

## 回應表格

### 香港的未來發電燃料組合公眾諮詢

請於2014年6月18日或之前透過以下方式提交你的意見。

郵寄地址：香港添馬添美道二號政府總部東翼十五樓環境局電力檢討科

電子郵件：fuel\_mix@enb.gov.hk

傳真：2147 5834

#### 第一部分(見註)

這是  團體回應 (代表個別團體或機構意見) 或

個人回應 (代表個人意見)

太古城青少年義工服務團

(電話)

#### 第二部分

#### 燃料組合

燃料組合	輸入		天然氣	煤 (及可再生能源)
	核能 (大亞灣核電站)	從電網購電		
現時 (2012)	23%	-	22%	55%**
方案1* 通過從內地電 網購電以輸入 更多電力	20%	30%	40%	10%
	總共：50%			
方案2* 利用更多天然 氣作本地發電	20%	-	60%	20%

\*以上的燃料比例用以提供一個基礎作規劃電力供應所需的基礎。不同燃料的實際分配應按實際情況釐定。

\*\*包括少量燃油。

第三部分

具體諮詢問題

問1: 就安全、可靠性、合理價格、環保表現及其他相關的考慮而言，你對兩個燃料組合方案有何意見？(請就每個方案說明你的看法)

方案	支持	不支持	不支持方案的原因 (可選擇多過一項)
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> 安全 <input checked="" type="checkbox"/> 可靠性 <input checked="" type="checkbox"/> 合理價格 <input checked="" type="checkbox"/> 環保表現 <input type="checkbox"/> 其他 (請註明): _____
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 安全 <input type="checkbox"/> 可靠性 <input type="checkbox"/> 合理價格 <input type="checkbox"/> 環保表現 <input type="checkbox"/> 其他 (請註明): _____

問2: 你認為在兩個燃料組合方案中，哪一個較理想？為什麼？(請只選擇一個)

- 方案1   
 方案2

原因: (可選擇多過一項)

- 安全  
 可靠性  
 合理價格  
 環保表現  
 其他

請註明: \_\_\_\_\_

第四部分

其他意見或建議

本港電力自主，自給自足！

618B00064

618B00064 附件

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 個人回應 (代表個人意見)

趙家賢議員辦事處  
 (個人或機構名稱)

(電話)

#### 第二部分 燃料組合

燃料組合	輸入		天然氣	煤 (及可再生能源)
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#### 具體諮詢問題

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問2: 你認為在兩個燃料組合方案中，哪一個較理想？為什麼？(請只選擇一個)

方案1   
方案2

原因:(可選擇多過一項)

安全   
可靠性   
合理價格   
環保表現   
其他  請註明: \_\_\_\_\_

### 第四部分

其他意見或建議

香港電力要保持自給自足的自主性。

致環境局局長：

## 捍衛電力自主 反對中港電力聯網 發電燃料組合諮詢意見書

### 前言

2005-2006 年間，南方電網、中港電力發展公司等公司，相繼向本港提出供電之議，雖然最終不了了之，但南方電網早已伺候，種種動作如注資中電、與中電興建緊急電網，為今日聯網埋下伏線。十年未夠，南方電網捲土重來，主動向香港政府提出供電，更由南方電網前子公司、中國能源建設集團有限公司旗下的廣東省電力設計研究院撰寫顧問報告。在諮詢短短不足三個月，環境局局長多次傳媒訪問中，誘導市民支持買電方案，彷彿成為南方電網的推銷員。環境局副局長陸恭蕙更明言，指燃料組合諮詢完結後，會進行「開放電力市場諮詢」，新的競爭者極有可能來自中國，引中電電力入港的意圖路人皆見。

水和電力都是重要的戰略資源，不少發達國家如新加坡和杜拜等，都願意斥鉅款保持水、電自給自足，而兩大經濟體美國和中國，都在前年分別提出「能源自主」和「立足國內」的目標，可見能源自給自足的重要性。香港雖然缺乏化石燃料資源，但香港有完善的國際貿易基礎，可以向國際採購燃料然後自主發電。當財務司司長都要求水務署研究興建海水化淡廠的同時，環境局卻計劃向中國買電，罔顧香港利益，目光極為短淺。

據悉，是次諮詢本有三個方案，其一是增加核電比例至五成，另外兩個就是現在的聯網方案和天然氣方案，但因福島核災之故別走核電方案。要求市民在網電、天然氣之間二擇其一，無疑是逼市民傾向方案二，但政府未有公開顧問報告，實在難以讓市民深入討論。就此，在方案一、二外，作以下建議：

### 一. 捍衛電力自主 反對向中國買電

電力乃重要的戰略資源，香港作為國際金融中心，高樓大廈、金融機構、數據中心林立，不論電梯、交易系統、數據庫、通風系統都倚賴電力運作，倘有停電，人命、經濟損失不堪設想。故此，穩定的電力供應不可或缺。

根據世界經濟論壇報告，本港電力質素在 2010 至 2012 年全球排名分別為第 7、第 3 和第 1，而中國則分別是第 49、第 59 及第 67，排名連續三年下跌。若從實際穩定率比較，香港中電平均意外停電率為 2.3 分鐘，港燈則約一分鐘，而南方電網城市平均停電時間為 2.31 小時，即 138.6 分鐘，2013 年平均「預安排停電」和故障時間共 4.63 小時(277.8 分鐘)。可見香港電力穩定度遠比中國優勝。或許香港人近年鮮有遇上大規模停電，而忘記停電帶來的損失，但局方作為決策者，又是否以市民福祉作賭注？

購買外地電力，價格、發電方式、環保表現、穩定性等，往往只能從商業協議議訂，如有故障、電壓不穩等導致停電，難以透過法律途徑追討。反觀以本地發電，政府可以透過法例監管電力公司表現，無論在整體電力質素更有保障。我們建議香港除了維持購買大亞灣核電廠 70% 的發電量外，其餘電力全數由本港生產，並維持本地發電裝機總容量維持於最高用電量的 120%，以防止本地機組故障和維修等原因而減少電力供應。去年香港最高用電最高峰為 10,068 兆瓦，扣除大亞灣核電廠的 1,377 兆瓦後，本地發電裝機實際總容量為 10,645 兆瓦(見表一)，僅及本地高峰用量。由於未來數年兩電將有多個機組即將退役，包括青山發電廠八組燃煤發電機組，與及港燈兩組燃煤發電機組，以及一組燃氣聯合循環發電機組。為保香港電力自給自足，香港有必要在 2024 年增加總發電裝機容量至 12,000 兆瓦。

發電廠	最高裝機容量(兆瓦)
青山發電廠	4,108
龍鼓灘發電廠	2,500
竹篙灣發電廠	300
南丫島發電廠	3,737
大亞灣核電廠	1377.6 (總容量 1,968 的 70%)
總計	12,022

表一.. 2013 年香港發電廠裝機容量

自 2011 年福島核事故後，世界多個國家開始轉向研究更高效率的可再生能源和改善傳統火電技術，港府亦因此取消增加核電比例的計劃，然而 2013 年南方電網的核電發電比例為 5.13%。環境局副秘書長劉明光召開閉門簡報會，會上指香港如採用聯網方案，將會從南方電網主網購入電力。另外，黃錦星局長在本年四月九日回應梁繼昌議員的提問時，指出「若非以專線傳輸，電網上的電力不能因其能源種類作出識別」。因此香港與南電主網聯網，將無可避免增加核電比例。以方案一建議比例，和南方電網現時核電比例 5.13% 計算，香港未來仍有近 21.5% 電力來自核電，與現時比例相約，加上廣東省正計劃興建多所核電廠，南方電網買電核電比例將進一步提升，香港核電比例只會與日俱升。

南方電來除了大肆發展核電外，亦銳意增加水力發電比例，當中以雲南水電最大規模。至 2013 年，水電佔南方電網總發電量 31.6%，雖然水電號稱零排放，拉低了南網的碳排放率，但穩定性和對環境的破壞一直備受爭議。以 2009 至 10 年廣東、廣西、雲南、貴州大旱為例，南方電網水電發電量大減，廣東省更要向本港購電 18 億千瓦時，網內亦需要啓動多火力發電廠應付需求，故此南方電網越依賴水力發電，潛在停電風險便越高。同時，雲南大規模興建水壩，對環境、水文、生態已造成極大破壞，亦令到大量少數市民需要遷徙。近年南方電網碳排放率雖然不斷下降，只因水電比例增加，而非內地火電減排技術有所改善，現時南網的燃煤發電廠每生產一度電，仍然生產近 0.9 克二氧化碳。政府一直推銷聯網方案，卻未交代水電對禍害，與及南方電網燃煤、燃氣的排放表現，甚至以「綠色能源」作包裝，完全是誤導公眾。雖然向其他國家購買電力的確能減少香港本地污染物排放，但。以宏觀減排角度，香港向中國買電不過是把污染轉嫁他方，更何況香港燃煤、燃氣發電減排技術遠較中國成熟，本地發電不單可以有效監察排放，亦減低遠距離供電的功耗，更符合整體利益。

政府經常借澳門向南網買電來推銷方案一，然而澳門向南網買電價格八年間上升 36%，現已升至每度電 0.8 元，以香港三成電力向南網購買估計，屆時香港每年淨流失 106 億。比較現時香港各種來源發電所需成本，香港燃煤發電成本約為每度電 0.25-0.29 港元，燃氣發電是每度電 0.89 港元，從大亞灣購買核電則約每度電 0.46 港元；觀乎現時南方電網雖然超過一半電量來自較便宜的燃煤發電，中國煤價亦連續三年下跌，澳門向南網買電仍然需要每度電 0.8 元，價格遠比本地燃煤高。

同時，現時兩電在香港總共聘用超過六千人，當中不少為專業技術職位，例如工程師、技工等，自工業北移後，本地技術職位需求急跌，如果向南方電網購電而減少本地發電，甚至減少本地發電機組數量，不單令工人失業，更會令工人和技術流失到其他國家。香港自主發電，把電力生產過程留於本港的同時，亦留住大量資金、技術、人才和就業機會，當政府宣傳和諮詢報告中，為何絲毫未有提及方案一為本地帶來的損失？向中國買電，香港又豈止每年損失 106 億？

此外，南方電網貪污情況嚴重，十年間有多名雲南水電主事官員被查，今年初亦有多名南方電網要員被捕，而近日中國審計署發表的《西電東送 21 個輸變電專案審計結果》，更指出西電東送多個項目沒有公開招標，有利益輸送之嫌。

總結以上種種，向中國買電不論在穩定度、環保、經濟、勞工，以至公眾可監察程度都不可取，然而，最令人憂慮的，乃是香港和中共之間的政治鴻溝。日前中國國務院發表《「一國兩制」在香港特別行政區的實踐》白皮書，明目張膽地背棄「一國兩制、高度自治、港人治港」這個莊嚴承諾。中共十七年來在香港的種種行徑，還有中共官員高調干預香港民主化過程，與香港人在政權移交前「民主回歸」的期望背道而馳。當香港完熟的公民社會，遇上中共大一統思想下的統戰模式，政治衝突無可避免。由於南方電網乃中國國務院轄下國營企業，為免日後政治衝突影響民生，本港有必要保持穩定的水源、電力和糧食供應，以作為香港的一道屏障。

我們重申，香港必須保持電力自主，除大亞灣所購買核電配額外，堅拒向中國購買電力，同時訂立 2024 年香港本地發電總配額為 12,000 兆瓦，以應付電力需求增長。

## 二. 增加可再生能源比例

機電工程署 2002 年所撰寫的《香港使用可再生能源的可行性研究》，建議本港可再生能源目標為：

到了 2012 年可以滿足 1% 全年電力；

到了 2017 年可以滿足 2% 全年電力；

到了 2022 年可以滿足 3% 全年電力。

可惜最終政府未有採納署方建議，多年來可再生能源推廣進程亦極為緩慢。截止 2013 年，港燈可再生能源發電比例只有 0.48%，而中電可再生能源比例更不堪，但今次諮詢中對可再生能源著墨不多，更指可再生能源比例到二零二零年最多只佔本港用電量 1%，也沒有訂下長遠策略，可見局方缺乏承擔。

環境所限，香港彷彿難以興建大規模風力、太陽能發電廠，而小型的家用發電裝置裝設在高樓大廈林立的市區並不合適，因為風力和陽光受阻，發電效率極低。但實際上，政府忽略香港鄉郊的大量丁屋發展可再生能源的潛地。丁屋政策擾攘多年，但其存廢莫衷一是，丁權制度應該會維持一段長時間。丁屋面積和高度都有限制，天台陽光相對較充足，因此政府可以修例，要求在新建丁屋須自資在天台加設太陽能熱水器，以作為丁屋土地優惠的條件，同時研究現有丁屋及村屋興建太陽能熱水器的可行性。以香港八十萬原居民估算，香港約有二十萬丁屋，如廣泛使用，節能效果甚為可觀。

至於大規模可再生能源，雖然立法會已通過興建小蠔灣有機資源回收中心，計劃以生物燃料發電，然而香港廚餘回收制度落後，縱使回收中心號稱每日處理量達二百公噸，但我們對政府能否趕及在 2018 年廣泛推廣極不樂觀。參考台北經驗，廚餘回收計劃推行近十年，回收率才達到 40%，反觀香港至今回收規模極小，小蠔灣有機資源回收中心恐怕只淪為篤數工程，更遑論梁振英妻子在垃圾分類行業的利益衝突。

自二零零二年《香港使用可再生能源的可行性研究》後，香港未有積極研究可再行能源的推廣和普及，我們要求政府以環境及保障電力穩定度為前題，研究增加可再生能源比例、改善建築物能源效益，同時資助本地大學研究節能和可再生能源的技術。

此外，財政司司長曾俊華去年提出在本港重設海水化淡廠，以減少對東江水的依賴，而近年國際間興起「水電共生」的概念，水務署 2008 年的《全面水資源管理策略》的報告中亦有類同建議。「水電共生」簡單而言，便是在發電廠旁興建海水化淡廠，以發電的餘熱和電力供應海水化淡廠，既增加熱效能，又可以減低功耗，希望局方能積極考慮這個發展模式，有助香港爭取電力和水源自主。

### 三. 興建液態天然氣接收站，降低天然氣成本

2011 年日本 311 大地震後，日本全面停止核能發電，改以天然氣代替，令亞太區液化天然氣價格急升，由 2011 年 2 月每百萬英熱單位(MBTU)11 美元，最高升至接近 20 美元，近一年則在 16-17 美元間浮動。由於亞太區多為島國，交易往往以液化天然氣為主。至於亞洲大陸天然氣管道覆蓋率不如歐洲、北美，當中主要天然氣網絡已是中亞與中國的管道。香港在地理上南面臨海，北面接壤亞洲大陸，有條件液化天然氣、天然氣管道兩者並行。

2006 年，中電曾提出興建液化天然氣接收站，但港府 2008 年和中國簽訂《供氣供電問題的諒解備忘錄》後，中電自行撤回計劃，備忘錄則協定香港可以研究從中國「西氣東輸」管道購買天然氣源自土庫曼的天然氣，廣州連接香港管道亦已完工著手興建天然氣管道，然而西氣東輸價格約為每英熱單位 18-20 美元，遠高於現時崖城天然氣每單位 8 美元。放眼地球另一邊，美國成功開發頁岩氣後，美洲天然氣供應更加充裕，美國隨即與亞洲最大天然氣進口國日本簽訂天然氣合約，同時，日本計劃重新啓動國內核電廠，對天然氣需求將會大減。而另一個天然氣進口大國中國，今年初亦與俄羅斯簽訂天然氣合約，自 2018 年起供氣 30 年。

分析地區能源形勢，我們預料到 2018 年，亞洲液化天然氣價格將會大幅回落，因此本港有需要盡快興建液化天然氣接收站，增加天然氣的採購範圍，以減低價格波幅。

### 四. 重建青山電廠，引入燃煤氣化複循環發電系統(IGCC)

港府 1997 訂立政策，限制香港興建燃煤發電廠，計劃以自然淘汰減少燃煤發電。現時本港最大的燃煤發電廠青山廠(A、B)快將退役，另一邊箱港燈亦有兩個燃煤機組預計 2017 拆卸，以上機組佔香港裝機容量三份之一以上。誠如第一段所述，現時燃氣發電成本是燃煤的三倍以上，如果全面以天然氣發電，成本將會大幅上升，兩電最終只會把成本轉嫁給消費者。為應付燃煤發電廠退役帶來的加價壓力，長遠故然必要檢討利潤管制協議，如減低資產的可獲利潤比例、增加商業用戶累進電費，同時考慮把部份利潤與售電額掛勾，但今次集中討論本港燃料組合，利潤管制應留待下次檢討，不贅。但遠水不能救近火，我們認為最直接的處理方法，就是容許青山發電廠全部或部份重建為燃煤發電廠。雖然燃煤發電在碳、硫，以至氮氧化合物等排放遠高於天然氣，但近年國際間興起燃煤氣化聯合循環技術(IGCC, Integrated Gasification Combined Cycle)，硫、氮氧化合物和水銀排放能減少約 80%，碳排放減少 20-30%，同時熱效益提升至 35%-45%，比現時青山發電廠的熱效率 33.1% 為高。雖然採用 IGCC 技術後，成本會增加 10-30%，但以中電燃煤發電成本每度電 0.29 港元計算，往後每度電成本仍不超過 0.4 港元。加上香港從印尼入口煤價格不斷下跌，由 2011 年每公噸平均 726 港元跌至 2013 年每公噸約 572 港元，而且預計價格尚有下跌空間。適逢今年香港與東盟討論自由貿易協議，本港應把握機會與印尼、馬來西亞、越南與及觀察國東帝汶討論燃煤及液化天然氣關稅協定，有望降低煤料成本。



在香港難以大量興建可再生能源的情況下，增加天然氣發電比例、改善火力發電技術是平衡環保、價格和穩定性的可行方法，故此我們建議單一豁免青山發電廠重建為燃煤發電廠，緩解電費和減排壓力。

## **五. 公開廣東省電力設計研究院的顧問報告**

今次諮詢，局方以單一招標委託廣東省電力設計研究院撰寫顧問報告，局方在事前未有諮詢能源諮詢委員會，事後亦未有把報告交予委員會審議，徒設諮詢架構。期後，有傳媒發電廣東省電力設計研究院曾經為廣東電網轄下公司，關係極為密切。雖然廣東省電力設計研究院 2011 年分拆到中國能源建設集團有限公司旗下，但研究院仍然是南方電網和廣東電網的「主要技術服務和技術依托單位」，為南方電網進行工程諮詢、勘察設計和管理等工作。

雖然南方電網現時與廣東省電力設計研究院現時只是客戶關係，但稍為研究中國電力市場，便知道 2011 年中國電力架構改組後，南方電網主要經營廣東、廣西、雲南、貴州與及海南的電網和部份發電廠，而開發、設計、興建、以至營運等職責由中國能源建設集團有限公司負責，而南方電網和中國能源建設集團有限公司同屬中國國務院轄下的國營企業。簡而言之，中國能源建設在鋪設電網後，會把電網管理、經營權交予南方電網。香港現時已有連接廣東電網的緊急輸電設施，以作緊急供電，但如果日後購電三成，兩電便有輸要在中國鋪設電網，其時最大機會，便是與中國能源建設集團有限公司合作，當中利益關係昭然若揭。政府一再以南方電網和廣東省電力設計研究院無直接關係，拒絕公開顧問報告，無視當中所涉及的利益輸送，我們無法接受！

顧問報告涉及重大公眾利益，我們要求局方公開廣東省電力研究院的顧問報告、利益申報，以釋公眾疑慮。

捍衛電力自主 反對中港電力聯網  
2014 年 6 月 18 日

**Enclosure****Views from the Hong Kong Institution of Engineers on  
Future Fuel Mix for Electricity Generation****Introduction**

The Hong Kong Institution of Engineers (HKIE) aims at ensuring and enhancing the living of the people in Hong Kong and the steady development of our economy. Hence, we believe that having a strategic plan for our long term power supply would be vital to support all the essential activities and functions in Hong Kong.

