Greenpeace Response to Hong Kong's Climate Change Strategy and Action Agenda:

Policy Suggestions for a Genuine Low-Carbon Hong Kong

(20 Oct 2010)

Introduction

Greenpeace welcomes the release on the 10 September of the Environmental Protection Department's (EPD) three-month consultation paper, 'Join Hands for a Low Carbon Future,' which seeks public feedback on 'Hong Kong's Climate Strategy and Action Agenda'. While we recognise that the consultation is the first step to prompting public discussion on reducing Hong Kong's greenhouse gas (GHG) emissions, the plan does not provide a comprehensive range of GHG emission reduction scenarios.

This is the first time that the EPD has proposed a concrete 10-year GHG reduction target. It has proposed reducing carbon intensity by 50% to 60% by 2020 (based on 2007 levels). Unfortunately, this target is still lower than that recommended by the United Nations Inter-governmental Panel on Climate Change (IPCC) for developed economies. The IPCC has urged developed nations to reduce their GHG emissions between 25% and 40% by 2020 from 1990 levels in order to keep the average global temperature rise below $2^{O}C$.

Greenpeace is also concerned with the strategy proposed by the EPD to cut carbon emissions. The EPD proposed to boost nuclear power to 50% of the energy mix from the current 23%. This is both irresponsible and dangerous, and threatens future generations. Greenpeace strongly urges the government to immediately abandon all plans to expand the region's nuclear energy sector.

Greenpeace believes that, as a developed economy, Hong Kong must accept its responsibility to the global community and reduce its GHG emissions by the rate urged by the IPCC. The government's proposal replaces one threat – climate change – with another equally dangerous threat – nuclear power. We strongly urge the Hong Kong government to gather political will and adopt the effective measures on energy efficiency and renewable energy that would transform Hong Kong into a truly low-carbon economy.

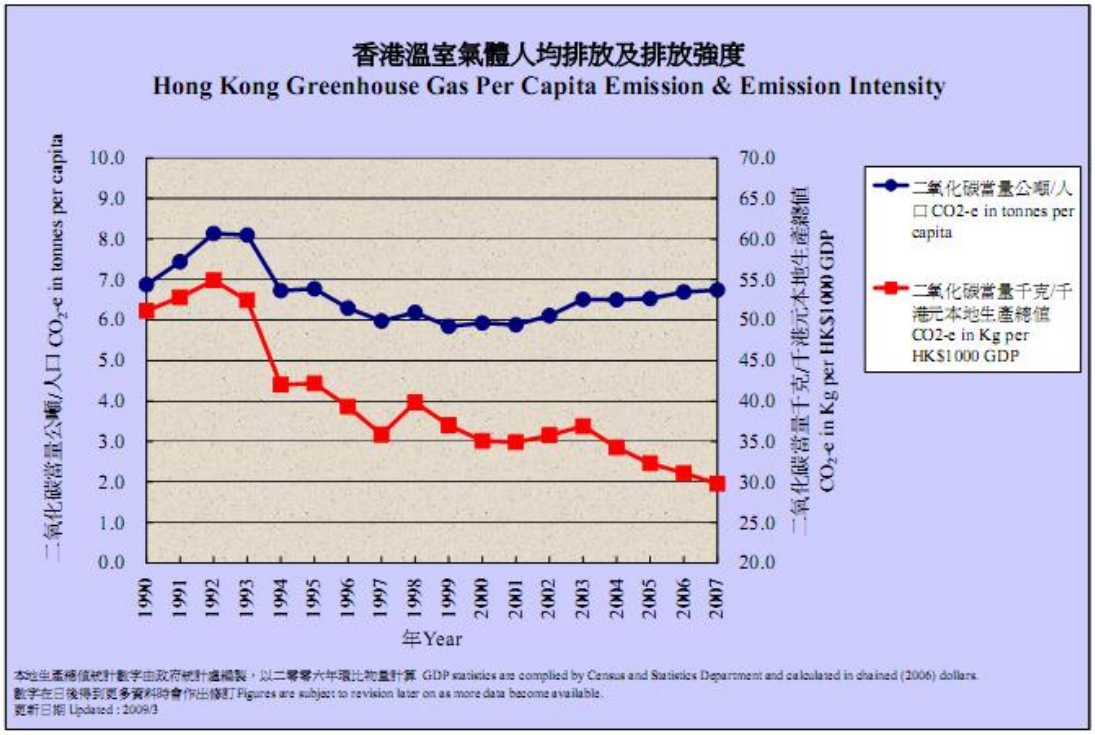
This briefing paper is comprised of two parts: A) Greenpeace's response to the 'Hong Kong's Climate Strategy and Action Agenda'; and B) Greenpeace's own low-carbon scenario which would allow Hong Kong to pursue a genuine low-carbon economy and meet IPCC GHG reduction targets. It maps out concrete measures that can be applied to three key sectors: energy, transport and waste treatment.

(A) Hong Kong's Climate Change Strategy and Action Agenda

1. Carbon intensity reduction target is inadequate

Government's proposal: to reduce carbon intensity by 50-60% over 2005 levels by 2020

Hong Kong has a developed economy with little industry and so the use of carbon intensity targets is not appropriate to measure emissions reduction. Carbon intensity measures carbon dioxide emissions per unit of economic growth (or GDP). With growing economies, emission intensity can decline even though total greenhouse gas emissions can rise. According to the EPD, Hong Kong's greenhouse gas emissions have been rising since 1999 and are now back to their former high of 1993. Emission intensity, though, has been declining because of the gradual growth of GDP. See below graph from EPD[1]:



If we calculate actual reductions in carbon emissions for the intensity reductions proposed we can see that at the lower range of the scale, the government will hardly be

[1] http://www.epd.gov.hk/epd/tc_chi/climate_change/files/GHG_Per_Capita_and_Emission_Intensity_1990_2007.pdf

reducing emissions at all. GHG emissions in 1990 was 35,300 kilotonnes[2], while the projected 2020 total GHG emissions if the government meets its proposed targets ranges from 28,000 kilotonnes to 34,000 kilotonnes[3]. Therefore, if we take 1990 as the base year of measurement (which is what the IPCC is using), then the total GHG reduction by 2020 would be from 3.6% to 20.6%. See Table 1. It betrays a lack of political will and commitment on the government's behalf to make responsible and effective GHG emissions cuts.

