出國報告（出國類別：出席國際會議）

出席 2013 年亞太清潔能源高峰會議暨國際展覽(Asia Pacific Clean Energy Summit and Expo 2013, APCESE 2013)

服務機關：經濟部能源局

姓名職稱：陳主任秘書玲慧

派赴國家：美國夏威夷

出國期間：102 年 9 月 8 日至 9 月 13 日

報告日期：102 年 10 月 9 日

行政院及所屬各機關出國報告提要

出國報告名稱：出席 2013 年亞太清潔能源高峰會議暨國際展覽(Asia Pacific Clean Energy Summit and Expo 2013,APCESE 2013)

頁數 42 含附件：■是□否

出國人員姓名／服務機關／單位／職稱／電話

陳玲慧／經濟部能源局/主任秘書／（02）27757702

出國類別：□1 考察 □2 進修 □3 研究 □4 實習 ■5 其他

出國期間：102 年 9 月 8 日~ 9 月 13 日

報告期間：102 年 9 月 25 日

出國地區：美國夏威夷

分類號/關鍵詞：潔淨能源(Clean Energy)、再生能源(Renewable Energy)、節能減碳(Energy Conservation and Carbon Reduction)

內容摘要：

本次出國行程係奉派出席「2013 年亞太清潔能源高峰會議暨國際展覽(Asia Pacific Clean Energy Summit and Expo 2013,APCESE 2013)」，主要目的係為了解亞太地區清潔能源發展現況及趨勢，藉此機會得以與區域內專家學者交換發展經驗。此外，並透過代表處安排，利用開會期間拜會夏威夷州眾議院議長 Mr. Joseph M. Souki 及州議員兼衛環委員會召委 Mr. Chris Lee、夏威夷州政府商業經濟及觀光廳能源辦公室 Energy Conservation Program Manager, Ms. Carilyn O. Shon、夏威夷大學 Office of the Vice President for Research, Dr. Daniel M. Ishii 等，就未來可能進行之合作方式及項目，作意見之交換。

此次行程重要成果包括在地熱及生質燃料之研發及推廣應用上應可逐步建立交流平台來推動實質技術合作；另在研發上和夏威夷大學達成在海洋能、水處理(淨化)、生質燃料、RDF (廢棄物衍生燃料)等 4 項技術可先透過視訊會議讓雙方技術人員交流，並逐步籌辦小型 workshop 來收斂雙方可推動具體合作之技術內涵；再者是希望台灣能在明(103)年 APCESE 扮演更積極之參與角色，並將台灣綠能產業帶入夏威夷市場。

目　錄

壹、出國行程記要

一、出國目的

本次出國行程係出席「2013 年亞太清潔能源高峰會議暨國際展覽(Asia Pacific Clean Energy Summit and Expo 2013,APCESE 2013)」，主要目的係爲了解亞太地區清潔能源發展現況及趨勢，藉此機會得以與區域內專家學者交換發展經驗。此外，並透過代表處安排，利用開會期間拜會夏威夷州眾議院議長 Mr. Joseph M. Souki 及州議員兼衛環委員會召委 Mr. Chris Lee、夏威夷州政府商業經濟及觀光廳能源辦公室 Energy Conservation Program Manager, Ms. Carilyn O. Shon、夏威夷大學 Office of the Vice President for Research, Dr. Daniel M. Ishii 等。

二、行程紀要

此次行程重點係出席「2013 年亞太清潔能源高峰會議暨國際展覽(Asia Pacific Clean Energy Summit and Expo 2013,APCESE 2013)」，除藉此機會與會場上與會人員進行技術及經驗交流外，並利用開會期間之空檔拜訪夏威夷州議會、州政府能源處、夏威夷大學等單位，進行經驗交流及討論未來可能合作之領域及模式。茲將詳細行程分述如下表：

日期	行程	地點
9/8 (星期日)	•去程	台北－美國夏威夷
9/9(星期一)	•出席 APCESE 2013	美國夏威夷
9/10(星期二)	•出席 APCESE 2013 •拜會夏威夷州眾議院議長 Mr. Joseph M. Souki 及州議員 Mr. Chris Lee •拜會夏威夷州政府商業經濟及觀光廳能源辦公室 Energy Conservation Program Manager, Ms. Carilyn O. Shon 及 Office of International Affairs, Strategic Marketing & Support Division Executive Director, Mr. Milton G. Kwock	美國夏威夷
9/11(星期三)	•出席 APCESE 2013 •拜會夏威夷大學 Office of the Vice President for Research, Associated Vice President for Research, Dr. Daniel M. Ishii	美國夏威夷
9/12(星期四)	•回程	美國夏威夷－日本東京－台北
9/13(星期五)	•返抵台灣	

貳、參訪活動及工作內容

此次會議係由 4 個系列會議同步進行，包括：一、亞太清潔能源高峰會議及展覽會(Asia Pacific Clean Energy and Summit and Expo，APCESE)； 二、國防能源相關議題技術的挑戰與商機(Military Opportunities & Programs)； 三、島嶼與孤立社區綠能相關議題(Island & Isolated Communities)； 四、國際海洋溫差技術研討會(International OTEC Symposium)等。

APCESE 主要係由政策面及推動面在探討潔淨能源之推動願景、模式及成果；國防能源相關議題技術的挑戰與商機(Military Opportunities & Programs)則廣泛說明美國軍方在推動節能減碳之活動及計畫；至於島嶼與孤立社區綠能相關議題(Island & Isolated Communities)系列研討會，則是由一些島嶼系列國家或地區提出一些現身說法，來強調如何落實永續發展，這部分與我國推動「澎湖低碳島」之理念頗爲類似；國際海洋溫差技術研討會(International OTEC Symposium)則是針對海洋溫差發電技術及應用現況和趨勢進行探討。

此次出席場合係以 APCESE 爲主，但也同時可自由參與國防能源相關議題技術的挑戰與商機(Military Opportunities & Programs)及島嶼與孤立社區綠能相關議題(Island & Isolated Communities)等兩個會議場合了解其進行內容及與參與人員有些互動。

一、出席 APCESE 2013

(一)日期：102 年 9 月 9 至 11 日(星期一至三)

(二)與會人員：夏威夷州州長及來自 25 個國家及地區超過 400 家公司及 1,000 人

(三)會談紀要：

此次夏威夷政府主辦會議共有 4 項會議係同步進行，分別是亞太清潔能源高峰會議及展覽會(Asia Pacific Clean Energy and Summit and Expo，APCESE)、國防能源相關議題技術的挑戰與商機(Military Opportunity & Programs)、島嶼與孤立社區綠能相關議題(Islands & Isolated Communities)及國際海洋溫差技術研討會(International OTEC Symposium)等。議程之安排，每天均安排有不同主題之 Keynotes，就不同之議題，進行引言。

第一天上午引言代表首先是由夏威夷州州長 Mr. Neil Abercromble 開始，他特別強調於就任州長(2010)時所提出「A New Day in Hawaii」中對能源之宣示，渠

認爲夏威夷對能源之推動計畫是追求能源的獨立，希望透過夏威夷當地充沛之潔淨能源來逐漸減少對化石能源之進口；其中重點大部分還是著重於供應端，尤其是電力供應的穩定；其次則是交通部門(約消耗全夏威夷三分之一的能源)如何導入潔淨車輛(電動車、油電混和車、生質燃料車等)；至於在需求端也提出在 2030 年提升能源效率 30%的目標。另於潔淨能源部分，則致力於風力、太陽能、地熱、海洋能、生質燃料等之研究發展。

第二位則是由夏威夷州國會參議員 Mr. Brian Schatz 以預錄之錄影帶發表看法，內容亦呼應州長之說法，強調夏威夷需要逐漸擺脫對化石能源之依賴，並擴大對各項再生能源之使用，如此才能維持一個良好之環境品質。