2. With now more frequent contact and closer cooperation of the HKSAR with the surrounding regions in the Pearl River Delta (PRD) and in the Mainland, we are well aware that various issues concerning the development in Hong Kong may also have effects to other regions. For electricity supply, Hong Kong should then take a wide perspective, and the planning horizon for the fuel mix should be in longer term, say, up to 20 years.

3. In regard to the Public Consultation on Future Fuel Mix for Electricity Generation (“the Consultation Document”) launched by Environment Bureau, the HKIE would like to put forth and elaborate our views on this important subject as follows for consideration.

**Observations and Analysis on the Options Proposed**

4. It is noted that in the Consultation Document, two Options are raised, i.e. Option 1 - Importing more electricity through purchase from the Mainland power grid; and Option 2 - Using more natural gas for local generation. We think that each Option should be carefully assessed in itself apart from comparing the two Options under various criteria to see their respective impacts.

**Reliability**

5. The reliability of local power utilities has reached a world class level and stays amongst the best in the world for long that any deterioration of it can hardly be tolerated and accepted by the Hong Kong community. As a densely populated metropolitan and with over 50% of the buildings installed with lifts, any power interruption in Hong Kong may pose serious security and safety risks. Hence, the HKIE believes that every endeavour should be taken to maintain the high reliability of the local power utilities.

6. With reference to the experience in Macau, it is known that 92% of the electricity is imported from China Southern Grid (CSG), which has a performance record of about 2 minutes per year (or a reliability of 99.9996%) for supply to the city<sup>1</sup>. In

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<sup>1</sup> Press Release on 31 March 2014, Copmanhia de Electricidade de Macau  
<http://www.cem-macau.com/CEM-Annual-General-Meeting.13959>

2012, import to Macau consists of multiple transmission lines of a total capacity of 1750 MVA with 500 MVA back-up transmission<sup>2</sup> and local generation has a capacity of 472 MW, to meet its maximum demand of 766 MW. It should be noted that high reliability in Macau is achieved through investment in redundancy and backup. The large entertainment complexes in Macau have equipped with their own large capacity backup generators and numerous uninterruptible power supply (UPS) to cater for unplanned outages. However, it is also aware that EHV (extra high voltage) supply to Macau has suffered occasional interruptions or voltage dips due to various reasons.

7. Putting the perspective in the Hong Kong situation, we as a commercial and financial centre could not afford to have degradation in electricity supply reliability. Reliability of customer supply in Hong Kong is measured within several minutes of unplanned customer interruption per year (<1 minute with Hong Kong Electric and 2.3 minutes with CLP Power), whereas it is noted that the reliability with CSG is measured in hours (an average of 2.3 hours in CSG urban areas per year though better for Guangzhou at 1.5 hours and Shenzhen at 0.8 hours)<sup>3</sup>.

8. As Option 1 highly depends on the security of supply of the CSG, system instability might be caused due to collapse of interdependent networks or extreme weather events, leading to disastrous brown-out or blackout. In case of interruption in the CSG, local supply of electricity is required, but it would be difficult for a “full-time” standby power plant to re-start and generate electricity instantly in case of emergency. Therefore, 30% grid import without dedicated transmission will most likely reduce supply reliability in Hong Kong. While Hong Kong may build up a reserve capacity in local generation to mitigate the effect of over-reliance on import, unless this is Renewable Energy (which is by its nature intermittent), maintaining the required capacity over the long term will incur equipment under-use and costs. Option 1 therefore leaves much room of concern on the reliability; and if for implementation it would require more measures that can fully address such reliability concern without any environmental or other benefits.

9. Meanwhile, Option 2 is a well proven one with reliability of supply over 99.999%, and is conceived as substantially more reliable in this sense. In fact, the local HK Electric and CLP Power systems have already been interconnected since 1980s. The advantage of this locally controlled interconnection for mutual emergency support has been fully realised and this has helped to maintain their excellent supply reliability records. However, international experiences show that multi-regional interconnected systems can be more prone to system disturbances; as one part can cause cascade problems to other parts of the interconnected systems, or even massive blackouts in the worst cases as listed below:-

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<sup>2</sup> 2012 Sustainability Report, Companhia de Electricidade de Macau  
<http://www.cem-macau.com/IMG/pdf/Sustainability2012.pdf>

<sup>3</sup> Corporation Social Responsibility Report 2013, China Southern Power Grid Company Limited  
<http://www.csg.cn/shzr/zrbg/201405/P020140515547853771135.rar>

Article	Millions of people affected	Location	Date
July 2012 India blackout	670	India	31 July 2012
July 2012 India blackout	330	India	30 July 2012
2009 Brazil and Paraguay blackout	87	Brazil, Paraguay	10–11 Nov 2009
2003 Italy blackout	55	Italy, Switzerland, Austria, Slovenia, Croatia	28 Sep 2003
Northeast blackout of 2003	55	the United States, Canada	14–15 Aug 2003

### Affordability

10. It is agreed that in considering the future electricity supply options, financial consideration is an important factor, though not the ultimate point of concern. It would be worth to project and compare the cost for either Option for the capital cost investment as well as the maintenance and depreciation for the necessary constructions of each of them. However, given the lack of details and forecasts provided for either Option, it would be difficult to have an accurate cost comparison of the two Options in this regard.

11. While in the Consultation Document it is indicated that both Option 1 and Option 2 may lead to similar quantum of increase in electricity generation cost, more projection figures are suggested to be provided to illustrate the situation. In fact, the cost for Option 1 would be mainly due to the investment cost of grid infrastructure plus various uncertain cost elements related to electricity purchase. A long term power purchase agreement has to be entered to ensure the proposed cross-boundary power import a pragmatic business case. Adopting Option 1 might in future put Hong Kong less flexible in catering for the possible decrease in electricity consumption due to societal awareness of energy saving or the dramatic drop of cost of natural gas due to technological advancement.

12. The cost of Option 1 relies on the cost of the electricity generation in CSG which is subject to direction from regulators, inflation in China and currency appreciation. These factors are not under the buyer's control, and so the affordability for Option 1 is uncertain and seems not transparent enough to make a judgment at this moment. The overall cost may or may not be reduced if the market is open to CSG or other power grids in future for competition. For Macau, it is noted that the electricity import price had increased by around 30% over the past five years. A similar example to this situation is our water supply. Due to the high investment cost of importing Dongjiang water to Hong Kong, we experience the dilemma of continually importing expensive water which might not all be necessary for a certain period. In fact, the water cost has increased by around 27% from 2009 to 2013.

13. For Options 2, the local power companies are under the surveillance of the Government and the public, and future tariff increase will be closely monitored and probably controlled. Furthermore, the purchase of natural gas could be from various sources by competitive price while there is not yet clear pricing information for Option 1 for assessment. Hence, Option 2 would seem to provide a more competitive environment for cost control.

14. Nevertheless, both Options will depend on the price of gas but with Option 2 more so. Due allowance should also be given to the cost of its long distance transport of gas supply from elsewhere. Gas price is traditionally volatile and it remains to be seen as to how the recent discovery of gas in the vicinity may assist gas produce affordability for Hong Kong. However, it is noted that with shale gas boom in the US, export of gas to Asian countries after completing its liquefaction facilities around 2017 would seem practicable. The recent discovery of gas in the vicinity coupled with huge Sino-Russian gas deal sealed may provide more gas supply to the Asia market. In this respect, Hong Kong should consider developing liquefied natural gas facilities to be able to freely access international markets. In this way, it is possible to better stabilise the gas price and this will favor the use of more natural gas in CSG which in turn may improve its environmental performance of Option 1 (if the CSG adopts more gas in electricity generation), and helps in the affordability for Hong Kong's electricity generation under Option 2.

#### Safety

15. Safety as a top priority can never be compromised. In regard to electricity generation safety, no form of power generation, be it coal, natural gas or nuclear, is totally risk free. However, it is perceived that Option 2 would ensure that electricity is generated, transmitted, distributed and used in a safer and more efficient manner as both local utilities companies are well-established and have many years of successful experience in delivering reliable electricity supplies to Hong Kong safely.

16. For Option 1, Hong Kong can hardly control whether the sources of energy generation are safe. There is still much room to expect on the construction safety in the Mainland for Option 1 as well as on the hazards/environmental impacts that should be better controlled for those communities living close to those power plants supplying electricity to Hong Kong if Option 1 is pursued.

#### Environmental Impact and Performance

17. Environmental impact is a very significant concern in assessing the electricity supply options. Arising from this concern, we suggest the Government to clarify whether the carbon and air pollutant emissions targets shall be capped at the 2020 level in the next two decades, or if a further tightening is foreseen.

18. It is important that any import of fuel mix should utilise plants that have a low environmental footprint, so that Hong Kong would not export air emissions and do not indirectly cause environmental damage to the communities close to those power plants supplying electricity to Hong Kong. Option 1 proposed in the Consultation Document for importing 30% electricity from the CSG would result in emissions to be

put on the account of CSG instead of that of Hong Kong. Inevitably, this would seem to transfer our emissions reduction responsibility to CSG as elaborated further below.

19. It is noted that Option 1 does not specify the source and fuel for the electricity generation. It is aware that Guangdong is heavily reliant on coal for powering its economic growth and its coal generation fleets are expanding rapidly. Even though nuclear power, hydropower and even power transmitting from Yunnan and Guizhou provinces are already utilised, additional generations have to be dispatched for exporting power to Hong Kong. Given that Guangdong's coal generation capacity will be expanded by 50% within the 12<sup>th</sup> Five Year period (by 2015), the marginal fuel to meet the extra demand for exporting power to Hong Kong might have to be by lower-efficiency coal generation units, and hence it is likely that the net emissions under Option 1 will be increased. This proposition is supported by the 0.918kgCO<sub>2</sub>-e/kWh carbon emission factor published in the 2012 Sustainability Report of CEM<sup>4</sup>. As such, Option 1 may not be greener than Option 2. At worst, this will still deprive the rights of people in Guangdong or other provinces in the PRD supplying electricity to Hong Kong to enjoy the benefit of lower emissions.

20. New coal fired generation was banned in Hong Kong more than 15 years ago. Hong Kong has been using natural gas for electricity generation since 1996. With much higher thermal efficiency of 50% to 60% (versus about 35% of coal-fired units) and much lower emissions compared with coal, local natural gas generation can be seen as a clear choice for delivering cost-efficient and cleaner energy to consumers. It is therefore considered that more local generation by gas, as in Option 2, would be more preferable for its benefit of emissions reduction at source.

21. From an environmental perspective, if the objective of this Consultation Document is to identify cleaner alternatives for phasing out existing coal fired generation in Hong Kong, Option 2 can better achieve this objective by increasing the percentage of the relatively cleaner natural gas in the fuel mix. Meanwhile, there is considerable uncertainty for Option 1 because the sources of generation are unidentified and thus the claimed emissions reduction cannot be justified unless a dedicated transmission from the CSG power grid with green energy sources is used.

22. Meanwhile, in regard to construction of infrastructures for each Option, the building of interconnecting facilities within Hong Kong will be substantial in Option 1 bearing in mind that the new interconnection is to be capable of transmitting about 30% of power of the territory. Environmental impact of the additional infrastructure for Option 1 could be huge as compared to that for Option 2, in which the construction work involved will mainly be the replacement of coal-fired generators to gas-fired ones on existing locations and an associated liquefied natural gas (LNG) terminal. Hong Kong has fully mastered the technical knowhow for constructing and operating natural gas generation units with proven track record. In order to meet the emissions caps set under the 2<sup>nd</sup> Technical Memorandum of Air Pollution Control

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<sup>4</sup> 2012 Sustainability Report, Companhia de Electricidade de Macau  
<http://www.cem-macau.com/IMG/pdf/Sustainability2012.pdf>

Ordinance (APCO), local power companies have to increase gas share in their fuel mix to about 40% from 2015. Given that land is available within the existing sites used of local generation, the lead time for building a local natural gas generation units will only be around 4 years. Therefore, increasing gas share in our fuel mix from 40% to 60% in eight years, from 2015 to 2023, is practical and manageable.

#### Flexibility and Diversification for Fuel Mix

23. The gist of the fuel mix is reaching flexibility in choice against volatility, delivering more diversified fuels, and an opportunity for smooth and gradual transition to enable more choice to the Hong Kong electricity market. As Option 2 relies 60% on natural gas and Option 1 40%, we should be cautious for over-dependence on natural gas since the worldwide trend of switching to natural gas will make its supply volatile.

24. As the capacity of electricity imported from the Mainland as proposed by Option 1 is substantial, the interconnection built between the Mainland and Hong Kong may pave the way for new entrants of suppliers in the electricity market when the current Scheme of Control Agreement (SCA) expires. Yet for Option 1, with two long-term power purchase agreements supplying 50% of electricity to Hong Kong in place (i.e. 20% from Daya Bay and future 30% from CSG plus similar long term gas supply contracts for another 40% of electricity), will not give any more room for change with the balance 10% in the next two to three decades. Furthermore, based on the current centralised electricity market in the Mainland, it may not be fully possible to buy electricity from the most competitive electricity generation sources through the grid and hence could not open up the electricity market through grid import.

25. Nevertheless, Option 2 would not rule out or diminish the possibility of open electricity market in future. For Option 2 to have better impact, diversification should not be limited to the types of resources, and should be extended to the diversified sources of resources such as the global sourcing LNG and possibility of local re-gasification of LNG, in form of gas receiving station or floating storage and offloading unit. Other proven and commercialised technologies can also be introduced to supplement the normal natural gas generation.

26. For decades, the Government has tried optimally regulated Hong Kong's electricity sector and delivered its energy policy objectives by means of a bilateral agreement with the power companies – under the SCA, with its effectiveness demonstrated over years. Under the SCA regime, the two power companies have been seen complying with requirements on safety, security, reliability and environmental performances laid down by the Government. The capital and operating expenses proposed by the two power companies in their 5-year Development Plan are stringently vetted and approved by the Government. Not only the actual tariffs are reviewed by the Government, the actual operating performances of the two power companies are audited by the Government. The current transparent regulatory regime has been successfully delivering reliable and quality electricity supply services to end consumers at reasonable and competitive costs and compatible

with the environmental and economic needs for the community in Hong Kong performance laid down by the Government at internationally low tariffs. The achievement attained by the Hong Kong power companies is vividly demonstrated by the top electricity supply quality ranking of Hong Kong among 148 economies given by the World Economic Forum in 2013<sup>5</sup>.

27. The capital and operating expenses (and hence tariffs) proposed by the two power companies in their 5-year Development Plan are stringently audited, vetted and approved by the Government. Increasing local gas generation proposed in Option 2 is a proven business-as-usual operation and development model for Hong Kong. Under the stringent scrutiny of the Government set out in the SCA framework, timely completion of natural gas generation units with high quality and cost-effectiveness to meet Hong Kong's demand is to be expected. Option 2 seems much more transparent to consumers and it subject to higher Hong Kong regulatory control than the grid purchase option proposed.

#### Contingency

28. It is concerned that Option 1 might mean higher uncertainty in terms of land/route requisition, time and cost on planning, design and construction of the grid infrastructure for power import. In contrast, Option 2 would have minimal uncertainty due to the progressive replacement of coal-fired plants by gas-fired plants, readily available land in the existing power station sites, and mature transmission infrastructure from these sites linking to HK networks. Holding back from installing local plants on the one hand and possible failure to build the grid infrastructure in time on the other hand would put Hong Kong more at risk. Hence, it is opined that Option 2 would seem more flexible than Option 1 because of shorter lead time and less capital investment (i.e. building new gas-fired plants when compared with building new grid infrastructure). Option 2 would also allow a step-by-step approach in increasing the number of generation units.

