# Response to the Public Consultation on the Future Development of the Electricity Market by the Hong Kong S.A.R. Government, June 2015

Web Link to HKSAR Gov Site

## Myths, Facts and Suggestions

# Contents

# **Part 1** - introduction

# Introduction

**Electricity generation is one of the most fundamental building blocks of a prosperous society** and so related policies rightly deserve careful analysis and scrutiny.

**It requires large, often up-front, investments that have long term repercussions for the competitiveness of an economy, as well as the health and welfare of its citizens.** It is also a highly technical field and as such it does not lend itself to superficial analysis by non-experts.

The past 20 years have seen new technologies associated with generating, transmitting, and distributing electricity in addition to the availability of new fuels. These now offer several interesting and challenging choices for strategic planners in Hong Kong.

**The HKSAR does not have an integrated energy policy. It should.** The creation of the HKSAR and closer integration with the Mainland offers the HKSAR the opportunity to look at its energy policy afresh and holistically. **In the post-colonial era it makes little sense, and it is grossly inefficient, to have three separate energy monopolies (HKE, CLP and Towngas) with significant overlap and duplication, that absorb excessive resources from the Hong Kong economy.**

The sensitivity of the people of Hong Kong to harmful and $CO_2$ emissions has increased and introduced a new important factor in the decision making process.

**The opportunity to reform the HKSAR's electricity supply framework offers the Government the opportunity to significantly boost the competitiveness of the HKSAR's economy, balancing costs and benefits, risks and opportunities, for the benefit of numerous stakeholders.**

It is a complex topic that cannot be exhausted in a few slides or a short presentation. Nevertheless **in the following pages we seek to highlight the most important issues facing the decision maker, provide and challenge the evidence to support the claims made for the current supply regime, both positive and negative, and suggest a target structure for the future HKSAR electricity industry along with a progress path to achieving it.**

# **Part 2** - a four slide executive summary

# Summary …

- The HKSAR Government considers the following as the main criteria for assessing the current electricity supply industry: **Safety, Reliability, Affordability, Environmental Performance.**

- The Government considers that it has largely achieved these policy objectives and is now intent on formulating policy to possibly introduce competition into the current monopolistic market.

- In formulating future policies it would be important first to objectively analyse what has been achieved under the status quo. **Have the previous policy objectives really been reached? What are the real pros and cons of the current duopoly structure and how can it be improved?** We have sought to provide some answers these questions and to stimulate debate on others.

- A superficial assessment of the status quo would lead the casual observer to conclude that indeed the HKSAR has an adequate electricity supply. **A more in-depth analysis reveals however that in reality that is not the case and there are some serious problems with the current arrangements, beyond the obvious: that it is a privately controlled, Government sponsored monopoly that costs the economy far more than it should.** The status quo needs to be properly assessed in order to formulate a policy that seeks to improve upon it.

- What follows is a simplified assessment of the current electricity supply arrangements for the HKSAR. Nevertheless, it clearly highlights areas with obvious deficiencies, and others that require some additional study. **Overall, we would argue that there are several opportunities to significantly improve on the current arrangements and to add significant value to the economy of the HKSAR going forward.**

- **A win-win for all stakeholders is indeed possible provided that the timidity of the past in enacting tangible reform is abandoned, and the energy market of the HKSAR as a whole is reformed.**

# Summary …

**In assessing the HKSAR's electricity supply one should consider some of the characteristics that make Hong Kong difficult to compare to other electricity markets:** a small territory (therefore a small grid easily maintained, low transmission losses from generation to consumption), high customer density (therefore low cost of customer acquisition and high potential operational efficiency). **In the light of this, have the HKSAR Government's policy objectives really been achieved?**

- **Safety:** There have been no major accidents. However if one considers harmful emissions as a safety issue then the reality is quite different from the one presented by the monopolists (and the HKSAR Government). **HK still relies today on 53% coal** as its input fuel. While scrubbers have recently been fitted to reduce harmful emissions (cadmium, mercury, NOx, SOx …) (therefore previously saddling the HKSAR with decades of harmful emissions) these are not 100% effective. The use of low tech, inefficient, generating equipment leads to significantly more emissions than would be the case with newer technology. **In HK only 22% of fuel is natural gas - Singapore is already using 95% natural gas as fuel for electricity generation.**
- **Reliability:** by all account Hong Kong does have a reliable electricity supply. While this is an achievement it is not such an extraordinary success considering vast sums have been lavished on the two monopolists via the SCAs to ensure that that is the case. Further, the transmission network in HK is very compact, easily maintained and repaired. If could be said that **Singapore does even better than Hong Kong in this regard, and, most developed countries achieve similar results, with much lower relative costs to the community.**
- **Affordability:** HK's electricity prices are compared by the monopolists (and the HKSAR Government) to those in cities like New York and London. The problem with such a comparison is that the utilities that supply these cities, unlike the monopolists in Hong Kong, have to supply consumers over much wider territories than the cities themselves. A very significant part of the cost of delivering electricity is the cost of transmission and the losses from delivering electricity across great distances. **Despite these (and several other) very considerable advantages that the Hong Kong monopolists enjoy, the reality is that in March 2015 average US electricity prices were significantly lower than Hong Kong's.** Further proof that electricity prices could be much lower in Hong Kong is that **the monopolists in Hong Kong enjoy five times the profits i.e. 9.99% vs. 2% of the U.S. utility average** (measured on a return on assets basis which is the HKSAR's chosen regulatory return parameter). As a further example of such outsized profit margins, **HKE enjoyed a 55.6% EBITDA / Revenue in 2014 in its HK business; very few companies in any sector have such margins, let alone, regulated, virtually risk-free utilities.**
- **Environmental Performance:** for the reasons mentioned above in "Safety", **Hong Kong performs poorly. Especially considering the vast capital allocations made via the SCA to the monopolists, harmful emissions in Hong Kong are significantly higher than they should be. Even $CO_2$ emissions in HK are twice as bad, per capita, as those on the Mainland, which puts the whole issue of environmental performance in stark perspective.**

# Summary …

Other factors to consider:

- **<u>Monopoly effects</u>**:
  - the current Scheme of Control Agreement (SCA) could have been justified 40-50 years ago when capital was scarce and HK needed to attract risk capital to build its electricity infrastructure. That goal was achieved a long time ago. **The SCA should have been replaced by a significantly better regulatory framework, at least 30 years ago**;
  - **a poorly regulated monopoly regime has cost HK significantly** in terms of excessive electricity costs, harmful emissions, excess obsolete capacity, lack of innovation, inefficient use of fuel;
  - **capital expenditure has been inefficient and excessive** and directed in the wrong places (oversized, inefficient, low tech, excess capacity for example). It should have been directed to improve efficiency (tri-generation), reduce emissions, diversify fuel sources more rapidly, develop an integrated smart grid, and install smart metering, for example;
  - a closed market has meant **missed opportunities** to introduce innovation such as a smart grid, connected services, cleaner generation, developing renewable energy sources, leveraging on HK's skills in managing clean efficient energy in highly urbanised environments;
  - under the Competition Ordinance that will shortly come into force, there is a serious question on the legality of these monopolies.
- **HK now faces additional costs to remedy the errors of the past** while tens of billions of HKD have been misallocated resulting in a significant waste of resources for the HK economy. Going forward this could be partially remedied by curbing the excess profits of the monopolists and the resulting savings not applied to an overall reduction of electricity prices but used in a well executed capital expenditure plan to improve the current low tech and obsolete infrastructure.

# Summary … way forward

The following is a suggested **MINIMUM** list of targets for the HKSAR to aim for **in order to have a SAFER, MORE RELIABLE, MORE AFFORDABLE, CLEANER, HIGHER QUALITY, MORE INNOVATIVE, energy market for the 21st century:**

A. **Create** a new legal and technical framework, to be in place by 2020, for an open electricity, gas and services market under a single Energy Authority, separating: power generation, transmission, distribution, and retail services. Tackle demand by enacting energy saving policies in building codes for a more holistic approach to energy in HK (e.g. impose use of more advanced technologies enabled by a smart grid);

B. **Scrap** the SCAs in the medium term. In the short term extend them at internationally comparable ROAs of about 2% (compared to 9.99% current ROA for HKE and CLP);

C. **Open up** the market, by 2020, for the supply of: electricity generation, hot water, cooling and ancillary services to third parties (also from the Mainland) while at the same time fostering the growth of locally grown talent to create new services and technologies to cater for the energy market of a highly dense urban environment thus leveraging Hong Kong's unique skills, talent and location;

D. **Set** ambitious and stringent targets for the reduction of harmful coal burning and $CO_2$ emissions by 2025.

E. **Break up the monopolies by separating** HKE's and CLP's **T**ransmission and **D**istribution from power generation into a **TD**NewCo. Do the same for the Hong Kong and China Gas Company Ltd.;

F. **Upgrade** transmission and distribution networks to a smart grid with smart metering to enable new generation and energy saving technologies;

G. **Integrate** the transmission and distribution network between HKE and CLP and the southern China grid to increase synergies, help to open up the market, and to create a more robust, redundant supply;

H. **Incentivise** the Hong Kong and China Gas Company to transition to Natural Gas, ditching the wasteful transformation of Natural Gas into Towngas, and opening the gas pipeline network to third parties for localised tri-generation;

I. **Let the market** decide what the price of wholesale electricity should be by launching auctions to supply guaranteed capacity from both fossil and renewable energy sources, to the new integrated HK grid (TDNewCo) allowing mainland PRC and other entities to participate;

J. **Provide** a mechanism to protect tariffs for those most vulnerable (low income households), send price signals to reduce waste, and use generation more efficiently (night time use for example) as well as incentivising suitable renewable energy projects;

**Part 3** - a copy of our response to the public consultation by the HKSAR Government

# Response to the Public Consultation on the Future Development of the Electricity Market by the Hong Kong S.A.R. Government, June 2015

## Q1 How important is choice to you in respect of the supply of electricity? What objectives do you consider should be achieved through introducing competition to the electricity market?

