

Overview of Feedback and Suggestions Received

**National Climate Change Secretariat (NCCS)
18 June 2015**

This document summarises the feedback themes, and was prepared by NCCS and relevant government agencies. A compilation of specific suggestions, as well as government agencies' responses to them, is provided in separate documents.

General Comments

1 In general, suggestions and feedback centred on the key theme of energy use. Many respondents observed that opportunities for more efficient energy use exist across all sectors. Companies could benefit from cost savings, and there would also be market opportunities for solutions and services that enable greater energy efficiency. A few respondents felt that efforts could target sectors with significant potential to become more energy efficient.

2 To achieve greater energy efficiency, various forms of incentives were suggested, and that these incentives could be made more accessible by enhancing application processes. However, there was also recognition that regulation would continue to play an important role. Suggestions on legislation included references to stricter energy standards for household appliances and industry equipment.

3 Another important theme was on creating awareness about energy use, and better public education on climate change and its impacts. Respondents noted that businesses, individual volunteers, non-government organisations and people sector communities could play important roles. For businesses and households, increasing accessibility to information on energy use and best practices would also be necessary. This could be achieved through capacity building programs, better knowledge sharing, energy labels, and continued support for benchmarking and base-lining. Another suggestion pertained to introducing regulations for carbon footprinting or reporting, which would create more awareness and accountability about energy use and thus encourage greater energy efficiency.

4 Several suggestions on introducing advanced or emerging technologies to reduce energy use and carbon emissions were also received across sectors. Examples included advanced waste heat recovery (e.g. from data centres or from air-conditioning systems), utilisation of fuel cells, anaerobic digestion of waste, and carbon capture and storage/utilisation.

5 There were other comments that were not directed at specific sectors. For instance, one perspective was that carbon pricing would be an efficient way to encourage energy conservation and efficiency, to help reduce emissions. There were comments on whether such pricing would need to be regional or global in nature to be effective, and the implications for businesses and households.

6 On Singapore's post-2020 commitment for the new global agreement expected to be finalised later this year, there was an observation that Singapore should not regress compared to our pledge for 2020 to reduce emissions by 7 to 11% below Business-as-Usual (BAU) levels unconditionally, or 16% below BAU levels conditional on a global agreement. There was also some interest in how Singapore was working with the region to reduce carbon emissions, given Singapore's small share of global emissions and influence in the region.

Examples of general comments:

"...The Singapore school system can and should place more emphasis on climate change education. There should be more intensive integration of environmental education into the academic subjects across all levels of the school systems."

"...as a country we need to frame this not only as an economic issue, but also as a social and sustainability issue. We all know that Singapore is vulnerable to climate change in many ways – such as rising sea levels, potential food shortages, bush

fires, flooding from torrential downpours et al. If we do not address the problem, the livability and survival of Singapore may be called into question before the turn of the next century..."

Energy Efficient Homes

7 Many respondents emphasised bringing about greater awareness of energy use and energy conservation habits. This could be achieved through having more upfront information about potential savings or the efficiency of household appliances. More detailed electricity bill comparisons between households were also suggested, e.g. comparisons based on number of household members instead of type of housing. Public education campaigns through traditional and social media or through events like "earth hour" would increase awareness of energy conservation habits. Examples of these habits include using natural ventilation where possible, and keeping appliances in good operating condition.

8 Respondents also suggested that further energy efficient behaviour and practices could also be encouraged if more incentives were provided by the government such as rebates for "below-average" use or energy use reductions, rebates for upgrading to efficient appliances, or incentives for developers to install efficient appliances during construction or retrofitting of homes. Some felt that a progressive electricity tariff system would help to discourage high energy use. Respondents also noted that households will benefit from better minimum energy performance standards, and ongoing efforts to introduce smart technology for better energy management in homes. Other technologies, such as motion sensors and heat pumps would also reduce energy use within homes.

9 Several respondents felt that energy management systems could help to reduce energy consumption. Features like real-time plug-level monitoring, automation, or remote monitoring through smartphone apps, as well as warnings for excessive use, would encourage energy conservation. However, respondents also noted that these solutions may not change behaviour significantly enough to warrant the investment. Others felt that behavioural change would be more effectively addressed by introducing better comparisons of energy use across households and neighbours.

Examples of suggestions received on energy efficient homes:

"...Schemes to promote awareness can also include info on how long it takes to recoup additional costs, so that consumers can make a more informed decision when making their purchases."

"I feel that the choice of being energy efficient ultimately lies with the persons themselves. If the person is not conscious of how the energy management technology works or what the basis for using such technology is, it defeats the purpose."

Carbon Efficiency in the Transport Sector

10 Respondents provided suggestions to increase carbon efficiency across the various transport modes. They provided feedback on public transport, private vehicles, taxis, commercial vehicles, and cycling.

