KONRAD ADENAUER STIFTUNG

Energy Matters in Australia, Germany, New Zealand and the South Pacific

A Collaborative Approach

Edited by Dr Frank Umbach & Eva U Wagner

THE PERISCOPE SERIES
VOLUME 4 / 2020

KONRAD ADENAUER STIFTUNG

Energy Matters in Australia, Germany, New Zealand and the South Pacific

A Collaborative Approach

Edited by Dr Frank Umbach & Eva U Wagner

THE PERISCOPE SERIES
VOLUME 4 / 2020

KONRAD ADENAUER STIFTUNG

About Konrad Adenauer Stiftung

Konrad Adenauer Stiftung (KAS) is a German political foundation with a mission to promote international dialogue, regional integration, sustainable development, good governance, democratic processes, social market economy and exchange of knowledge. It is named after the first Chancellor of the Federal Republic of Germany after WWII, Konrad Adenauer, whose name represents the country's democratic rebuilding, the anchoring of German foreign policy in a trans-Atlantic community of values, the vision of European unity, and Germany's orientation towards a social market economy. Currently, KAS has 107 offices and operates in around 120 countries, on six continents. With our worldwide networks and long-term partner structures, we aim to contribute to policy development in line with our values and aims.

As current global developments - such as the volatile security environment - underscore the common interests of Europe and Australia, **KAS' Regional Programme Australia and the Pacific** (KAS Australia) seeks to foster durable collaboration through dialogue among parliamentarians, politicians and representatives of leading think tanks, as well as political analysis and consultancy. For the European Union in general and Germany in particular, dialogues with Australia and New Zealand are of special relevance due to our history of strong bilateral and regional relations. Given our shared values, common beliefs and interests, there are manifold opportunities for this partnership.

About the Periscope Series

'Periscope' is KAS Australia's Occasional Analysis Paper Series. Just like the real-world sighting instrument, Periscope is meant to broaden our insights - taking in views from different angles. It seeks to bring together perspectives from Germany, Europe, Australia and the Pacific in order to augment our understanding of contemporary issues in the area of foreign and security policy as well as energy, economic and social policy matters.

Energy Matters in Australia, Germany, New Zealand and the South Pacific

A Collaborative Approach

The Periscope Series
Volume 4 / 2020

Foreword

Energy matters – to all of us – whether we are living in an industrialised country or a developing nation. We all depend on clean, reliable and affordable energy.

Germany with its large manufacturing sector and very limited natural resources depends heavily on the import of raw materials. On the positive side, Germany phased out black coal in 2018, is on track to phase out brown coal (lignite) by 2038 and has achieved a 46% proportion of renewable energy by now. **New Zealand**, not least thanks to its geographical location alongside the Ring of Fire, already sources an even larger proportion of its energy demand from renewables. Aotearoa (Maori for "land of the long white cloud") is, however, yet to cut down from high per capita greenhouse gas emissions. **Australia**, despite its abundance of renewable energy sources, is struggling to ensure reliable energy. The country "down under", too, ranks high in terms of per capita greenhouse gas emissions. Experts argue that if Australia were to meet the emissions reduction targets pledged under the Paris Agreement, it would be thanks to the use of carry-over credits from the preceding Kyoto Protocol. On the other hand, Australia arguably has the potential to become a renewable energy superpower, and to export any excess in the form of hydrogen, tipped to become the hero of energy transition. The main issue for the **Pacific Region** is a different (though related) one. The Boe Declaration on Regional Security - issued by the Pacific Islands Forum (PIF) leaders in 2018 - reaffirms that climate change remains the single greatest security threat to the livelihoods, security and wellbeing of the Pacific peoples. According to UN High Commissioner for Human Rights, Michelle Bachelet, "*[t]he world has never seen a threat to human rights of this scope*". Climate change is also argued to have contributed to Australia's recent bushfire crisis. In the words of Australia's Chief Scientist, Dr Alan Finkel: "*The link between climate change, a rising number of forest fire danger days and our season of bushfires is clear, and has resulted in a steep collective cost that can be measured in billions of dollars in economic damage - which pales to insignificance when compared to the greater costs behind the statistics. The lost lives and livelihoods. The lost businesses and homes. The lost flora and fauna.*"

Clean, reliable and affordable energy and climate change are among the biggest challenges Australia, Germany, New Zealand and the Pacific Island states are facing. In fact, they are global issues that transcend national borders. Yet they are primarily dealt with at national level. In an endeavour to overcome borders and distances, to promote synergies and to foster collaboration between like-minded countries, KAS Australia promotes the free exchange of policy strategies and innovative ideas. The measures we take include an annual energy policy dialogue which provides German lawmakers and experts with a forum to meet their Australian and New Zealand counterparts as well as other stakeholders.

This edition of the Periscope is published following the 2nd KAS-EUCERS Energy Policy Dialogue "Energy Strategies: Germany, New Zealand & Australia - A Comparative Perspective". While the publication draws on the topics of the Dialogue (renewable energy & energy efficiency; balancing energy security, affordability & environmental sustainability; current energy policy challenges), it is not restricted to them, and includes the Pacific viewpoint as well.

Energy and climate matters affect the private, public and economic sectors alike. They also have a wider impact on foreign and security policy, and give rise to socio-cultural issues. Accordingly, they must be mastered by political decision makers and business representatives as well as society as a whole. This edition seeks to make the findings of the Dialogue and related issues available to a wider audience, so that they may be used to the greatest possible extent in the public debate, policy making process and implementation of possible solutions.

Finally, I would like to say a few words in regards to the ongoing coronavirus pandemic, which may be unrelated to energy and climate policy matters, but shows that global solidarity and cooperation is crucial to tackling global issues. My thoughts and sympathies are with all those affected by the pandemic, and I wish all of us the strength we need to make it through these difficult times.

Dr Beatrice Gorawantschy
Director - KAS Regional Programme Australia and the Pacific

Canberra, April 2020

INTRODUCTION

Energy Matters in Australia, Germany, New Zealand and the South Pacific

Dr Frank Umbach

The latest edition of the annual 'World Energy Outlook 2019' Report highlights again the widening gap between global energy policy trends and the target agreed upon under the Paris Agreement, namely to keep global warming in this century below 2°Celsius above pre–industrial levels and to pursue efforts to limit the increase even further to 1.5° Celsius.

The Report also highlights the fact that 850 million people are still without access to electricity. While global CO_2-emissions stagnated in 2015 and 2016, they rose in 2017 and 2018 by 2%. In 2019, emissions peaked to a new historic record and are expected to rise further in the forthcoming years despite worldwide concerns about global warming trends and international climate-related discussions. Given the present global energy megatrends (i.e. rising energy demand), global warming may increase up to 3-3.5° Celsius instead of the agreed target of 2/1.5° Celsius.

Despite some positive trends such as the expansion of renewables (the global market for offshore wind turbines, for instance, grew by 30% between 2010 and 2018) and the falling costs for renewables or the rising share of natural gas as the cleanest fossil fuel, many other trends are still worrying:

- *Global coal demand:* it rose for a second consecutive year in 2018 – with three quarters of the demand coming from the Asia-Pacific region. The amount of coal-fired power generation and consumption even in developing countries increased to a new record of 6,900 TWh. China's newly built coal-fired power plants exceed the European Union's capacity. China is also the largest foreign investor of coal-fired power plants.
- *New clean energy investment:* decreased by more than a fifth in developing countries in 2018, while global power generation rose to a new high. China's clean energy investment alone fell from US$122bn to US$86bn between 2017 and 2018.
- *Demand for natural gas:* the worldwide demand for natural gas has been projected to increase four times faster than the demand for oil as a 'bridge fuel' for the energy transition to a decarbonised economy. Natural gas might even replace oil as the world's most important energy source. But the longer-term climate target to reduce global CO_2-emissions by 90% by 2050 cannot be achieved by using more natural gas. The EU already anticipates the replacement of conventional natural gas by 'green gas' (biomethane, hydrogen, etc.).
- *Global Green-House Gas (GHG) emissions:* they may rise until 2040, even if governments agree to new climate targets (and nationally determined contributions). Even more worrying is the announcement of the Trump administration to withdraw from the Paris Agreement, and the weakening support of global climate policies by Russia, Brazil, China and African countries. These countries would not accept a reduced economic growth for

the sake of more ambitious climate policies nor are they willing to restrict their oil and gas exports as main revenues for their state budgets. In their view, regime and political stability outweigh any ambitious climate protection efforts.

- *New technologies:* while digitalisation and artificial intelligence technologies promise to increase energy conservation and efficiency, electrification and new disruptive technologies (such as block chain, internet of things and, in particular, cryptocurrencies) have been developed without regard to their energy demand. These technologies may dramatically increase the global electricity demand far beyond current predictions. Furthermore, while technology options such as carbon capture, storage and use (CCSU) or hydrogen are already technically available, they are not yet profitable and cost competitive.

Against this background, the Konrad Adenauer Foundation's Regional Programme Australia and the Pacific in collaboration with the European Centre for Climate, Energy and Resource Security (EUCERS) of the King's College in London - implemented the 2nd KAS-EUCERS Energy Policy Dialogue in New Zealand and Australia in the first week of October 2019. As in 2018, the German delegation discussed various topics with Australian (and for the first time also with New Zealand) energy experts, representatives of the government, parliament, industry and the academia. The topics ranged from the German Energiewende (energy transition) and its lessons for other countries to energy efficiency, digitalisation and cybersecurity as well as the future potential of hydrogen as a means for storing electricity and overcoming the volatility of renewable-based electricity generation for a country's baseload capacity.

Also this year, as the contributions to this edition of the Periscope show, the various seminars and discussions between the German delegates and their New Zealand and Australian counterparts have underscored our mutual interest in sharing experiences, 'lessons learnt' and best practices in our respective energy policies. Particular attention has been paid to future cooperation in regards to energy efficiency, global energy supply security, the potential of hydrogen, critical raw material supply security in the light of the worldwide expansion of electric vehicles and batteries, pathways for an expedited transition to decarbonised non-fossil fuel energy systems and impacts of climate change (such as migration and displacement or geopolitical conflicts including the Arctic as well as the Antarctic). The spirit of our discussions has also been spurred by the mutual recognition of various challenges to China's energy, raw material and industrial-technology policies as well as an overall understanding that the G20 democracies need to foster their cooperation in regards to energy, climate and industrial policies for a sustainable future of the global order and worldwide stability.

ANALYSIS

Energy Transition in a Global Context

Dr Joachim Pfeiffer MP

About the Author

Dr Joachim Pfeiffer is the economic & energy policy spokesman for the CDU/CSU parliamentary group. He was born in Mutlangen (Germany) and studied business economics with a technical orientation at the University of Stuttgart. He held a scholarship from the Konrad Adenauer Foundation during his studies. His political career he began in 1990, whilst he was studying toward his doctorate. From 1992 to 1997 Dr. Pfeiffer was employed by the electric supply company Energie Versorgung Schwaben AG (EVS). Here he gained particular experience in mergers & acquisitions. Soon after obtaining his doctorate in 1997 he was the head of economic and employment promotion activities for Stuttgart, provincial capital of Baden-Württemberg. Since 2002 Dr Pfeiffer is a member of the German Parliament. In 2009 Dr Pfeiffer became the economic & energy policy spokesman of the CDU/CSU parliamentary group, a role he holds until today. He is also a lecturer at the Institute of energy economics & the rational use of energy at the University of Stuttgart, works as a freelance consultant and is chair of the CDU for the county of Rems-Murr.

Climate change is one of the most pressing global challenges of the 21st century. The world's population is expected to grow to around ten billion by 2050. The consequence is an increasing demand for energy, after all people in developing and emerging countries also have a justified desire for better living conditions.

Responses to climate change must therefore first and foremost be developed with the help of an international, global approach, rather than unilateral efforts and instruments.