**RR response:**

a) **Choice** is important to obtain best value. It is also important to allow users to select the most appropriate supplier for their needs and to provide market signals (for example some users may prefer to buy energy from suppliers that favour cleaner technologies or renewable energy);

b) **Competition** in the electricity market should have the following goals:
- enhance HK's long term economic competitiveness
- better value for the community as a whole (reduce monopoly excess returns, HK Electric had a 29.6% net profit margin in 2014 on its HK business - falling from >50% in the 1990s but still > 4x the world average - CLP has similar results)
- greater efficiency by introducing modern, efficient, cleaner generating equipment (CCGT tri-generation for example)
- greater reliability (through integration of grid in HK and with Southern China Grid and upgrading to a smart grid)
- greater safety by lowering harmful coal and CO2 emissions
- break up the monopolies by separating generation from transmission, distribution and retail services
- opening the market up to new and better services, upgrading the distribution network to a smart grid with smart metering, enable use of smart appliances and smart home energy

## Q2 To what extent do you think the current contractual arrangement by SCAs has allowed us to achieve the energy policy objectives of safety, reliability, affordability and environmental protection, and what problems do you see with this regulatory approach?

### RR response:

A. The SCA served a useful role in the past to provide very generous returns to attract the capital required to build up the HK electricity supply network. That basic need was satisfied at least 30 years ago and the returns to the monopolists should have been reduced then. Resources have been squandered as a result (HK Electric had an EBITDA/revenue of 55.6% in 2014 on its HK business, it used to be >80% in the 1990s - these are incomprehensible returns (with no precedent or equal globally) for such guaranteed, low risk businesses - even the fuel risk is borne by customers).

C. Upon a superficial, non expert, analysis, HK has, by some measures, a quality, reliable electricity supply. Good results have been achieved. But it is not as good as it could be considering the very significant capital invested by the community over the past 30 years in particular. It falls far short of best in class.

E. Hong Kong's electricity supply is not as cost effective as it could be. This is clearly proven by the excess absolute (and especially on a risk adjusted basis) returns made by HKE and CLP. It is not as safe as is thought. The emissions from coal burning are harmful and costly to the community (health care costs and lost hours of work). It still relies (53%) on old coal based technology. The grid is low tech and is not integrated. It is a highly inefficient legacy electricity network with much excess obsolete capacity. Hong Kong could and should do a lot better.

G. The SCA has promoted the status quo, impeded innovation, competition and transparency, provides excessive returns to monopoly providers, has lead to substantial capital misallocation, and has not significantly improved the electricity supply of HK that still relies on 1990s technology. It provides poor value for HK businesses and households.

I. There is a serious question about the legality of the current energy monopolies in HK and the SCA itself when the Competition Ordinance (CO) comes into full force. Under s. 21 of the CO, it is likely the incumbents could face prosecution with forced divestiture of operations, assets or shares as possible outcomes.

## Q3 What is your view on the following areas in the future contractual arrangement (if any) between the Government and the power companies?

**RR response:**

## (a) duration

The SCA should be scrapped. The framework for a new open energy market should be devised rapidly. But this will take time. 3 years would be a reasonable timeframe. In the meantime:

A. renew the SCA from 2016 to 2020 at much lower rates (in line with international utility returns, ROAs of between 2-5% are the norm)

B. urgently set new long term goals for a unified energy market for the HKSAR with clear targets; and

C. develop a legal, technical, market framework for a new, modern, efficient, competitive energy market for Hong Kong (covering all energy: electricity, gas, fuel). There should be one HK Energy Authority to maximise efficiency and provide consistent regulation. Energy technologies have progressed substantially and there is now much interplay between different fuels and a much wider choice than in the past. The end result could be a win-win for all stakeholders and most importantly a new energy policy will further contribute to the long term growth, productivity, quality of life and competitiveness of the Hong Kong economy and its citizens.

## (b) permitted rate of return

Must be in line with international utilities returns especially on a risk adjusted basis, and in relation to the current very low interest rate environment. HK utilities have had returns of over 500% of the US electric utility average. Return on Assets should be in the range 2-5% at most (ROA is an obsolete return policy for a utility - it is more appropriate to cap a return on equity). This could be the quid - pro - quo for the incumbents avoiding immediate, potentially devastating, challenges under the Competition Ordinance.

## (c) tariff approval mechanism

Pricing as well as being reasonable should also be used to send signals to the market to incentivise saving, and fine tune consumer behaviour to maximise efficiency of the system. We are not in favour of reducing electricity prices from current levels so the current tariff approval mechanism by and large could be kept but with stronger HKSAR Government veto rights on tariffs and also, most importantly:

A. returns of the monopolists should be reduced in line with international returns for utilities

B. the savings that result should be transferred to the HKSAR Government and used to invest in better power generation technology, integrate the grid, improve the fuel mix to use more natural gas (Singapore is using 95% NG, HK is only using 23% NG), invest in a smart grid with smart metering via public tenders.

Set the goals and let the open market provide the best, most cost-effective solutions.

## (d) fuel cost arrangement

Globally most utilities take fuel cost risk. Not in HK (another reason HK utility returns should be much lower). The status quo can continue (fuel cost adjustment passed on to customers) but ROA for HKE and CLP must be 2-5% at most.

## (e) incentive and penalty scheme relating to the performance of the power companies

Targets should be set and stiff penalties levelled accordingly also in line with the demands of the new Competition Ordinance. See below.

## What other improvements would you suggest?

Hong Kong should have a world class electricity supply system. To the expert observer it currently falls well short. At a minimum, the following objectives should be set for the next 5-10 years:

A. reduce energy costs for the HK economy by 20% - the savings used not to reduce prices to consumers - but to invest in modern, efficient infrastructure as much investment is required over the next 10 years to upgrade current inefficient, antiquated energy generation, transport and distribution systems. In this way consumers need not pay more (on average) and the resources required for future capital projects are met by cutting down on monopoly profits.

B. boost natural gas use to 95% from current 22% and cut coal use to less than 5% from current 53% within 5 years (95% NG use already achieved by Singapore in 2014)

C. combine the transmission grid in HK and link up with the southern China grid within 2020 (increases system reliability and efficiency, opens up the market to cheaper supplies from China)

D. upgrade the grid to smart technologies (more efficient use of resources, opens up the possibilities of new high tech industries such as storage, electric vehicles, smart appliances, renewable energy integration)

E. aggressively reduce CO2 and harmful emissions (reduce health care costs to the community, reduce hours lost to work, improve HK's image)

F. provide a framework for appropriate renewable energy utilisation in Hong Kong also working together with other relevant areas (eg. building code to require use of built-in integrated photovoltaics in new buildings for example)

All the above will require the break up the current monopolies by separating generation from transmission, distribution and retail services.

## Q4 Should Hong Kong further promote renewable energy despite the higher tariff implications; and if so, about how much (in terms of percentage of your electricity bill) are you prepared to pay?

### RR response:

Renewable energy is most efficiently employed when optimising for local conditions. Solar and wind are the two most cost-effective, large scale renewable energy technologies now globally employed to great effect. Solar electricity can be generated for as little as 8-25 US$ cents / kWhr (depending on solar irradiation, scale, technology) and wind from as little as 6-15 US$ cents / kWhr (depending on wind assets, scale, on- or off- shore). Not far from Hong Kong's current electricity prices. **There is definitely significant potential for HK to employ cost effective renewable energy but one needs to be realistic about the scope. Hong Kong will not be able to efficiently produce more than 10-20% of its needs from renewable energy due to a lack of space.** We would encourage the HKSAR Government to explore in particular:

A. offshore wind (estimated potential for Hong Kong - 100-400MW)

B. rooftop solar photovoltaic (PV) for large structures (e.g. airport buildings, warehouses, port facilities, convention centres, ocean terminals, etc. etc.) - in the aggregate there is significant space in Hong Kong to develop up to 1000MW of PV.

