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**Energy and Environment
Business Council (EEBC)**



EUROPEAN CHAMBER
OF COMMERCE
IN HONG KONG
香港歐洲商務協會

EEBC
Position Paper

About the EEBC

The Environment and Energy Business Council (EEBC) is the latest initiative by the European Chamber of Commerce (ECC) in Hong Kong. It was set up in early 2013, with the objective to represent European businesses in Hong Kong and Macao in addressing concerns regarding environmental protection and sustainability issues in Hong Kong. It is comprised of representatives of large, medium and small enterprises of the business sector, from the European member states throughout Hong Kong and Macao. The EEBC's main objective is to encourage the Hong Kong Government to enact and implement legislation to build sustainability criteria into Hong Kong's core development strategy.

The Hong Kong Smart City Blue Print under Review

This position paper was produced by the European Chamber of Commerce in Hong Kong, in collaboration with the Environment and Energy Business Council and its members. In December 2017, the Hong Kong government presented the *Smart City Blue Print* for Hong Kong. By adopting the measures set out in this Blue Print Hong Kong should be turned into a world-class smart city. In this position paper, we want to review the *Smart City Blue Print* in general, and the *Smart Environment* section in more detail.



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Abbreviations

SNDGG	Smart Nation and Digital Government Group
MSW	Municipal Solid Waste
IoT	Internet of Things
RFID	Radio Frequency Identification Technology
IWM	Integrated Waste Management
PET	Polyethylene Terephthalate
EPD	Environmental Protection Department
FEHD	Food and Environmental Hygiene Department
EPBD	Energy Performance of Buildings Directive
EED	Energy Efficiency Directive
OOTV	Overall Thermal Transfer Value
LEED	Leadership in Energy and Environmental Design
USGBC	The U.S. Green Building Council
IAQ	Indoor Air Quality
GFA	Gross Floor Area
HKGBC	The Hong Kong Green Building Council's
BEC	Building Energy Codes
GHG	Greenhouse Gas
ETP	The European Technology Platform
EPC	Energy Performance Certificate
IEA	International Energy Agency
SCA	Scheme of Control Agreement
KWh	Kilowatt Per Hour
CHP	Micro Combined Heat and Power

General Review of the Hong Kong Smart City Blue Print

Main points to take away from the Blue Print:

What this means for Hong Kong: “World Class Smart City”: The Blue Print is more a list of separate initiatives in different areas of society because the vision and bigger picture of what “World Class” means for Hong Kong is undefined. They should be seen small steps bound together by a clear vision of where Hong Kong wants to go.

Organizational changes in the Government: To make sure that all initiatives are aligned, and that government departments work together and to support Private and government cooperation, different organizational structures are required to be successful in implementing the Smart City concept in Hong Kong. In Singapore, the Smart Nation initiative is driven from the top by the “Smart Nation and Digital Government Group (SNDGG)”, a ministerial committee chaired by the Deputy Prime Minister, with a budget of S\$ 19 billion. No organizational changes are being addressed in the Smart City Blue print.

Initiatives not specific and actionable enough: Not all initiatives are specific and actionable enough to ensure that they are followed through. Often, there are often no timelines, it is unclear who takes the lead, and which parties are required to make it a success. No budget is available and the final results are not clearly defined. Who are we going to hold accountable when certain initiatives are not executed, or when results differ from the expectations?

Technology and Innovation culture: Being a smart city is not only about technology or initiatives, it is also about culture - a culture which embraces an innovative drive to meet the needs of an increasingly complex, fast-changing environment; a culture of appropriate risk taking, where making mistakes is seen as part of a learning process. Do not be afraid to be an early adopter of new technology. A recent study by KPMG shows that 73% of executives and 45% of the general population are of the view that Hong Kong falls behind other developed cities in terms of fostering a technology and innovation culture. Fostering and developing an innovation culture is not addressed in the Smart City Blue Print.

Disrupting regulations and vested interests: Implementing the smart city concept in Hong Kong can be hindered by existing regulations and vested interests. A prominent example is the introduction of Uber in Hong Kong. Although there is wide public support, the vested interests (taxi branch) and existing regulations prevent Uber from operating legally in Hong Kong. Implementing Fin-Tech in Hong Kong has similar challenges. The implementation of new technologies in Hong Kong would benefit from a “regulation light environment” in order to support the adoption and implementation of smart technology.

Executive Summary: Review of the Smart Environment Section of the Hong Kong Smart City Blue Print

This paper focuses on reviewing the *Smart Environment* section of the blue print. We will address the strategy and initiatives identified in the blue print, which relate to *Waste Management, Green and Intelligent Buildings* (including Energy Efficiency), *Climate Action Plan 2030+* and *Pollution Monitoring*. We will touch upon Hong Kong's current situation, opportunities, and challenges, and draw a comprehensive comparison between the policy making and business approaches taken by Hong Kong and member states within the European Union.

Waste Management

The handling of waste has been a part of Hong Kong's political agenda for decades. Despite all the efforts and targets set by the Hong Kong government, the amount of waste going to the landfill is still growing. In 2016 Hong Kong disposed of 3.786 million tonnes of *Municipal Solid Waste* (MSW) to the landfills (10,345 tonnes a day) - a growth of 2.1% from 2015 and the highest annual landfilled volume since 1991 (start of the public available data). The recovery rate of MSW went down to 34%, continuing the trend of the last couple of years. Historically, being a small and densely populated city with little space and processing industry, Hong Kong focused its recycling efforts on collection, sorting and rudimentary processing to make the recyclables fit for export. Almost all recovered MSW was exported. However, with Mainland China closing its borders for 24 types of polluting "foreign rubbish" from the 1st of January of this year, a strategic change is required in Hong Kong's recycling industry. More advanced processing of recyclables needs to take place to produce high quality secondary raw material to meet the stricter requirements of markets like Mainland China.

The EEBC would like to recommend to Hong Kong government to support this strategic change with the following:

- The EEBC supports the introduction of governmental subsidies or gate-fees for recycling companies in Hong Kong. Hong Kong is an expensive location to operate recycling activities. Serious investments are needed to upgrade the recycling industry and Governmental support is required to make recycling in Hong Kong long-term viable. Subsidies can be funded by implementing Product Responsibility Schemes (PRS) to assure the polluters pay principle.
- The EEBC recommends the Hong Kong Government to create the possibility to conduct sandbox projects in designated areas. For instance, in Singapore, environmental

companies can have a safe space to introduce different recycling solutions whilst minimizing regulatory disruptions. Upgrading the recycling industry will require the introduction of new technology in Hong Kong.

- The EEBC recommends the Hong Kong Government to make more waste available for recycling. Although waste being sent to the landfill is at a record high, long-term stable and secure supply of waste for recycling is still not available. The main reason for this is that waste going to the landfill is mixed and therefore unsuitable for recycling.

