

The 21st Annual Power Symposium 2023
Sustainable Energy and Technology Development for Smart Liveable City
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Keynote Speech

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Introduction and Opening

1. Good morning, Miss Diane WONG (Under Secretary for Environment & Ecology), Ir Alfred LEE (Chairman of Power and Energy Section of IET HK), Ir Kan IP (Symposium Chairman), Mr Paul TOMLINSON (Chief Operating Officer, CLP Power), honourable speakers, distinguished guests, ladies and gentlemen.

2. It is my great honour to join this symposium today. I am very delighted to share my views with you on the challenges and opportunities relating to “Sustainable Energy and Technology Development for Smart Liveable City”, the theme of today’s symposium.

3. To start with, may I invite you to envision how a smart liveable Hong Kong would look like. To stimulate your imagination, we have visualised this future with the aid of Artificial Intelligence (AI).

4. This AI-generated image showcases the harmonious adoption of sustainable energy, intelligent infrastructure and technologies that enhance the quality of our life. It may appear futuristic and seemingly unattainable, but transformation is always born of bold ideas. By pushing the boundaries of our imagination, we can pave the way for transformative changes.

On-going transformation

5. While this futuristic vision may seem distant, our city is in fact undergoing ongoing transformation. For example, the way we travel in Hong Kong has changed a lot in recent years. If you drive often, you would probably understand the frustrations of unpredictable journeys in the past. Even for the same route, the travel time could

vary significantly.

6. Fortunately, smart technology nowadays, such as real-time traffic information received through apps and tools, have greatly transformed our driving experience. Recent advancements like HKeToll have revolutionised tunnel travel, allowing seamless payments and eliminating the need to stop or change lanes. Moreover, parking experience has also improved with the introduction of licence plate recognition systems that reduce queuing time, as well as smart car parks that indicate where the vacant car parks are.

7. With technology continues to progress, I am confident that manual parking will soon be phased out. Major mechanical vehicle parking systems are being constructed as pilot projects in Hong Kong, and you can just leave your car at the car park entrance and let the mechanism store your car somewhere.. Fully automated parking systems optimise parking efficiency by utilising both vertical and horizontal parking space, resulting in significant saving of the drivers' time and the parking space for other use. These technologies are developing around the world, once deemed futuristic, but will shortly become or has become realistic in our daily life.

Part 1 – Turning Smart

Strategies for creating a smarter city: engaging everyone in the process

8. The transformation of transportation highlights the potential of smart and liveable cities. To realise the vision of smart cities, we must focus on the practical implementation of smart technologies. The symposium leaflet also emphasises the integration of cutting-edge technologies and innovative solutions as key components of a smart city.

9. The Mainland China has emerged as a major player in smart city development. “The 14th Five-Year Plan of the People’s Republic of China” (2021) attaches great significance to expediting digital transformation. According to the 2022 Smart City White Paper, China is implementing a large number of smart city pilot projects, tailored to specific regional characteristics and differences. Cities like Beijing, Shanghai,

Guangzhou, Shenzhen and Hangzhou have made remarkable progress in recent years.¹

10. Hong Kong has also embraced this directive by outlining six dimensions in the Smart City Blueprint 2.0, and implementing over 130 initiatives that continuously enhance and expand existing city management measures and services. “Data” plays a pivotal role in smart cities, yet data security also poses a tremendous challenge. To address this concern, the Government has taken proactive measures to enhance digital infrastructure, such as the implementation of “iAM Smart”. Fostering the adoption of technologies in a more streamlined and cost-effective manner, this initiative facilitates the implementation of digital Government services that prioritise the needs and convenience of the public. Moreover, the Government and other public and private organisations have opened up their data for free via the Public Sector Information Portal to facilitate the development of a smart city².

