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Keynote Session:

The Flexible City: Regenerative Sustainability and the Urban Technological Transition

Prof Steve RAYNER, James Martin Professor of Science & Civilization, University of Oxford, UK

Biography

Steve Rayner is James Martin Professor of Science and Civilization at Oxford University, where directs the Institute for Science, Innovation and Society. He founded and co-directs the Oxford Programme for the Future of Cities. He previously served on the faculties of Oxford's Said Business School and Columbia University's School of International and Public Affairs. From 2002-2007, he led the UK national research programme on Science in Society and was a member of the UK Royal Commission on Environmental Pollution from 2003-2009. He was a Lead Author for Working Group 3 on the Fourth and Fifth Assessment Reports of the IPCC.

Abstract

Conventional ideas of sustainable development have been limited to "damage control". Advocates of regenerative sustainability argue that we must raise our ambitions from mere damage control to actually improving the world for humans and nature. But the phenomena of socio-technical lock-in and path dependency resulting from past decision making might seem to obstruct the pursuit of this agenda. The presentation looks at some examples of technological development in the city to inform our thinking about opportunities to learn from traditional technologies combined with advanced materials and design techniques to contribute to regenerative urban development in the 21st Century.

Keynote Session:

Paris Climate Change Conference: Implications for Engineering Sector

Ir Dr Otto POON, Co-founder and Past Chairman, Hong Kong Climate Change Forum

Biography

Ir Dr Poon is a Chartered Engineer and Founder and Chairman of ATAL Engineering Group.

He had served in various government advisory bodies including Advisory Council on the Environment, Energy Advisory Committee and Council for Sustainable Development. He is the Past President of HKIE, Life President of HKFEMC, and Co-Founder and Past Chairman of HKCCF.

He is now the Chairperson of Lift and Escalator Safety Advisory Committee, Council Member of HKQAA and Director of HKGBC, to name a few.

He was conferred Honorary Degree of Doctor of Technology by Coventry University and elected a Fellow of Hong Kong Academy of Engineering Sciences.

Abstract

The paper has two parts. The first part traces the origin of UNFCCC, and the development of the 21 COPs (Conference of Parties) leading to the Paris Agreement. The salient points of the Paris Agreement are listed and how INDCs (Intended Nationally Determined Contributions) are used as the first step to achieve a 2°C rise in atmospheric temperature. From the projection of the greenhouse emissions, it is evident that the total INDCs declared under the Paris Agreement is inadequate to limit the temperature rise and Parties have to review and resubmit more ambitious carbon reduction measures by 2020. The second part of the paper highlights from engineering perspective decarbonizing measures to mitigate against climate change and strengthening the resilience of urban environment to adapt against extreme weathers.

Theme: Building in Future City

Advanced Technologies for Air-conditioning

Prof William BAHNFLETH, Professor, Pennsylvania State University, USA

Biography

William Bahnfleth is Professor of Architectural Engineering and Director of the Indoor Environment Center at the Pennsylvania State University. He holds BS, MS, and PhD degrees in Mechanical Engineering from the University of Illinois and is a Registered Professional Engineer (PE). He is a fellow of ASHRAE, ASME, and ISIAQ and a past president of ASHRAE (2013-2014). He is the author of over 150 peer-reviewed publications. His current research activities focus on indoor air quality, particularly applications of ultraviolet germicidal radiation. He has also published extensively on thermal energy storage, chilled water systems, and building science.

Abstract

"Advanced" technology is often taken to be the latest development – something revolutionary and far ahead of its predecessors. Terms like "cutting-edge" or "state-of-the-art" are used to convey a similar meaning. However, where heating, ventilation, and air-conditioning of buildings is concerned, truly revolutionary developments are relatively rare. Another perspective on advanced technology is that it is the best way to meet the performance requirements of systems with available technology. Sometimes, advanced technology is truly new, but in many cases, it is familiar technology re-imagined and enhanced to meet changing needs – and it may sometimes be neither hardware nor software, but process. All of these embodiments of advanced technology are considered in this presentation. To elaborate on this concept, examples of areas of current priority are considered: indoor air quality (IAQ) and thermal comfort, energy efficiency, demand response, environmental protection, and quality maintenance. To a great extent, these priorities are coupled. IAQ and comfort criteria have a strong influence on energy use and emissions, so design criteria must be carefully defined to promote well-being and then met with systems that are as low in resource use and pollution generation as possible. Air cleaners to reduce mechanically cooled ventilation needs and use of

radiant cooling and heating to reduce loads while maintaining comfort are examples of this coupling. The need for improved demand response capability for HVAC systems has reinvigorated technologies like cool thermal energy storage that have long been used for other reasons. The impact of growing solar and wind power input to electric grids make it imperative that buildings be able to shift loads rapidly. Finally, technology – equipment and processes – to ensure delivered performance are coming into greater use – from fault detection to energy certification and ongoing commissioning, new effort is being directed to realizing the potential performance of systems.

