



29 August 2019

Consultation Feedback Submission to the National Climate Change Secretariat's Public Consultation for Long Term Low Emissions Strategy for Singapore

On the same day as Prime Minister Lee's National Day Rally Speech that emphasized how climate change will impact safety and liveability in Singapore, a group of scientists gathered in Iceland to say farewell to Okjokull Glacier, the first of the nation's glaciers to lose its status as a glacier because of our rapidly warming climate. Iceland's melting glaciers are a stark reminder that climate change is a clear and present existential threat to Singapore. In light of that, Climate Conversations whole-heartedly supports the National Climate Change Secretariat's intention to develop a Long Term Low Emissions Strategy for Singapore.

Rising sea levels is not the only reason why liveability will be impacted in Singapore. This Consultation Paper noted that Singapore's annual average temperature has risen by 1.7°C from 1972 to 2015. This increase already has an impact on our water security - in the form of recurring drought affecting the Linggiu Reservoir in Malaysia, one of our water sources. It is also important to our food security - areas in the Mekong Delta region have been flooded with sea water and are no longer able to support rice production. The heat also shortens the reproduction cycle of mosquitoes¹, increasing the threat of transmittable diseases like dengue fever. Recurring heat waves inevitably increase the risk of heatstroke among our low-income elderly as well as migrant workers who toil each day to build Singapore.

While we feel the threat viscerally as an island-state, we need to throw our full support behind action that can help reduce emissions to achieve the 1.5 degree warming threshold recommended by the IPCC. We cannot afford to look inward and focus solely on adaptation of our coastal defences. Our ASEAN neighbours have already borne the brunt of repeated extreme weather events. The stress they will experience through reduced fertile land, drinking water, and destroyed property can only lead to increased tensions for the region unless we work together to reduce the threat by significantly reducing emissions.

Climate Conversations is a Singapore registered not-for-profit with a mission to grow the level of commitment in Singapore to care for the environment and overcome the worst impacts of climate change. We do this by training and supporting youth leaders to strengthen the climate change movement in Singapore. Our youth leaders facilitate in-depth and intimate discussions in small groups to help participants see how we will be impacted in Singapore and what we can do. We have run more than 100 conversations since January 2018 and we have heard from our participants what motivates and what de-motivates them towards action. Earlier this January, we also hosted a discussion session with Green

¹ <https://www.asiaone.com/health/hot-weather-may-dengue-cases-singapore>



Drinks, with speakers from Sunseap, ES Power and experts on energy systems to help raise awareness about green choices in the Open Electricity Market.

From that perspective, we would like to respond to the Consultation Paper anchored on what our leaders, our conversation and event participants have discussed and raised as issues that concern them.

E) Encouraging Collective Climate Action

E2: What are the challenges individuals face in taking climate action in their daily lives?

The biggest challenges to collective action is the lack of recognition of the need for system-level action and adopting the right framing to focus on transparency around impact.

Taking climate action is hard, and we can break down the various components that lead to action.

- 1) Is there a lack of knowledge of the importance of climate change?
- 2) Are they aware of the key actions that need to be taken?
- 3) What would they be motivated by?

A survey on Singaporeans' attitudes on climate change was conducted by Climate Conversations and Milieu, a consumer data analytics firm, between October 2018 - January 2019. You can find the report at climate.sg/report with the methodology described.

We learnt that a large proportion of Singaporeans know the severity of the impacts of climate change. In response to the question, "*When will we experience economic impacts from climate change*", close to 80% of Singaporeans responded that they expected economic impacts within their lifetime. In fact, the median expectations for when economic impacts from climate change will be felt was 15 years.

We also noted the broad support for critical system level interventions. The top 3 actions supported, all receiving >60% support, were:

- Charging companies a fee for pollution
- Increased investment in green energy
- Stopping investment and funding that cause deforestation

However, the same survey noted a high level of disempowerment. From our >100 conversations, we can anecdotally summarize what motivates and what demotivates people to action.

- 1) Our national targets are not aligned to our potential impact



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As highlighted in this Consultation Paper, “From 2000 to 2014, our emissions intensity decreased by 37% while energy intensity decreased by 33%”. Given that, our target to reduce emission intensity by 36% from 2005-2030, which means an increase in absolute emissions until 2030, is hardly ambitious. It is also not congruent with our economic status as a relatively wealthy economy. We might be a small nation, but in fact, Singapore has frequently found ways to punch above its weight. Given the threat to Singapore’s survival, certainly climate change warrants us to have a more ambitious target and to innovate on how to magnify our impact.