The European Union's Emission Trading Scheme

In the European Union (EU), the EU Emission Trading Scheme (ETS) sets a mandatory emissions reduction path for all EU countries over the years for the sectors it covers (including the entire energy sector, i.e. all coal, gas and other power plants). The ETS is a quantity control instrument which, thanks to the limited number of emission allowances issued, ensures that the EU achieves its internationally agreed climate protection targets. In the defined area of the ETS, the relevant greenhouse gas emissions of the EU will be reduced by 43% by 2030 (compared to the reference year 2005). The ETS is the central European control instrument for climate protection and has impressively demonstrated its effectiveness through the planned reduction of emissions to date. Consideration should be given to extending the ETS, e.g. to the building and transport sectors. Such strengthening of the ETS - or the introduction of another form of CO_2 pricing in the non-ETS sector - could lead to considerable efficiency gains if it was coupled with an open-technology approach and genuine competition between the best and cheapest emissions reduction technologies. Similar efforts to tackle climate change may also be observed in other regions of the world.

New Zealand's ETS and the Role of Geothermal Energy

With the introduction of an ETS, New Zealand put a price on greenhouse gas emissions. Thus, the country also opted for a market based-approach in order to meet domestic and international climate change targets. The trading system is set by supply and demand and leaves it up to the emitter to decide whether they wish to reduce their emissions or purchase units. Only after substantial reforms a cap on the number of units in the scheme was introduced in 2018 and is intended to be reduced over time. New Zealand's ETS was initially designed to cover all sectors, however, currently emissions from agriculture must only be reported and not surrendered. As a consequence, only around 50% of New Zealand's greenhouse gas emissions are covered by the trading scheme to date.

When it comes to renewables, New Zealand has a long history of geothermal electricity generation. The country lies within a geographical area of high volcanic and seismic activity known as the Ring of Fire. It covers boundaries between several tectonic plates and is characterised by active volcanoes and frequent earthquakes.

According to the Energy Efficiency and Conservation Authority (EECA), geothermal energy provides for almost 20% of New Zealand's electricity supply. Total geothermal electricity capacity in New Zealand stands at over 900 MW. It has been estimated that there is approximately another 1,000 MW of geothermal resources that could be used for generating electricity. Given the fact that there are no subsidies or grants in New Zealand, neither for large nor small renewable energy projects, only economically viable and market-proven energy projects are implemented. The example of New Zealand and other countries located alongside the Ring of Fire shows how critical it is to use renewable energy sources given that wind does not blow equally strong everywhere, the sun does not always shine and geothermal energy may be easier tapped in some regions than in others, depending on the geological conditions.

Australia's Instruments for Reducing Greenhouse Gas Emissions

Australia, to give another example, is seeking the best way to fulfil its commitment to reduce emissions. After repealing its 2012 carbon tax in 2014, today the Emission Reductions Fund (ERF), introduced in 2015, is the key instrument of Australian climate protection policy. The Fund provides financial incentives to use new technologies and methods that reduce greenhouse gas emissions and improve energy efficiency. Under the ERF, Australian carbon credit units are issued on registered projects that have been proven to reduce CO_2 emissions. The ERF covers projects in the agricultural, building, power generation, industry, transport and waste management sectors.

Generally speaking, a market-based system such as a trading scheme is the means of choice because it is potentially internationally connectable. By linking emissions trading systems, larger and more liquid markets may be created, emission reduction targets may be achieved more cost-effectively and distortions of competition may be avoided through a uniform CO_2 price. The aim must be to harmonise and link emissions trading systems in order to work towards the creation of a global carbon market and thus the establishment of a level playing field.

The global challenge of climate change must also be met globally!

The German Instrument: Expanding Renewable Energies

Another way to facilitate the transition towards a more sustainable environment is the expansion of renewable energies. For many years, Germany was regarded as a showcase example for international energy transition and decarbonisation. The country advanced to be an innovation pioneer in photovoltaic and wind power plants (on- and offshore) and thus paid for the learning curve of the world in the field of energy system transformation. Although almost 40% of its electricity now comes from wind, sun, water or biomass, the energy revolution in Germany seems to have stalled: failure to meet the national climate protection target by 2020, overpromotion of renewable energies, a drastic rise of electricity prices, which private households and industry in particular have a hard time bearing, and an insufficient grid development for its expanded electricity generation based on renewable energies.

The 2010 Energy Concept sets the goal of reducing primary energy consumption by 50% by 2050. It was also agreed to reduce greenhouse gas emissions by 80% to 95% by 2050, now even climate neutrality

Capital Wind Farm near Canberra © Infigen Energy

(as proposed by the EU's new 'European Green Deal' of last December) should be striven for. These goals could easily have been achieved if we had adhered to the 2010 goals.

Let me explain this: In 2010, electricity was generated in Germany using around 10% renewable energies and 30% nuclear energy. This means that 40% of electricity generation was CO_2-free. Without the abrupt phase-out of nuclear energy, we would have had 30% nuclear energy while the use of renewable energies would have grown to 40% by 2020. This would have meant that up to 70% of electricity generation would have been CO_2-free by 2020. The issue, however, was that the meltdown of the core in Fukushima (as the result of a tsunami) was immediately followed by a 'meltdown of the brain' in Germany. Instead of replacing coal, which is rich in greenhouse gases, with nuclear power, renewables took the place of low-emission nuclear power in the energy supply.

Hence: A rethink is needed. The question is: How must the transformation of the energy system be structured so that climate protection may succeed while Germany and Europe remain equally attractive for companies? The balance may be found in the energy triangle, which defines security of supply, economic efficiency and environmental compatibility as equal goals. In order to successfully restructure the energy supply and achieve the 65% renewable target by 2030, it is also necessary to push ahead with climate protection measures at national and EU level, which must not counteract the European ETS as the key instrument of climate policy. Reason and understanding, not blind activism and ideology, are needed here. Increasing energy efficiency is the best way to achieve this goal, because not to consume energy is still the cheapest and cleanest option. For this reason, the competitive increase in energy efficiency in all sectors - buildings, industry and transport - must be promoted.

Instead of coercion and prohibition, incentives and technology-open competition are needed. With its "climate protection package 2030", which was adopted in the end of September 2019, the Federal Government is moving in the right direction, in particular with the introduction of a market-based pricing system for CO_2 in the transport and building sectors.

The further expansion of renewable energies makes sense and is being pursued by the Grand Coalition. However, in contrast to the current situation, the expansion must be even more competitive and innovation-oriented as well as synchronised with an accelerated grid development.

Taking National Conditions into Account

When taking a broader view, it becomes clear that a one-size-fits-all approach is not appropriate concerning the expansion of renewable energies.

Given its geographical location between two tectonic plates, New Zealand has an abundant supply of geothermal energy. The country could exploit this strategic advantage to become a forerunner in the field. Similarly, Australia's geography is almost unique in the world for the expansion of wind and solar power: High solar radiation due to proximity to the equator, partly very strong and stable winds and above all lots of space. The population density in Germany is 75 times higher, whereas in Australia large parts of the continent are virtually uninhabited.

The mere expansion of renewable energies is not an end in itself. The integration of more renewables must rather take into account local circumstances in order to be efficient and bear the brunt of a secure and affordable energy supply.

Strategic Perspectives for Energy Transformation and Decarbonisation

For years, Germany has been a forerunner in regards to the development of photovoltaic and wind power plants. This role of a pioneer has come, however, at a price. Germany embarked on the project when renewable energy prices were much higher than they are today. As the subsidies are fixed for 20 years, this approach has created a "backpack" of costs which the country still carries today. The annual subsidies for renewable energy support add up to over €26 billion. Meanwhile, renewables have become increasingly competitive. As a result, they must learn to stand on their own two feet more quickly, prove themselves in competition and ultimately manage without subsidies. As the examples of Australia and New Zealand indicate, it will be vital not only to build renewable energy plants but also to consider local circumstances in order to increase their efficiency and effectiveness. Last but not least, the aim must be to merge the existing parallel subsidy systems into a new market design in which all technologies are combined according to competitive criteria, renewable energies and conventional power plants as well as storage, flexibility and digitisation. Furthermore, energy efficiency and sector coupling must be promoted.

Such an approach towards renewable energy systems combined with a global carbon market would truly help to tackle climate change in the most effective way.

ANALYSIS

“Energiewende” in Germany and Australia

Jonathan Jutsen, Carsten Mueller MP and Christoph von Spesshardt

About the Authors

Jonathan Jutsen

Jonathan Jutsen has been a leader in energy and carbon management for 35 years. Jon is the CEO of The Australian Alliance for Energy Productivity. The focus of the Alliance is to double Australia’s energy productivity by 2030 (2XEP) a2ep.org.au

Jon is also the CEO designate for a bid to the Commonwealth Government to establish a co-operative research centre (CRC): www.RACEfor2030.net.au

He is a Chemical Engineer with a Masters in Energy Technology. He was selected as one of the ‘100 Most Influential Engineers in Australia’ and is a Fellow of the Academy of Technological Science and Engineering. He has been named as Engineer of the Year and received Millenium Medal for his contributions to the field, was named in the Crikey list of top carbon cutters, and the WME Leaders list for ‘Energy and Carbon’. He was awarded Energy Efficiency Champion 2018 by the EEC in November.

He was also a member of the Board of ARENA (Australian Renewable Energy Agency) until mid-2018.

Carsten Mueller MP

Carsten Mueller is a member of the German Bundestag. A lawyer and banker by degree, he is a member of the Committee on Economic Affairs and Energy, the Committee on Legal Affairs and Consumer Protection and the Committee on Scrutiny of Elections, Immunity and the Rules of Procedure. Carsten Mueller is honorary chairman of the German business initiative for energy efficiency (DENEFF) as well as Chairman of the Parliamentary Club on Energy Efficiency. He has been a great advocate of energy efficiency for years.

Christoph von Spesshardt

Christoph von Spesshardt serves as a Director Public Affairs and Strategy Knauf Group and is temporarily delegated to the Asia-Pacific region, heading regional Public Affairs for Knauf Insulation out of Australia. He holds a MSc in Policy and Communications and can trust on 20 years of experience in public and external affairs. Christoph is passionate about energy efficiency and an active advocate for its enormous potential in businesses and societies. Consequently he co-founded the German business initiative for energy efficiency (DENEFF) in 2010 with now more than 180 company members, which he since serves as vice chair. He also is a non-executive director of the Australian Alliance for Energy Productivity and chairs the German-Australian governmental taskforce for energy efficiency.

Similar to many highly industrialised countries, Australia and Germany are standing at the crossroads of their energy future. Whereas Germany's Government, led by Angela Merkel, decided to pursue a phase out of nuclear and coal power and to follow an energy transition, or "Energiewende", after the tragic incident of Fukushima, Australia has experienced a decade of uncertainty in its energy and climate policy.

Rising energy costs and carbon emissions, and ensuring energy supply reliability are issues in both countries, demanding constructive, long-term solutions with bi-partisan support. In this context, the authors would like to explore a creative approach to energy and climate issues which creates lasting value. It is time to map out a path for Australia's energy transition, which addresses the opportunity for simultaneously achieving energy security, reliability and affordability as well as low carbon outcomes. Australia could learn from the German experiences, both good and bad, to help master this transition.

So, let's have a look at the concept of the **German Energiewende**:

The initial focus of Energiewende was the Renewable Energy Act (Energie-Effizienz-Gesetz) (EEG). This law was adopted in 2000, ensures access of renewable energy to the grid and provides operators with fixed remuneration for 20 years. The feed-in payments are funded by a charge paid for by all electricity consumers. For new power plants, remuneration is reduced every year, initially by 5%. Another important feature is that renewable energy is given priority over conventional electricity.

Consequences for electricity prices

The large growth in electricity generation from renewable energy to a share now of 40% has, however, had consequences: The capacities required to fund renewable energy has risen significantly and, as a result, electricity prices have escalated. The proportion of taxes payable on electricity prices meanwhile amounts to over 50%.