Although waste going to the landfill is at record high, long-term stable and secured supply of waste for recycling is still not available. The main reason is that waste going to the landfill is mixed and therefore unsuitable for recycling. To create a stable and secured supply of waste for recycling the EEBC recommends the following:

- The EEBC fully supports the introduction of the *Waste Charging Scheme* for *Municipal Solid Waste* as mentioned in the *Smart City Blueprint*. This will support separation at the source and create an incentive to reduce waste.
- The EEBC recommends the Hong Kong government to introduce a deposit system for items like plastic bottles, glass and aluminium cans. By returning the bottles or cans, the deposit will be returned either by the shop or a recycling machine. This creates an incentive to separate waste at the source. Norway has achieved a recycling rate of 97% for plastic bottles by using this system.
- The EEBC suggests the Hong Kong government to set up mechanical waste sorting facilities near the landfills for the *Municipal Solid Waste*. The government can complete the sorting process, whilst the recycling processes should be contracted out for recycling expertise to conduct. This abolishes the problem of waste ownership and creates a steady supply of recyclable materials for the Industry.

To strengthen the Waste management activities in Hong Kong the EEBC recommends the following:

- The EEBC advises the Hong Kong Government to set up underground waste treatment facilities in densely populated districts. An identical waste management system has been found in Barcelona and Seoul. It effectively tackles the issue of lack of land and offers additional possibilities to manage the waste collected. This can be combined with other public utilities like water and electricity.
- The EEBC stresses the need for continuous enforcement and inspection in regard to illegal dumping. Illegal dumping of waste could hinder the effectiveness of the MSW charging scheme. Smart tracking and tracing systems are commercially available to support the government with these efforts.

- The EEBC recommends organizing all activities related to waste management under one government department to strengthen the focus on recycling. Currently two departments are involved, FEHD and EPD. We recommend making EPD responsible for all waste management to strengthen the focus on environmental and recycling activities.

Energy Efficiency of Buildings

In Hong Kong, there are approx. 40,000 buildings (of which approx. 8,000 are government buildings). They consume 90% of the electricity generated in the territory, which equates to 63% of the carbon footprint. Such a high percentage should be no surprise. Since the 80's, industrial production has moved elsewhere, leaving Hong Kong as a service economy. Whilst Government has started to set targets for better energy performance in new buildings, the overall impact has been limited. Retrofitting work aimed at improving existing buildings is the most effective strategy in order to curb energy consumption, lower carbon emission, and improve energy efficiency overall. There are many opportunities to do this in Hong Kong. Finally, we need to provide consumers and producers of electricity with the information they need to better manage their consumption and production. With the use of smart meters, real-time analysis can be conducted on time and volume of electricity consumed, which then allows the market to adjust its demand and supply accordingly.

To improve the energy efficiency of buildings in Hong Kong the EEBC would like to propose the following recommendations for the consideration of the Hong Kong government:

- The European Commission can share with the Hong Kong Government the success of the United Kingdom's Energy Performance Certificate (EPC). Whenever a property is built, leased, or sold, the EPC is required.
- The EPC contains information about a property's energy use and typical energy costs. Hong Kong understands competition; merely having published energy data is a key driver of improved awareness and building energy performance.
- To strengthen the regulations, promote the use of thermal barriers (insulation) and energy recovery ventilation, as well as improve the air-tightness (less unwanted air-exchange) and shading. This will provide better thermal comfort, healthier indoor air and reduce the need for air-conditioning. Currently, for BEAM there is a 10% GFA concession. More concessions might work as an effective incentive because people keep registering without certifying. The EEBC suggests incentivizing the use of higher level BEAM certification (for silver, gold and platinum each may be more GFA), or incentivize higher energy efficiency in general.

- Producing guidelines and guidance to enable the use of equipment and energy efficient technologies new to Hong Kong, to serve the expanding retrofit market in the forthcoming years.
- The EEBC invites the Hong Kong government to provide a complimentary energy consultation for interested parties in becoming energy efficient. This initial consultation gives businesses a simple blueprint of the possible energy efficiency designs. Loans with competitive interest rates should be made more available and readily accessible to interested parties.
- Supporting the role of the smart grid throughout Hong Kong, enabling both electricity consumers and producers to adjust electricity usage with reference to the data provided.

Reducing Carbon Emissions from Electricity Production in Hong Kong:

In the *Smart City Blue Print*, the Hong Kong Government refers to the “*Hong Kong Climate Action Plan 2030+*” for actions related to reducing carbon emissions in Hong Kong. The first focus in this plan is to replace coal by natural gas, the second is to replace coal by increasing the share of nuclear power. However, clear goals are not defined for 2030. Although renewable electricity production is becoming more important on the international level, there is limited focus on renewable electricity production to reduce carbon emissions in the action plan. The current share of renewable electricity production in Hong Kong is lower than 1%. In the *2030+ Plan* Hong Kong’s Realizable Renewable Electricity Potential by 2030 is determined at 3-4% focusing on solar, wind and waste-to-energy. This potential should be reached by using Feed-In Tariffs and Certificates. Because of its narrow scope, the potential determined in the plan is much lower than what is seen internationally. The Feed-In Tariff proposal from the Environmental Bureau only focuses on solar and wind (ignoring waste-to-energy despite it being included in the 2030+ plan), while a wide range of renewables are being supported internationally. Furthermore, only renewables produced in Hong Kong are taken into consideration, even though all other energy sources (coal, gas, and nuclear) are being imported. In contrast, internationally, a mix of both local and imported renewables are being supported to reduce carbon emissions.

The EEBC fully supports the steps taken so far, including the introduction of a Feed-In Tariff system, and recommends the Hong Kong government to support Renewable Electricity Generation by:

- The EEBC fully supports the introduction of a “feed-in tariff system”, however, for a wider range of renewable energy sources. Under the current proposal feed-in tariffs are only applicable to sun and wind energy.

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- Define Mandatory Renewable Electricity Targets (and separate from Nuclear). For companies to invest in renewables mandatory targets are a must.
- Include both local and international sources of Renewables. The current sources (coal, gas and nuclear) are all imported into Hong Kong. However, for renewables the Hong Kong governments limits itself to only locally produced renewable which limits the potential considerably.

1. Introduction

'Smart City' kick-starts the 4th industrial revolution (global digital transformation). Automation alters traditional business engagement and provides new means to achieve sustainability. Hong Kong's waste and pollution management is a compound issue which encompasses interconnected social, economic, technological, and policy concerns. To tackle the arising problems, it is important to have a bespoke approach fitting Hong Kong's characteristics (for example, landscape, business structure, talent pool). The *2017 Policy Address* reinforces the concept of 'Smart City', which was introduced in the Hong Kong '*Smart City Blueprint*'. 'Systems thinking' is used to find out the root cause of existing problems, while the 'Internet of Things' (IoT) helps solve identifiable problems. By incorporating advanced technology into citizens' daily lives, the Government seeks to promote better livelihood. This paper aims to find ways to reduce, monitor and manage pollution, so as to construct a '*Smart Environment*' in Hong Kong.

2. Towards a Circular Approach to Waste

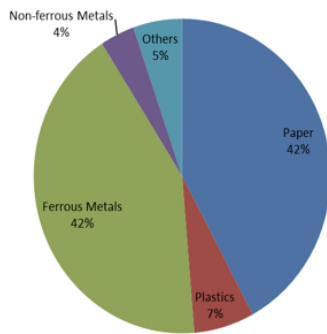
Hong Kong has disposed 3.786 million tonnes of Municipal Solid Waste (MSW) in 2016, and yet, it only has a 34% recycling rate². Therefore, it is reasonably foreseeable that landfills will be saturated in 2020³. Modelling on European examples, Hong Kong can optimize its status quo by adopting an intelligent waste management system. This solution focuses on '2Rs': reduce and recycle.