第三位則是美國陸軍負責能源相關的助理秘書(Assistant Secretary) Ms. Honorable Katherine Hammack，她特別說明美國陸軍在各個營區推動的淨零排放策略(Net Zero Strategy)，包括能源、水資源及廢棄物等 3 項；在能源部分則是採取再生能源之安裝、能源儲存再加上區域性智慧電網之建置。當然這推動過程中最大困難是機動車輛所需之各式燃料，由於無法大量引入生質燃料，因此在目標上是較難真正達成淨零排放；但對於電力部分則因爲太陽光電之配置，預期目標是可以達成的。

第四位則是美國海軍負責能源之副助理秘書(Deputy Assistant Secretary) Mr. Thamas Hicks，他特別強調對海軍而言，是船艦及飛機對各式燃料油之需求，這部分短期內是很難利用生質燃油來取代，因此目前推動的項目較著重在各陸域上營區之節能減碳；同時在夏威夷地區積極參與海洋能之開發，其重點則在海洋溫差發電之建置，此外也進行潮汐和波浪發電系統之探討和測試。

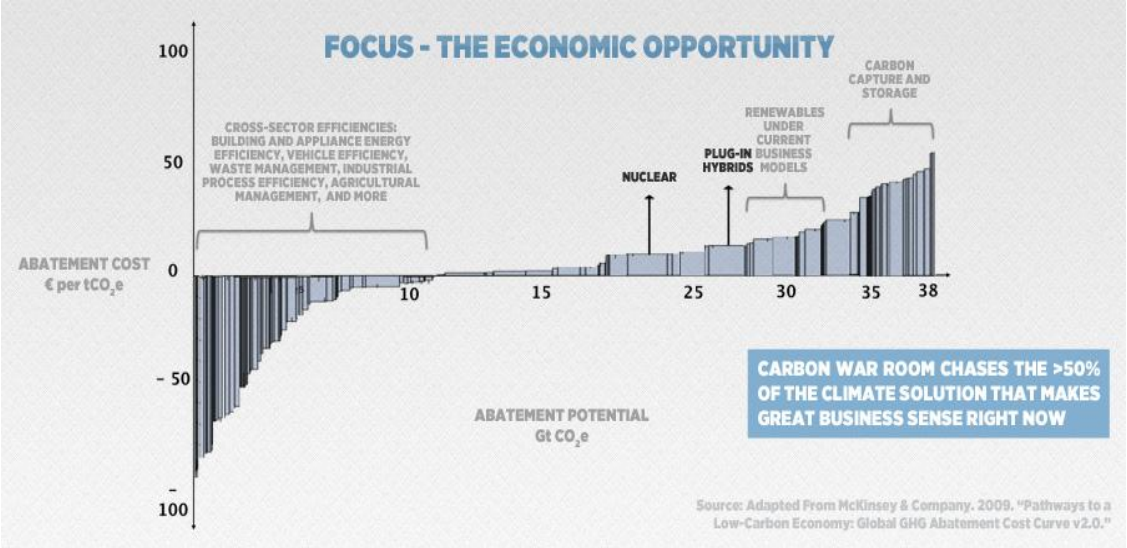
第二天上午安排之專題演講全部是來自 NGO 團體，從民間的角度來看整體潔淨能源及永續環境之推動。第一位是美國 Blue Planet Foundation 的 Mr. Henk Rogers，他先強調，對一些島嶼國家或地區將面臨比一般地區更大之挑戰，包括：(1)必須要儘快結束化石燃料的使用；(2)每個人都是推動永續發展的一塊拼圖，必須從每個人身體力行去實踐；(3)太陽光電、風力均是極佳的再生能源，但節能則是更重要的能源來源之一；(4)交通部門耗能是島嶼國家之最大挑戰。接著亦說明該組織的任務係從民間的角度持續關注夏威夷在推動百分百潔淨能源之進展及成效。總體而言，分成 5 個面向來評價，分別是交通、能源效率、再生能源、智慧電網及經濟發展。他們每年會出版 1 份報告，來說明各個領域之評價結果，

以 2012 年對夏威夷推動潔淨能源之總體評價而言是(C-)；其中以交通部門及智慧電網之進度和表現最差(D)，其次是經濟(C-)、再生能源(B-)，節約能源則是在這五者間表現較為令人有所期待(B)。在其演講中，特別強調民間力量參與的必要性，但如何讓民間充分了解政府資訊則是避免雙方在認知上不同而產生無法正確溝通的窘境。他的說法令職感受良多，因為目前台灣對能源議題的討論，常常因為角度及認知上的差異，迫使政府和民間的溝通無法正常進行。該組織所出版「Energy Report Card」的模式，以較為淺顯模式來說明夏威夷追求能源永續發展的現況，也許可以作為國內之參考。

第二位係來自日本 GAIA(Global Assimilation of Information for Action) Initiative 的 Ms. Tomoyo Nonaka，她強調如果從宇宙之角度來看，地球何嘗不是也可以視為一個島嶼，因此我們目前在一些島嶼上所從事之努力，未來也可以同樣之思維模式放大至整個地球。目前 GAIA 在日本沖繩一個約有 8,000 多人居住的小島(Kunejima)上所做的示範，是將空氣、水、土壤、能源做整體性之考量，也就是考慮島上居民的生活及地球之永續，而在串連這些因素，資通訊技術就成為解決問題極佳的手法。所有供電系統係以一組 50kW 的海洋溫差發電為基礎，再搭配太陽光電、風力發電，當然因應緊急情況仍有柴油發電機作為備用機組。而為了在這有限的電力條件下，也積極推動各項節約能源措施，在其演講中，亦提出了一個也許可以讓我們共同省思的問題，那就是為了有效降低地球環境之持續惡化，並使地球能回歸永續發展，是否人類的生活應該回歸到簡單化？

第三位係來自非洲外海的塞席爾(Republic of the Seychelle)群島國家之榮譽大使 Ambassador Ronald Jumeau，他從一個來自島嶼國家的角色提出了島嶼國家在面臨能源之挑戰時所應採取之作為，他認為目前在推動之建築節能應該不能侷限在政府建築，而應該擴大至所有商業及住宅之建築，才能發揮最大之節能效果，甚至衍生至再生能源之應用。以該國而言，屋頂型太陽光電為推動重點之一，而目前是採用類似 ESCO 模式推動，也就是以租屋頂的模式推動，因此可以增加全民參與的誘因，同時又因導入專業公司，使系統均能維持較高的使用率。他也提到，目前該國在推動再生能源上還是面臨能源儲存的問題。此外，他也認同前面兩位演講者之意見，也就是節約能源才是推動地球永續發展之主要及最有效的作法；因此該國也將節約能源視為重點推動項目，並以 2015 年前減少電力消耗 6%為目標。

第四位則來是 Carbon War Room 的 Mr. Peter Boyd，他首先說明該組織的任務係從經濟角度來思考如何降低地球上之碳排放。因此他強調任何節能減碳措施必須於政策、資金、技術三方的配合下才能產生最佳的處理方式，其中資金扮演相當重要之角色在於提供對各種阻礙提供合理的解決模式。他同時說明，針對全球在 2020 年所需達成之減碳目標所需之各類技術在目前均是存在的，但問題在於我們如何善用這些既有的技術並使其符合成本效益；也就是說以目前的技術是可以解決全球目前因爲化石燃料過度使用所衍生暖化的問題，關鍵是在我們有沒有決心要去推動及落實。基於這樣的考量，該組織亦提出節能減碳的成本曲線(如圖一所示)。這條曲線導和目前工研院所提出的減量成本曲線頗爲類似，同樣強調節約能源係成本最低的減碳手法，其他如再生能源、CCS 等均是相當高成本之手法。



圖一、Carbon War Room 所完成的減量成本曲線

第三天上午則是由夏威夷州商業、經濟發展及觀光廳廳長 Mr. Richard Lim 針對夏威夷州在 2008 年開始推動清潔能源政策之進度及成果進行說明，然後和其它幾位來賓，Mr. Robin Campaniano、 Ms. Jennifer DeCesaro (Department of Energy)、Mr. Scott Seu (Hawaii Electric Company)、Mr. George Kailiwai III (Department of Defense)針對這些推動現況及成果進行補充說明及討論，重點著重於使用端的能源效率、再生能源之電力供應、生質燃料、交通部門之永續發展策略等。

