競爭事務委員會
COMPETITION COMMISSION

Competition Commission

Submission on "Public Consultation on the Future Development of the Electricity Market"

1. The Government of the Hong Kong SAR through the Environment Bureau (the Bureau) has invited public comment on its "Public Consultation on the Future Development of the Electricity Market" which was released on 31 March 2015 (2015 Consultation Paper or Consultation Paper). The 2015 Consultation Paper reviews the future development of the electricity market in Hong Kong, including by analysing the market readiness for new suppliers of electricity in 2018, identifying the preparatory work to be done to facilitate the introduction of competition, and setting out the options for modifying the current regulatory framework. The Competition Commission welcomes the opportunity to provide comments on the Consultation Paper, as the future of the electricity sector is a matter of great interest and importance to Hong Kong businesses and consumers.

2. The Competition Commission is an independent statutory body established under the Competition Ordinance (Cap 619) to enforce the provisions of the Ordinance which prohibit anti-competitive conduct. The functions of the Commission include "*to promote public understanding of the value of competition and how this Ordinance promotes competition*" and "*to advise the Government on competition matters in Hong Kong and outside Hong Kong*".[1] Pursuant to these functions, the Commission comments only on the competition matters raised by the 2015 Consultation Paper in this Submission.

3. At present, there is no competition in the electricity sector in Hong Kong. The Government is committed to the introduction of competition. In the Foreword to the Consultation Paper, Mr KS Wong, Secretary for the Environment, states:

> "*In conducting this review of the future development of the electricity market, we are not only guided by our four energy policy objectives of safety, reliability, affordability and environmental protection, but have also paid due regard to <u>our goal to introduce competition to the</u>*

[1] Competition Ordinance, sections 130(b) and (d).

electricity market when the requisite conditions are present" (emphasis added).

4. The Government's position on competition is qualified in that the commitment is to introduce competition when the "requisite conditions" are present. As discussed below, the requisite conditions for competition in the electricity market will not arise spontaneously of their own accord without Government action. An important characteristic of the electricity sector in Hong Kong is that, in their respective operating territories, each of the two generators of electricity is also the owner and operator of the transmission and distribution grids used to carry electricity from a generator to electricity customers. In these circumstances and in order to facilitate the entry of new suppliers of electricity, there must be a framework to establish the terms and conditions of access for potential new entrants to use the transmission and distribution grids. This framework, in the view of the Competition Commission, is one of the "requisite conditions" for competition to be introduced. Another is a means for trading electricity at the wholesale level. It is only the Government who can establish these requisite conditions for competition. The marketplace itself cannot and will not do this.

5. In this Submission, the Competition Commission:

(a) reviews the conclusion of the 2015 Consultation Paper that Hong Kong is not ready for competition in the electricity sector because the "requisite conditions" are not present;

(b) provides an overview of the framework under which electricity is supplied in Hong Kong;

(c) provides an overview of the electricity supply chain and the relevance of international experience in considering competition in Hong Kong; and

(d) analyses the preparatory work for the introduction of

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competition proposed by the Consultation Paper.

6. The Submission proposes a different approach as to how best to introduce competition in the Hong Kong electricity sector. In particular, the Competition Commission recommends that the Government establish an independent advisory body with the mandate to make recommendations on:

(a) a regulatory and institutional framework which would include the terms and conditions of network access for potential new entrants;

(b) a mechanism to allow for the selling of electricity at the wholesale level to facilitate competition from new suppliers;

(c) the specific measures required to enhance the interconnection between the Hong Kong grids themselves, and between the power grids in the Mainland and in Hong Kong; and

(d) the measures required to deal with the transitional issues arising from introducing competition in Hong Kong.

7. In order to avoid any further delay to introducing competition, the Competition Commission also recommends that the Government should take up the option provided in the current Scheme of Control Agreements to renew the agreements for a further five years, with adjustment to other terms as considered appropriate or advisable. The Commission believes this would be preferable to entering new long term agreements. As a consequence, competition could be introduced in 2023.

The Electricity Supply Chain

8. As noted in paragraph 3.3 of the 2015 Consultation Paper, the electricity industry can generally be thought of as consisting of four separate but vertically connected activities:

(a) Generation – this refers to the generation of electricity in electric power stations of different types;

(b) Transmission – this refers to the transmission of electricity at high voltages from the power stations where it is generated to sub-stations in different localities, that is, close to but not all the way into the customers' premises;

(c) Distribution – this refers to the transmission of electricity for the "last mile" from sub-stations into customers' premises by way of local networks of low-voltage power cables; and

(d) Retail – this refers to range of activities of marketing, billing, metering, and other associated activities related to the actual marketing and selling of electricity to customers.

9. These are the four core activities required in producing electric power and delivering it to customers. Each of these activities has its own characteristics and competition implications.[2]

Overview of the Hong Kong Electricity Supply Industry

10. Electricity supply in Hong Kong is currently governed by a pair of Scheme of Control Agreements (SCAs) between the Government and each of The Hongkong Electric Company and associated entities (HKE) and the CLP Group and associated entities (CLP). Under these SCAs, the two electricity

[2] Standard references on competition in, and the regulation of, electricity and other utilities include Viscusi, W.K., J.M. Vernon, and J.E. Harrington (2005), *Economics of Regulation and Antitrust*, MIT Press: Cambridge, MA; Armstrong, M., S. Cowan, and J.S. Vickers (1994), *Regulatory Reform: Economic Analysis and British Experience*, MIT Press: Cambridge, MA; Kahn, A.E. (1971), *The Economics of Regulation: Principles and Institutions*, MIT Press: Cambridge, MA; Littlechild, S, 1983, *Regulation of Telecommunications' Profitability*, HMSO: London; Beesley, M. and S. Littlechild (1989) 'The Regulation of Privatized Monopolies in the United Kingdom', *Rand Journal of Economics*, 20 (3): 454-472; Joskow, P. J. (2006). 'Regulation of Natural Monopolies', in *Handbook of Law and Economics* (eds.: A.M. Polinsky and S. Shavell), North-Holland, Amsterdam; Joskow, P. J. and R. Schmalensee (1986) 'Incentive Regulation for Electric Utilities', *Yale Journal of Regulation*, 4 (1): 1-49.

providers (together, the Companies) supply electricity to the entire jurisdiction, with HKE supplying Hong Kong Island, Ap Lei Chau, and Lamma Island, and CLP supplying Kowloon and the New Territories including the remaining Outlying Islands.