2) Focus on system-level actions

If we are only planning to peak emissions in 2030, we should set a near-term deadline for a roadmap for a sharp decrease to meet the “net-zero” requirements of the Paris Agreement. Such a roadmap would require system-level changes. A constant focus on actions like recycling by individual households, which is an important part of resource conservation but has little impact on carbon emissions, leads to a high level of dissonance amongst the public. Cognitive dissonance frequently leads to inaction, even amongst the most motivated. System-level problems require system-level actions.

3) Values are what motivate Singaporeans, not financial figures

Concern for the future, the future of their children as well as what could be impactful are key motivators. Financial benefit is not a key reason to act, and as such, framing of policies and discussions might need to shift. For example, if there is deeper discussions and sharing of how policies and corresponding grant programs are leading directly to impact on carbon reduction, people are more likely to show support. As an example, this Consultation Paper mentions several grants and incentive schemes that could support a low-carbon transition. These are framed by how large or widespread the program is, but there is hardly any information on their impact or event potential impact.

E) Encouraging Collective Climate Action

E5: Are you prepared to bear some additional costs/inconvenience to contribute to a low carbon Singapore?

Acknowledging the need for personal inconvenience should not preclude our policies from focusing on ensuring the added costs are incentivizing the highest leverage change in our economy and minimizing the burden on the lower-income Singaporeans.

Here, the use of framing of the costs/inconvenience in this question is likely to elicit one-sided responses. While we acknowledge that there are inconvenient aspects to a low carbon lifestyle, we also need to highlight that a low carbon system enables a switch, because it minimizes inconvenience.

We see that most clearly in our low carbon transport system. Singapore’s investment in the planning and implementation of a low carbon transport system can serve as a learning point for the rest of the



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economic systems that need to transition. We continually expand the reach of our underground system, and linking them to our housing estates with covered walkways. We invest in our bus network and new innovations like point-to-point services. High costs of car ownership, a curb on car growth have been our norm for some time. All of these make a low carbon transport lifestyle an easier choice.

Climate Conversations firmly believes that the key solutions to our climate breakdown need to be systemic. Business models need to change, and new technology need to be rapidly test-bedded and deployed. These choices will only be made by businesses if they internalize the costs of a brown system choice. If the carbon price is fully passed through to consumers, there will be little incentive to innovate where we have the highest leverage.

Yes, the economy as a whole needs to bear increased cost. We need the costs to incentivize those that can make system level changes. We also need to ensure this change does not place increased burden on our lower income groups. Programs that use parts of the proceeds of the carbon price to offset increased energy price, or support appliance efficiency upgrades for lower income groups can minimize their burden.

B) Encouraging Responsible Climate Action through Carbon Pricing

B9: Does your company employ the use of shadow or internal carbon prices in your decision making? If yes, how is the carbon price or range of carbon prices decided?

While carbon pricing is not the only tool in an economy's climate mitigation toolbox, we support it as a critical system-level lever in Singapore's fight to reduce emissions. It can be particularly useful to have businesses internalize the climate costs that were previously intangible to them, but we need to price it for action by having a clear roadmap to \$80-\$100/tCO₂e.

While we have no visibility on how Singapore companies set carbon price, we have clear sources on how international companies who operate in Singapore set carbon prices. For example, ExxonMobil, has been reported several times to use a shadow price ranging from \$40-\$80/ton of carbon (tCO₂e) since 2009². In ExxonMobil's public CDP filing in 2016, it explains that the carbon price range "reflect potential policies governments may employ related to the exploration, development, production, transportation or use of carbon-related fuels"³. That means, the companies take the cue from governments. As public sentiment change on climate change, governments around the world are shifting policies, affecting the companies' internal carbon price.