C. built-in integrated solar photovoltaic (Hong Kong does not have much usable land for this purpose but there are plenty of vertical spaces in buildings). This is particularly cost effective when this technology is planned by architects at the design stage. It should be mandatory to employ BIPV for all new buildings in Hong Kong for example. Potential is 150-300MW.

D. waste to energy, biomass to energy and other technologies could also contribute at the margin

We would urge the HKSAR Government not to repeat the mistakes made by some western governments in the early days of renewable energy incentivisation. It is not up to planners to decide pricing and the right technologies. Provide long term goals and let the market come up with the right pricing and technologies by running appropriate auctions, to suit local conditions, in the right size, to attract sufficient players of repute and capability. For example to provide HK with 200 MW of wind power or rooftop solar power in designated sites. Hong Kong, by being late to the game has the advantage that there are now many global players active in this space that could be invited to Hong Kong to bid for specific projects in a cost effective manner.

**We disagree entirely on the fact that introducing renewable energy should have negative tariff implications.** For example there is no need to increase electricity prices to consumers if a) the excess profits of the monopolists are curbed, b) a carbon tax is levied on the CO2 emissions, c) the proceeds from which can be used to incentivise renewable energy use in the HKSAR considering there are clear benefits in doing so.

## Q5 What specific requirements would you suggest to be set out in the future contractual arrangement (if any) between the Government and the power companies to encourage the promotion of demand side management and renewable energy by the power companies?

### RR response:

The following is a minimum:

A. upgrade grid to smart technologies (using solutions that facilitate grid interconnection in future - open standards across Hong Kong and possibly the southern China grid);

B. introduce smart metering (using solutions that facilitate open communications with third party devices eg smart appliances);

C. establish a clear technical, pricing, regulatory framework for third party grid connection rights (eg. connecting 2 way inverters, solar and wind arrays to the grid), with penalties for the monopoly operators in case of delay or non compliance.

D. establish a clear technical, pricing, regulatory framework for net metering (so that parties that produce their own energy for part of the day using solar for example are allowed to do so) and at what price energy can be sold back to the grid, with penalties for the monopoly operators in case of delay or non compliance

E. consider setting targets for the current monopolists : eg. must install a minimum of 100 MW per annum of renewable energy generating equipment per annum.

# Q6 Do you have any other comments and suggestions?

## RR response:

As previously stated, the HKSAR does not have an integrated energy policy.  It should.  The creation of the HKSAR and closer integration with the Mainland offers the opportunity to move away from outdated colonial era policies and look at energy holistically.  In the post colonial era it makes little sense to have three separate energy monopolies (HKE, CLP and Towngas) that absorb excessive resources from the Hong Kong economy (the proof is in their outsize profits).

The HKSAR Government should consider a two step process:

- 1a) buy more time keeping the status quo BUT at much better value to the community with ROAs not exceeding 2-5% (in line with international returns)
- 1b) promote urgent steps to prepare the energy market of the future: integrating the power grids, moving HK to use Natural Gas, open up Towngas' gas network to third parties
- 1c) urgently set new long term goals for a unified energy market for the HKSAR with clear goals and targets; and
- 1d) develop a legal, technical, market framework for a new, modern, efficient, competitive energy market for Hong Kong (covering all energy: electricity, gas, fuel).  There should be one HK Energy Authority to maximise efficiency and provide consistent regulation.  Energy technologies have progressed substantially and there is now much interplay between different fuels and a much wider choice than in the past.  The end result could be a win-win for all stakeholders and most importantly, it will further contribute to the long term growth, productivity, quality of life and competitiveness of the Hong Kong economy and its citizens.
- 2) implement a new open market for energy starting in 2020 achieving full openness by 2025.

# **Part 4** - additional analysis and considerations

# Supplemental analysis

The HKSAR Government's public consultation has obvious limitations in scope, some, no doubt, for practical purposes.

We believe however, that the questions posed in the public consultation limit the scope of the debate. There are several important issues that are not capable of being adequately addressed within the limited scope of the consultation.

In the slides that follow we attempt to look at the broader scope of a possible reform of the HKSAR's electricity supply and the entire HKSAR energy market, hoping to provide a broader analysis of the status quo, and the challenges and the opportunities faced by the HKSAR as it attempts to reform its energy policy.

# Current strengths

Often mentioned strengths of the current electricity supply in Hong Kong are:

- **Reliability**
- **High Quality**
- **Safety**
- **Price competitiveness**

Is this really the case? What is the evidence?

# Current weaknesses

Often mentioned weaknesses of the current electricity supply in Hong Kong are:

- **<u>Monopolistic supply</u>**
- **<u>Low Tech</u>**
- **<u>Polluting</u>**
- **<u>Excessive $CO_2$ emissions</u>**

Is this really the case? What is the evidence?

# Summary analysis

- **Reliable** electricity supply: interruptions have been measured in minutes/annum in the HKSAR compared to hours/annum in other countries. This is an excellent and valuable achievement but also unsurprising considering[1]:

    1. much improved and reliable transmission and distribution technology over the past 20 years, the small distribution networks that HKE (Hong Kong Electric) and CLP (China Light & Power) - the incumbents - need to maintain in HK. In larger metropolitan areas and countries with larger networks often the length of the outage is highly dependent on the time taken by support crews to reach and repair the affected node;
    2. HK's limited temperature swings and urban character: power outages often occur as a result of severe weather events; HK's power lines are largely interred and protected from environmental damage;
    3. the exceptional returns on assets enjoyed by HKE and CLP over the past decades - one of their main arguments to preserve the exceptionally profitable status quo has been to achieve high levels of operational reliability to minimise risks of political and administrative scrutiny of their monopolies. Considering the small extent of the HK grid such an investment in reliability was comparatively small particularly in proportion to the outsize profits earned;
    4. If one wants to be picky, Singapore does even better (0.4 minutes lost compared to 2.3 minutes in HK - 2011-13 average (source: CLP).

    **However**, the electricity transmission and distribution networks on HK island, Lantau, Kowloon, the New Territories and China are not effectively interconnected. For example, in case of an unforeseen event destroying HKE's power generation (tsunami, earthquake, terrorist attack), Hong Kong island would be left without a meaningful electricity supply. Indonesia tsunami, Fukushima, 9/11 and other massively disruptive events were all thought of as unlikely until they occurred. There are no widely known contingencies in HK to guarantee supply in such a scenario. Grid interconnection and smart grid development should be high on the agenda of reforms for this reason alone.

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IT'S A FACT but …

# Summary analysis

- **<u>High Quality</u>** electricity supply: An important characteristic of electricity supply is its quality; having low voltage and harmonic fluctuations. The HKSAR benefits from having a very high quality supply by any measure. The merits of the incumbent monopoly suppliers are balanced by the HKSAR's particular circumstances[(2)]:

    1. voltage and harmonic fluctuations are much harder to manage in metropolitan areas / countries with extensive grid networks where generation and consumption are separated by great distances and great nodal complexity. HK's electric grid network is small and compact. The power stations are only a few miles from the point of consumption;
    2. low environmental risk as HK's power lines are largely interred and protected from environmental damage from HKSAR weather, e.g. thunderstorm activity often contributes to voltage and harmonic distortion (lightning strikes for example). There is a low lightning risks in HK to its transmission infrastructure;
    3. one of their main arguments to preserve the exceptionally profitable status quo in HK has been to ensure a high quality supply by the incumbents to minimise risks of political scrutiny of their monopolies. Considering the reduced size of the HK grid such a goal has not been difficult to achieve requiring relatively small investments in proportion to the outsize profits earned.

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IT'S A FACT

# Summary analysis

- **<u>Safe</u>** electricity supply: It has been a safe supply insofar as there have not been notable accidents, however this ignores the fact that[(3)]:

    1. environmental safety has been poor as there have been significant unaccounted for environmental and health impact risks and costs from <u>decades</u> of unscrubbed coal burning emissions (lead, cadmium, mercury. NOx, SOx);

    2. even now, 53% of fuel used for electricity generation in HK is coal. Environmental and health impact remains very substantial, not to mention continuing heavy $CO_2$ emissions. Billions of HKD of external costs have been inflicted on society but remain unaccounted;

    3. Daya Bay nuclear power plant is only a few km from the HK border and hence the HKSAR is not immune to nuclear accident risks although such a risk is widely regarded as extremely low. Nevertheless it is there. In addition, Guangdong province plans to build up to 8 additional nuclear power plants in future - most will be within 250 km of Hong Kong.