11. The SCAs have the following notable features:

(a) The Companies are permitted to earn a rate of return in respect of their electricity-related operations of 9.99% annually on their net fixed electricity-related assets (except in respect of their renewable energy-related assets, on which they are permitted to earn 11% of the net fixed asset values annually).[3] In this way, the SCAs effectively operate as a rate-of-return scheme of price regulation (see paragraphs 50 to 53 below) operating across all the different supply segments including generation, transmission, and distribution.

(b) Each of the SCAs will expire under its own terms during 2018 (the SCA with HKE expires on 31 December 2018; the SCA with CLP expires on 30 September 2018).[4] Each of the SCAs contains a renewal provision under which the Government may, but is not obliged to, renew the SCA for a further five years.[5]

(c) However, if the Government elects not to renew an SCA, the provision guaranteeing the permitted rate of return on electricity-related assets will nonetheless continue for another five years beyond the expiry of the SCA, the Government's decision not to renew the SCA notwithstanding.[6]

(d) Each of the SCAs provides broad indemnification for the Companies against any losses ("Stranded Costs") incurred as a

[3] Clause 4(2) of both SCAs.
[4] Clause 7(1) of both SCAs.
[5] Clause 7(2) of both SCAs.
[6] Clause 7(5) of both SCAs.

result of changes implemented by the Government to the electricity supply market (called a "Specified Market Change" under the SCAs) that cause a material impact on the respective Company in respect of any investments made or agreements entered into by the Companies under the SCAs in respect of electricity-related activities.[7]

12. There is no legislation that expressly creates rights or obligations to supply electricity in Hong Kong; these primary rights and obligations are found in the SCAs. Nevertheless, HKE and CLP have certain corollary rights and obligations under other laws, including:

(a) the Electricity Ordinance (Cap 406), which imposes a number of safety and reporting obligations on any electricity supplier in Hong Kong, including HKE and CLP;

(b) the Air Pollution Control Ordinance (Cap 311) and the Environmental Impact Assessment Ordinance (Cap 499), which require HKE and CLP to hold permits for certain aspects of their activities;

(c) rights to use land for electricity generation stations created by private treaty grants; and

(d) certain additional land-related rights, such as statutory easements granted to CLP.

13. HKE and CLP each operate as vertically-integrated electricity providers in their respective territories. In particular, each company is active in the four core activities required in producing electric power and delivering it to customers, namely generation, transmission, distribution and retailing. As such, they operate their own generation plants,[8] transmission and distribution

[7] Clause 8, both SCAs.
[8] CLP's main generation plants are owned by Castle Peak Power Company Ltd. (CAPCO), in which CLP holds

networks, and supply electricity directly to their customers.

14. Around 77% of electricity needs in Hong Kong are met by local generation, while the remaining 23% is imported through a dedicated transmission line from the Daya Bay Nuclear Power Station in Mainland China.[9] HKE and CLP account for the vast majority of local generation; though there are facilities for distributed power generation (including distributed Renewable Energy facilities) in Hong Kong, the scale of such facilities remains small.[10]

The Government's Policy of Introducing Competition to the Electricity Market in Hong Kong

15. As noted above, the Government is committed to introducing competition in the electricity sector. In the 2015 Consultation Paper, the Government concludes that the requisite market conditions for competition are not present. A number of reasons are given in support of this assessment.

16. First, the Consultation Paper points out that there are at present no new suppliers of electricity.[11] With respect to supply from new domestic (commercial) generators, the Consultation Paper remarks that "[i]*n the local context, it is unlikely that there would be a new sizable electricity supplier as land is in short supply for a new supplier to build generating plants*".[12] It points out that an area of about 25 hectares would be required for a new market player to build six gas-generating units (which would account for 20% of total installed capacity in Hong Kong).[13] It does not consider the possibility of supply from smaller (non-distributed) generation facilities.

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a 70% interest, with China Southern Power Grid Co. Ltd. owning the remaining 30%.

[9] Environment Bureau, 2014 "Future Fuel Mix for Electricity Generation" consultation document, paragraph 1.4.

[10] The 2015 Consultation Paper refers to such distributed generation as being "*small-scale*" (paragraph 4.11), and notes that the number of distributed Renewable Energy facilities "*remains small*" (paragraph 4.18).

[11] 2015 Consultation Paper, paragraphs 4.2 to 4.15, paragraph 4.16 ("*there will not be a substantial new source of supply either from the Mainland or locally in the near term…*").

[12] 2015 Consultation Paper, paragraph 4.10.

[13] 2015 Consultation Paper, paragraph 4.10.

17. The Consultation Paper notes that there may be opportunities for small-scale distributed power generation.[14] It should be noted that typically such generation is intended to provide electricity for use by the generator itself and not for commercial supply to others. The Paper also points out, based on a commissioned consultancy report, that it is technically feasible for Hong Kong to import electricity from the Mainland through the China Southern Power Grid Company (CSG) as CSG has a sufficient surplus of electricity to meet Hong Kong's requirements.[15]

18. Second, the Consultation Paper recognises that the introduction of new suppliers will require (a) grid access; and (b) enhancements to the interconnection of existing grids. Specifically, the Paper identifies that arrangements must be in place for access to the grids of the two power companies and that enhancements must be made to the interconnection between the power grids in the Mainland and in Hong Kong and the interconnection between the Hong Kong grids themselves.[16]

19. Taking each of the points in paragraph 18 in turn, the following additional details can be noted.

(a) Grid access

20. There is at present no regulatory framework for enabling third party access to the existing transmission and distribution grids of the two power companies. It is helpful to distinguish in this regard between the grid used for transmission of power at high voltages (transmission grid) and the grid used for distribution of power at lower voltages (distribution grid). The power companies are required only to allow customers with distributed Renewable Energy (RE) systems to connect to the (distribution) grid for back-up supply, and must offer reasonable terms in this respect under the terms of the existing

[14] 2015 Consultation Paper, paragraph 4.11.
[15] 2015 Consultation Paper, paragraph 4.6.
[16] The Paper also envisages requiring the power companies to publish the segregated annual cost data pertaining to their generation, transmission and distribution systems (2015 Consultation Paper, paragraph 4.25).