Table 1: Comparing carbon intensity reduction targets with actual reductions in GHG emissions

Lower limit: 50% carbon intensity reduction by 2020 (based on 2005 levels)	Lower limit in actual reduction by 2020 (based on 1990 levels): **(35,300 – 34,000) / 35,300 x 100% = 3.6%**
Upper limit: 60% carbon intensity reduction by 2020 (based on 2005 levels)	Upper limit in actual reduction by 2020 (based on 1990 levels): **(35,300 – 28,000) / 35,300 x 100% = 20.6%**

If we follow the spirit of the Kyoto Protocol's "common but differentiated responsibility principle," Hong Kong should accept responsibility for its historical emissions and its current capacity to cut emissions now. The IPCC has urged developed economies to cut emissions by 25% to 40% by 2020 (based on 1990 levels) so as to keep the global average temperature rise under 2°C. As Table 1 shows, the 50% to 60% carbon intensity target proposed by the Hong Kong government is equivalent to cutting absolute emissions by 3.6% to 20.6% by 2020 (against 1990 levels). Even using the strictest target this is much lower than the lowest IPCC target.

---

[2] P. 59, Annex 3, http://www.epd.gov.hk/epd/english/climate_change/files/Climate_Change_Booklet_E.pdf

[3] P.44, Table 6, http://www.epd.gov.hk/epd/english/climate_change/files/Climate_Change_Booklet_E.pdf

The threat of climate change is real and imminent. Hong Kong must adopt a strong carbon emissions reduction target and at the same time engage the public. Such a modern and developed city as Hong Kong, needs far stronger and far more responsible measures than those outlined in the government's proposal.

2. Expansion of nuclear power is flawed

Government's proposal: Increase nuclear power to 50% of energy mix by 2020 from the current 23%

Since some 67% of Hong Kong's GHG emissions come from the energy sector, it makes sense for the government to focus on transforming the energy mix to cut emissions. Unfortunately, the government proposes to do this by boosting nuclear power from its current 23% of all energy generated to 50% by 2020. This is both irresponsible and problematic.

Firstly, the government does not offer the public a full picture of the realities of depending on nuclear power for such a significant proportion of the energy mix. Greenpeace raises two key questions related to this proposal:

- Did the Hong Kong government conduct any risk assessment on expanding nuclear uptake to 50%, particularly in terms of the risks of radiation leaks and the treatment of nuclear waste?
- Did the Hong Kong government conduct any research to investigate the benefits and costs of using nuclear rather than investing in more renewable energy, such as wind and solar?

The Hong Kong government has intentionally downplayed the substantial risks involved in expanding the nuclear energy sector. It has portrayed nuclear power as 'clean' (in terms of carbon emissions throughout its life cycle), 'stable' (in terms of power supply) and 'cheap' (in terms of what CLP Group pays for electricity generated at the Daya Bay nuclear plant). This portrayal of nuclear power is misleading and unacceptable for a government consultation paper. We have outlined below some of the more misleading statements (and sometimes outright lies) about nuclear power in the government's consultation paper.

Government 'facts' on nuclear power	The truth
"It is a proven technology that is being widely applied in 30 countries and around 440 power generating units." (p. 40, box)	• Even for the third generation reaction, which is claimed by the nuclear industry to be "the most up-to-dated design with the most advanced technology", operators as well as insurance companies require a strict cap on their liability for damages to third parties caused by nuclear accidents.
"According to an assessment report issued by IPCC in 2007, even taking into account the 'total life-cycle' of nuclear power, GHG emissions per unit of electricity produced are less than 40g CO2-e/kWh, which is comparable to renewable energy sources if available." (p. 41, box)	• Pollution from nuclear power plants is not GHG emissions, but rather nuclear waste. Plutonium, one of the world's most highly radioactive elements, takes 240,000 years to be deemed safe.
"Compared with natural gas, nuclear power is generally less expensive and more reliable, and emits no GHG during the electricity generation process" (p. 41, 5.42)	• It is not less expensive because the government has not used the true cost of using nuclear power. Nuclear incurs extra costs related to dealing with insurance and liability[4], waste disposal[5], maintenance and decommissioning of reactors[6]. The true costs will run into the thousands of millions of Hong Kong dollars for each reactor.

[4] The Brussels Convention limits of liability were set as follows: Operators(Insured) €700m; Installation State(public funds) €500m; and Collective Sate contribution €300m

[5] In 2003, Andra, the French agency for radioactive management, estimates a total cost for final waste storage of between €15.9 billion and € 58 billion in France.

[6] Nuclear Generation Decommissioning Fund of British Energy was reported to be € 660 million

	• Nuclear generation is facing significant balance-sheet challenges. The rating agency, Moody's, is considering applying a more negative view on issuers that are actively pursuing new nuclear generation.[7]
"Comparison of Fuel Sources for Power Generation in Hong Kong" (p. 42, Table 5 and box) – Examples: - "…the current unit price of nuclear electricity imported from the Mainland is about 50 cents/kWh" - The availability of uranium is 'adequate supply for centuries' and Renewable energy is "constrained locally".	• The supply of uranium is not adequate. According to Red Book, NEA / OECD 2009, 5.4 million tons of uranium are identified and inferred worldwide. The total demand of uranium is 59,065 tons in 2008. It shows that the uranium supply could fall into shortage within 100 years only if the consumption rate remains the same. Any growth in nuclear power capacity will exhaust the uranium at a faster rate. • The supply of uranium ore is limited. Some 63% of uranium ore is currently sourced from three countries: Australia, Canada and Kazakhstan[8]. • Uranium is controlled by an oligopoly. Some 64% of uranium is currently mined by only four companies: Cameco, Rio Tinto, KazAtomProm and Areva[9]. This means price competition is limited.