Mr. Lim 在報告時特別說明，因爲夏威夷大量依賴進口化石能源已經影響到夏威夷寶貴的天然資源，如土地、空氣及水，甚至威脅到生活品質及環境，也將夏威夷的經濟發展帶入極大之風險；因此爲維繫夏威夷的永續發展及經營，於 2008 年由州政府及聯邦政府之能源部共同推動 Hawaii Clean Energy Initiative (HCEI)，希望將商業界領袖(經濟發展)、政府官員(政策制定)及民眾結合在一起共同推動夏威夷之能源自主性，並減少對進口化石能源之依賴。但誠如州長於開幕所強調的，夏威夷過去幾年於推動能源自主上仍遭遇極大的困難，仍有許多瓶頸亟待突破，因此這次特別把這樣的議題提出來，期望能透過專家之討論，爲夏威夷未來推動潔淨能源找出一條較爲可行之路。

茲就幾位來賓幾個回合之討論，整理出 6 個主要觀點：

1. 能源效率的提升是降低夏威夷對化石能源依賴的重點，透過高效率產品之導入；LED 照明爲積極推動的項目之一，建築節能則是高效率技術整合應用的模式，可以透過 ESCO 模式來推動；ESCO 模式已在一些學校及政府部門達成不錯之績效，未來應可以繼續擴大推動。
2. 由於交通部門仍是消耗化石能源的最大宗，因此除了提升各式車輛之能源效率、導入 hybrid 車輛外，更應積極投入生質燃料之開發及生產，以降低交通部門之排碳量。
3. 積極推動電動車輛(含燃料電池車輛)應該也可以列入重點。
4. 爲配合再生能源(太陽光電、風力、甚或海洋能)之逐步導入電力系統中，應提早及積極推動智慧電網，以因應電力系統之調配。
5. 這中間有個較難解的問題是由美國國防部代表 Mr. George Kailiwai III 所提出的。因爲夏威夷是美國海空軍的主要基地之一，甚多化石能源系提供飛機及船艦之消耗，而這部份雖然軍方也全力在推動節能減碳，甚至所謂「零排放」之政策，但畢竟只能針對岸上之設施，因此如何在這方面減少化石燃料之使用，確實是未來的一大挑戰。
6. 夏威夷有豐沛之海洋能及地熱，但如何開發及如何匯入電網中，尤其是夏威夷在島與島之間是否需要將電網完全連結也是一項重要議題。

二、拜會夏威夷州議會

(一)日期：102 年 9 月 10 日下午 2:00 ~ 3:30 (星期二)

(二)美方會談人員/職稱：Mr. Joseph M. Souki/議長及 Mr. Chris Lee/州議員兼衛環委員會召委

(三)會談紀要：

此次拜訪行程係由我國駐夏威夷辦事處朱處長為正及黎副處長倩儀代為安排及陪同前往，雙方就下列議題進行討論及意見交換。

1.交換能源政策及法規推動經驗

職說明了我國永續能源政策綱領之目標及新能源政策有關逐步走向非核家園之目標(報告內容詳附件四)；而 Mr. Joseph M. Souki 則簡短說明了夏威夷追求能源自主性之目標和作法。共同的交集是雙方均是依賴進口能源之地區，因此再生能源就成為比較能自主之能源；但雙方也均面臨到再生能源在推動上之困難，一方面是成本因素，另一方面則是再生能源很難成為基載之電力供應來源。

2.交換海洋能、地熱相關推動作法及遭遇之困難

台灣曾和夏威夷在海洋溫差發電上已有可行性評估之合作，惟後來因雙方海洋條件尚有差異，而無法進入實質合作。此次特別向議長說明了我國在波浪發電上之進展，惟夏威夷海象是否符合波浪發電之發展則有待進一步之評估，因此議長建議我們在這部分可以與夏威夷之天然資源研究所討論進一步之合作評估及研究。至於地熱之發展上，夏威夷有不錯之資源，同時也投入地熱資源之探勘和評估分析技術建立，應該有機會建立雙方合作之機會。

3.生質能源未來之合作

在生質燃料的發展上，夏威夷有技術上之需求，因為他們亟需生質燃料來減少交通部門之化石能源使用量，惟與台灣面臨相同的問題就是料源的問題；爰海藻產油的技術發展亦於談話中提出。此外，亦向他們說明了我國在丁醇技術上的突破，目前正進入尋求投資者進行量產的階段，他們也表達了興趣，因此未來應可進一步就生質能的部分進行交流及尋求合作的機會。值得一提的是，夏威夷目前也面臨垃圾掩埋的問題，因此對我們已成熟的 RDF 技術頗為關注，這也是下一階段可以和夏威夷談如何將台灣技術或產業帶進去以協助他們處理垃圾問題。

圖二、拜訪夏威夷州議會

(左起)楊組長秉純、陳主任秘書玲慧、議長、Mr. Chris Lee、朱處長爲正

三、拜會夏威夷州政府商業經濟及觀光廳能源辦公室

(一)日期：102 年 9 月 10 日下午 4:00 ~ 5:30 (星期二)

(二)美方會談人員/職稱：Ms. Carilyn O. Shon / Energy Conservation Program Manager；Mr. Milton G. Kwock/Office of International Affairs, Strategic Marketing & Support Division Executive Director

(三)會談紀要：

此次拜訪行程係由我國駐夏威夷辦事處朱處長爲正及黎副處長倩儀代爲安排及陪同前往，雙方就下列議題進行討論及交換意見。

1.ESCO 推動機制

此次 APCESE 有特別安排一個會議是由夏威夷政府部門人員及 ESCO 業者介紹夏威夷地區利用 ESCO 模式推動節能改善之成效；因此特別就他們如何推動 ESCO 業者評鑑機制進行了解。根據 Ms. Carilyn O. Shon 的說法，他們根據 ESCO 業者過去的實績及公司制度來評定這家 ESCO 公司是否爲合格之業者，並作爲政府或公部門在規劃節能改善時，他們具備參與競爭之依據。而我國

ESCO 同業公會亦試圖建立這樣之評鑑機制，但因目前評鑑內容仍有爭議地方，故遲未能建立這項評鑑機制。未來也許公部門可以參考國外之實際推動狀況來考慮是否以建立廠商等級之模式來規範 ESCO 公司設計及施工之能力資料系統，並提供公部門或私部門之參考。

2.明(103)年擴大台灣在 APCESE 的參與

職表達台灣似可更積極參與 APCESE 的活動並帶領產業界進入夏威夷節能減碳的市場； Ms. Carilyn O. Shon 則代表主辦單位 DBEDT 表達誠摯的歡迎，因爲今(102)年日本即由政府協助組團，將其國內一些中小企業帶到夏威夷，除參與搭配活動同時進行之展覽外，主辦單位亦特別安排一個時段，由這些廠商進行產品說明。因此 Ms. Carilyn O. Shon 表示，將在他們檢討完今(102)年辦理情形及規劃明(103)年主軸時，請台灣提出參與構想，再來討論是否將其納入整體活動的一部分。

3.能源效率

Ms. Carilyn O. Shon 表示她了解台灣在推動各項節約能源措施之成就，因此希望雙方能在這方面有更多之交流，因爲夏威夷條件和台灣較爲類似，因此希望借重台灣之經驗來協助夏威夷擬定及推動各項節約能源措施及方案，以達成州長希望提升能源效率 30%的目標。職表達了樂觀其成，也願意協助將台灣各項節能技術或產品引進夏威夷，希望未來能就這方面之交流建立一個技術交流機制。