11 To encourage greater public transport use, respondents felt that service quality improvements would be important. These could include increasing the frequency of bus and MRT arrivals to reduce crowding, improving the reliability of service and increasing convenience for commuters. Increasing the number of full-day bus lanes would also help to

enhance service quality. Other suggestions to increase public transport utilisation included increasing the number of carparks under the 'park & ride' scheme and improving last mile options for commuters e.g. through providing bicycle racks, or through autonomous vehicles integrated into public transport networks. Autonomous vehicles could increase carbon efficiency by avoiding inefficient driving practices like excessive acceleration.

12 The general perception of respondents towards encouraging 'greener' vehicles was that electric vehicles (EVs) could be introduced, and that these would be particularly feasible in Singapore in the long-run because of the relatively short distances driven in Singapore. Respondents suggested that subsidies could be provided for this. More trials were also suggested. The challenges associated with EVs were also highlighted, such as the need for charging points in HDB estates. The electricity used to charge the EVs would also have to be 'green' to significantly increase carbon efficiency.

13 Car and taxi sharing was another suggestion to reduce carbon emissions from vehicles. Respondents also suggested that using biofuels for vehicles would reduce carbon emissions, and observed that vehicles are increasingly compatible with biofuel blends today. However, respondents also noted that greener vehicles may instead be used more heavily because of lower fuel costs, and that public transport was still significantly more carbon efficient.

14 To encourage cycling, having more bicycle lanes was suggested. These could be off-road lanes within mature towns, or bicycle priority lanes on roads or pedestrian paths, where possible. Bike friendly facilities such as showers at work, or bicycling racks near MRT stations, could be encouraged. A safe cycling public campaign was also suggested, and this could involve defensive cycling classes.

15 For commercial vehicles, there were suggestions on measures to improve fuel efficiency and reduce carbon emissions. Smart telematics and smart logistics could increase efficiency of commercial vehicle operations. These include using technology for better route planning, and encouraging eco-driving habits such as reduced idling.

Examples of suggestions received on carbon efficiency in the transport sector:

"Having more direct bus routes to places will make travelling by public transport not just a lot faster than present but also a lot more convenient."

"To encourage drivers to purchase more climate-friendly vehicles there should be more charging stations for electric cars."

"Bike sharing is the most environmentally friendly option. Make it simple to access, with rewards for frequent usage and plentiful docking stations all around the country."

"Commercial vehicles, especially the old lorries and pick-up trucks, emit a lot of smoke. The old ones should quickly be phased out and replaced with newer greener models."

Energy Efficiency and Renewable Energy Opportunities for Businesses

16 Most responses on energy efficiency and renewable energy opportunities for businesses were applicable to both the industrial and buildings sectors. The general feedback was that increasing energy efficiency for businesses is challenging because the return on investment (ROI) was typically considered, and incentives could be provided to

improve the ROI and reduce the payback period (i.e. the amount of time to recoup the additional investment on energy efficiency).

17 For the industrial sector, suggestions centred on introducing regulation, the need for more incentives for energy efficiency, and better knowledge sharing. More incentives would address the issue of high upfront costs for some energy efficiency projects. Regulation could include improvement targets (%) in energy efficiency, or the introduction of minimum energy standards for industrial equipment, similar to standards for household appliances. Energy standards could incentivise action and enhance selection of energy efficient equipment. However, introducing excessive legislation could also make the industrial sector uncompetitive. To increase knowledge sharing, there were suggestions to facilitate sharing of best practices, and provide industry averages and baseline statistics. For SMEs, there were also suggestions such as providing more technical and financial assistance for SMEs, which typically have less manpower to devote to energy management practices and energy efficiency initiatives. Respondents also identified challenges to greater energy efficiency in the industrial sector, e.g. difficulty in accessing grants, and a lack of expertise on the part of energy services companies (ESCOs) and service providers to address energy efficiency, particularly at the process or system level.

18 For the buildings sector, several respondents conveyed that buildings in Singapore were often excessively cold, and that it was important for this to be addressed. Building management personnel were often not aware, or had the mind-set that erring on the side of a lower temperature would be more acceptable. Respondents also shared that there were often split incentives preventing greater energy efficiency, where tenants (who pay the bills) are not the same as those making capital investment decisions (landlords/building owners who could invest in a more efficient chiller system, for example). Newer technologies that allow local or zone-based adjustment of central air-conditioning would improve efficiency. Energy monitoring systems were also suggested to collect real-time data on energy use to identify possible areas of excessive energy use. Additionally, respondents highlighted that better passive design could significantly reduce energy use. Examples of better passive design include optimising building orientation for natural ventilation, and tinted windows to reduce cooling load.