Theme: Building in Future City

Ropeless Elevator System

Mr Joerg MUELLER, Head of Major Project Consulting, ThyssenKrupp Aufzugswerke GmbH, Germany

Biography

Joerg Mueller studied Electrical Engineering and joined ThyssenKrupp Aufzugswerke in 1993. He worked in the testing division of R&D, later managed the modernization department and was responsible for sales and engineering. Since 2005 Joerg Mueller has been working as Senior Engineer and Head of Major Project Consulting for the factory in Germany. He supports international Major Projects for New Installation and Modernization. Together with his team he has developed new concepts for vertical transportation in high-rise buildings, considering space efficient planning, quality of service of lift systems and energy consumption; using modern simulation methods.

Abstract

So far all described elevator systems for high rise application are still equipped with ropes. This technology, used since elevators are born is the crucial limitation of travel height extension.

The most important impacts are the following:

- Because of given safety factors from all codes worldwide the number and the diameter of the ropes have to be increased according to the height of travel. Hence, the total mass of the ropes will increase up to a limit, where they are not able any more to carry their own weight.

Now, Thyssenkrupp's new ropeless concept – announced to be developed two years ago is using a Linear Motor technology to eliminate rope suspension which does not limit vertical hoisting any more.

- According to the state of the art technology of elevators, to follow non vertical shapes of a building in inclined hoistway is restricted to some exceptions.

With the ropeless concept, inclined hoisting is not limited by behavior of the

suspension means.

- Super- and mega tall buildings cannot exist because of statically reasons without building sway, influenced by wind, by sunshine or seismic effects. Elevators with rope suspension are directly affected by the buildings behavior and can cause operational breakdowns or hazardous damages.

Moving without ropes, “MULTI” does not cause distinctive rope sway effects in High Rise – and Super High Rise buildings

- Up to now, elevators are not designed for horizontal movement. Direct horizontal links between elevator shafts, between buildings and to public facilities are limiting the urban mobility.

The “MULTI” concept supports passenger transportation in vertical and horizontal directions.

The functional principle follows the idea that circulating cabins for passengers in a loop of minimum two shafts will provide a continuous traffic flow. Both or even more hoist way will be linked by a so called exchanger device, which enables the cabin to change from one shaft to the other horizontally.

By means of a Linear Motor system, those elevators will not be equipped with ropes any more. The technology is well known and proven in the Thyssenkrupp’s Maglev Train systems. A high degree of safety and comfort is guaranteed.

To control an independent movement of the cabins the reliable and successful technology of the “TWIN” system is applied on a highest level of safety procedure on SIL3 standard. An advanced destination dispatch algorithm will organize an optimum in traffic control.

Theme: Building in Future City

Retro Commissioning and Optimization of Building Operation

Mr Kenneth LI, Director, Building MEP, China Region, WSP | Parsons Brinckerhoff (Asia) Ltd.

Biography

Mr Li has over 25 years' experience in mechanical and electrical engineering systems for various types of projects, including mega size commercial complex, super high-rise buildings, deluxe class hotels, special purpose built universities and institutions, industrial and railway infrastructure projects, for stages from feasibility study, conceptual design, detailed design till testing and commissioning.

Mr Li is also a specialist in energy studies, actively participating in institutional activities, including those organized by HKIE, CIBSE, HKGBC and BSL. Mr Li has also actively participated in Building Energy Code Implementation. He is the Technical Task Force Member for Mandatory Building Energy Code and the Chairman for working group for the Performance-based Building Energy section of the BEC.

Currently, he is the member of Buildings Energy Efficiency Appeal Board Panel. He is also a Faculty member of HKGBC, Expert Panel Member of BEAM Society Limited and Committee Member of Platinum Group for LEED Community in Hong Kong.

Abstract

Retro-commissioning (RCx) is commissioning for an existing building with the aim of optimizing the building operation. It is a systematic process of identifying improvement and optimization opportunities of the Central Building Services Installations (CBSIs) through searching for the indicators of the underlying building operational irregularities which would lead to inefficient energy use and poor indoor environment; and subsequent implementation of those identified opportunities for achieving building optimization.

In this presentation, Mr Li will introduce the background for Retro-commissioning,

and then he will cover the definition and scope of Retro-Commissioning as well as the benefits and challenges ahead, followed by the procedure in carrying out Retro-Commissioning. The building optimization approaches will also be shared, together with the alternative method in using Energy Modeling for systematic analysis on energy saving opportunities through various means of system optimization. Case sharing will also be included to demonstrate some common findings.

Theme: Home for Tomorrow

Direct Current Supply for Future Home

Prof Eric CHENG, Director, Power Electronics Research Centre, The Hong Kong Polytechnic University

Biography

Prof Eric Cheng obtained his BSc and PhD degrees both from the University of Bath in 1987 and 1990 respectively. Before he joined PolyU in 1997, he was with Lucas Aerospace, United Kingdom as a Principal Engineer. He received the numerous international award related to power conversion including the recent Gold Prize of Seoul International Invention Fair (2015) and Gold award in ICAN at Canada (2016). He has published over 250 papers and 7 books. He has hundreds of interviews by media on his R&D. He is now the professor and director of Power Electronics Research Centre of the university.