[7] http://www.scribd.com/doc/18057014/Moodys-New-Nuclear-Generation-June-2009#open_download

[8] http://www.world-nuclear.org/info/inf23.html

[9] http://www.world-nuclear.org/info/inf23.html

The risks from nuclear energy are real, inherent and long-lasting

- Nuclear power is dangerous – There is no safe way to deal with radioactive nuclear waste and nuclear accidents are not uncommon. Every year, there are on average over 400 reported incidents in nuclear plants in France.[10] Nuclear power stations also provide the raw ingredients for assembling nuclear weapons and dirty bombs and provide an obvious target for terrorist attacks.

- Nuclear is not cheap, it is very expensive. Costs associated with safety and security, insurance and liability in case of accidents or attack, waste management, construction and decommissioning are high and rising.

- Nuclear delivers too little too late. Between 2001 and 2005, the average construction time for new nuclear plants was nearly seven years (82 months) globally[11] , according to analysis by the World Energy Council. "Each dollar invested in electric efficiency displaces nearly seven times as much carbon dioxide as a dollar invested in nuclear power, without any nasty side effects," according to the US Rocky Mountain Institute. [12]

Nuclear energy threatens the safety of future generations. A responsible government will foster open debate on this issue and ensure that when it comes to making decisions on nuclear power the process will be open and transparent. The government has framed this consultation paper in such a way that it does not encourage open and honest public debate on the nuclear issue. It has not offered a true picture of the costs and risks of its nuclear expansion plans and it appears to have no intention of doing so.

---

[10] Source: *Residual Risk* report, 2007, based on IRSN

[11] http://www.iaea.org/programmes/a2/index.html

[12] GUARDIAN 12 August 2004,"Nuclear Plants Bloom" by John Vidal
http://www.guardian.co.uk/life/feature/story/0,,1280884,00.html

3. Renewable energy target is unacceptably low

Government's proposal: To make renewable energy mix 3%-4% of the total energy mix by 2020

Currently renewable energy only makes up less than 1% of the energy mix.

In sharp contrast to the ambitious plans for expanding nuclear power generation, the Hong Kong government has shown a serious lack of commitment to developing the renewable energy sector. The government proposes a miserly expansion of renewable energy to 3% - 4% of the total energy mix by 2020. There are no plans for Hong Kong and Guangdong province (or any other part of China) to collaborate on renewable energy projects. This omission means that this consultation paper is even less likely to provide meaningful discussion on how to lead Hong Kong and Southern China on the path to a low-carbon future.

Mainland China has a renewable energy target of 15% by 2020

China now has the world's biggest capacity in renewable energy capacity. In 2009, China added 37 GW of renewable capacity[13], more than any other country in the world. It now has 226 GW in total renewable energy capacity[14]. China's wind energy sector has expanded at as fast rate. In 2009, the country added 13.8 GW, which represents more than one-third of the world market. Back in 2002, China only made up 2% of the world total[15]. The central government has made a 15% target of energy to come from renewable energy sources by 2020[16], which is a modest target to start with. According to the estimation of Greenpeace and Global Wind Energy Council, China's wind power can reach 230GW of installed capacity by 2020, which is equal to 13 times the current capacity of the Three Gorges Dam; its annual electricity output of 464.9TWh could replace 200 coal fire power plants[17].

---

[13] http://www.ren21.net/globalstatusreport/REN21_GSR_2010_executive_summary.pdf

[14] Same as above.

[15] Same as above.

[16] http://cn.chinagate.cn/economics/2007-09/10/content_8851366.htm

[17] http://www.greenpeace.org/china/en/press/release/windpower2010-release-en

There are already policies supporting the development of wind and solar power in Guangdong province. In 2009, the total accumulative investment into wind energy was RMB 1.5 billion and is expected to increase to RMB 2.7 billion in 2010[18]. Greenpeace worked with Garrad Hassan to publish a report on Guangdong's wind power capability in 2005. That report concluded that the installed capacity of wind power in Guangdong could reach 20,000 MW by 2020 and generate as much as 35,000GWh of clean electricity or 17% of the province's energy needs in 2005[19].

Hong Kong lacks political will to develop a renewable energy sector

Many local and city governments across the globe have introduced measures to stimulate the growth of the renewable energy sector. These include: clear, long-term targets for renewable energy; urban planning that incorporates renewable energy into city development; building codes that mandate or promote renewable energy; tax credits and exemptions; purchases of renewable power or fuel for public buildings and transport; innovative electric utility policies; subsidies, grants and loans[20].

In 2002, the government's Electrical and Mechanical Services Department (EMSD), the technical arm of the Hong Kong government responsible for renewable energy applications and their promotion[21], published its 'Study on the Potential Applications of Renewable Energy in Hong Kong',[22] which concluded that renewable energy could make a meaningful contribution in meeting Hong Kong's long-term energy needs[23] provided several barriers, mostly non-technical, could be lifted. Such barriers include grid access to third parties as well as different prices for different energy sources. The latter half of this paper presents a series of enabling measures to remove these barriers.

---

[18] http://www.gddpc.gov.cn/csdh/tzc/zdxm/200905/t20090512_29801.htm

[19] http://www.greenpeace.org/china/zh/press/reports/wind-guangdong

[20] http://sefi.unep.org/english/globaltrends2010.html

[21] http://www.emsd.gov.hk/emsd/eng/pee/nre.shtml

[22] The report can be downloaded at http://re.emsd.gov.hk/tc_chi/gen/overview/files/stage1_report.pdf

[23] As mentioned by the EMSD report, the potential resources of electricity generated from PV (5994 GWh), offshore windfarm (8058 GWh), onshore windfarm (2630 GWh), urban wind turbines (3000 GWh) and landfill gas (448 GWh) reached 20130 GWh in total, which is roughly equivalent to 40% of the projected 2020 electricity consumption level.