Singapore has taken an important step to put a price on carbon. However, at \$5/ tCO₂e, the price is too low. In a comprehensive report completed in May 2017, Lord Nicholas Stern and Professor Joseph

² <https://fortune.com/2016/07/10/exxonmobil-carbon-tax/>

³ <https://cdn.exxonmobil.com/~media/global/files/energy-and-environment/2016-cdp-response.pdf>



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Stiglitz, who were the co-chairs for the High-Level Commission on Carbon Prices, recommended that the carbon price should be set at \$40-\$80/ tCO₂e in 2020, and between \$50-\$100/ tCO₂e in 2030⁴. This Commission's members included expert representatives from both developed and developing economies. They reviewed what it would take for companies to shift technologies, amongst other things, with the key goal in mind - to achieve the reductions necessary for a climate-safe future. And as scientists improve models and methods, they are finding that the heat trapped in oceans will mean we will need faster, accelerated decrease in our CO₂ levels to meet this climate-safe future⁵. This points to the need for a roadmap towards a carbon price at the higher part of the range: \$80-\$100 / tCO₂e.

Singapore's intention to increase the carbon tax rate to between \$10 and \$15/tCO₂e by 2030 will be too little, too late. This carbon price is unlikely to drive companies to choose energy efficient technology, let alone fuel switch, nor experiment with carbon capture. Not only will we be disincentivizing our key emitters to take climate change into consideration, we will be losing out on innovating for our future.

C) Reducing Emissions from Power Generation

C4: What are other alternative energy sources or technologies that Singapore can consider? Please share your views.

One key area which we think a higher carbon price can lead to carbon optimization is in our energy sector, especially in battery storage and demand side management.

Singapore is rapidly growing our solar peak supply. This is highly applaudable given our constraints. However, one area we can broaden our impact is in replacing our spinning reserves with battery storage and creating strong support for demand side management from industry. Both solutions increase flexibility and resiliency of our energy systems without increasing our carbon footprint. Both can support the intermittency from solar, and battery storage can also replace part of the existing spinning reserves which is now currently based on a bidding process amongst our energy producers.

Battery prices are dropping rapidly, and new examples of technology deployment in Puerto Rico and South Australia have shown the technology to be ready for market. However, the current economics for spinning reserves is driven by our large spare capacity which is >60% above our current peak power consumption needs, and still within comfortable reserve margins for at least the next 3 years⁶. That means we can very quickly and cheaply burn more fossil fuels in plant B, if plant A has a failure. There is hardly any incentive to think of an alternative.

⁴ <https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices>

⁵ <http://sdg.iisd.org/news/study-suggests-global-warming-is-faster-than-scientists-estimated/>

⁶ Electricity Market Authority. Singapore Electricity Market Outlook, 2018.



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What if we truly saw climate change as an existential threat, like what PM Lee has said? We would acknowledge that our economy needs to be run based on a carbon budget, and this would be the basis of our carbon tax. If the cost of increasing carbon in our atmosphere is taken into account, the economics could change how we view our current spare capacity, which is all based on fossil fuels. We would have policies to grow demand side management, and incentivize innovation on how to use battery storage, and even an electric vehicle charging network in the right ways, to derive the most value for our grid stability as well as climate needs.

F) Tapping on Green Growth Opportunities

F5: What are some green technologies you would like to see being tested and developed in Singapore?

Increase in humidity, heat and sea level are already inevitable, and we can adapt in ways that are less harmful to the climate and the environment.

Besides sea level rise, the increase in humidity and heat should also be a key cause of concern. Studies point to 32°C wet bulb temperature as the threshold where humans will have difficulty carrying out normal activities⁷. Labour force productivity can be compromised even before that and ensuring the health and safety of outdoor workers (in particular shipyard, construction and public works workers) will be critical.

Former Prime Minister Lee Kuan Yew has been quoted before, “Air conditioning was the most important invention for us”, and we have to recognize that as we increase our air conditioning needs, we will be exacerbating the warming. The urban heat island effect increases. The most common refrigerant gas (R-22) is 1800 times more potent than CO₂ when it comes to warming the planet⁸. Some others are up to 10,000 times more potent. We need to start looking at alternative cooling technologies and alternative natural refrigerants like ammonia and carbon dioxide.

Environmentally friendly refrigerants are not only less potent as a greenhouse gas, but they are also more efficient in transferring heat thus will use less energy. Research shows that refrigerants are a leading contributor to climate change and the #1 solution to be tackling⁹. We cannot develop policy around how refrigerants are managed, especially in after-life care of systems, if we don't yet have visibility over it. The National Environment Agency currently encourages refrigerant recycling but it is neither measured, monitored, tracked or reported. Singapore needs a stringent refrigerant management policy to accurately account for and ensure safe handling, storage and recycling of refrigerants to minimize the potential for negative environmental impact.