Abstract

DC distribution is now a modern method of power transfer. Most of the home appliances are DC based. This includes the LED lighting, computer, TV and audio equipment. Even the higher power machines such air conditioner, washing machines, cooker are all DC based. Therefore DC distribution is actually a more convenient method of power supply. Today the renewable energy and green technology are popular and even widely installed in home. The use of solar panel and electric vehicles could reach most home users in next few years. The DC distribution will therefore be important technology for development. The technology involved and the energy and material saving due to the DC operation are impressive.

Theme: Home for Tomorrow

Exoskeletons for the Elderly: Challenges in Control Interfaces

Prof Richard SO, Hong Kong University of Science & Technology

Biography

Prof So is a Professor of Industrial Engineering and Professor of Bio-medical Engineering with the Hong Kong University of Science and Technology. His research includes computational modeling of human spatial vision and spatial hearing. Prof So is a Fellow of the International Ergonomics Association, a Fellow of the Chartered Institute of Ergonomics and Human Factors, and a Fellow of the Hong Kong Institute of Engineers. Prof So is currently serving as the Co-Editor-in-Chief of Displays, Editor of Ergonomics, and Scientific Editor of Applied Ergonomics. He is serving on the Commission Internationale de L'eclairage (CIE) Technical Committee TC1-67 and expert panel for ISO working group on dynamic image safety. He is a frequent Keynote Speaker and has authored more than 100 refereed publications.

Abstract

Humans have vertebrate endoskeletons to protect our internal organs and provide a supporting frame for our bodies. Together with attached nerves, muscles and connective tissues, they facilitate the movements of our bodies through the control of our central nerves systems (CNS). Unlike humans, animals like crabs have exoskeletons. They also serve similar purposes in protecting the internal organs of the animals and, together with attached nerves and soft tissue fibers, facilitate their bodily movements. As we get old, our muscles and endoskeletons will weaken resulting in impairment in our ability to move. Assistive tools such as walking sticks and crutches have long been invented by our ancestors to improve the quality of our lives when we are old. Advances in electronics and mechanical designs have reduced the sizes, weights and costs of robotics exoskeletons to a point that they are becoming affordable to the general public. Similar to the functions of animal exoskeletons, they offer protection and facilitate movements of our bodies. This talk will focus on the control interfaces of such exoskeletons. In particular, we will start with lessons to be learnt from the biology of exoskeletons and endoskeletons and

move on to customized design solutions for portable exoskeletons to assist the elderly. Focuses will be on how our CNSs are 'programmed' to control our endoskeletons and the types of information that are fed back to facilitate our biological control loops.

Theme: Home for Tomorrow

Technologies for Smart Ageing City

Mr William Li, Assistant Vice President, Consumer Group with Hong Kong Telecom

Biography

William is currently serving in the capacity of Assistant Vice President, Consumer Group with Hong Kong Telecom (HKT). He is focused in the deployment of Smart Living services and solutions for international projects. He has over 20 years' telecommunications experience, in which 13 years working with HKT as a solutions consultant and program management. In addition, he has 10 years of system integration experience and 10 years of global program management, running multiple billion dollars worldwide projects.

Abstract

Smart Living Technologies promise to enhance the quality of living and life by bringing extra comfort, convenience, and efficiency at home. Between 2015 and 2030, the number of people in the world aged 60 years or over is projected to grow by 56 per cent, from 901 million to 1.4 billion, and by 2050, the global population of older persons is projected to more than double its size in 2015, reaching nearly 2.1 billion. With this phenomenon on global population ageing, how can Elderly people be benefited from this technologies? Can Smart Living Technologies provide integrated safety and health monitoring services for elderly people. In this forum, audiences will discover how HKT can transform domestic surroundings into smart elderly solution and how elderly people can enjoy their life. Lastly, we will also share other elderly solution being deployed in other countries.

Theme: Lifestyle of Health and Sustainability

Advocating for Green Consumerism - Electricity use in the home

Prof Yuk-Shan WONG, Chairman, Consumer Council

Biography

Prof Yuk-Shan Wong is currently the President of the Open University of Hong Kong. He obtained his PhD in Plant Biochemistry from McGill University of Canada in 1979. Since the 1980s, Prof Wong has performed teaching, research and administration work at various universities. He has published 8 books and over 160 international journal papers in the areas of environmental biotechnology, plant biochemistry and mangrove conservation.

He is a Deputy to the National People's Congress of China and a member of the Committee of the Hong Kong Basic Law, the PRC. He is also the Chairman of the Consumer Council.

He has been appointed Justice of Peace in 2001 and received a Bronze Bauhinia Star medal in 2004.

Abstract

Sustainable Consumption is one of the Hong Kong Consumer Council's strategic priorities. Not only should consumers enjoy goods that are safe, diverse and good value for money; but the goods and services should use the Earth's finite resources efficiently and without causing undue pollution.

Our presentation discusses and examines consumers' views about the sustainable use of energy, the current pattern of energy usage in the home. It goes on to show how Government could adopt innovative policies to reduce energy use. There is also discussion of how consumers' energy footprint could be reduced.

Households are responsible for 26% of Hong Kong's electricity consumption: around 55% of this is used in air conditioning, refrigeration and lighting.

