For information
on 29 April 2011

Legislative Council
Panel on Environmental Affairs

The Impacts of the Development of Nuclear Energy for Local Power Generation on Hong Kong

Introduction

This paper sets out the Administration's considerations in determining the future fuel mix for power generation and briefs Members on a recent visit to the relevant mainland organisations to exchange views on energy safety and development.

Core Considerations of Future Fuel Mix

2. There are four guiding principles underlying our energy policy, namely safety, reliability, environmental protection and affordability. The top priority is safety. Safety of power generation cannot be compromised regardless of fuel sources. Hong Kong as an international financial centre and a densely populated city will not tolerate any instability in electricity supply. The future fuel mix also has to address increasing concerns over environmental protection, including the reduction of air pollution and carbon emissions. We will need to carefully consider the issue of affordability (i.e. the level of electricity tariff). We strive to avoid high-cost fuel in order not to pass relevant cost to the public and the commercial sector, which may exert pressure on their spending or undermine the competitiveness of Hong Kong.

3. In 2009, coal accounted for about 54% of the fuel mix for power generation in Hong Kong, followed by natural gas and imported nuclear power, each accounting for about 23%. Among the various fuel sources, coal assumes the highest carbon emission factor, and is a primary source of air pollution. As regards greenhouse gas emissions, power generation accounted for about 67% of the total emissions in Hong Kong. The majority of local coal-fired power plants have come into operation since the 1980s, and will start to retire in phases in the run-up to 2020. The rest will also be completely retired by early 2030s. Starting from 1997, power companies in Hong Kong had not been allowed, for environment reasons, to build new coal-fired power plants. We must explore means to suppress the share of coal in our fuel mix.

Alternative sources of cleaner, low carbon fuels will have to be identified in time to replace coal to meet the local demand for electricity supply.

4. Natural gas is relatively clean among different fossil fuels but its price is relatively unstable and on the rise. Its adoption would have a bigger impact on electricity tariff. We should also avoid over-reliance on a single fuel source. In term of supply reliability, because of geographical and natural resource constraints, the technical and practical feasibility of large-scale development of renewable energy needs to be further explored. In 2002, the Electrical and Mechanical Services Department engaged a consultant to study the feasibility of developing renewable energy in Hong Kong. Putting aside considerations on technical and financial feasibility, the initial assessment at that time was that by 2022, the total amount of renewable energy to be developed in Hong Kong could only generate about 700 to 1 500 million kWh of electricity, which accounts for about 1.5% to 3% of the total electricity demand at present. Apart from technical factors, the development of renewable energy also needs to take account of other requirements, including environmental impact assessment, cost effectiveness, views of residents, etc. The extent of developing renewable energy in Hong Kong is uncertain. This notwithstanding, we will not preclude or stop exploring the potential of renewable energy under our energy policy.

5. There are suggestions that Hong Kong can import renewable energy from the Mainland. On present showing, the supply of renewable energy from the neighbouring Guangdong Province to Hong Kong is rather limited. We understand that the development of hydropower in Guangdong is near saturation. The supply of wind power may increase, yet its share in the power supply will not be significant. As the supply of hydropower and wind power is highly dependent upon local circumstances which involves many uncertainties, the supply to Hong Kong is constrained.

6. As regards the issue of affordability, at present the unit price of nuclear power supplied to Hong Kong is around 50 cents per kWh. The generation cost of coal-fired electricity by local power companies is around 40 to 60 cents and that of gas-fired electricity is 70 to 90 cents. The cost of renewable energy is a few times higher than those of main stream fuel sources.

7. Compared with natural gas, nuclear power is generally less expensive and more reliable. Moreover, nuclear power emits no greenhouse gases during the electricity generation process. The increase in the import of nuclear energy would help achieve a more balanced fuel mix, which helps avoid over-reliance on natural gas as the largest single source of fuel supply. If we were to shelve the proposal to import more nuclear power in 2020, according to the consultant's assessment we might not be able to meet the original target of

substantially reducing greenhouse gas emissions in 2020 only by relying on the use of more natural gas.

8. Based on the above considerations, we issued last year the consultation document on "Hong Kong's Climate Change Strategy and Action Agenda" and propose to reduce the use of coal to account for no more than 10% of the fuel mix in 2020. We also propose to increase the share of natural gas in the fuel mix to around 40% and substantially increase the share of non-fossil, low carbon fuel, such that renewable energy would make up about 3% to 4% of the fuel mix. The balance of about 50% would be met by imported nuclear power. This fuel mix was proposed with the objective to reduce carbon emissions and lower our carbon footprint. It also takes into account other considerations such as supply reliability and affordability.