This entails quantity-based waste charging, a producer responsibility scheme, the promotion of recycling, and the maximization of landfill diversion. Data-driven waste management design enables better monitoring of consumer pattern, which facilitates the logistics with regards to waste collection, reducing the amount of inefficient trucks and traffic congestion. The user-centric approach can decrease the total amount of municipal solid waste produced and improve the city's sustainability in the long run.

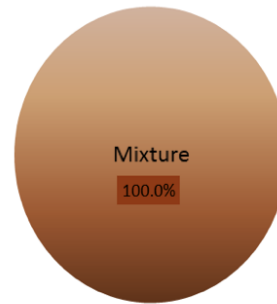
²The Government of the Hong Kong Special Administrative Region' (info.gov.hk), 'Waste statistics published for 2016' (Gov.hk, 2017) <<http://www.info.gov.hk/gia/general/201712/27/P2017122700307.htm>> accessed 4 May 2018.

³'Govhk: Municipal Solid Waste' (gov.hk, 2018) <<https://www.gov.hk/en/residents/environment/waste/msw.htm>> accessed 25 January 2018.

Major Materials Recovered/Recycled in 2016



Real Composition Landfilled MSW in 2016



Graph 1: Statistical Composition Landfilled MSW in 2016. Graph 2: Real Composition Landfilled MSW in 2016⁴.

2.1 Smart Collection

Seoul, South Korea, uses a volume-based system for waste management. Citizens must tap a card before throwing their waste into specially designed bins, which use radio frequency identification (RFID) technology. Recyclable trash is free of charge. Normal garbage is charged based on quantity and weight, which is then calculated into a monthly bill⁵. In the United Kingdom, ‘*BigBelly*’ smart bins were introduced in 2011. Solar sensors are used to determine whether the bin is full, and a notification is generated when it is nearing full capacity (at roughly 85%). The data collected can be used to determine the frequency of trash collection⁶. This enables better route planning for trash collection cars, prevents redundant transport, and decreases greenhouse gases emission.

2.2 Smart Sorting

Waste sorting centres can employ artificial intelligence to automatically identify and sort recyclables from trash.

Robotic engagement can significantly reduce labour demand, improve quality control, and relieve the landfills’ burdens. The artificial intelligence can also perform additional functions such as: analysing the types and amount of trash generated by different districts.

This performance increases the Government’s understanding of consumers’ waste management behaviours, and eases the formation of long-term waste management plans.

⁴ All the data of graph 1 and 2 is taken from EPD, <<https://www.epd.gov.hk/epd/english/top.html>>.

⁵ ‘Getting Smart In The City – Letsrecycle.com’ (letsrecycle.com, 2018) <<https://www.letsrecycle.com/news/latest-news/getting-smart-city>> accessed 23 February 2018.

⁶ ‘Is This The World’s Most Hi-Tech Bin? Solar-Powered Device Costs £1,000 A Year But Councils Think It Could SAVE Them Money’ (Mail Online, 2018) <<http://www.dailymail.co.uk/sciencetech/article-2382598/Is-worlds-hi-tech-bin-Solar-powered-device-cost-s-1-000-year-councils-think-SAVE-money.html>> accessed 23 February 2018.

2.2.1 The Netherlands

The Netherlands is one of the forerunners in Europe in regards to Integrated Waste Management (IWM) and recycling. Since mere household separation is insufficient, in order to further separate household wastes, Amsterdam has installed a post-separation plant in 2017⁷. This implementation has contributed to achieving the sustainable objective of separating 65%-75% of household waste in Amsterdam by 2020. Sorted materials can now be recovered more easily, and refining work was made more accessible for the recycling industry.

2.2.2 Hong Kong

Hong Kong vastly differs from the Netherlands. Lack of space and a strict permit granting system inhibit recycling industries from entering the market. Mechanical sorting effectively separates recyclables from trash, and can therefore be easily processed. Technological advancement enables firms to differentiate various types of wastes, however companies are only incentivized to join the market if there is a share of profits. Hong Kong deals with a significant amount of food waste, without sorting, organic wastes go directly to the landfill. To fulfil food waste reduction by 40% by 2022, subsidies and channels should be actively promoted, to engage in processing food waste into biodiesel⁸. The government can delegate processing work to tenders on a government contract, this bilateral cooperation can efficiently recycle and export waste collected to be refined as biodiesel, creating a win-win situation for Hong Kong.

2.3 Maximize Landfill Diversion

2.3.1 Capannori, Italy

The European Commission and the European Parliament aim to “manage waste as a resource by 2020” and has stated that “the waste generated per capita is in absolute decline”. Following its success of 80% landfill diversion rate, and without the use of incinerators, Capannori, Italy has achieved the most effective result in following the zero-waste target. Waste collected is either recycled, reused, or composted⁹.

⁷ 'AEB Amsterdam - Scheidingsinstallatie Huishoudelijk Restafval - Banzo' (Banzo, 2018) <<http://www.banzo.nl/reference/nascheidingsinstallatie-huishoudelijk-restafval>> accessed 25 January 2018.

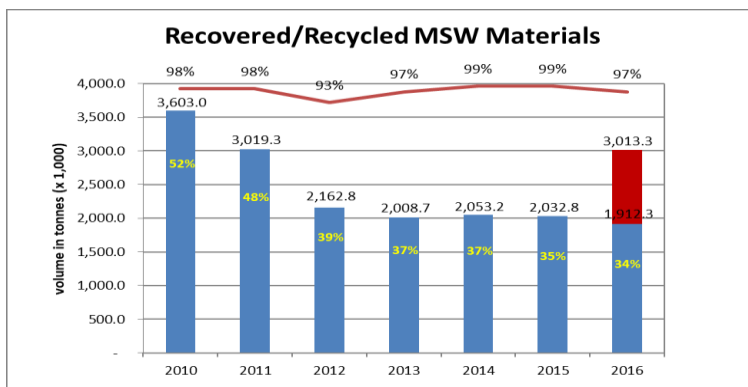
⁸ 'Problems & Solutions | Environmental Protection Department' (Epd.gov.hk, 2018) <http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html> accessed 25 January 2018.

⁹ 'No landfill, no incineration: municipalities commit to zero waste - Eco-Innovation Action Plan - European Commission' (Eco-innovation Action Plan May 2, 2018) <https://ec.europa.eu/environment/ecoap/about-eco-innovation/good-practices/eu/20131204-zero-waste_en> accessed January 22, 2018.

This brings a significant monetary reduction on waste management by USD 2.7 million for local councils in 2009¹⁰.

2.3.2 Hong Kong

Recovered waste is a source of income for Hong Kong. In 2016, it was recorded that HKD 4.0 billion were gained upon recovering about 1,910,000 tonnes of waste. A drastic difference, however, existed between the waste recovered locally and externally. Approximately 32 times more waste is exported to China and other countries for recycling, than the amount recycled locally (i.e. 97% and 3% respectively)¹¹. Hong Kong's significantly lower percentage of waste recovery is likely due to the inadequate policy support, unsustainable business models, and a high set up cost for recycling-related infrastructure. The EEBC strongly supports paragraph 242 in the 2017 Policy Address, it is believed that with the government's initiative in better connecting the local recycling industries with waste, Hong Kong can smoothly overcome the challenge presented by China's ban on importing foreign wastes¹².