The Consumer Council undertook a telephone survey of a representative sample to 15-64 year old Hong Kong people to understand their awareness, behaviour and readiness about sustainable consumption. Findings clearly indicated that consumers have high awareness of the importance of energy efficiency and say are taking certain simple actions to conserve power, but they find it more challenging to take actions that take more effort or require compromises in comfort.

The challenge for business and policy makers is to make it more straightforward for consumers to harness their good intension and convert this into action. This will take a mixture of better quality information presented in a way that can be readily understood, regulation of appliance labels and ensuring that energy efficiency labels are updated to reflect technological changes, like the replacement of tungsten lights, with CFLs with LEDs in lighting. Some of the disruptive technologies like electric vehicles and smart homes offer great opportunities to use energy more sustainably but need good engagement with consumers to ensure consumers' privacy and digital security is protected and the technology is affordable and available to all.

Theme: Lifestyle of Health and Sustainability

"Trees • COOLiving" (Lifestyle of Health & Sustainability)

Dr Vivian TAAM WONG, Chairperson, Friends of the Earth (HK)

Biography

Hon Professor at the LKS Faculty of Medicine, HKU
Adjunct Professor, SCM and SPH & PC, CUHK
Vice President, Modernized Chinese Medicine International Association
Board of Director, GP-TCM Research Association
HK Coordinator, Consortium for Globalization of Chinese Medicine

A former CEO of the Hospital Authority and PH Specialist in Policy & Research at the World Bank, as Chairman of FoE (HK), she works on environmental problems affecting the health and wellbeing of life on Earth.

She has served on numerous international and local, professional and public institutions in leadership and advisory roles in the fields of education, health, welfare and art. Recent related appointments in HK, include Advisory Committee on Water Supplies, Genetically Modified Organisms Expert Group, Food Waste 'Lean & Green' Label Scheme and HKTDC Innovation & Technology Advisory Committee.

Abstract

The Paris Agreement at COP 21, limiting global warming to within 1.5 ^{o}C above pre-industrial level, requires drastic limitation of GHG emission. The energy use for the 5 key sectors of Energy Supply, Industry Production, Agriculture, Buildings and Transport are 14.4, 13, 10-12, 8.8 and 6.7 $GtCO_2$/year respectively.

With the focus on Climate Change, FoE strengthened our **Vision to promote "a healthy and sustainable environment for all**", offering ethical solutions and setting priorities for high impact public policies, business practices and community lifestyle. With "**Zero Carbon and Zero Waste**" as a target, we have rebranded the flagship

initiative under "Trees. COOLiving" in driving a **COOL Lifestyle via** 衣食住行, the daily living essentials with the greatest carbon emission/pollution: clothing, food & agriculture, housing and transport. Community engagement is being promoted via RTHK CIBS series "地球 COOL 生活". Under the collective targets of the **UN Sustainable Development Goals**, an innovative Eco City with a Green Economy, Circular Economy and Shared Economy is being promulgated.

At the Corporate level, we have launched the COOL Corporate program to enhance their actions for environmental impact. At the individual level, we have COOL Ambassadors to promote the 10 acts of **LOHAS (Lifestyle of Health & Sustainability)** 樂活十宜:

1. Refuse・Reduce 源頭減廢
2. Recycle・Reuse 循環再用
3. Redesign・Repair 升級再造
4. Order Less・Waste Less 適食・惜食
5. Less Meat・More Green 多菜少肉
6. Power Smart 善用能源
7. Drive Less・More Mass Transit 綠色交通
8. Hike・Bike 行路踩單車
9. Urban Farming/Forestry 綠化都市
10. Fair Trade 本土・ 公平貿易

Theme: Lifestyle of Health and Sustainability

Innovation, Electric Vehicles and Future Mobility

Prof C C CHAN, Honorary Professor, The University of Hong Kong

Biography

Prof C C Chan holds BSc, MSc, PhD, HonDSc, HonDTech degrees. Honorary Professor and Former Head of the Department of Electrical and Electronic Engineering at the University of Hong Kong; Visiting Professor of MIT, University of Cambridge, etc; Founding President of the World Electric Vehicle Association; Senior Consultant to governments, Strategic Adviser or Independent Director of public companies and industries; Fellow of the Royal Academy of Engineering, U.K., Chinese Academy of Engineering, IEEE, IET and HKIE. Recipient of the Royal Academy of Engineering Prince Philip Medal; Chinese Academy of Engineering Guang-Hua Prize, World Federation of Engineering (WFEO) Medal of Engineering Excellence; Gold Medal of Hong Kong Institution of Engineers; IEE International Lecture Medal; "Asia's Best Technology Pioneers" by Asiaweek; "Father of Asian Electric Vehicles" by Magazine Global View; "Pitamaha (Grandfather) of Electric Vehicle Technology" in India; "Environmental Excellence in Transportation Award" by Society of Automotive Engineers (SAE); published 11 books, over 300 technical papers and holds 9 patents.