#### Economic Consideration

29. For Option 1, the minimum lead time for the significant infrastructure required for importing 30% of Hong Kong's total electricity demand from the Mainland would be around 10 years. Taking into consideration of the complexities associated with land acquisition, environmental impact assessments and potential judicial reviews, the lead time for the cross-border transmission infrastructure may well exceed 10 years. The upfront capital investment required for the new cross-border transmission infrastructure could be in the order of tens of billions of HK dollars.

30. It is generally believed that Option 2 could enhance local economic development, improve local engineering prospects and job markets, and nurture local expertise. In addition, the incremental nature of adding individual local natural gas generation units

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<sup>5</sup> The Global Competitiveness Report 2013-14, World Economic Forum  
[http://www3.weforum.org/docs/WEF\\_GlobalCompetitivenessReport\\_2013-14.pdf](http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf)



in response to demand requirement will better suit Hong Kong's future pattern of demand growth.

### **Other Options and Tactics**

31. The HKIE believes that for electricity supply and fuel mix, there can still have other possible alternatives that worth for public to deliberate. Other options could also be considered, e.g. dedicated circuit to dedicated source where we could be sure about the carbon content and reliability could be controlled. Although local renewable energy such as solar and wind energy is unlikely to provide significant amount of power due to the city's geographical constraints, more practical means to utilise these energy, like both offshore wind farms, should still be considered seriously. Other kinds of renewable energy generated from waste-to-energy through the anaerobic treatment of sludge, wastewater, municipal solid waste and food waste for biogas and electricity production should be explored more seriously and put in implementation. It may just contribute about 6-7% of the total electricity supply, but it does indicate that the Government is trying its best to develop a sustainable city with strong dedication to waste recycling and reuse. Other solutions including establishing fixed or floating LNG re-gasification facilities for power generation to enhance our generation diversification should also be given positive considerations.

32. Also, nuclear power import from new nuclear power stations in Guangdong Province can be considered. The percentage of imported nuclear power can be selected according to the emissions limits, actual electricity loading and economic consideration due to price variation of natural gas. This would provide more diversity and flexibility if there is any contingency occurred affecting the supply of natural gas or if there is any emergency events which occur in the local power stations (e.g. due to super typhoon). Nevertheless, we should strike a balance between importing nuclear power and the optimum capacity of local generation using natural gas based on a power system study so as to meet our daily electricity consumption and environmental emission targets.

33. Lifetime CO<sub>2</sub> emissions of nuclear is low and generally at the same level as renewable. Radiological emissions are at minute levels and any radiation level increases are only marginally detectable, without any significant impact to health or the environment. The occurrence of the Chernobyl and Fukushima accidents was mainly due to multiple human errors and the responsible government's ability to deal with nuclear emergency and prevent accident. The nuclear technology and emergency preparedness have continued to improve in the present operating reactors. Safety of the new generation of nuclear reactors under construction is further enhanced.

34. The public can deliberate on the possibility of buying nuclear power from LingAo and constructing a new interconnector between LingAo and both Kowloon/Hong Kong Island for supplying electricity to the HEC and CLP networks, so all Hong Kong consumers can benefit from this source of low-carbon energy. The new interconnectors can also help to reinforce mutual support between Guangdong and Hong Kong to deal with contingency events in the respective power system. The design of the new interconnectors should be based on a comprehensive power system

study for the bulk transmission system in CSG and Hong Kong with a view to ensuring the stability and security of the interconnected power grids in the region.

35. Although Hong Kong has been importing nuclear power from Daya Bay in the past 20 years via CLP's 400 kV network in the New Territories and Shenzhen which is also interconnected to the 500 kV network of CSG, we are able to enjoy a high reliability of electricity supply over the years because proper backup and contingency measures are in place. In fact, Hong Kong's investment in the Daya Bay project has demonstrated a safe, clean, affordable and reliable energy supply over the past 20 years. The operation model of the present nuclear supply from the Daya Bay Nuclear Power Station through dedicated transmission lines has helped to support the high electricity reliability in Hong Kong. The reliability of supply in Hong Kong would not be affected by the additional import as long as the new interconnectors are designed and operated properly with sufficient backup generation capacity.

36. The long term cost of nuclear electricity is kept stable as its operating cost makes up for a small portion of the overall cost. The 2013 cost of Daya Bay to Hong Kong is at HK¢ 0.47/kWh while the projected cost of the most advanced AP1000 at Sanmen is at HK¢ 0.57/kWh (RMB 0.46/kWh as estimated in 2011) which is lower than the current gas fuel cost (HK¢ 0.89/kWh in April 2013) by a comfortable margin.

## Conclusion

37. Based on the Consultation Document, both Options should be able to meet the energy policy objectives but to a different extent. However, it is believed that Option 2 would at present be more reliable and should be more flexible in terms of the pace of infrastructure development. It would also offer better environmental benefits in terms of emissions reduction at source and sustainability as well as regulatory control.

38. For the longer term, as reliability of the Mainland grids improves and more sources of genuinely low-carbon energy are developed, there may be opportunities for Hong Kong to have more interconnection with the Mainland, as long as supply reliability in Hong Kong is not compromised and adequate local back-up remains available. Although this is not a decision which needs to be taken now, how such interconnection might be developed technically, and how much energy would be available by when, and at what cost, should be further studied.

39. However, from the perspective of the development of engineering profession in Hong Kong, with the phase out of coal-fired power station by gas-fired generators within the territory, Option 2 could enhance local economic development, provide better local engineering prospects and enlarge job market.

40. The HKIE also suggests the Government to seriously consider more possible tactics to deal with the long term fuel mix issues, apart from the only two Options proposed. In any case, we agree that the subject should be reviewed regularly due to changing economic environment, deviation in load forecast and advance in technology. Moreover, more public discussion is needed and more other sustainable electricity supply sources should be explored before any decision is reached.

18 JUN 2014

附件

## 回應表格

### 香港的未來發電燃料組合公眾諮詢

請於2014年6月18日或之前透過以下方式提交你的意見。

郵寄地址：香港添馬添美道二號政府總部東翼十五樓環境局電力檢討科

電子郵件：fuel\_mix@enb.gov.hk

傳真：2147 5834

#### 第一部分(見註)

這是  團體回應 (代表個別團體或機構意見) 或  
 個人回應 (代表個人意見)

陽光泛貨便利店有限公司

(個人或機構名稱)

(電話)

及

(電郵)

#### 第二部分

#### 燃料組合

燃料組合	輸入		天然氣	煤 (及可再生能源)
	核能 (大亞灣核電站)	從電網購電		
現時 (2012)	23%	-	22%	55%**
方案1* 通過從內地電 網購電以輸入 更多電力	20%	30%	40%	10%
	總共：50%			
方案2* 利用更多天然 氣作本地發電	20%	-	60%	20%

\*以上的燃料比例用以提供一個基礎作規劃電力供應所需的基礎。不同燃料的實際分配應按實際情況釐定。

\*\*包括少量燃油。

第三部分

具體諮詢問題

問1: 就安全、可靠性、合理價格、環保表現及其他相關的考慮而言，你對兩個燃料組合方案有何意見？(請就每個方案說明你的看法)

方案	支持	不支持	不支持方案的原因 (可選擇多過一項)
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> 安全 <input checked="" type="checkbox"/> 可靠性 <input checked="" type="checkbox"/> 合理價格 <input checked="" type="checkbox"/> 環保表現 <input type="checkbox"/> 其他 (請註明): _____
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> 安全 <input type="checkbox"/> 可靠性 <input type="checkbox"/> 合理價格 <input type="checkbox"/> 環保表現 <input type="checkbox"/> 其他 (請註明): _____

問2: 你認為在兩個燃料組合方案中，哪一個較理想？為什麼？(請只選擇一個)

- 方案1   
 方案2

原因: (可選擇多過一項)

- 安全  
 可靠性  
 合理價格  
 環保表現  
 其他

請註明: \_\_\_\_\_

第四部分

其他意見或建議

保持香港競爭力

618B00080



618B00080

18 JUN 2014

元朗屏山區居民協會

Yuen Long

Ping Shan District Residents Association

香港添馬添美道二號  
政府總部東翼十五樓  
環境局電力檢討科  
(傳真號碼：2147 5834)

敬啓者：

香港未來發電燃料組合

本會一向致力服務元朗屏山區居民。就最近政府的「香港的未來發電燃料組合」諮詢文件，本會提出以下意見。

電力供應與我們的生活密不可分。從居民的角度看，最希望當然是目前穩定的電力供應得以維持而電價不會大幅上揚。就諮詢文件裏提到未來將有機會從內地大量供電給香港，本會擔心這會令到香港的電力供應穩定性大幅下降。需知道電力供應的穩定性是香港繁榮的基石，若然政府只顧減排而忽略供電穩定性，香港社會亦需要付出沉重代價。

最後本會希望政府對能否維持現有穩定的電力供應多作考慮，並就未來發電燃料組合的諮詢持開放態度和聽取各方意見。

此致

經濟發展事務委員會秘書

元朗屏山區居民協會主席  
張木林謹啓

二零一四年六月十七日



618B00098

18 JUN 2014

618B00098

Annex

**Response Form**  
**Public Consultation on Future Fuel Mix for Electricity Generation for Hong Kong**

Please send this response form to us on or before 18 June 2014 by one of these means:

mail: Environment Bureau, Electricity Reviews Division, 15/F, East Wing,  
 Central Government Offices, 2 Tim Mei Avenue, Tamar, Hong Kong.

e-mail: fuel\_mix@enb.gov.hk

fax: 2147 5834

**Part 1 (See Notes)**

This is a  corporate response (representing the views of a group or an organisation) or  
 individual response (representing the views of an individual)

by Mr. Wong Ka Wo, Simon / Chairman of Chamber of Food & Beverage Industry of HK  
 (name of person or organisation)

at \_\_\_\_\_ and \_\_\_\_\_  
 (telephone) (e-mail)

**Part 2**

**Fuel Mix Options**

FUEL MIX	IMPORT		NATURAL GAS	COAL (& RE)
	NUCLEAR (DBNRS)	GRID PURCHASE		
Existing (2012)	23%		22%	55%**
<b>OPTION 1*</b> Importing more electricity through purchase from the Mainland power grid	20%	30%	40%	10%
	Total : 50%			
<b>OPTION 2*</b> Using more natural gas for local generation	20%	-	60%	20%

\* The above fuel mix ratios aim at providing a basis for planning the necessary infrastructure for electricity supply. Flexibility should apply to actual deployment of each fuel type, having regard to the circumstances happening on the ground.

\*\* Inclusive of a small percentage of oil

618 B 000 98

**Part 3**

**Specific Questions for Consultation**

Q1: How do you view each of the two fuel mix options with regard to safety, reliability, cost, environmental performance and other relevant considerations? (Please indicate your view on EACH of the two options.)

Option	Support	Not Support	Reason for NOT supporting (You can tick more than one box)
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Safety <input checked="" type="checkbox"/> Reliability <input checked="" type="checkbox"/> Affordability <input checked="" type="checkbox"/> Environmental performance <input type="checkbox"/> Others (please specify): _____ _____
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Safety <input type="checkbox"/> Reliability <input type="checkbox"/> Affordability <input type="checkbox"/> Environmental performance <input type="checkbox"/> Others (please specify): _____ _____

Q2: Which of the two fuel mix options do you prefer? Why? (Please tick ONLY ONE box)

- Option 1
- Option 2

Reasons: (You can tick more than one box below)

- Safety
- Reliability
- Affordability
- Environmental Performance
- Others  Please specify: \_\_\_\_\_

**Part 4**

**Other Comments and Suggestions**

Please refer to attached letter.



# 香港食品及飲品行業總會

Chamber of Food & Beverage Industry of Hong Kong

18<sup>th</sup> June 2014

Electricity Reviews Division  
Environment Bureau  
15/F, East Wing, Central Government Offices  
2 Tim Mei Avenue, Tamar  
Hong Kong  
Fax number : 2147 5834  
E-mail : fuel\_mix@enb.gov.hk

Dear Members of Electricity Reviews Division,

To us, practitioners of Food and Beverage Industry in Hong Kong, reliable electricity at a reasonable cost is crucial to the operation of our businesses and we urge for your consideration on this factor while deciding the right fuel mix for Hong Kong.

We are most concerned about the effect on cost and reliability if Option 1 was chosen. From the consultation paper issued, we see neither the related plan on the amount required for investment of supporting infrastructure, nor its impact on tariff. We need to ensure that there will be sufficient back-up capacity in Hong Kong too in case any supply shortage happens. Also, the actual fuel(s) to be used and emission control means for this grid purchase option are also unknown to us.

Food and Beverage is both a skilled and labour intensive industry with chefs and supporting labour for cleaning, food processing and customer relations, we share the view that it is important to retain skilled engineers as well as maintenance workers as it will be difficult to reverse our decision – we will then need to face the consequence of losing local professionals and possibly lower supply reliability!

For Option 2, we see that it will be similar to the current arrangement except with increased natural gas generation. Our only concern is tariff stability so we would suggest seeking a long term stable supply of natural gas at a reasonable price.

Lastly, we would recommend you to revisit your plan for other options in consideration of the above factors mentioned.

Yours sincerely,

Simon Wong  
Chairman of Chamber of Food & Beverage Industry of HK





民主黨就「香港的未來發電燃料組合公眾諮詢」意見書  
2014年6月18日

電價考慮

1. 任何對現有電力市場的改變，包括發電燃料組合、市場開放性、規管加構，皆會對電價造成影響。然而，政府諮詢文件提供資料不足，無從知道向內地買電的項目資本開支、發電成本、供電可靠性等資料，令人難以衡量不同發電燃料組合及發電來源對電價的直接影響，而這亦是市民最迫切關心的議題。
2. 政府在立法會上表示，根據澳門的經驗，向南方電網購電，價格穩定，指由 2003 至 2012 年，價格基本上沒有變動。但若細心分析，澳門購電比例自 2007 年突破 50%，當時電價為每度 0.68 澳門元，而 2012 年為 0.84 澳門元。由此可見，由 2007 至 2012 的五年間，澳門電費上升 24%。可見隨著購電比例增大，議價能力愈低。政府需要向公眾提供更多資料，會以什麼機制確保以一個合理的價格買電。
3. 隨著兩電燃煤發電機組於 2017 年起陸續退役，不論方案一或二，使用天然氣發電比例必然較現時高。未來的電費水平將受天然氣價格左右，我們建議兩電向海外購買天然氣，避免過分依賴單一來源。

輸入電力，轉嫁污染

4. 政府沒有交代購入的三成內地電力是以什麼燃料生產，對於政府指從內地買電可改善本地空氣質素，這說法有商榷餘地。政府諮詢文件顯示，南方電網近年的發電比例為：火電 62%、水電 31%、核電 6%及風力發電 1%，但政府諮詢文件沒顯示所購買的內地電力是指明必須來自可再生能源，為確保輸港供電穩定性，所供應的電力為基礎電力，那便會以煤電佔比最高。因此，方案一只是將香港的排放污染物轉移至內地，無助改善區內空氣質素。向內地買電，變相將污染源頭轉嫁內地，治標不治本，更違反公義。

## 從內地電網購電

5. 向內地買電涉及開放本港電力市場，這將會是一個重大政策改變。任何電力市場結構改變皆會影響包括現有兩間電力公司、企業及市民大眾等持份者的利益。但環顧政府是次整份諮詢文件，這個重大議題完全沒有被觸及。政府明顯透過這份諮詢文件，「欽點」南方電網加入香港電力市場。

6. 民主黨認為，政府應該考慮以公開競投形式，邀請現有兩間電力公司及其他內地電力企業競投長期供電合約，經過評審，透過市場競爭把合約批給在供電可靠性、價格、環保和安全各方面表現最佳的公司，並在合約中附加賠償或懲罰機制，藉以確保供電穩定性。獲得合約的公司若表現欠佳，如出現停電情況，便需要向受影響用戶作出賠償，而市民利益則得到最大保障。

7. 另一方面，由內地輸入電力，相關基建如跨海電纜等投資金額十分龐大，輸電成本最終亦會反映在電價之中。政府應清楚交代該筆龐大資本開支是由誰負責？是政府、中電、港燈、還是中電及港燈？

## 開放電力市場

8. 政府只對發電燃料組合作諮詢，而對多年來開放電網的要求則隻字不提。要引入競爭，「廠網分家」是一個必走的路，先由政府買電網或由兩電成立聯營公司，管理電網輸配電業務。而相比香港複雜百倍的中國電力市場，早於 2002 年，推行廠網分家、競價上網，開放區域電力市場。相反，本港電力市場一直被兩電壟斷，為人詬病，再加上《管制計劃協議》（《協議》）9.99%的准許利潤回報，以固定資產計算回報，變相鼓勵電力公司不斷增加投資，而不需要控制成本，就可以賺取最大利潤，造成電費高企。

9. 要改變這個現況，政府首先應盡快與兩電探討加強聯網，為開放市場鋪路，並藉 2018 年《協議》屆滿時，改變回報安排。假若按照向內地輸入三成電力的比例，以公開競投形式開放，整個能源組合討論將會變得不一樣。因此，要深入討論未來能源組合的利弊，及分析對各持份者的影響，政府應進一步清晰交代對開放電力市場的看法，並於短期內展開公眾諮詢，加快開放電力市場的步伐，確保供電穩定之餘，電價亦會處於一個合理水平。