According to the EMSD, wind power (both offshore and urban wind turbines) and solar power could contribute up to 21% of Hong Kong's total annual energy needs. So why is it that the government only proposes that renewable energy should make up a meagre 3% to 4% of the energy mix? Greenpeace strongly urges the Hong Kong government to seriously consider developing both large-scale (such as offshore wind farms) and decentralised renewable energy applications suitable for Hong Kong's urban environment. Both Hong Kong power companies have proposed developing offshore wind farms[24]. Greenpeace strongly urges the government to start with a 10% renewable energy target by 2020. With political will and the right measures, the government can phase out dangerous coal and nuclear power and transform Hong Kong into a modern low-carbon city.

4. Next steps

The government's 'Hong Kong's Climate Change Strategy and Action Agenda' and associated consultation paper is not only lacking in inspiration for developing the renewable energy sector, disappointing in its proposal to increase the share of nuclear power, but it is also not transparent. Greenpeace urges the government to immediately:

a) Release the full report: 'A Study of Climate Change in Hong Kong – Feasibility Study' (Agreement no. CE 45/2007 (EP)). 'Hong Kong's Climate Change Strategy and Action Agenda' was drawn up based on this study. Greenpeace believes the public have the right to know what assumptions, data and analysis went into the agenda. In particular, we believe that information on the cost calculations and scenario projections for various energy options should be made public knowledge.

b) Extend the public consultation period to at least six months from the current three months. This is such a crucial issue and the public needs time to fully understand the situation.

c) Make public the next steps following the end of the consultation period. Since nuclear energy expansion and emissions reduction are controversial issues, the government needs to make all the decision-making processes transparent including who will be involved.

---

[24] P.38, box, http://www.epd.gov.hk/epd/english/climate_change/files/Climate_Change_Booklet_E.pdf

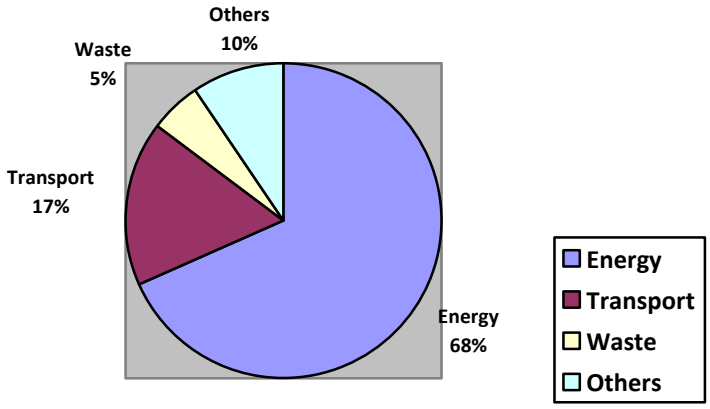
(B) Greenpeace suggestions for a genuine low-carbon economy in Hong Kong

Hong Kong has the capability to make substantial GHG emissions cuts and thereby make a genuine global contribution to combating climate change. An aggressive reductions target can be achieved by introducing strict energy efficiency measures and adjusting the energy mix. Greenpeace recommends that Hong Kong commit to the strictest IPCC developed nation target: a 40% cut in GHG emissions by 2020 over 1990 levels. It can achieve this by taking concrete measures in the energy, transport and waste treatment sectors. Table 2 shows the Greenpeace proposed reduction portfolio by 2020 (base year 2007) from the energy, transport, and waste treatment sectors in order to achieve the IPCC reduction target for developed economies.

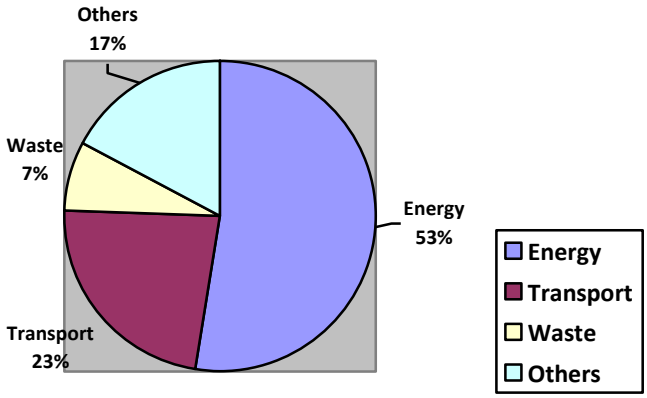
Table 2: Greenpeace proposed 2020 GHG emissions reduction portfolio if Hong Kong adopts strictest IPCC target for developed nations.

Sector / Year	1990	2007	2020 (Greenpeace proposal)	% change by 2020 (base year 2007)
Total emissions	35,300 KT	43,300 KT	21,280KT	40% (as of 1990)
Energy sector (Electricity Generation)	22,900 KT	29,600 KT	11,165 KT	- 62%
Transportation	5,940 KT	7,380KT	4,898 KT	- 33%
Waste	1,550 KT	2,180 KT	1,526 KT	- 30%
Others	4,910 KT	4,140KT	3,691 KT	-11%

Greenhouse gases emission in 2007 (43,300 Kilotonnes)