11. In smart city development, the Electrical and Mechanical Services Department (EMSD) actively supports the Government’s vision by acting as a “facilitator” and “promoter”, especially in the areas of Smart Government, Smart Living, Smart Mobility and Smart Environment.³ In 2018, the EMSD launched the InnoPortal to align the needs of the Government, public organisations and electrical and mechanical (E&M) trades with innovative solutions from start-ups and research institutes. This platform has led to the development of numerous remarkable applications.

12. To achieve our long-term goals, the EMSD further harnesses the benefits of AI by establishing the E&M AI Lab. The Lab serves as a crucial platform for strengthening partnerships among Government authorities, industry players, academia and research institutes, accelerating the development of big data and AI applications for building E&M facilities, and ensuring the implementation of efficient and effective AI technologies. Additionally, it plays a vital role in the development of a proficient workforce, fostering a collaborative environment that empowers individuals to actively contribute to the

¹ 智慧城市標準化白皮書（2022版），國家智慧城市標準化總體組
<http://www.cesi.cn/images/editor/20220803/20220803172531606.pdf>

² LCQ8: Management of data of public and private organisations
https://www.ogcio.gov.hk/en/news/press_releases/2022/07/pr_20220706.html

³ Hong Kong Smart City Blue Print 2.0
[https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint\(ENG\)v2.pdf](https://www.smartcity.gov.hk/modules/custom/custom_global_js_css/assets/files/HKSmartCityBlueprint(ENG)v2.pdf)

progress of AI application, and smart city initiatives, and drive sustainable development.

Part 2 – Turning Sustainable

How does sustainability contribute to developing a smart liveable city?

13. The concept of sustainability is often emphasised as a crucial factor in creating a smart and liveable city. Without sustainability, a city cannot be truly considered smart or liveable.

14. The United Nations has set forth 17 Sustainable Development Goals (SDGs) that serve as a precise framework for promoting sustainable development in a comprehensive and interconnected manner. Within the context of creating a smart and liveable city, three specific elements hold particular significance: They are “**Affordable and clean energy**”, “**Industry, innovation, and infrastructure**” and “**Partnerships for the goals**”. In terms of these elements, we can delineate both our current achievements and future aspirations in building a smart and liveable city.

(A) Promoting efficient energy use at the operational user level

15. Energy efficiency plays an essential role in achieving sustainability. As shared by Miss WONG in the Opening Remarks, buildings account for about 90% of electricity consumption in Hong Kong, and therefore the Government has set clear targets to reduce electricity consumption of both commercial and residential buildings.

(A-1) Government Facilitation and Regulation

16. To achieve these targets, a comprehensive strategy has been adopted. We regularly review the Buildings Energy Efficiency Ordinance and Mandatory Energy Efficiency Labelling Scheme to ensure the requirements align with global technological developments.⁴ Moreover, we explore the expansion of the scope of regulation to cover buildings with higher energy consumption, such as data centres, and more appliance categories, such as non-domestic products, to further enhance the overall energy performance of buildings and appliances.

⁴ Reference : <https://www.info.gov.hk/gia/general/202112/31/P2021123100260.htm>

17. Apart from standards upgrade, we are moving forward to implement a minimum energy performance standard for appliances to raise the overall energy efficiency. Looking ahead, with a mix of mandatory legislative means and the collaboration and contribution of the public and the trade, we envision a greener future with prominent green life style in the community.

(A-2) Adoption of new and innovative technology

18. On technology, let me recapitulate with you a familiar story. Light Emitting Diode (LED) is currently the leading lighting technology in homes, accounting for half of global residential lighting sales. LED lamps use 90% less energy and last up to 25 times longer than traditional incandescent bulbs. It is a breakthrough technology that wipes out the incandescent lamp and fluorescent lamp. Obviously, we need technological breakthrough to achieve significant energy efficiency and a sustainable future.

19. In this regard, the EMSD is actively driving research and development of innovative technologies. One example is the application of high efficacy driverless LED lighting. Our trial results will soon be ready, and we expect the luminaire efficacy of driverless LEDs to surpass that of conventional ones significantly, which is a considerable advancement in technology and has great potential to improve energy efficiency in buildings. We also promote the use of immersion cooling technology in data centres. This technology cools down the heat generating parts of servers by submerging them into a thermally conducting but non-electrically conductive liquid. It can save up to 30% of cooling energy for data centre servers as shown in our trial.