Graph 3¹³: the red line corresponds to the amount of MSW exported by Hong Kong (– i.e. almost all of it). This demonstrates Hong Kong's dependency the export of recovered/recycling materials. The percentage of materials recovered from the total MSW appear in blue. From 52% in 2010, this percentage has fallen to

34% in 2016, which indicates that nearly over 60% of MSW went directly to the landfill in 2016. The red block represents the target of 3,013.3 tonnes of recovered/recycled MSW materials for 2016. At 1,912.3 tonnes, the actual number of recovered MSW was far below the target set out in the Blueprint.

¹⁰ 'North, "Zero Waste: Nil to Landfill Is Now a Practical Goal' (Knowledge@Wharton March 6, 2014) <<http://knowledge.wharton.upenn.edu/article/zero-waste-nil-landfill-now-practical-goal/>> accessed January 22, 2018.

¹¹ 'Waste Reduction Website' (Waste Recycling Statistics | Waste Reduction Website December 27, 2017) <https://www.wastereduction.gov.hk/en/quickaccess/stat_recycle.htm> accessed January 29, 2018.

¹² 'Make Best Use of Opportunities Develop the Economy Improve People's Livelihood Build an Inclusive Society' (policyaddress.gov.hk January 2017) <<https://www.policyaddress.gov.hk/jan2017/eng/pdf/PA2017.pdf>> accessed January 16, 2018.

¹³ 'Hong Kong Blueprint for sustainable use of resources 2013-2022' (enb.gov.hk, May 2013) <<https://www.enb.gov.hk/en/files/WastePlan-E.pdf>> accessed May 19, 2018.

2.4 Glass Recycling

In 2015, 204 tonnes of glass beverage containers were dumped into the landfill on a daily basis. However, only 11% of the glass was recycled. The EEBC highly values the Hong Kong government's *New Producer Responsibility Scheme on Glass Beverage Bottles*.

The scheme is expected to be piloted in 2018 at the earliest, and would have the effect of raising Hong Kong's recycling rate to 60% (1.5 times more than the current rate).

2.5 Plastic Bottle Recycling

In 2015, Hong Kong disposed of 5.2 million plastic bottles on a daily basis¹⁴. However, a large amount of plastic is not recycled, as evidenced by the shockingly low plastic (PET) bottle-recycling rate of 7.6%¹⁵. Compared to Hong Kong, Norway's plastic recycling rate is 12 times more (i.e. 97%). The significantly high plastic recycling rate in Norway is the product of its deposit return system, namely *panteordning* in Norwegian. Since 1972, reverse vending machines have been found in Norway. Under this system, a pre-fixed charge was included in the cost of recyclable products. Upon returning the plastic containers via the reverse vending machine, the labelled amount is returned to the customer. For the returned deposit, customers can choose supermarket vouchers or cash. Witnessing the success of Norway's deposit system, other European nations, namely Germany, Estonia, Finland, and Croatia, adopted this system to improve their national plastic bottle recycling rate¹⁶.

2.6 Recommendations

The EEBC would like to propose the following recommendations for the consideration of the Hong Government:

- The EEBC supports the introduction of governmental subsidies or gate-fees for recycling companies in Hong Kong. Hong Kong is an expensive location to operate recycling activities. Serious investments are needed to upgrade the recycling industry and Governmental support is required to make recycling in Hong Kong long-term viable. Subsidies can be funded by implementing Product Responsibility Schemes (PRS) to assure the polluters pay principle.

¹⁴ 'HK'S Offshore Plastic Problem Worse Than Expected, Say Volvo Crews' (South China Morning Post, 2018) <<http://www.scmp.com/sport/hong-kong/article/2130069/hong-kongs-offshore-plastic-pollution-worse-expected-volvo-ocean>> accessed 23 February 2018.

¹⁵ 'Recycling Is Not A Problem Hong Kong Can Dump On China Now' (The Green Earth, 2018) <<http://greenearth-hk.org/en/2017/12/20171222/>> accessed 23 February 2018.

¹⁶ Charley Ross, 'Norway Has Perfected Plastic Recycling, Here's What The UK Can Learn From Them' (HuffPost UK, 2018) <http://www.huffingtonpost.co.uk/entry/norway-has-perfected-plastic-recycling-heres-what-the-uk-can-learn-from-them_uk_5a7acbc5e4b06505b4e9983e> accessed 23 February 2018.

- The EEBC recommends the Hong Kong Government to create the possibility to conduct sandbox projects in designated areas. For instance, in Singapore, environmental companies can have a safe space to introduce different recycling solutions whilst minimizing regulatory disruptions. Upgrading the recycling industry will require the introduction of new technology in Hong Kong.
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 - The EEBC fully supports the introduction of the *Waste Charging Scheme* for *Municipal Solid Waste* as mentioned in the *Smart City Blueprint*. This will support separation at the source and create an incentive to reduce waste.
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- The EEBC recommends organizing all activities related to waste management under one government department to strengthen the focus on recycling.

Currently two departments are involved, FEHD and EPD. We recommend making EPD responsible for all waste management to strengthen the focus on environmental and recycling activities.

3. Energy Efficiency of Buildings

Green and intelligent buildings are designed to promote energy efficiency and sustainability¹⁷. Energy consumption is minimized at its root, as these buildings save energy¹⁸. Hong Kong is slowly incorporating green concepts into its buildings, some of the recent and most environmentally impactful breakthroughs include: Lo Wu Correctional Institute and Diamond Hill Crematorium¹⁹. Insulation of buildings, and the certification of energy efficient buildings.

3.1 Insulation of Buildings

3.1.1 Stricter Regulation

Approximately 90% of Hong Kong's electricity consumption originates from buildings.²⁰ The Electrical and Mechanical Service Department introduced a voluntary "Hong Kong Energy Efficiency Registration Scheme for Buildings" in 1998. Later in 2012, the Hong Kong Government launched the "Buildings Energy Efficiency Ordinance."²¹ Under the Ordinance, it is expected that 2,800,000,000 kWh of electricity can be reduced within 10 years, which is equivalent to 2,000, 000-tonnes of carbon dioxide²². Compared to Europe, Hong Kong's energy efficiency regulations on housing are relatively relaxed. The European Commission introduced an Energy Performance of Buildings Directive (EPBD) and Energy Efficiency Directive (EED) in 2010 and 2012 respectively. The two directives highlighted the communal effort in achieving zero-energy consumption in buildings.

¹⁷ 'Hong Kong Smart City Blueprint' (Smartcity.gov.hk, 2017)
<[https://www.smartcity.gov.hk/doc/HongKongSmartCityBlueprint\(EN\).pdf](https://www.smartcity.gov.hk/doc/HongKongSmartCityBlueprint(EN).pdf)> accessed 23 February 2018.

¹⁸ GovHK (www.gov.hk), 'Govhk: Green Buildings' (Gov.hk, 2018)
<<https://www.gov.hk/en/residents/environment/sustainable/buildings.htm>> accessed 18 January 2018.

¹⁹ Ibid.

²⁰ 'Buildings Energy Efficiency Ordinance' (Beeo.emsd.gov.hk, 2018)
<http://www.beeo.emsd.gov.hk/en/mibec_beeo.html> accessed 25 January 2018.