Abstract

Mobility is freedom. Mobility is the most apt expression for our quest for happiness. In order to achieve sustainable mobility, innovation is the driving force of meeting the challenge of future mobility,

Today cross border innovation is the height of innovation. This it is vital to be open-minded. Namely, to integrate the Chinese ancient civilization and the western modern civilization, to uphold the spirit of renaissance. Renaissance scientists and engineers are those not only understand Why and How Things work but also on Why and How the World works. The characters of renaissance scientists and engineers can be summarized as 1. Global thinking instead of local thinking; 2. Circle thinking

instead of linear thinking; 3. Closed loop thinking instead of open loop thinking; 4. Life cycle thinking instead of partial life thinking; and 5. Harmony thinking between human and nature. In short, we should have all round universe perspectives. We should be open-minded. We should promote the philosophy of engineering, which is system integration, including vertical integration and horizontal integration.

The commercialization of electric vehicles is coming. The success of commercialization of electric vehicles depends on the satisfactory tackling of four factors: initial cost, convenience of use, energy consumption and exhaust emission. Therefore, we need to pay further efforts towards the following three fundamental enablers or three goodness factors:

1. Availability of good performance products at affordable cost;
2. Availability of good infrastructures that is efficient and friendly to use;
3. Availability of good business model to leverage the cost of barrier.

In this connection, we need to integrate the policy, industry and market. We need the hand shake among key players in the automobile industry and the electric power industry. Electric vehicle industry can be a disruptive industry, since the function, production and commercial chain of electric vehicles are not at all the same as conventional vehicles. In terms of function, electric vehicle is not only just a transportation means, but also an electric device with moving energy storage capability. Thus the integration of electric vehicles and smart gird, of electric vehicles and information and communication technologies, is quite essential. Such integration and collaboration should aim at gradually achieving the common goal of four zeros: zero emission, zero gasoline, zero traffic accident, and zero traffic jam.

In this invited speech, the global state of the art of electric vehicles, their key issues and key technologies, the correlation between energy and information, the features of Internet of Vehicles, the challenges of exciting future mobility will be discussed.

Theme: Future City Transportation

Autonomous Car – The Driverless Car Technology

Mr Patrick LAM, Senior Traffic and Transport Engineer, Project Delivery, West Kowloon Cultural District Authority

Biography

Mr Lam is a transportation professional with 20 years of experience. He managed projects from development-based impact assignments to regional/ national level infrastructure studies. He is currently working as a senior traffic and transport engineer to supervise and manage consultants to plan, design and implement various transportation initiatives for the West Kowloon Cultural District. He is also responsible for liaison with the government departments to implement at the West Kowloon Cultural District the largest integrated basement in Hong Kong.

Before joining West Kowloon Cultural District Authority, he had worked in the consultancy industry with extensive international experience including assignments in the PRC, Korea and Middle East.

Abstract

The development of the autonomous vehicle has become the hottest topic in the automobile industry in the last ten years. Not just mainstream carmakers invest billions in technologies that could allow humans to take their hands off the wheel, IT Titans like Google and Baidu also unveiled their blueprints and conducted pioneering tests of their self-driving cars on motorways and urban street environment. As of September 2016, Google announced that its self-driving cars had completed over 2 million miles of driving on autonomous mode. Although self-driving cars may still seem like science fiction, many industry analysts and carmakers predict that truly autonomous vehicle will be available around 2020, running on public roads. Policy-makers, transport and urban planners are increasingly taking notice of the benefits of benefit from this disruptive new technology.

This presentation is designed to encourage policy makers and organisations to move

ahead of the curve with autonomous vehicles. It gives a brief review of the history and technology of the autonomous vehicles, its potential benefits and economic savings, socio-economic impacts as a result of the introduction of autonomous vehicles in the economy. Self-driving cars and bus pilot projects around the world are also presented. Most importantly, it introduces the autonomous shuttle proposal and phased implementation plan which are being considered by the West Kowloon Cultural District Authority.

Theme: Future City Transportation

Intelligent Transport for City of Tomorrow

Dr Jacob KAM, Managing Director – Operations & Mainland Business, MTR Corporation Limited

Biography

Dr Jacob Kam is the Managing Director - Operations and Mainland Business of MTR. He is responsible for overseeing the Company's transport operations in Hong Kong and its rail and property businesses in the Mainland of China. In addition, Dr Kam is responsible for overseeing global railway operations standards and ensuring mutual learning of best practices among all the Company's railway operations. He joined the Company in 1995 and had held management positions in Operations, Projects and China & International Business Divisions. He obtained BSc from University of Southampton, and PhD from University College London. Dr Kam is a Chartered Engineer and a corporate member of both the Institution of Mechanical Engineers in the United Kingdom and The Hong Kong Institution of Engineers. He is also a chartered fellow of The Institution of Occupational Safety and Health in the United Kingdom and The Chartered Institute of Logistics and Transport in Hong Kong. Dr Kam is a member of Vocational Training Council.

Abstract

In the Public Engagement exercise of "Hong Kong 2030+: Towards a Planning Vision and Strategy Transcending 2030" (issued October 2016), HKSAR Government has once again deliberated its remarks of how Hong Kong has seen the needs and aspirations of society in the territorial development strategy of the decade. Under the influence of Global Megatrends of media and societal catalysts, growing awareness in our environment and shifts in global economic power, it is crucial for Hong Kong to assess and recognize its own strength as well as opportunities that come along.

