香港工程師學會
THE HONG KONG INSTITUTION OF ENGINEERS

Enclosure

Legislative Council Panel on Environmental Affairs
Views from the Hong Kong Institution of Engineers on
Hong Kong's Climate Change Strategy and Action Agenda

General

The Hong Kong Institution of Engineers (HKIE) supports the Government's initiative to formulate policies to reduce Greenhouse Gas (GHG) emissions to combat climate change. The Consultation Document (Document) puts forward a number of targets and action plans, and if adopted, for formulation of future policies and strategies. The HKIE is pleased to see the needed leadership taken by the Environment Bureau calling for the community actions to develop a low carbon economy allowing growth and prosperity in a sustainable manner. However, the HKIE also notices that the Document falls short of including relevant and important economic and background figures to trigger a more meaningful debate meeting the goal and expectation of this consultation exercise.

2. The imminent threat of climate change has been reflected by the escalation of extreme weather in recent years of abnormal severity and off-season occurrences comparing with the historical records. Examples include heat waves of abnormally high temperatures of extended periods, cold fronts with sharp fall in temperature in rapid pace, extremely destructive storms like super-typhoons shifting across otherwise placid territories and the presence of ever intruding wind shears. Although Hong Kong is lucky from the suffering of much adversity as compared with other places in the world; we, being a part of the international community, need to contribute to look for a solution.

3. The present state of limiting choices in energy resources is a major constraint in combating climate change. In the coming decades, the need to produce energy by using fossil fuel with emissions of GHG is still inevitable. But we can develop various methods to capture the emission of those GHG. Taking note that these processes and methods may also using up a lot of energy it is essential that when considering the solution for climate change, we need to verify and justify the energy production and utilisation in a holistic manner.

4. With global limited energy resources, the challenges are real: to develop more renewable energy, to maximise the existing energy production efficiency, and at the same time, to minimise GHG emission from the fossil fuel consumption and to maximise efficiency in the demand side. In the energy production process, especially for the electricity generation, transmission, and distribution, it is essential that we need to develop better methods and approaches in order to reduce emissions, and to increase efficiency by better design, operation, maintenance and repair. In the energy utilisation, we need to encourage efficient use and preservation of energy, so that energy would not be over consumed in an unnecessary and wasteful manner. In daily usage, appliances and fixtures of best energy efficiency should be used as far as possible. Any residual energy shall best be captured and re-utilised as far as practicable. Of course, a life style with efficient and wiser use of energy should be encouraged leading to a more sensible consumption.

5. Based on the above considerations, the HKIE would like to further provide the following suggestions for consideration of the Administration.

Strong Leadership

6. To combat climate change, the Government should take a strong leadership with concerted efforts across the Administration. We note that an Inter-departmental Working Group on Climate Change led by the Environment Bureau was established in 2007. However, it is observed that the over all coordination in climate change policy is still not strenuous enough to cohere and discharge individual initiatives among different departments. For instance, the Water Supplies Department is working on water conservation; Electrical and Mechanical Services Department is working on energy efficiency but directed by Environment Bureau; Environment Bureau is working on air pollution, charging station and use of electric vehicles (EV); Architectural Services Department and Housing Authority are working on green building; Drainage Department is working on water recycling; Highways Department is working on public transportation; the Treasury is working on Research & Development for renewable energy, etc. It is hoped that through the consultation based on this Document, the Government can instigate a mechanism with across-the-board authority like an independent commission to lead and to integrate these initiatives with one master plan for execution.

Control of GHG Emission

7. The HKIE supports the direction to reduce the carbon intensity of Hong Kong by 50-60% by 2020 as compared with the 2005 level. The HKIE also opines the decision to establish a target is vital for the planning and implementation of a low carbon economy. Our professional engineers are ready to contribute to the solutions in actions.

8. With the present technology, energy production using fossil fuel with emissions of GHG is still aplenty. For new installations, equipment and technologies of lower GHG emission order and higher economic efficiency must be employed. In the interim, there is a need to make enhancement on the existing installations to reduce GHG emission with the best available emission reduction technology under a strict regime of control. Inefficient generating plants are to be retired from services in a timely and orderly manner taking into consideration the premature disposal itself is not an environmental friendly gesture as well as the need to preserve the reliability and security of the existing energy production.

9. The end users also bear a duty to reduce carbon intensity not only with sensible consumption but also accepting the more efficient source of production. Consumers can contribute in accepting the higher costs of energy produced by cleaner fuels and renewable energy. Government should persuade the general public in endorsing this approach in order to furnish further detailed planning. The time allowed for achieving the target reduction between now and 2020 is very demanding given the long lead time required for planning, consultation and execution.