20. For Government buildings, we pursue the implementation of AI in control systems to improve energy efficiency performance of air-conditioning system. Later today, my colleague will share with you his insights gained from implementing AI-based chiller plant optimisation solutions. We also eagerly await your views on the adoption of new and innovative technologies.

(A-3) Better use of energy and partnering with stakeholders

21. Partnership is definitely an important element in co-creating a sustainable future. The EMSD signed a Memorandum of Cooperation on Building Energy Saving Retrofit in the Greater Bay Area with professional bodies, trade associations and academia in

Hong Kong, Macao and the Mainland to jointly develop and promote building energy retrofit technologies, and deepen the professional knowledge of existing retrofit practitioners. We are delighted to see successful retrofit cases recently with electricity savings of up to 30%.⁵ The continuous sharing of successful experience will undoubtedly help advance industry knowledge and contribute to the construction of a green living environment.

22. Moving forward, we will continue to play a pivotal role in partnering with the trade to foster collaboration and promote energy efficiency enhancements by innovative and intelligent technologies. Let us work together and put in our collective effort for a sustainable future.

(B) Prioritising the use of sustainable energy sources

(B-1) Ceasing coal-fired power generation and increasing the use of natural gas as transition fuel

23. While promoting efficient energy use at the user level is vital, the most impactful approach to achieve sustainability involves prioritising the adoption of clean and sustainable energy sources at the production end. In Hong Kong, the power generation sector contributes to almost 60% of CO₂ emissions. In view of this, Hong Kong has set a target to eliminate coal-fired power generation by 2035 and increase the use of natural gas as a transition fuel.

24. To facilitate this shift, the CLP Power and the Hong Kong Electric Company Limited have recently commissioned an offshore Liquefied Natural Gas (LNG) terminal. This terminal enables the simultaneous berthing and operation of the world's largest Floating Storage Regasification Units and LNG carriers⁶, exemplifying remarkable technological advancements and the collaborative efforts of professionals who have contributed to its success. Though natural gas is not carbon-free, it emits only half the amount of CO₂ compared to coal-fired power generation, making it a more environmentally friendly option during the transitional phase.

⁵ Reference: <https://www.wenweipo.com/a/202301/11/AP63bdcb33e4b053580de021b0.html>

⁶ Reference: <https://www.wenweipo.com/a/202305/16/AP6462d746e4b0f46e55d2ac89.html>

(B-2) Increasing the use of renewable energy

25. The adoption of renewable energy (RE) has a positive effect on sustainable development. Dedicated to RE development over the years, China has become the global leader in RE, ranking number one in installed capacity and in the installation of additional photovoltaic (PV) systems and wind turbines each year.⁷ In fact, in the electricity generation energy mix of the Mainland, the capacity of renewable energy accounts for nearly half, and exceeded that of the combination of coal, gas and nuclear generation plants. By the end of 2025, the anticipated installation of large utility-scale facilities will further raise the total solar and wind capacities to more than 1 300 GW, surpassing the Mainland Government's target of 1 200 GW well ahead of 2030.⁸

26. Hong Kong also strives to increase the share of RE to 7.5% to 10% by 2035, and the Government has been committed to creating favourable conditions for the private sector in RE development. With various supporting measures, the Feed-in Tariff Scheme has already attracted over 23 000 applications and is estimated to meet the annual electricity demand of about 90 000 households upon completion of these RE systems. Meanwhile, the Hong Kong Disneyland Resort's staff car park solar canopy project, which is the first project commenced since the introduction of Government's facilitation measures to support solar PV installation in open car parks, is expected to be completed by the end of this year and will generate over 200 000 kWh of electricity annually.⁹