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IT'S A HALF TRUTH AT BEST

# Summary analysis

- **<u>Price competitive</u>** electricity supply:  HK electricity prices are considered competitive with those of other developed cities/countries (but upon closer analysis they are not so and one could easily argue they should have been <u>at least</u> 20% lower)[(4)]:
  - in 2015 the lowest residential tariff proposed by HKE is 107.2 cents / kWh equal to some 13.8 US$ cents. The highest is 186.4 cents equivalent to 24 US$ cents;
  - in 2015 the average basic tariff proposed by CLP is 114.2 cents / kWh equal to some 14.7 US$ cents;
  - These are all significantly higher than the US average in 2015, 12.6 US$ cents / kWh (US being a good proxy considering the similar fuel mix, but not a good proxy considering the huge distances utilities must cater for, so if anything favourable to the incumbents);
  - HKE and CLP (and the HKSAR Government in its current Public Consultation document) like to favourably compare their rates to those of other cities like Sydney, London, New York.  The fact is that in those cities the utilities need to serve much wider communities with much higher fixed infrastructure costs, transmission losses, cleaner fuel mixes, and significantly more stringent emissions regulations. Lastly prices of electricity in these cities include sales taxes (4% - 20%) for which there are none in Hong Kong;

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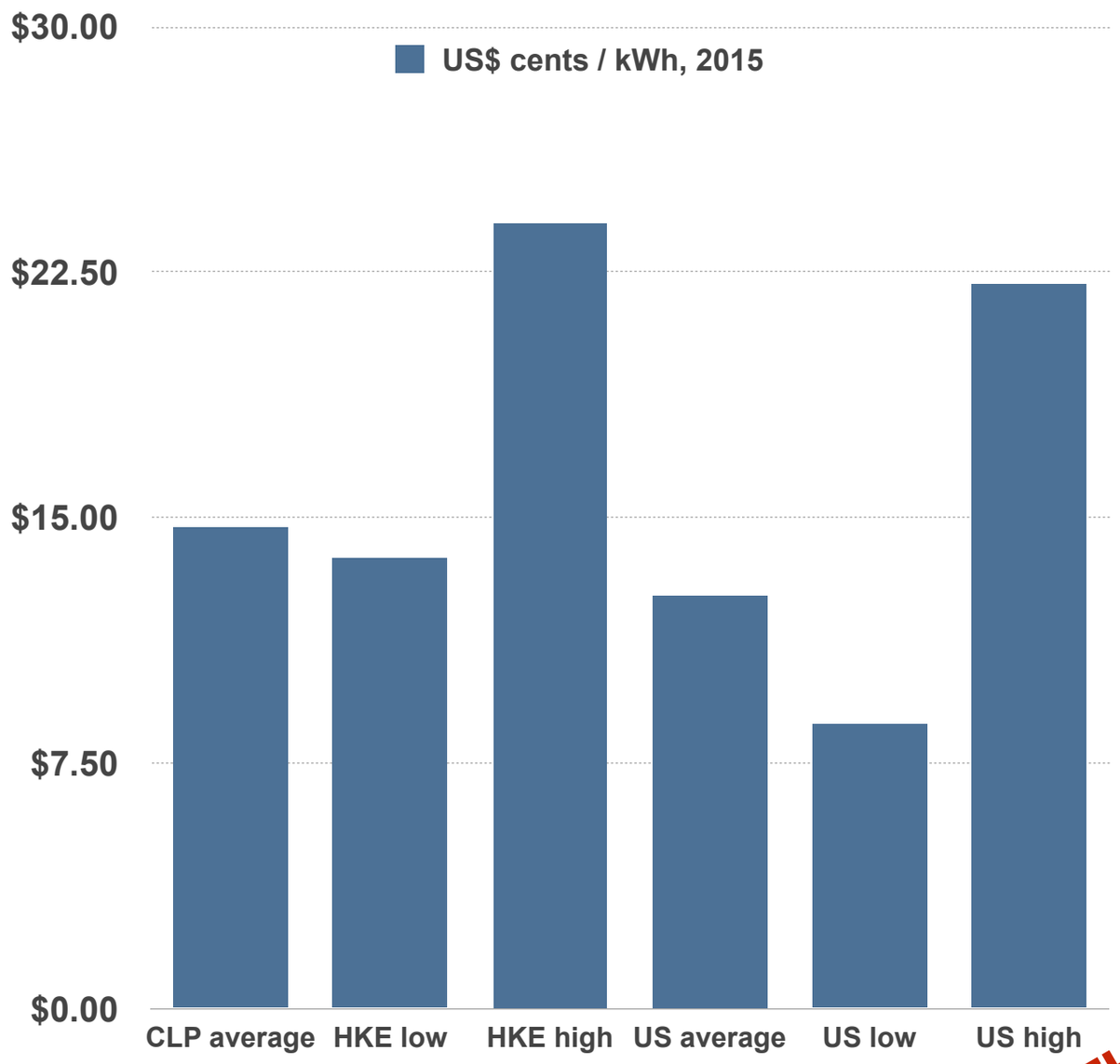
**IT'S A HALF TRUTH AT BEST**

# Summary analysis

- **<u>Price competitive</u>** electricity supply (continued):

- Average US residential electricity tariffs for the rolling 12 months ended March 2015 in the US were 12.6 US$ cents / kWh, some 97.65 HK$ cents / kWh.

- The range was from a low of 8.68 US$ cents / kWh in Washington State to a high of 22.12 US$ cents / kWh in Massachusetts, in March 2015. (see table ->)

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http://www.statista.com/statistics/183700/us-average-retail-electricity-price-since-1990/

IT'S A HALF TRUTH AT BEST

# Summary analysis

- **<u>Price competitive</u>** electricity supply (continued): Comparisons on a $/kWh basis are meaningless in isolation. Hong Kong enjoys conditions that support low costs of generation, transmission, distribution due to special circumstances, some specific to Hong Kong. Prices should have been significantly lower:
  - low transmissions losses and low distribution costs in HKSAR due to the small size of the grid, high concentration of users, short distance from generation to point of consumption (worth about 10% - 20% of final price);
  - Absence of sales or VAT taxes on electricity sales in HK (worth 4% - 20% of final price)
  - HK's low corporate tax environment (worth some 10% - 20% of final price - meaningful comparisons must be made after tax);
  - low cost generation infrastructure: coal and gas fired plants used in HK are relatively cheap to acquire, build and operate - negative externalities are not reflected in electricity prices in Hong Kong but are borne by the community in terms of increased healthcare costs, lost wages, lost hours of work);
  - low cost of fuel: 53% of the fuel used to generate electricity in HK is coal which is by far the cheapest fuel for power generation (when not accounting for negative externalities);
  - good operational efficiency attained by the monopoly suppliers (some on merit, some due to HK's high customer density);
  - and finally fuel cost adjustments are pushed onto taxpayers and consumers which means a much lower business risk for the generators since >50% of the final cost of electricity is represented by input fuel costs. This alone would argue for a lower allowed rate of return on the generators' investments/equity and hence lower electricity prices for customers.

HK electricity prices are somewhat comparable to those in other countries but they could / should be much lower (at least 20% lower) given HK's special circumstances. The evidence is in the profit margins of HKE and CLP.

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References:

http://www.enb.gov.hk/sites/default/files/en/node2605/Consultation%20Document.pdf



IT'S A HALF TRUTH AT BEST

# Summary analysis

- **<u>Monopoly</u>** electricity supply: to the external observer, accustomed to the economics of global utilities, it is somewhat surprising that past HK Governments, over decades, have perpetuated a monopoly (which could have been somewhat justified on efficiency grounds) but have also done so by granting private companies exceptionally generous returns (especially high for electricity utilities) via a Scheme of Control Agreement (SCA), while at the same time demanding very little in return (for example in terms of a significantly reduced environmental impact, better infrastructure, better value for government and consumers over time)[(5)]:
  - As can be seen from the table overleaf, **HK Electric enjoyed outsize profit margins in 2014 (29.6% net revenue margin achieved in 2014, it was well over 50% in the 1990s, and well over 45% in the early 2000s** …);
  - CLP enjoys similar results.

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References:

(5) http://www.enb.gov.hk/sites/default/files/en/node66/SCA_of_HEC_Eng.pdf

IT'S A FACT

# Summary analysis

- **<u>Monopoly</u>** (continued):

| HK Electric | 2014 | 2010 | 2009 | 2008 | 2005 |
|---|---|---|---|---|---|
| | HK$ millions | HK$ millions | HK$ millions | HK$ millions | HK$ millions |
| Gross tariff revenue | $14,222.00 | $13,194.00 | $12,723.00 | $14,542.00 | $12,485.00 |
| Net return | $4,216.00 | $4,633.00 | $4,548.00 | $6,452.00 | $6,134.00 |
| **Net revenue margin** | **29.6%** | **35.1%** | **35.7%** | **44.4%** | **49.1%** |
| Depreciation | $1,988.00 | $1,793.00 | $1,623.00 | $1,516.00 | $1,832.00 |
| Interest cost | $690.00 | $118.00 | $285.00 | $154.00 | $181.00 |
| Tax | $1,009.00 | $930.00 | $1,453.00 | $1,218.00 | $1,314.00 |
| EBITDA | $7,903.00 | $7,474.00 | $7,909.00 | $9,340.00 | $9,461.00 |
| **EBITDA / Revenue** | **55.6%** | **56.6%** | **62.2%** | **64.2%** | **75.8%** |

References:

http://www.hkelectric.com/web/IR/FinancialReports/AnnualReports/AnnualReport_2014_en.htm

IT'S A FACT

# Summary analysis

- **<u>Monopoly</u>** (continued):
  - HK Electric and CLP are the most profitable electric utilities in the world, by a very wide margin, and have been reaping these extraordinary profits for several decades virtually unchallenged.
  - Globally, electricity utilities operate on net profit margins (on sales) of about 5% to 10% (most however are in the low single digits - RWE for example, a large German power utility, has been operating over the past 5 years on net profit margins on sales of between 2.5% to 6.2%);
  - The extent of oversize returns earned by the incumbents in HK defies comprehension and is a textbook case of monopoly profits. There is no reasonable or rational justification for such a significant transfer of wealth from the public purse to privately held monopolies years after the initial rationale for the SCAs achieved their scope.