Introducing the second pillar: energy efficiency

To address high electricity prices, policy makers in Germany developed a second pillar, namely to increase energy efficiency in all sectors. In order to promote energy efficient products and services and to create a level playing field for energy efficiency measures, the federal government in Germany created a National Action Plan on Energy Efficiency Plan (NAPE) in late 2014. After an intensive dialogue process during which stakeholders such as the German Business Initiative for Energy Efficiency (Deutsche Unternehmensinitiative Energieeffizienz) (DENEFF) proposed a variety of options, a package of cost effective measures was developed. This plan became the foundation of the German energy efficiency policy. The plan provides for various measures and initiatives to increase energy efficiency in Germany, including in the

> **A significant advantage of the Enliten concept compared with other proposals is the strategic focus on energy productivity: gaining more value from every unit of energy deployed.**

building and industry sector, and to kick-off investments in energy efficiency services via contracting. The total amount of public money spent on energy efficiency will increase from €40bn to €60bn by 2030 according to the latest update of the national energy efficiency strategy.

How may this experience be applied to Australia:

Borrowing from the German concept of Energiewende, we propose a model for the Australian energy transition. We suggest to use a unifying name, 'Enliten', to signify a brighter, more positive approach to benefit from harnessing and directing inevitable change. A significant advantage of the Enliten concept compared with other proposals is the strategic focus on energy productivity: gaining more value from every unit of energy deployed. Higher Energy productivity may reduce gross energy demand, and thus greenhouse gas emissions, throughout the year. It may also be used to reduce peak energy demand at any given moment (increase usage when electricity is very inexpensive, and so may enhance electricity system reliability and reduce energy costs. Even though energy productivity improvements tick all the boxes, they have to date not been adequately implemented in Australia. Investment in our Commonwealth energy efficiency programs amounts to about a thousandth of that in Germany (and the economy is 1/3 the size). There is no reason why Australia could not have it all – reliable, affordable and clean energy (RACE). To achieve all three, Australia needs an integrated energy transition strategy based on the following main instruments:

Energy productivity on energy user sites (factories, offices and homes) is the key, from improving energy efficiency of buildings, processes and equipment; distributed generation; demand control to match volatile energy supply (including use of storage - thermal storage such as hot or cold water, material storage, or batteries), applying energy to enable greater value (e.g. digitalisation of industry - industry 4.0); and replacing fossil fuel heating with electricity technologies (e.g. heat pumps) or renewable fuels (e.g. biogas from waste digestion).

Large scale renewable generation of electricity using solar or wind, together with investments to reduce supply volatility such as batteries, pumped hydro or fast ramp gas fired generation (noting that end user demand management should come first, as it is lower in cost and commercial risk).

Energy for transport: Sourced from using renewable energy to generate hydrogen (including using low cost excess renewables as a form of storage), electrification of land transport, and/or production of bio-fuels from waste or other organic sources, which is needed particularly to decarbonise air transport and shipping.

Key element: improving energy competitiveness

Improving energy productivity is the glue that allows Enliten deliver RACE. It allows carbon mitigation and accelerated renewables to be achieved economically. Every alternative model fails without energy efficiency at its centre. Germany found this out from experience, and refocussed its policy by making energy efficiency the centrepiece so as to deliver the promise of transition. In Australia, central support for an energy transition was largely neglected at Commonwealth level. This is particularly unfortunate given Australia's existing poor energy productivity. There is an economic imperative to boost energy productivity given that Australia generates less value with each unit of energy deployed than other developed countries. Combined with the rapid increase in energy prices in the last decade, Australia now faces a competitive disadvantage in energy costs.

In sum, Australia must establish a national energy productivity innovation programme to accelerate the development, application and technology transfer of the technologies needed to achieve its goals. A national strategy is also required to ensure that there is a chance for the Australian economy to benefit from leading in at least some niche aspects of the transition, and to ensure that, as the transition takes place, Australia is not just a tech-taker of imported technology and business solutions.

ANALYSIS

Climate Security and its Geopolitical Implications

Prof Dr Friedbert Pflueger

About the Author

Prof Pflueger is the Director of the European Centre for Climate, Energy and Resource Security (EUCERS) at the Department of War Studies, King's College London. He has previously served as a press secretary to the former German President Richard von Weizsaecker. Further, he was a Member of the German Bundestag (1990-2006), Chairman of the Bundestag Committee on the Affairs of the European Union (1998-2004) and Deputy Minister for Defence in the first Merkel Government (2005/06). Since September 2009, he is Professor for International Relations at the Department of War Studies, King's College London. He is also non-resident senior fellow at the Atlantic Council's Energy and Environment Program and Senior Advisor to the World Energy Council's Global Gas Centre. Friedbert Pflueger has his own consultancy in Berlin/Erbil and is Senior Adviser for Roland Berger Strategy Consultants. He publishes frequently on current energy and resource security issues.

Today, a universal challenge is emerging that we must urgently address. This challenge has unfortunately been understudied and only been given marginal attention thus far: climate security – or more precisely, the geopolitical implications of climate change. Indeed, climate change has become a threat multiplier that is exacerbating volatile situations around the world with dire geopolitical implications.

Key issues of our time such as cross-border migration, conflicts over water, power politics, as well as civil and interstate wars are more deeply intertwined with climate change than previously assumed.

For many, climate change poses an existential threat while for others, it may become an advantage. Two flashpoints in particular stand out:

1. The Arctic and Greenland

Rising global temperatures are melting our polar ice caps. Over the last three decades, the Arctic has experienced some of the most rapid climate change developments on Earth, almost twice the global average. Sea ice has declined by about 10%, and NASA's laser altimeter readings show that the edges of Greenland's ice sheet is shrinking.[i] As ice fields, glaciers and sea ice continue to melt, countries are increasingly recognising the potential to unlock vast tracts of natural resources such as oil, natural gas, and minerals. The Artic accounts for about 13% of undiscovered oil and 30% of undiscovered gas.[ii]

The opening up of the Northeast, Northwest and other passages due to the melting ice gives rise to new questions revolving around who has the right to control the seaways or to exploit the vast undiscovered natural deposits. These questions raise serious geopolitical concerns, and rightly so given the history of tensions in the region between the five Arctic coastal states (Canada, Denmark, Norway, Russia and the US) as well as other actors such as NATO and China.

Recently, President Trump played with the idea of buying Greenland. While his proposal caused global astonishment and garnered widespread ridicule, it was not just an outlandish idea. Greenland has long had a militarily important location between Russia and North America.

In 1940, the US seized control of Greenland to prevent the island from being used as a springboard for an invasion of North America. During the Cold War, Greenland's strategic geographic location was used by the US to track Soviet submarines, to place strategic bombers and later missiles that could attack Soviet targets, as well as for missile early warning radars at the American air base in Thule.

Today, Greenland remains as important as ever for the US and NATO because of two new challenges:

Challenge 1: Russia's enhanced military capabilities

In November 2019, Russia conducted a major military exercise in the region involving 12,000 soldiers, five nuclear

submarines, 15 warships, 100 aircrafts, as well as the launch of the world's first "combat icebreaker".[iii] Moreover, Russia has five nuclear-powered icebreakers, currently the only country to have any, and it is also constructing the world's northern-most airbase in Nagurskoye[iv], which will give Moscow the ability to strike Thule Air Base and thus cause significant damage to the US' missile defence and early warning system. In geopolitical terms, Russia's increased assertiveness in the Arctic has two key aims:

1. to gain a strategic military position with strike capabilities against North America and other potential adversaries, and
2. to bolster Russia's claim to around 1.3 million square km of the Arctic.

Ultimately, the symbolism of Russia's activities in the region is not lost on the international community and could potentially become a conflict hotspot in the years ahead as the melting ice renders the region increasingly attractive.

Challenge 2: China's growing economic clout

The opening up of the Arctic has also become of interest to countries not usually associated with the region. In its 2018 white paper, China launched its Polar Silk Road initiative, which aligns Beijing's Arctic interests with the Belt and Road Initiative. In the paper, China describes itself as a "Near-Arctic State" and makes it clear that it has a strategic interest in being involved in natural resource extraction as well as commercial activities including shipping. China has already sought to project its economic influence through commercial forays in Greenland. Chinese private and state-owned companies have invested in mining projects[v], a Chinese investment company was interested in buying a former naval station[vi], and in 2017 the Chinese government applied for permission to build a satellite receiving station. As trade starts to pick up when the melting ice opens up the seaways, it is likely that China will attempt to increase investments in the region. Eventually, Chinese capital could make up a significant share of the island's economy, giving Beijing leverage that may be used to pursue not only commercial but also geopolitical interests.

For instance, if China decided to develop major infrastructure along the Polar Silk Road, it would warrant close attention. Such facilities could easily be re-purposed for military use with strike capabilities against both the US and Russia, particularly at a time when the US is reducing its international engagements and Beijing simultaneously seeks to be recognised as a major power with a growing global reach.

2. Antarctica

The Arctic is not the only frontier with vast untapped potential. Antarctica, which is twice the size of Australia, holds the world's largest store of freshwater as well as vast potential reserves of oil and gas.

Competition is already heating up between the US, Russia and China. These countries are seeking to position themselves for when the Antarctic Treaty provision that bans mining might change in 2048, the year the ban is up for review. While the interest to exploit oil and gas in the region is obvious, the continent's freshwater reserves could also become a strategic resource in the future as water scarcity is exacerbated by climate change. In 2018, Cape Town faced such severe water shortages that it even began preparations for a "Day Zero", the point at which the city's municipal water supply would be shut down.

Antarctica: New Zealand Scott Base in the Ross Sea © Dr Regina Eisert

The city thankfully managed to avert the crisis this time. In the future, countries under severe water stress such as South Africa could become major importers of water from Antarctica.

The US', Russian and Chinese interest is not limited to the potential natural resources available, but also extends to the continent's geopolitical significance. All three countries already have critical infrastructures in place to aid their Global Positioning Systems (GPS) or, in the case of China, the BeiDou Navigation Satellite System (BDS). Having a ground station near the South Pole may increase the accuracy of global satellite navigation systems. As more and more land becomes available due to climate change, the likelihood of other installations - including military installations - is likely to increase as various countries recognise the monetary and strategic value that is being unlocked and start laying claims to both land and sea territories around the South Pole.

Such a development could be of particular concern to states that are within aircraft range, including Australia, South Africa and Argentina. Already in 1955, Australia's Foreign Minister Richard Casey stated that Australia could not afford to have the territory in 'hostile hands'. In the 1980s, the Australian government went so far as to officially communicate six key strategic interests in Antarctica, including to maintain " Antarctica's freedom from strategic and/or political confrontation"; and to be "informed about and able to influence developments in a region geographically proximate to Australia".[vii] Today, the country's strategic interests are as relevant as ever and successive Australian governments have re-affirmed these interests.

Conclusion

Whether talking about food security, water shortages, rising temperatures, or extreme and unpredictable weather patterns, links are being made between a changing climate and security. And it is truly a global problem. Emissions produced in the US lead to melting the icecaps in the Arctic, which in turn is detrimental to Pacific island states. As the manifestations of climate change increase and become more extreme, its effects will play an increasingly important role in discussions of security and geopolitics.

Comprehensive strategies need to be developed in this relatively new field to respond to climate-induced security threats and geopolitical instability both nationally and around the world. The Paris Agreement is a good first step in pushing us to commit to curbing emissions and drafting climate adaptation action plans. But pledges and promises alone are not enough. We need to step up and turn them into concrete action.