⁷ <https://blogs.ei.columbia.edu/2017/12/22/humidity-may-prove-breaking-point-for-some-areas-as-temperatures-rise-says-study/>

⁸ https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf

⁹ <https://www.drawdown.org/solutions-summary-by-rank>



Finally, we would like to point out that our current climate adaptation plan, as shared by PM Lee, can have severe impacts on climate change and on sea life. We can minimize the impacts if we deploy green technologies in providing protection to shorelines.

The World Bank released this year a compilation of examples of “Integrating Green and Grey Infrastructure”. It has a series of real case studies of using mangroves to protect shorelines. In particular, there is an example of Vietnam, our ASEAN neighbour that has already been hit hard in terms of climate change. They invested in 9,000 hectares of mangroves along the shores of 166 communes as well as along the shores of 100 kilometers of dike lines. This natural bulwark cut the cost of damages to the dikes by \$80,000 to \$295,000. It was also effective in preventing damages to private property and public infrastructure, as well as supported yield growth in aquaculture along the coast¹⁰. Another innovation that is being looked at is EConcrete that allows for ocean life to thrive on seawalls and also increase stability overtime because of increased weight when corals grow on it¹¹.

Our hope for Singapore

Where Singapore innovates, the world mimics. For example, our electronic road pricing system has endeavoured to internalise the cost of congestion, and shift the conversation to focus on the “right to mobility” as opposed to the “right to road space”. Our innovation has captured the attention of other leading cities like New York and London¹², and also serve as discussion case studies for cities in developing regions.

When Singapore innovates best, is in times of scarcity. Not only is road space scarce in Singapore. Water is too. Our investments into innovation has put us on the map of water sustainability as an example for other water scarce nations.

Singapore has built its international reputation as a financial hub and it is time to join the other financial leaders - London, New York, Tokyo and Hong Kong - in recognizing our role in reducing carbon emissions through the financial system. While we celebrate the green dollars we are raising through green bonds, we cannot forget the impact that our brown dollars are having.

Our financial institutions cannot continue to participate in deals that lock us in an unsafe climate future for Singapore and our ASEAN neighbours. The International Energy Agency has already warned that “we have no room to build anything that emits CO₂ emissions”¹³. Every coal-fired power plant, every irresponsible deforestation loan exacerbates our island’s and neighbours’ liveability challenge. In July 2018, Climate Conversations joined 15 other NGOs to encourage Singapore banks to adopt responsible

¹⁰ <https://www.worldbank.org/en/news/feature/2019/03/21/green-and-gray>

¹¹ <https://www.youtube.com/watch?v=YGJ5EBrh8IQ>

¹² <https://www.straitstimes.com/world/united-states/new-york-city-to-install-erp-style-toll-in-bid-to-ease-traffic>

¹³ <https://www.theguardian.com/business/2018/nov/13/world-has-no-capacity-to-absorb-new-fossil-fuel-plants-warns-iea>



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policies to end coal financing. We are glad that they all announced stronger policies in 2019. However, this is not enough. There are still power plants in their pipeline. Some of these plants will be in countries like Vietnam, where wind power could be cheaper than coal by 2021, just 2 years away¹⁴.

Madam Ho Ching, Executive Director and CEO of Temasek Holdings, shared in a speech in January 2019, "We have only about 10 years to reduce our carbon footprint....There is, as you know, no Plan B for us, because there is no Planet B."¹⁵ We agree.

The world's remaining carbon budget is a critically scarce resource. It is in these times of scarcity that Singapore needs to innovate. Not only do we need to be actively investing in innovation of a low-carbon future like Temasek is doing, we also need innovation in our financial regulation to drive capital away from brown investment and towards green investments. As PM said in the National Day Rally, "Everything else must bend at the knee to safeguard the existence of our island nation". Now is the time to do what Singapore does best - step up with the innovation in times of scarcity - not just for ourselves, but for our neighbours.

Yours Sincerely

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¹⁴ <https://www.carbontracker.org/vietnam-wind-power-conference/>

¹⁵

<https://www.temasek.com.sg/en/news-and-views/news-room/speeches/2019/keynote-address-ho-ching-st-gallen-symposium-singapore-forum.html>