4.LED 合作

由於我國在 LED 產業上有相當成熟之技術，而夏威夷政府在推動節約能源上將 LED 照明列爲重點；我們也特別說明台灣於交通號誌燈、路燈等實際推動所產生之節能效益。而台灣產品如要進入美國市場先要通過各項檢測，並可以夏威夷作爲一個橋頭堡及示範區。

圖三、拜訪夏威夷能源處

(左起) Mr. Milton G. Kwock、楊組長秉純、陳主任秘書玲慧、Ms. Carilyn O. Shon、朱處長爲正

四、拜會夏威夷大學

(一)日期：102 年 9 月 11 日上午 10:00 ~ 11:30 (星期三)

(二)美方會談人員/職稱：Dr. Daniel M. Ishii / Associated Vice President for Research

(三)會談紀要：

此次拜訪行程係由我國駐夏威夷辦事處黎副處長倩儀代爲安排及陪同前往，首先就雙方技術研發重點及成果作簡短之介紹和說明；隨後就可能之交流領域進行討論，主要之結論有 2 項：

1.以雙方地理條件及發展狀況來看，建意雙方可初步交流之主題：海洋能、水處理(淨化)、生質燃料、RDF 等 4 項。

2.至於交流模式則可先透過視訊方式，讓雙方研究人員進行技術討論，以實際了解雙方目前各項技術發展程度及未來規劃，然後再就實際可能有交集及合作可能性之項目進行規劃召開小型之 workshop，以讓雙方研究團隊能面對面的規劃如何展開實質之合作。

參、結論與建議

此次 APCESE 2013 是以 4 個會議方式同步進行，亦包含一個小型展示會，據主辦單位表示計有來自 25 個國家及地區超過 400 家公司 1,000 人參與此次活動。在職與參加會議人士接觸過程中，絕大部分是以美國人爲主(其中有些來自美國本土)，其餘則多是來自太平洋地區之一些島國，但亦有來自日本、韓國等亞洲國家；其中甚至有一團是來自泰國軍方，他們是以參加有關 Military Opportunities & Programs 爲主，他們表示希望透過這個機會和美國軍方人士交流。此外，以日本爲例，他們則是以政府爲主導，帶領一些日本小企業前來展示他們本身之產品(絕大部分係以住商應用爲主之創意或實用產品，這可能和夏威夷有很多日籍僑民有關)，同時亦請主辦單位安排一個時段，由這些企業代表上台介紹及說明自已的技術及產品(由企業代表以日文介紹，主辦單位同步翻譯方式進行)。這讓人見識到日本的團隊力量(其實這幾年出國參加一些會議，偶而會碰到類似的情況)。

由於此次會議安排極爲緊湊，再加上我們又安排了一些正式的拜會行程，因此只能利用會議中間的休息時段和與會人士就一些議題交換意見，並無法做太深入的交流；但透過和幾位來自太平洋上一些島嶼國家人士的交談中，發現這些國家對珍惜大自然資源之重視。這也讓職反思，科技進步到底是帶來幸福或不幸呢？到底是改善了我們的生活亦或破壞了我們原本的環境呢？這真的是一線之隔，光賴人們如何面對這些問題及因應這些問題了。

另外，爲保握難得前來夏威夷參訪的機會，亦透過我國駐夏威夷代表處的積極安排，總共利用會議空檔進行 3 項的拜會行程，其中 2 項是官方行程，另 1 項則是技術交流。

綜合這次的出席研討會及拜訪行程，有以下之心得和感想：

一、 夏威夷政府之魄力召開此項大型會議，希望引進美國本土及其他國家的力量，讓夏威夷在追求能源自主性之努力上能有較大之突破。這種面對問題及企圖解決問題的努力，也許可以讓我們作爲借鏡。

二、 日本政府協助有創意的日本小公司(在聊天過程，發現其中有一個公司僅爲 5 個人之小型公司，甚至負責人連以英文溝通都有困難)出國前來參加展示及會議，並同時幫助他們準備翻譯人員，更向主辦單位爭取時段讓他們親自上台介紹及說明他們產品的特色(當然也提供即時翻譯)。這讓我有些感觸，我們的政府是否也能有這樣的模式來協助中小企業，而不是讓我們的中小企業自已拎著皮箱闖天下？

三、 再生能源之利用必需因地制宜；因此技術交流是有必要的，也就是透過技術交流來達成雙方之互補，如此才有機會加速及落實各項再生能源技術之推廣應用。

四、 夏威夷雖然市場量不夠大，但因爲美國有意將夏威夷建構爲潔淨能源之示範島嶼，因此我們應該可以思考以夏州作爲進入美國市場的一個橋頭堡。

五、 在此次會議中有甚多 NGO 來參與，從他們的報告中或交談中，感覺上他們通常扮演推動潔淨能源並協助政府之角色，如 GAIA 實地參與日本琉球一個小島的建設來落實維繫地球永續發展的推動工作。這點應該可以讓我國政府省思如何協助國內 NGO 團體和國外接觸，以促使他們能較爲理性探討國內所面臨的問題。

經由這次會議參與及 3 項拜會行程，並和參與 APCESE 2013 會議之各國人員和專家交換意見，以及和夏威夷州議會及能源主管部門進行會談中，發現雙方有甚多未來可合作之契機，綜合其結論與建議如下：

一、由於 APCESE 是採取多個會議及展示會方式同步進行，出席人員除一些島嶼國家外，亦有不少美國海軍及陸軍之軍方單位，他們基本上對技術及產品均有某種程度的需求，因此這項會議除了有相當多產業之贊助單位外，亦同時吸引不少產業界人士參與。我國應該有機會以一個提供者的角色來提供技術或產品。因此下次倘有類此會議，建議可以由政府籌組一個參訪團，包含研究單位及產業界，藉由展出及特別安排之說明會，來推廣我國已開發成熟之技術及產品，以達成爲我國再生(潔淨能源)能源產品尋求另一個出海口(其實節能技術及產品也有相對之需求)的機會。

二、由於我國已和夏威夷州政府在 2008 年 9 月簽署「Exchange Note」，雙方同意未來推動各項實質性合作，因此後來也衍生出我國在 OTEC 方面持續關注可能合作之內容，但因爲雙方對推動之力道有些差異而暫無具體合作內容；但今(102)年透過這次高峰會之多方接觸及幾個正式之拜會行程，發現台灣及夏威夷在很多方面有許多合作及創造雙贏的契機，而這些單位也表達較爲強烈之合作意願。

(一)研發單位之互補，目前初步有意願之議題有 4 項：海洋能、水質淨化(小型可移動式)、生質燃料、及 RDF(我國有機會技術輸出)等；執行方式可由研究人員就個別議題先以視訊會議方式進行討論，在有初步共識後，則透過小型 workshop 方式來找出可以互補之技術項目，最後才展開實質之合作(含研發及應用)。

(二)雖然夏威夷市場量可能引不起國內廠商之意願，但由於美國政府有意將夏威夷

打造成爲一個潔淨能源之示範島，同時夏威夷州長也宣示擴大潔淨能源之運用來追求能源之獨立自主，另一方面則訂有節約能源之目標；亦即夏威夷對能源之未來供需有相當明確目標。而我國在節能減碳推動過程已建立不少技術及產品，並在國內均有實際安裝之成果及實績，因此我國技術及產品應該有機會切入夏威夷市場，並成爲進入美國的轉運站。建議這部分可以結合第 1 項之建議來協助國內產業界在夏威夷建立知名度，以利後續之市場行銷。

三、由於這次會議亦有不少 NGO 受邀出席發表他們在推動地球永續發展上之作法及成果，如來自日本的 GAIA Initiative，特別介紹了他們在 Okinawa 推動無碳島之成果和經驗；而來自印度洋中島國 Seychelles 的一位榮譽大使介紹了該國如何建設低碳島之經驗。這樣之介紹均在現場獲得極大之迴響，也增加與會人員對這些國家努力之認同。因此建議未來如果我們也能以台灣團模式參與的話，可考慮邀請國內一些 NGO 團體參與或協助安排在會中進行專題演講，讓他們實際了解國外較爲實務之作法，以期將他們在國內之影響力轉換爲能在國內更務實推動潔淨能源或低碳技術之助力。