Endnotes

i www.nationalgeographic.com/environment/global-warming/big-thaw/

ii https://pubs.er.usgs.gov/publication/70035000

iii www.voanews.com/europe/russia-ups-ante-arctic

iv https://warontherocks.com/2019/08/lets-not-make-a-deal-geopolitics-and-greenland/

v www.diis.dk/en/research/china-in-greenland

vi www.reuters.com/article/us-denmark-china-greenland-base/denmark-spurned-chinese-offer-for-greenland-base-over-security-sources-idUSKBN1782EE

vii www.defence.gov.au/ADC/Publications/IndoPac/Forster_IPSP_Final.pdf

ANALYSIS

New Challenges for Raw Material Supply Security in the New 'Rare Metal Age' in the 21st Century — Prospects for European–Australian Cooperation

Dr Frank Umbach

About the Author

Dr Frank Umbach is the Research Director of the European Centre for Climate, Energy and Resource Security (EUCERS), King's College in London. He is also an Adjunct Senior Fellow at the S. Rajaratnam School of International Studies (RSIS) at the Nanyan Technological University (NTU) in Singapore; a Visiting Professor on "EU Energy (External) Policies and Governance" at the College of Europe in Natolin/Warsaw (Poland) and an Executive Advisor of Proventis Partners GmbH, Munich (a M&A company). He also works as an international consultant for governments, international organisations (i.e. NATO), energy, consulting and investment companies (i.e. Gerson Lehrman Group/(GLG) on international energy security, policies and markets, geopolitical risks, cyber security and critical (energy) infrastructure protection/CEIP, as well as (maritime) security policies in Asia-Pacific.

Moreover, he is the author of more than 500 publications in more than 30 countries worldwide. He has published regularly for the Geopolitical Intelligence Service (GIS), Liechtenstein since 2011, and is the author of the study ""Energy Security in a Digitalized World and its Geostrategic Implications", Study of the Konrad Adenauer Foundation (KAS)/Regional Project: Energy Security and Climate Change Asia-Pacific (RECAP), Hongkong, September 2018, 171 pp. (kas.de/wf/doc/kas_53447-1522-2-30.pdf).

The question of raw material supply security and its challenges has returned to the international agenda in May 2019, when Beijing has threatened to restrict its exports of rare earths (REs) to the United States amidst the US–China trade conflict. China's threats reminded the US and the EU of the rare earth supply conflict in 2010.

Back then, China - as the world's largest producer and exporter of rare earth elements (REEs) - suspended its supply to Japan and tried to use its de facto monopoly of global REEs' production for political purposes in an escalating diplomatic conflict over maritime territories and energy resources in the East China Sea. Prior to China's latest threats to supply security of REs, international experts warned that China might reduce its REs exports to meet its domestic demand from its electric vehicle (EV) industry and other high-tech sectors.

The rapidly growing worldwide demand for critical raw materials (CRMs) is largely the result of the global transition to decarbonised economies, expansion of 'green technologies' (i.e. renewable energy sources) and 'industry 4.0'. Each of them is heavily dependent on a stable supply of CRMs. The growing demand creates unprecedented challenges, including bottlenecks and supply shortages, to each stage of the global supply chains of CRMs, from mining to processing, refining and manufacturing. Addressing these challenges has become even more important as emerging disruptive technologies such as electric vehicles (EVs) and their batteries, robotics and artificial intelligence (AI) systems further drive the global demand for CRMs (i.e. 'technology metals'). The World Bank already warned in 2017 that decarbonised energy systems and 'green economies' are much more raw material intensive than the old energy world based on fossil fuels.

Given the new waves of disruptive technologies which come at an ever increasing rate in the civilian and defence sector, the availability and stable supply of CRMs as the foundation of these technology revolutions have become a major worldwide concern of companies and governments alike. Access to, and stable supply of, CRMs and their supply chains are required for any new technology to enter the market and to be applied for its use. These concerns have risen as the great power rivalries, in particular, between the US and China, are fuelled by the technology race. Both superpowers increasingly use strategies of economic warfare to push their unilateral economic and foreign policy agendas by using the instruments of their economic prowess such as China's producer and export monopoly of refined REs. The powers who control CRMs and possess the manufacturing and processes know-how as well as capacities also control the technological and industrial power in the 21st century's new 'Rare Metal Age'.

Characteristics of the new Critical Raw Material sectors

The production of CRMs - compared with the production of conventional oil and gas resources – is geopolitically more

challenging and problematic as 50% of the CRMs are located in fragile states or politically unstable regions. Security of supply risks are not restricted to primary natural resources and CRMs but also extend to the import of semi-manufactured and refined goods as well as finished products. Manipulated prices, restricted supplies and attempts to cartelise CRM markets with wide-ranging negative economic consequences are not limited to producing and exporting countries. Powerful state and private companies are also responsible for non-transparent pricing mechanisms for many precious CRMs. Global supply chains have become ever more complex with blurred boundaries between physical and financial markets and weakly governed market platforms. These market imperfections lead to the manipulation of prices, and threaten the stability of the future security of CRMs' supply.

The specific functionalities and characteristics of the various CRMs often render them difficult to recycle and/or to substitute, in some cases they are even irreplaceable. New technologies also bring about the need for new raw materials and suppliers. For these raw material exporters, new technologies offer new economic development, welfare and trade with industrialised high-tech countries dependent on the import of CRMs. The rise of these new economic powers based on CRM exports, however, may domestically lead to the 'Dutch disease' with social imbalances and widespread corruption, and externally result in new geo-economic and geopolitical competition, rivalries and international conflicts. Producers and exporters of CRMs are confronted as 'rentier states' with traditional challenges of a 'resource curse' and unprecedented international attention to their mining practices and conditions. The more the world expands to 'green technologies' and becomes dependent on a rising and stable supply of CRMs, the more the international focus will be directed towards their environmental standards and energy efficient production methods. Mining companies, driven by fear for their international reputation, are already increasing the share of renewables in their energy mix of production and endeavour to reduce negative environmental side effects.

In developed countries, environmental pollution might decrease thanks to EVs and an expanded battery use for EVs and renewable energy sources (RES). But the opposite might be true in developing countries producing the raw materials for the rich world due to environmental and social costs. These countries may face more water shortages, rising emissions, toxic pollution and other environmental challenges, and may have to cope with human rights abuses and international labour standards. Supply chains from mining to end products are often not fully transparent, despite many efforts to improve industry practice for responsible and ethical sourcing. International certification schemes - such as the 'OECD Due Diligence Guidance' and conflict-free sourcing initiatives - offer instruments for more transparency and international collaboration.

The future supply security of CRMs depends largely on timely investments, which in turn depend on adequate investment conditions, and alternative strategies such as the re-use and reduced use, substitution and recycling of CRMs. Using these strategies for decreasing the rising imports of CRMs might allow a reduction of imported and produced CRMs in the mid- and long-term. In the EU, these response strategies have already become integral parts of the development of 'circular economies',

which use CRMs more economically, efficiently and environmentally by reducing their mining demand and import in order to strengthen security of supply.

While these strategies for 'circular economies' may help in the mid- and long-term, they do not offer a real short-term solution to the rising import dependence on REs and other CRMs. In the mid-term, such efforts might only have a marginal impact on broadening the global supply basis for REEs and other CRMs. Raw material intensity and efficiency (comparable to energy intensity and efficiency) and life-cycle analyses will become even more important factors and instruments for analysing and differentiating within mining and manufacturing industries.

At present, recycling options are also limited due to a lack of sufficient data on both current and future recycling rates and insufficient profitability for the private industry. While substitutes are available for many applications, they are often less efficient and/or require more energy in return. In this regard, and in order to create sustainable as well as commercially profitable 'circular economies', many more investments in research and the development of new technologies for recycling, re-use and substitution are needed.

Prospects for Enhancing EU-Australian Cooperation on a Stable Worldwide Supply of CRMs

The EU's extended list of defined CRMs highlights rising concerns about supply security of CRMs and China's domestic and foreign raw material policies. The list was officially extended from 14 CRMs in 2010 to 20 in 2014 and to 27 in 2017.

In the mid- and long-term, it is of utmost importance that the EU (following the example of the US) strengthens its cooperation with Australia to develop a long-term sustainable counterstrategy to China's raw material and industrial-technology policies. In the light of environmental policies and climate warming as well as the overall mounting waste challenges, the EU should fully implement the concept of a 'circular economy' and recycling, substitution, re-use, and reduced use strategies. The EU's approach offers Australia and other Asian countries such as New Zealand (as producers and consumers of CRMs) a strategic concept for addressing their own challenges, including their rising demand for, and consumption of, CRMs as well as related environmental, ethical, social, technological and economic issues.

Similar to the US government, the EU should support non-Chinese CRM mining and refining projects to diversify and stabilise its domestic and global supply. The prospects for opening new mines outside of China has often been hampered and delayed by numerous environmental challenges and standards. Western companies have often shunned the dirty work or given up due to high costs and failing competitiveness towards state-owned Chinese companies and their subsidised raw material projects inside and outside China. Western strategies for diversifying REEs production and imports have often proved to be unprofitable in the last years. Moreover, opening new mines and refining facilities around the world requires lead times of at least 7 years on average, in Western countries often 10 to 20 years. Facing mounting public resistance in many OECD countries, it has become ever more challenging to find private Western investors for long-term mining projects due to rising political risks (i.e. public acceptance). The EU and its member states' governments need to explain and

The Australian government has recently 15 REs and other CRMs projects as part of a joint Australian-US cooperation to challenge China's monopoly. The plan provides for the Northern Minerals company to develop REs mines in Western Australia.

publicly support their raw material policies and projects for economic, environmental and climate protection reasons as imports result in higher GHG-emissions as life-cycle analyses have highlighted.

The Australian government has recently offered 15 REs and other CRMs projects as part of a joint Australian-US cooperation to challenge China's monopoly. The plan provides for the Northern Minerals company to develop REs mines in Western Australia. The company has already signed an offtake agreement with the German Thyssenkrupp Materials Trading company. Western Australia's minister for mines, Bill Johnston, has explicitly invited the EU and European companies to join these projects as the EU plans to open 26 giga-factories for battery production by 2025. It requires a stable supply of significant amounts of lithium and other CRMs for this purpose. The projects would also offer greener supply chains for European car-making companies as Australia has an enormous potential for solar and wind energy. In this regard, the EU and Germany can offer and share with Australian partners high-technologies, management skills and best practices in regards to renewable energies as well as experiences and 'lessons learnt' from the German and EU 'Energiewende' (energy transition).

In January this year, a new 'Raw Material Strategy' of the German government, which has revised the older one of 2010, has been published. It envisages an action plan with 17 concrete measures and new initiatives. According to this strategy, the German government also plans to consider the creation of a 'competence centre' in Asia (in addition to an already existing one in AHK South Africa and another new one in Ghana). Given Australia's status as a leading CRM producer and exporter, its excellent bilateral economic relations with Germany and as a democratic OECD country, the new competence centre in Asia should be located in Australia for strengthening further the bilateral relationship.

References

Frank Umbach, 'Energy Security in a Digitalized World and its Geostrategic Implications', Study of the Konrad Adenauer Foundation (KAS)/Regional Project: Energy Security and Climate change Asia-Pacific (RECAP), Hongkong, September 2018.

Frank Umbach, 'Rare Earth Minerals Return to the U.S. Security Agenda', Geopolitical Intelligence Service (GIS), 1 August 2019.

European Commission, 'On the List of Critical Raw Materials for the EU. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions', Brussels, 13 September 2017 COM(2017) 490 final.

Bundesministerium für Wirtschaft und Energie (BMWi), 'Rohstoffstrategie der Bundesregierung', Berlin, 14 January 2020.

ANALYSIS

Energy Transition and Hydrogen Exports

Kelvin Say, Changlong Wang

About the Authors

Kelvin Say

Kelvin Say is a research fellow at the University of Melbourne, Energy Transition Hub, focusing on decarbonisation and operational opportunities from the integration of decentralised energy resources (DER) into the electricity market along with the creation of new market segments, operational roles and business models.