Fuel Mix and Nuclear Generation

10. The Document proposes to revamp the fuel mix for power generation whereby the nuclear energy will increase from 23% to 50% by 2020 whilst reducing the coal power

plant from 54% to 10% or less by 2020. This energy policy can be quite controversial. The HKIE notes two counter arguments on this. One is the safety issue and whether after all nuclear energy is indeed 'clean'. The other is with the proposal to increase the nuclear portion to 50 percent of the mix, the Government does not have to do anything more to achieve the reduction target. In our views, nuclear power generation is safe (See Annex I), produces virtually no emission, and has a low environmental footprint (See Annex II). It is also at a competitive cost and can be deployed in a large scale to meet with the electricity consumption in Hong Kong. In particular with the emphasis of turning to electricity for more transportation modes, like EV and Hybrids in additional to several new rail projects, nuclear is a ready and swift option for a wholesale and base supply of electricity needed leaving us with reserves on other initiatives.

11. That said the HKIE notes details on how and what to make this target realistic are not given in the Document. The HKIE is therefore suspicious whether such proposal had been subject to a thorough assessment taking accounts of that the phasing out of existing coal power plants is to be carried out without premature and wasteful decommissioning of them. Or whether it was proposed just for the sake of achieving an end result of the emission target, regardless. Obviously, if additional nuclear generated electricity is to be transmitted to Hong Kong, the transmission line upgrade and right-of-way must be considered.

12. The Mainland is embarking on an active nuclear power programme in which a number of nuclear power generating units would be commissioned over the coming years. With a sizeable proportion of these nuclear units located in Guangdong, apparently the best option to meet the proposed fuel mix is for Hong Kong to tap into these units.

13. If this assumption of the HKIE were correct, associated work in Hong Kong is still enormous. A lead time of some eight years would be required. The Government should take note of the time constraint in achieving this target in collaboration with the Mainland.

14. In addressing the concern of the community, details on the location, design, safety standards and operation modes of the proposed nuclear plants must be timely and duly published. The HKIE believes that the experience learnt from the Daya Bay venture would be a good example to follow and replicate. Engineers, utilities, and other relevant parties should be invited to participate in the planning and implementation.

15. The Scheme of Control Agreements with the two power utilities will expire in 2018. If the proposed fuel mix for 2020 is adopted, the Government is required to review the new electricity market before 2018, considering that it is necessary to provide an energy policy with business stability for the two power utilities to provide high quality services.

Energy Consumption Reduction

16. The HKIE notes inroads were made to introduce the Mandatory Building Energy Code and Mandatory Energy Efficiency Labelling Scheme for electrical appliance. But this is not enough. The existing approach on energy efficiency should be strengthened and enhanced. Public awareness and user culture must be addressed with more promotion.

17. Imposing tax on the electricity tariff can change the lifestyle on energy usage. In the Mainland, different electricity tariff rates are charged in different time periods to minimise the peak demand of the power plants. Thermal storage system is one of the effective means to shape down the peak demand for a more efficient running of generation plants in achieving a lower carbon emission. Thermal storage systems have now gained its popularity in a number of cities in the Mainland. The HKIE considers it may be appropriate to review and establish energy demand-based tariff policy to enable energy consumption conservation in Hong Kong. The Administration should devise reward schemes to encourage energy saving. Of course, other incentives for the general public to reduce the energy consumption should also be explored.

Waste to Energy

18. It is appreciated that the Government plans to develop integrated waste management facility (IWMF) in phases by adopting advance incineration facility with energy recovery as the core waste treatment technology. However, the Document falls short to delineate the details of the role and associated arrangements in relation to the ultimate entity responsible for the cost including capital expenditure and running cost. The general public needs this information to carry out a meaningful debate and make an informed decision.

19. Further to the above and in the longer term, the HKIE believes that there are scopes to increase the contribution provided by the waste-to-energy as a source of electricity supply, a much-needed arrangement helping to ease off the pressure on landfill sites. Reference on the target could be made to other comparable developed metropolitans like cities in Japan and Germany.

Green Transportation

20. It is encouraging to note that the Document suggests the wider use of alternative fuels for motor vehicles. To tally with the implementation programme of the increasing use of electric vehicles, the Government needs to formulate policy and strategy of setting up a complete infrastructure skeleton including the handling and recycling of the used battery cells. Currently, there are no such facilities in place in Hong Kong. The suggestion to grant concession via GFA to new buildings with equipment of charging facilities installed in the car parks is not just and fair to existing buildings owners and fails to address the promotion of EV for private uses in a holistic manner. The HKIE regrets previously the Administration procured EV for trial from overseas manufacturer instead of from a local venture as that could provide not only the needed funding but a much needed encouragement to local industries. The HKIE strongly recommends more incentives should be introduced for the usage of EV, as well as supporting the research and development of EV.

21. Further to the above, the HKIE recommends the Government to encourage the use of more environmental friendly engine for all other types of motor vehicles, including buses and lorries, to tally with standards adopted by overseas countries. The use of environmental friendly engines will greatly improve the roadside air quality of which it is a major concern to the people of Hong Kong. In addition, the GHG reduction policy should cover aviation and marines sectors as well.

Regional Cooperation

22. The HKIE fully supports expanding cooperation with the PRD. We need to work with the PRD on a range of issues including low carbon urban planning, regional monitoring and sharing, research and innovation cooperation, rail transportation, energy security, low carbon supply chain etc.