Energy efficiency and carbon reduction

9. There are views that the carbon reduction targets could be achieved by promoting energy efficiency instead of increasing the import of nuclear electricity. In the past few years, the Government has raised public awareness and promoted energy efficiency and carbon reduction through a range of measures, resulting in a slower growth in electricity consumption. For instance, between 2005 and 2009, our electricity consumption has only increased by 3.6% despite the 2.8% growth in population and 13% growth in Gross Domestic Product. We will continue to promote energy efficiency, and have, in this regard, proposed future directions and measures in the climate change consultation document, which include expanding the scope and tightening the requirements of the Building Energy Codes, expanding the use of district cooling or water-cooled air conditioning, reducing energy demand in new buildings, improving energy efficiency in commercial buildings as well as expanding the scope and tightening the energy efficient electrical appliance standards for domestic use, etc. Despite our continuous efforts in promoting energy efficiency, as population, economic activities, the number of tourists and public services are expected to be on a rising trend in future, it would indeed be a very big challenge for the community as a whole to achieve substantial reduction in total electricity consumption and hence carbon emissions in the coming 10 years alongside economic growth. We also have to address another practical and important issue, and that is, the need to identify as soon as possible cleaner and low carbon alternative fuel sources for power generation to replace coal-fired power plants due for retirement gradually before 2020, so as to satisfy the original electricity demand.

Exchange with the Mainland

10. The Government led a delegation to exchange views with the National Nuclear Safety Administration (NNSA) of the Ministry of Environmental Protection from 19 to 21 April 2011. The visit aimed to enhance the understanding of energy safety and development in the Mainland. We also took this opportunity to learn more about the safety measures adopted by the Mainland in response to the nuclear incident that took place in Fukushima, Japan in March 2011.

11. The delegation comprised representatives from a number of government departments (including Environment Bureau, Security Bureau, Department of Health, Electrical and Mechanical Services Department and Hong Kong Observatory), nuclear experts and academics from Hong Kong, as well as members of the Energy Advisory Committee and the energy industry.

12. During the visit, NNSA explained in detail their function, as well as the legislative framework, departmental regulations, safety requirements and guidelines, etc. under the regulatory regime on nuclear safety in our country. As advised by NNSA, since the development of nuclear facilities in 1980s, the Mainland has fully adopted international standards to frame its safety regulations and reflect these standards in various legislation, safety requirements and guidelines. The entire set of nuclear safety measures are based on commonly adopted international standards.

13. NNSA also introduced their work to step up the monitoring of environmental radiation levels after the Fukushima Nuclear Incident. They explained the four-point decision announced by the State Council, including the immediate organisation of a comprehensive safety inspection of existing nuclear facilities and the commission of a comprehensive review of nuclear power plants under construction. The approval of new nuclear projects would also be temporarily suspended, pending comprehensive safety inspection and completion of nuclear safety planning. The relevant work has already commenced and we will keep in view any future development.

14. Moreover, NNSA made a brief introduction to such issues as disclosure of nuclear safety information, international cooperation, support and monitoring, as well as the Mainland's participation in international cooperation efforts to enhance nuclear safety.

15. The delegation also visited the Institute of Nuclear and New Energy Technology of Tsinghua University to better understand the latest development of relevant technologies and exchange views with experts from the Institute.

16. The visit has enhanced our understanding of the nuclear safety

regime in the Mainland. It has also provided a platform for communication between the relevant government departments and nuclear experts on both sides. The exchange and discussion facilitates our consideration on the ways to disseminate information on energy development and nuclear safety through public education and information sharing to enhance the understanding of members of the public.

Conclusion

17. We acknowledge the impact of the recent Fukushima Incident in Japan on the discussion on the local fuel mix. Many countries which are developing or using nuclear power have already started reviewing the use of nuclear power. Hong Kong is no exception. The Fukushima Incident may also have a bearing on the carbon reduction targets for combating climate change in various countries. As a user of nuclear power, we will closely monitor relevant developments, and fully deliberate our plan in using nuclear power in future from an objective, scientific and rational perspective. We should not jump to any conclusion easily on the future fuel mix, or give up nuclear power in the fuel mix altogether.

18. As long-term planning on energy supply affects the livelihood of the public and different sectors, we need to act cautiously. On the use of clean energy in future, we are consolidating views received during the public consultation on climate change to chart the way forward, including how to revamp our future fuel mix. In the process, we will take into account the impact of the Fukushima Incident on the development of the nuclear industry. We expect the future fuel mix to support the sustainable development of Hong Kong and to strike a reasonable balance of all relevant considerations, including safety, reliability, environmental protection and affordability. This is of paramount importance to Hong Kong in maintaining economic prosperity, to member of the public in enjoying higher living standard in a modern city, and to Hong Kong, as a member of the international community, in discharging its responsibility to reduce carbon emissions and combat air pollution, as well as to ensure safe use of energy.

Information Noted

19. Members are invited to take note of this information paper.

Environment Bureau
April 2011