Greenhouse gases emission in 2020 (21,280 Kilotonnes) -- Greenpeace Scenario



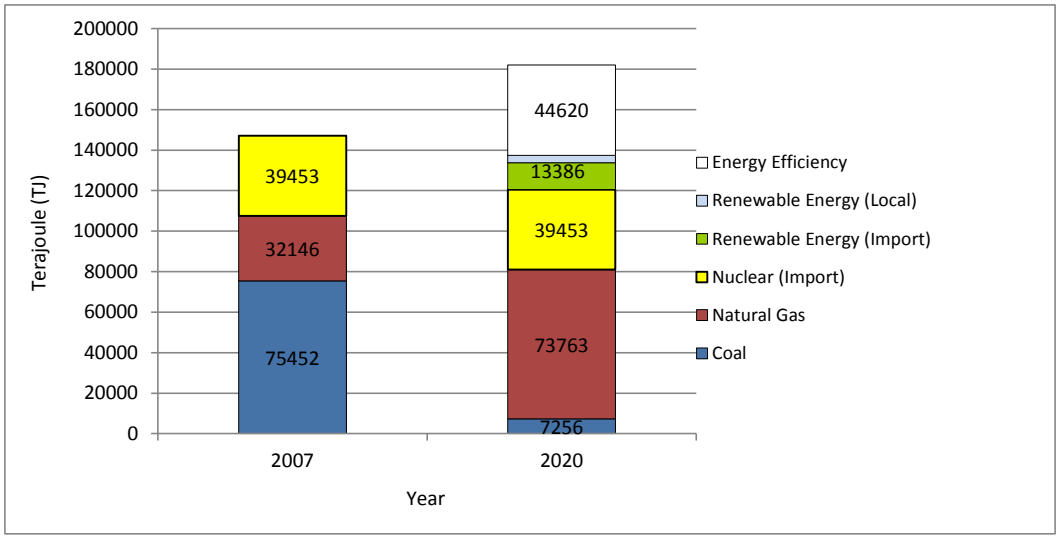
To achieve these reduction targets, we offer examples of measures that have been adopted elsewhere in the world to cut GHG emissions that have proved effective. These also illustrate that it is possible to cut GHG emissions without turning to nuclear power. We strongly urge the Hong Kong government to pursue these options and commit to the IPCC emissions reduction target.

Energy Sector: Cut GHG emissions by 62% (from 2007 to 2020)

From 29,600 KT GHG emissions (2007) to 11,165 KT (2020)

Even with emissions cuts, the energy sector is still likely to be Hong Kong's biggest emitter of GHG in 2020. However, if the renewable energy sector undergoes a major boost and substantial improvements are made to energy efficiency then the energy sector can cut its emissions by more than 60% from 2007 levels. Graph 3 shows how the energy mix can be improved to cut Hong Kong's GHG emissions.

Graph 3: Hong Kong's energy mix in 2007 set against Greenpeace proposal for energy mix in 2020



Local Electricity Consumption in 2007: 147,071 Terajoule[25]

Projected Local Electricity Consumption in 2020: 178, 478 Terajoule [26]

---

25 http://www.censtatd.gov.hk/hong_kong_statistics/statistical_tables/index_tc.jsp?charsetID=2&tableID=127

26 http://www.news.gov.hk/tc/category/environment/091021/html/091021tc04005.htm

According to the government's projection, there is an annual increase of 1.5% electricity consumption in Hong Kong. Under this projection, the total energy consumption of Hong Kong will be equal to 178,478 TJ by 2020 (based on 2007 levels).

To achieve a genuine cut in greenhouse gases emission, Greenpeace suggests the government to aim at a 25% reduction in energy efficiency of the total electricity consumption so that the actual electricity demand of 2020 will be decreased to 133,858 TJ[27].

While the Memorandum of Understanding on Energy Co-operation (MOU) signed between HKSAR government and mainland in 2008 allows Hong Kong to have further uptake of nuclear power from Guangdong, we would like to propose the nuclear energy exported to Hong Kong to remain unchanged (39,453 TJ) [28] in 2020, so as to maximize the opportunities from energy efficiency measures and renewable energies. On the other hand, the MOU also mentions the level of the electricity from natural gas will be equalled to 20,490GWh (about 73,763 TJ) by the two power companies in Hong Kong[29]. With the MOU, we can thus calculate the capacity of the remaining energy from renewable sources and coal.

According to government's projection in the consultation paper[30], the offshore wind energy projects of the two power companies can be reached 2% of local electricity demand (3,570 TJ). We would like to urge the Hong Kong government to increase the renewable energy to at least 10% of its total electricity consumption (i.e. 13,386 TJ) by 2020 through maximizing Hong Kong local renewable energy projects potential as well as taking positive collaboration with Guangdong government (while mainland is targeting an energy mix of 15% renewable energy in 2020)[31]. If this can be achieved, we can reduce the electricity generated by coal to around 7,256 TJ, which will only take up 5% of total energy mix by 2020.

---

[27] 178478 TJ X 75% = 133858 TJ

[28] http://www.enb.gov.hk/en/news_events/speeches_presentations/speeches_080922a.html

[29] http://www.legco.gov.hk/yr09-10/english/panels/ea/papers/ea0922cb1-2841-1-e.pdf

[30] P. 38, http://www.epd.gov.hk/epd/english/climate_change/files/Climate_Change_Booklet_E.pdf

[31] *3845 TJ (HK planned RE) + 4227 TJ(Guangdong Operating +Planned wind by 2009) + 5314 TJ(Further development in Hong Kong and Guangdong in 10 years)*

To conclude, with 25% improvement of energy efficiency in the first place, the breakdown of energy mix in 2020 proposed by Greenpeace would be:

Natural Gas = 73,763 TJ (55%)

Nuclear = 39,453 TJ (30%, with the amount of energy unchanged as 2007)

Renewable Energy = 13,386 TJ (10%)

Coal = 7,256 TJ (5%)

Below are Greenpeace suggestions for three measures on improving energy efficiency of commercial products, improving the energy efficiency of buildings and boosting renewable energy.

Measure One: Target a 25% improvement in energy efficiency from now to 2020

Typically, there are three main measures that are employed globally to improve energy efficiency. Below are the examples from mandatory labelling of the energy efficiency of products, an efficiency performance standard and an energy performance contract.

