



EEAA/IEEE/EE One-Day Forum 2018

Smart Technology and Energy Strategy for Hong Kong's Electricity Supply Industry Towards 2033

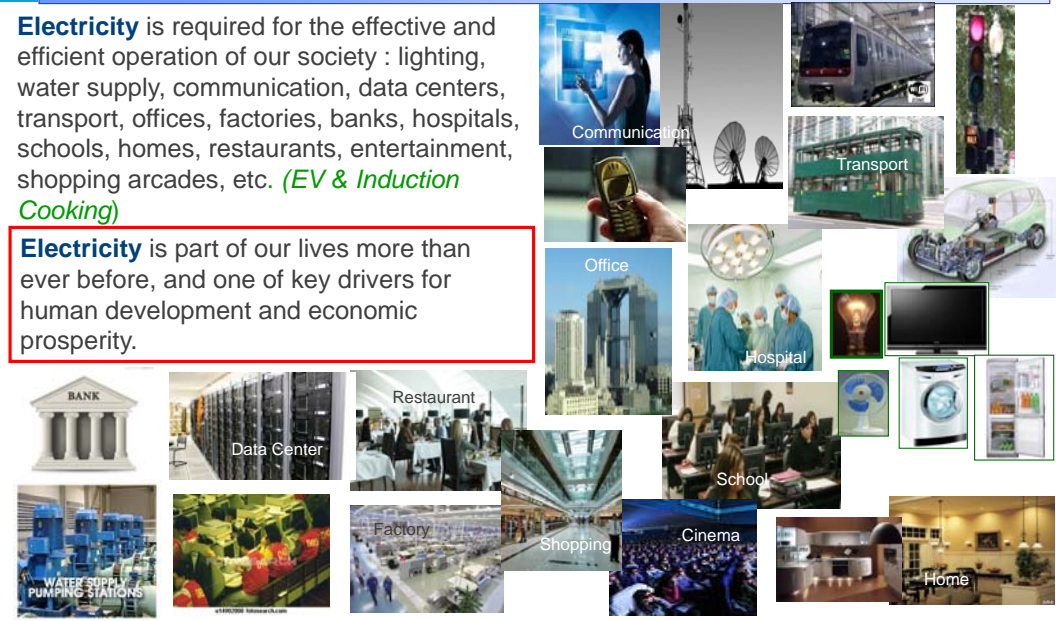
GREEN FUEL & RENEWABLE ENERGY FOR ELECTRICITY GENERATION IN HONG KONG (ISSUES & CONCERNS)

Ir Dr C W Tso
Fellow HKIE/IMEchE

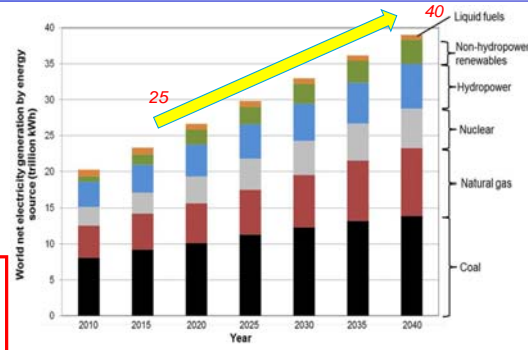
Electricity : Part of Our Lives (1/2)

Electricity is required for the effective and efficient operation of our society : lighting, water supply, communication, data centers, transport, offices, factories, banks, hospitals, schools, homes, restaurants, entertainment, shopping arcades, etc. (EV & Induction Cooking)

Electricity is part of our lives more than ever before, and one of key drivers for human development and economic prosperity.



Electricity : Part of Our Lives (2/2)



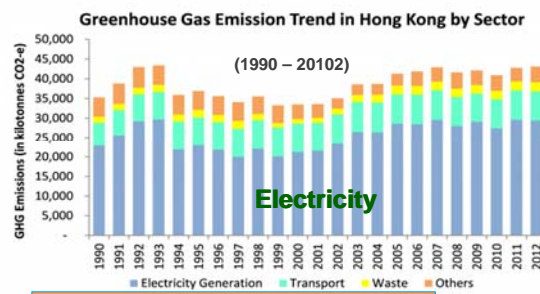
World net electricity generation by energy source
Source: https://www.researchgate.net/figure/World-net-electricity-generation-by-energy-source_fig1_269931471

Even with advances in efficiency and efforts in conservation, rising populations (7.5 billions in 2017 => 10 billions by end of century), urbanization and expanding economies will produce a net increase in electricity Demand.

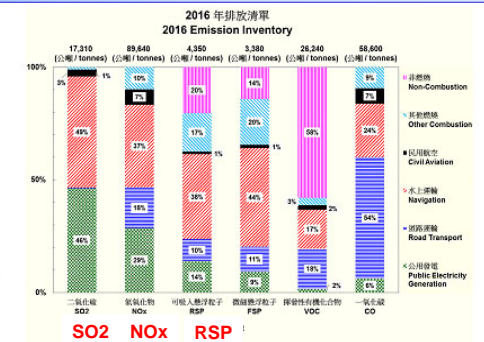


HK as a developed economy electricity demand <3% annually for past 10 Years

Hong Kong Carbon Emissions & Air Pollutants



2014 HK Carbon Emission: 44.9 million Tonnes



Largest Carbon Emissions
2nd Largest Air Pollutants



Production of Electricity in Hong Kong

Sources: EPD Web Site
Hong Kong's Climate Action Plan 2030+
<https://asian-power.com/environment/commentary/understanding-renewable-energy-future-hong-kong>