19 The potential of renewable energy for businesses was also highlighted. Apart from installations of solar PV on rooftops, vertical PV panels and micro wind turbines were also suggested. To encourage adoption by building owners and industrial facilities, installation, licensing, and sale of excess electricity generated should be made easier, especially for smaller systems.

Examples of suggestions received on energy efficiency and renewable opportunities for businesses:

“The industrial sector needs to take a holistic view to understand the business and social impact of their decisions on emissions and climate change. Unfortunately, clarity of purpose may require stringent policies, including carrots and sticks, such as more aggressively tiered energy pricing. This would stimulate industries to take a longer term view towards EE.”

“It would be good to have industry averages and other statistics so that comparisons with best practices can be made.”

“We can provide incentives for industries to reduce their carbon emissions, the current incentives are insufficient motivation for many smaller companies to take significant action.”

“It is quite common to hear feedback about the problem of excessively cold air-conditioning in buildings in Singapore... The government has to ensure that building owners stick to the recommended indoor temperature range of 23-25°C”

“Passive design must be done right! Double glazed windows, orientation of building, natural ventilation and sunlight modeling etc.”

Carbon Efficiency in the Power, Waste, and Water Sectors

20 For the power sector, there was support for increasing renewable energy deployment, e.g. solar PV is the most viable option for Singapore – it has reached grid parity in some cases. However, respondents noted that there were challenges to large-scale adoption of renewables in Singapore such as a limited land area (for solar) and low wind velocities (for wind power). For solar PV, respondents shared concerns over intermittency and its impact on grid reliability. There were also suggestions to introduce subsidies for cleaner forms of electricity generation. Other suggestions in the long-term included deploying nuclear reactors or solar satellites that collect solar power in space.

21 Many suggestions were received on ways to reduce waste. Respondents suggested taxation for plastic and food waste, and mandatory recycling. Suggestions to reduce food waste included disposal through composting or anaerobic digesters, or conversion of waste cooking oil into useful products. In addition to incentives or regulation, public education on conservation and eco-labelling of products, could also result in a mind-set shift to the 3Rs (reduce, reuse, and recycle). Business-to-business recycling, or a market for recycling material, was also raised.

22 There were also suggestions on increasing water conservation through public education and greater awareness. For example, awareness about water consumption could be increased if utility bills showed comparisons of water use with neighbours within one's block. Newer technological solutions for greywater recycling and rainwater harvesting could also significantly reduce overall water use.

Examples of suggestions received on carbon efficiency in the power, waste, and water sectors:

“Introducing renewable energy like solar PV, and more efficient electricity generation could help to reduce emissions from the power sector. Because of variable output from solar PV systems due to changes in weather conditions, we have to address intermittency challenges to ensure power system reliability.”

“Singaporeans are largely unaware of their impact to their environment. Much more can be done to educate on using less plastic bags for example. Singaporeans take a bag for everything; and very often, they bag what is already in a plastic bag!”

“1) Introduce a graduated water tax for different tiers of water usage 2) have competition of water usage within block or community i.e. most water efficient homes get to pay less.”

Economic and Green Growth Opportunities

23 Respondents felt there were many opportunities for development of green (clean energy, water, and environment) technology and research in Singapore, and that this should be encouraged. Respondents highlighted areas of research that Singapore could further explore, such as microalgae sequestration of carbon or anaerobic and aerobic digestion systems that reduce waste volumes. Domains with significant growth potential for Singapore could include green financing supporting energy efficiency, renewable energy, energy storage, and other 'green' domain projects. Another possible area was in data mining and big data analysis to increase automation, reduce waste (e.g. for warehouse management), and to identify possibilities for a more sustainable future (e.g. through studying energy use patterns).

24 To harness green growth opportunities, respondents suggested encouraging test-bedding in Singapore, and also providing incentives for local companies to develop solutions for the region. Beyond developing solutions, it is also important to integrate proven, advanced technologies into Singapore's industries. Greater multidisciplinary collaboration between public and private research communities could accelerate development and deployment of 'green' solutions. There was also feedback on the importance of supporting and promoting promising 'green' start-ups. At the same time, providing education and training opportunities in 'green' sectors would create the necessary knowledge for greater green growth.

Examples of suggestions received on economic and green growth opportunities:

"Singapore is limited in natural resources but we are a financial hub, with lots of talent and money that can support green growth in areas with stronger demand and supply for green growth."

"Simple: Singapore is NOT a large market; but technologies developed (e.g., energy storage and 'command and control' systems) will see a large market in the region. Hence, the role of government (and government buildings and infrastructure) to serve as test-beds (with incentives to local companies to develop new components, devices, systems, and processes for deployment in the region) is critically important."