²¹ Ibid.

²² 'LCQ4: Policies And Measures To Promote Green Buildings' (Info.gov.hk, 2018)
<<http://www.info.gov.hk/gia/general/201505/06/P201505060638.htm>> accessed 25 January 2018.

As stated in the *Directive 2010/31/EU* (EPBD recast), “all new buildings must be nearly “zero-energy” buildings by 31 December 2020.”²³ Starting on the 1st January 2019, all new public buildings shall also fulfil the aforementioned standards.²⁴

Expanding from the government sector to private sector, the European community is actively enhancing energy efficiency in buildings through positive legislations. Belgium and Sweden also developed remarkable national energy efficiency measures. In 2015, Brussels, Belgium became the pioneer of legalizing passive house standards for all new constructions.²⁵ As for Sweden, in 2020, all new buildings shall not rely on fossil fuels for energy generation (air-conditioning, heating etc.)²⁶. Hong Kong’s regulations are significantly lagging behind. To administer energy efficiency in buildings, it is necessary to strengthen existing regulations. Positive legislations should stress the standard and details required for insulating building materials, as well as tighten the OOTV value. Insulation should be set at a higher standard, such that developers will dedicate more effort in improving the energy efficiency at the start. Hong Kong’s constructions have a long user life, the money invested will deliver in the form of long-term benefits in the future.

3.1.2 Vacuum-insulated Windows and Window Frames

Vacuum-insulated windows and window frames have two purposes: insulation, and noise reduction. Hong Kong has a negligible temperature difference between indoor and outdoor. Hence, thermal transfer heat is relatively small. However, heat enters the internal environment via windows and radiation. By altering the solar transmittance of the glass’ raw materials used (low-e coating), solar heat gain can be reduced. This reduces the amount of electricity required to cool down the buildings. In addition, vacuum-insulated layers can effectively inhibit sound waves transmission, which reduces about 90% of outdoor noise.

3.1.3 Efficient Building Envelope

An efficient building envelope uses insulating materials to control the inflow and outflow of air between buildings and the environment. Various insulating materials for walls, windows, and roofs etc., are introduced into the market to fit different needs. They enable effective and accurate calculation of energy needed to maintain a specific indoor temperature. Insulating materials reduce thermal heat transfer in the building’s outer layer, this cuts electricity

²³ 'Buildings - Energy - European Commission' (Energy, 2018) <<https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>> accessed 23 February 2018.

²⁴ Ibid.

²⁵ 'Brussels Exemplary Buildings Program + Passive House Law Of 2011 — Northwest Ecobuilding Guild' (Ecobuilding.org, 2018) <<http://www.ecobuilding.org/code-innovations/policy-profiles/brussels-belgium-first-region-to-adopt-passive-house-building-code-2011>> accessed 23 February 2018.

²⁶ 'National Programme For Energy Efficiency And Energy-Smart Construction' (Government.se, 2006) <<http://www.government.se/49b73b/contentassets/3929b99d18f74904bb54c9a47dd32b03/national-programme-for-energy-efficiency-and-energy-smart-construction>> accessed 23 February 2018.

consumption at its root. Insulation is also effective in regulating indoor temperature, minimizing electricity consumption fluctuation due to seasonal changes, and efficiently maintaining a comfortable working environment for employees by improving indoor air quality.

3.1.4 Smart Buildings and Wellness

The definition of a 'green' building is rapidly changing in today's marketplace. While the themes of consumption efficiency remain paramount, the concept of wellness and technology are taking centre stage. Even green building certification systems such as the WELL Building Standard²⁷ and the LEED Rating System are transforming from static, documentation-based rating tools to dynamic, performance-based ones, via the use of increasingly available technology such as smart metering. LEED recently introduced a new tool called ARC²⁸ that can gauge the performance of an office, building, or even city in real time via IoT connected devices and reporting tools. Europe has been one of the first movers in this area, with the city of Savona, Italy, being the first city in Europe to be LEED Pre-Certified by USGBC using the ARC tool²⁹. The city has been reporting their energy, water, and waste consumption, in addition to air quality measures that allow it to create a worldwide benchmark.

Air quality is arguably the most important component of building wellness. Hong Kong has worsening air quality issues and reporting tools that promote transparency, especially in terms of indoor air quality (IAQ), are essential for today's smart city. In Mainland China, the RESET Standard has blazed the path for IAQ requirements - defining that air should be measured via smart sensors, which relay information to a publicly viewable central cloud³⁰.

Hong Kong can easily become the leader in this space, and there should be public policy to encourage developers to use IoT tools to report on issues such as IAQ, so that occupants have the right to access this information pertinent to their health.

3.2 Certified Energy Efficient Buildings

3.2.1 Purposes

Since April 1st, 2011, the Hong Kong government mandates BEAM Plus Certification to be the prerequisite for gross floor area (GFA) concession. The GFA concession is commonly granted to eligible developers of "green and amenity features projects"³¹.

²⁷ 'Better Buildings are well' <<https://www.wellcertified.com>> accessed March 14 2018.

²⁸ 'Measure your green performance' <<https://www.arcskoru.com>> accessed March 14 2018.

²⁹ 'USGBC and GBCI Announce Savona, Italy as the First City to Sign on to LEED for Cities in Europe' (newsroom.usgbc.org July 31, 2017) <<http://newsroom.usgbc.org/httpnewsroomusgbcorg/>> accessed March 14 2018.

³⁰ 'RESET™ is the world's first sensor-based and performance-driven BUILDING STANDARD and certification program' (reset.build) <<https://www.reset.build>> accessed March 14 2018.

³¹ 'Green Building Certification Label - The Hong Kong Green Building Council (HKGBC) 香港綠色建築議會' (Hkgbc.org.hk, 2018) <<https://www.hkgbc.org.hk/eng/beamplus-certlabel.aspx>> accessed 23 February 2018.

Two energy certification systems are prevalent in Hong Kong: The Hong Kong Green Building Council's (HKGBC) BEAM Plus Certification,³² and the United States Green Building Council (USGBC) Leadership in Energy & Environmental Design (LEED) Certification³³.

Energy certification can increase public awareness of energy efficiency. Different certification systems measure energy efficiency using different parameters. This creates objective, comparable information for customers' decision-making. Simultaneously, customers' behaviours control the free market, hence increasing customer awareness can incentivize developers to opt for energy efficient construction designs. This effectively creates a snowball effect, which further leads building developers to become more energy efficient than the standards required by Building Energy Codes (BEC). Certification can have different effects on new and old buildings. In new buildings, certification can help achieve energy efficiency beyond the required standards, reduce pollution, and create better indoor working environments. In old buildings, retrofitting can improve overall energy efficiency³⁴.