SCAs. Despite the arrangements which the Government has put in place in the SCAs, and the technical guidelines issued by the Electrical and Mechanical Services Department, the Consultation Paper acknowledges that the number of such distributed RE facilities remains small.[17]

21. To address this issue, the Consultation Paper states that the Government will discuss with the existing grid owners the opening up of their transmission grids for access by new players, and to jointly conduct a study with them during the next regulatory period to work out detailed arrangements in this respect.[18] This proposal reflects the Government's preference for a voluntary approach to grid access, whereby access would be negotiated between the grid owners and the third party customers on an individual, case-by-case basis.[19] It is said that the voluntary approach would take less time to implement as compared to the mandatory approach, while the mandatory approach could involve a lengthy legislative process and (some would argue) interference with private business operations and property rights by the Government.[20]

(b) Enhanced interconnection with the Mainland power grid and between the local power grids

22. The existing interconnection with the Mainland China grid is not sufficient to allow supply by Mainland suppliers into Hong Kong. The study commissioned by the Government indicates that new transmission infrastructure would be needed in order to bring electricity from CSG (and presumably other Mainland suppliers) into Hong Kong.[21] The Government considers that importing electricity from the Mainland would remain a feasible option in the longer run.[22] As noted above, there is surplus generation capacity and it is technically feasible for Hong Kong to import electricity directly from CSG.

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[17] 2015 Consultation Paper, paragraph 4.18.
[18] 2015 Consultation Paper, paragraph 4.22.
[19] 2015 Consultation Paper, paragraph 4.22.
[20] 2015 Consultation Paper, paragraphs 4.20, 4.21.
[21] 2015 Consultation Paper, paragraph 4.8.
[22] 2015 Consultation Paper, paragraph 4.23.

23. With respect to the existing interconnection between the two power companies' grids, the Consultation Paper notes that this needs to be strengthened if new sources of supply from the Mainland are to be introduced in Hong Kong.[23] It should be noted that enhancing these grids would also be needed for new domestic sources of supply and, as discussed in paragraph 27 below, to enable an effective wholesale electricity market to operate. The Paper comments that, at present, enhancing interconnection between the two Hong Kong grids will increase the tariff without bringing concrete benefits to customers at least in the near term.[24]

24. With this in mind, the Government plans to "*commission a study with the existing grid owners as well as CSG to look into the detailed arrangements for strengthening the interconnection between the power grids of the Mainland and Hong Kong as well as that between the existing grids in Hong Kong*".[25]

Options for Introducing Competition at different levels of the Electricity Supply Chain

25. The following sections outline how the Government might introduce competition into the electricity market in Hong Kong in a way consistent with international best practice and experience.

Generation

26. Generation is potentially a competitive market, and is so in many other jurisdictions around the world. Competition could be introduced in Hong Kong generation in essentially three ways. Each of these would likely require some sort of wholesale electricity market or "power pool" to be set up, including establishing an electricity market operator who would manage this power pool.

[23] 2015 Consultation Paper, paragraph 4.15.
[24] 2015 Consultation Paper, paragraph 4.14.
[25] 2015 Consultation Paper, paragraph 4.23.

27. The three ways are:

(a) By introducing competition between HKE's and CLP's existing assets, by allowing them to sell electricity produced in their own stations into the other's defined service area. This would require the existing interconnector between the two companies' power grids to be strengthened.

(b) By allowing new entrants to set up new electric power stations in Hong Kong and to sell the electricity generated to customers, for instance by way of a wholesale electricity market.

(c) Importing power from the Mainland. This would require the interconnection between the power grids in the Mainland and Hong Kong to be strengthened.

28. As noted above, each of these means of introducing competition in generation would be made most effective by the establishment of a wholesale electricity market (a "power pool") managed by a dedicated wholesale electricity market operator who would manage this market. Very broadly speaking, a wholesale electricity market operates much like most other wholesale markets, in that electricity demand (by customers) and supply (by generators) in any particular period of time are matched and the wholesale price for electricity that results is the market price of electricity for that period.

29. In the typical wholesale electricity market, the market operator receives "bids" from electricity generators for each period of time over the day (typically, in half-hour intervals) indicating the loads that the particular generator is willing to supply into the grid at different wholesale electricity prices. The market operator then matches those bids for each time period against the projected demand for that time period so that they match, and consequently orders the generators who have bid at or under the market clearing price to supply electricity into the grid. The resulting market clearing price is the wholesale electricity price for that time period. A wholesale electricity

market therefore works in many ways like a stock exchange, with a market operator continually balancing demand and supply to achieve a market clearing outcome (resulting in a stable electricity supply) and a market clearing price (giving a signal to the most efficient generators to be supplying the market at any one time).

30. The supply of electricity through a wholesale market in this way has important potential benefits and consequences for customers. The broad benefits to customers of competition, the process of suppliers competing with each other for customers, are well known. Customers will switch to a different supplier when the competing supplier offers a better, cheaper product – this is the case in markets generally, including electricity specifically. This process in turn incentivises suppliers to attempt to supply a better, cheaper product to customers.

31. Moreover, this process has particular benefits that arise specifically in the case of electricity markets. Electricity markets are typically characterised by consumer demand profiles that are substantially different at different times of day, with peak demand occurring at some parts of the day and off-peak demand at other parts of the day. Simultaneously, different generator types (with different fuels, such as gas-fired or coal-fired) have different cost structures and different levels of suitability to peak or off-peak pricing. For instance, coal-fired generators are typically viewed as particularly suitable for baseload power, in that that they are typically most cost-effective when they operate throughout the day, whereas gas-fired generators are typically relatively more cost-effective for peak-only operation.

32. Competition between different generators can enable the market to select the most cost-effective types of generations for different elements of the customer demand profile, by way of different prices, with the ultimate result of providing more cost-effective generation for customers, and cheaper prices. International experience shows that this process can commonly lead to an increased use of gas-fired generation for part-day peak-time operation. Gas-fired generation can be more cost-effective than coal-fired generation for

part-day operation when one takes into account all the generation costs, including the capacity construction capital costs in addition to the fuel and operating costs.

