

Responses to Feedback and Suggestions on Economic and Green Growth Opportunities (June 2015)

This document was prepared by the Economic Development Board (EDB), the National Environment Agency (NEA), the National Climate Change Secretariat (NCCS), the National Research Foundation (NRF), PUB, Singapore's national water agency, and SPRING Singapore.

S/N	Suggestion	Response
Clean Technology & Green Solutions		
1	Encourage clean energy, water, and environmental technology development in Singapore	<p>There are opportunities to collaborate with local research and educational institutions to develop clean energy, water, and environmental technology. The National Research Foundation (NRF) set aside S\$195 million in 2011 for research into sustainable energy technologies under the multi-agency Energy Innovation Programme Office, and \$300 million under the Energy National Innovation Challenge. Several local institutions conducting research on sustainable energy have also been formed, such as the Solar Energy Research Institute of Singapore (SERIS) and Energy Research Institute @ NTU (ERI@N).</p> <p>The National Research Foundation has also set aside S\$470 million since 2006 to promote research and development of clean environment and water technologies in Singapore. This effort is spearheaded by the Environment & Water Industry Programme Office (EWI). Singapore's water industry ecosystem has more than tripled in size since 2006 to more than 180 water companies and 26 research centres. The water companies represent the entire value chain of the water industry, spanning from upstream component players (e.g. membrane manufacturers), equipment OEMs, and system integrators, to downstream EPC players and project developers. Beyond water, Singapore is also nurturing the environmental industry which includes environmental consultancy, waste management, and pollution control.</p>
2	Green financing is a growth area. As a financial hub, Singapore should support green growth through green financing for energy efficiency, renewable energy, energy storage, and the sharing economy. Other opportunities in this area could include carbon credit trading.	<p>There are several examples of green financing in Singapore. Sustainable Development Capital LLP (SDCL) was appointed in 2014 to establish a private sector-led pilot financing program to fund energy efficiency projects. For the buildings sector, the pilot Building Retrofit Energy Efficiency Financing (BREEF) scheme was introduced in 2011 to facilitate financing from participating financial institutions for energy efficiency retrofits.</p> <p>Late last year, the Singapore Exchange (SGX) announced rising interest in "green bonds" from Asian investors – debt securities in which capital raised is used for projects with environmental benefits. For example, the first green bond in Asia was listed on SGX, and was issued by the Export-Import Bank of Korea. The proceeds were used exclusively to fund climate friendly projects.</p> <p>Singapore has also been able to attract some players to conduct carbon credit trading activities in Singapore. A post-2020 agreement to cut carbon emissions, expected in end-2015, may facilitate further growth in carbon credit trading volumes globally and in Singapore.</p>

3	Explore new technologies that could drive green growth in Singapore, e.g. microalgae sequestration and advanced biofuel production	<p>Carbon sequestration via microalgae was one of the technologies explored in the Carbon Capture and Storage/Utilisation technology roadmap developed by the National Research Foundation (NRF) and NCCS. It was found that the carbon dioxide (CO₂) reduction potential via biological means, such as microalgae, for Singapore is limited. This is because effective CO₂ sequestration with microalgae requires significant amounts of land and water, both of which are limited in Singapore. However, microalgae may offer some niche and attractive options for CO₂ utilisation from an economic perspective such as the production of nutraceuticals and pharmaceuticals. There is some research in CO₂ sequestration via algae being conducted in the Institute of Chemical Engineering and Sciences (ICES-A*STAR) and the National University of Singapore (NUS).</p> <p>There is R&D activity taking place in the various research institutes in Singapore on next generation biofuels such as Jatropha, marine algae, ligno-cellulosic ethanol and biomass. Much of the R&D takes place in ICES-A*STAR, the Institute of Environmental Sciences and Engineering (IESE-NTU) and Temasek Life Science Laboratory (located in NUS).</p>
4	Introduce a commodities market for recycled material	<p>There are a number of third-party exchanges for recycled items. Examples include www.youswop.com, a community to exchange and trade unwanted items that are still in working condition, and www.wasteisnotwaste.com, a platform that facilitates the exchange of waste materials and unwanted items between companies, organisations, businesses, non-profit organisations, designers and schools.</p>
5	Promote the sharing economy through use of software and apps	<p>The “sharing economy” is an evolving ground-up movement in Singapore. Individuals and groups are harnessing technology, peer-to-peer and social networks to facilitate the sharing of physical and non-physical resources. Examples include websites like iCarsclub and Rent Tycoons. Ground-up initiatives such as these complement the Government’s efforts to promote climate friendly practices such as resource conservation and recycling. We welcome more of such efforts by companies, organisations and individuals.</p>