3.2.2 Passive House

As defined by the '*Passivhaus Institut*', a Passivhaus (passive house) "has a heat demand of 15 kWh/m² per year, whilst the total primary energy use in the house is restricted to 120 kWh/m² per year." Studies have shown that energy saved from utilizing a 'passive house' can reduce 50-65% of carbon dioxide emission for each building³⁵. 'Passive house' design is unique to regional climate³⁶. Hong Kong's weather is subtropical and humid³⁷, hence, there are additional needs for dehumidification and insulation. Architectural designs feature airtightness and insulating building materials to keep heat out. Airtightness can form two barriers: an air barrier and a vapour barrier. The air barrier prevents indoor cold air from leaking out through the holes in the walls. This maintains a steady room temperature and eliminates the need for constant air-conditioning. The vapour barrier controls moisture movement, which maintains a suitable level of humidity whilst simultaneously inhibiting mould growth. The two barriers can effectively regulate the indoor temperature and humidity, which abolishes the need for external devices to tackle these issues. Existing limitations to

³² 'BEAM Plus - The Hong Kong Green Building Council' (HKGBC) 香港綠色建築議會' (Hkgbc.org.hk, 2018) <<https://www.hkgbc.org.hk/eng/BEAMPlus.aspx>> accessed 23 February 2018.

³³ 'LEED | USGBC' (New.usgbc.org, 2018) <<https://new.usgbc.org/leed>> accessed 23 February 2018.

³⁴ Monica Murjani and others, 'Innovation And Technology In Hong Kong' (Germany Industry and Commerce Ltd. (GIC)/ German Chamber of Commerce, Hong Kong (GCC), 2017) <http://hongkong.ahk.de/fileadmin/ahk_hong_kong/publication/GCcomm201703_full_web.pdf> accessed 23 February 2018.

³⁵ 'Promotion Of European Passive Houses - Intelligent Energy Europe - European Commission' (Intelligent Energy Europe, 2018) <<https://ec.europa.eu/energy/intelligent/projects/en/projects/pep>> accessed 23 February 2018.

³⁶ 'Passive Institute, 'Passivhaus Institut' (Passivehouse.com, 2018) <http://passivehouse.com/02_informations/01_what_is_a_passive_house/01_what_is_a_passive_house.htm> accessed 23 February 2018.

³⁷ 'Climate Of Hong Kong' (Weather.gov.hk, 2018) <http://www.weather.gov.hk/cis/climahk_e.htm> accessed 23 February 2018.

the introduction of ‘passive house’ into the market are: lack of public awareness, inadequate market demand, and limited contractor skills. Policy support and public education are paramount to effectively improve energy efficiency.

3.3 Light Pollution

3.3.1 Status Quo

Lighting accounts for approximately 15-19% of global energy consumption and over 5% of worldwide greenhouse gas (GHG) emissions³⁸. In Hong Kong, lighting accounted for 12% of the total electricity consumption in 2015³⁹.

End-User	Residential	Commercial	Industrial	Total Electricity consumption of lighting
Electricity consumption of lighting in 2015	15%	9%	10%	12%

Contribution of Lighting to the total Electricity Consumption by End-users in Hong Kong in 2015⁴⁰.

Illuminance from advertisement billboards outside of shopping malls and hotels disturbs nearby residents’ daily lives as well as nature.

The EPD continued to opt for non-binding sets of documents, known as “Guidelines on Industry Best Practices for External Lighting Installations” and the “Charter on External Lighting” to regulate existing light pollution issues⁴¹.

3.4. Developing Cleaner Energy Systems Day-night Tariff Out.

‘Smart Grid’ is an initiative created by The European Technology Platform (ETP) in 2006. The intelligently designed electricity network provides an efficient means to monitor generators’ and consumers’ actions⁴². With the use of smart meters, real-time analysis is conducted on time and volume of electricity consumed, this then allows the market to adjust

³⁸ ‘UN Environment. BRIGHTEN UP! Making the switch to efficient lighting’ (unenvironment.org 19 September, 2017) <<https://www.unenvironment.org/news-and-stories/story/brighten-making-switch-efficient-lighting>> accessed December 12, 2017.

³⁹ ‘Hong Kong Government, Electrical & Mechanical Services Department’ (emsd.gov.hk September, 2017) <https://www.emsd.gov.hk/filemanager/en/content_762/HKEEUD2017.pdf> accessed December 18, 2017.

⁴⁰ ‘Hong Kong Government, Electrical & Mechanical Services Department’ (emsd.gov.hk September, 2017) <https://www.emsd.gov.hk/filemanager/en/content_762/HKEEUD2017.pdf> accessed December 18, 2017

⁴¹ ‘LCQ11: Light Pollution’ (info.gov.hk 5th of July, 2017)

<<http://www.info.gov.hk/gia/general/201707/05/P2017070500421.htm>> accessed December 18, 2017.

⁴² Potočnik J, “European SmartGrids Technology Platform” (ec.europa.eu, 2006)

<https://ec.europa.eu/research/energy/pdf/smartgrids_en.pdf> accessed January 23, 2018.

its demand and supply accordingly. Consumers can then plan their electricity consumption in accordance to different price periods⁴³. The European Commission's "benchmarking smart metering deployment in the EU-27" was adapted by the DG ENER and JRC, focusing on the implementation of smart meters throughout the EU. Smart meters utilize the newest digital technologies to provide information updates, which helps establish "a two-way electronic communication" with the consumers and the grid.⁴⁴ Member States are obligated to guarantee the implementation of smart metering under the "EU energy market legislation in the *Third Energy Package*". Upon complete installation amongst Member States, approximately 72% of EU consumers will be using smart meters for electricity, whilst 40% of EU consumers will be using them for gas.⁴⁵

3.4.1 Challenge

A time-of-use tariff system was experimented by CLP and Hong Kong Electric. Under this system, electricity providers charge different rates for electricity consumed within different time intervals. Peak hours electricity rate would be higher than off-peak period⁴⁶. The implementation of smart grid and smart meter is difficult to incentivize tenants to cut electricity consumption. In commercial buildings, tenants regularly pay a set amount of management fee, which includes unlimited use of central conditioning, and lighting. The fee is calculated based on the floor area regardless of actual consumption. In residential settings, some contracts include bills, regardless of actual usage. To maximize tenants' benefits, they will likely exhaust all possible resources unless they possess a high level of environmental awareness.

3.5 Recommendations

To improve the energy efficiency of buildings in Hong Kong the EEBC would like to propose the following recommendations for the consideration of the Hong Kong government:

- The European Commission can share with the Hong Kong Government the success of the United Kingdom's Energy Performance Certificate (EPC). Whenever a property is built, leased, or sold, the EPC is required.

⁴³ 'Smart Grids And Meters - Energy - European Commission' (ec.europa.eu, 2018) <<https://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters>> accessed 25 January 2018.

⁴⁴ Wilson A, "Smart electricity grids and meters in the EU Member States" (europarl.europa.eu September 2015) <http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568318/EPRS_BRI%282015%29568318_EN.pdf> accessed January 17 2018.

⁴⁵ 'Smart Metering Deployment In The European Union | JRC Smart Electricity Systems And Interoperability' (Ses.jrc.ec.europa.eu, 2018) <<http://ses.jrc.ec.europa.eu/smart-metering-deployment-european-union>> accessed 25 January 2018.

⁴⁶ "CLP launches Smart Energy Programme to help turn Hong Kong into a Smart City" (clpgroup.com June 15, 2017) <https://www.clpgroup.com/en/Media-Resources-site/Current%20Releases/20170615_en.pdf> accessed January 25 2018.