Transmission

33. Transmission is ordinarily carried out by means of large high-voltage cables. Such high-voltage cables are typically characterised by large economies of scale to the point of likely being natural monopolies in the economic sense. For this reason, transmission is typically considered to be better governed by being permitted to operate as monopolies subject to price regulation, thereby avoiding unnecessary duplication of natural monopoly networks.

34. Moreover, transmission is necessary for competitive generators to deliver their electricity to customers. This means that the transmission cables can be thought of as being "essential facilities", in that they are necessary for competition to be able to operate effectively in potentially competitive related markets (here, generation). Where an operator controls an essential facility of this kind, it is typically considered to be desirable to mandate regulated access to these facilities by producers (generators) in related markets. Here, this would mean mandating that the transmission cable operators permit the generators to access the transmission cables to be able to deliver that electricity to the final customer, subject to a regulated price for the transmission services. As noted above in paragraph 18 and following, the 2015 Consultation Paper recognises the importance of such arrangements: "*[a]llowing third party access to the existing power grids is a critical enabler for introducing new suppliers*".[26]

35. Mandated access would need to apply to all generators supplying into the network and for all customers buying directly from the network (for example, major commercial and institutional customers seeking to buy electricity from a particular generator). It is common for major commercial customers to agree with a particular generator that the generator will supply

[26] 2015 Consultation Paper, paragraph 4.18.

their specific electricity needs by way of a bilateral supply agreement, rather than that customer buying from the power pool. Such agreements can be very efficient from both parties' perspectives, but they can only work if the generator can transmit the contracted electricity to the customer. An access regime therefore would need to extend to bilateral supply agreements of this kind.

Distribution

36. Distribution is ordinarily carried out by means of a network of low-voltage cables into customers' premises. As with transmission cables, such low-voltage cable networks are typically characterised by large economies of scale to the point of likely being natural monopolies in the economic sense. For this reason, distribution is typically considered to be better governed by being permitted to operate as monopolies subject to price regulation, thereby avoiding unnecessary duplication of natural monopoly networks.

37. Moreover, as with transmission cables, distribution cables are similarly necessary for competitive generators to deliver their electricity to customers. This means that the distribution cables can be thought of as being "essential facilities", in that they are necessary for competition to be able to operate effectively in potentially competitive related markets (here, generation). As with transmission cables, it is typically considered to be desirable to mandate regulated access to these distribution facilities for the benefit of electricity producers (generators), by mandating that the distribution cable operators grant access to their services to enable any generator who supplies electricity into the power grid to deliver this electricity to the generator's final customer, subject to a regulated price for the distribution services.

Retail

38. A number of jurisdictions have introduced retail level competition over the provision of essentially regulated services. In some jurisdictions, retail competition extends to all customers, both larger industrial customers and smaller retail and household customers, whereas other jurisdictions reserve

retail competition for the larger industrial and commercial customers only. Larger industrial customers may typically benefit from individually negotiated tariff plans that, for instance, provide incentives for the customer to increase their industrial activities at off-peak times and restrict it at high-demand times. Smaller retail and household customers may benefit from greater choices over pricing and payments plans.

39. Retail competition can be considered as a part of a broader set of competition and regulatory reforms, but it is not a necessary part of making Hong Kong electricity markets more competitive. Where retail competition is introduced, it is generally rendered effective by the existence of competition at the generation level.

40. In summary, experience from other jurisdictions suggests that potentially the most significant gains from competition can occur through the introduction of competition in generation, buttressed by the economic regulation of transmission and distribution assets. By way of illustration, the most significant benefits resulting from Singapore's electricity market reforms are considered to arise from increased competition in generation arising from generation operators switching to more cost-effective fuel mixes to supply the electricity grid as a response to market signals: see further paragraphs 62 to 69 below.

Options for Regulatory Reform to Facilitate the Introduction of Competition

41. A common regulatory regime for the introduction of competition into electricity markets would be comprised of three core components:

(a) a wholesale electricity market, operated by a dedicated market operator;

(b) a scheme of access and pricing regulation for transmission networks, managed by a dedicated industry regulator; and

(c) a scheme of access and pricing regulation for distribution networks, managed by a dedicated industry regulator.

Wholesale electricity market

42. Competition among different generators typically operates by way of a wholesale electricity market, operated by a dedicated market operator. Generators bid offers of electricity supply into the wholesale market on a time-of-day basis, typically half-hourly intervals, and electricity retailers and direct customers bid to buy electricity. The electricity market operator then performs the market clearing and settlement functions.

43. As also described in paragraphs 26 to 32 above, the existence of such a wholesale market potentially enables competition both among existing generators and potential new generators, when accompanied by access and pricing regulation for network elements as described below. With such a market, existing generators can compete for each other's customers. Moreover, potential new entrants have a mechanism for attempting to enter the market and compete with incumbents for these same customers.

44. An effective electricity market would require the ability for electricity to move between different parts of Hong Kong. This would likely require the strengthening of the existing interconnection system between HKE's network and CLP's network, that is, to provide for sufficient high-voltage transmission capacity over the short distance and the harbour between these two networks. Strengthening the interconnection between the two networks would allow meaningful competition between these two suppliers. Moreover, the enhanced interconnection would likely also enhance the security and stability of supply for Hong Kong as a whole. Furthermore, with this strengthened interconnection the overall reserve generation capacity for Hong Kong as a whole may be smaller than the reserve capacities of the two companies managed separately, resulting in lower required future capital investment.

Mandated access regulation to natural monopoly networks necessary for competition in related markets to thrive

45. In order to allow new generators to supply electricity into the system with confidence, it is typical to place a form of access regulation on the natural monopoly infrastructure elements (typically, transmission and distribution). Access regulation refers to rules that would allow all electricity producers (generators) to gain mandated access to the natural monopoly cables to deliver their product to customers, subject to a regulated price.

46. The fundamental purpose of access regulation is to prevent an operator who has control over these "essential facilities" represented by the transmission and distribution cables from preventing competition in related, potentially competitive sectors (here, generation). This form of access regulation would be necessary to permit potential competition in generation and other potentially competitive or contestable markets to operate effectively.

