

Policy Brief^{#1}

Cooperative Pathways to Carbon Neutrality:
Harmonising Climate Technology and
Behavioural change





Editorial Board

Dr Jeawon Kim, Dr Jongseok Shin, Ms Wona Lee, Ms Crystale Pae, Dr Ji-Hee Son
Division of Climate Technology Cooperation

Green Technology Center Korea

17th Fl. Namsan Square Bldg., 173, Toegy-e-ro, Jung-gu, Seoul 04554, Republic of Korea

CONTENTS

Foreword by Dr. Byung-ki Cheong, President of the Green Technology Center Korea	04
Foreword by Prof. Sharyn Rundle-Thiele, Founding Director of Social Marketing at Griffith	05
Foreword by Ms. Ricki Hersberg, Executive Director of the Plastic Oceans Australasia	05
Purpose of this brief	06
Key messages	07
Example solutions for carbon neutrality	10
[Climate Mitigation]	
① Policy implications to combat Plastic Waste – The Seoul Metropolitan Government City	
② Technology to combat Food Waste – Korea Institute of Civil Engineering and Building Technology	
[Climate Adaptation]	
① Social Science for Wildlife Conservation – Social Marketing @ Griffith, Australia	
② Education program for our next generation – Plastic Oceans Australasia	
Summary of Lessons Learned	18



DR. BYUNG-KI CHEONG
PRESIDENT OF GREEN TECHNOLOGY CENTER

FOREWORD

The latest UN IPCC report warns that atmospheric CO₂ concentrations have reached 410 ppm, higher than at any time in at least 2 million years, and global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ occur in the coming decades. It reinforces the existing global consensus that we have to take immediate action to substantially reduce CO₂ emissions and achieve carbon neutrality by 2050 in order to contain global warming within 1.5°C until the end of this century.

With minimal use of resource inputs such as materials and fuels based on the ‘reduce-reuse-recycle’ value-chain, transition from linear to the circular economy can affect reduced greenhouse gas emissions and is indispensable to achieving carbon neutrality. Technology innovation plays an essential role in the transition. Also required are systematic structural changes in society as a whole, ranging from overproduction and consumption of materials and products, including people’s perceptions and behaviors.

No less important than these is global cooperation aiming to accelerate the development and transfer of climate technologies as well as policy engagement in the process of implementing the value-chain of the circular economy.

Green Technology Center, a Korean government-funded research institute for climate technology policy, initiated collaboration with Australian research institutions and NGOs to explore pathways towards carbon neutrality on the basis of the circular economy. Through a series of seminars sharing information on the best researches and practices of either side, we made ourselves better prepared for what can be done collaboratively for carbon neutrality, specifically in Asia-Pacific regions.

We hope this brief document may provide readers with valuable insights as to the importance of appropriate policy, climate technology solutions, and social change approaches in the context of circular economy value-chain aiming to reduce carbon emissions hence achieving carbon neutrality by 2050.



PROF. SHARYN RUNDLE-THIELE
FOUNDING DIRECTOR OF SOCIAL MARKETING AT GRIFFITH

FOREWORD

We have long known that awareness is not enough for people to be able to act. People need to be shown what to do and they need to have support in place to be able to take action. Awareness that our planet is in a perilous situation is high leaving many people feeling helpless. Everyday citizens need more help and support. Approaches such as social marketing can be applied to drive more action delivering the change our planet needs to see. Social marketing is a 50-year-old behaviour change approach that sells rather than tells. Working with people to understand the alternatives they want to see is an approach that can be applied to empower citizens to take action benefitting themselves and the planet.



MS. RICKI HERSBERG
EXECUTIVE DIRECTOR OF THE PLASTIC OCEANS AUSTRALASIA

FOREWORD

NGOs can play a catalytic role in building up community awareness regarding climate action and its likely impact on people’s lives, livelihoods and habitats. They can help build up their capacities to undertake the needed adaptive actions to reduce vulnerability, mitigate risks and build resilience. To maximise the potential of NGOs to contribute positively through behaviour change mechanisms in relation to climate action and plastic pollution, there are five areas of behavioural interaction and engagement to help to address these challenges... These are: improving knowledge sharing; enhancing coordination on planned activities; enhancing collaboration across systems and scales; focusing on knowledge co-production; and emphasising learning processes. By collaborating with other likeminded organisations, NGO’s can provide a transparent, measurable layer of demonstrated deliverables.