Test-beds and Living Labs		
6	Encourage test-bedding, with incentives for local companies to develop solutions for the region	<p>Singapore is a “Living Laboratory” where companies can develop, test, and deploy sustainable urban solutions before scaling up for the region and beyond. Under the Living Lab strategy, companies are able to co-innovate with research institutions and public agencies that can facilitate or make available national urban infrastructure for companies to test-bed and commercialise innovative solutions. Through these collaborations, companies are able to benefit from using Singapore as a reference market to develop and sharpen their solutions before scaling up for markets in Asia and the rest of the world. At the same time, Singapore stands to gain from working with the top companies in the world on the latest smart and sustainable technologies. Overall, Singapore is regarded as an attractive marketplace for smart-sustainable urban solutions due to our focus on system-of-systems and cross-domain integration.</p> <p>One scheme to promote collaboration between public and private organisations is the Public-Private Co-Innovation (CI) Partnership Programme, which seeks to encourage co-innovation between the Government and the private sector. The CI Partnership Programme will highlight the needs of government agencies, and invite companies to submit proposals to solve these needs. Successful companies are then invited to test-bed and later implement their solutions with the government agency.</p>
7	Encourage better collaboration between public and private research institutions/organisations, e.g. through closer partnerships across multidisciplinary fields	
8	Increase transparency of test beds for members of the public and researchers to better understand behaviours and results.	<p>There are ongoing efforts to promote sharing of information and research findings from test bedding projects. For example, as part of Green Buildings Innovation Cluster (GBIC), a Building Energy Efficiency Repository (GBIC-Repository) will be set up to collect and share results from demonstration projects and allow stakeholders to draw on best practices. BCA has also set up regular Research and Innovation Workshops to share knowledge and findings, including those from test bedding projects, with researchers and the public. Another example of information sharing on test bed efforts is PUB’s R&D publication “Innovation in Water – Singapore”, which features selected ongoing water R&D projects that PUB is undertaking. This is released annually and is available for download on the PUB website.</p>
9	Encourage start-ups alongside larger companies that are deploying technology in Singapore’s test-beds	<p>The Public-Private Co-Innovation (CI) Partnership Programme gives companies a platform to translate innovative ideas into marketable products and services. To support SMEs, the government funding co-share is larger than that for other companies for the proof-of-concept and proof-of-value phases. If the solutions developed provide good value for money, the Government could also be a significant consumer and first-user of the solutions, thereby helping companies build a track record to generate new business opportunities.</p>

Capability Development

10	Increase education and employment opportunities in green sectors	<p>Training programs and certification schemes have been introduced for capability building in green sectors. These include the Singapore Certified Energy Manager (SCEM) programme and the Certified Green Mark Professional (GMP) scheme.</p> <p>Institutions like the Solar Energy Research Institute of Singapore (SERIS) and the Energy Research Institute@NTU (ERI@N) have also been established to conduct world-class industry-oriented R&D and to train manpower for the renewable energy and energy efficiency sectors. Along with its R&D investments, the Government is committed to groom research talent in urban sustainability through postgraduate scholarships and specialised courses.</p> <p>Singapore's investments in clean energy, environment, and water technologies have increased employment opportunities. For example, investments in clean water technologies have helped develop Singapore into a Global Hydro-hub; in the water sector 2,300 jobs were created over the period 2006 to 2010.</p>
11	Better awareness of green growth opportunities through green entrepreneur competitions, green advocacy committees	<p>To encourage closer environmental partnerships across the 3P sectors, NEA has organised the Clean & Green Hackathon to bring together different segments of the community to collaborate and co-create solutions to improve our living environment.</p> <p>Events like the Green Growth & Business Forum 2014 have also been organised to promote the economic and business benefits of low carbon growth, and bring together policymakers, business leaders, and the research and innovation community to discuss the importance of green growth. Other events like the Singapore International Water Week (SIWW), CleanEnviro Summit Singapore (CESS), and the International Green Buildings Conference (IGBC) are also platforms for companies, research institutions, and public agencies to explore collaborations and share the latest in business, scientific, and technological innovation, and policy development.</p>
12	Provide more opportunities for SMEs to work with MNCs to develop knowledge and better commercialise technology	<p>The Partnerships for Capability Transformation (PACT) initiative by EDB and SPRING supports collaborations between large organisations (LOs) and SMEs. For example, SPRING works with LOs to identify and implement collaborative projects between LOs and SMEs in areas such as: 1) Knowledge transfer from LO to SME; 2) Capability upgrading of LO's new or existing suppliers; 3) Development, co-innovation and test-bedding of innovative solutions between LO and SMEs.</p>

Other		
13	<p>Increase automation, which is a green solution. For example, warehouse management systems could be controlled remotely and data analyses will reduce waste. Less traffic, manpower, and space would be needed.</p>	<p>Various funding schemes support the implementation of automation solutions. For SMEs, these include the Productivity and Innovation Credit (PIC), iSPRINT by iDA which supports IT-based productivity solutions, as well as the Capability Development Grant by SPRING that supports capability upgrading projects that can lead to significant productivity improvement.</p> <p>In the area of warehouse automation, companies can work with the Supply Chain Management Centre of Innovation at Republic Polytechnic that can advise companies on business process improvements including: 1) Value-stream/chain mapping and analytics; 2) Process and automation simulation for logistics and supply chain scenarios; 3) Performance improvement through integration of mechanization, automation and human factor engineering.</p>
14	<p>Provide subsidies and government backing for green start-ups in their infancy</p>	<p>Start-ups in the environmental sustainability business can explore various support schemes provided by SPRING, NEA and the Environment & Water Industry Programme Office (EWI).</p> <ul style="list-style-type: none"> • <u>SPRING SEEDS</u>: An equity-based co-financing scheme for Singapore-based start-ups with innovative products and services with intellectual content and strong growth potential. • <u>Technology Enterprise Commercialisation Scheme (TECS)</u>: A competitive grant that provides early-stage funding at Proof of Concept and Proof of Value stages to support the commercialisation of proprietary technologies. • <u>NEA's Green Technology schemes</u>: The Environment Technology Research Program (ETRP) and the Innovation and Environmental Sustainability Fund (IES) support environmental technology development at the R&D, applied research and test-bedding/demonstration stages. • <u>EWI's FastTech</u>: An incubation grant that supports the commercialisation of innovative environmental and water technologies in partnership with approved incubators.