47. Access regulation typically has two main elements: (1) a requirement to grant access, and (2) a requirement to grant access at some broadly cost-reflective price allowing for a reasonable profit by the operator (see the discussion of pricing regulation below). These two elements reflect that access to a network can be normally denied in two ways: (1) an outright refusal, and (2) a constructive refusal, in which access is nominally granted, but under terms and conditions (such as a price) that amount to a refusal to grant access. An access regime typically aims to prevent both types of refusal to grant access, outright refusals and constructive refusals. A wide number of regulatory jurisdictions around the world feature this type of access regime in connection with regulated network utilities industries.

Pricing regulation for natural monopoly networks in electricity markets

48. Where mandated access arrangements are in place, a key requirement is to determine the price of access to the network. In order to prevent constructive denials of access by way of unreasonably high prices, access

regimes typically set regulated access prices.

49. The two main forms of pricing regulation used in electricity market regulation around the world are (1) rate-of-return regulation and (2) price-cap or incentive-based regulation. The general trend around the world is that United States municipalities and states tend to favour rate-of-return regulation and European and Asian jurisdictions (including Singapore) tend to favour price-cap regulation.

Rate of return based regulation

50. Rate of return regulation fundamentally sets an upper limit on the rate of return that a regulated entity is permitted to earn on its capital and other assets. This type of regulatory regime essentially operates by:

(a) evaluating the entity's regulated asset base;

(b) evaluating an allowable rate of return on this asset base;

(c) calculating the total annual allowed revenue resulting from the allowed rate of return on the asset base;

(d) evaluating the expected demand for the relevant period; and

(e) setting the prices so that (in combination with the forecast demand) the prices give rise to this annual allowed revenue.

51. Hong Kong's electricity sector is currently effectively governed by a rate-of-return regulatory regime. As noted in paragraph 11, under the SCAs, each of the two providers are permitted to earn an annual rate of return of 9.99% on the value of their electricity-related assets. Prices to Hong Kong electricity customers are set in accordance with achieving this allowed rate of return.

52. Rate of return regulation is widely understood to have a strong

potential to create certain adverse outcomes from customers' perspectives. In particular, rate of return regulation is well known to create incentives for companies to over-invest in capital equipment, as the company is guaranteed a particular rate of return on its investment. Because of the price-setting mechanism, the costs of any over-investment are then directly passed on to customers by way of increased prices. Rate of return regulatory mechanisms share this potentially undesirable feature with other "cost-plus" pricing mechanisms more generally – a provider may be incentivised to spend as much as possible (because they will be reimbursed for all spending plus a margin or rate of return), rather than spending efficiently. This suggests that the regulatory regime in place may be generating excessive investment in excess capacity and other physical capital assets, in excess of what customers would ultimately wish to fund by way of electricity charges.

53. In addition, and importantly, this incentive for over-investment is significantly exacerbated where the allowed rate of return is materially higher than the entity's actual cost of capital (typically calculated as its weighted average cost of capital (WACC) taking into account the costs of both equity and debt financing). International experience suggests that regulated electricity infrastructure operators, earning safe cash flows subject to regulatory protection, tend to have costs of capital for the regulated assets of between 6% and 8% per annum; the Government's consultant appears to have reached similar conclusions.[27] This suggests that the 9.99% rate of return currently permitted under the SCAs may be too high. In particular, the allowed rate of return may be exacerbating a tendency to excessive consumer-funded investment relative to what customers would wish to pay for – in other words, customers are paying too much for their electricity as a result of this allowed rate of return.

Incentive-based regulation, or price caps

54. Incentive-based regulatory regimes are essentially designed to regulate prices in a way that corrects for the potentially misaligned incentives of rate-of-return regulatory regimes. Their core objective is to regulate prices (1)

[27] 2015 Consultation Paper, paragraph 5.16.

so that the prices reflect some measure of costs, while (2) providing incentives for operators to engage in efficient levels of investment, rather than the maximum level of investment.

55. The typical approach of incentive-based regulatory regimes operates broadly as follows:

(a) The regulator and the operator establish the efficient level of costs, based on benchmarking or similar approaches. There are a number of different ways by which this is made operational in different regulatory jurisdictions.

(b) Prices are set according to the efficient level of costs, typically in the form of a price cap.

(c) The efficient costs and the price cap are set for a particular period, typically five years, after which each is reviewed in a periodic regulatory review.

(d) In its ongoing operational management between regulatory reviews, the company effectively retains complete flexibility to manage its own costs.

(e) If the company generates cost savings by making efficiency and productivity gains, these savings accrue to the company's profit levels in the immediate terms. In this way, the regime provides incentives for the company to pursue innovation and efficiency initiatives because it is in the company's own financial interest to do so.

(f) In the longer term, these efficiency gains will be reflected in a lower level of efficient costs as determined by the regulatory during the periodic regulatory review.

56. The desirable features of an incentive-based regulatory regime are that it is capable of generating consumer benefits in the longer term while being compatible with the operator's incentive structures. Efficiency gains mean that fewer resources are used to deliver a result to customers, whereas those same efficiency gains will result in lower prices to customers in the longer run. The efficiency gains, while accruing to the company in the shorter term as increased profitability, will in the longer term accrue to the consumer (in the form of lower prices).

A dedicated sectoral regulator for natural monopoly network utilities

57. A regulatory regime including a wholesale market and access and pricing regulation would almost certainly require a specialist sector regulator to be established. Most jurisdictions around the world have specialist economic regulators for electricity and comparable utilities industries characterised by strong monopoly features. The reason is that it is generally recognised that the specialist expertise and industry knowledge required are better housed and developed in specialist industry regulators rather than general competition agencies or government departments.

58. Such dedicated regulators typically take into account the interaction of potentially competitive sectors and natural monopoly sectors that are vertically related to each other. As described above, generation is commonly a contestable (that is, potentially competitive) activity that requires access to natural monopoly infrastructure (typically regulated) to be able to deliver its product to its customers. Difficulties can arise where the operator controlling the regulated sector is also active in the contestable activities (generation and retail) and competes there against other entities. Such an operator can have the incentive to advantage its own generators or retailers (and disadvantage its rivals) in its operations of the regulated natural monopoly activities. For this reason, private bilateral negotiations between the parties are typically *not* effective in achieving reasonable access, as the party controlling the physical network typically has the incentive to deny its rivals access to the network even on otherwise reasonable commercial terms.