PURPOSE OF THIS BRIEF

This brief on ‘Cooperative Pathways to Carbon Neutrality: Harmonising Climate Technology and Behavioural change’ is produced by Green Technology Center and partnered Australian institutions, Social Marketing @ Griffith and Plastic Oceans Australasia to introduce ways that the Republic of Korea and Australia adapted to achieve carbon neutrality.

Under the UNFCCC, a global cooperation is at the heart of Climate Action. For the Republic of Korea to actively engage in building foundations for global cooperation with Australia, we designed a capacity building webinar with our partners last year. This effort led to co-hosting three webinar series named “No Time to Waste” through June to August, 2021. This brief compiles the presentation and discussion delivered by renowned speakers from each country and showcases what climate technologies are needed for climate mitigation and behavioural change strategies can bring climate adaptation to achieve climate neutrality.

THE BRIEF

- Informs the **importance of establishing well-directed policy environment** for a climate technology to reduce carbon emission and to include local communities for more.
- Presents **climate technology solutions and social change approaches** specifically designed to and could be implemented for carbon neutrality by 2050.
- **Highlights actions policymakers** can take to increase the chance of transferring climate technology solutions most effectively.

KEY MESSAGES



PROF. MARK HOWDEN
DIRECTOR, THE INSTITUTE FOR CLIMATE,
ENERGY & DISASTER SOLUTIONS
AT THE AUSTRALIAN NATIONAL UNIVERSITY

Australia is one of the biggest per capita emitters globally. We’re also perhaps the developed nation which is most exposed to problematic climate change as the recent IPCC report indicated. It’s increasingly clear too that we could also be the biggest contributors globally to the transition to clean energy future through clean energy exports particularly, but also through technology development that Australia’s so good at doing.

What really matters to climate change action in Australia, the emission reduction action, the three biggest things that have reduced Australia’s GHG emissions are firstly, land clearing policy which generates around about 100 million tons per annum reductions in emissions. Secondly, penetration of renewables into the electricity market which saves around about 21 million tons of carbon dioxide per annum. And thirdly, the price on carbon, which was only very temporary by the emissions trading system, which generated at the time around about 18 million tons per annum reduction. And importantly, wide across these three themes, *it’s actually the policy that really matters*. There are technologies which support that which are enabled by the policy. But even the penetration of renewables into the electricity market was largely using known technology, existing technology.

For effective progress on climate change we don’t need technologies but even more we need a stable, well-informed, and well-directed policy environment which facilitates investment in and use of those technologies in Australia and across our region because we’re all in this together.

This section of the brief was directly quoted from an original presentation Prof Mark delivered on the 24th of August 2021. To view the original presentation, search 'No Time to Waste - Webinar Series 3, Session 3: Carbon Neutral Solutions' on YouTube.



MR. WILLIAM BLOMFIELD
ACTING DIRECTOR, CLIMATE MITIGATION AND INVESTMENT,
DEPARTMENT OF FOREIGN AFFAIRS & TRADE

Australia recently suffered from a bushfire crisis. Acknowledging the traditional owners of the country here and their continuing connection to land, sea and community, we learned how Australia is actively incorporating indigenous techniques for fire management into environmental management. Indigenous knowledge is helping avoid high intensity wildfires later in season, has enabled changing fire patterns to reduce GHG emissions, protect natural and cultural assets, with a whole host of co-benefits.

It is clear that indigenous people are contributing to Australia's climate action, and some successful examples are Indigenous rangers' program to 'care for country' and indigenous savannah fire management in the 'Top End'. The next step will be ensuring appropriate engagement with indigenous people as we develop out large-scale renewable energy projects and clean energy projects. *Voluntary participation is important to carbon neutrality.* Climate Active is an Australian government program encouraging and recognising leadership in voluntary climate action, enabling individuals, businesses and governments to gain recognition and certification. Renewable energy in Australia's national electricity market has grown significantly with strong level of individual, community and household take-up, indicating that the government should execute programs that allow our people to participate voluntarily for climate action.

To support global cooperation, Australian Government recently developed a Technology Investment Road Map with a strategic view of future investments. The process has identified five priority technologies: clean hydrogen, energy storage, long duration energy storage, low carbon materials such as low carbon steel and aluminium, carbon capture and storage and soil carbon. The potential for transformative economic and abatement impacts both in Australia and overseas across multiple sectors in application is substantial. If we manage to increase global uptake of these technologies, we can significantly reduce global emissions from across energy, transport industry and agriculture sectors which account for around 90% of global emissions.

