

Responses to Other Feedback and Suggestions (June 2015)

This document was prepared by the National Climate Change Secretariat (NCCS) and relevant agencies.

S/N	Suggestion	Response
General Climate Change Awareness and Education		
1	Teachers should be trained to be well versed on climate change issues, and be able to impart environmental knowledge to students	<p>Climate change-related topics are incorporated into the school curriculum, such as in Science and Geography. In addition, the National Environment Agency (NEA) conducts workshops for trainee teachers at the National Institute of Education (NIE) on key environmental issues. NEA also engages a network of Environmental Education Advisors (EEAs) across schools to plan and implement environmental education and outreach programmes for their students and staff.</p> <p>Other initiatives targeted at schools include the “Climate Change Climate Challenge” exhibition at the Science Centre and a roving interactive drama skit for primary schools “Stop Melting my Home” that seeks to encourage climate friendly actions through the story of a polar bear.</p> <p>The Government will continue to explore new ways of engaging schools and students.</p>
2	Engage community groups to influence and change behaviour to mitigate climate change. This public advocacy could be values-based	<p>The Government recognises the importance of public engagement and encourages various groups to promote climate friendly actions. Examples of community-led initiatives include RUN 350, organised by Young NTUC to raise awareness of the need to lower atmospheric CO₂ levels, and North West CDC’s “Green Homes @ North West” programme where students go door to door to engage residents on climate change and encourage them to save energy. Where possible, government agencies also collaborate with the people sector to raise awareness and promote climate friendly actions, and will continue to look for new opportunities.</p>
Raising Awareness & Individual Actions		
3	Increase requirements for ethical or ‘green’ labelling of products, better promotion of ‘green’ labels for products, offices, etc.	<p>The Singapore Environment Council (SEC) administers the Singapore Green Labelling Scheme (SGLS) and Project Eco-Office. To date, about 2900 unique products have been certified across 25 countries, and 300 unique offices have been certified. SEC regularly reviews the criteria and categories for green labelled products to drive producers and consumers to adopt greener practices.</p> <p>The Singapore Green Building Council administers the Singapore Green Building Product (SGBP) certification scheme, which assesses green building products and materials, and sets benchmarks for a building product’s environmental performance. The SGBP scheme complements the Building and Construction Authority (BCA) Green Mark scheme by identifying and helping the industry select environmentally-preferred products and materials to achieve environmental sustainability for Singapore’s built environment.</p> <p>The support of such efforts, as well as “green” products, requires a concerted effort by all segments of society.</p>

4	Introduce gamification and small incentives for activities that result in GHG mitigation	<p>Hackathons co-organised by government agencies bring together developers, designers, researchers and passionate citizens to co-create new prototype solutions to promote environmental sustainability. For example, the E3 Hackathon organised by UP Singapore, the Energy Market Authority (EMA), and Singapore Power in 2013 aimed to encourage sustainable energy consumption and energy efficiency in Singapore. Some apps and prototypes developed during these hackathons have incorporated gamification to promote environmental sustainability. The development of games and mobile apps to promote environmentally sustainable actions is an area that the Government will continue to explore.</p> <p>Currently, NEA's myENV mobile app includes a Life Cycle Cost Calculator that enables the public to calculate the life cycle cost of different models of air-conditioners, refrigerators, clothes dryers and televisions in Singapore, and to potentially save energy costs through buying more efficient appliances. Third party developers such as Intraix and Carbon Story have also introduced mobile apps and online services to help users save energy and calculate and offset their carbon footprint. These ground-up initiatives complement the Government's efforts to promote climate friendly habits such as switching off the lights when not in use and taking public transport.</p> <p>The Government welcomes similar efforts by students and youths, community groups or businesses to make climate-friendly actions more attractive.</p>
5	Reduce meat consumption and instead switch to plant-based diet	<p>The choice of adopting a plant-based diet and consuming less meat is a personal one. One approach to reduce the carbon footprint from food consumption would be to reduce food waste along the food chain. The Agri-Food & Veterinary Authority of Singapore (AVA) collaborates with industry and research institutions to develop technological innovations for post-harvest processing and packaging to reduce post-harvest losses. AVA also promotes test-bedding and adoption of innovative technology for food waste reduction and recycling. At the local processing and retail end, NEA and AVA work with the industry to develop good practice guides for food manufacturing and food and beverage (F&B) retail establishments to reduce food waste. At the consumer end, AVA and NEA are looking into developing a comprehensive public education outreach programme targeted at schools, retailers and community. A survey on consumer attitudes and behaviour regarding food waste was commissioned in 2014 and was completed recently. The results will help formulate strategies to cut food waste.</p>
6	Increase amount of urban greenery, through urban farming, introducing greenery in urban alleyways	<p>Efforts have been focused on expanding the Community-In-Bloom (CIB) programme that helps community gardeners grow plants and also practise recreational farming by growing edible crops. Today, Singapore has more than 850 community gardens and NParks targets to have 2,000 community gardens by 2030. These community gardens contribute to a pervasive matrix of greening measures to create a verdant, multi-dimensional landscape that is aesthetically pleasing, recreationally exciting and richer in biodiversity.</p> <p>"Urban alleyways" occur primarily in older private estates. These are typically narrow, and cannot accommodate both planting and human traffic in most instances. While NParks does not focus greening efforts on alleyways, greening of such alleyways by communities is encouraged. Separately, NParks continues to explore innovative ways of adding greenery to our urban areas. For example, NParks aims to add more skyrise gardens to achieve</p>