電話：

圖文傳真：

TEL：

FAX：

馬灣鄉事委員會公函 146007 號

主席

陳崇業先生

敬啟者：

副主席

吳炳坤先生

香港的未來發電燃料組合

總務主任

陳崇祿先生

有關政府最近向公眾諮詢「香港的未來發電燃料組合」，本人欲提出以下意見供貴部門考慮。

財務主任

陳容喜先生

電力供應與居民的生活息息相關。九龍、新界各區離島包括馬灣的市民現由中電提供優質供電服務，水平達至世界級層次，對香港極為重要。所以本人希望決定香港的未來發電燃料組合時，必須與現時的狀況一樣，有一個充足而可靠的電力系統，隨時滿足客戶們的需求，而且是源源不絕地供應。

稽核主任

樊炳雄先生

據諮詢文件顯示，建議從內地電網輸入更多電力，香港可參照澳門例子，從內地電網輸入電力的做法實在有商榷餘地。大家都知道香港與澳門兩地的經濟發展方向、人口密度及用電需求截然不同，實難以作為重要的參考價值。

工商漁業主任

黎德全先生

政府應謹慎處理在優化發電能源並同時考慮電力質素，免致因減得加的反效果出現！

文娛康樂主任

鍾新有先生

此致

交通運輸主任

郭根元先生

鄉村環境事務主任 環境局電力檢討科

陳美勝先生

馬灣鄉事委員會

陳崇業主席 MH

謹啟

二〇一四年六月十七日





致 香港添馬添美道2號  
政府總部東翼15樓  
環境局  
電力檢討科

618B00135

### 有關「未來發電燃料組合」之事宜

本人是香港中小型企業總商會(下稱『本會』)之會長，本身亦是中小企之經營者，政府的未來發電燃料組合諮詢文件，本人早前已經向立法會經濟發展事務委員會提交意見書，由於議題牽涉本港約30萬家中小企的營商環境，現再向環境局重申並提出以下意見，敬希貴局考慮。

#### 供電穩定

- 本會會員均為中小企業，面對經常變動的外圍經濟因素，不斷上升的經營成本，如租金、原材料價格等，本港中小企業可以依賴的後援是一向相對可靠的本地營商環境，如穩健的法治和健全的基礎建設，電力供應是其中一項相當重要的因素，本人希望政府的諮詢，不要忽視本港電力供應的穩定和可靠。
- 本港電力需求一向高企，除了人口密集、工商廠廈林立，本港大大小小公司業務往來之頻繁，亦相當依賴交通運輸網絡的可靠性和可持續性，任何一個環節，都需高度依賴電力供應的穩定與可靠，如果在兩個方案中選取一個，而結果是將保持香港高度可靠的供電能力置於次位，甚至沒有額外措施維持原來的供電可靠性，那麼，中小企的營商環境，將會受到挑戰。
- 本會一直致力協助中小企業努力創優增值，業界近年亦積極開拓市場，增加投資，改良產品及管理，包括提升電腦系統、加強生產設備等等，這些作業均非常依賴穩定的電力供應，假設一家投資公司在營業期間遇上停電以致錯過交易，損失的除了是客户及公司的金錢，還有更多無法評估的法律責任和本港企業商譽的損害。

#### 維持合理電費

- 政府就諮詢文件中提出的方案，不論是方案一從內地電網輸入更多電力，或是方案二的利用更多天然氣作本地發電，都可能會導致電費大幅上漲，不過，由諮詢期開始到現在，政府一直不能告訴我們兩個方案引致的電費加幅為多少，

秘書處：  
Secretariat：  
Tel：

Fax：

Email：

Website：





618 B 00135

香港中小型企業總商會  
The Hong Kong General Chamber of Small and Medium Business

作為中小企一份子，本人只是擔心中小企的生存空間還會剩下多少，我們是否會因為未來能源組合會面對更加困難的營商環境？請政府保證我們業界的經營環境不會比現時差。

事實上，面對國際燃料價格波動，本人希望政府選擇一個最有利及最具彈性的方案，令電費價格不會暴漲，從而扼殺本港中小企的生存空間。此致  
環境局電力檢討科

本人謹代表商會全人再次向您表示由衷謝意！順祝

敬頌 鈞安！

香港中小型企業總商會

會長 吳家榮 謹啟  
2014年6月17日



# CIWEM HK

THE CHARTERED INSTITUTION OF  
WATER AND ENVIRONMENTAL MANAGEMENT  
HONG KONG

香港水務及環境  
管理學會

Electricity Reviews Division  
Environment Bureau  
15/F, East Wing  
Central Government Offices  
2 Tim Mei Avenue  
Tamar, Hong Kong  
By email: fuel\_mix@enb.gov.hk

18 June 2014

Dear Sirs,

## Public Consultation on Future Fuel Mix for Electricity Generation

The Chartered Institution of Water and Environmental Management (CIWEM) has a history of working in environmental management dating back to 1895 in the U.K. The Chartered Institution of Water and Environmental Management Hong Kong (CIWEM HK) with members of CIWEM residing in Hong Kong has been operating autonomously since 1987 providing a platform for engineers and scientists working in air quality, noise, water quality, waste management and disposal, energy, and nature conservation that concern the people of the territory and the surrounding regions. On behalf of CIWEM HK, we would like to provide our views on the Future Fuel Mix for Electricity Generation as follows:

### *Reliability*

As Hong Kong is a financial centre and an international business hub, a reliable electricity supply is vital for the success of our business, e.g. proper data/information handling, to maintain our competitive edge. Reliable electricity supply is also essential to safe living and working environment for high rise buildings. In this regards, local electricity generation has a proven track record of reliability whereas a large scale grid purchase will rely on the responsibility of all the electricity market players when the grids in HK and the Mainland are interconnected. In saying so, for Option 1, the grids in Hong Kong and the Mainland have to be reinforced and enhanced to ensure that the system can cope with our demand with high degree of reliability.

It is noted that stand-by power plant may not be re-started in case of emergency because they are normally not in operation. The impact of power breakdown should be carefully considered if electricity supply is heavily relied on from sources outside Hong Kong.

### *Environmental performance*

Coal fired power plants emit SO<sub>2</sub> and more CO<sub>2</sub> than natural gas. With the increasing demand of electricity in the Mainland, coal will still be heavily relied on for power generation in the Mainland because of cost and supply. Within China Southern Grid (CSG), there are other clean fuel sources, such as hydropower, renewable energy and nuclear energy. While the Central Government has been working very hard to improve the air quality by developing renewable energy, the proportion of these clean fuel sources is still low when compared with coal. We would emphasise that sourcing of electricity supply from CSG must be on environmentally friendly basis. A designated transmission network from Guangxi or Yunnan hydropower plant to Hong Kong, similar to the arrangement of transmitting nuclear power from Daya Bay, will be favourable to ascertain that the electricity received is from a clean fuel source.

On the other hand, it is clear that replacing the retired local coal fired generating units with natural gas generating units can improve local air quality significantly. The improvement in environmental performance by using natural gas for power generation is obvious.

**Affordability**

The cost of natural gas has been increased in the past decade and we anticipate that this would still be subject to market conditions.

For both Options 1 and 2, the cost of associated infrastructure development should be considered. This should include transmission cables (overhead, underground or submarine), submarine natural gas pipelines and receiving facilities.

**Suggestion**

The information in the consultation document is not enough for making decision on either option of future fuel mix at this stage. CIWEM HK considers that power companies (current or future) could be allowed to decide on the fuel mix as long as they can meet the future air pollution reduction targets and other emissions standards set out by the Government. The companies can assess their business models and provide the best services for Hong Kong.

We understand that future fuel prices, power plant infrastructure investment and grid expansion would critically affect the tariff, which has subsequent impact on Hong Kong citizen and the local economy. The hidden costs on the environment and public health from pollution should also be considered carefully.

The Government should also develop incentive schemes as well as aggressive energy policy such as mandatory installation of energy efficient devices and requiring high electricity consumption sectors to set energy reduction targets to encourage consumption reduction. Energy conservation programme should also be conducted to raise the awareness of the public.

CIWEM HK looks forward to working constructively with the Government in taking our views forward. If there are any questions or concerns in regards to the content of this submission, please contact Mr Samuel Kwong, CIWEM HK Chairman 2014/15

Yours faithfully,

CIWEM HK Committee 2014/15

cc Mr K.S. Wong – Secretary for the Environment, HKSAR Government  
Ms. Christine Loh – Under Secretary for the Environment, HKSAR Government

回應表格  
香港的未來發電燃料組合公眾諮詢

請於2014年6月18日或之前透過以下方式提交你的意見。

郵寄地址：香港添馬添美道二號政府總部東翼十五樓環境局電力檢討科

電子郵件：fuel\_mix@enb.gov.hk

傳真：2147 5834

第一部分(見註)

這是  團體回應 (代表個別團體或機構意見) 或  
 個人回應 (代表個人意見)

蒼萃

(個人或機構名稱)

(電話)

及

(電郵)

第二部分

燃料組合

燃料組合	輸入		天然氣	煤 (及可再生能源)
	核能 (大亞灣核電站)	從電網購電		
現時 (2012)	23%	-	22%	55%**
方案1*	20%	30%	40%	10%
	總共：50%			
方案2*	20%	-	60%	20%

\*以上的燃料比例用以提供一個基礎作規畫電力供應所需的基礎。不同燃料的實際分配應按實際情況釐定。

\*\*包括少量燃油。



第三部分

具體諮詢問題

問1: 就安全、可靠性、合理價格、環保表現及其他相關的考慮而言，你對兩個燃料組合方案有何意見？(請就每個方案說明你的看法)

方案	支持	不支持	不支持方案的原因 (可選擇多過一項)
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> 安全 <input checked="" type="checkbox"/> 可靠性 <input checked="" type="checkbox"/> 合理價格 <input type="checkbox"/> 環保表現 <input type="checkbox"/> 其他 (請註明): _____
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> 安全 <input checked="" type="checkbox"/> 可靠性 <input checked="" type="checkbox"/> 合理價格 <input checked="" type="checkbox"/> 環保表現 <input type="checkbox"/> 其他 (請註明): _____

問2: 你認為在兩個燃料組合方案中，哪一個較理想？為什麼？(請只選擇一個)

方案1

方案2

原因: (可選擇多過一項)

安全

可靠性

合理價格

環保表現

其他

請註明: \_\_\_\_\_

第四部分

其他意見或建議

強烈反對引入內地電力，東江水是前車之鑑！



18 June 2014

Electricity Reviews Division  
Environment Bureau  
15/F, East Wing, Central Government Offices  
2 Tim Mei Avenue  
Tamar, Hong Kong

(By email: [fuel\\_mix@enb.gov.hk](mailto:fuel_mix@enb.gov.hk))

**WWF’s Submission to “Public Consultation on Future Fuel Mix for Electricity for Hong Kong”**

WWF is pleased to submit this document pursuant to the invitation for response on “Public Consultation on Future Fuel Mix for Electricity for Hong Kong”.

This submission presents WWF’s views and proposals on the role of **Clean Energy** for Hong Kong to be “**Asia’s world city**”<sup>1</sup> and “**Asia’s most sustainable city**”<sup>2</sup>.

**Response on Specific Questions for Consultation**

**Fuel Mix Options**

FUEL MIX		IMPORT		NATURAL GAS	COAL (& RE)
		NUCLEAR (DBNPS)	GRID PURCHASE		
Existing (2012)		23%	-	22%	55%**
OPTION 1*	Importing more electricity through purchase from the Mainland power grid	20%	30%	40%	10%
		Total : 50%			
OPTION 2*	Using more natural gas for local generation	20%	-	60%	20%

\* The above fuel mix ratios aim at providing a basis for planning the necessary infrastructure for electricity supply. Flexibility should apply to actual deployment of each fuel type, having regard to the circumstances happening on the ground.

\*\* Inclusive of a small percentage of oil

<sup>1</sup> <http://www.brandhk.gov.hk/en/#/en/about/overview.html>

<sup>2</sup> <http://www.wwf.org.hk/news/index.cfm?unewsid=10480&ulangid=1>



Q1: How do you view each of the two fuel mix options with regard to safety, reliability, cost, environmental performance and other relevant considerations? (Please indicate your view on **EACH** of the two options.)

Option	Support	Not Support	Reason for NOT supporting (You can tick more than one box)
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Safety <input type="checkbox"/> Reliability <input type="checkbox"/> Affordability <input type="checkbox"/> Environmental performance <input checked="" type="checkbox"/> Others (please specify): _____ _____
2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Safety <input type="checkbox"/> Reliability <input type="checkbox"/> Affordability <input type="checkbox"/> Environmental performance <input checked="" type="checkbox"/> Others (please specify): _____ _____

Q2: Which of the two fuel mix options do you prefer? Why? (Please tick **ONLY ONE** box)

- Option 1   
 Option 2

Reasons: (You can tick more than one box below)

- Safety   
 Reliability   
 Affordability   
 Environmental Performance   
 Others  Please specify: \_\_\_\_\_

### Summary - WWF's Perspective

WWF's perspective is that, by 2050, Hong Kong can become Asia's leading low-carbon city, by completely decarbonising our electricity generation system and shifting to "Net Zero Carbon". The decisions we make in the next five years are key to achieving this.

The fuel mix consultation contains three commendable developments, which are essential to our low-carbon future:

- 1. Referencing a Carbon Target.** Without a clear target to reduce greenhouse gas (GHG) emissions, cities and countries will find it extremely challenging to cut emissions and tackle climate change. Referencing a



carbon target as an objective in the context of the fuel mix is a very positive development.

2. **Strengthening Connection to Mainland Grid.** It is unlikely that Hong Kong can become completely self-sufficient in terms of renewable energy production in the next few decades. In any case, it needs to be part of a much larger regional energy system in order to guarantee reliability of supply. Hong Kong is already reliant on power generated in the Mainland, and further strengthening grid connectivity to benefit from the economy of scale in renewable energy production from across the border is something WWF supports.
3. **Reducing Reliance on Coal.** Both options in the fuel mix consultation call for Hong Kong to reduce its reliance on coal. Burning of this fossil fuel for power generation has many hidden costs such as air pollution and associated respiratory illnesses, and is the single biggest contributor to GHG emissions and hence climate change. Both fuel mix options are an important step towards phasing out coal completely.

The fuel mix consultation has room for improvement in five key areas:

1. **Adopting an Absolute Carbon Reduction Target.** In terms of the HKSAR Government's path forward in combating climate change, WWF is pleased to see that the Government remains committed to achieving substantial carbon reductions. However, the target of reducing carbon intensity by 50%-60% by 2020 when compared to 2005 equates to an absolute reduction range of 19%-33%, which is excessively wide. We urge the Government to focus on the most ambitious end of the target range to ensure that Hong Kong effectively drives to a low carbon future, and to ensure that our carbon reduction target is an absolute target.
2. **Ensuring Sound Carbon Accounting, and Purchasing New Renewable Energy from Guangdong.** Any accounting methodology for GHG emissions for Hong Kong should include emissions as a result of power that is generated and imported from the Mainland. To avoid encouraging more burning of coal, and therefore contributing to increased CO<sub>2</sub> globally and increased air pollution locally, Hong Kong should also encourage Guangdong to provide newly-built, additional renewable energy for Hong Kong. This could be achieved by, for example, offering a small financial incentive to build new wind and solar installations which feed into the China Southern Power Grid, and a guarantee that any extra power purchased for Hong Kong is at least equal to any extra renewable power generated. By taking this approach, Hong Kong can drive regional low-carbon development and tackle regional air pollution, while putting our city onto a pathway to



greater sustainability. This will also ensure there is no carbon-leakage from Hong Kong to Mainland China.

- 3. Setting a Separate Renewable Energy Target.** The consultation mixes coal and renewable energy under a single fuel mix target. Experience in other countries shows that overarching targets for the percentage of renewable energy in the fuel mix are a key way to achieve carbon targets. When coupled with long-term enabling policies to support the deployment of wind energy (offshore and onshore) and solar energy (photovoltaics (PV) and solar thermal), they also provide certainty for the private sector and for individuals to invest in renewable energy. This is an investment in a low-risk, environmentally friendly and less vulnerable future. Every kilowatt-hour of electricity generated from renewable energies plays a part in freeing us from the conflicts over dwindling resources, reduces the major negative consequences of sourcing and using coal, natural gas and grid purchase, protects the climate and reduces the risks presented by nuclear energy. We therefore urge the adoption of a specific and ambitious target for renewable energy production within the fuel mix.
- 4. Setting a Demand-Side Management Target.** The consultation assumes a 1% to 2% growth in energy demand for the city, which is not consistent with sustainable development, and underlines the urgent need for ambitious energy efficiency policies for Hong Kong. WWF believes that the Government should demonstrate much stronger policy determination to decrease the city's overall energy needs through the setting of an aggregate absolute energy reduction target. While Hong Kong is deciding on whether it is increasing the energy supply from grid purchase or natural gas, it should follow other developed cities in carrying out large-scale energy saving and conservation programmes.
- 5. Embracing Inter-Woven Policy Making and Longer-Term Thinking.** The consultation document suggests that the outcome of this consultation of the future fuel mix would set the scene for the review of the post-2018 regulatory framework for the electricity market. We appreciate the challenge the Government faces in setting climate and energy policies, because such policies are highly interrelated, involving supply-side, demand-side, carbon management and air pollution issues while taking into account reliability and affordability. However it is also important to ensure that that policy is joined-up, and long-term. We therefore urge the Government to ensure that any planned upcoming policy-making on energy issues is in the context of a roadmap to 2030 and 2050. Investments in energy infrastructure in the next five years will still be in operation in 2050, so it is important to ensure that there is a longer-term policy roadmap beyond 2020. This will help "...set clear objectives and a roadmap...." and "...turn Hong Kong into a healthy,



low-carbon and resource-saving metropolis that is in harmony with nature...” as promulgated in the Chief Executive’s Policy Address in 2013<sup>3</sup>.