An integrated transportation infrastructure offers unprecedented seamlessness and efficiency in moving people through optimization of circulating vehicles and

intermodal connections. Technological breakthroughs of an IoT-networked and socially connected communication infrastructure helps further personalize and revolutionize the daily transit experience. Such breakthroughs avail citizens with abundant mobility options with streamlined and coordinated schedules, fostering smart mobility and connectivity in travels. Acknowledging the unique capacity and capability in the role of the railway (>40% of passenger trips) as the backbone of public transportation (90% of all mechanised passenger trips) in Hong Kong, MTR becomes one vital player in the construction of this Conceptual Spatial Framework for Hong Kong 2030+.

Having heartily served Hong Kong people for the past decades, MTR has successful put the mass on track all over Hong Kong as MTR “connects and grows communities”. Whilst urbanization and demographical change alters the general expectation of the way of life by dwellers in this vibrant city, MTR also manifests its usual agility in embracing the challenges.

MTR shared the Government’s foresights in strategically acquiring systems’ real-time data of public transportation to provide integrated real-time transport service information. Through the application of the Foresight-driven Asset Strategy FAST2030+, more intelligent assets and process innovations are in the pipeline to boost added-value customer experience and to bridge the expectation in truly realizing seamless, integrated and enjoyable journeys for dwellers of the City of Tomorrow.

Theme: Future City Transportation

Vision of Hong Kong Youth

Youth Energy Saving Awardees

Biography

Daisy Lau and Hayley Mak are Assistant Engineer of MVAC Maintenance at ATAL Building Services Engineering Limited. Our job duties include preparation of tender document and cost estimation, planning and coordination of the work progress cooperation with sub-contractors and consultants. Both of us are graduated with honors from City University of Hong Kong and have been working in this industry for two years already. Besides of work, we are also interested in environmental issues, and hope our knowledge and experience can help to save the earth in the future.

Abstract

Everyone wants a better quality of life, no doubt. But citizens live better by sacrificing the nature: keep operating the air-conditioners in low temperature for comfort, very weak awareness in recycling the waste, travel with own car, etc. We have countless of high carbon life, thanks to the culture of convenience.

We have been to Copenhagen, Denmark and Malmo, Sweden after we won the golden prize in “Energy Saving for All” Competition held by EMSD. The trip impresses us and we are surprised that people in Copenhagen and Malmo travel mainly with bicycles or metro, they have developed low carbon eco-city, they care about the marine habitat, they use renewable energy and plan to step forward to become a zero-carbon city.

What is the difference between Hong Kong, Malmo and Copenhagen? Why can’t Hong Kong to be a low-carbon city (or even a zero-carbon city)? We actually believe that Hong Kong has a potential to develop a greener city. Huge amount of municipal waste is a valuable resource to generate electricity, all windows in A-grade office is also a source to generate electricity without placing the solar cell only on the roof-top; we can also build more bicycle lane for citizens! Why not?

Theme: Power up for Tomorrow's City

How Smart Grid Enables a Greener and Smarter Future City of Hong Kong

Ir Eddie WU, Director – Technical Services, Power Systems, CLP Power Hong Kong Limited

Biography

As Director - Technical Services of Power Systems, CLP Power, Ir Wu is responsible for a wide range of technical operations including protection, telecommunications, digital control & automation, electrical workshop, power quality, electrical vehicle, security and metering. Prior to his current role, he had experience in strategy & planning, energy management, customer services and new business development in CLP. Before joining CLP, he worked in management consulting and utility industry in New Zealand, Australia and Greater China. Ir Wu is a Chartered Engineer of HKIE and an Executive Committee member of the JC-PIPI chapter of IEEE HK.

Abstract

Hong Kong is a densely populated, well connected metropolitan city with very high usage of smart devices such as smart phones. The government and citizens of Hong Kong have the ambition to make the city greener and smarter in the future with a detailed roadmap being developed.

Energy plays a very important role in modern cities. A greener and smarter city requires support from a greener and smarter energy sector with renewable and clean fuel, reliable and intelligent network, and efficient and smart way of energy usage.

Smart Grid is the core part of the power supply value chain and a key enabler of a greener and smarter future city of Hong Kong. It leverages advancements in communication and information technologies to enable a highly automated, integrated, intelligent and customer orientated power supply system. Smart Grid supports a greener, more distributed and interconnected new energy marketplace.

It enables many advanced and intelligent applications across the power supply value chain from generation, transmission, distribution to customer usage.

On the generation side, more renewables and clean fuel generators supported by energy storage are coming to the market. As an example, CLP is studying the Floating Storage Regasification Unit (FSRU) as a more secure and flexible way of clean fuel supply to Hong Kong. The transmission and distribution network is becoming more reliable and intelligent driven by self-healing technology, proactive outage management and real time asset condition monitoring. On the user end, enabled by smart meters, big data analytics and digital communication channels, customers can enjoy more choices and have greater control of their energy consumption and management. Smart meter is a key enabler of smart grid at the customer end and could enable benefits such as value added services, energy management, and safety and reliability enhancement.