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http://www.rwe.com/app/wartung/hv2014/bpk_docs/RWE-Annual-Report-2014.pdf

http://www.wsj.com/articles/SB10001424127887324373204578374432165174290

IT'S A FACT

# Summary analysis

- **<u>Monopoly</u>** (continued):
  - Return on assets (ROA) is a concept with no significant international precedent. In the US for example utilities are regulated on a return on equity (ROE) basis. The focus in the SCA on the apparently low 9.99% ROA (it used to be 15% pre 2008) is highly disingenuous and wholly to the advantage of the incumbents. Due to their low risk, utility scale power assets can be financed with high leverage at very low interest costs, producing oversized sales margins and ROEs which is the only meaningful measure of return.
  - Even if one insisted on using ROAs, for electric utilities in the US ROAs are around 2% for example, which means that the incumbents in HK have enjoyed returns about 500% greater than the US utility average (not until long ago the allowed return was 700% the US average). There is also a strong case that with declining interest rates allowed for ROAs should have declined far below the current 9.99%.
  - It will be difficult to introduce meaningful competition into the Hong Kong electricity market without decisive and major reform because the incumbents hold deeply entrenched market dominance and deep vertical integration.
  - The precedents seem to require that. There is a history of challenges brought against HKE and CLP and their generous SCA concessions by Legco (amongst others) over the years. However these challenges were systematically seen through by the incumbents with minor changes, despite the overwhelming evidence that the SCA was ripe for change.

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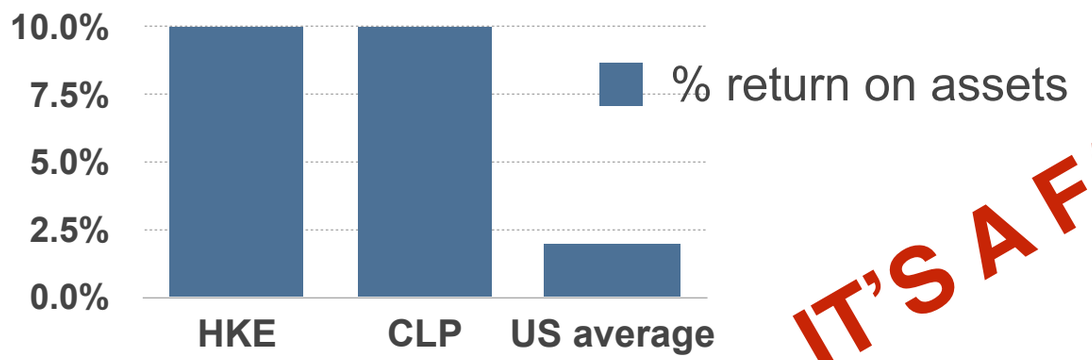
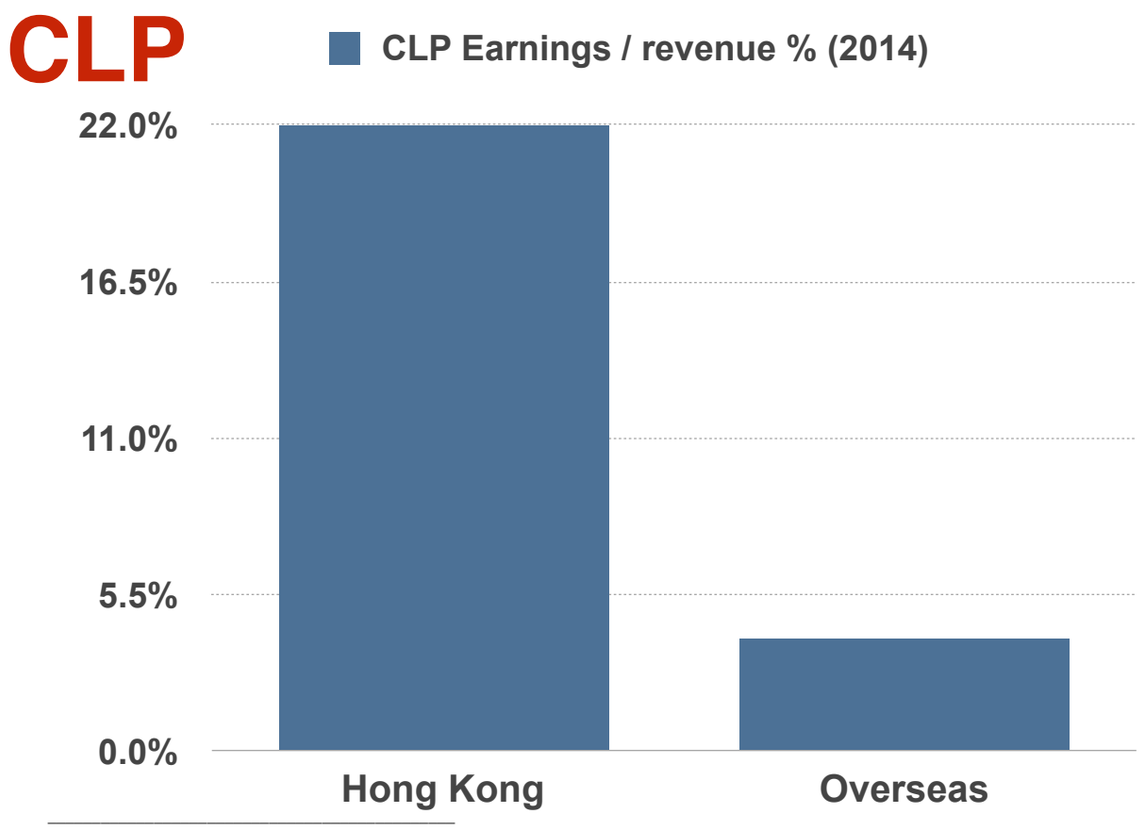
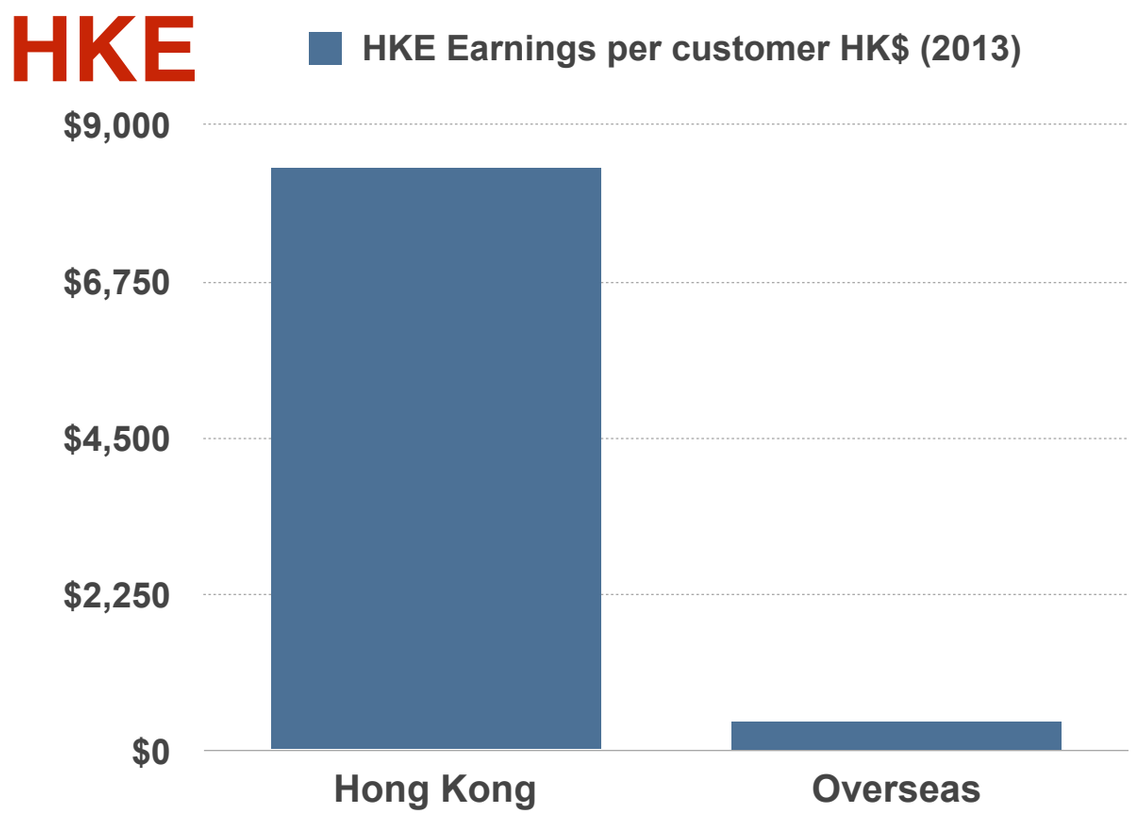