59. A typical regulatory regime takes account of these potential problems by requiring the operators of the regulated monopoly activities to grant access to the natural monopoly infrastructure in a way that is neutral between the infrastructure operator's own activities in the contestable sectors and its rivals in those sectors. A common way of achieving this is to require the vertically-integrated operator to treat its regulated monopoly activities by way of some form of management or similar separation. Different regulatory jurisdictions take different specific approaches to this issue.

The International Experience with Competition and Regulatory Reform in Electricity – the Example of Singapore

60. A number of jurisdictions have reformed their electricity markets and introduced competition in accordance with the broader principles described in this Submission.

61. We highlight here the reforms undertaken by Singapore as a way of exemplifying a common pattern of comprehensive reforms undertaken in a number of other jurisdictions over recent decades.

The Singapore example for regulatory reform[28]

62. Prior to 1995, Singapore's electricity industry had traditionally been vertically integrated and Government-owned. During the period 1995 to 2000, beginning with a corporatization process on 1 October 1995, the Government of Singapore fundamentally restructured the Singapore electricity industry with the overarching policy objective of electricity market liberalisation and the introduction of competition for the purposes of benefiting customers.

63. The central planks of the restructuring of Singapore's electricity market were:

[28] Energy Market Authority, "Regulating Singapore's Electricity Industry", presentation to the EAS Energy Market Deregulation Forum, 23 October 2012.

(a) Achieving a clear separation of the contestable or potentially competitive market segments from the natural monopoly segments; and

(b) Creating systems of open access to the infrastructure of the natural monopoly segments.

64. Two regulatory bodies were established:

(a) The Energy Market Authority (EMA), which acts as the industry regulator including the economic regulator of natural monopoly infrastructure, the industry promoter and developer, and the power system operator; and

(b) The Energy Market Company (EMC), which acts as the wholesale electricity market operator.

65. The generation market was viewed as being contestable (potentially competitive) and was opened to competition. The market operates by way of a wholesale electricity market operated by the EMC.

66. The transmission and distribution segments were seen as being non-contestable and were made the subject of economic price and access regulation by the EMA. The EMA regulates transmission and distribution by way of an incentive-based economic regulation regime of the kind described in paragraphs 54 to 56 above.

67. The retail segment was viewed as being contestable. Retail competition was introduced in a phased-in manner, first for large industrial and commercial customers, and subsequently in stages for smaller customers (mainly households). The EMA estimated in 2012 that around 75% of all customers had retail choice, and the EMA stated that it was working to extend

retail choice to the remaining 25% of customers.[29]

68. Some of the achievements of the Singapore electricity market restructuring include:

(a) Competition between generators and time-of-day wholesale pricing have induced generators to switch from older oil-fired steam plants to more cost-efficient gas-fired plants, which have the added benefit of being able to be powered down readily during off-peak periods. The EMA estimated in 2012 that electricity prices would have been 15% higher without this competition-induced shift in fuel mix.[30]

(b) Customers have benefited through a greater choice of retailers and pricing plans.

69. In the natural monopoly sectors (transmission and distribution), regulation has brought about lower rates for both transmission and distribution rates, while maintaining the high performance and levels of integrity of the power grid.

Relevance and limitation of international comparisons

70. It is important to understand the limitations of international comparisons. Direct price comparisons are difficult because of different physical, regulatory and other constraints in different systems, and different policy and political choices. Moreover, those comparisons obscure the most important question – this is not what happened elsewhere, but what would happen in Hong Kong under a different system.

71. Some examples cited in the 2015 Consultation Paper illustrate the

[29] "Regulating Singapore's Electricity Industry", cited in footnote 28 above.
[30] "Regulating Singapore's Electricity Industry", cited in footnote 28 above. Ministry of Trade and Industry, MTI Insights: FAQs on Electricity Tariffs, 12 July 2011, available at http://www.mti.gov.sg/MTIInsights/Pages/FAQs%20on%20Electricity%20Tariffs.aspx.

difficulty of direct international comparisons. Direct international comparisons and lessons need to be understood and learned in the context within which they occurred, and those contexts often differ in important ways.

(a) An example of different policy objectives is the changing policy objectives with respect to the United Kingdom's electricity regulatory regime over time.

From the time of the 1980s electricity market reforms until between around 2008 to 2010, the primary objective of the UK electricity regulatory framework was economic: using competition and incentive-based regulation to effect longer-term increases in efficiency in the industry and consequent decreases in prices to customers. During this period, the UK saw a sustained period of decreasing prices.

Between around 2008 and 2010, these economic goals were combined in the regulatory regime with parallel (and sometimes conflicting) environmental objectives on tackling climate change and other objectives related to income distribution, introducing to the regulatory remit the role of measures other than competition. As a consequence, renewable fuel mix objectives with the potential to increase prices were combined with the older economic objectives of decreasing prices and increasing efficiency while ensuring supply reliability. The impact of this shift on outcomes in the industry are widely believed to have included substantial increases in electricity prices. Electricity prices in the UK, which had been steadily declining since the 1990s, began to rise again around this time. However, the shifting policy objectives away from an economic regulatory objective and towards other UK national political imperatives mean that it is very difficult to draw any meaningful international lessons from recent increases in UK electricity prices.

(b) An example of important physical differences between locations is that Hong Kong has a very compact geography. This geography likely means that far less capital investment in transmission capacity is required in Hong Kong relative to most other jurisdictions, with the consequence that the efficient transmission cost component of Hong Kong electricity prices is likely to be significantly lower than in other comparable other jurisdictions.

(c) A further example of unusual local conditions is provided by the California electricity crisis of 2000-01, when wholesale electricity rose very substantially and blackouts and brownouts occurred in that U.S. state. As suggested in the Consultation Paper[31] and as is widely agreed by the U.S. Federal Energy Regulatory Commission and others, these events were possible only because of an unusual confluence of events, including flawed market design and inconsistent market rules, and market manipulation by Enron Corp. traders and others taking advantage of these market design problems.

This market manipulation was essentially brought about by parties artificially creating blackouts by "economic withholding", that is, by taking plants off line for the purpose of causing the electricity price to spike; the flawed market design enabled this manipulation to take place. This manipulation of problems with market design ultimately led to Government and private litigant legal action resulting in very substantial payments by Enron Corp. and other energy traders in settlement of their market manipulation.[32]

[31] 2015 Consultation Paper, paragraph 3.10.