Promotion and Communication

23. In the Document, there is little or no proposal for individuals living a low carbon life. Although the amount of GHG reduction by each individual may be insignificant in comparison to major sources; however, community efforts count and again it is also important to send a clear message to people that everyone can contribute to combat climate change. Our professional engineers are in a good position in helping to develop solutions in the mitigation and adaptation to the call of climate change.

24. Sufficient facilities and infrastructure should be provided for the general public to promote a greener life style, for instance, bicycle paths and storage as a viable choice of transportation means. Collectively, the effort from the community is significant.

25. In short, promotion and education to the public on living a lifestyle in an environmental friendly manner is essential for low carbon economy development.

Framework of Adaptation

26. The Document presents several possible areas of major impacts due to climate change with corresponding adaptation options. Hong Kong is vulnerable because it relies on importation of our daily needs of food, energy sources and materials. Appropriate contingency plan must be prepared and put in place.

27. In the 'built environment and infrastructure' area, asset damage due to geo-hazards (e.g. landslides) will likely bring along human casualties. The Government should consider taking scenario-based assessments of possible major impacts and collateral damage involved on the built environment and infrastructure so as to highlight the potential shift in risk profile to living stocks and properties. This could better help identifying the need for further studies and risk mitigation actions holistically for the different impact areas.

28. On the other accumulating concern, the HKIE foresees that clean water resources could become the next crisis. It is important for the Government to consider and prepare Hong Kong to face these pressing risks, and formulate corresponding solutions and action plans.

29. The HKIE supports the Framework of Adaptation options. In addition, the HKIE recommends reviewing climate change related insurance, contractual conditions for conducting business, and identifying and quantifying responsibilities for GHG reduction for various stakeholders.

Conclusion

30. It is recognised that the threat of climate change and diminishing energy resources would have a significant impact to our world. Climate change is an important environmental issue that is affecting the global sustainability. We all have a role to play in fostering a more sustainable world. In the coming decades, energy production using fossil fuel with emissions of GHG is still unavoidable. In the world of limited energy resources, we are facing challenges of developing more renewable energy, maximising energy production efficiency, minimising fossil fuel emissions, and maximising efficiency in our energy usage. Hence, we must view the issue holistically from a total life cycle approach and we need to change our life style where possible. In conclusion, the HKIE supports the strategy and action agenda as set in the Document and the HKIE is ready to work with the Government to implement these measures and targets. The HKIE also hopes this is not a mere consulting exercise with findings received be shelved but could be put forward for implementation. The HKIE also strongly recommends setting up an independent commission with representations from professionals and the public to assist the Bureau in steering various initiatives across departments into one overall action plan.

Annex I

Nuclear Safety

A nuclear power station is designed, built and operated to the highest standards. It is designed with multiple safety barriers to contain the effect of an incident within the plant as well as designed with duplicate safety systems, often based on different engineering principles, so as to provide a high level of safety for the plant, the public and the environment.

2. To operate a nuclear power station, an organization needs to be qualified for its operation and maintenance. Activities at the plant, such as plant status monitoring, regular plant checks, staff training, emergency preparedness and event reporting, are conducted under the guidelines put forward by the International Atomic Energy Agency (IAEA) of the United Nations.

3. The design, construction, operation and its eventual decommissioning is under the strict oversight of the national regulator, which in the case of China is the National Nuclear Safety Administration, and operates under a regime in line with guidelines promulgated by the IAEA. The IAEA and the World Association of Nuclear Operators regularly conduct experience sharing exchanges and reviews to disseminate good practices in the nuclear industry to maintain improvement and good performance.

4. Overall, the above measures make using nuclear power a very low risk activity, which can be shown by placing it against various activities in our daily life, expressed through the amount of life shortened by these activities, or Lost of Life Expectancy (LLE)[1]:

Activity or Risk	**LLE (days)**
Heart diseases	2100
Cancer	980
All accidents	400
Car accidents	180
Air pollution	80
Radon in homes	35
All US electricity nuclear (Union of concerned scientists)	1.5
Airline crashes	1
Living near nuclear power station	0.4
All US electricity nuclear (NRC)	0.04

Lost of Life Expectancy (LLE) averaged over total US population

[1] *Cohen Bernard, The nuclear energy option, Plenum Press, 1990*

Annex II

Nuclear Waste

As with most industrial processes, nuclear power produces waste and in this case, solid nuclear waste and the useless products which form a few percent of the spent (used) nuclear fuel. A 1000 MW nuclear power station typically produces in a year some 75-300 cubic metres of solid nuclear waste and about 1 tonne of highly radioactive waste contained within some 25 tonnes of used nuclear fuel[2]. The waste is about the same size as a coffee mug should a person use exclusively nuclear electricity in one's lifetime. This small waste quantity is not dispersed in the biosphere but is intended to be stringently kept away from the environment with multiple layers of barriers for a very long period to allow its radioactivity to fall to original ore level in a few thousand years. The long storage period is not particularly onerous as many ancient artifacts and man-made structures have lasted quite well in the last few millennia and having an engineering solution is not an issue.

[2] *Radioactive Waste Management, World Nuclear Association, 2009 and Daya Bay Performance, Hong Kong Nuclear Investment Company website, www.hknuclear.com*