27. Imagine PV panels gracing building facades, mounted on vehicles, lining roadsides, and the limitless potential for innovative applications across various sectors. The possibilities for harnessing solar power extend far beyond our imagination. Besides that, at the regional cooperation, we can increase the proportion of zero-carbon energy, including renewable energy, by procuring such energy from nearby region and construction of large-scale electricity facilities for receiving and processing zero-carbon electricity transmitted from neighbouring areas.¹⁰ The efforts devoted to such diverse

⁷ Reference: Statistical Review of World Energy 2023 by The Energy Institute (EI) (https://www.energyinst.org/_data/assets/pdf_file/0004/1055542/EI_Stat_Review_PDF_single_3.pdf)

⁸ Reference: <https://globalenergymonitor.org/wp-content/uploads/2023/06/GEM-RTTT-China-2023-report-English-1.pdf>

⁹ Reference: <https://www.info.gov.hk/gia/general/202306/02/P2023060200275.htm>

¹⁰ Reference: <https://www.info.gov.hk/gia/general/202303/15/P2023031500386.htm>

ways will be truly remarkable in achieving sustainability.

(B-3) Exploring the use of hydrogen

28. In recent years, hydrogen has gained significant prominence in the energy field, as it holds immense potential to revolutionise our transition towards a carbon-free future. The key advantages of hydrogen is that it is an effective energy storage medium.

29. Numerous countries have devised roadmaps and targets for extensive use of hydrogen. While the availability of green hydrogen is currently limited, interim solutions like blue or grey hydrogen are good substitutes in the interim to enable a smoother transition to green hydrogen when it becomes more accessible. In line with this objective, the Government targets to progressively launch the hydrogen bus and heavy vehicle trial scheme in 2023.

30. Regardless of the type of hydrogen used, it is vital to recognise the highly flammable nature of hydrogen and exercise caution when implementing it in a densely populated city like Hong Kong. To this end, formulation of technical guidelines pertinent to hydrogen fuel system, refuelling station and quantitative risk assessment are being studied by the Government. Ensuring safe utilisation of hydrogen also necessitates the establishment of comprehensive legislation in the long run. In this connection, the EMSD has been examining the legislative amendments on the Gas Safety Ordinance (Cap. 51), laying the groundwork for future legislation in the hydrogen fuel domain.¹¹

31. While hydrogen has primarily been used for fuel cell vehicles, scientists and researchers have begun exploring its potential beyond road applications. In 2018, Germany unveiled the world's first hydrogen-powered train. Later in 2021, Norway launched the world's first vessel powered by liquid hydrogen. Looking towards the skies, Airbus has also announced its plan to introduce the world's first zero-emission commercial aircraft by 2035. These remarkable developments demonstrate the versatility of hydrogen as a clean energy solution.

(B-4) Imagining the use of other alternative energy sources / technologies

¹¹ Reference: <https://www.info.gov.hk/gia/general/202306/08/P2023060800658.htm>

32. Undeniably, there is a wide array of alternative energy sources that merit further study and exploration. It is important to think innovatively and explore beyond conventional boundaries, as the possibilities brought by technological advancements are limitless. Notably, recent advancements in nuclear fusion research, achieved by countries like China and the United States, have brought us closer than ever to realising the potential of this technology. Embracing innovation and pushing the boundaries of what is possible will be conducive to developing a sustainable environment that benefits all.

Conclusion

33. In conclusion, building a smart liveable city requires the adoption of sustainable energy and technology. The futuristic image we saw at the beginning of my speech is a powerful reminder of the potential within our reach. However, it is important to remember that this goal cannot be accomplished by AI or technology alone. It necessitates the collaborative efforts of engineers, professionals, practitioners, academics and researchers like you.

34. Working together, we can overcome challenges, implement innovative solutions, and transform our vision into a sustainable reality. Let's turn the impossible to possible, leveraging our expertise and passion to create a smart and liveable Hong Kong that realises our aspirations and meets community needs.

35. Now, let's embrace the opportunity to learn from upcoming speakers and share new ideas. Thank you.