四、夏威夷積極推動屋頂型太陽光電，故對 PV 有強大之需求，我國應可強化目前「PV 擴大海外市場」之方案，協助國內產業進入夏威夷市場。

五、夏威夷大力推動電動車，對技術及產品均有需求；然夏威夷環境條件和國內較爲類似，且國內經濟部工業局已輔導國內建立電動車產業，因此，建議可輔導國內電動車產業開拓夏威夷市場。

六、美國軍方有甚多推動節能減碳之計畫，並對外尋求技術或產品之提供，我國產業界如能和美國本土企業合作，將有不少商機；建議國防部亦可派員出席，並透過與美國軍方之交流，了解美國軍方在節能減碳之成功作法。

七、我國雖和夏威夷州政府在 2008 年 9 月簽署「Exchange Note」，但因爲雙方在推動之力道有些差異而暫無具體合作內容；但今(102)年透過這次高峰會之多方接觸及 3 個正式拜會行程，發現雙方在海洋能、水質淨化(小型可移動式)、生質燃料、及 RDF(我國有機會技術輸出)等 4 項議題應有互補之機會；建議可先透過研究單位之交流，再擴大至產業之合作。

附件及參考資料

附件一、APCESE 議程安排

Program Day-At-A-Glance

	APCESE Asia Pacific Clean Energy Summit	APCESE Asia Pacific Clean Energy Summit	Military Opportunities & Programs
Monday, September 9			
8:30 - 10:00	Welcome Oli, National Anthem, and Hawai'i Pono'i - Kalakaua C (4th fl) Keynotes: • Governor Neil Abercrombie, State of Hawai'i • U.S. Senator Brian Schatz, State of Hawai'i (video remarks) • Honorable Katherine Hammack, Assistant Secretary of the Army, Installations, Energy & Environment, U.S. Department of Defense		
10:00 - 10:30	Coffee & Networking		
10:30 - 12:00	Scalability and Feasibility of 42 MW Microgrid to Lana'i and Pacific Islands; UCSD Special Session - 312	Sustainable Transportation in Hawai'i - 314	Overview of DoD Energy Initiatives - 315
12:00 - 1:30	Expo & Networking Lunch		
1:30 - 3:00		How Hawai'i Can Lead The World in EV Deployment - 314	Defense Energy Technology Challenge (DETC) - 315
3:00 - 4:00	Expo Coffee & Networking - 313ABC		
4:00 - 5:30	Renewables and Green Infrastructure Opportunities - 312	The Water-Energy Nexus: Innovative Energy Management in Sustainable Water Infrastructure - 314	TROPEC/PACOM Defense Energy Technology Challenge (DETC) - 315
5:30 - 7:30	Defense Energy & Island Solutions Showcase & Reception - 316AB		
7:30 - 8:45	Film Screening and Director Remarks: Last Paradise-A 45-year quest for adrenaline and energy. Director: Clive Neeson, Cinematographer		
Tuesday, September 10			
8:30 - 10:00	Islands Keynotes - Kalakaua C (4th fl): • Henk Rogers, Founder and Chairman, Blue Planet Foundation • Tomoyo Nonaka, Chair, GAIA Initiative; Former Chair & CEO, Sanyo Co-Chairs: Mark McGuffie, Managing Director, Enterprise Honolulu; Audrey Newman, Senior Advisor, Global Island Partnership		
10:00 - 10:30	Coffee & Networking		
10:30 - 12:00	Hawai'i Renewable Grid Integration: Lessons Learned - 312	Hawai'i Performance Contracting & Green Building - 314	Smart Grid and Security: SPIDERS - 315
12:00 - 1:30	Networking Lunch		
1:30 - 3:00	Energy Storage Island Options - 312	Hawai'i Efficiency Initiatives & Incentive Programs - 314	Local Biofuel for Energy Security: the Military, Agriculture and a Sustainable Community Model - 315
3:00 - 3:30	Expo Coffee & Networking - 313ABC		
3:30 - 5:00	Shipping LNG Opportunities & Impact: Commerce, Jones Act & the Environment - 312	Island Challenges and Opportunities for Military and Aviation Biofuels - 314	Defense Energy Challenge-Company Presentations - 315
5:00 - 7:00	APCESE Expo & Poster Reception - 313ABC		
Wednesday, September 11			
8:30 - 10:00	HCEI Video - Kalakaua C (4th fl) Keynotes: Richard Lim, Director, State of Hawai'i, Department of Business, Economic Development, and Tourism (DBEDT); Hawai'i Clean Energy Initiative 5-Years of Progress - Keynote Panel • Moderator: Robin Campaniano, Hawai'i Clean Energy Initiative • Richard Lim, Director, State of Hawai'i, Department of Business, Economic Development, and Tourism (DBEDT) • Jennifer DeCesaro, Department of Energy *Opening Program Announcement: "Hawai'i is now paradise for energy startups: Meet the Energy Excelerator," Dawn Lippert, Senior Manager, Energy Excelerator		
10:00 - 10:30	Coffee & Networking		
10:30 - 12:00	Accelerating Energy Startups: How to Make a Difference and a Profit - 312	Utility Business Model of the Future: Island, Isolated & Interconnected Grids - 314	Unique Defense Challenges and Opportunities in Waste to Energy Conversion - 315
12:00 - 1:00	Networking Lunch (for purchase)		
1:00 - 2:30	Accelerating Energy Startups: Working Session - 312	Seeing is Believing: Tools for Renewable Integration - 314	