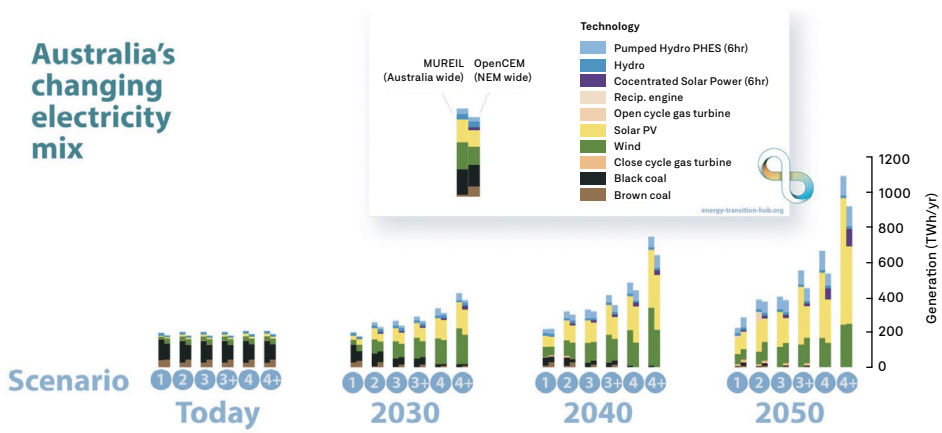
He has an industry background as an engineer in automation and control systems and is in the process of completing his PhD on electricity system and market transitions from household PV battery adoption. His areas of expertise and research include techno-economic modelling, DER market integration, energy system transformations, and electricity market design.

Changlong Wang

Changlong Wang received his Bachelor of Engineering degree with Honours at the Australian National University. He is working towards a Doctor of Philosophy at the University of Melbourne as a CSIRO supported student. His fields of research are in the modelling of integration of renewable energy technologies into large power systems, generation and transmission system planning and optimisation, large-scale storage system and demand management modelling, and large-scale renewable energy export through High Voltage DC (HVDC) links, Hydrogen and energy-intensive products, such as “green” steel.

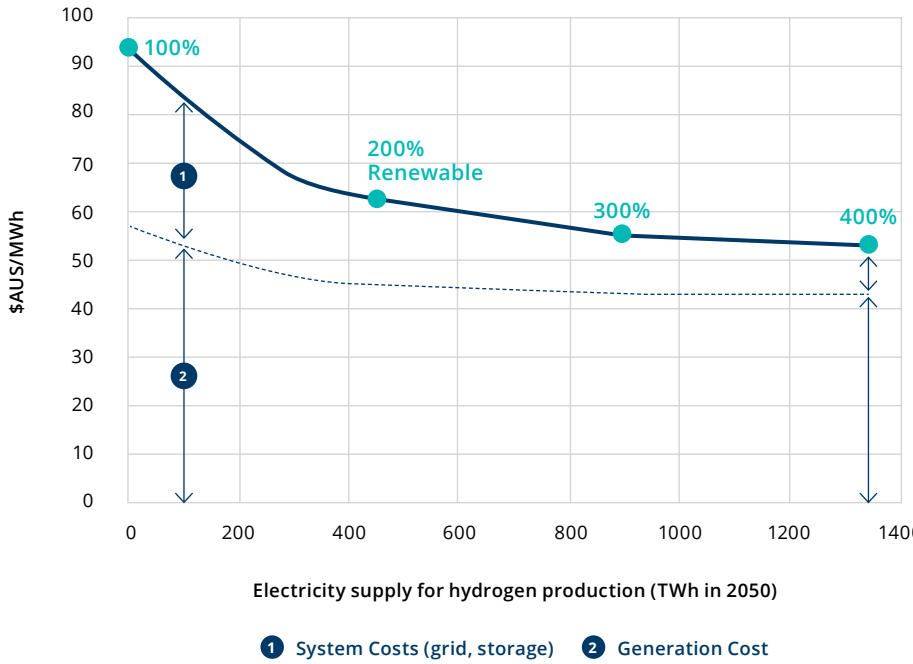
Carbon neutrality requires significant renewable resources to provide the energy for transition. Australia is well placed to provide large quantities of cost-competitive green fuels to deeply decarbonise not only its own economy, but also those of others, such as Germany. Recent research shows that decarbonisation and hydrogen production are not disconnected but offer synergistic benefits that assist both hydrogen producers and the wider economy.

By taking advantage of its significant solar, wind and land availability, Australia has sufficient renewable energy resources to decarbonise its own energy use while supplying green hydrogen to international markets. Modelling by researchers at the Australian-German Energy Transition Hub evaluated the cost-optimal transition of Australia's electricity supply by 2050 across a range of scenarios, starting from the existing 'Status Quo' climate energy policy environment through to an ambitious '200% Renewable' scenario (4+).



Electricity generation (TWh/year) for the six scenarios from 2020 to 2050. Across all scenarios, no new coal power is deemed economically viable, while renewable electricity expands. Source: Energy Transition Hub, Australia's power advantage

Costs of electricity supply (annual average in 2050)



The results show that even in the absence of additional climate energy policies, carbon emissions in the electricity sector are expected to fall by 40-48% in 2030 (relative to 2005), driven by retirements in fossil fuel generation, falling costs of renewable energy technologies and a continued growth in solar PV and wind power capacity. As the level of decarbonisation across the economy increases, solar PV and wind technologies rise to become Australia's primary sources of energy, dominating Australia's electricity future while keeping system costs similar to or below those of today.

Expanding Australia's energy transition to include the production of hydrogen (via electrolysis) results in a range of benefits that are dependent upon the location and energy source of these electrolysers. In the short term, while electrolyser costs remain high (around $3000/kW with low conversion efficiency), locations with the lowest hydrogen production costs have high and complementary wind and solar resources hydrogen production. Such locations include the Pilbara region in Western Australia, central Northern Territory (with sufficient water access), South Australia, and Tasmania. These locations are able to provide the highest possible energy capacity factors to operate hydrogen facilities but tend to be located away from the major demand centre of the National Electricity Market (NEM). These findings are consistent with early investments occurring in large-scale green hydrogen export facilities (such as the 15-GW Asian Renewable Energy Hub project) that are located away from the NEM.

However, as electrolyser costs fall over time (towards $800/kW in 2050 and with improved conversion efficiencies), the range of economically viable locations for hydrogen production becomes more tolerant to regions with lower capacity factors and begins to include the option of sourcing energy from NEM (as opposed to onsite generation). By integrating hydrogen production into the NEM, a number of further benefits can be realised. First, electrolysers are able to take advantage of low and moderate electricity prices while switching off during times of high network demand and low supply (i.e. high electricity prices). Second, the flexibility of hydrogen production counterbalances the variability in renewable electricity generation across the network, thus reducing their curtailment and the need for additional investments in peaking generation, energy storage and transmission. Third, greater use of hydrogen within the domestic economy is promoted. These integration benefits may assist the wider economy by reducing electricity cost of supply pressures thus benefitting all electricity customers including hydrogen producers. Additional increases in the quantity of hydrogen production further reduces the network and generation costs for each megawatt-hour of electricity supplied, suggesting synergies and opportunities that come from producing hydrogen in Australia.

The significant renewable energy and land resources available in Australia provide the capacity to not only deeply decarbonise the national economy, but also to provide Australia with a new source of revenue as a significant exporter of cost-competitive green hydrogen to international markets. When developing a strategy for a hydrogen export economy, a systems perspective is required as hydrogen production and the decarbonisation of Australia's economy are inherently linked. Scenario analyses highlight that optimal locations for hydrogen production are heavily influenced by electrolyser costs, the level of decarbonisation in the Australian economy, and the scale of hydrogen production for both international and domestic markets. Many nations face significant challenges achieving net-zero emissions with their own domestic renewable energy sources; Australia has an opportunity to leverage its competitive advantage to become a significant supplier of green hydrogen for the rest of the world.

References

Burdon R, Hughes L, Lord M, Maddedu S, Ueckerdt F, Wang C, 2019, Innovation and export opportunities of the energy transition, www.energy-transition-hub.org/resource/innovation-and-export-opportunities-energy-transition

Ueckerdt F, Dargaville R, Gils HC, McConnell D, Meinshausen M, Scholz Y, Schreyer F, Wang C, 2019, Australia's power advantage: Energy transition and hydrogen export scenarios, www.energy-transition-hub.org/resource/australias-power-advantage-energy-transition-and-hydrogen-export-scenarios

ANALYSIS

Energy Efficiency in Germany and Australia: Different Approaches, Different Outcomes

Bahador Tari, Associate, Energetics

About the Author

Bahador Tari is a senior climate risk and energy management professional with Energetics, an Australian management consultancy advising large energy users across all sectors of the economy and all levels of government. With more than 15 years' experience working with government, industry and business decision-makers on energy strategy, climate risk and sustainability, he has expertise in energy infrastructure, investment and regulation. Bahador has delivered major energy infrastructure projects and has leveraged funding for investment in programs for improving energy efficiency and accelerating Australia's transition to a lower carbon economy.

In recent years, the resilience of Australian manufacturers has been tested with high energy costs; the result of a doubling in electricity prices, a tripling in gas prices, security of supply issues and increas–ingly complex energy markets. In the face of these challenges, energy efficiency seems like an obvious solution.

However, national policy inertia has combined with difficulties around identifying, assessing and implementing efficiency measures to hinder the pursuit of energy efficiency by industrial energy users. In this article we discuss the role of energy efficiency in supporting business outcomes and compare Australia's experience with that of Germany, which leads the world's energy efficiency rankings.

Features of Germany's energy policy suite

A report released by the American Council for an Energy-Efficient Economy (ACEEE) in 2018,[i] which evaluated 25 of the world's largest energy users on 36 efficiency metrics, ranked Australia 18th (dropping two places since 2016). Australia's buildings sector was in the top half (10th) of countries surveyed, while in transport and industry Australia ranked 20th and 22nd respectively. Overall, Germany and Italy tied for first place. Germany scored best for national efforts, including cross-cutting targets and programmes. In Germany, the Energiewende or 'energy transition' propelled an overhaul of the country's energy use, from a system based on fossil fuels to one centred on renewables[ii]. Its targets, formalised in 2010, commit the government to reducing emissions by 40% by 2020 and 80-95% by 2050, compared with 1990; sourcing at least 80% of electricity from renewables by 2050 and national energy efficiency goals of 20% primary energy reduction until 2020 and 50% reduction until 2050 (base year 2008).[iii]

In December 2014, the Government adopted the 'Climate Action Programme 2020' which included its National Action Plan on Energy Efficiency (NAPE). The three pillars of Germany's NAPE include improving energy efficiency in buildings, establishing energy efficiency as an investment and business model, and encouraging individual responsibility for energy efficiency. According to research by KfW,[iv] between 2000 to 2017, there was a 25% reduction in the total primary energy intensity, which is attributed to energy efficiency, demand management and increasing renewable energy capacity. However, while Germany's energy policy has made significant strides in improving its energy productivity, strong economic growth and increasing energy consumption in the transport and building sectors have offset some of the efficiency gains in the same period; resulting in a relatively modest overall reduction (6%) in primary energy consumption. Further, addressing its climate change objectives, managing the implementation of energy polices concurrent with phasing out nuclear power and increasing renewable energy output have been challenging for Germany. Whilst it has diversified its electricity mix towards renewable energy, growing it from 4% in 1990 to 38% in 2018,

While discussions of the Energiewende in Germany reveal diverse viewpoints about its success, carbon emissions reduction, renewable energy development and improvement of energy efficiency were clear driving forces.

Germany is set to miss its 2020 target of 40% reduction in greenhouse gas emissions (currently tracking to achieve 32%).[v]

In response, Germany's 2030 Climate Action package, which passed into law in November 2019, stipulates a reduction in greenhouse gas levels by 55% compared to 1990 levels by 2030.[vi] A raft of measures will be implemented including a carbon price on the transport (excluding aviation) and buildings sectors from 2021, retrofitting of buildings to become tax-deductible by 2020 and increasing the number of public charging points for electric vehicles to one million by 2030.