## Additional Information, Comments and Suggestions

### **Getting all the Energy We Need from Renewable Sources**

- Global potential endowments of renewable resources are quite vast. It is estimated that total technical renewable energy potential can exceed 100 times present global energy consumption<sup>4</sup>.
- Harvesting our energy from renewable sources can raise social and environmental prosperity significantly by securing affordable, reliable and clean energy for everyone. Unfortunately, despite its multiple benefits, renewable energy is still subject to common misconceptions that distort the real value of renewables, including the economic and the environmental implications of both small and large scale deployment. Partly these are based on public misinformation, prejudices, old data, weak science, ignorance, or propaganda promoted by vested interests.
- Renewable energy has the enormous potential to shift the current global carbon emitting energy system to a more sustainable one. WWF’s Energy Report (2011) demonstrates that large-scale deployment of renewables alone would reduce greenhouse-gas emissions from the energy sector by about 80% while keeping global warming well below 2°C by 2050. This will solve most of the problems of dwindling fossil fuel resources, and avoid the very worst impacts of climate change.

### **Renewable Power Generation is Becoming Increasingly Competitive**

- One of the limiting factors for renewables is their comparably high up-front costs. Nonetheless, costs of electricity generation renewables such as wind, solar PV, concentrated solar power (CSP) and some biomass technologies have fallen considerably due to enhanced economies of scale, increased technology efficiency and better capacity factors. For instance, depending on technology and markets, prices for PV modules have fallen over 60% in the last few years. Similarly, wind turbine costs have declined by around 25% since 2009. Capital costs for modern renewables will keep falling<sup>5</sup>.

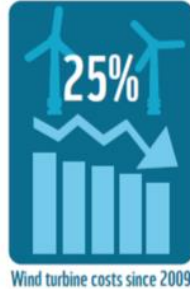
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<sup>3</sup> <http://www.policyaddress.gov.hk/2013/eng/p133.html>

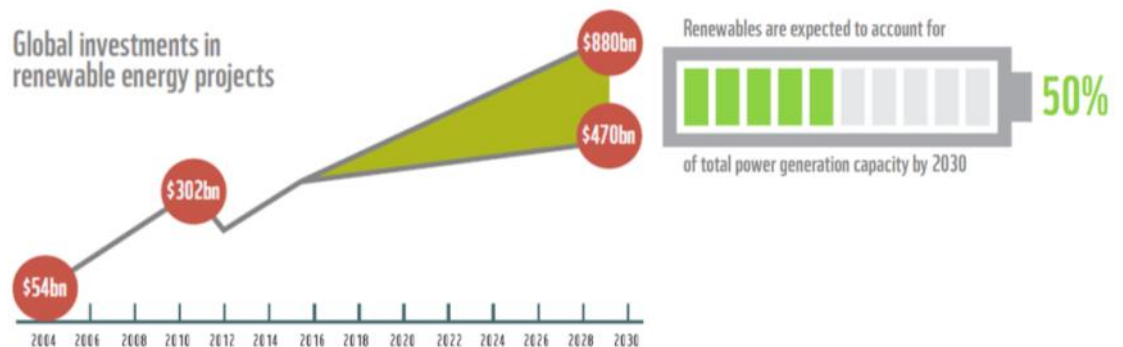
<sup>4</sup> IPCC (2011) IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation. Available at: [http://srren.ipcc-wg3.de/report/IPCC\\_SRREN\\_Full\\_Report.pdf](http://srren.ipcc-wg3.de/report/IPCC_SRREN_Full_Report.pdf)

<sup>5</sup> IRENA Secretariat (2013) Renewable Power Generation Costs in 2012: An Overview. Available at: [http://costing.irena.org/media/2769/Overview\\_Renewable-Power-Generation-Costs-in-2012.pdf](http://costing.irena.org/media/2769/Overview_Renewable-Power-Generation-Costs-in-2012.pdf)

Prices have fallen



- Global investments in renewable energy projects grew at an annual rate of ca. 26% during the period 2004-2011, from US\$54 billion to US\$302 billion<sup>6</sup>. Depending on policies and incentives, it is estimated that global investments in renewable energy projects may rise to between US\$470 billion and US\$880 billion by 2030<sup>7</sup>.



- A transition to renewable energy and energy efficiency is not only possible but also cost-effective, providing energy that is affordable for all and producing it in ways that can be sustained by the global economy and the planet.

### **The world is Building a Clean Energy Policy Landscape, Why not Hong Kong?**

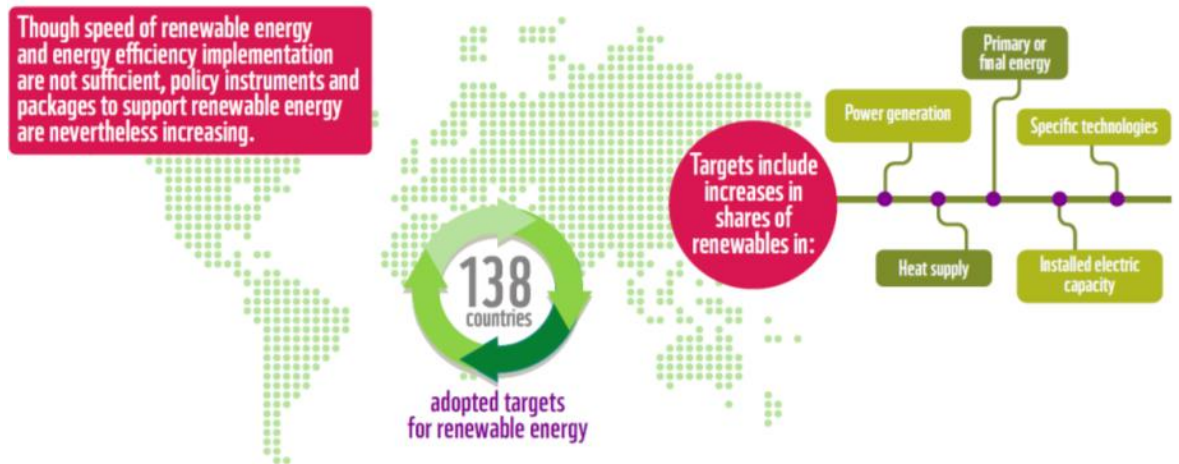
- Hong Kong needs to speed up the development of policy instruments and packages to support renewable energy and energy efficiency implementation. By 2012, at least 138 countries adopted targets for renewable energy. Additionally, at least 127 countries, including Mainland China, had some type of renewable electricity policy by 2013, namely feed-in-tariffs or renewable portfolio standards<sup>8</sup>. Other renewable energy friendly policy schemes, such

<sup>6</sup> Bloomberg New Energy Finance (2014) Global Trends in Clean Energy Investment. Available at: <https://www.bnef.com/InsightDownload/9155/pdf>

<sup>7</sup> Bloomberg New Energy Finance (2013). Global Renewable Energy Market Outlook 2013: Fact Pack. Available at: <http://bnef.com/InsightDownload/7526/pdf>

<sup>8</sup> REN21 (2013) Renewables 2013: Global Status Report. Available at: [www.ren21.net/Portals/0/documents/.../GSR/2013/GSR2013\\_lowres.pdf](http://www.ren21.net/Portals/0/documents/.../GSR/2013/GSR2013_lowres.pdf)

as the carbon-pricing scheme, have been adopted or are under consideration in at least 11 additional countries<sup>9</sup>.



### **Reliable and Clean Energy on Demand**

- Power supply must be available on demand. While there is potential for all power plants to suffer occasional outages, those powered by variable renewables are constrained to a greater degree due to unpredictable seasonal and daily weather changes. Such bottlenecks can be overcome by electricity storage and technical power balancing to meet demand changes.
- Large shares of variable renewable power cannot be integrated easily into existing grid power systems, unless the design and management of the system changes. Our classical power system works with the concept of “base load” power: a centralised, all-day power supply from constant fuel sources including nuclear. A renewable-based system has to work differently to be effective and reliable. This is not only a question of technological but also of policy choices. With the help of smart grids and grid management by the utilities, it is possible to bring the necessary energy services at any time to the customers, who themselves mostly also require variable power on demand.

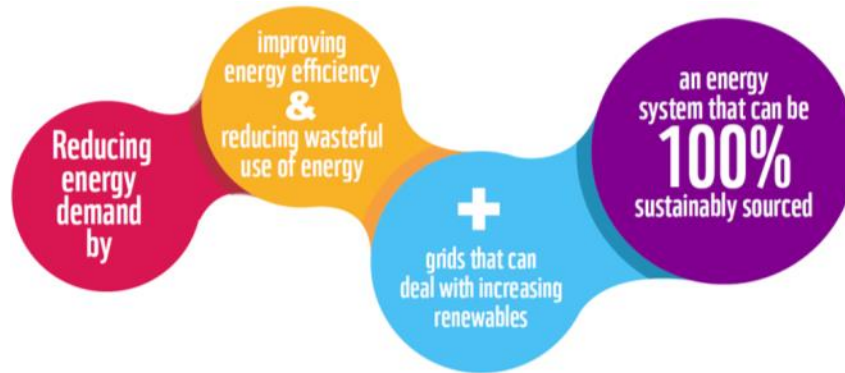
### **Reducing Energy Demand and Harnessing Energy Efficiency: Game-Changers for a Clean Energy System**

- The consultation document estimates that the total electricity consumption may increase from about 43 billion kWh in 2012 to about 48 billion kWh in 2020 and about 50 billion kWh in 2023, based on the latest trend of an average growth rate of about 1%-2% per annum in recent years. Energy efficiency is a key requisite to meeting future energy needs from sustainable renewable sources. Reducing energy demand by improving energy

<sup>9</sup> GLOBE International (2013) The GLOBE Climate Legislation Study (3<sup>rd</sup> edition). Available at: [http://cdkn.org/wp-content/uploads/2013/01/3rd\\_GLOBE\\_Report-1.pdf](http://cdkn.org/wp-content/uploads/2013/01/3rd_GLOBE_Report-1.pdf)



efficiency and reducing wasteful use of energy – and coupling these measures with grids that can cope with the increasing demand for renewable electricity – coincides with a fast renewable energy supply growth that will ultimately result in a clean energy system that can be 100% sustainably sourced.



- “Net Zero Carbon” is not impossible. For example, back in autumn 2010, an agreement had already been reached in Germany to almost completely avoid greenhouse gas emissions by 2050, therefore marking the phasing out of the fossil fuels coal, oil and gas. This will be made possible above all by a rapid expansion of power generation using renewable energy sources and by a massive increase in energy efficiency.
- WWF believes that in parallel with the fuel mix discussion, Hong Kong could set longer-term and more ambitious renewable energy and energy efficiency targets and to create an enabling environment with an overarching policy and institutional framework that include the provisions necessary for transformational change in the current energy framework.
- Renewable energy and energy efficiency are essential if we are to realise an energy transition to a sustainable future for all. The current way we produce and use energy is untenable. Our carbon-intensive energy is the main contributor to climate change as well as air, soil and water pollution. It is responsible for about two-thirds of Hong Kong’s greenhouse gas emissions. We have to question the conventional views on our energy future, and the “business-as-usual” scenarios, embarking on a serious search for realistic alternatives.
- The world has reached peak conventional oil and gas, meaning oil and gas companies are digging deeper and deeper into unconventional sources, with disastrous environmental and social consequences. Coal is still relatively readily available, but catastrophic in terms of climate changing emissions. Society can no longer afford to hang on to its old energy paradigm, and its dangerous dependence on fossil fuels.

### **Long-Term Thinking for a Clean Energy Future**

- Some of the power generating units in Hong Kong will start to be retired in the coming few years. It is worth noting that energy planning requires long-term thinking. Power plants usually take at least a decade to plan and build and need huge upfront investments. Subsequently, any new energy infrastructure would have an operational life of many decades. Changes in fuel prices, electricity tariffs, policies and regulations introduce risk elements into the decision-making process. Meanwhile, there are only six years before year 2020 when the city is supposed to meet the carbon intensity reduction target. We need a 2030 and 2050 target, and a roadmap to get there.
- Energy conservation is one of the prerequisites of a future powered by renewables. We will not be able to meet the needs of our planet's expected nine billion inhabitants if we continue to use it as wastefully as we do today. According to WWF's Energy Report (2011), aggressive demand-side management will be able to reduce global energy demand by 50% by 2050. We challenge Hong Kong to consider this ambitious but essential energy efficiency target.
- Hong Kong's fuel mix target should be set in the context of the city's long term carbon reduction target and demand side management target. It needs to also factor in the need for potential regional integration, for example with Guangdong, which should have a strong potential for renewable energy growth. A new regulatory regime of the electricity market needs to be adapted so as to guarantee security of electricity supply with an intention to withdraw from fossil and nuclear energy, while observing the climate protection targets – a "clean energy vision" for Hong Kong.
- This long-term thinking is consistent with the vision of our Chief Executive. For example in his 2012 election manifesto, the Chief Executive stated that "... in response to the global concerted action to mitigate climatic change, we must study and set a target for reducing the emission of carbon dioxide by 2020 and devise an all-round action plan...". In his 2014 Policy Address he stated that "... we will set out clear objectives and a roadmap to achieve cleaner air, better fuel mix, energy conservation, emission reduction, resources recovery and nature conservation in a comprehensive and systematic manner. These endeavours will turn Hong Kong into a healthy, low-carbon and resource-saving metropolis that is in harmony with nature".

### **Economic Considerations**

- The consultation document suggests that the two proposed fuel mix options will roughly double the unit generation cost over the five years from 2008 to 2012, while the actual tariff implications cannot be ascertained at this stage. A marginal abatement cost curve analysis of Hong Kong's energy system



will be necessary to reflect the spectrum of cost contributing to an improved and clean energy system, so as to allow a more meaningful debate on what fuel mix composition the city should adopt, and ensure that we begin our clean energy transition in the most cost-efficient way.

- While it is still premature to speculate on the future electricity tariff using various fuel mix compositions, the currently externalised environmental costs of electricity production should be included in the future energy formula for Hong Kong to upkeep its aspiration in its responsible global citizenship.

### **Conclusions**

- WWF is of the view that we need to change the status quo of energy production and consumption, and articulate a new pathway for the future – a scenario into a truly alternative vision for a clean energy future.
- Renewables are produced by relatively new technologies. Knowledge gaps, misinterpretation of facts or magnification of uncertainties are simply examples of arguments used to dismiss renewables. To achieve the optimal decarbonisation path, misconceptions need to be debunked.
- Realising transformational changes in the energy system will largely depend on shifts in public choices and positive perceptions towards renewables and energy efficiency; not strictly economics nor technologies. A whole shift in the energy paradigm has to take place across sectors, including energy, transport as well as the built environment sectors.
- Hong Kong needs an overarching energy policy that enables the best fuel mix including renewable energy and energy efficiency deployment.
- A clean energy vision is the only way to meet the plethora of challenges facing the planet, from combating climate change and hedging against risks of volatile and costly fossil fuel imports, to addressing air pollution and providing sustainable or “Net Zero Carbon” energy for society.

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## 環保觸覺就「未來發電燃料組合公眾諮詢」提交之意見書

政府於本年三月開始就香港「未來發電燃料組合」展開公眾諮詢。環境局建議兩個發電燃料組合方案諮詢公眾。第一個方案是「網電方案」，即從內地電網（即南方電網）購電；第二個方案是「本地發電方案」，即利用更多天然氣作本地發電。環保觸覺（本會）有以下意見：

### 一、 可再生能源「被消失」，要求在港增加可再生能源比例

在政府四十多頁的諮詢文件中，談及可再生能源（包括風能、太陽能等）的篇幅不足兩頁。更甚的是，當局開宗明義就指多個可再生能源效益存疑，只能滿足本港電力需求中的極小部分，儼如未諮詢就先將可再生能源判死刑。在全球都追求環保能源的大趨勢下，本會對政府率先在港放棄發展可再生能源深感失望。

本港兩大電力供應公司，香港電燈有限公司（「港燈」）及中華電力有限公司（「中電」）早年展開離岸水域風場研究。當中港燈的研究選址在南丫島和長洲之間水域，在2010年預計可提供五萬個四人家庭一年所需電力；中電在西貢的研究選址則仍在收集數據中，但亦預計可供應八萬個四人家庭年用電量。雖然兩間公司的選址各有利弊，可能影響水域的生物及漁業等，但研究亦反映香港實在有潛力發展風力發電，政府不應貿然放棄。

事實上，本港背靠珠三角地區，而中國近年亦以各種優惠政策大力拓展可再生能源。為實現香港在珠三角地區可作為環保城市的典範，本會建議以香港充裕的資金，大力拓展在區內的可再生能源設備，此舉不但可提升本港的可再生能源使用比例，更可在香港的監察下配合國內的政策，創造雙贏局面。

此外，政府亦應積極推廣和考慮資助社區的小型再生能源發電，如低污染的太陽能、小型風力發電、廚餘發電等，供應該大廈或社區使用。香港應以每一建築物皆能小規模發電為目標，積少成多，並藉此推行環境教育，使社會各界一同節能減排。

### 二、 拒絕從內地買電，不應將發電污染轉嫁內地，環保存疑

根據政府提議的「網電方案」，建議從內地輸入電力以滿足香港約一半的電力需求，即從內地南網「網對網」購買約佔30%的網電，加上維持從大亞灣核電站輸入核電的百分比（約佔20%）。此舉其實只是將發電污染源頭轉嫁內地，實在不符合環境公義。再者，內地所排放的溫室氣體亦會將香港置於全球暖化的危機下，若發電廠設於廣東沿岸，空氣污染物亦很大機會被吹到香港，根本無助改善香港空氣質素。

雖然環境局在諮詢文件中否認此「置換效應」，又指非化石燃料佔南網總裝機的容量的44%，不斷吹噓向內地買電的好處。但值得關注的是，香港直接由內地電網購入電力，對於其供電源頭是完全沒有約束力及決策權，香港無法確保其電網的電力來自可再生能源（更不談核電亦是「非化石燃料」之一）。再者，內地不少城市都常出現缺電情況，而其電力需求亦同樣因人口及經濟增長和急速城市化