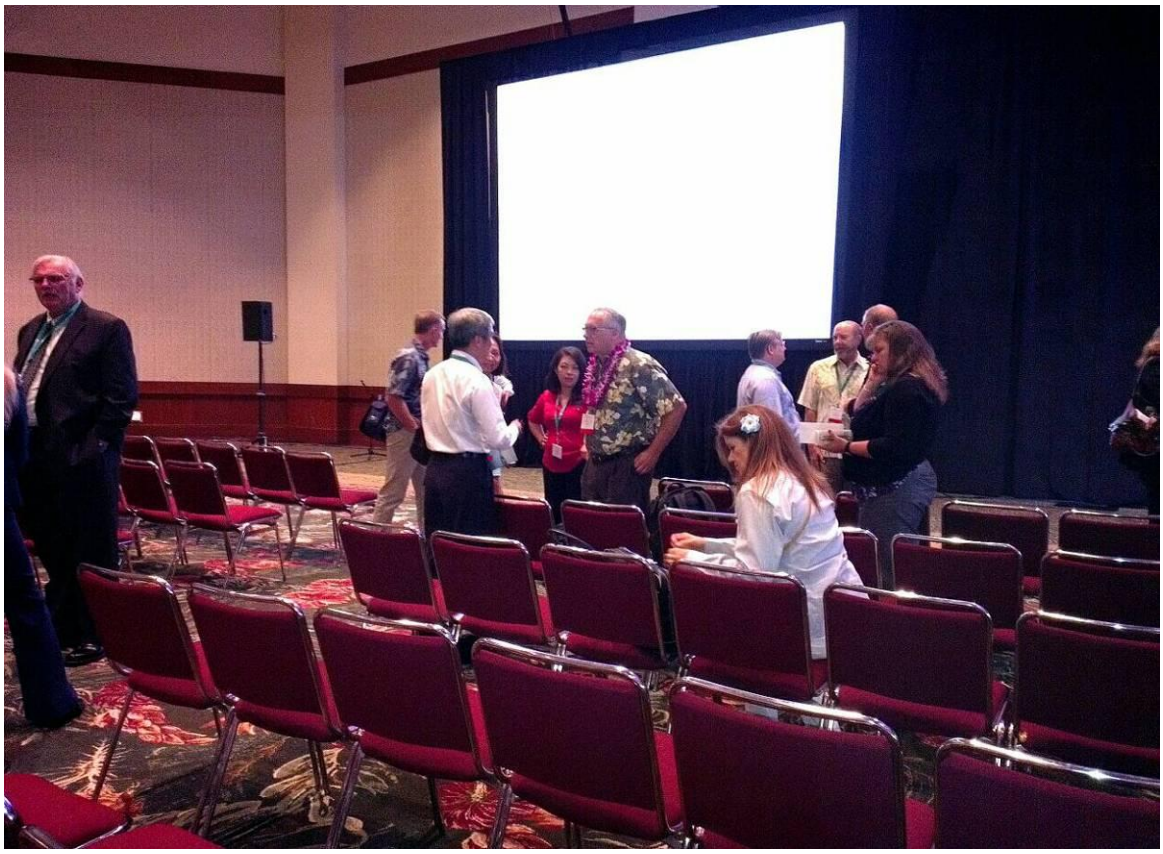
4

IICC Islands & Isolated Communities	IICC Islands & Isolated Communities	International OTEC Symposium
• Thomas Hicks, Deputy Assistant Secretary of the Navy for Energy, U.S. Navy • Clay Nesler, Vice President, Global Energy and Sustainability, Johnson Controls, Inc. Chair: Mark Glick, Energy Program Administrator, State Energy Office, DBEDT, State of Hawai'i		
Global Environmental Systems and Leaders Development - 317A	Hawai'i Green Growth: Building a Sustainable Future. IICC Opening Remarks: Kate Brown, Global Island Partnership - 317B	OTEC Policies, Finance and Incentives - 316C
NREL Naval Facilities Engineering Command Energy Programs: Hawai'i & Guam - 317A	Impacts to Islands and Isolated Places – Learning from Nature to Improve Resiliency - 317B	OTEC Developers Perspective - 316C
Remote Community Knowledge Transfer Hawai'i - Alaska - 317A	Islands Connect for Future Solutions - 317B	OTEC The Ocean Environment - 316C
- 320 Theater		
• Ambassador Ronald Jumeau, Climate Change and Small Island Developing State Issues, Republic of the Seychelles • Peter Boyd, COO, Carbon War Room		
Shizuoka Clean Energy Initiative Spotlights: Japan Special Session - 317A	Carbon War Room: Smart Island Economies Q&A Panel Discussion - 317B	Experimental Plants & OTEC Technology - 316C
Global Island Partnership (GLISPA) - Special Session - 317A	Global Islands Solutions Challenge - 317B	OTEC Other Applications - 316C
Electric Vehicle Initiatives-Japan Special Session - 317A	Global Islands Solutions Challenge - 317B	OTEC Summary and Recommendations: Working Session - 316C
Jennifer DeCesaro, DOE • Scott Seu, Vice President, Energy Resources and Operations, Hawaiian Electric Company • George Ka'iliwai III, Director, Resources and Assessment (J8), U.S. Pacific Command (PACOM), Department of Defense End-Use Efficiency: Renewable Electricity: Biomass Fuels: Sustainable Transportation		
Hawai'i Homeland Energy & Sustainability Efforts - 317A		
Energy, Economic and Environmental Issues and Solutions for Island Economies - 317A		

附件二、出席會議過程及和其它與會人員交流照片

會場入口牌樓

開幕儀式前的祈福



工研院楊組長和主辦單位負責人 DBEDT 的 Mr. Mark B. Glick 交換意見

夏威夷公園內的 LED 路燈(風光電整合)

夏威夷州政府及州議會大樓

大會開幕典禮

附件三、主要交流及會面人員名片

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附件四、向夏威夷州議會議長說明用簡報

簡報題目：Energy Policy in Taiwan

經濟部能源局
Bureau of Energy

工業技術研究院
Industrial Technology Research Institute

The 2013 Asia Pacific Clean Energy Summit and Expo

Energy Policy in Taiwan

Speakers:

Ling-Hui Chen, Secretary-General, BOE, MOEA, Taiwan

Dr. Bing-Chwen Yang , Division Director, GEL, ITRI, Taiwan

9-11 September, 2013

經濟部能源局
Bureau of Energy

工業技術研究院

Profile of Taiwan (2012)

- Area: 35,980 km^2
- Population: 23.15 million
- Density: 643.4 persons/km^2
- GDP: 14,988 billion NTD
- Location: Pacific Ocean, 120 km off the coast of mainland China

Outline

- Energy Situation in Taiwan
- Framework of Sustainable Energy Policy
- New Energy Policy
- Concluding Remarks

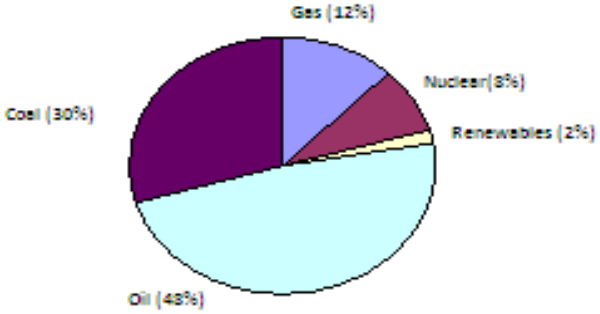
Energy Situation in Taiwan

Energy Supply in Taiwan

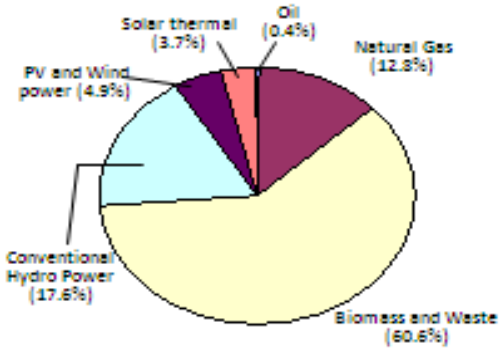
High Dependence on Imported Energy

- 98% energy supply rely on imports of which fossil fuel accounts for the major part
- 87% of total indigenous energy supply is renewable energy

Total Primary Energy Supply (2012)
140 Million KLOE



Indigenous Energy Supply (2012)
3 Million KLOE

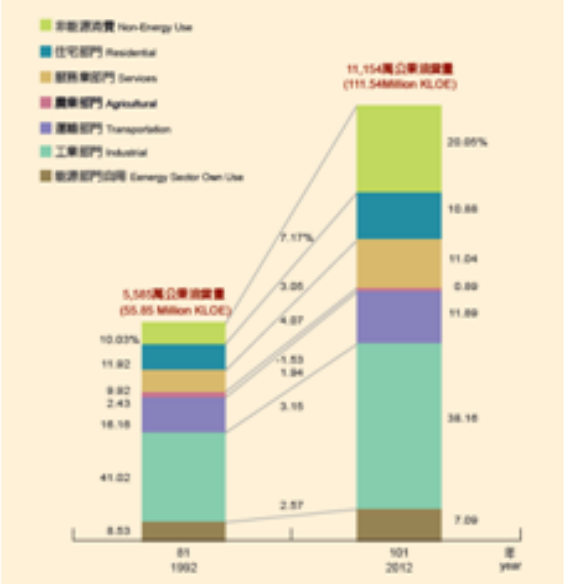


Source: 2012 Energy Statistics handbook, BOE

Energy Consumption in Taiwan

- The energy consumption of 2012 totaled 111.54 million KLOE (kiloliter oil equivalent), of which 38% is for industrial sector, 12% for transportation sector
- Both service and residential sectors energy consumption are growing annually and represent 11% share, respectively

Energy Consumption by Sector (2012)