		200ha of skyrise greenery by 2030.
7	Increasing local, sustainable food production will improve our food security, which could be threatened by climate change	Local food production complements efforts to diversify Singapore's overseas food sources. To improve the sustainability and productivity of local farms, AVA provides technical advice and other assistance, and encourages capability building through technology adoption as well as research and innovation. Nevertheless, due to land constraints, overseas sources will continue to form the bulk of Singapore's food supply.
Carbon Pricing		
8	Introduce carbon taxation, or result-based carbon and co-benefit finance/trading to increase carbon abatement	Carbon pricing and markets are evolving in different parts of the world, including the European Union (EU), South Korea and China. Singapore has not reached any decision on carbon pricing. A carbon price would encourage energy conservation and energy efficiency and lower carbon emissions. However, it would also entail costs for businesses and households. As such, the benefits and implications will have to be carefully studied before a decision is taken.
New Technologies to Reduce Carbon Emissions or Increase Energy Efficiency		
9	Introduce carbon capture, and storage/utilisation (CCS/U) (e.g. conversion of CO ₂ to Methanol) to reduce CO ₂ levels and generate fuel and industrial feedstock	<p>CCS/U from major stationary sources is a potential technology that could help Singapore to reduce carbon emissions from its power and industry sectors in the longer term. While several technology options are possible for CCS/U, most are nascent and require further R&D. Besides the common challenges of high energy requirements, high cost of carbon utilisation as well as potentially limited international demand for CCU products, Singapore would need to address considerations such as low CO₂ concentration streams, lack of local storage sites and high cost of long distance transport of CO₂. Given our lack of domestic options for CCS, CCU presents greater potential for longer term CO₂ mitigation in Singapore. However, much work is still required to lower the cost of carbon utilisation, improve CCU process energy efficiency, as well as to find a market for CCU products. Nonetheless, research work in CCS/U is currently conducted in Singapore in institutes such as the A*STAR Institute of Chemical and Engineering Science and through programmes like the Cambridge Centre for Carbon Reduction in Chemical Technology (C4T), which is funded by the National Research Foundation (NRF).</p> <p>In order to assess the potential and steps required to further CCS/U in Singapore, a technology roadmap was developed. The roadmap identified the major sources and concentrations of CO₂ emissions, highlighting those with highest potential for CCS/U. It also reviewed the various possible CCS/U options, identified the challenges and opportunities and evaluated their feasibility within Singapore's context. We will continue to monitor developments in CCS/U to determine the potential for application in Singapore.</p>
10	Excess heat generated from air-conditioning and industrial processes could be reused to save energy used for heating	Waste heat utilisation is widely recognised as a means to reduce energy consumption and mitigate carbon emissions. While some industries have made efforts, there is scope for better heat recovery/waste heat utilisation. Companies have highlighted various considerations that impact the deployment of such technologies. For example, retrofitting and equipment upgrades may not be immediately possible due to capital or operational constraints.

		<p>Agencies and industry regularly share and encourage best practices through workshops and conferences. The Government, industry and academia are also exploring new technologies that will increase the efficiencies of waste heat recovery.</p> <p>The Government continues to support and encourage the wider adoption and improvements in waste heat recovery through various R&D grants, schemes (e.g. Design for Efficiency (DfE) and Energy Efficiency Improvement Assistance Scheme (EASe)) and through various capability building programmes.</p>
11	Encourage hybrid technologies or fuel cells for more industries (e.g. port equipment, MRT trains)	<p>Besides the deployment of hybrid technologies in vehicles, there are a number of hybrid applications in buildings as well as in Singapore's new MRT line in the form of regenerative braking for lifts and MRT trains respectively. The Government continues to encourage all sectors to explore various emerging technologies, such as hybrid drive systems, which can contribute to Singapore's climate efforts.</p> <p>While fuel cells have the potential to offer higher efficiencies compared to conventional energy conversion technologies, further R&D efforts are required to lower their cost and improve their performance. There are also cost and technical challenges associated with developing the infrastructure for production, storage, and distribution of fuel sources such as hydrogen. Singapore has an active R&D community working on fuel cell research, such as at the Energy Research Institute @ NTU, Clean Energy Research Centre at Temasek Polytechnic and at NUS.</p>