Key measures	**Further explanation**
1. Expand the coverage of the ***Mandatory Energy Efficiency Labelling Scheme (MEELS)***[32] from the current five kinds of electrical appliances (air conditioners, refrigerating appliances, compact fluorescent lamps, washing machines and	The U.S. "Energy Star" label covers 30 product categories including home electronics (such as battery chargers), commercial food services (such as ice machines) and other commercial products (such as power adapters and exit signs). It is estimated that the energy star label helped the U.S. prevent 40 million tonnes of GHG emissions in 2008.[33]

[32] Further information on the "MEELS": http://www.emsd.gov.hk/emsd/eng/pee/eels_mandate.shtml

[33] http://www.asiapacificpartnership.org/pdf/BATF/9th_meeting/Current_Developments_in_U.S._Appliance_Labels_and_Standards_.pdf (p.9)

humidifiers) to all appliances including commercially-used appliances.	
2. Set ambitious, mandatory and constantly upgrade ***Minimum Efficiency Performance Standards*** for all manufactured and imported electrical appliances, and ensure compliance by tough market surveillance and high financial penalties.	Japan's "Top Runner Model"[34] encourages manufacturers and importers of energy-consuming equipment to continuously improve the use-phase energy efficiency of products within selected market segments. The obligation of compliance with Top Runner regulations rests entirely with manufacturers and importers. In iterative cycles, Top Runner introduces product-specific energy performance requirements, where the basis for the adoption of standards is pre-defined as the use-phase energy performance of the best technology available on the market at the time of revision. Exact standard levels, however, along with appropriate target years, are agreed on an extensive consultative process involving several stakeholder groups. Thereafter, when promulgated by the regulator, the targets become mandatory for all manufacturers and importers in Japan (except for very small actors). To date 18 product categories have been brought into the Top Runner scheme and an additional three are currently considered for inclusion. It is expected that the Top Runner Model" helped Japan to make total savings between 16% and 25% of the whole national savings

[34] http://www.aid-ee.org/documents/018TopRunner-Japan.PDF

	target by 2010, a total of about 2000 to 2500 PetaJoule (1 PJ=1015J).[35]
3. Set up ***financing systems*** to encourage Energy Service Company (ESCO) to provides customers with energy saving measures, such as through the arrangement of ***"Energy Performance Contracting"*** (EPC)	An *"Energy Performance Contracting" (EPC)*[36] is a turnkey service, in which Energy Service Company (ESCO) provides customers with a comprehensive set of energy efficiency, renewable energy and distributed generation measures and often is accompanied with guarantees that the savings produced by a project will be sufficient to finance the full cost of the project. The US EPC is now growing at more than 20% per year, driven by increasing and volatile energy prices, federal and state energy savings mandates, the continued lack of capital and maintenance budgets for federal facilities, and growing awareness of the need for large-scale action to limit GHG. The EPC model in US has proved to be a strong gear of private-sector investment in energy efficiency measures, which is also a complement to public funded energy efficiency programs.

Measure 2: Target a 25% improvement in energy efficiency of buildings from now to 2020

Buildings in Hong Kong consume 89% of the total local electricity so there is much scope to improve energy efficiency in this sector. Using known measures, Hong Kong could save up to 25% of its energy consumption by 2020 by improving the energy efficiency of all its buildings.

[35] Chapter 3.10, Table 2, http://www.aid-ee.org/documents/018TopRunner-Japan.PDF

[36] http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf

Key measures	Further explanation
1. Set ambitious and mandatory and constantly upgrade standards for Building Energy Efficiency Bill.	The Hong Kong government has introduced the "Buildings Energy Efficiency Bill" [37] into the Legislative Council on December 2009, which is now under discussion in the Legislative Council. While the bill is a good first step to specify the minimum energy efficiency standards for buildings in Hong Kong by mandating compliance with the Building Energy Codes, there should be a mandatory "review mechanism" in a regular three-year basis, so as to allow the government authority to tighten the relevant energy efficient standards with the most updated technology in that period of time.
2. The granting of Gross Floor Area (GFA) concession to real estate developers should be hooked up with the actual green performance of the buildings.	Since 2001, to encourage the incorporation of green features in building developments, Hong Kong government decided to exclude / disregard those facilities in GFA and defined at Joint Practice Notes on "protection and improvement of the built and natural environment"[38]. However, the government fails to have any monitoring system and procedures to make sure that those "green features" have brought improvement to the neighbourhood environment. Therefore, one critical step that Hong Kong government needs to consider to impose to developers which would like to apply for GFA concession is that those building projects should conduct "mirco-climatic analysis" at the initial development phase, so as to project the impacts

[37] http://www.emsd.gov.hk/emsd/eng/pee/mibec.shtml

[38] http://www.bd.gov.hk/english/documents/joint/JPN01.pdf; http://www.bd.gov.hk/english/documents/joint /JPN02.pdf

	of the buildings to the neighbourhood environment and then take substantial measures to mitigate those impacts. Hong Kong Housing Authority is a good example of conducting this study for its development project[39]. Also, to strengthen the quality of "check and balance", Hong Kong government should demand those developers with granted GFA on "green features" to disclose the buildings' annual carbon audit report and energy consumption report, so as to allow concerned flat owners and public to monitor key energy and emission records of the buildings.
3. Establish a buyer-friendly ***rating scheme*** to make public each building's energy.	There are new regulations in the UK that aim to improve the energy efficiency of new and refurbished buildings[40]. They hope to make newly built houses 25% more energy efficient by 2020 which would save around 2 million tonnes of carbon dioxide emissions every year between 2010 and 2020[41]. It is part of an initiative by the UK government to make all new houses zero-emission by 2016 and other new buildings zero emission by 2019.
4. Replace the voluntary carbon auditing scheme[42]	Carbon audits are the first step to reducing carbon dioxide emissions. Information from a

[39] http://www.housingauthority.gov.hk/en/aboutus/news/pressreleases/0,,2-0-16185--0,00.html

[40] Greenpeace position paper to Legislative Council Bills Committee on the "Building Energy Efficiency Bill" For further information on the UK example, please refer to appendix 2 of Greenpeace position paper: http://www.legco.gov.hk/yr09-10/chinese/bc/bc02/papers/bc020209cb1-1064-3-c.pdf.