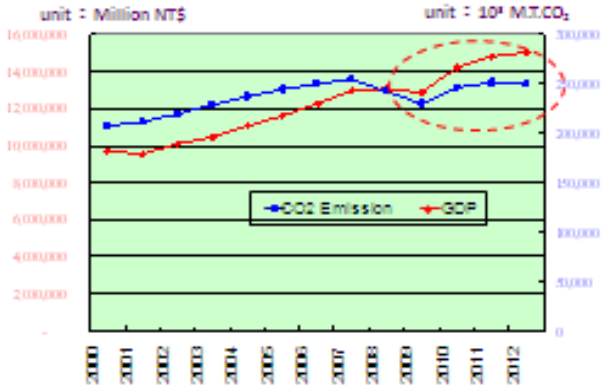


Source: 2012 Energy Statistics handbook, BOE

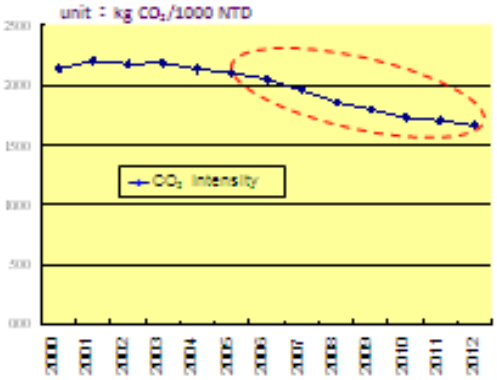
CO_2 Emissions in Taiwan

- The carbon emissions of year 2008 and 2009 for the first time in 20 years had negative growth for two consecutive years. However, compared to 2009, the CO_2 emission has grown by 6.2% because of the economic recover in 2010
- CO_2 emission for producing one unit of GDP continues to decline (CO_2 emission intensity) which is an indication of gradual year-by-year improvement on the low-carbon energy structure and energy efficiency of our nation

CO_2 Emission and GDP of Taiwan (2012)



CO_2 Intensity in Taiwan (2012)



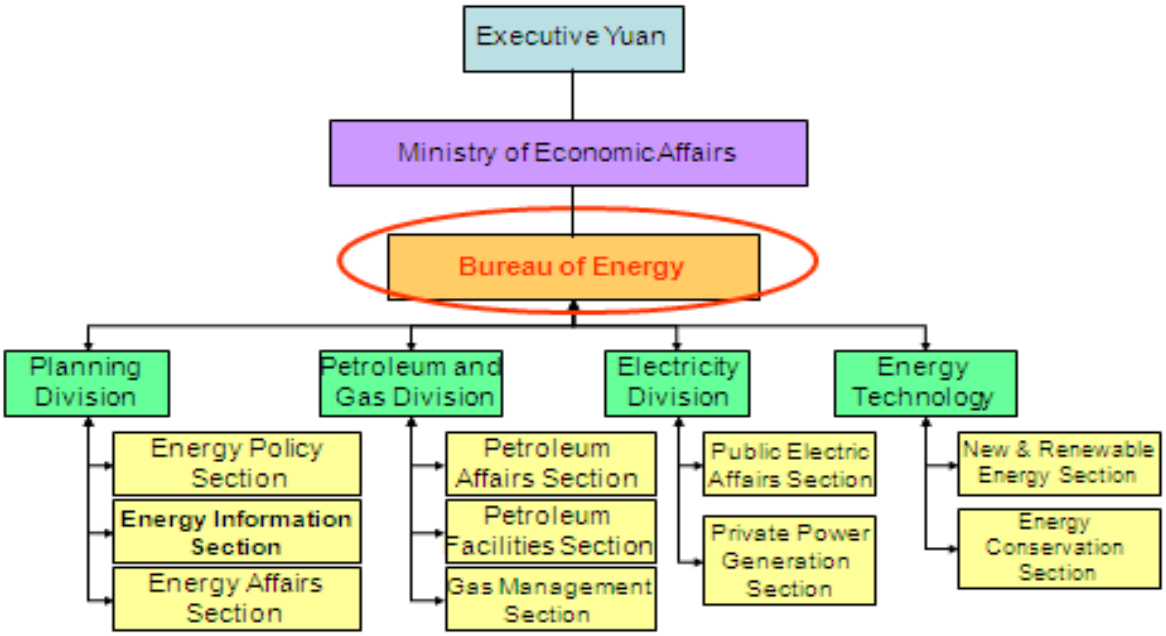
Source：Bureau of Energy, Monthly Energy Statistic

Framework of Sustainable Energy Policy

towards 3-E

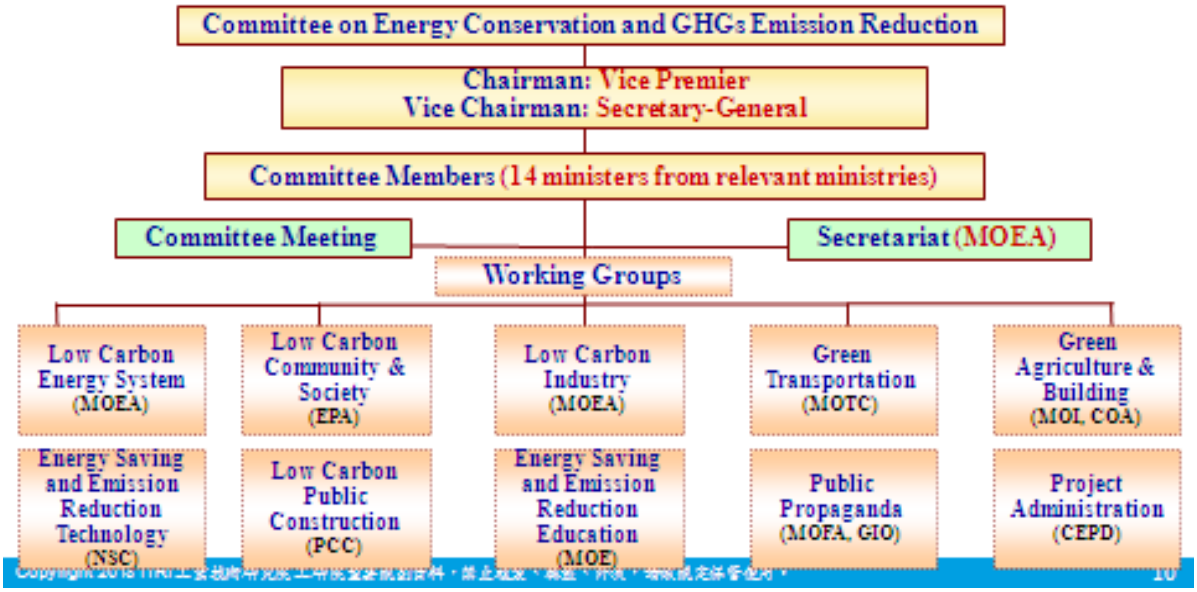
(June, 2008)

Energy Authority: Bureau of Energy



Inter-Ministry Cooperation

- To enhance the cooperation among governmental ministries on energy and climate issues, the Executive Yuan established the "Committee on Energy Conservation and GHGs Emission Reduction" in January 2010.
- This committee oversees the implementation of energy and climate relevant action plans, and serves as a platform for inter-ministry energy and climate policy discussion.