Contrasting approaches: policy integration vs. a separation of energy and climate

While discussions of the Energiewende in Germany reveal diverse viewpoints about its success, carbon emissions reduction, renewable energy development and improvement of energy efficiency were clear driving forces. We also see Germany's climate targets, which were agreed in 2007, have been upheld.

In Australia, the politicisation of climate change and energy policies over the last decade has resulted in policy inertia at a time when the resilience and competitiveness of Australian businesses are being challenged with energy affordability and security issues. While Australia aims to reduce its emissions by 26-28% on 2005 by 2030 through the 'Climate Solution Fund' (formerly the Emissions Reduction Fund), the Renewable Energy Target and a National Energy Productivity Plan, emissions are rising from the stationary (including manufacturing and mining) and transport sectors. They are expected to increase by 12% and 44% respectively.[vii]

Missing the energy efficiency opportunity in Australia

Improving energy efficiency should be a key strategy, particularly in the industrial and transport sectors, which are experiencing emissions growth. At a national level, due to a lack of policy and targeted programs, Australia's rate of energy efficiency improvement has continued to lag behind other developed economies. In fact, Australian's peak scientific body CSIRO, found that if energy efficiency measures were pursued across the economy, a lower renewable energy capacity of 50% would be required to meet emissions reduction targets.[viii]

The so-called National Energy Productivity Plan (NEPP), which aims to improve the economic output per unit of energy used by 40% between 2015 and 2030, has yet to yield benefits. A 2018 update statement showing that the 2.3% annual improvement required to meet the 2030 target is not being achieved.[ix]

Anecdotal evidence suggests that even with high energy prices, there are still

barriers to implementing energy efficiency measures, including capital constraints, insufficient energy data capture and management systems, and lack of internal experience and capability to identify and evaluate opportunities.

With the Australian government currently reviewing the NEPP, there is an opportunity to apply lessons from other countries with similar 'energy trifecta' challenges, such as Germany, and either revamp the NEPP to drive energy efficiency or implement a program to help businesses overcome the barriers faced. In addition, as Australia's greenhouse emissions grow, energy efficiency offers a reduction pathway that should attract bipartisan political support – perhaps helping to push through the impasse that has gripped Australian energy and climate policy for more than a decade.

References

i Castro-Alvarez et al: "The 2018 International Energy Efficiency Scorecard", American Council for an Energy-Efficient Economy, June 2018, https://www.aceee.org/sites/default/files/publications/researchreports/i1801.pdf

ii www.bmwi.de/Redaktion/EN/Dossier/energy-efficiency.html

iii Anke Brüggeman, "How Efficient is Germany?", KfW Research, No. 213, 3 July 2018 www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-2018-EN/Focus-No.-213-July-2018-Energy-efficiency-Germany.pdf

iv www.cleanenergywire.org/news/german-energy-transition-fails-emissions-and-efficiency-report

v Germany's Energiewende, World Nuclear Association, www.world-nuclear.org/information-library/energy-and-the-environment/energiewende.aspx, updated December 2018.

vi Clean Energy Wire, www.cleanenergywire.org/factsheets/germanys-2030-climate-action-package, 14 October, 2019.

vii Gordon Weiss, "Australia's emissions to 2030 and beyond to 2050", Energetics, 24 July 2019 www.energetics.com.au/insights/thought-leadership/australia-s-emissions-to-2030-and-beyond-to-2050

viii Campey et al: "Low Emissions Technology Roadmap", CSIRO, June 2017 www.csiro.au/en/Do-business/Futures/Reports/Low-Emissions-Technology-Roadmap

ix www.energy.gov.au/sites/default/files/australian_energy_update_2018.pdf?acsf_files_redirect

STATEMENT

"The world amid an energy transition has to battle the headwinds of economic and social dislocation as countries grapple with pulling down emissions. Here in New Zealand, the Government have taken the step of a "swift but smooth" transition away from fossil fuel dependency through banning future exploration. In my understanding of change management, anything swift is not usually smooth, and that is proving true in New Zealand. The Government announced that they are banning any new petroleum exploration outside of onshore Taranaki, which is the regional hydrocarbon centre for New Zealand. [...] A sound strategic process is needed when making such decisions around a country's energy future. [...] We are now generating more emissions, not less, and while the Government has legislated against hydrocarbon exploration, we are relying more and more on coal for our electricity generation. The best way forward is consultation, advice seeking, environmental and economic analysis, which in the end enables a more orderly transition with less social and economic dislocation."

Jonathan Young MP

Spokesperson for Energy and Resources
National Party of New Zealand

Wairakei Geothermal Power Station © KAS Australia

ANALYSIS

Cross–Country Collaboration Key to Achieving Energy Objectives

The BusinessNZ Energy Council

About the Author

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 body and member of the World Energy Council (WEC). BEC members are a cross-section of leading energy-sector business, government and research organisations. Together with its members the BEC is shaping the energy agenda for New Zealand.

The world faces a highly uncertain energy future. Internationally, businesses, governments and individuals are grappling with issues such as accelerating deeper and affordable decarbonisation, rethinking energy security as dynamic resilience in an era of broadening geopolitics, cyber insecurity and global environmental risks.

The need to balance our energy systems across the dimensions of affordability, sustainability and reliability is becoming more obvious and urgent, yet the responses are increasingly complex.

It is important that, in addressing the realities of climate change, countries need to support public acceptance at home and foster international cooperation. New Zealand and Germany can take a leading role in addressing the realities of climate change by working in partnership.

The two countries enjoy a supportive relationship based on common interests and values, making us like-minded partners in international affairs, trade, commerce, science and cultural exchange.

Germany has long been one of New Zealand's most important partners in the area of science and innovation, with 2017 marking the 40th anniversary of the Scientific and Technological Cooperation Agreement.

Prime Minister Jacinda Ardern visited Berlin in April 2018, meeting with Federal Chancellor Dr Angela Merkel where they discussed a 'truly excellent relationship'.

In terms of energy, Germany has already expressed interest in collaborating with New Zealand on green hydrogen. In September, Chancellor Merkel agreed to support a €54 billion package of climate policies aimed at getting Germany back on track to meet its goal of reducing greenhouse gas emissions by 2030.

Over the next 40 years, hundreds of billions of dollars will be expended on capital, operating and fuel costs across the energy sector. Governments need to strike a balance between making long-term policy and investment decisions, and decisions that are resilient and adaptive to the rapidly moving energy system. Governments should not work in silos when making these decisions.

New Zealand is also looking to Germany and see what it can learn from the German energy transition 'Energiewende' (Germany's transition to non-nuclear, sustainable power sources).

The 'Energiewende' policy includes greenhouse gas reductions of 40% by 2020 and 80-95% by 2050 relative to 1990. As part of the 'Energiewende', the Ministry of Education and Research announced an investment of €300 million in research on green hydrogen by 2023 (€180 million has already been allocated for the coming years).

In a recent meeting, facilitated by the BusinessNZ Energy Council and the Konrad Adenauer Foundation, Director General of the Federation of German Industry (BDI) Dr Joachim Lang asked how Germany and New Zealand could work together in developing hydrogen.

He said that Germany would have a strong interest in importing green hydrogen from New Zealand, showing a willingness to pay the additional cost of producing green,

instead of brown or grey, hydrogen. This is another great opportunity for New Zealand and Germany to identify potential areas of collaboration and the BEC would be pleased to facilitate its further development.

Similar to Germany, New Zealand faces rapidly changing patterns of energy use, emerging disruptive technologies and the challenge of living affordably and sustainably.

Our recent BEC2060 project[i] paints a picture of New Zealand's plausible energy future and the range of trade-offs we might need to make.

Importantly, the research highlights the importance of cooperation between organisations and countries.

As a member of the World Energy Council (WEC)[ii], BEC members are a cross-section of leading energy-sector business, government and research organisations. Together with its members the BEC is shaping the energy agenda for New Zealand.

The WEC offers extraordinary opportunities at the global, regional and national levels. Access to this high-level network stimulates useful dialogue, promotes the exchange of ideas, aids development of new business partners and investment opportunities and provides valuable collaboration and information sharing across the energy sector. This is a strong, win-win relationship.

Our internationally renowned, New Zealand-specific modelling envisages our potential and plausible energy system futures. Using an explorative analysis, we were able to give a more accurate, open-ended insight into how New Zealand's future energy mix might look, should things we are uncertain about coalesce in different ways, and the range of trade-offs and choices these different pathways imply.

It became clear from the results that the biggest opportunity to decarbonise is to leverage New Zealand's amazing renewable electricity resources and convert much of the transport fleet and industrial heat to electricity.

But we cannot do it alone. More forward-thinking solutions are needed, and we need to look to the likes of Germany for ideas.

Global and domestic innovation and R&D will be a critical part of finding commercial solutions for decarbonisation. We also note aviation and marine solutions to decarbonisation are neither obvious nor easy.

A technology race is underway, and the race is finely balanced. We must be wary of "betting the house" on a given technology. Robust trialling, piloting, and clear policy frameworks will level the playing field for technology development. The NZ-Germany Scientific and Technological Cooperation Agreement could play an important role in this.

If we fail to ask the 'what-if' questions and fail to look to our international partners, we will become blinded to the possibility that the future we are aiming for will not eventuate.

Endnotes

i www.bec2060.org.nz/

ii www.worldenergy.org/

STATEMENT

"An area of delegation interest was New Zealand's approach to water. It was acknowledged that as coal was the global currency of success of the 19th century, and oil and gas of the 20th century, it is likely water will become a strategic asset for the 21st century. NZ has abundance of water, an opportunity to use it for economic and environmental outcomes that could be world leading. A largely decarbonised NZ economy in 2050 will need close to twice the renewable generation that it has today. Low emissions food and fibre is expected to be in high demand. Opportunities exist to synthesis both opportunities in a way that can demonstrate to the world that feeding the world with high value low emissions food is possible."

Todd Muller MP

Spokesperson for Agriculture, Biosecurity, Food Safety and Forestry
National Party of New Zealand

Karapiro Hydro Power Station © KAS Australia

ANALYSIS

Fiji's Response to Migration and Displacement in the Context of Climate Change and Natural Hazards

Dr Tammy Tabe

About the Author

Dr Tammy Tabe is an anthropologist who has worked widely in the Pacific Islands region, specifically in Solomon Islands, Fiji, Tuvalu and Kiribati. She currently works as a Lecturer at the University of the South Pacific. Her research interests focus on ecosystem-based adaptation, gender inequality, Pacific Islands epistemologies, historical relocations, identity, diaspora, and climate change migration and displacement

Climate change is an existential threat and will have significant implications on Pacific Islands despite the fact that the countries contribute the very least to global carbon emissions. It is one of the greatest threats to human security because it undermines livelihoods, compromises cultures and individual identity, increases migration and displacement of people, and disrupts the ability of states to provide the conditions necessary for human security (Adger et. al 2014).

According to the Intergovernmental Panel on Climate Change's (IPCC) 1.5° Celsius Special Report, the rate of global mean sea-level rise will likely increase from 0.52 to 0.98 meters between 2080 and 2100. This increase will intensify pressure on human settlements in the Pacific and pose risks to livelihoods, water and food security, human health, and economic growth (IPCC 2018). This short paper explores international frameworks on climate change migration and displacement that have been developed for countries to adopt, and provides an outline of how Fiji, a Pacific Island country affected by climate change, has responded nationally to international and regional frameworks and guidelines on adaptation and human mobility in the context of climate change.