Role of Hong Kong Electricity Supply Industry

In Supporting Hong Kong's Pursuit of Sustainable Economic Development



https://www.google.com.hk/search?q=is+hong+kong+a+cosmopolitan+city&safe=active&source=inms&tbm=isch&sa=X&ved=0ahUKewjny43NrdraAhXCzbwKHeAPAmEQ_AUICigB&biw=1366&bih=651#imgrc=eRb8_n5H33QI2M

In Improving Hong Kong's Air Quality to meet WHO standard



https://en.wikipedia.org/wiki/Air_pollution_in_Hong_Kong#/media/File:Hong_kong_haze_comparison.jpg

In Meeting Hong Kong's Ambitious Carbon Intensity Reduction Targets by 65% to 70% by 2030 using 2005 as the base to combat Climate Change



<https://www.climateready.gov.hk/actions.php>

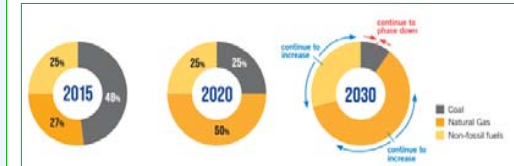
Hong Kong Strategy

Deepening Energy Efficiency & Energy Conservation - YES

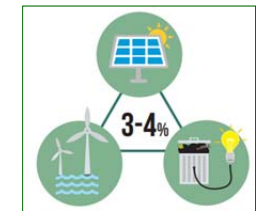


Pushing two power companies to Increase use of Natural Gas in fuel mix for electricity generation from <30% in 2015 to 50% in 2020

Fuel Cost UP
>HK\$100 billion for new plant
Electricity Tariff UP



Working with the wider community to have 3 to 4% Electricity produced from Renewable Energy by 2030
Feasible? Viable?

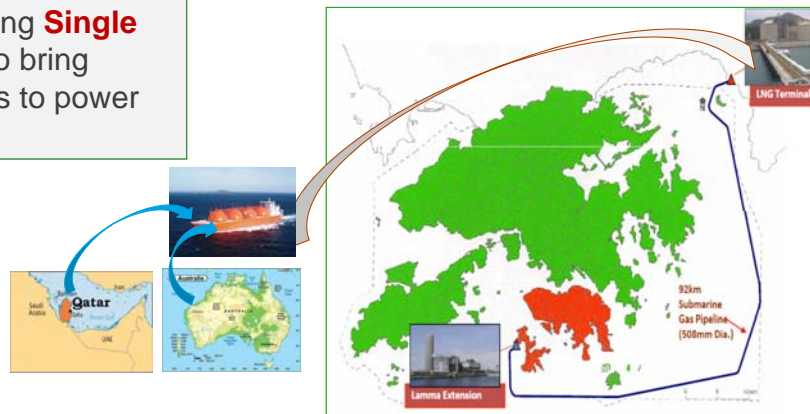


(Sources: EPD Web Site
Hong Kong Climate Action Plan +2030)

Increase of Natural Gas in Fuel Mix to 50% in 2020

Security, reliability and diversity of supply sources of natural gas?

Risk of using **Single Pipeline** to bring natural gas to power stations?

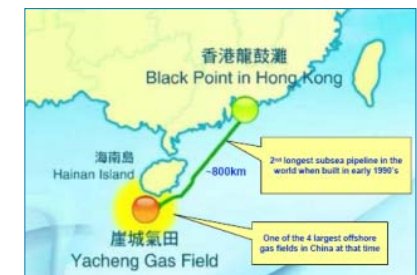


(Sources: HEC Seminar Paper/Website)

Increase of Natural Gas in Fuel Mix to 50% IN 2020



2nd West-to-East Pipeline to supply gas to CLP



Security, reliability and diversity of supply sources of natural gas?

Risk of using **Single Pipeline** to bring natural gas to power stations?



(Sources: CLP Website and Publications)

Wind Power as RE for Electricity Generation



HEC Proposed 100MW Offshore Wind Farm

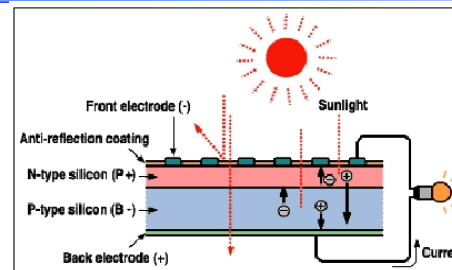
CLP Proposed 200MW Offshore Wind Farm

As Hong Kong is close to Equator, the wind resources are rather weak, the proposed 300MW offshore wind farms at capital cost over **HK\$10 billion** can generate about **600 million kWh** electricity (**1.2%** HK's 2023 consumption) with capacity factor of 23%

Sources: HEC Web Site; CLP Web Site and EPD Web Site

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Solar Power as RE for Electricity Generation



Hong Kong has favorable solar radiation (1,333kWh/m2) but Solar PV panels take up huge space for any significant output.

To supply **1%** of electricity consumption, a PV solar farm would need 3.6km2 space, equivalent to **20 Victoria Park**



Source: Hong Kong Climate Action +2030

Land Scarcity in Hong Kong – Better for Housing?

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RE for Electricity Generation – Best Option???

Both Wind Power and Solar Power are not only expensive but “Not firm capacity”: Intermittent, unreliable/unpredictable source, not for base-load operations. Also requires fossil-fuelled or nuclear power plant as back-up.



The 3,000t/day waste to energy incineration plant (part of Waste Management System to tackle waste disposal) being built in Sek Ku Chau can generate about **500million kWh** electricity ...Bonus (**1%** of HK's 2023 consumption)

Source: EPD Web Site

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Thank You !

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