[32] In relation to Enron settlement, see for example, Federal Energy Regulatory Commission "Fact Sheet on Enron Settlement", 15 July 2005, available at http://www.ferc.gov/industries/electric/indus-act/wec/settlements/07-15-05-enron.asp. In relation to settlements with other parties, see for example, State of California Department of Justice press release, "Attorney General

However, this type of event is extremely rare in the broader international experience of electricity market competition reform, and has never recurred in California.

72. The Singapore example is useful to draw upon because of the strong similarities between Hong Kong and Singapore, because of the Government of Singapore's highly effective and deliberate implementation of a widely accepted approach to electricity market reform, and because this reform is widely thought to have substantially benefited customers in the way outlined above.

Assessing Government's Actions to Introduce Competition

73. In this section we assess the Government's proposals, as outlined in the 2015 Consultation Paper, in respect of preparatory work to facilitate the introduction of competition in the Hong Kong electricity sector. As discussed in paragraphs 15 to 24 above, the proposed preparatory work would deal with grid access and enhancing grid interconnection (within Hong Kong and between Hong Kong and the Mainland).

74. The Government's commitment to the goal of introducing competition in the Hong Kong electricity sector is apparent from the Government's position at the time of entering the current SCAs in January 2008.[33] In his statement announcing the signing of the new SCAs, the then

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Kamala D. Harris Announces $750 Million Settlement Stemming from California Energy Crisis", 16 August 2013, available at https://oag.ca.gov/news/press-releases/attorney-general-kamala-d-harris-announces-750-million-settlement-stemming.

[33] The Government has also indicated its commitment to introducing competition to the electricity market on a number of occasions both prior and subsequent to the signing of the SCAs. See, for example:

(1) Statement by the then Secretary for Economic Development and Labour, Mr. Stephen Ip Shu Kwan, extracted from the official records of a Legislative Council meeting of 15 February 2006, page 4721, "*We will endeavour to make every preparation for a gradual liberalization of the market within the next 10 years, …*".

(2) Statement by the then Secretary for the Environment, Mr. Edward Yau during Panel on Economic Service meeting of 18 July 2007, paragraph 26, page 11 of minutes of meeting, "*The Secretary for the Environment*] *confirmed that it was the Administration's long-term objective to further open up the electricity market of Hong Kong. The Administration would make the necessary preparation during the next 10 years, including drawing up the proper regulatory framework for other new supply sources to access the existing power*

Secretary for the Environment, Mr. Edward Yau, stated that the agreements "*fully reflect the Government's policy objectives of 'reducing tariffs and emissions; and paving the way for an open market'*" (emphasis added).[34] Similarly, the Government's briefing paper to the Legislative Council on the new SCAs refers to the "*Government's stated intention to introduce competition to the electricity market as early as 2018*"[35] and stated that the Government would "*proceed with the preparation for the opening up of the electricity market*".[36]

75. Indeed, in the statement by Mr. Yau referred to above, the Secretary suggested that the reduction of the term of the new SCAs from 15 years to 10 years was specifically designed to enable preparation for an open market: "*On the preparation for an open market, the tenure of the new agreements will be reduced from the existing 15 years to 10 years*". He indicated that the Government would take into account the market readiness for an open market in deciding whether to extend the tenure of the current SCAs when they expire in 2018 for another five years.

76. In public statements and various consultation and briefing papers relating to the 2008 SCAs, the Government outlined the preparations that it would take to allow for the possible opening up of the electricity market.

77. As with the current 2015 Consultation Paper, these preparations related to grid access and enhancing interconnections between the power grids. The Government referred in particular to conducting "*studies on open market models and the regulatory framework, as well as enhanced interconnection*

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grid".

(3) Environment Bureau, 2014 "Future Fuel Mix for Electricity Generation" consultation document, paragraph 1.16, "*The Government has undertaken to carry out preparatory work, including studying the feasibility to open up the market, within the current regulatory period, before implementing any changes to the post-2018 electricity supply regulatory framework*".

[34] Government press release, "New Scheme of Control Agreements reached with the two power companies", 7 January 2008.

[35] CB(1)546/07-08(01), Legislative Council Panel on Economic Development, "New Scheme of Control Agreements With the Two Power Companies", 7 January 2008, paragraph 14.

[36] CB(1)546/07-08(01), cited in footnote 35 above, paragraph 21.

between the grids of the two power companies".[37] It indicated that it would proceed with "*the formulation of a new market mechanism and the associated regulatory framework, in the next regulatory period*".[38]

78. The position of the Government regarding the introduction of competition is reflected in the current SCAs themselves. They contemplate the introduction of competition after the expiry of the agreements in 2018.[39] It is envisaged that, in the period prior to January 2016, the Government will discuss with the two power companies market readiness, potential future changes to the electricity supply regulatory framework and transition issues.[40] In addition, the SCAs contain a clause to recover so-called Stranded Costs relating to investments made under the SCAs which are impacted by changes implemented by the Government to the electricity supply market structure (namely, "Specified Market Changes").[41]

79. The measures relating to the introduction of competition outlined in the SCAs and Government statements in 2008 thus bear a number of similarities with the measures proposed in the 2015 Consultation Paper.[42] In both cases, discussions with the power companies and the undertaking of studies in the relevant areas seem to be the favoured approach towards preparing for the opening of the market.

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[37] Government press release, cited in footnote 34 above.
[38] CB(1)546/07-08(01), cited in footnote 35, paragraph 21.
[39] See, for example, recital (D) and clause 7(3) of both SCAs.
[40] Clause 7(3), both SCAs.
[41] See clause 8, both SCAs. "Stranded Costs" is defined in Schedule 1 of both SCAs.
[42] The 2005 consultation on the previous SCAs also proposed a number of specific preparatory measures around grid access and interconnection between the power grids, which are again similar in substance with those proposed in the 2015 Consultation Paper. The Government indicated, for example, that it would:
(1) "*draw up the regulatory framework regarding provision of grid access for other new supply sources in the long run*" (2005 consultation paper for Stage II Consultation, paragraph 2.22);
(2) "*work with the two power companies to review and harmonise the planning criteria and reliability standards for the interconnected power system*" (2005 consultation paper for Stage II Consultation, paragraph 2.25); and
(3) "*make preparations for enhanced interconnection [with Guangdong], covering both technical and regulatory aspects such as conducting power system planning & utilisation studies and power flow assessments, and preparing for the relevant legislative framework*" (2005 consultation paper for Stage II Consultation, paragraph 2.26).