We have set ambitious economic targets where they are competitive against existing approaches. To support developing countries, Australia has pledged A\$1.5 billion between 2020 and 2025 in climate finance, which is a 50% increase over our previous 2015 to 2020 commitment. Over 70% is directed to adaptation and resilience and there is a very strong focus on the Pacific. For example the Australia Pacific Climate Partnership focuses on integrating climate and disaster science information services into Australia's aid program to support the Pacific. Australia's technology-driven approach, and encouragement of voluntary participation can supporting achieving net zero. The approach aims develop the practical scalable solutions to enable Australia to reach net zero, while partnering with other countries to decarbonize and grow our economies.



DR. DUKWOO JUN
DIRECTOR, DIVISION OF CLIMATE TECHNOLOGY COOPERATION,
GREEN TECHNOLOGY CENTER

Despite the recent booming consensus on climate change responsive actions, applying and mainstreaming the climate technologies in the society can face several challenges with technical limitations, financial shortages, and lack of institutional setups. In many cases, it should be underlined that the holistic approach finely advances the efficiency and effectiveness of climate technology cooperation. Not only the technical aspect but also institutional, social and financial aspects should be counted on to ensure the success of the climate technology cooperation.

One good instance for the holistic approach can be found in our cooperation case with Bangladesh in the water sector. In 2017, Bangladesh requested a technical assistant (TA) through the CTCN to solve their water security issue with seawater intrusion into groundwater. This TA required GTCK, as a consultant in this TA, to find the finest technical option of securing the drinking water from saline water and suggest the initial strategy of deploying the alternative. Although a technically safe and high-energy-efficiency solution was identified, its high cost for the facility installation and operation could have the beneficiary communities bear the heavy brunt. Under a thorough survey on the institutional setups, budgetary capability and social governance, GTCK and its partners developed the innovative business model linking to the UN's carbon market. Earning the carbon credit from locals and selling it in the international market enabled the private sector and the local communities to equip the trustworthy drinking-water supply solution with financial and institutional sustainability.

In the climate technology cooperation, the holistic approach helps estimate the potential benefits, detect hidden challenges and hedge crucial risks in advance. Furthermore, the multipronged strategy based on the holistic approach facilitates the key stakeholders such as technology suppliers, project investors, governments, and local communities to cultivate and implement innovative climate actions.

EXAMPLE SOLUTIONS FOR CARBON NEUTRALITY

CLIMATE MITIGATION

① POLICY IMPLICATIONS TO COMBAT PLASTIC WASTE

THE SEOUL METROPOLITAN GOVERNMENT CITY

COVID-19 has changed our lifestyles and we need a paradigm shift of existing waste policies. The Seoul Metropolitan government believes if the role of the public focused on leading examples and inducing voluntary change in the private sector, *it is now necessary to establish a reusable infrastructure to decrease plastic use in the private sector.*

To lead the practice of zero disposable plastic use in public, the use and import of disposable cups and vinyl are prohibited from city-related private establishments. In addition, conditions that require inhibition on the usage of disposable supplies have been added when selecting private consignment agencies. Therefore, for the public sector, we plan to increase mandatory purchase of eco-friendly and green products -mainly for procuring office supplies or household goods- up to 90%.

Not only the Seoul's 'Plastic Free Seoul' plan, but also the private sector's voluntary participation is key to reduce disposable plastic usage. To encourage active participation, various campaigns and educational programs are being delivered to reduce the use of disposable cups and straws, plastic bags, delivery supplies and laundry vinyl. Additionally, a Memorandum of Understanding has been signed with wholesale, retail stores and various franchises to reduce disposable plastic usage and the Seoul Metropolitan Government is providing administrative and financial support for this.

Seoul plans to expand 'Zero Waste Stores' that sell products without packaging materials. In cooperation with large discount stores, Seoul aims to establish spaces exclusively for Zero Waste and support small shops in neighborhoods and establish more than one Zero Waste stores in all administrative districts in Seoul by 2025.