[41] http://www.energyefficiencynews.com/i/2893/

[42] For further information on the voluntary carbon audit scheme: http://www.epd.gov.hk/epd/tc_chi/climate_change/ca_intro.html

with a ***mandatory carbon audit legislation***, in which all buildings' owners are obliged to work on a robust carbon audit process and publicly disclose the results.	carbon audit gives essential information on how energy efficiency can be improved. It also helps the government set concrete benchmarks and emissions caps for top emissions sources. For example, the government could create a per-square metre area energy consumption benchmark for residential buildings.
5. Establish a set of ***minimum requirements for "green buildings" features*** for all new construction.	Singapore's Building and Construction Authority (BCA) began a "BCA Green Mark Scheme" in January 2005 which set four Green Mark ratings based on the environmental performance of specific buildings. The four ratings are: Green Mark Certified, Gold, Gold Plus or Platinum Award. Buildings achieved level of Green Mark Platinum can achieve 30% of energy saving compared to a normal building. [43] With these ratings, the Singapore government can encourage the real estate market to improve its environmental standards. For example in 2008, the government passed the Building Control Act which required all new buildings with a gross floor area of 2,000 sq. m to meet Green Mark Certification. The 2nd Green Building Masterplan was also launched in 2009 which aimed to ensure that 80% of public and private buildings in Singapore will attain a BCA Green Mark Certification by 2030. [44]

Measure 3: To boost renewable energy from both Guangdong and local sources to achieve 10% in total energy mix from 2007 to 2020

[43] http://www.bca.gov.sg/GreenMark/others/gbmp2.pdf

[44] Same as the above.

A long-term visionary energy development plan which involves strong cooperation with wind energy rich Guangdong can help to cut 3998 kilotonnes of GHG in 2020, which contribute to 13.5% reduction of carbon emission from 2007 to 2020.

Key measures	**Further information**
1. Establish a ***long-term energy policy***, in which renewable energy plays a bigger role in the energy mix. The policy should have clear targets and include supportive measures[45].	Hong Kong should match the mainland's 'Mid- to Long-Term Development Plan for Renewable Energy'[46] (October 2007). The plan requires ***renewable energy to make up 15% of total energy generated by 2020***. The 2002 EMSD study, mentioned earlier in Part A of this briefing paper, showed that Hong Kong has the capacity to make renewable energy a key part of its energy mix. Greenpeace urges the Hong Kong government to start with setting a 10% renewable energy target by 2020.
2. ***Cooperate closely with Guangdong*** on developing renewable energy projects.	In the 'Guangdong-Hong Kong Collaboration Framework Agreement' signed in early April[47], a green "Pearl River Delta" concept was introduced and thus provide more rooms for Hong Kong to invest or collaborate with Guangdong to build infrastructure of renewable energy in the region. We suggest that a dedicated authority should be formed between both governments to investigate the best way to deliver renewable energy in the

[45] International Energy Agency has published a very comprehensive report on various policy measures to intensify and activate the development of renewable energies market. Please refer to ***figure 4.2*** in the report for the summary table: *"Renewable energy: Market and policy trends in IEA countries"*: http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=1263

[46] The whole document on the "Mid-Long term Development Plan for Renewable Energy" can be downloaded at: http://cn.chinagate.cn/economics/2007-09/10/content_8851366.htm

[47] For more details on the GD-HK agreement: http://news.gov.hk/tc/category/administration/100407/html/100407tc01002.htm

	PRD region and to Hong Kong.
3. Provide ***tax rebates or other financial incentives*** to urban decentralised renewable energy projects.	Other parts of the world have successfully used decentralised renewable energy generators such as roof-top solar panels, individual wind turbines in a community or district level, combined solar- and wind-powered street lighting, and so on. The Hong Kong government can first deploy such decentralised energy generators to ***schools and public areas***. This will not only increase the public awareness of energy saving, but also the increase in demand will also lower the market costs of these facilities in a long run.
4. Reform the ***electricity regulatory and pricing mechanism*** to make renewable energy and energy efficiency measures more attractive to both producers and consumers.	The electricity-pricing mechanism is a crucial tool to boost the uptake of renewable energy. If the "true cost" of fossil fuels and nuclear energy is reflected in the accounting of the "price" of different source of electricity, such as cost to environment and safety / risk management, it would increase the cost competiveness of renewable energy such as wind energy, which will also encourage the power companies and consumers to be more supportive to renewable energy. Furthermore, from the end user point of view, the electricity pricing mechanism should be redesigned with the aim to motivate consumers to save energy, such as using a progressive scale in which the per unit price for lower electricity users will be lower than that of the higher electricity users. It could work in a similar way to the current water pricing. On the other hand, the government should begin to discuss how to liberalize the electricity market as soon as possible. This should include measures to encourage the use of renewable energy, which

	includes major elements on boosting the uptake of energy efficiency and renewable energy measures. Together with substantial social discussion and public engagement on the topic, the government should make sure that the liberalization plan is ready by the end of this term of Scheme of Control Agreement (signed between Hong Kong government and the two local power companies) in 2018.

To sum up, we propose:

- A 25% improvement in energy efficiency of consumer products from 2007 to 2020.
- A 25% improvement in the energy efficiency of all buildings from 2007 to 2020.
- By 2020 to have local electricity generation of 133858 TJ (assuming a 25% improvement in energy efficiency) composed of 55% natural gas, 30% nuclear energy (remaining at the 2007 level), 10% renewable energy and 5% coal.

Greenpeace estimates that the above measures will help Hong Kong's energy sector cut their carbon emissions to 11,165 kilo-tonnes without the need to increase its uptake of nuclear power.