有所增加，因此向內地買電的可靠性存疑。

事實上，大陸的「可再生能源」是否環保亦值得商榷：佔南方電網中非化石燃料大部分的雲南水電，開發過程置環境於不顧，破壞山河、摧毀居民家園、影響下游農業水資源；有些地區更因未跟電網公司協調好，結果要大量「棄水」；亦曾有不少媒體報導，內地一些風力發電場根本沒有連繫到電網上，白白浪費了電力。

### 三、 應以需求管理著手，全港一同減少用電

本港近十年的用電量不斷上升，年增長率更不時超過2%，遠超約0.5%的人口增長率，反映香港人的生活習慣愈趨浪費。政府應由需求管理著手，積極推動社會節能減排，並從政策落實減少浪費能源的政策，如盡快推行光污染立法、限制廣告招牌不得在日間開啟、加強推廣及管制政府場所、商場等的冷氣溫度等。

現時，商業用電佔全港用電近七成之多，更有繼續上升的趨勢。最令市民感不公平的是，對於住宅收費，電力公司採用的是「漸進制」，即用電愈多，每度電費便愈貴。相反，對商業用戶則採用「累退制」，即用電愈多，每度電反而愈平。因此，商業用戶對節能的誘因大減，變相鼓勵他們用更多電。政府應積極限制電力公司取消電費「累退制」，當中可考慮豁免醫院、公共交通等提供公共設施的用電「大戶」，使全港市民和商戶一同節能減排。

### 四、 減少備用電量、賣電回內地荒謬

現時香港的備用電量達三成，接近國際能源總署建議的20%至35%中的上限，當中不少備用電需反過來賣往大陸，實屬全球罕見。根據香港統計處2013年香港能源統計年刊，在過去五年，出口往中國內地的電力佔本地產電量4至10%。即使要保持電力供應穩定，香港亦根本無須保留如此高的備用電量，徒添發電對環境的影響，亦加重市民的電費付擔。

### 五、 憂慮增加天然氣比例使電力公司利潤大增、要求修訂利潤管制協議

「本地發電方案」建議大增於香港的天然氣發電比例，但這很大機會引致電力公司增加天然氣發電機組及興建天然氣接收站。在利潤管制協議的框架下，電力公司資產越多，准許利潤便越多。電力公司已一直牟取暴利，所以若不取消或大幅更改利潤管制協議，增加天然氣發電比例並非理想做法。

### 六、 減用核電

本會認為社會仍普遍質疑核電的安全性，所涉及的核廢料儲存問題至今仍未得到適當的解決。是次政府所建議的兩個方案中，均是維持向大亞灣核電廠購買佔香港供電量的兩成電力，市民即是「無得揀」。政府以2009年草草跟內地簽下的合約作解釋，指香港已承諾向大亞灣多買電20年，到2034年才屆滿。

然而，經過福島核災難後，核電的安全性已響起嚴重警號，核洩漏的影響是我們不能承受的風險，特別是大亞灣核電廠位處人口稠密地區。有見及此，本會認為當局應積極採取減用核電的措施，並用上述的節能方法並加大發展可再生能源取代之。

## 結語

環保觸覺堅決反對由內地購入電力。本會促請政府以積極態度檢討現有未來發電燃料組合方案，加強在社區、本港以至珠三角地區發展可再生能源，並透過改善現有電費機制、善用能源政策等進一步推動節能減排，減少能源浪費和用電量，以達到降低碳排放、減少甚至停用化石燃料和核電的目標。

環保觸覺

二零一四年六月十八日



Electricity Reviews Division  
Environment Bureau  
15/F, East Wing, Central Government Offices  
2 Tim Mei Avenue, Tamar  
Email: fuel\_mix@enb.gov.hk

18<sup>th</sup> June, 2014

Dear Sir or Madam,

**RE: Response to Public Consultation Document on Future Fuel Mix**

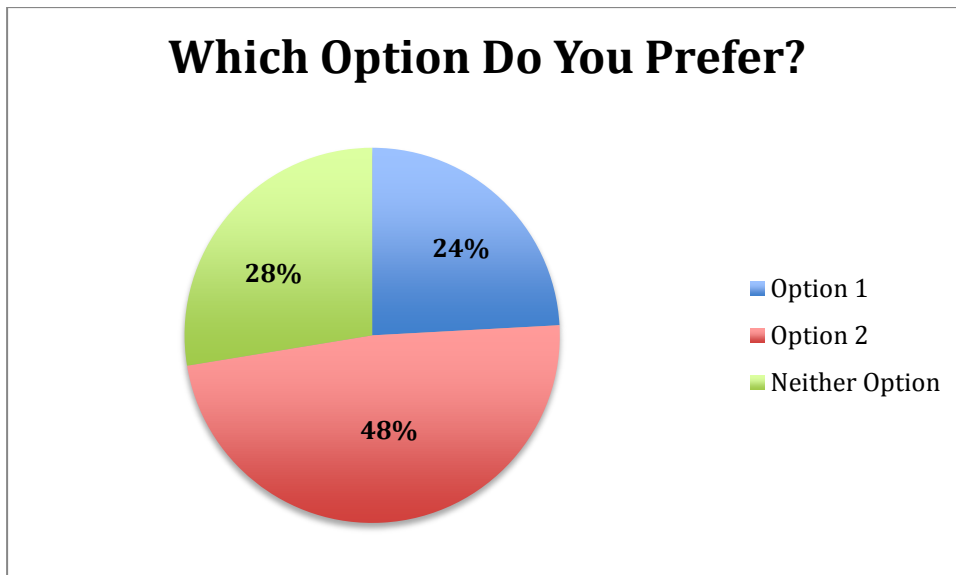
We, at the Environmental Management Association of Hong Kong (EMAHK) along with the Hong Kong Institute of Environmental Impact Assessment (HKIEIA), have compiled views amongst our members in response to the Public Consultation Document regarding Hong Kong's future fuel mix for electricity generation.

In doing so, we passed on the document to our members, along with an impartial summary, and a survey in which they chose which option they preferred and notes by which they could comment. As well as this, there was a 'neither option' choice in which our members could comment on their concerns regarding the two options and give possible new 'fuel mixes'.

Firstly, we wish to commend the Environment Bureau for giving compiling an excellent report that was detailed and comprehensive as well as understandable to both experts and the general public alike. Yet, it has also been noted that there is seemingly a lack of any meaningful mention of energy **conservation** through technology or perhaps placing any responsibility on the customers (be they businesses, residential etc). Because data about fuel mix is presented in percentages rather than figures, this doesn't give the public a sense of perspective about consumption, the role they could have in lowering it and this effect on energy generation. Nevertheless, it reads very well.

**Results**

The pattern of our results is shown in the chart below as well as a summary of the comments that were given.







### Option 2 – 48%

There were barely any comments from those who chose Option 2. Those that did comment stated a satisfaction in that this option would provide Hong Kong with more responsibility into generating it's own electricity and that we would not be passing on pollution costs to the Mainland. Option 2 was also seen as an opportunity for the government to offer power companies more incentives to develop on renewable energies.

### Option 1 – 24%

There were more comments from those that chose Option 1. The vast majority of these comments referred to conditions that would make this option successful. These included reliability and security. Should Mainland power generation bear these in mind as they provide electricity, the members that chose this option would not have a problem with it.

### Neither Option – 28%

Our members that chose this option had a variety of comments yet the majority drew upon more development over time on renewable energy sources that included offering incentives to commercial and government building to develop PV for their own use or inclusion back into the grid. Should this happen, then the market can be monitored to see if the tariff would stay stable or if any benefits can be had.

Others commented on a wider perspective, especially referencing an IPCC report. As Hong Kong has very little in the way of renewable energy generation as well as any future developments in this area and as IPCC recommends a complete reduction in fossil fuel consumption, there should be more in terms of nuclear energy generation rather than less of it.

We appreciate you taking the time to read our comments on the issue and we hope that you will take them into consideration when formulating your final conclusion. Please do not hesitate to contact us should you have any queries.

Kind Regards

EMAHK Executive Committee  
[www.emahk.org](http://www.emahk.org)

#### *About Us:*

*The EMAHK was founded in 2010 by a group of alumni of the MSc Environmental Management program of the University of Hong Kong, which started more than 20 years ago. We currently have almost 300 members, consisting of graduates from 15 universities in 4 countries.*

*The aim of the EMAHK is to improve the quality of the environment in Hong Kong and its vicinity by improving awareness through stressing the importance of environmental management. Professional views will also be provided on what is needed to manage the many challenges to our environment in the face of continuous economic development. Our input will cover issues from environmental policy to specific issues and projects. With the multi-disciplinary and professional background of our members, we believe we differ from other environmental bodies which are generally organized around a specific scope.*

# 618B00146

## 香港的未來發電燃料組合公眾諮詢

我們是香港浸會大學的校園低碳先鋒，由不同學系的同學組成，致力於在校內及校外推廣可持續的低碳文化。對於環境局提出的兩個能源組合方案，一是向內地南方電網輸入用電(下稱方案一)，二是提高本港天然氣發電量(下稱方案二)，由於對環境及市民的利益影響深遠，本組織希望就此發表以下意見。

先就方案一而言，向內地南方電網輸入用電，是一個技術上可行，但對香港、中國是弊大於利的方案。

對香港而言，向南方電網輸入用電會使香港失去重要的電力控制權，因為此方案使香港有三成電力是來自南方電網，兩成來自大亞灣核電，最後全港電力將會有一半是由中國提供。對於一個極度需要供電穩定的城市來說，這使南方電網將來有權隨時提高收費，以提供百分百供電穩定的服務予香港，對於一個電費有增無減的方案而言，使用南方電網電力，使價格完全受制於南方電網，電費甚至有可能比購買天然氣更高，這是顯然是不利香港。

中國政府在「十三·五」計劃中，多次提到要加快中國城鎮化發展。現時，中國南方仍有大量農村，如果在未來十年，這些農村進行城鎮化改革，會對南方電網的電力需求更大，這有機會使供應香港的電力成本變得更高昂，增加香港市民的負擔。另外，未來中國的城鎮化發展，也會增加南方電網供電的不穩定性，若使用聯網供電，若聯網一方電壓下跌，會連累整個電網停電，而重啟電網程序複雜，香港作為國際金融中心，若因購買南方電網的電力出現停電，對本港的經濟和社會造成重大負面影響，因此，穩定性是選擇香港未來能源組合的首要考慮條件。

此外，現時南方電網有超過六成是來自燃煤發電，他們有不少燃煤發電機組內的控制空氣污染措施，並不符合國際標準，香港現時進行是次能源改革，目的是要減少燃煤發電，倘若我們再次各南方電網購電，豈不是再走回頭路，變相支持中國提高燃煤發電比例？現時內地不少城市正受霧霾問題所困擾，倘若香港要把三成發電的責任，由中國承擔，這不但會加重中國的空氣污染，而內地的空氣污染物亦會隨風吹襲香港，使環境局多年提出的「藍天行動」付之一炬。由此可見，方案一的潛在負面影響眾多，這似乎不是一個理想的方案。

就方案二而言，增加天然氣發電比例至六成，這的確有助減低發電對香港空氣污染的影響，並同時為香港提供穩定電力。不過，這個方案最令人擔憂的問題是隨著國際對環境保護愈來愈關注，香港若提高天然氣發電至六成，在天然氣的需求不斷增多，但天然氣蘊藏量愈趨短缺的情況下，國際天然氣價格必會上升，

到時將會加重市民負擔。不過這個方案無疑是比向南方電網購電更能夠為香港提供穩定的電力供應。然而，若政府採用這個方案，仍要面對天然氣用盡後，再採用什麼發電燃料，並面對香港兩間電力公司繼續壟斷全港電力市場的兩大難題。在天然氣價格持續上升的情況下，兩電會以此為藉口，繼續加價，市民的負擔只會繼續增加。加上現在發電機組將於 2023 年完全退役，新建的發電機組成本高昂，兩電又會把興建發電機組的成本轉移至市民，因此，方案二對香港市民而言，未能解決長遠電力供應的難題，提供兩電繼續壟斷的環境，又會加重市民負擔，因此方案二不是一個良好的解決方案。

電力系統作為公共事業，政府理應改良現有的方案二，修改現有的法例，加入公共事業反壟斷競爭法，及設立強制性開放電網市場法例。根據本組織早前曾到新加坡 Senoko 電力公司考察所得，新加坡政府於 1990 年開始推動電力市場改革，針對當時新加坡以國營機構作為單一電力供應商的緣故，導致電力市場欠缺進步的誘因。因此，新加坡政府決定開放電力市場，透過公用事業局去監管電力市場，並設立電力批發和零售中心，通過此改革，可使電力供應更公平公正。

倘若香港政府要推出類似新加坡的改革方向，相信非短期之內便能完成。因此，我們認為，不論當局最終採用那一個方案，均可效法新加坡，對發電廠的利潤作出嚴格控制，例如對發電廠的資產重組作出嚴格監管，防止壟斷。因此，我們建議當局應修改現有的限制電力公司的最高收益比例，不得再讓電力公司透過擴大資產方式，不斷以未達到最高收益比例的限制成為增加電費的藉口。

總而言之，我們相信香港是有條件仿效新加坡的做法，而一個理想的方案應達到開放電網，反對電力供應壟斷，以及為香港未來發電的能源提供可持續的長遠解決方案。誠盼當局可參考外國做法，與能源專家商討，研究更可行更有利全港的方案。

香港浸會大學校園低碳先鋒



香港經濟民生聯盟  
Business and Professionals  
Alliance for Hong Kong

618B00147



# 「未來發電燃料組合」諮詢文件 經民聯意見書

2014年6月



## 《未來發電燃料組合公眾諮詢》 經民聯意見書

### 引言

政府在三月發表《未來發電燃料組合》諮詢文件，展開為期三個月的公眾諮詢，當中提出了兩個方案供市民考慮，方案一是仿效澳門向內地電網買電，方案二是大幅增加天然氣發電比例至六成。

### 政府建議的兩個方案

燃料組合		輸入		天然氣	煤 (及可再生 能源)
		核能 (大亞灣核電站)	從電網購電		
2012年		23%	-	22%	55%
方案一	通過從內地電網購電以輸入更多電力	20%	30%	40%	10%
		總共 50%			
方案二	使用更多天然氣作本地發電	20%	-	60%	20%

資料來源：政府《未來發電燃料組合公眾諮詢》

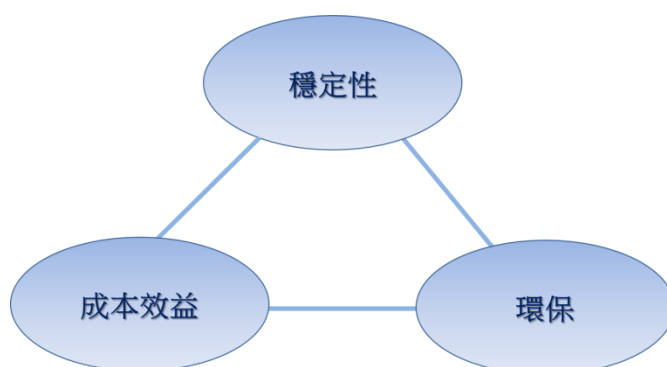
發電燃料與供電穩定性、電價及碳排放有密切關係，更將影響到未來多年的相關基建配套規劃，一經採納便難以在短期內改變，可謂影響深遠。

因此，經民聯除了廣泛聽取業界和市民的意見外，亦特別於6月9日舉辦了「香港未來能源組合座談會」，並邀請到環境局局長黃錦星先生、環境局副秘書長劉明光先生、香港城市大學校長郭位教授、恒生管理學院商學院院長蘇偉文教授、生產力促進局主席陳鎮仁先生、中華電力副主席阮蘇少湄女士、港燈董事總經理尹志田先生作主題演講和討論，代表不同持份者，從不同角度分析發電燃料組合的發展方向，並對備受關注的本港能源自主權、電價走勢、天然氣價格及供應、碳排放等議題進行討論。

經民聯希望透過不同渠道及場合，全面了解社會對未來發電燃料組合的看法，考慮不同發電燃料組合可能帶來的長遠影響和潛在風險。

## 以三大標準衡量方案

經民聯總結業界和市民的意見，經民聯認為，選擇燃料組合的衡量標準主要有三項，分別是**穩定性**、**成本效益**及**環保**。



### 1. 穩定性為首要條件 絕不能犧牲

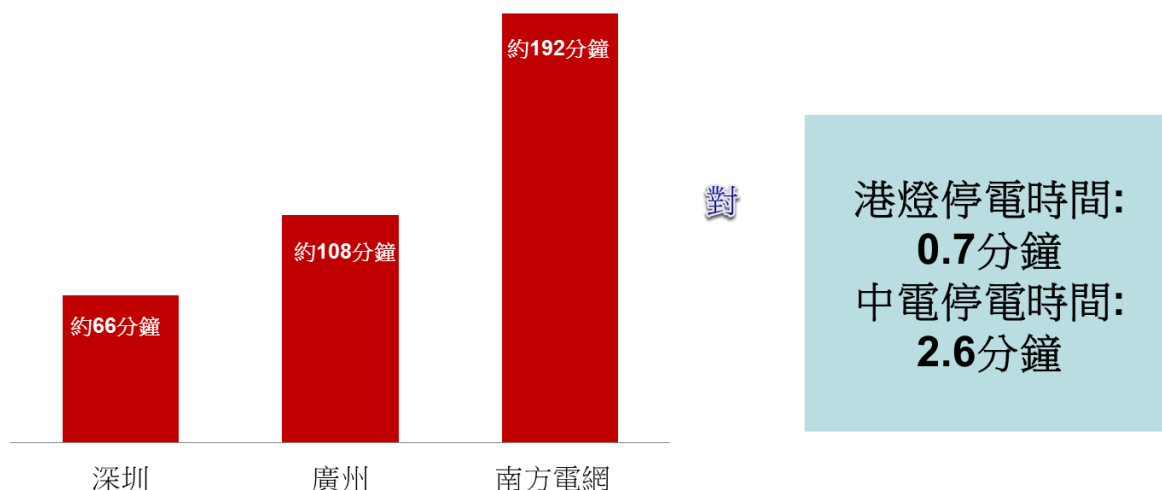
香港作為國際金融及貿易中心，市場交易頻繁，莫說出現大規模停電，造成市場停頓會帶來巨大經濟損失，若供電的穩定性下降，即使每年停電多一分鐘，也勢削弱香港的競爭力，甚至影響國際金融及貿易中心的地位。