In summary, smart grid is a key enabler of a greener and smarter city of Hong Kong. It would enable new intelligence, open new potential and bring in new benefits for our society in the future.

Theme: Power up for Tomorrow's City

A Greener Future – Safe, reliable and clean electricity generation

Ir Francis CHENG, Director & General Manager (Generation), The Hong Kong Electric Company Limited

Biography

Ir Francis Cho-ying Cheng, C.CHEM; FRSC; MHKIE is a scientist and an engineer. He joined The Hongkong Electric Company, Limited (HK Electric) in 1979 and has since then worked as a Chemist and an Engineer before promoting to the present management position. He has worked in the Operations, Maintenance and Technical Services Department of Lamma Power Station which is the only power station supplying electricity to Hong Kong Island, Apleichau and Lamma Island.

Cheng graduated from The University of Hong Kong in 1977. He worked as a teacher in a secondary school for two years and then joined HK Electric. He was trained in the then Apleichau Power Station, which was an oil-fired station, before transferring to Lamma Power Station. The posts he held in the past included Senior Generation Chemist, Assistant Chief Maintenance Engineer, Chief Technical Services Engineer and Chief Engineer (Generation).

For community service, Cheng has helped the implementation of qualifications framework for the Electrical and Mechanical Services Industry under the Education Bureau of Hong Kong for more than 12 years. He is currently the chairman of the Industry Training Advisory Committee for Electrical & Mechanical Services. He had also participated in various activities and taken up roles in promoting vocational education and training in the electrical and mechanical services industry.

Abstract

Improving the local and regional air quality and reducing carbon emission are topics that attracted much public attention in recent years. In line with Hong Kong Special Administrative Region (HKSAR) Government's policy in these aspects, HK Electric started using natural gas as fuel to generate electricity in 2006. A 330-MW gas-fired

combined-cycle gas-turbine (CCGT) unit was commissioned that year along with a 92-km sub-sea gas pipe from Shenzhen. Building on the successful operation and maintenance (O&M) experience of the CCGT, another 345-MW two-on-one gas-fired CCGT also started to burn gas in 2010. The latter unit was converted from two open-cycle gas turbines first commissioned in 1989. These two CCGT units have been put on base-load operation since then and have been generating more than 30 % of the electricity from Lamma Power Station. As HK Electric does not have any spare gas-fired units, the reliability of these two CCGTs has been among the top priorities of the Station.

To meet HKSAR Government's target of further increasing the percentage of electricity from gas-fired units, HK Electric has started the construction of another two 350-MW class CCGTs which are expected to be fully operational by 2020 and 2022.

At the same time, to explore the use of Renewable Energy (RE) sources in Hong Kong, HK Electric built an 800-kW wind turbine in Tai Ling of Lamma Island in 2006 and also installed a 1-MW solar generation system in 2010 in Lamma Power Station. Both the wind turbine and the solar generation system are the largest one of their kinds locally.

In this paper, the O&M experience with the gas-fired CCGTs, the associated gas-handling facility and the RE sources are presented. Challenges of the future development and applications of RE in the local environment are also discussed

Theme: Power up for Tomorrow's City

How Natural Gas Changes Cities in Mainland China?

Mr Martin KEE W N, Director and Executive Vice President, Towngas China Company Limited

Biography

Mr Kee graduated from the Department of Engineering, The University of Hong Kong and holds a master degree in Business Administration. He joined the Hong Kong and China Gas Company Limited in 1990, and has been participating in HKCG's business development and operation in the Mainland since 1994. He is now the Director and Executive Vice President of Towngas China Company Limited responsible for the operation and management of the gas project companies in East China and Southwest regions. He is also in charge of various functional departments of the Headquarters. Mr Kee is a member of the 13th Nanjing Committee and previously a member of the 11th and 12th Changzhou Committee of the Chinese People's Political Consultative Conference.

Abstract

With the rapid economic development in China in the past two decades, the quest for higher living standard and the demand for energy have been ever growing. However, serious pollution, air pollution in particular, has accompanied the rapid "coal-based" economic growth. China's coal consumption is still dominant making up 64% of the national primary energy consumption in 2015. With the Chinese government's pledge in the Paris Climate Change Summit 2015 to cut its greenhouse gas emissions per unit of gross domestic product by 60-65% from 2005 levels by 2030, natural gas, as a clean energy promoting sustainable development of the Chinese economy, has been playing and shall continue to play an important role in China's energy development.

The growing demand for natural gas has driven development and innovation in the gas industry in China. There have been tremendous improvements in gas infrastructures. There is now a well-developed national gas network and more

natural gas storage facilities are available. There are more sources of natural gas supply including piped gas from Central Asia, liquefied natural gas (LNG) and unconventional gases to cater for the growing gas demand. Gas companies provide the society with more energy efficient natural gas applications not only in the domestic market but also in the commercial and industrial sectors – from traditional cooking and water-heating to space-heating and clothes-drying, from traditional catering and power generation to combined heat-and-power and vehicular fuel. While the Mainland energy market becomes more market-driven and customer-focused, there is a continuous raise in safety standard and customer service standard in the gas industry with an emphasis on innovations and new technologies.