IT'S A FACT

# Summary analysis

- **<u>Monopoly</u>** (continued):
  - If anyone had any doubt as to the profitability of the current SCA arrangement for HKE and CLP one just needs to compare the profitability of their Hong Kong and overseas businesses:




References:

Power Assets 2013 annual report (these figures were not available for 2014)

http://www.powerassets.com/pahWeb/IR/FinancialReports/AnnualReports/AnnualReport2013_en.htm

CLP 2014 annual report

https://www.clpgroup.com/en/investors-information/financial-reports/our-reports?year=2014

IT'S A FACT

# Summary analysis

- **<u>Monopoly</u>** (continued):
  - Upon serious scrutiny the current monopoly has not served HK as well as the vested interests and (must be said) successive HK Governments would like customers, taxpayers and the public to believe.
  - Despite allowing the incumbents to earn massive profits and indirectly financing investment for tens of billions of HK$ in infrastructure, over decades, HK is left with outdated and outmoded polluting and inefficient power assets, relying largely on coal, an outdated transmission and distribution network and low tech metering.
  - By way of comparison, Singapore's fuel mix has moved to 95% natural gas (2014) while HK's languishes at 22%. Singapore has an open electricity market since 2003 with now 8 active power generators and 6 electricity retail licensees.
  - Consumers pay much higher electricity prices than they should if the incumbents were regulated in line with utilities world wide (prices in HK are demonstrably at least 20% higher than they should be). **<u>The evidence is in the profit margins of HKE and CLP.</u>**
  - Lack of competition and effective regulation has stifled innovation. No significant new transmission, distribution or generation technologies have been introduced to Hong Kong despite plenty of global proven developments over the past 20 years. Even the introduction of scrubbers and natural gas has taken much longer than necessary and still lags that in other developed countries.
  - There is now a serious question on the legality of the current monopoly arrangements when the Competition Ordinance (CO) comes into force later in 2015. Under Cap 619 s. 21 of the CO, it is likely the incumbents could face prosecution with forced divestiture of operations, assets, shares as possible outcomes.

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IT'S A FACT

# Summary analysis

- **<u>Monopoly</u>** (continued):

  - Along with several others around the world, the reform of the UK electricity markets is one of the best documented cases showcasing the benefits of opening up a monopoly to competition, and shows unequivocally how businesses and households have benefitted:

*"The 6.5 million customers who had changed their electricity supplier by June 2000 have together seen their bills fall by £299 million since the start of competition. This is a 15 per cent reduction in real terms, an average of £45 per customer. About half of this reduction is attributable to competition."*

References:

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IT'S A FACT

# Summary analysis

- **<u>Low Tech:</u>** Electricity generation, transmission and distribution in Hong Kong relies largely on 1980s - 1990s technology. Upgrading power generation equipment and the grid would bring substantial benefits to Hong Kong[(6)]:
  - An integrated smart grid would enable significant gains for both utilities and consumers by:
    - boosting the efficient use of generating assets
    - improved reliability and safety
    - reduced emissions leading to lower healthcare costs, fewer lost work hours, better quality of life
    - facilitate integration of cleaner, distributed generation (especially if the market was opened up)
    - better integration of electric vehicles/transportation
    - ultimately lessen the need to build new power plants and reduce capital expenditure borne by the community
    - facilitating opening up the market to new entrants to reduce power bills, provide new and better services, more employment opportunities, new markets for local startups, innovation and technologies
  - Smart metering at home would also provide benefits to consumers, taxpayers, utilities:
    - better consumer feedback on energy use enabling habits adjustment to lower bills, emissions
    - would enable the use smart appliances to reduce energy use
    - eliminate manual meter reading
    - in future enable embedded storage and home energy management systems
    - in an open electricity market rapidly enable supplier switching for a more efficient market
    - enable a smart grid to operate even more efficiently

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References:

(6) http://www.whatissmartgrid.org/smart-grid-101/consumer-benefits

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http://www.cpuc.ca.gov/PUC/energy/Demand+Response/benefits.htm

# Summary analysis

- **<u>Low Tech:</u>** (continued):
  - Along with an integrated modern, smart grid, modern electricity generation technologies such as tri-generation (a form of cogeneration of heat, cooling and power) should have been introduced on a large scale to HK long ago.
    - The electrical efficiency of a simple cycle plant power plant without waste heat utilisation typically ranges between 25% and 40%, a tri-generation combined cycle gas turbine (CCGT) can achieve electrical efficiencies of over 60%.
    - With a CCGT natural gas turbine electricity is generated and the waste heat is used in part to provide hot water and, via an absorption chiller, cooling. If this technology was adopted widely in Hong Kong for district power generation, it would substantially reduce electricity demand from the network for cooling and domestic water-heating and therefore significantly reduce harmful emissions.
    - It has been suggested that such technology has never been introduced (except on a tiny scale) directly threaten the profitable business model of all three HK utilities (HKE, CLP and The Hong Kong and China Gas).
  - Several other technologies could be introduced to Hong Kong that could leverage local conditions and provide plenty of research and startup opportunities to develop new technologies to produce new services and clean energy in dense urban environments - for example:
    - distributed small and medium scale tri-generation
    - built-in solar integrated power generation using the huge vertical surfaces of HK's buildings
    - waste to energy cogeneration plants
    - energy storage and integration with electrical vehicle transportation
    - tidal energy and offshore wind farms

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References:

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IT'S A FACT

# Summary analysis

- **<u>Pollution:</u>** Electricity production in Hong Kong still largely relies on coal as a base fuel (53%). Emissions are significant and severely damaging to public health (see Safety on slide 7) with significant costs borne by businesses and households. The pollution problem of course is wider than that caused by power generation but there is no doubt that this is the one area where emissions can be easily targeted and reduced [7]:
  1. The move to natural gas has been exceptionally slow in HK by any standards. It accounts for only 22% of HK's fuel mix while it is already 95% in Singapore, saddling Hong Kong with unnecessary health and other productivity related costs, not to mention negative image impact;
  2. there is an evident lack of leadership and vision to produce a cohesive energy plan for HK, no doubt opposed by vested interests in the utility and power sector in Hong Kong's electricity and gas supply monopolies:
     - why not leverage Towngas' Daipeng LNG terminal in Guangdong with pipeline already running to TaiPo as a conduit for plentiful NG supplies into Hong Kong? It could also enable third parties to generate their own power and provide opportunities to open up the market. An extension is planned to reach Lamma to serve HKE but all these uncoordinated efforts are a waste of resources and missed opportunities for Hong Kong.
     - why not switch Hong Kong and China Gas Ltd's hydrogen based Towngas to natural gas citywide? It would enable the use of the HK gas pipeline network to potentially increase competition locally by allowing distributed generation using LNG? (All excuses made to avoid such a change are technical nonsense such as the "difficulty" of converting existing appliances to NG, inconvenience to consumers etc. etc. - it has been done before in Europe and elsewhere on a massive scale and in any event the LONG TERM benefits far outweigh the SHORT TERM costs).

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http://www.ucsusa.org/clean_energy/coalvswind/c02c.html

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http://www.gdlng.com/en/project/project_02.aspx

IT'S A FACT

# Summary analysis

- **<u>Excessive $CO_2$ emissions:</u>** Electricity production in Hong Kong relies overwhelmingly on fossil fuels (75%) resulting in very high emissions per capita[8]:

  1. HK's $CO_2$ per capita emissions from the consumption of energy are approximately 2x those of the Mainland and some 70% higher than those of the United Kingdom;

  2. Given the wealth and resources of the HKSAR there is an argument for Hong Kong to be making a more meaningful effort to reduce its $CO_2$ emissions from power generation. It is somewhat embarrassing that with all its challenges the Mainland is able to do 2x better than the HKSAR in this area.