再者，香港亦銳意發展為區域數據中心，供電的穩定性更成為不可或缺的條件。事實上，香港已連續3年獲國際機構評選為亞太區最佳數據中心選址，其中能源成本和風險低，正正是香港的優勢。故此，經民聯認為，在上述三個衡量標準當中，應以穩定性為首要，絕不可因為其他因素而犧牲供電穩定性。

有業界人士反映，憂慮輸入電力之後，香港的供電穩定性會受到影響。2012年兩電的每年停電時間均少於2.6分鐘，但南方電網的停電時間則達192分鐘，即使單以大城市計算，廣州和深圳的停電時間仍分別達到108分鐘及66分鐘。



## 穩定性——停電時間比較 (2012)



資料來源：兩電年報、南方電網社會責任報告

儘管政府多次以澳門向南方電網買電做例子，指澳門向內地買電的供電穩定性在2012年達99.9999%；事實是現時澳電在其年報內公布的供電可靠度所反映其系統平均停電時間指數，當中只包括因澳電責任而造成的供電中斷，即澳電公司的供電可靠度數據並不反映因內地供電中斷或限制供電事故而造成的停電時間。

澳門自2007年起大幅增加輸入內地電力，購入的內地電力佔澳門總發電/購電量由2006年的37.3%增至2007年的53.7%；同期的系統平均停電時間指數亦由2006年的3.87分鐘大增至2007年的7.88分鐘。

在2007年8月，因內地送電至澳門聯網線路發生嚴重事故，導致澳門電網聯網中斷，引發停電，接著自2008年起，澳電再無公布全澳門的供電可靠度數據。今年3月，澳門氹仔區一帶亦發生停電，逾二千戶受影響。因此，特區政府指出，澳門向內地買電的供電穩定性在2012年達99.9999%，並沒有全面反映實況。香港若仿效澳門做法，必須加強配套，確保供電穩定性不能低於現時水平。



南方電網覆蓋內地五個省份，包括雲南、貴州、廣西、廣東及海南省，不時因天災或意外事故而導致大規模停電，2008年初受雪災影響，至少90個縣市停電；2011年1月又因低溫雨雪天氣，在貴州和雲南省至少有104個鎮停電；2012年4月，南方電網轄下深圳變電站設備故障，導致深圳市羅湖區、福田區和龍崗區等地大面積停電，19趟和諧號廣深動車出現誤點，道路紅綠燈失靈，交通出現癱瘓。

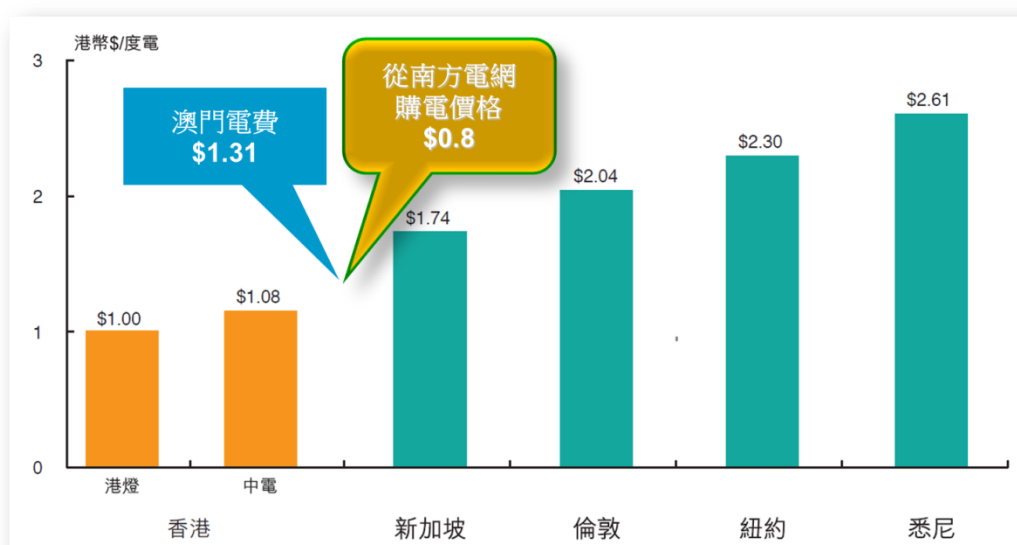
內地現時實行廠網分家，南方電網沒有發電廠，而是透過廣東電網向香港供電，因此不能只考慮南方電網主網供電穩定性；此外，香港未有網對網(grid-to-grid interconnection)經驗，故以此方法向南方電網購電存在一定的停電風險。若網對網供電，則須配套設施及發電機組配合，並須研究一旦內地出現供電緊張，香港可否獲優先供電，以及香港是否應設置後備機組作應變，以維持正常供電。

## 2. 必須對成本效益及相關風險有充份掌握

電價直接影響到普羅市民的生活和中小企的營運，故此政府在選擇能源方案時，必須同時考慮對電價的影響。有市民反映，擔心若大比例增加由南方電網輸入電力，長遠會大大減低香港的議價能力，同樣可能引致電費大幅增加。

澳門在2007年起向內地輸入電力之後，2008年至2013年間電價已上升27%。現時澳門從南方電網的購電價格為每度電0.8港元(下同)，但加上輸電基建等各項成本，實際電費為\$1.31/度電；兩電的電價現時則約為\$1.0-\$1.08/度電。

香港與四個主要城市的電價比較





亦有分析指，隨着海上液化天然氣接收站（Liquefied Natural Gas Floating Terminal）的技術日益普及，中電亦曾指出，本港有可租用設施而不用自行興建，便能購入非亞洲區較便宜的天然氣，成本較陸上天然氣站便宜一半，而且在調配上更具彈性，目前已有二十個國家引入，包括美國和中國內地的天津。

而廣東將有更多天然氣接收站投入營運，南中國海離岸氣田的開發步伐正在加快，以及美國的頁岩氣革命使天然氣價格大幅下降，有望紓緩因增加天然氣發電比例而引致的電費增幅。但同時有評論擔心，亞洲的天然氣需求仍然有增無減，若大幅增加天然氣發電比例至六成，若天然氣價格繼續上升，屆時難免要大幅增加電費。

### 3. 基建投資成本數據欠奉

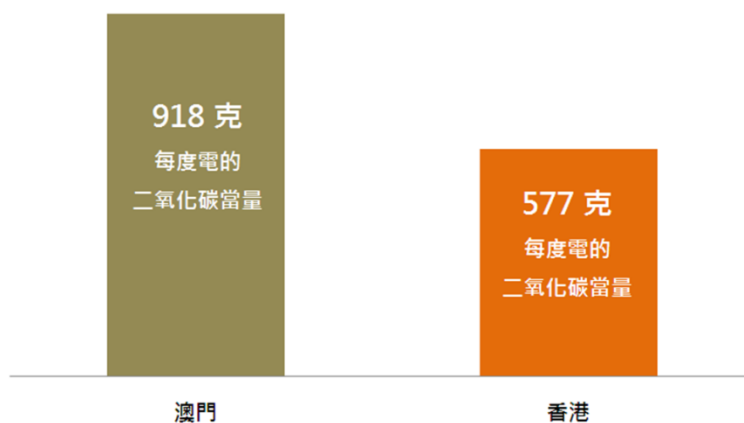
在前期成本方面，根據政府諮詢文件，兩個方案的前期投資相若。若向南方電網購電，需要支付連接南方電網的基礎建設成本，但諮詢文件並沒有列出有關成本估算。經民聯認為，連接網對網的基建預算，及相關的協議條款等重要資料，可讓市民及業界評估方案的成本估算是否切實可行，以及萬一出現超支，將由哪一方承擔。

另一方面，若要增加天然氣設施，亦需要對成本有具體估算，並評估興建相關設施所需的額外土地。故此，政府考慮不同選項時，必須謹慎處理電價協議，亦應同時評估相關基建的預算，避免使市民和中小企百上加斤，或納稅人要承擔可能出現的超支。

### 4. 須衡量區域性的環境影響

碳排放亦是不少市民關心的問題。雖然由南方電網輸入電力可以減少在本港直接燃燒化石燃料的影響，但現時南方電網 62% 的機組為化石燃料機組，主要靠燃煤發電，故向內地購電仍然可能增加碳排放，甚至降低區域性空氣質素，間接影響到香港。

2012年發電/購電 每度電的溫室氣體排放量



資料來源：港燈

相對而言，若以天然氣發電配合其他再生能源，對環境的影響則會較低。觀乎港燈提供的實際數字，現時香港每度電碳排放量為 577 克，若增加本地天然氣發電至 60%，更可進一步減少碳排放至 400 克。但從南方電網輸入電力的澳門則達到 918 克，可見輸入電力衍生的碳排放問題仍有待解決。故此，經民聯認為，若計劃向南網購電，必須確保其發電燃料組合得以優化，碳排放得以降低。

## 其他能源組合的可能性

### 1. 化石能源

在化石能源方面，過去六年間，美國頁岩氣能源革命使美國天然氣價格大幅下降 70%，使美國由天然氣淨入口國成為淨出口國。而根據美國能源署(EIA)的估計，中國有全球最大的頁岩氣儲量，約有 36 兆立方米，是本港可以考慮引進的選擇。

### 2. 可再生能源

可再生能源方面，2013 年世界能源理事會與彭博新能源財經合作，調查全球各國多種發電能源的成本價，比較由傳統的煤、氣、核電，到新研發的海洋發電、生物燃料等發電成本差異，發現部分可再生能源的成本已較數年前下降，其中水電及在岸風電，只要建在合適地區，成本與傳統能源如天然氣及煤相若。

報告亦認為，雖然目前全球 65%電力仍靠天然氣及煤等碳排放最高的化石燃料生產，但隨着可再生能源生產成本下降，火電比例有望在 2030 年降至 40-45%；太陽能則由現時 2%升至 16%；風電有望由 5%升至 17%。長遠而言，政府亦可積極考慮加強相關科研投入，研究更大規模地引進再生能源。

### 3. 核能

2010 年 9 月 10 日，政府當局發表有關《香港應對氣候變化策略及行動綱領》的諮詢文件，當中提出根據 2008 年顧問研究結果所得的建議，闡述減低香港的碳強度及使香港逐步發展為低碳城市的具體目標。當時政府曾建議 2020 年的發電燃料組合為煤不多於 10%、天然氣約 40%、可再生能源約 3-4%，其餘約 50% 為輸入核能，較之現在兩個方案的 20%有明顯差距。



隨著核電技術已進入第三代，安全性及效能均較前大為提升，加上鄰近城市本身亦設有核電廠，在並無增建核電設施的情況下，安全風險並不會因調整核電比例而上升。加上現時大亞灣核電廠輸入的電力有專綫傳送，換言之即使增加供電量亦不會影響供電穩定性，故政府亦應因應實際情況，積極考慮增加核電的比例。

## 總結

對於開放電力市場，引入競爭，經民聯持開放態度，但我們認為在選擇新的發電燃料組合之前，必須釋除公眾在穩定性、成本效益及碳排放三方面的疑慮。工商專業界認為，香港作為國際金融及貿易中心，尤以供電穩定性至為關鍵，停電多一分鐘都不能接受。

### 1. 穩定性

- 港燈的數據顯示，其供電的穩定性達 99.9998%，中電亦超過 99.999%，均達世界級水平，但南方電網供電穩定性為 99.96%，別小看這幾個點子的差距，相當於港燈和中電的客戶每年平均經歷意外停電分別約 0.7 及 2.6 分鐘，南方電網則相當於每年停電約 192 分鐘，確實可見明顯的差異。
- 向內地購電的澳門，今年 3 月在氹仔區一帶出現停電，逾二千戶受影響。政府是否有措施確保即使採納方案一向南方電網購電，仍能確保本港的供電穩定性不低於現時水平？
- 在內地能源亦出現緊張的情況下，若採取方案一，相關的供電協議是否能確保香港獲得優先供電？香港一定獲得所承諾的供電量？
- 若採用方案一，若南方電網及大亞灣核電廠均未能達標，本港的後備機組可應付多少供電量？香港是否因而需要提升後備機組的供電量？涉及的相關基建投資金額為何？由哪一方承擔？
- 核電技術已進入第三代，安全性及效能已大大提高，香港用專綫從大亞灣輸入電力，增加供電量不會影響穩定性，而且更是零排放，為何政府的諮詢方案不考慮調整核電的比例？
- 香港應和內地尋求區域性合作，但香港是否應放棄能源自主權？方案一建議香港本地發電量由現時約 77%降至 50%的理據為何？

## 2. 成本效益

- 雖然業界對未來的天然氣價格走勢預測較為樂觀，但政府的估算又如何？有否具體的分析數據？若採取方案二，增加天然氣供電比例至六成，萬一天然氣價格飆升，電費價格是否仍然能夠維持在合理水平？
- 若採取方案一，本港的供電自主性及議價能力會否因而減低，繼而引致電費大幅增加？
- 根據澳門能源業發展辦公室的資料，澳門自 2007 年向內地購電後，2008 – 2013 年間電價已上升 27%，若香港仿效澳門向內地買電，如何保證電價長遠能夠平穩、合理地增加？
- 政府在諮詢文件中只提及兩個方案的成本相若，但具體的投資金額如何，卻未有詳細交代，政府是否能在短期內提供相關資料？對兩個方案的基建投資預算及超支風險，是否有充份掌握？萬一出現超支，將由何者承擔龐大的額外開支？
- 目前兩電調整電費幅度是有協議根據，具透明度，市民知悉兩電如何得出調整幅度，兩電亦會向公眾解釋，甚至有時因應輿論反響而作微調。若採納方案一向南方電網購電，有關購電價格及調整價格的方程式會否公開？

## 3. 環保

- 若採取方案一，政府如何確保輸入的電力是來自潔淨能源，又確保其碳足印符合政府為2020年制定的本港空氣質素和減排目標？
- 現時澳門發電的碳排放比香港高，主要因為輸入內地電力引申的排放，但政府諮詢文件卻並未提到方案一的碳排放，政府可否向公眾公開相關數據？
- 空氣污染及碳足印的影響絕不局限於香港，基於現時南方電網 62%以燃煤發電的能源組合，採取方案一是否只是等於把污染轉嫁予珠三角其他城市，而非長遠提升珠三角地區整體的供電環保表現？
- 減排溫室氣體方面，早前美國首次提出至 2030 年減二氧化碳排放 30%，中國可能會作出回應，有揣測指中國或考慮實施碳足印上限，政府是否亦已將此因素納入考慮之列？
- 政府在 2008 年公布的《香港應對氣候變化策略及行動綱領》諮詢文件中，也羅列出不同的情景下，在 2020 年及 2030 年之香港溫室氣體排放量，為何是次卻未能提供同類的數據推測？



改變未來發電燃料組合，是一個非常重要的決定，對香港影響深遠，但這份《未來發電燃料組合》諮詢文件只簡單羅列兩個方案，多項關鍵數據欠奉，包括各方案的供電穩性、前期投資成本及溫室排放量等，經民聯認為不應在現階段資訊不完整的情況下，對諮詢文件提出的兩個選擇倉卒定論。

在這三個月的諮詢期間，兩間電力公司、環保團體及學者等不同持份者對兩個方案均提出不少疑問，經民聯促請政府向公眾提供更多資料和數據，進行深入研究，探討更多不同的發電燃料組合的可能性供市民考慮，務求最後能選出最具可持續性、最合乎香港整體利益，及可靈活適應未來環境變化的方案。

此外，香港作為國際金融及貿易中心，工商界在過去數年已積極改用環保設施和機器，以節約能源，未來會繼續提升能源效益，經民聯期望政府亦帶頭鼓勵市民實行效率用電(**efficient use of electricity**)，節省電力開支之餘，共同為環保出一分力。

(完)

## 公民黨對《未來發電燃料組合諮詢文件》的意見書

### 整體意見

有關環境局於本年三月公佈的《未來發電燃料組合諮詢文件》，文件封面提出「優化燃料組合 開展長遠規劃」。公民黨認為，文件不但未能為本港燃料組合作出真正改善建議，反而引起更多疑團，令市民對能源發展未來方向感到困惑。因此，公民黨對環境局是次諮詢工作表示費解，並向特區政府以下質疑。

### 利益衝突

據報<sup>i</sup>，文件提出向南方電網購電的方案，源自一份由與南方電網關係密切的廣東省電力設計研究院撰寫的顧問研究報告，而特區政府並無就委託顧問事宜進行公開招標，令人質疑特區政府漠視南方電網與研究院的利益衝突，兩者關係難免予人瓜田李下的感覺。

### 能源自主

基本上，文件並無任何篇幅提及本港能源自主的目標。不論方案一或二，能源來源均來自中國大陸。特區政府應推動節能措施和發展可再生能源。相反，文件只著眼於「能源供應」，繼續忽視「需求管理(推動節能)」，反映環境局欠缺整全的能源政策。