80. Based on a review of the public record, it is reasonable to conclude that limited progress has been made since 2008 to carry out the preparatory work proposed by the Government when the current SCAs were signed. As far as the Commission is aware, the discussions with the power companies envisaged in the SCAs have not been held (although it is noted that the period for such talks envisaged in the SCAs has not yet expired[43]). The consultancy study which was commissioned with respect to CSG referred to in the 2015 Consultation Paper does not seem to have addressed the key question of enhancing interconnection between the CSG grid and Hong Kong.

81. The Government recognises that the benefits from competition would likely come from the introduction of new sources of supply, both domestic and from the Mainland. As the 2015 Consultation Paper suggests, competition would not come in the transmission segment (and by implication, the distribution segment) of the supply chain.[44] The Government has acknowledged that "*[a]llowing third party access to the existing power grids is a critical enabler for introducing new suppliers*", as mentioned above.[45] As the Government has identified, enhancing interconnection of the grids within Hong Kong and between Hong Kong and the Mainland is also needed to facilitate competition from new suppliers.

82. The experience since the conclusion of the existing SCAs in 2008 suggests that the Government's preparatory measures to date have not been enough to bring about the necessary access arrangements. The measures proposed in the 2015 Consultation Paper, which take a similar approach in terms of recommending studies into the relevant issues and discussions with the power companies, are therefore, unlikely to be sufficient to enable the opening of the market.

83. Among other things, it may be queried whether the voluntary

[43] According to clause 7(3) of both SCAs, such discussions are to occur prior to 1 January 2016.
[44] 2015 Consultation Paper, paragraph 3.4, "*Transmission and distribution businesses are generally regarded as natural monopolies as it would not be practical or economical to have more than one set of transmission and distribution network in the same geographical area*".
[45] 2015 Consultation Paper, paragraph 4.18.

approach toward grid access favoured in the Consultation Paper would in fact lead to significant new third party supply. The lack of incentives on the part of the power companies to facilitate alternative suppliers suggests it may be difficult for an agreement on reasonable access terms to be reached on a voluntary basis without either direct Government intervention or the threat thereof if satisfactory voluntary arrangements cannot be made. The experience with respect to grid connection by distributed RE facilities also suggests there may be limitations in practice to this approach.

84. In addition, the Consultation Paper proposes that the future grid access be developed by the Government discussing the issues with the electricity companies.[46] The Competition Commission does not believe that such discussions are the best way to achieve a policy direction that will be in the interests of Hong Kong customers and the wider Hong Kong economy.

85. The views of the power companies along with other stakeholders are of course important to the consideration of any proposal for regulatory reform. The Commission recommends that such stakeholders should be actively consulted in the relevant discussions. As outlined below, however, those discussions should be led by an independent advisory body seeking the views of these stakeholders as necessary, rather than by the power companies themselves.

86. As the power companies are fully vertically integrated operations engaging in generation, transmission, distribution and retail components, it is not in their self-interest to facilitate the entry of new suppliers to compete with them. The disappointing experience with RE distributed power referred to in the Consultation Paper again illustrates this point. As such, working with the power companies to develop terms of access is unlikely to be productive.

[46] See, for example, 2015 Consultation Paper, page 4, Foreword, "*Having regard to the outcome of this consultation, we will commence discussion with the power companies to draw up the regulatory arrangement for the electricity market after the expiry of the current term of SCAs*" and paragraph 4.22, "*We plan to discuss with the existing grid owners to open up their power grids for access by new players, and to jointly conduct a study with them during the next regulatory period with a view to working out the detailed arrangements for access by new players to the existing power grids preferably on a voluntary basis*".

Recommendations on Preferred Approach to Introducing Competition

87. The Commission agrees with the 2015 Consultation Paper that the requisite conditions for the introduction of competition are not yet in place, given the current absence of new sources of supply and the required framework for access. To facilitate meaningful competition in the supply of electricity, a regulatory framework must be established to provide access to the transmission and distribution infrastructure by both suppliers and buyers. Further, there must be a means, such as through the creation of a wholesale market, for electricity to be bought and sold between different suppliers and buyers.

88. Both these steps are necessary to achieve the goal of meaningful competition. Efforts by the Government which are focused on consultation and joint development with the power companies are unlikely to be productive.

Recommendation 1: Establishment of independent advisory body

89. Having regard to all the circumstances, the Competition Commission is of the view that the preferred approach is for an independent advisory body to be established to make recommendations concerning the introduction of competition in the Hong Kong electricity sector.

90. Accordingly, the Competition Commission recommends that the Government establish an independent advisory body as soon as possible with the mandate to make recommendations on:

(a) a regulatory and institutional framework which would include the terms and conditions of network access for potential new entrants;

(b) a mechanism to allow for the selling of electricity at the wholesale level to facilitate competition from new suppliers;

(c) the specific measures required to enhance the interconnection

between the Hong Kong grids themselves, and between the power grids in the Mainland and in Hong Kong; and

(d) the measures required to deal with the transitional issues arising from introducing competition in Hong Kong.

91. The Competition Commission appreciates that having regard to certain provisions of the current SCAs and other constraints that a very substantial lead time, of perhaps three years or longer, will be required for significant changes in the market and regulatory environment to be implemented. In consequence, the Competition Commission recommends that the independent advisory body be established by 2016 and be required to publish a report on the above issues within 24 months. This would allow the Government sufficient time to consider the report and to implement its recommendations including preparing relevant legislative proposals before 2023.

92. Such an independent advisory body would need to be properly resourced and staffed. In particular, the staff should led by experienced and qualified experts in the relevant fields, which include industry knowledge, engineering, the economics of regulation, and law.

Recommendation 2: Exercise of option to renew SCAs for additional five years

93. In order to avoid any further delay to introducing competition, the Competition Commission also recommends that the Government should take up the option provided in the current SCAs to renew the agreements for a further five years, with adjustment to other terms as considered appropriate or advisable. The Commission believes this would be preferable to entering new long term agreements. As a consequence, competition could be introduced in 2023.