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References:

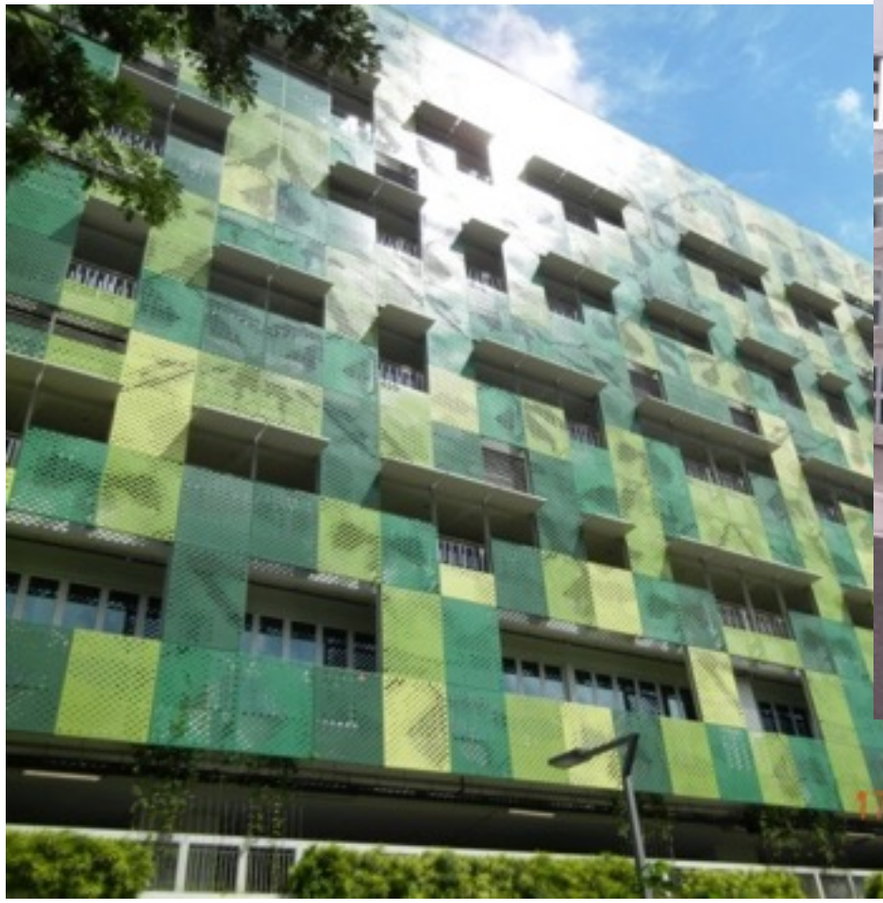
(8) http://www.eia.gov/cfapps/ipdbproject/iedindex3.cfm?tid=90&pid=45&aid=8&cid=regions&syid=2008&eyid=2012&unit=MMTCD

# Renewable Energy

Many policymakers know that solar and wind are now widely used, robust, cost effective technologies. **<u>However</u>**, not many know that with built-in solar photovoltaics (BIPV) an entire building's glass and solid facade can produce electricity. This will open up new possibilities for policymakers where horizontal space is a constraint, as in dense urban environments.

# Renewable Energy

BIPV can be used in place of glass / windows but also could be the electricity generating envelope for entire surfaces, that need not be transparent.



# Renewable Energy

Renewable energy is most efficiently employed when optimising for local conditions. Solar and wind are the two most cost-effective, large scale renewable energy technologies now globally employed to great effect. Solar electricity can be generated for as little as 8-25 US$ cents / kWhr (depending on solar irradiation, scale, technology) and wind from as little as 6-15 US$ cents / kWhr (depending on wind assets, scale, on- or off- shore). Not far from Hong Kong's current electricity prices. **There is definitely significant potential for HK to employ cost effective renewable energy but one needs to be realistic about the scope. Hong Kong will not be able to efficiently produce more than 10-20% of its needs from renewable energy due to a lack of space.** We would encourage the HKSAR Government to explore in particular:

A. **offshore wind** (estimated potential for Hong Kong - 100-400MW)

B. **rooftop solar photovoltaic** (PV) for large structures (e.g. airport buildings, warehouses, port facilities, convention centres, ocean terminals, etc. etc.) - in the aggregate there is significant space in Hong Kong to develop up to 1000MW of PV.

C. **built-in integrated solar photovoltaic** (Hong Kong does not have much usable land for this purpose but there are plenty of vertical spaces in buildings). This is particularly cost effective when this technology is planned by architects at the design stage. It should be mandatory to employ BIPV for all new buildings in Hong Kong for example. Potential is 150-300MW.

D. **waste to energy, biomass to energy** and other technologies could also contribute at the margin

We would urge the HKSAR Government not to repeat the mistakes made by some western governments in the early days of renewable energy incentivisation. It is not up to planners to decide pricing and the right technologies. Provide long term goals and let the market come up with the right pricing and technologies by running appropriate auctions, to suit local conditions, in the right size, to attract sufficient players of repute and capability. For example to provide HK with 200 MW of wind power or rooftop solar power in designated sites. Hong Kong, by being late to the game has the advantage that there are now many global players active in this space that could be invited to Hong Kong to bid for specific projects in a cost effective manner.

# In summary …

- **In our analysis, the HKSAR:**
  - currently **has an adequate, high quality, reliable electricity supply, albeit with dirty emissions**;
  - **although relatively expensive**, considering average incomes and the wealth of HK, it is considered affordable (by some).
- **It is also clear that the HKSAR could (and should) do <u>significantly</u> better:**
  - the SCA arrangement could have been justified 40-50 years ago when capital was scarce and HK needed to attract risk capital to build its electricity infrastructure. **The SCA arrangement should have been replaced by a significantly better regulatory framework, at least 30 years ago**;
  - **a poorly regulated monopoly regime has cost HK significantly** in terms of excessive electricity costs, harmful emissions, capital misallocation, inefficient use of fuel, and missed opportunities: lack of innovation in products and services, failure to develop local technologies that could have resulted in a strong, high tech, HK electricity industry that leverages on HK's skills in managing clean efficient energy in highly urbanised environments;
  - **pricing could have been significantly reduced**, or at least excessive profits of the monopolists reduced, and the savings could have been invested to improve what is wrong / old / obsolete with the electricity infrastructure without asking households and businesses to pay more, in the past and the future;
  - **capital expenditure has been inefficient and excessive** in the past, and directed in the wrong places (oversized, inefficient, low tech, excess capacity for example). It should have been directed to improve efficiency (tri-generation), reduce emissions, diversify fuel sources more rapidly, develop an integrated smart grid, and install smart metering, for example;
  - **pollution and $CO_2$ emissions have been, and continue to be, excessive** - the community has paid a very high price for decades and continues to pay a high price for excessive harmful emissions. These have been ignored by past pre- and post- colonial HK Administrations;
  - **HK now faces additional costs to remedy the errors of the past** while tens of billions of HKD have been misallocated resulting in a significant waste of resources for the HK community.

# What could be achieved?

**The HKSAR needs to decisively move on, ditching the timidity of the past, to tackle substantial inefficiencies in the local electricity (and gas) supply markets, that are indefensible.** There is no need to employ risky technologies or embark in risky structural changes to achieve very substantial long term gains for HK businesses and households in terms of increased reliability of supply, reduced energy costs, better services and reduced emissions. **Short term fears must be overcome decisively to achieve long term gains.**

**The chief obstacle to achieving a reformed and efficient energy market in the HKSAR is not technology or cost** - it is the timidity of past colonial and HKSAR administrations in confronting powerful entrenched interests.

**In the past, successive rounds of negotiations between Governments and the monopolists have always resulted in lopsided agreements resulting in exceptional returns for the monopolists with Governments demanding very little in return.** It is to be expected therefore that the existing energy monopolies in HK will naturally oppose any significant change with all their might, connections and lobbying efforts.

**However, there's no need for confrontation. With strong leadership, there is no reason why a win-win solution cannot be found to satisfy all stakeholders'** interests bearing in mind that the interests of a few (the existing monopolists) have been catered for exceptionally generously for decades.