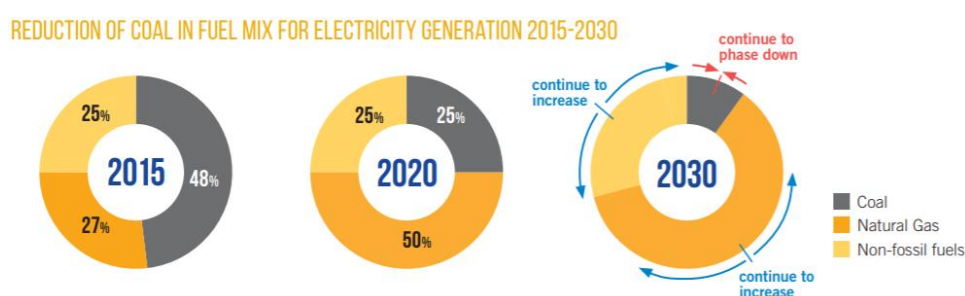
- The EPC contains information about a property's energy use and typical energy costs. Hong Kong understands competition; merely having published energy data is a key driver of improved awareness and building energy performance. To strengthen the regulations, promote the use of thermal barriers (insulation) and energy recovery ventilation, as well as improve the air-tightness (less unwanted air-exchange) and shading. This will provide better thermal comfort, healthier indoor air and reduce the need for air-conditioning.
- Currently, for BEAM there is a 10% GFA concession. More concessions might work as an effective incentive because people keep registering without certifying. The EEBC suggests incentivizing the use of higher level BEAM certification (for silver, gold and platinum each may be more GFA), or incentivize higher energy efficiency in general.
- Producing guidelines and guidance to enable the use of equipment and energy efficient technologies new to Hong Kong, to serve the expanding retrofit market in the forthcoming years.
- The EEBC invites the Hong Kong government to provide a complimentary energy consultation for interested parties in becoming energy efficient. This initial consultation gives businesses a simple blueprint of the possible energy efficiency designs. Loans with competitive interest rates should be made more available and readily accessible to interested parties.
- Supporting the role of the smart grid throughout Hong Kong, enabling both electricity consumers and producers to adjust electricity usage with reference to the data provided.

4. Reducing Carbon Emissions from Electricity Production in Hong Kong

4.1 Action Plan 2030+ Reducing Carbon Emission

The Hong Kong government's 'Smart City' blueprint refers to the *Hong Kong Climate Action Plan 2030+*. In it, the government highlights its intention of investing into a cleaner environment (for the targets see graph 3). Up to 2020 the main focus was on replacing coal by natural gas. Among other things, the plan focuses on encouraging power companies to use natural gas and non-fossil fuel sources, instead of using local power plants.

With this in mind, the government aims "to reduce the carbon intensity by 65% to 70 % by 2030"⁴⁹, and replace coal by increasing the share of nuclear power.



Graph 4: blueprint Hong Kong Smart cities⁵⁰

4.2 Renewable Energy

Internationally, renewable energy is booming. Hydro, wind, and solar powers are in the lead. In 2016 alone, global new solar PV capacity has doubled⁵¹, and renewables have come to represent nearly two thirds of net new power worldwide. According to prognostics, by 2022, wind and solar energies are set to reach over 80% of renewable capacity growth across the world. This is due in part to a now overwhelming consensus on the harmful effects of our dependency on non-renewable resources. There is also the fact that this relatively nascent sector can be highly profitable, particularly in light of recent drops in announced and auction prices, taxation, and tariffs. However, despite encouraging observations, some governments have been slow to catch on and make a substantial commitment to renewables. Hong Kong in particular, is seriously lagging behind, with renewables representing less than 1% in the current share of renewable electricity production (Hong Kong's final electricity consumption is dominated by coal and oil, closely followed by nuclear power)⁵².

⁴⁹ 'New Theme of Control Agreements reached with the two power companies' (info.gov.hk April 25, 2017) <<http://www.info.gov.hk/gia/general/201704/25/P2017042500763p.htm>> accessed 12 April 2018.

⁵⁰ "Hong Kong's Climate Action Plan 2030+ (enb.gov.hk, January 2017) <<https://www.enb.gov.hk/sites/default/files/pdf/ClimateActionPlanEng.pdf>> accessed 02 May, 2018.

⁵¹ "Renewables 2017", International Energy Agency (IEA), 4 October 2017. <<https://www.iea.org/publications/renewables2017/>> accessed 12 April 2018.

⁵² "Information Note: Feed-in tariff for solar power in selected places" (Research Office Legislative Council Secretariat, 17 January 2018) <<https://www.legco.gov.hk/research-publications/english/1718in04-feed-in-tariff-for->

4.2.1 Europe: Germany, the United Kingdom, and Denmark

This number is particularly telling in contrast to the European performance. Within the EU-28, renewables accounted for 17% of gross final energy consumption in 2016, and among all renewable energy sources, solid biofuels and renewable wastes were the most produced⁵³. In Germany, according to preliminary data from AG Energiebilanzen, renewables made up 33.3% of gross power production in 2017. Wind power, biomass, and solar energy are in the lead in Germany, making up respectively 50%, 21%, and 18.3% of the total gross renewable energy production (3.1% comes from hydro power, and 0.9% from waste)⁵⁴.

In terms of electricity generations alone, the IEA expects the share of PV and wind power in Germany to rise from 18% in 2016, to 26% by 2022 (IEA, 2017).

In the UK, renewable energies made up 29.8% of gross power generation during the second quarter of 2017. 42.88% of the country's renewables came from wind power, 36.39% from Bioenergy, 17.18% from solar PV, and 3.52% from hydropower⁵⁵. The IEA predicts that the share of PV and wind power in the UK's electricity generation will rise from 14% to 26% (IEA, 2017). Furthermore, according to predictions, from 44% in 2016, Denmark's renewables are set to make up about 70% of the country's electricity generation by 2022 (IEA).

4.3 Feed-In Tariff System

Beyond Europe, countries throughout the world are focusing on producing renewable energy to reduce their carbon footprint. In 2012, Japan introduced its feed-in tariff, which contributed to an increase in the use of solar power. Less than three years ago, Japan installed the world's second largest solar power generator, with a capacity of 41.6 gigawatts⁵⁶. China has recently kick-started its production of renewable energy. As a result, the country has become a dominant force in clean energy financing⁵⁷.

solar-power-in-selected-places-20180117-e.pdf> accessed 8 May 2018.

⁵³ 'Renewable energy statistics' (Eurostat, ec.europa.eu January 2018) <http://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics> accessed 8 May 2018.

⁵⁴ Appunn, Bieler, and Wetengel, 'Germany's energy consumption and power mix in charts' (Clean energy Wire, 3 April 2018) <<https://www.cleanenergywire.org/factsheets/germanys-energy-consumption-and-power-mix-charts>> accessed 8 May 2018.

⁵⁵ 'UK Energy Statistics, Q2 2017' (Department for Business, Energy & Industrial Strategy, 28 September 2017) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/647750/Press_Notice_September_2017.pdf> accessed 9 May 2018.

⁵⁶ 'Feed-in tariff for solar power in selected places (legco.gov.hk 12 January, 2018) <<https://www.legco.gov.hk/research-publications/english/1718in04-feed-in-tariff-for-solar-power-in-selected-places-20180117-e.pdf>> Accessed at 12 April 2018.

