a low emissions global economy, lifting our energy productivity and diversifying our export base.

Targets are helpful to the extent they have widespread buy-in, identify an overall direction of travel that helps frame the actions of market participants and embody the right balance of trade-offs between the range of potential outcomes sought. Such targets help business, local government and consumers gauge commitment levels. But targets can also make government a hostage to fortune. Mandatory targets with hard and fast plans to achieve them can easily become inflexible millstones that stifle innovation and misdirect resources. Balance is required. Our deep dive into 2030 energy targets for New Zealand, based on our BEC2050 scenarios work, helps shed light on these issues. We look to the work of the Productivity Commission as it seeks to frame how we might collectively think about the long-term transition to a low emissions economy, especially with respect to the energy sector.

BEC says businesses (and consumers) want targets to provide direction and investment confidence.

9. Fossil fuels in a post-Paris world

Upstream natural resources pose interesting challenges for decision-makers. Do we continue to encourage new exploration and mining or treat the existing permits as legacy activities to be progressively wound down? Government needs to consider and resolve whether in the transition there is a role for high emissions activities that are economic and emissions efficient (given prevailing climate change policy settings) as well. These high value resources are likely to continue to play an important global economic role for many decades as the transition unfolds.

These questions are important as we work to reconcile policy settings with targets and sectoral objectives. Should we use climate change policy to pick sectoral or fuel-type winners, and forego the substantial economic benefits associated with other alternatives? Or should we support our energy security and export revenues with policies that attract explorers to the bottom of the world, operating under environmental practices that suit our location and terrain, and resource allocation, and consenting systems that show we are a sound investment destination while encouraging the development of low emissions alternatives? These are questions to which fossil fuel explorers and large globally competitive fossil fuel users, who export their products around the world earning export revenue, need answers. And they are also relevant to maintaining energy security at affordable levels. Although the challenges are enormous, policies that are neutral between technologies and sectors and fully account for costs are likely to be the most efficient and avoid unintended negative consequences.

BEC says future policy choices for fossil fuels need to be transparent and account for all economic and environmental opportunities and risks.

8. ...but need to be backed by robust policies aimed at achieving outcomes.

Unless we address the renewable content of our wider energy consumption, the energy sector will struggle to substantially contribute towards our international climate commitments. Targets without policies supporting the outcomes sought are pointless. For targets to be credible and to support a stable energy policy environment, we broadly need to understand how we might reach them. Anachronistic policies such as low fixed charge regulations no longer have a role to play.

Our scenario work shows that emissions are strongly related to economic, energy productivity and population growth and a significant reduction will likely require large reductions in carbon intensity. New Acts or institutions do not in themselves help us address practical-challenges or accountabilities, especially as targets become progressively more stringent. The question government now needs to address with business as the primary solution provider is how effort can best be harnessed across the energy sector to achieve the necessary transformation, while balancing risks such as investment and carbon leakage. This needs to be done in an open and transparent way, especially as we seek to reconcile the aspirations of the sector with the emission-reduction commitments made. Our work suggests the need for a baseline set of key outcomes-based indicators to monitor progress towards our goals, allowing for a more informed conversation about the policy trade-offs required to reach them.

BEC says energy sector outcome indicators should drive the future shape of energy policy as much as targets.

ABOUT BEC

The BusinessNZ Energy Council (BEC) is a group of New Zealand's peak energy sector organisations taking a leading role in creating a sustainable energy future. BEC is a division of BusinessNZ, New Zealand's largest business advocacy group. BEC is a member of the World Energy Council (WEC). BEC members are a cross-section of leading energy sector businesses, government and research organisations. Together with its members BEC is shaping the energy agenda for New Zealand.

Our vision is to support New Zealand's economic well-being through the active promotion of the sustainable development and use of energy, domestically and globally. With that goal in mind, BEC is shaping the debate through leadership, influence and advocacy.

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