**The time is now ripe for the interests of the wider community to take precedence over those of the monopolists, especially for the future competitiveness of the HKSAR.**

# What and how?

The following is a suggested **MINIMUM** list of targets for the HKSAR to aim for **in order to have a SAFER, MORE RELIABLE, MORE AFFORDABLE, CLEANER, HIGHER QUALITY, MORE INNOVATIVE, energy market for the 21st century:**

A. **Create** a new legal and technical framework, to be in place by 2020, for an open electricity, gas and services market under a single Energy Authority, separating: power generation, transmission, distribution, and retail services. Tackle demand by enacting energy saving policies in building codes for a more holistic approach to energy in HK (e.g. impose use of more advanced technologies enabled by a smart grid);

B. **Scrap** the SCAs in the medium term. In the short term extend them at internationally comparable ROAs of about 2% (compared to 9.99% current ROA for HKE and CLP);

C. **Open up** the market, by 2020, for the supply of: electricity generation, hot water, cooling and ancillary services to third parties (also from the Mainland) while at the same time fostering the growth of locally grown talent to create new services and technologies to cater for the energy market of a highly dense urban environment thus leveraging Hong Kong's unique skills, talent and location;

D. **Set** ambitious and stringent targets for the reduction of harmful coal burning and $CO_2$ emissions by 2025.

E. **Break up the monopolies by separating** HKE's and CLP's **T**ransmission and **D**istribution from power generation into a **TD**NewCo. Do the same for the Hong Kong and China Gas Company Ltd.;

F. **Upgrade** transmission and distribution networks to a smart grid with smart metering to enable new generation and energy saving technologies;

G. **Integrate** the transmission and distribution network between HKE and CLP and the southern China grid to increase synergies, help to open up the market, and to create a more robust, redundant supply;

H. **Incentivise** the Hong Kong and China Gas Company to transition to Natural Gas, ditching the wasteful transformation of Natural Gas into Towngas, and opening the gas pipeline network to third parties for localised tri-generation;

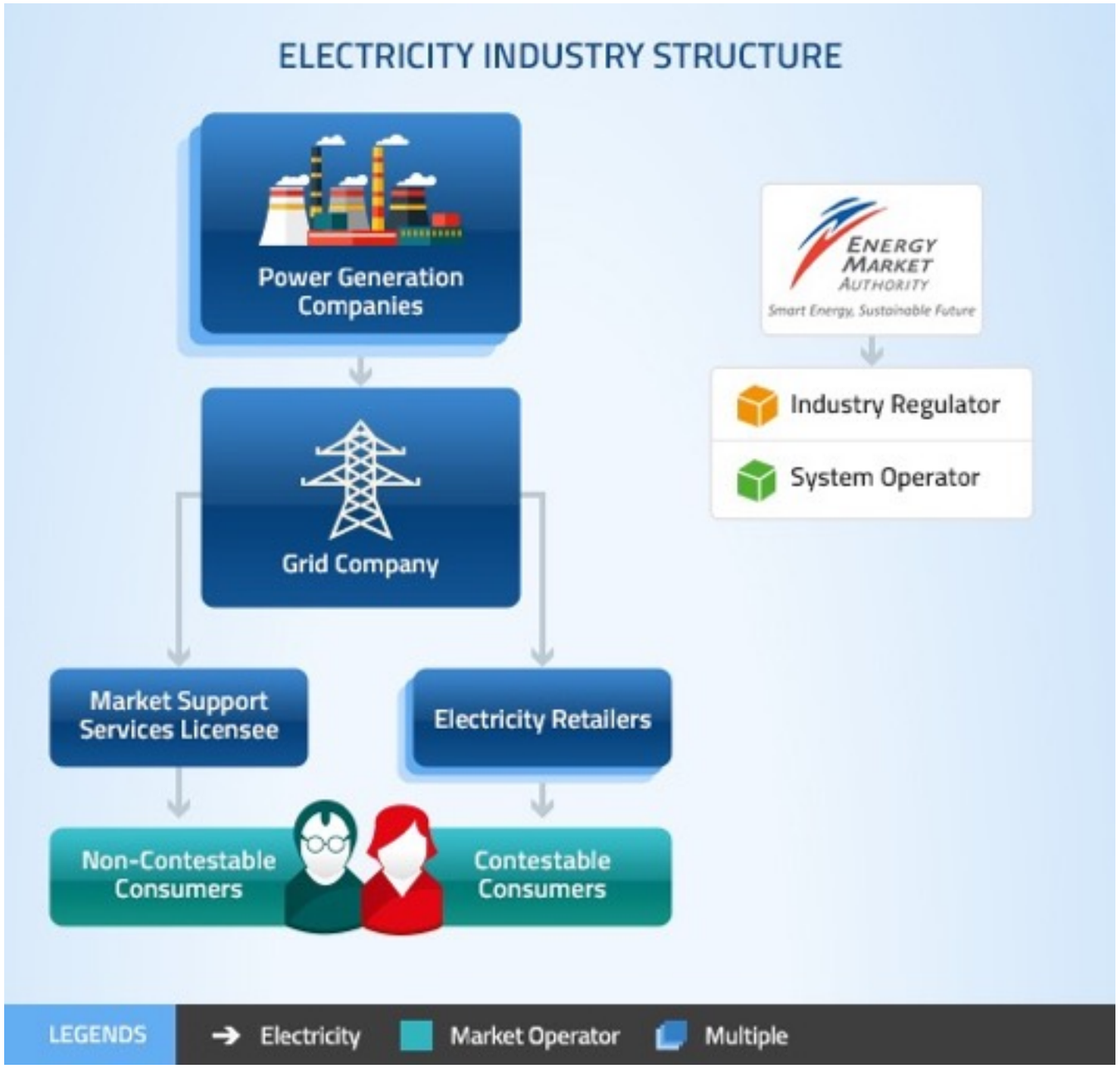
I. **Let the market** decide what the price of wholesale electricity should be by launching auctions to supply guaranteed capacity from both fossil and renewable energy sources, to the new integrated HK grid (TDNewCo) allowing mainland PRC and other entities to participate;

J. **Provide** a mechanism to protect tariffs for those most vulnerable (low income households), send price signals to reduce waste, and use generation more efficiently (night time use for example) as well as incentivising suitable renewable energy projects;

# A good precedent …

Singapore has successfully moved its electricity generating, transmission and distribution infrastructure from a government monopoly to an open market model separating generation, distribution from retail services.

Lessons can be usefully learnt from the Singapore experience given the similarities between the two territories and economies.



# Timeframe … time is money

It is clearly too late to enact tangible reforms before the expiry of the 2018 SCAs. Accordingly a 5 year plan needs to be enacted to achieve the following:

**By end 2015**:

A. agree the objectives of a strategic energy plan for the HKSAR
B. set the legal framework to abolish the existing monopolies (HKE, CLP, HKCG) under the Competition Ordinance
C. commence discussions to incentivise the Hong Kong and China Gas Company to transition to Natural Gas and to open the gas pipeline network to third parties to avoid forced divestiture of assets under the Competition Ordinance
D. start negotiations with the incumbents to avoid forced divestiture of assets under the Competition Ordinance to achieve:
    - immediate ROA reductions from a maximum of 5% to an internationally recognised 2%, at most, from 2016 to 2019
    - separation of generation, transmission, distribution by 2019;
    - integrate the transmission, distribution networks between HKE and CLP and the southern China grid by 2019;
    - commence upgrade of transmission and distribution network to a smart grid with smart metering, to be completed end 2019;

**By end 2016**: set ambitious and stringent targets for the reduction of harmful and $CO_2$ emissions by 2025.

# Timeframe … time is money

**By end 2016**: develop a mechanism to protect tariffs for those most vulnerable (low income households), and charge higher tariffs to large energy users to incentivise energy saving and use proceeds to finance capital spending projects;

**By end 2017**: launch auctions to supply guaranteed capacity to the new integrated HK grid (TDNewCo) by end 2020, allowing mainland PRC and other entities to participate;

**By end 2018**: develop a comprehensive legal, technical framework for an open electricity, gas and services market separating: power generation, transmission, distribution, and retail services for Hong Kong;

**By end 2019**: Separate HKE's and CLP's transmission and distribution from power generation into a TDNewCo.  Do the same for the Hong Kong and China Gas Company Ltd.;

**By end 2020**: Open up the market for the supply of: electricity generation, hot water, cooling and ancillary services to third parties (also from the Mainland) while at the same time fostering the growth of locally grown talent to create new services and technologies to cater for the energy market of a highly dense urban environment thus leveraging Hong Kong's unique skills, talent and location;

# A win win for all …

**HKSAR Government:**

- **improves on all its goals**: a MORE reliable, safer, MORE competitive, cleaner, electricity supply for the HKSAR without extracting more resources from the economy of the HKSAR;
- **enhances long term competitiveness of the HKSAR economy**;
- obtains **a substantially more rapid reduction of airborne pollutants and $CO_2$** emissions than under previous SCA frameworks;
- **enables more innovation and competition** in the power sector thus providing opportunities for local innovators to add value and create new services and technologies
- is able to **promote greater use of renewable energy** solutions suitable for the Hong Kong environment potentially developing local innovation and know-how
- **greater integration with the economy of southern China** (via grid)
- **enhances the rule of law** (monopolists must abide by $CO_2$ emissions restriction regardless of size, political and economic clout)

# A win win for all …

**<u>Households and businesses obtain:</u>**

- a significantly **better deal as taxpayers** than previous SCA schemes
- **no increase in electricity prices in the short term** to finance the upgrade of the distribution network to a smart grid, more efficient, cleaner generating equipment, improved choice and services, greater renewable energy offerings
- **greater choice** of electricity provider and **improved technology leading to lower energy costs in the longer term**
- **better services** including in future interface with smart appliances, home energy management systems for example
- a **cleaner environment**
- greater peace of mind (**improved electricity supply reliability**)

# A win win for all …

**<u>Incumbents (HKE, CLP - and Towngas):</u>**

- **inevitably loose excess profits** from their unsustainable monopolies (which in any event **they have enjoyed for decades**, against all odds)
- **avoid potentially devastating penalties** under the Competition Ordinance (forced divestitures on unfavourable terms)
- **remain in control of substantial assets** and a long term sustainable business