⁵⁷ 'IEEFA Report: China in 2017 Continued to Position itself for Global Clean Energy Dominance' (ieefa.org 9 January, 2018) <<http://ieefa.org/ieefa-report-china-continues-position-global-clean-energy-dominance-2017/>> Accessed at 8 May 2018.

Nevertheless, a recent study has shown that feed-in-tariffs reduce cost-effectiveness and increase payback time, therefore improving the economic viability of renewable energy⁵⁸.

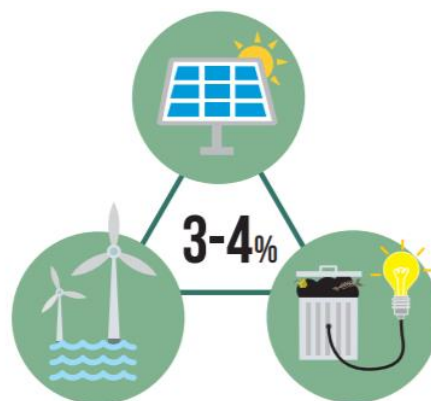
4.3.1 Hong Kong

In the 2030+ Plan, realizable renewable electricity potential by 2030 is determined at 3-4% (see graph 5), focusing on sun, wind, and waste-to-energy.

This goal should be reached by using Feed-in Tariffs and certificates. In April 2017, the Hong Kong government applied a new *Scheme of Control Agreement* with its two power companies (CLP Power and HK Electric). With this scheme, the Hong Kong government introduced feed-in tariffs for solar and wind energy on commercial and business consumers.

Payments for a feed-in tariff “would be set at HK\$3 to HK\$5 per kilowatt-hour (kWh) of electricity, to stimulate investment in clean energy production”⁵⁹.

Therefore, both CLP and HK Electric “would offset some of the costs by selling renewable energy certificates”⁶⁰. This agreement only supports local sources of renewable energy (sun and wind). In comparison, other international feed-in tariff systems also support the import of renewables.



Graph 5: Renewables⁶¹

4.3.2 The United Kingdom and Germany

For example, in Europe, Germany and the United Kingdom are among the leaders in terms of feed-in tariffs. Both of these countries have put in place multiple feed-in tariffs because they consume and produce a large quantity of renewable electricity. Germany is offering feed-in tariffs for: wind energy, solar energy, geothermal energy, biogas, hydro-power and biomass⁶².

⁵⁸ Johann, A & R. Madlener (2014) ‘Profitability of Energy Storage for Raising Self-Consumption of Solar Power: Analysis of Different Household Types in Germany’ <https://ac.els-cdn.com/S1876610214031397/1-s2.0-S1876610214031397-main.pdf?_tid=822cd0bc-fdd8-4ff9-b55a-561af9cef1be&acdnat=1525838724_717765f77d42bee7044e0b6b874d1f57> accessed 7 May 2018.

⁵⁹ ‘CLP Power Hong Kong Limited New Initiatives under the New Scheme of Control Agreement’ (legco.gov.hk April 2018) <<https://www.legco.gov.hk/yr1718/english/panels/ea/papers/ea20180423cb1-840-1-e.pdf>> accessed 8 May 2018.

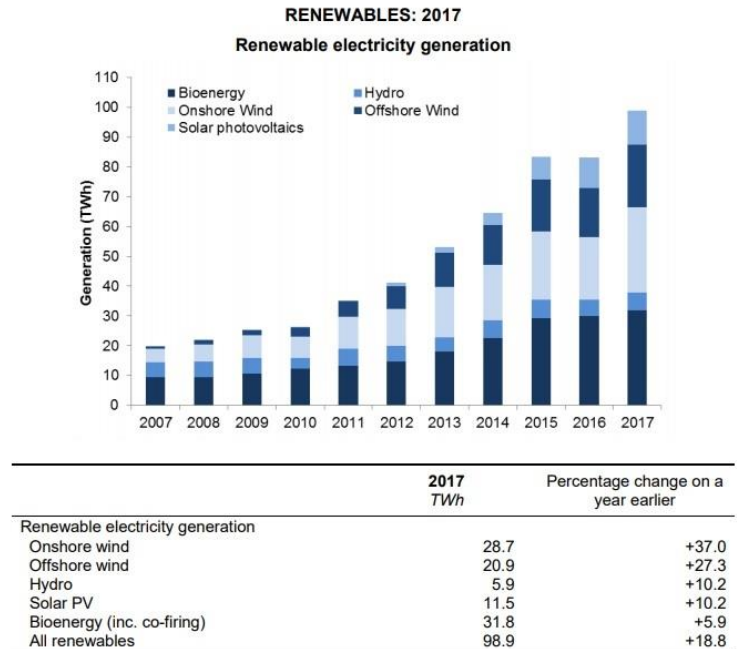
⁶⁰ ‘Feed-in tariff for solar power in selected places (legco.gov.hk 12 January, 2018) <<https://www.legco.gov.hk/research-publications/english/1718in04-feed-in-tariff-for-solar-power-in-selected-places-20180117-e.pdf>> accessed 12 April 2018.

⁶¹ ‘Hong Kong’s Climate Action Plan 2030+’ (enb.gov.hk, January 2017) <<https://www.enb.gov.hk/sites/default/files/pdf/ClimateActionPlanEng.pdf>> accessed 2 May, 2018.

⁶² ‘Legal Sources on Renewable Energy’ (res-legal.eu 12 October 2017) <<http://www.res-legal.eu/search-by-country/germany/single/s/res-e/t/promotion/aid/feed-in-tariff-eeg-feed-in-tariff/lastp/135/>> accessed 12 April 2018.

The UK government provides feed-in tariffs for small-scale, low-carbon electricity, produced through the use of different renewable energy technologies such as solar PV, anaerobic digestion, hydro, wind, micro combined heat and power (CHP)⁶³.

Besides, the UK is not only supporting local renewable sources, but it also supports the import of natural gas energy from neighbour countries (see table 1: the UK is importing 31.8% of Bioenergy). Comparing feed-in tariff systems with other countries with high percentage of renewable energy, the EEBC encourages the Hong Kong government to consider giving its support to both local and imported renewables.



Graph 6: Renewables in UK 2017⁶⁴

4.4 Recommendations

The EEBC fully supports the steps taken so far, including the introduction of a Feed-In Tariff system, and recommends the Hong Kong government to support Renewable Electricity Generation by:

- The EEBC fully supports the introduction of a “feed-In tariff system”, however, for a wider range of renewable energy sources. Under the current proposal feed-in tariffs are only applicable to sun and wind energy.
- Define Mandatory Renewable Electricity Targets (and separate from Nuclear). For companies to invest in renewables mandatory targets are a must.

Include both local and international sources of Renewables. The current sources (coal, gas and nuclear) are all imported into Hong Kong. However, for renewables the Hong Kong governments limits itself to only locally produced renewable which limits the potential considerably.

⁶³ ‘About the FIT scheme’ (ofgem.gov.uk 2018) <<https://www.ofgem.gov.uk/environmental-programmes/fit/about-fit-scheme>> accessed 7 May 2018.

⁶⁴ ‘UK Energy Statistics, 2017 & Q4 2017’ (Department for Business, Energy & Industrial Strategy, 29 March, 2018) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/695626/Press_Notice_March_2018.pdf> accessed 28 April 2018.