International Frameworks

A significant number of international frameworks have been developed to regulate and guide migration and displacement in the context of conflict, persecution, war and other related factors. The frameworks govern the regulatory of internal and cross-border migrations and support the recognition of protection and human rights of refugees and stateless persons displaced by conflicts, wars, and economic factors. Similarly, policies that administer internally displaced people (IDP) predominantly focus on disaster risk reduction and management measures as well as the temporary relocation of communities. Many of these policies are guided by frameworks such as:

- the 2015 Sendai Framework on Disaster Risk Reduction 2015-2030, which aims to reduce risks and build resilience in communities and countries;
- the Guiding Principles of Internal Displacement that set to address the needs of internally displaced persons and ensure that they are protected;
- Populations at Risk of Disaster – A Resettlement Guide by the World Bank that informs states' decisions and informs stakeholders on the application of preventative resettlement programs such as disaster risk reduction measures for protecting the lives and assets of people at risk or restoring their living conditions; and
- the Nansen Initiative Platform on Disaster Displacement, which supports the Nansen Initiative on human displacement by disasters and climate change across borders.

The United Nations Framework Convention on Climate Change (UNFCCC) has also played an instrumental role in the development of mechanisms to combat climate change and support mitigation and adaptation actions. The ratification of the Kyoto Protocol in 1998, aimed at reducing global emissions, was significant for Small Island Developing States, especially Pacific Islands in adapting to the adverse impacts of climate change. In 2010, reference to adaptation measures such as climate change induced displacement, migration and planned relocation were first mentioned under the Cancun Agreement Framework.

In 2013, the Warsaw International Mechanism (WIM) on Loss and Damage was established based on the Cancun Agreement to address loss and damage related to climate change for both extreme and slow onset events affecting migration and displacement, particularly in developing countries that are highly vulnerable to climate change (UNFCCC 2019). The WIM was supported by the Paris Agreement which was endorsed in 2015. The Paris Agreement is an environmental landmark that was adopted by many countries in 2015 to address the adverse impacts of climate change. Its main aim is to strengthen and accelerate actions to reduce global greenhouse gas emissions in an effort to curb the increase of global temperature to 2° Celsius above preindustrial levels and to pursue efforts to limit the temperature increase even further to 1.5° Celsius.

The Paris Agreement also commits to combat climate change impacts, enhance adaptation actions through integrated and preventative approaches to address human mobility and displacement in the context of climate change, and to mainstream migration as an adaptation strategy into existing policies and guidelines (UNFCCC 2019). It also provides a pathway for developed nations to support developing states in the implementation of mitigation and adaptation actions.

In 2016, the United Nations High Commissioner for Refugees (UNHCR), in collaboration with Georgetown University and the International Organization for Migration (IOM), published a Toolbox on Planned Relocations to Protect People from Disasters and Environmental Change. The toolbox underlines operational guidelines to assist governments and stakeholders who may need to undertake planned relocation related to climate change and disasters (UNHCR et. al 2016).

In the same year, the New York Declaration for Refugees and Migrants was also adopted in recognition of the need to protect the human rights of all refugees and migrants regardless of their status. The Global Compact on Migration (GCM) was established as an outcome of the New York Declaration for Refugees and Migrants, based on the need for a holistic and comprehensive approach to human mobility and enhanced cooperation at local, national, regional, and international levels (IOM 2019). The GCM outlines measures that can assist and guide governments when addressing international migration in the context of climate change and environmental degradation, now and in the future. The Compact prioritises measures that enable people to adapt to both climate change and environmental changes experienced in their homes, and to reduce possibilities of migration in vulnerable locations. The measures also provide available and flexible alternative pathways for regular migration (IOM 2019).

While some of these international frameworks allude to the critical concerns of climate change in Fiji, it is likely that with the

escalating impacts and the subsequent lack of mitigation actions by developed countries, and the limited adaptive capacity of communities in Fiji, a significant number of populations may be forced to abandon their homes and relocate elsewhere for safety and improved livelihoods. As such, relocation will be a required adaptation measure for vulnerable communities in the country. Relocation may be complicated, lengthy and costly, and must be properly planned to minimise potential challenges and ensure the continuity of communities in their new destinations.

Fiji's Responses

Fiji lies in the Southwest of the Pacific Ocean and comprises of two major islands – Viti Levu and Vanua Levu. Most of its islands are of volcanic origin and are predominantly mountainous, especially the two major islands with numerous small volcanic islands, low-lying atolls and elevated reefs. The country is largely dependent on natural resources, agriculture and tourism for its economy. However, as a small island nation, it is also highly vulnerable to climate change and natural hazards. The country is already experiencing prolonged droughts, frequent and increased precipitation and flooding in low-lying areas, loss of fertility in agricultural lands due to saltwater inundation, intensified tropical cyclones, and sea level rise and storm surges. National efforts in collaboration with international and regional organisations, institutions and churches have been placed on capacity building in communities across Fiji to address climate change impacts and build community resilience (SPREP et. al 2015).

About 800 communities have been identified to be highly vulnerable to climate change and disasters and are in need of immediate relocation. A few of these communities have already been relocated while others are awaiting relocation. In 2014, the village of Vunidogoloa was the first ever to be relocated 2 kilometers inland as a result of sea level rise and increased coastal

A Fijian girl walks in her village on flooded land in Fiji. On Feb 2016 Severe Tropical Cyclone Winston was the strongest tropical cyclone in Fiji in recorded history.

inundation. The relocation was jointly facilitated and supported by the government and the community (McNamara and Jacot des Combe 2015). In 2017, the people of Tukuraki were relocated to a safer location after being affected by a series of disasters that occurred since 2012 (SPC and BSRP 2017). In 2018, several households in Narikoso village, extremely vulnerable and affected by sea level, were relocated to the new village site that has been cleared for the community. The relocation was facilitated with assistance and funding from external donors (SPC 2016). With the need to relocate more communities in the future, planned relocation guidelines are essential to regulate and guide this process.

The Guidelines serve to demonstrate the commitment of Fiji's government to meeting the requirements of international frameworks on human mobility in the context of climate change, and to respond effectively to the relocation needs of its people.

In 2018, at the end of Fiji's Presidency of COP 23, the country launched its 'Planned Relocation Guidelines - A Framework to Undertake Climate Change Related Relocation' (PRGs) - the first ever to be developed in the Pacific Islands. The Guidelines serve to demonstrate the commitment of Fiji's government to meeting the requirements of international frameworks on human mobility in the context of climate change, and to respond effectively to the relocation needs of its people. The PRGs support Fiji's commitment to recognise international frameworks and ensure that the guidelines are aligned to the 2030 Agenda for Sustainable Development, the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the Toolbox on Planned Relocations to Protect People from Disasters and Environmental Change, the Global Compact of Migration, and with Fiji's climate change policies, including the National Development Plan, the National Adaptation Plan, the National Disaster Risk Reduction Policy and Fiji's Nationally Determined Contribution (Government of Fiji 2018).

Fiji's PRGs were built on strategies that aim to reduce the vulnerability of people and enhance resilience among its communities. The Guidelines provide step-by-step procedures that may be used by all actors to guide Planned Relocation processes caused by climate change and disasters in Fiji. The procedures of the PRGs are coordinated based on three main pillars - Decision to undertake relocation, Planning for a sustainable relocation, and Implementation of a relocation plan that aligns with all human rights and protection. The Guidelines also provide for complementary measures that include the sustainability of the plan, the physical process of the relocation, and the monitoring and evaluation of the relocation on a long-term basis.

The three pillars are supported by five main principles – A Human-Centered Approach, A Livelihood-Based Approach, A Human Rights-Based Approach, A Preemptive Approach, and A Regional Approach. The Principles ensure that the values and rights of communities, households, and individuals affected by climate change and disasters are respected and protected in the process of planned relocation. The PRGs also constitute three primary processes, the PRE-Planned Relocation Process, the IN-Planned Relocation Process, and the POST-Planned Relocation Process, which clearly guide actors and inform decisions related to Planned Relocation in Fiji. However, Planned Relocation is the last option for Fiji, and will only be considered after all adaptation alternatives have been explored and exhausted. The government is also developing its Standard Operational Procedures (SOPs), which summarise the broader Guidelines into practical steps

that may be translated, reproduced, and applied at local and national levels to guide any planned relocation in Fiji (Lund 2019).

In June 2019, Fiji ratified Act 21, which was foundational to the establishment of the Adaptation Trust Fund for the Planned Relocation of communities in Fiji. The Act was renamed the 'Climate Relocation of Communities Trust Fund'. The purpose of the Trust Fund is to fund and support the planned relocation of communities in Fiji that are severely affected by climate change and natural hazards. The Trust Fund also ensures that a clear funding system is in place that may be used to assist communities when relocation becomes necessary (Government of Fiji 2019). Fiji is currently also developing its Displacement Guidelines which will guide and assist the government and stakeholders in facilitating any form of displacement caused by climate change and natural hazards in the country.

Conclusion

The implementation of the Planned Relocation Guidelines, and the development of the Climate Relocation Adaptation Trust Fund and the Displacement Guidelines reflect Fiji's commitment in enhancing climate change adaptation and resilience for its communities and people. The PRGs are essential in supporting effective actions on climate change adaptation in the context of climate change migration in Fiji. The Standard Operational Procedures will provide the government and stakeholders with guidance when implementing PRGs for any relocation in the country. The establishment of the Climate Relocation Trust Fund also underlines Fiji's commitment to ensure that there is financial support to assist the relocation of vulnerable communities. With the development of the Displacement Guidelines, the country will also be equipped to minimise and address any form of displacement caused by climate change and natural hazards in Fiji.

With Fiji leading in the development and implementation of planned relocation and displacement procedures in the Pacific region, what implications does this have for other Pacific Islands whose communities may be forced to relocate as a result of climate change in the future? Like Fiji, some of the countries have also taken the initiative to implement related policies. In 2018, Vanuatu developed its National Policy on Climate Change and Disaster Induced Displacement, which serves as a guide for the government and stakeholders to address the needs of all communities affected by displacement. But for countries like Tuvalu, relocation will be the final option after the country has explored and exhausted all adaptation options. Kiribati has focussed more internally on building the adaptive capacity of its people to combat climate change. The Marshall Islands have contested the notion of relocation for its people because it is considered detrimental to the existence of the Marshallese people. Planned relocation may not be an appropriate adaptation measure for all countries in the Pacific. For those countries for which it is an option (or rather necessity), it would be important to understand the context and scale of the relocation. If it is internally, then it could easily be managed and guided by internal relocation and displacement policies, but if it is external, then it presents a larger scale scenario for Pacific Islands who may be subject to this process.

References

Adger, W. N., Juan M. P., Barnett, J., Dabelko, G.D, Hovelsrud, G.K., Levy. M., Spring, U.O and Vogel, C.H. 2014. Human security. In Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge University, pp. 755–91. Available online: www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap12_FINAL.pdf

Government of Fiji. 2018. Planned Relocation Guidelines. A Framework to undertake climate change related relocation. Available online: https://cop23.com.fj/wp-content/uploads/2018/12/CC-PRG-BOOKLET-22-1.pdf

Government of Fiji. 2019. Act 21 Climate Relocation of Communities Trust Fund. Available online: www.parliament.gov.fj/acts/act-21-climate-relocation-of-communities-trust-fund/

IOM. 2019. The Global Compact on Migration. Available online: www.iom.int/global-compact-migration

IPCC. 2018: Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts. D., Skea. J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J.B.R., Chen, Y., Zhou, X., Gomis, M.I., Lonnoy, E., Maycock, T., Tignor, M., and Waterfield, T (eds). World Meteorological Organization, Geneva, Switzerland. Available online: https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

Lund, D. 2019. Standard Operational Procedures for Planned Relocation in Fiji. Situation Analysis and Project Feasibility Assessment. GIZ Human Mobility in the Context of Climate Change Program.