How natural gas changes cities in Mainland China by bringing back the long lost blue sky is discussed with Yixing in Jiangsu Province and Maanshan in Anhui Province as examples.

Theme: Hong Kong in 2066

Lifecycle Building Information Modelling - Asset Management (BIM-AM) System for Buildings Operation and Maintenance

Ir LEE Che Kit, Chief Engineer/ Project, Electrical and Mechanical Services Department, The Government of the HKSAR

Biography

Ir C K LEE, BEng, MEng, MHKIE, MIET, CEng, is a Chief Engineer in the Project Division of the Electrical and Mechanical Services Department, overseeing project management and consultancy services on electrical, mechanical, electronics and ICT systems provided to government departments and autonomous bodies of Hong Kong.

Abstract

BIM technology has rapidly emerged in recent years in the construction industry to trim construction and design efforts/resources for building and Mechanical Electrical & Plumbing (MEP) engineering design and construction works. However, BIM application in the operation and maintenance (O&M) stage of the building lifecycle is yet to be explored.

This presentation aims to show that, by leveraging the conceptual BIM framework in facilitating effective exchange of information in an interoperable and reusable way, a novel architecture for exploiting BIM in integrating AM and a variety of O&M systems/tools, including Building Management System (BMS), Closed Circuit Television (CCTV) system, Radio Frequency Identification (RFID) scanning tool, Real Time Location System (RTLS) and ad-hoc wireless devices, has been successfully proposed and implemented by the Electrical & Mechanical Services Department (EMSD) with a view to streamlining building O&M. EMSD is the first to propose and implement a novel architecture for such visually intuitive and complete integration. The BIM-AM System is at the forefront of BIM integration in terms of the integration diversity and extent as compared with other research and real-world applications. The System allows locating and visualising any particular asset with its static / real-time asset information by manoeuvring freely throughout the BIM model,

instead of mere data exchange between BIM and AM systems.

Theme: Hong Kong in 2066

Big Data – Application of Environmental Sensors for Building and Sustainable Environment

Dr Zhi NING, School of Energy and Environment, City University of Hong Kong

Biography

Dr Zhi Ning is currently an Assistant Professor in the School of Energy and Environment at City University of Hong Kong. He has very rich experience of urban air pollution research and their impact on air quality, and public health. Dr Ning studied and worked in Southern California Particle Center in Los Angeles (SCPC), Max Planck Institute in Mainz, Germany (MPI), and Laboratory of Sciences in Climate and Environment in Paris (LSCE) before joining CityU. He has been also very active in technology innovation and development with more than 50 international publications, holding multiple US and China patents in PM2.5 and gas monitoring and control with international award. He is now working with Environmental Protection Department and Department of Health to research and advise the policy formulation in emission control and air quality in Hong Kong, also with Innovation Technology Commission and industries to develop new sensing technologies with IoT applications to monitor and control urban air pollution.

Abstract

Up until recently many of the facets of how we have dealt with environmental stressors and how we interact with our environment have been reactive. Most environmental monitoring has been conducted to inform us quite generally of how bad air or water quality was yesterday or in the prior year; when it is too late for us to make decisions on how to avoid harmful exposures. Data about these stressors and how they could be controlled have not been available for places where we should be most concerned with regards to our health and welfare; thus schools, elderly care centers, and people with health problems are unaware when they should act to avoid potentially harmful conditions. Further, in places where we work, commute in or live may have special exposure potentials, but we know very little about these. We have been "data poor".

This is changing as a result of the practical impacts of the “Internet of Things”, “Big Data” and lower cost sensor- based technologies. These can be designed into systems that will interact and give us the data needed to make more informed decisions and provide it in ways that are understandable and relevant to lay people and policy leaders. And what we learn can help us improve the way we operate our buildings, operate our commuter systems and even design the city scape.

My talk today will describe these concepts and how they are being developed and used in Hong Kong and internationally where entire cities are being outfitted with large numbers of smart sensors to potentially produce very dense and useful data sets and to communicate results in real time. I will also cover the challenges of making sure the big data is also good data.

Theme: Hong Kong in 2066

Future Cities - Living with Climate Change

Young Engineers, Electrical and Mechanical Services Department, The Government of the HKSAR

Biography

The group consists of five young engineers from the Electrical and Mechanical Services Department (EMSD). The five of them have different engineering background. They joined EMSD in 2014, and are now working as assistant engineers at various divisions of EMSD. The young engineers would like to devote themselves to promoting the status of engineering in society, and inspire the young generation to pursue a career in the engineering profession.

Abstract

Mankind is facing serious challenge from Climate Change. Global Warming is growing at an unprecedented rate, which subsequently leads to ice shelves melting and more frequent extreme weather. Many cities will likely be gradually drowned or even submerged. Are we going to live the same way in the future?

The presentation is going to explore some possible approaches on how we can adapt to such situations. Aside from protecting the existing infrastructure, the group would also like to introduce the concept of floating cities and living undersea. It is hoped that through the presentation, more attention would be gathered for the advance planning of our city's development, facilitating the smooth transition to the future.