### 用電需求

文件指「以近年年均增長約 1%至 2%的趨勢基礎作計算」，預測總用電量的數字如下：

預測總用電量

年份	用電量
2012	430 億度電
2020	480 億度電
2023	500 億度電

不過，文件並無就「1%至 2%」的數字作出仔細說明。究竟環境局按甚麼標準和假設推算該等數字不得而知。事實上，環境局「選擇性採用數字」的誤導手法已於 2010 年《香港應對氣候變化策略及行動綱領》<sup>ii</sup> 的公眾諮詢中表露無遺。根據環保署向立法會提交的文件<sup>iii</sup>，當時顧問研究「就 2020 年三個情景的本地能源需求作出推算。期內的用電量增幅，主要由於預計的社會經濟活動增長所致」。而在三個情境中，環境

局最終選取本地生產總值最高增長幅度(+64.1%)的情境三(進取方案)，即合計最終能源需求最高(2020年：401857太焦耳，與2005年相比上升36%)的方案，並以之作為建議大幅增加核電比例<sup>v</sup>(由2009年23%提高至2020年50%)的借口。

公民黨擔心環境局於本年諮詢中重蹈覆轍。公民黨要求特區政府應盡快公開所有資料，包括由廣東省電力設計研究院撰寫的顧問研究報告，以推動理性的公共政策討論。

### 核能發電

公民黨對環境局未有調低核電比例和制訂全面淘汰核電時間表表示遺憾。

針對文件的方案一，公民黨認為，南方電網的發電燃料組合包括火電(62%)、水電(31%)、核能(6%)及風能(1%)，而環境局卻未能清楚交代來自南方電網的能源來源為何，我們質疑特區政府暗渡陳倉提升核電比例。

就中國廣核集團<sup>v</sup>的大亞灣核電站所生產的電力，當中70%輸往香港，另外30%輸往南方電網，而中廣核的嶺澳核電站一期和二期亦把全部電力輸往南方電網，加上中電早前宣佈在未來五年從大亞灣增加一成供港核電<sup>vi</sup>，由大亞灣總發電量七成增至八成，使人有合理懷疑方案一旨在吸納更多核電。

公民黨反對提升核電比例，認為增加後患無窮的核電，與環境局倡議的可持續發展和綠色生活背道而馳。而環境局在考慮發電燃料組合和採用不同能源時，都不應凌駕市民安全和健康，尤其是核電涉及種種深遠和難以挽回的災害(例如環境影響、核輻射、核廢料、核洩漏事故等)。公民黨要求特區政府必須交代南方電網的背景、其與中廣核的供求關係和輸電詳情，及澄清特區政府就核能使用的立場。

公民黨本年初就本港能源組合進行民調，結果<sup>vii</sup>指社會對提升核電比例意見分歧(28%支持、35%反對、37%無意見和不知道)，及對核電的認知(69%)和政府處理核事故的信心(66%)均非常不足，說明增加核電只會撕裂社會；及市民對政府面對核事故的應變能力和防護措施缺乏信心，特區實在政府難以迴避社會對核電的憂慮和抗拒。

## 轉廢為能

環境局擬把綜合廢物管理設施與可再生能源網綁，並指「由廢物轉化為可再生能源的數量不會太多，可能最多只佔 2020 年初期總電力需求約 1%左右」，公民黨質疑，環境局說法等同「若無焚化爐，便無可再生能源」，從而迫使社會在特區政府現階段仍未做好回收減廢的情況下，便要接受焚化設施。公民黨認為，此說法反映特區政府根本無心無意推動可再生能源的發展，並對此表示失望。

另外，與四年前《香港應對氣候變化策略及行動綱領》公眾諮詢的建議發電燃料組合比較，環境局當時建議 2020 年的可再生能源比例為 3% 至 4%，較本年諮詢所指「1%左右」高三至四倍，現屆政府對此全無交代。

## 篩選方案

文件只提供兩個方案予公眾選擇，實有誤導公眾的意味。公民黨認為，特區政府應明確分析各種能源的利弊，讓公眾從中作出明智抉擇，並把之拼湊為不同組合。例如，文件中兩個方案均含 20% 的核電，若公眾基於抗拒核電而建議「無核方案」，他們在諮詢中根本無從選擇。

公民黨認為，特區政府不應早早篩選只適合其主觀意願的方案，尤其已有報導<sup>viii</sup>指「南方電網可靠度遠遜港 年停電時間 南：5.2 小時 港：2 分鐘」。特區政府的「篩選諮詢」行為，迫使社會「非一即二」，實為誤導公眾指南方電網「可靠」、「硬硬核電」及「接受政府消極發展可再生能源」及之舉。

公民黨

2014 年 5 月

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<sup>i</sup> <http://hk.apple.nextmedia.com/realtime/news/20140418/52395451>

<sup>ii</sup> <http://www.info.gov.hk/gia/general/201012/03/P201012030153.htm>

<sup>iii</sup> 2011 年 4 月 27 日，環保署，CB(1) 2039/10-11(01) 2011 年 2 月 28 日環境事務委員會會議。

<sup>iv</sup> [http://www.epd.gov.hk/epd/tc\\_chi/climate\\_change/files/Climate\\_Change\\_Booklet\\_C.pdf](http://www.epd.gov.hk/epd/tc_chi/climate_change/files/Climate_Change_Booklet_C.pdf)

<sup>v</sup> <http://www.cgnpc.com.cn/n1381/n1404/n1411/index.html>

<sup>vi</sup> <http://hk.apple.nextmedia.com/news/art/20140207/18617818>

<sup>vii</sup> <http://www.civicparty.hk/?q=node/5668>

<sup>viii</sup> [http://www.mingpaotor.com/htm/News/20140321/HK-gga1\\_er.htm?m=0](http://www.mingpaotor.com/htm/News/20140321/HK-gga1_er.htm?m=0)



## 自由黨就《未來發電燃料組合》諮詢文件回應

### 一、前言

1. 為了改善空氣質素及減少溫室氣體排放，本港逐步取締燃煤發電已成定局。當局重新啟動諮詢，就未來能源組合提出「內地購電」及「本地發電」兩個方案，一是從內地南方電網（下稱南網）購買約三成電力，另維持由大亞灣核電廠輸入兩成核電，輸入電力佔本港整體電力比例一半，而天然氣發電比例則由現時的兩成三增至四成，燃煤和可再生能源佔約一成；二是將天然氣發電比例大幅增至六成，燃煤和可再生能源發電約佔兩成，另加大亞灣核電廠的兩成核電。

### 二、整體評價

2. 雖然政府表示對是次諮詢持開放態度，不過，政府對「網電方案」的好處有更多着墨，而且從諮詢文件的鋪陳來看，文件花不少筆墨解釋向南網買電的各種疑慮，以及單靠大增天然氣發電的局限，指出按照本地發電方案，提高天然氣發電比例，需要投資新的發電機組，加上天然氣價格上漲的因素，政府估計整體發電成本將會上升，屆時電費的價格與向內地買電方案相差不大。見微知著，多少也反映出政府對發電燃料組合的「傾向性」。
3. 事實上，發電燃料組合的變動影響深遠，任何決定都可能影響未來二三十年的電力供應結構，並且不可能在期內因應重大謬誤作出根本性的修訂，故有關計劃絕不能草率決定。此外，未來發電燃料組合的取向，亦會牽動將會在2018年期滿的兩電《管制計劃協議》的規管架構，以及日後發電和供電的營運模式。換言之，是次發電燃料組合的諮詢，理應為未來規管架構是否改變、如何改變，提供一個可以更具體討論的基礎，因而應該從一個更寬闊的角度來全盤考慮問題。因此，自由黨認為，發電燃料組合的變動，牽涉層面極廣，當局不應僅僅提出兩個方向的假設作為諮詢的核心部份，同時當局亦未能為這兩個假設性方向提供充足的資料和數據，完全欠缺諮詢的深度。自由黨認為在如此片面和狹隘的層次上，根本無法就這方面的諮詢提出任何具實質意義的回應，更不可能因應市民的訴求，替他們作出合理和持平的抉擇，故當局應該就有關諮詢的範疇和各項相關因素作出淺層診斷和深層剖析，否則這類和稀泥式的諮詢不會對未來電力市場發展有任何實質幫

助。

### 三、具體評價

#### 資料不全 市民難抉擇

4. 據諮詢文件估計，未來電力需求會持續增加，以年均增長率約 1% 至 2% 計算，預測總用電量將會由 2012 年的約 430 億度電，增至 2020 年的約 480 億度電，以及 2023 年的約 500 億度電。而且，無論是從內地輸入電力的「網電方案」、抑或「本地發電方案」，兩者的發電成本均上升，預料較 2008 年至 2012 年五年間增加約一倍。本來要改善本港的環境質素，優化發電燃料組合以及應付未來電力需求屬無可厚非，問題是當局有否充分考慮市民的負擔能力，以及給予市民有意義和充足的選擇權。
5. 在發電燃料組合的選擇上，市民最關心的始終是電費問題。可惜，諮詢文件所展示的兩個方案，在發電成本上並無明顯差異，而兩者均會導致電費最少增加一倍。而且，諮詢文件還提出許多不明朗因素，包括經營成本、銷售量、電費穩定基金和燃料價條款賬目的變動等，這些因素容易受到外圍因素影響，難以作出準確預測。因此，在目前缺乏全面資料的情況下，根本上無法就兩個方案的優劣作出判斷，如硬要市民二擇其一，亦未必是最適合的方案。
6. 另外，市民環保意識增強，從生活層面上亦會採用不同的綠色生活模式；加上社會各界亦有不同的節能措施，減少耗電，令自由黨擔心當局在計算未來電力需求上或未能反映真實情況。以九倉旗下的商場海港城為例，商場的中央冷氣由新的水力製冷取替傳統的風力製冷；電梯及升降機換上變頻摩打，在無人使用時減速；照明系統亦換上節能光管，減少碳排放污染。在短短五年內，商場的節電量高達 10%，相等於 3,000 多萬度電，其電量可以為數萬個家庭提供全年的耗電量。因此，以環保趨勢的角度出發，自由黨相信未來電力需求或會是不升反跌，期望當局可交代更多相關資料。

#### 平衡環保與市民負擔

7. 香港在 2010 年跟隨國家擬在 2020 年之前減低碳排放量，即把碳強度由 2005 年的水平降低 50% 至 60%。由於發電佔碳排放量約 66%，故優化發電燃料組合是實現目標的重要步驟。然而，有關目標只屬自願性質，為了達標而迫使市民付鈔的做法值得商榷。另外，諮詢文件中表示，若從內地輸入電力，有關跨境輸電設施約於 2023 年全面落成後，可進一步降低本地排放量，亦可引入香港沒有的更多樣化及環保的燃料種類。
8. 然而，諮詢文件僅指出，南網在 2012 年的非化石燃料和化石燃料分別約佔 44% 和 56%。在其發電燃料組合中，火電、水電、核能及風能分

別約佔 62%、31%、6%及 1%，並未有表明香港可否就購電註明發電的來源或燃料組合。鄰近的澳門於 2008 年與南網簽訂輸電往澳門的合約，但合約並無訂明發電的來源或燃料組合，澳門電力股份有限公司發電部高級經理葉錦榮表示，由於電力輸入的主要成份是煤，碳排放較高。由此看來，若當局推行向南網買電的方案，一旦大陸增加燃燒煤炭，將會使珠三角區域的碳排放增加，即使香港的碳排放減低，亦只是將污染源轉移而已，污染最終會影響中港兩地居民。

9. 事實上，本港缺乏天然資源，為確保能夠獲得穩定的燃料供應而又能達致優化本港燃煤發電的目標，本港於 2008 年與內地簽訂《能源合作諒解備忘錄》，訂定西氣東輸二線為其中一個向香港供氣的新氣源。然而，西氣東輸二線工程浩大，天然氣管網自中亞國家土庫曼跨逾千里來港，所費不菲。除此之外，中電亦曾多次強調西氣東輸二線供港天然氣價對發電燃料成本構成壓力，加上中電現時採用的崖城天然氣田快將枯竭，未來將集中採用西氣東輸的供氣源，故發電成本必然增加。因此，面對購電污染源及成本高企的西氣東輸天然氣等問題，自由黨不禁要問，當局何不考慮使用成本較低的核電，而同時分階段實施自願性的減排目標，避免電費水平短時間急劇增加，平衡環保與市民的承受能力。

#### 掃除核電恐懼 市民應有權選擇

10. 以往，社會對採用什麼能源發電，有兩方面討論，一是電價低廉，一是認同為了減排，願意為此多付電費。事實上，現時大亞灣核電廠的每度核電售價約 0.5 元，較南方電網的 0.8 元便宜。而且，若比較從南網購電的澳門，自 2006 年至今，向內地購買的電價增幅已達 36%，買電量越多，議價能力便越低。因此，面對著可能受制他人的不利處境，自由黨認為當局不能迴避是否增加使用核電的問題。
11. 雖然自日本 311 大地震釀成福島核電廠巨大核災難後，特區政府對核電取態轉趨審慎，是次諮詢還隻字不提增加輸入核電的可行性，而改以從南網輸電。但面對未來有可能大幅增加電費，政府會否改變思路，採取更務實的態度，而市民又是否同意增加輸入核電，是值得當局探究的方向。要注意的是，增加使用核電無須額外作出建設新基礎設施的投資，亦不會增加安全風險(因為珠三角境內的核電廠數量不會因為港人拒絕使用更多核電而增加或減少)，但卻有可能紓緩市民的負擔壓力，無疑是一舉兩得的理想選擇。自由黨對是次諮詢文件並未將使用較廉宜的核電作為其中一個選擇，令社會及市民缺少更多選擇，確實非常遺憾。

#### 可靠性是重中之重 不能妥協

12. 諮詢文件指出，本港每年若向南網購買電力，僅佔南方電網每年售電量的 2%。雖然本港未曾大規模從電網購電，但政府認為從內地輸入更

多電力在技術層面上是可行的；而香港亦可以受惠於整個南網擁有多個供電源的強大網絡支援，亦可安排後備發電容量以應付緊急情況。然而，增設後備發電容量工程浩大，自由黨建議當局絕不應低估工程的複雜性及所牽涉的巨大成本。

13. 同時，據中國電力企業聯合會發表的電力可靠性報告指出，南方電網在 2012 年上半年，每戶平均停電 1.5 小時，而 2011 年全年每戶平均停電更達 5.2 小時。反觀本港，供電可靠率達到 99.999%，每年每戶平均停電時間只是數分鐘。香港作為國際金融中心，若供電不穩定，可能會影響港交所、數據中心等機構的運作，造成災難性後果。加上市民對能源供應穩定性高度重視，故自由黨強調，政府對供電的可靠性絕不能妥協。

### 實現兩電聯網 達致長遠效益

14. 根據環境局的資料顯示，雖然兩電已經實現聯網，不過主要是供緊急電力支援之用，如果是用作跨區供電，則兩電仍須就擴大聯網的供電容量及提升電力系統供電網絡等方面作出額外的資本投資。經濟學者林本利指出，政府自 1995 年已先後聘請多位顧問，做了多次兩電加強聯網和引入競爭的報告，都認為技術上可行。因此，自由黨認為，無論是次諮詢的發展如何，或最終會落實那個方案，當局都應把握是次機會，促成兩電全面性的跨區聯網，為本港的電力市場發展邁出重要一步。

### 從宏觀和長遠角度看待細節

15. 總括而言，任何對未來發電燃料組合的選擇，都將影響到本港的電力供應模式，因而這次諮詢，其實也可視為全盤檢討相關市場規管架構的前奏。正因如此，當局不應迴避關鍵問題的處理。有了一系列資料及數據，才可作全面的分析和明智的選擇。所以，自由黨認為，在以下的問題未被清楚闡釋前而下決定，只會操之過急和得不償失。自由黨認為當局有必要解答以下的提問，並就各範疇提供相關的數據和資料，才可給予未來電力市場較全面及清晰的方向。

(一) 諮詢文件中的兩個方案皆涉及大型基建，不管最終採用那個方案，未來發電成本都會大增，電費將會有增無減，當局有沒有充分考慮市民的負擔能力？除了建議的兩個方案外，當局有沒有考慮其他可行安排？例如增加使用成本較廉宜且更符經濟效益的核電；並考慮在《能源合作諒解備忘錄》訂定的西氣東輸天然氣合約完結後，進一步擴大本港輸入核電？

(二) 面對需要優化燃煤發電及減低碳排放量的目標，而迫使電費價格短時間急升的問題，當局會否考慮上述使用核電的

建議外，還會考慮分階段實施自願性的減排目標，以顧及市民的承受能力？

- (三) 若本港向南網購電，發電成本增幅約 1 倍，包括輸入電力的成本及建設所需跨境輸電設施的資本投資。不過，這個增幅，並未計及本地輸/配電、客戶服務及其他支援服務的成本；從相關投資和成本看來，市民日後承擔的電費，有機會不只增加 1 倍，當局有否準確評估當中牽涉的成本？另外，買電所需投資，若由中電和港燈負責，而它們的利潤會否仍然與固定資產淨值掛勾，為兩電增加利潤提供理由和搭建平台？
- (四) 2008 年兩電與政府談判利潤管制計劃時，因應社會要求開放電網，引入競爭，兩電在管制條款要求加入「擱淺條款」，獲政府接納。擱淺條款目的在強化兩電擁有電網的權益，若政策上要求開放為其他供電之用，兩電可以得到補償。因此，若政府決定向南網買電，會否觸動兩電在電網的利益，而市民是否需要為兩電投資新機組日後不能「物盡其利」的「擱淺成本」作出賠償？
- (五) 當局認為從內地輸入更多電力在技術層面上是可行的，因為本港可安排後備發電容量以應付緊急情況。然而，增設後備發電容量工程浩大，當局有否清楚估計工程所牽涉的各樣成本？