McNamara, K and Jacot des Combes, H. 2015. Planning for Community Relocations Due to Climate Change in Fiji. International Journal of Disaster Risk Science. Available online: https://link.springer.com/content/pdf/10.1007%2Fs13753-015-0065-2.pdf

SPC and BSRP. 2017. Refusing to disappear: how the people of Tukuraki became symbols of a resilient Pacific. Available online: http://bsrp.gsd.spc.int/index.php/2017/11/15/refusing-to-disappear-how-the-people-of-tukuraki-became-symbols-of-a-resilient-pacific/

SPC. 2016. Narikoso Relocation Project, Cost benefit analysis update note. Available online: http://ccprojects.gsd.spc.int/documents/new_docs/28012016%20-%20Fj%20-Narikoso%20CBA%20briefing%20note%20for%20stakeholders.pdf

SPREP, UNDP, and GEF. 2015. Pacific Adaptation to Climate Chang – Fiji Islands. Available online: www.sprep.org/attachments/Climate_Change/PACC_Report_of_in-country_consultations_Fiji.pdf

UNFCCC. 2019. The Paris Agreement. Available online: https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

UNFCCC. 2019. Warsaw International Mechanism for Loss and Damage. Available online: https://unfccc.int/WIM#targetText=At%20COP19%20(November%202013)%20in,adverse%20effects%20of%20climate%20change.

UNHCR, Georgetown University, and IOM. 2016. Guidance on Protecting People from Disasters and Environmental Change through Planned Relocation. Available online: www.unhcr.org/en-au/protection/environment/596f1bb47/planned-relocation-toolbox.html

CONCLUSION

Conclusions and Strategic Perspectives

Dr Frank Umbach

The exchange of national experiences with energy transition to decarbonised energy systems was at the core of the 2nd KAS–EUCERS Energy Policy Dialogue held in Auckland and Wellington / New Zealand as well as Sydney / Australia in October 2019.

The roundtables, seminars and meetings between German energy policy experts and their New Zealand and Australian counterparts have highlighted the varying starting points and conditions for our respective countries' national energy policies, be it in regards to national energy mixes, climate and other geographical conditions, the various industrial and economic factors or historical influences, regional energy cooperation frameworks as well as import and other external dependencies. As a result of these differences, there is neither a "silver bullet"-solution nor just one pathway or one-size-fits-all concept for every country, let alone for a global energy transition. Taking this into account, an exchange of national experiences, technologies and best practices, including an exchange on costs and failures, is even more important. Germany has taken a leadership role with its 'Energiewende' (energy transition), and while some of its strategies have proved to be successful, others have failed. Other countries may therefore learn from the German experience, both in positive and negative terms, and thus avoid making the same mistakes. Germany, on the other hand, despite being a global leader in regards to energy transition, may also learn from other countries and revise its energy transitions strategies, for example, by choosing options that have proved to be less costly and more effective. Moreover, all countries must cope with the technological challenge of finding affordable electricity storage solutions alongside the electrification of entire energy systems. They must also guarantee baseload stability as a pre-condition for energy supply security.

According to Todd Muller, Member of the New Zealand Parliament (NZ MP) and Spokesperson for Agriculture, Biosecurity, Food Safety and Forestry of the National Party of New Zealand, the major challenge for his country is an even more ambitious energy climate protection policy, which must be balanced with economic costs and ensure competitiveness towards other countries and trading partners. As New Zealand's economy is largely based on agriculture and enjoys a global leadership position in this field, he is concerned whether such a policy would undermine New Zealand's status and future economic development. Unlike other countries, New Zealand may benefit from its abundance of water, which it could even use to a greater extent for its energy transition. In his view, New Zealand must at least double its renewable energy generation in the decades ahead.

His fellow NZ MP, Jonathan Young, Spokesperson for Energy and Resources of the National Party of New Zealand, calls for a balanced transition pathway away from fossil fuels dependency. He criticises the Labour government's ban of any new petroleum exploration outside Taranaki, the country's main regional hydrocarbon centre. The perceived populistic governmental

decision was announced just before the Prime Minister departed to Europe without including other ministries' analyses on environmental and economic impacts. As a result, he says, New Zealand has become even more dependent on coal consumption.

As New Zealand's 'Business Energy Council' highlights in its contribution, New Zealand and Germany have recently enhanced their bilateral energy and climate cooperation based on common interests and values, which facilitates their overall bilateral economic partnership. Germany has expressed its interest in collaborating with New Zealand on research and technological development as well as future imports of 'green hydrogen', an interest it has also expressed towards Australia. As a member of the World Energy Council (WEC), New Zealand sees the opportunity to cooperate in regards to green hydrogen with Germany as well as other countries. According to the Council, New Zealand hopes to find adequate solutions and ideas for its own energy futures through international engagement.

The German Australian 'Energy Transition Hub' regards 'green hydrogen' as a crucial energy option, great opportunity for international cooperation with countries such as Germany and future export option for Australia. In comparison with other countries, Australia would benefit from perfect sun and wind power conditions to generate hydrogen from renewable energies. Even without additional energy policies, Australia's carbon emissions in the electricity sector may fall by 40-48% by 2030 (relative to the 2005 level). The Hub also predicts one of the lowest hydrogen production costs worldwide, and expects that the electrolyser costs will significantly decrease towards A$800/kW by 2050. In this light, it is hardly surprising that the Australian government has recently issued a national green hydrogen strategy and promotes this energy option also in international frameworks.

The expert trio Jonathan Jutsen (CEO of the Australian Alliance for Energy Productivity), Carsten Mueller (Member of the German Parliament) and Christoph von Spesshardt (Director of Public Affairs & Strategy, Knauf Insulation) focus in their contribution on energy productivity and energy efficiency. They propose an 'Enliten'-concept as a model of an integrated strategy to ensure reliable, affordable and clean energy for Australia's energy transition based on large-scale renewable generation and green hydrogen for the electrification of the transport sector. They also favour a national energy productivity innovation programme to facilitate the development and application of new technology options and technology transfers.

The Australian energy expert Bahador Tari of 'Energetics' (an Australian company providing consulting services in regards to climate change and clean energy) also focusses in his comparative analysis on energy efficiency and the various approaches and outcomes of Australia's as well as Germany's energy policies. He highlights that many countries have not really improved their energy efficiency despite the huge potential repeatedly identified by the IEA, the WEC and other international energy organisations. In this regard, Germany as the worldwide leader in energy efficiency together with Japan, is an exception. Unlike Germany, Australia has missed many energy efficiency opportunities and, therefore, should draw on the positive experiences Germany and other countries have already made.

The German MP Joachim Pfeiffer highlights in his contribution various experiences,

successes and failures of the German Energiewende in the context of the global energy transition and climate change challenges. He stresses the overall importance of the EU's Emission Trading Scheme (EU ETS) as the major emission reduction instrument for the EU's integrated energy and climate policies. He supports the EU ETS as one of the market-based and technology-open approaches of Germany's rather state-centred Energiewende policy. In his view, the German overpromotion of subsidies enabled the country to increase renewables to almost 40% of its national electricity production, but not to achieve its climate target of reducing carbon emissions by 40% by 2020 (towards the 1990 level). He also draws attention to New Zealand's ETS system and one of its renewable energy sources, namely the historical use of geothermal electricity generation. Despite varying determining factors of the European and New Zealand's ETS, he hopes for their harmonisation, the creation of a global carbon market and thus the establishment of a worldwide level playing field.

Frank Umbach's contribution widens the understanding of traditional energy security concepts by revising them and integrating also raw material supply security. As renewables expand worldwide, global dependence on politically unstable countries producing and exporting oil and gas will reduce over time alongside geopolitical risks and vulnerabilities. A closer look suggests, however, that a worldwide decarbonised green energy system will be much more raw material intensive. As the World Bank predicted in 2017: The faster the energy transition to a non-fossil fuel energy system takes place, the higher would be the global demand for critical raw materials (CRMs). Given the overall concentration of CRMs (i.e. rare earths, lithium, cobalt and others) in, and production and refining by, a small number of countries and regions (compared to oil and gas production) and an average period of time for opening new mines (from planning up to production) of 7-10 years, there are growing global supply risks and vulnerabilities due to new geopolitical dependencies that are still often overlooked. This development might further increase as a result of the electrification of the global transport sector and the battery demand of electric vehicles as well as rapidly applied digitalisation technologies, all of which require more CRMs than ever. In this context, the author favours a closer cooperation between Australia and the EU as well as Germany. Australia could offer a stable and diversified supply of CRMs for the EU and Germany, while Australia would benefit from European investments, technology transfers and application of European best practices for greening Australia's raw material and energy sectors.

Whereas global climate challenges and policies (Kyoto Protocol and Paris Agreement of December 2015) played a major role in all our discussions, Friedbert Pflueger's contribution pays special attention to the often overlooked climate security challenges of food insecurity, water shortages, rising temperatures, extreme and unpredictable weather patterns as well as their geopolitical implications. He focuses in his contribution on two case studies, namely the Arctic and Antarctic regions. The rising geopolitical interest and competition between great powers such as Russia, the US and China are not only the result of global warming but also of the anticipated oil and gas reserves in both regions which will become increasingly exploitable thanks to the ice melting and new technologies.

Tammy Tabe (Lecturer at the University of the South Pacific) focusses in her analysis

In sum, the various roundtables, seminars and meetings have shown again the mutual benefits of sharing various experiences, insights and lessons, which all three countries have learned in their energy transition and decarbonisation policies of their energy sectors and economies during the last years.

on the migration and displacement challenges caused by climate change and natural hazards. She highlights various UN agreements and other international initiatives adopted in this regard, and analyses Fiji as a case study on these interrelated issues. While Fiji has taken numerous decisions to support the relocation of vulnerable communities (such as the 'Climate Relocation Trust Fund'), she also cautions that Fiji cannot always serve as a model for other Pacific islands. Tuvalu, Kiribati and the Marshall Islands have taken different steps with a view to different conditions and priorities. These countries see in the relocation of communities only a final option after having considered and exhausted all other options. They have focussed more on internal adaptive capacity to combat climate change. Or they have rejected relocation as it is detrimental to, or opposed by, communities. While it is important to understand the ramifications and scale of the specific relocation in each case, it is equally necessary to understand the various impacts of a more easily managed internal relocation compared with an external relocation.

In sum, the various roundtables, seminars and meetings have shown again (as in 2018) the mutual benefits of sharing various experiences, insights and lessons, which all three countries have learnt through their energy transition and decarbonisation policies for their energy sectors and economies during the last years. More ambitious and successful global climate protection policies are only realistic when their governments are able to define and implement effective strategies. On this pathway, all three countries need to balance their policies and strategies by preserving a future economic development and competitiveness, guaranteeing security of supply as well as finding affordable solutions in order to win and not to lose public acceptance by its citizens.

Editors

Dr Frank Umbach, Eva U Wagner

Publisher

Konrad Adenauer Stiftung (Australia) Limited
Regional Programme Australia and the Pacific

11/3 Sydney Avenue
Barton ACT 2600
Australia

Tel: +61 2 6154 9322

www.kas.de/australia

Design, Layout and Typeset

Swell Design Group

Paper

RECYCLED
Paper made from recycled material
FSC® C102086

ecoStar+ is an environmentally responsible paper. The fibre source is FSC Recycled certified. ecoStar+ is manufactured from 100% post consumer recycled paper in a process chlorine free environment under the ISO 14001 environmental management system.

Energy matters – to all of us – whether we are living in an industrialised country or a developing nation. We all depend on clean, reliable and affordable energy. Energy and climate matters affect the private, public and economic sectors alike. They also have a wider impact on foreign and security policy, and give rise to socio-cultural issues. Accordingly, they must be mastered by political decision makers and business representatives as well as society as a whole. This Periscope edition seeks to make the findings of the 2nd KAS-EUCERS Energy Policy Dialogue "Energy Strategies: Germany, New Zealand & Australia – A Comparative Perspective" and related issues available to a wider audience, so that they may be used to the greatest possible extent in the public debate, policy making process and implementation of possible solutions.

KONRAD ADENAUER STIFTUNG

Konrad Adenauer Stiftung (Australia) Limited
Regional Programme Australia and the Pacific

11/3 Sydney Avenue
Barton ACT 2600
Australia

Connect

Telephone +61 2 6154 9322
Website kas.de/australia
Social facebook.com/KAS.canberra
linkedin.com/company/
konradadenauerstiftungaustralia