In order to promote high-quality recycled products, we plan to foster new industries and spread the culture of recycling resources with high utilization value such as transparent PET bottles. Through the Seoul Upcycling Plaza built in 2017, the government aims to spread upcycling culture to enhance the upcycling industry and spread the demand for upcycled products. In this vein,



Seoul is cooperating with plastic recycling and clothing companies to recycle transparent PET bottles to produce yarns and utilize them to produce whole new but upcycled clothing. And we will further discover and spread these business areas and establish a new recycling system that is reused to create new products.

② TECHNOLOGY TO COMBAT FOOD WASTE

KOREA INSTITUTE OF CIVIL ENGINEERING AND BUILDING TECHNOLOGY

About 14,000 tons of food waste is generated every day. According to the Ministry of Environment Korea, about 97% percent of generated food waste is recycled. About 45% of food waste is converted into animal feed, about 30% is recycled into compost another 15% is gasified to produce biogas and this high recycling rate is achievable because of the collection and treatment system.

In our research food waste is converted into renewable solid fuel. Here main challenges are to satisfy the qualification of fuel including calorific value, chlorine, ash, heavy metal content. But we produce high quality food waste biochar.

To date, various pyrolysis and experimental processes have been tested to find out the most efficient reduction method for chlorine from food waste biochar. For example, we now know pyrolysis temperature of 500 Celsius degree with demineralization using acid is the most efficient method to obtain food waste biochar with high performance. This calorific value of 5000 kilocalories per kilogram is similar to that of coal.

Several experimental settings were tested to achieve high calorific value and low ash content of food waste biochar and we confirmed that food waste biochar meets the qualification criteria of fuel for co-firing in thermoelectric power plant in many aspects. In addition, we also checked the combination of food waste and sludge is promising.

But we still have a long way to go. The energy efficiency and combustibility of food waste biochar in the plant needs to be tested and we don't know the optimized ratio of biomass for co-firing and of course the life cycle assessment of food waste biochar is required to ensure that this is sustainable and environmentally friendly. Most importantly, we have regulatory issues since currently using food waste as solid fuel is inhibited in Korea. Continuous conversation with people in the regulatory and industrial sectors to sort out a better approach for food waste is underway.

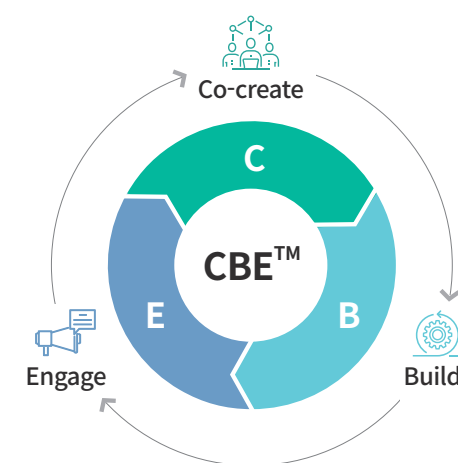


CLIMATE ADAPTATION

① SOCIAL SCIENCE FOR WILDLIFE CONSERVATION

SOCIAL MARKETING @ GRIFFITH, AUSTRALIA

Changing citizens behaviour is one of many actions that can be applied to drive action. Approaches that “sell” rather than “tell” people what to do are needed to move and motivate more people to take-action. The three-step continual improvement process Co-create – Build – Engage (CBE™) was developed by Social Marketing @ Griffith to deliver a clear stepwise process that can be followed to learn what people want to see.



[Figure 1] The CBE™- process

By understanding what people want and learning what alternatives are needed when and where we can support more citizens to take action. In Australia koala populations have declined by 30% or more over the past 3 years. Disease, habitat destruction, roads and domestic pets are all factors known to cause koala deaths, much of which can be prevented with human action. To understand how to mitigate the threat of dogs, the CBE™- process was applied to understand how dog owners could be moved and motivated to prevent dog and koala interactions. In 2017 co-creation was applied to learn. In a four-month period the research team implemented surveys, expert interviews, and an evidence review.

This research assisted the team to understand current dog behaviours and abilities and approaches that had previously been used to raise awareness for the issue and approaches that could be applied to achieve the desired outcomes. Dog owners co-designed the program that would work for them and other dog owners like them. The co-creation phase identified that dog owners wanted to be shown what to do to assist them to train their dogs to avoid wildlife and they

wanted to have fun. Experts had identified that a minimum 4 weeks was needed to train owners (and their dogs). The *Leave It* 4 week training program was built delivering a range of dog training options for dog owners to enrol in. Training options were available across a range of different dog abilities, days and times and at different locations. Dog trainers were trained to teach the ability of “koala aversion”. Koala aversion is the ability for a dog to avoid a koala. Engagement is the final phase of the CBE™ process. Promotion is undertaken during the engagement phase to let citizens know about the alternatives. Over a four-week period promotion was undertaken to raise awareness for *Leave It* offerings. Dogs completing the *Leave It* training programs improved their koala aversion abilities. Following the successful pilot, the program was rolled out city wide. Over a 3 ½ year period koala deaths from dog attacks in the local government area declined by 40% demonstrating the impact of applying a social marketing approach.