Transport Sector: Cut GHG emissions by 33% (from 2007 to 2020)

From 7,380 KT GHG emissions (2007) to 4,898 KT (2020)

After the energy sector, transport is the second biggest source of GHG in Hong Kong. Globally, the car industry is moving towards more fuel-efficient models, driven by consumer demand in the European Union and the U.S. At present, 14 European countries levy taxes that are wholly or partially based on the carbon emission performance of a vehicle. Those cars that emit over 160g/km need to pay a penalty tax while there are incentives for buyers of cars that emit under 120g/km or grants for companies that are developing them[48].

Measure 1: Improve fuel efficiency for all vehicles by 25% from 2007 to 2020

Key measures	Further information
1. Set clear ***carbon emission standard*** for different types of cars , and impose mandatory labelling of carbon emissions.	In January 2010, the U.S. has started a $375 million funding, which aims to reduce carbon dioxide emissions from heavy duty trucks and passenger vehicles by 20% by 2030.[49] This plan is expected to create over 6,000 jobs mainly in car manufacturing and assembly. The European Union passed new legislation in 2009 which limits carbon emissions from all new light-duty and passenger vehicles registered in the region[50] to at most 130 g per km. It requires manufacturers to gradually phase in the fuel-efficient cars from 2012 to 2015, with penalties for those who do not comply. By 2020, all new cars should have a carbon dioxide emissions rating of at

[48] http://www.acea.be/images/uploads/files/20080302_CO%202%20tax%20overview.pdf

[49] http://www.energy.gov/news2009/8506.htm

[50] http://ec.europa.eu/environment/co2/co2_home.htm

	most 95 g per km. There is no reason why Hong Kong, which imports all its vehicles, cannot apply the same strict limits.

Measure 2: Offer Tax Rebates for Environmentally-Friendly Vehicles

Key measures	**Further information**
1. Offer a ***tax rebate*** for environmentally-friendly vehicles.	The vehicle first registration tax is based on a vehicle's taxable value, while the vehicle license fee is based on cylinder capacity. We suggest the government offer a tax rebate on these two charges for vehicles that have lower carbon emissions. In this way, it can drive sales towards greener cars.

Measure 3: Exclude car-parking area when calculating gross floor area concessions

Key measures	**Descriptions**
1. Remove GFA concessions on car parking areas.	Car-parking spaces are currently included in GFA calculation. In order to discourage private-car ownership, we should remove GFA concessions for car-parks, so that the cost of car ownership will be higher.

Waste Treatment: Cut GHG emissions by 30% (from 2007 to 2020)

From 2,180 KT GHG emissions (2007) to 1,526 KT (2020)

Methane gas emissions from waste treatment (mainly methane gas) makes up a substantial part of Hong Kong's greenhouse gas emissions. Greenpeace proposes that the Hong Kong government cut methane emissions by reusing gases from landfill sites by 30% from 2007 to 2020.

1. Hong Kong currently re-uses less than 50% of landfill gases. By creating the demand for this unused landfill gases, we can increase the potential of using landfill gases as one of our main energy sources for power and towngas generation, and start investigating the possibility of using landfill gases in motor vehicles by converting it to compressed natural gas (CNG) or fuel cell. Surplus landfill gas from the North East New Territories Landfill is recycled and sent to the Hong Kong & China Gas Tai Po production plant for use as an alternative energy source.

2. Hong Kong & China Gas can increase their utilization landfill gas as an alternative energy source to create demand for the unuse landfull gases[51].

3. Landfill gas conversion into CNG should be investigated[52].

4. Both power companies in Hong Kong, CLP and HEC, should use landfill gas for power generation.

5. Research shows that molten carbonate fuel cells, which can power vehicles, can be fuelled by landfill gas. This makes landfill gas much more commercially viable for new technology innovators and businesses. Fuel cells typically run on hydrogen, which can be derived from landfill gas. Hydrogen utilised in fuel cells has zero

[51] http://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/msw_lgu.html

[52] The largest landfill-to-LNG plant in the world is the landfill gas from the Altamont landfill in California, which produces 49.210 litres a day of LNG. Almost 500 Waste Management Incorporate garbage and recycling trucks run on this new source of environmental friendly fuel instead of dirty diesel. The Altamont site has had a methane-fuelled electric power plant since 1989 that can power 8,000 homes a day. (http://www.examiner.com/green-transportation-in-national/waste-management-inc-plans-to-produce-its-own-lng-fuel)

emissions, high efficiency and low maintenance costs. In February 2010, a Finnish company developed the first ever landfill gas-run solid oxide fuel cell unit[53].

6. The ultimate solution for reducing methane gas from landfill is to reduce the size of landfills. The Hong Kong government should put efforts and resources to do the separation of waste and support the recycling industry in Hong Kong. Suggestions like food waste collection and treatment and bottle recycling chain should be actively considered by the government as soon as possible.

Conclusion

China has made efforts to reduce the rate its greenhouse gas emissions will rise in the next decade by committing to a carbon intensity reduction target of 40% to 45% by 2020, based on 2005 levels. As part of China, and one of the world's most developed economies, Hong Kong has the means and should bear the responsibility to shoulder much stricter greenhouse gas emissions cuts than China.

In this briefing, Greenpeace has mapped out possible measures in the energy, transport, and waste management sectors which would help the region cut its emissions by the IPCC recommended 40% by 2020 from 1990 levels for developed nations. We aim to show legislators that there are many answers to reducing Hong Kong's carbon footprint and that expanding nuclear energy is dangerous and clearly not a sensible route.

Greenpeace urges the Hong Kong government to immediately make public 'A Study of Climate Change in Hong Kong – Feasibility Study' (agreement no. CE 45/2007 (EP)). We also urge the government to initiate full public debate before expanding the region's nuclear power and to start a genuine discussion with stakeholders on how to achieve aggressive reduction targets by using clean energy and technology.

The coming decade is critical for stopping the advance of climate change. Hong Kong needs to become a genuine low-carbon economy. We believe Hong Kong can do it; we just need the government to take strong, responsible and committed action.

[53] http://www.renewableenergyfocus.com/view/7517/wrtsil-solid-oxide-fuel-cell-running-on-landfill-gas-passes-first-phase-field-trial/