Approaches that identify alternatives that citizens want to see can be applied to deliver the behaviour change resulting in the lasting impact needed to protect our planet. Extending into approaches that *“sell” rather than “tell” people what to do ensures that citizens are empowered to respond to complex problems.* By sharing stories of success showcasing how individuals and collective action is driving the changes we need to see we can help citizens to understand there is so much they can do to take action.

② EDUCATION PROGRAM FOR OUR NEXT GENERATION

PLASTIC OCEANS AUSTRALASIA



COVID-19 has only exacerbated the problem: a ‘plastic pandemic’ is emerging from our attempts to suppress it. Our attempts to prevent contamination in public places has seen evermore single-use plastics being used in takeaway food consumption and face masks. Now, more than ever, the actions of individuals, organisations and governments are crucial to tackling the plastic crisis and reducing plastic entering our oceans. Climate plans need to acknowledge greenhouse gas emissions from plastics and how plastics can be better managed.

But how do we do this? Plastic Oceans Australasia (POA) has created and now implements a scientific behavioural change program on how to stem the tide on single-use plastic by



working with community groups, businesses and individuals through education on how to reduce their consumption and reliance on plastic as a daily commodity.

Of many programs, the POA Education Program is a comprehensive package of learning resources and hands on activities revolving around single use plastics. POA provides guided support for the first 12 months and is then designed to be taken on solely by the school and passed down through the year levels as an ongoing initiative until single use plastics in the school are totally phased out. The Program equips both primary and secondary students in the age groups of 5-7, 7-11 and 11-16 years with the knowledge and skills to work effectively towards phasing out single use plastics from their campuses. The program itself contains both curriculum/classroom-based materials (Theory Modules) as well as co-curricular activities (The Schools’ Challenge) to be undertaken outside the classroom.

Our program demonstrates the need to work together to make a global wave of change with our daily habits. Students are our future. Empowering the community and schools to lead the conversation and action of plastic waste reduction increases not only the awareness but also the purposeful behaviour to make our future sustainable.

SUMMARY OF LESSONS LEARNED

This section summarises the key lessons learned through the ‘No Time to Waste’ capacity building webinar co-hosted by Green Technology Centre Korea, Social Marketing @ Griffith, and Plastic Oceans Australasia.

LESSON TO SHARE WITH POLICY MAKERS

It is time to establish a stable, well-informed, and **well-directed policy environment** to enable existing valuable climate technologies to effect change. Since the inception of the technology mechanism, scientists have developed and created various climate technologies to keep the temperature below 1.5°C. Despite this, governments have struggled to generate a stable policy environment that entails global climate citizenship, ownership, and stewardship. What technologies work and have the potential to change the scene is evident. What we need now is a ‘climate law’ that concretes implementation of climate technologies on the ground.

[Action item 1] Develop and execute an evidence-based policy that assists the implementation of climate technologies currently available within the global market.

[Action item 2] Create and legislate a climate law that encourages global climate citizenship, ownership, and stewardship.

[Action item 3] Establish innovative financing pathways/guidelines to ensure the impacts of each climate technology are appropriately documented to guide future practices.

LESSON TO SHARE WITH INDUSTRY OWNERS AND GENERAL PUBLIC

Voluntary participation, change, and maintenance must be encouraged and implemented in businesses and in our daily lives. The good impact comes from one empowering the others’ strengths. We, individuals as consumers of the environment, are aware of alternatives and novel approaches that could benefit our lifestyle to be more carbon-free. Whatever position you hold in this society, try to hear out what others, your people, and yourself wants and needs for a carbon-neutral lifestyle.

[Action item 4] Specifically for private industry owners: Actively involve a consumer insight in the process of developing environmentally-friendly products and services.

[Action item 5] Specifically for general public: Actively engage in product and service design to manifest the industry’s carbon reduction practices.