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Development of Energy Policy

Energy Events	Year	Policy Documents/Formulation	Laws and Regulations	Institution
COP 15	2009	3rd "National Energy Conference"	• Amendment of "Energy Management Law" • "Renewable Energy Development Act"	
	2008	"Framework of Sustainable Energy Policy"		
Effectiveness of Kyoto Protocol	2005	2nd "National Energy Conference"		
	2004			Bureau of Energy, MOEA
	2003	National Nuclear Free Homeland Assembly		
	2001		"Petroleum Administration Law"	
	1998	1st "National Energy Conference"		
Contracting of Kyoto Protocol	1997			
	1996	"Energy Policy in Chinese Taipei" 4th Rev.		
Gulf War	1990	"Energy Policy in Chinese Taipei" 3rd Rev.		
	1984	"Energy Policy in Chinese Taipei" 2nd Rev.		
	1980		"Energy Management Law"	
	1979	"Energy Policy in Chinese Taipei" 1st Rev.		Energy Commission, MOEA
1st Oil Crisis	1973	"Energy Policy in Chinese Taipei"		
	1970			Working Group on Energy Policy, MOEA
	1968	"Principles on Energy Development"		

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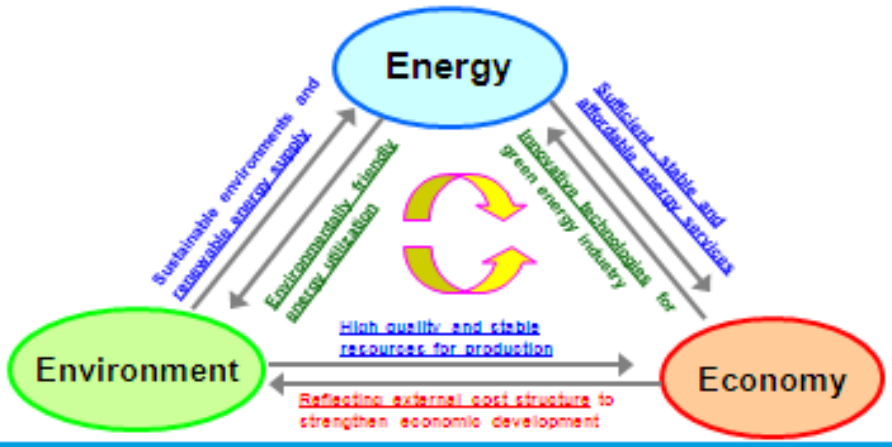
Sustainable Energy Policy (1/3)

(1) Definition

Sustainable energy development is：

- to satisfy the need present economic growth without sacrificing future generation's right for further development;
- to maintain a balance of "Environmental Protection" , "Energy Security" and "Economic Growth" in order to create a triple-win situation among Environment, Energy and Economy;
- and to utilize environmentally friendly "clean" energy, make "efficient" use of limited resources, and ensure a "stable" energy supply.

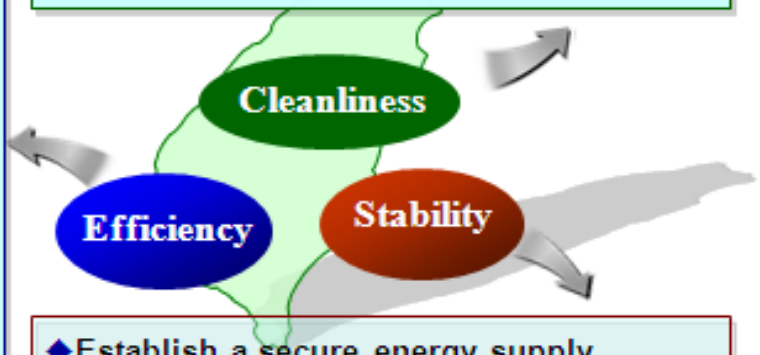


Sustainable Energy Policy (2/3)

(2) Objectives

- Energy efficiency:
- Reduced energy intensity 2% per annum and total reduce 25% in 2015.
- Further reduce energy intensity by 50% in 2025 with technological breakthrough and administrative measures.

- CO_2 Emission: return to 2005 level in 2020, and further be reduced to 2000 level in 2025.
- Share of Low Carbon Energy in Electricity System: up to 55% by 2025.



- Establish a secure energy supply system to support the need of economic development objectives.

Sustainable Energy Policy (3/3)

(3) Principles

Building a Two High Two Low Energy Consuming and Supplying System

High Efficiency	High Value-added	Low Emission	Low Dependency
Improve energy consumption and transformation efficiency	Increase the value-added per unit energy used	Create a low carbon and low pollution energy supply and consumption system	Reduce the dependency on fossil energy

Framework of Sustainable Energy Policy

- Cleaner Energy Supply
- Rationalized Energy Demand

Measure Formation

- The following energy policy measures of Chinese Taipei is based on the action plans of
  - "Framework of Sustainable Energy Policy" announced in June 2008.
  - "Conclusions of the 2009 National Energy Conference" held during April 15-16, 2009.
- The measures are classified into three categories:
  - Clean Energy Supply
  - Energy Conservation by Sectors
  - Green Energy Industry Development

Policy Measure: Clean Energy Supply (1/3)

Renewable Energy

- Effectively explore the power generating potential of carbon-free renewable energy, so that the renewable energy share could reach 15% in term of installed capacity.

1) Increase 10 GW renewable power generation units through the implementation of "Renewable Energy Development Act," which has been effective since July 8th, 2009.
2) Require 10% compulsory green content in Taiwan's Economic Recovery Programs.

Bureau of Energy

Policy Measure: Clean Energy Supply (2/3)

Energy Source	2012	2015	2020	2025	2030
On-shore Wind	621	866	1,200	1,200	1,200
Off-shore Wind	0	15	600	1,800	3,000
Hydro Power	2,060	2,052	2,112	2,502	2,502
Solar PV	201	492	1,020	2,500	3,100
Geothermal	0	4	66	150	200
Biogas	9	29	29	31	31
Waste to Energy	792	848	925	1,369	1,369
Ocean Energy	0	1	30	200	600
H2&Fuel Cells	0	7	60	200	500
Total	3,683	4,314	6,042	9,952	12,502
Percentage of installed capacity	7.7%	10.0%	10.6%	14.8%	16.1%

Source：Bureau of Energy

Bureau of Energy

Policy Measure: Clean Energy Supply (3/3)

Natural Gas

- Increase the utilization of low carbon natural gas, so that it accounts for more than 25% of power generated in 2025.

Nuclear Power

- Reconsider nuclear power as a no-carbon energy option.
  1) Complete the 4th Nuclear Power Plant by 2011 and 2012.
  2) Carry out efficiency improvement projects and evaluate the extension of operation license for the existing nuclear plants.

Coal

- Reduce the CO_2 emission of coal-fired power plant by Introducing clean coal technology and CCS technology.

Policy Measure: E C by Sectors (1/4)

Energy Sector

1) Accelerate the replacement of existing power generating units with best available technology(BAT).

2) Rationalize energy price to reflect the internal cost in the short run, as well as the external cost in the long run.

Industrial sector

1) Reduce the carbon intensity of industrial sector by more than 30% in 2025 by restructuring the industrial sector towards high value-added and low energy intensity.
   a. Require Best Available Technology (BAT) for major investment projects
   b. Equipment eff. Standard for 25 major energy consuming equipments.
   c. Energy audit and energy saving counseling
   d. Environmental impact assessment (EIA) for energy-intensive industry development policy.

Policy Measure: E C by Sectors (2/4)

Industrial sector

2) Allocate GHGs emission reduction duty to larger energy users to push the industry towards an energy-conserving production and sale.
   a. Require emission inventory registration for larger energy users.
   b. Encourage voluntary early reduction projects.

3) Assist small and medium-sized enterprises to improve their GHGs emission reduction capacity. Build up incentive mechanism and administrative scheme to encourage clean production.

4) Conduct preliminary assessment on the energy use of large investment projects according to "Energy Management Law" amendment.

Policy Measure: E C by Sectors (3/4)

Transportation sector

1) Provide a convenient mass transportation system to reduce the usage of private vehicles.
2) Construct an intelligent transportation system (ITS).
3) Build up a human oriented green municipal transportation environment.
4) Improve the vehicle fuel efficiency standard for 15-30% by 2015.

Residential and commercial sector

1) Apply integrated urban planning, as well as promote forestation in urban area to develop a low carbon city.
2) Promote low carbon and energy conserving green buildings.
3) Improve appliance efficiency standards for 10% to 70% by 2011 and further raise the efficiency standards by 2015.

Policy Measure: E C by Sectors (4/4)

Governmental sector

1) Reduce the energy use of governmental buildings and school by 7% in 2015.
2) Integrate "Carbon Neutral" concept into policy planning procedure.

Public sector

1) Promote public emission reduction movement.
2) Promote emission reduction from central government through local governments, enterprises, and communities to develop a low-carbon and recycling society.

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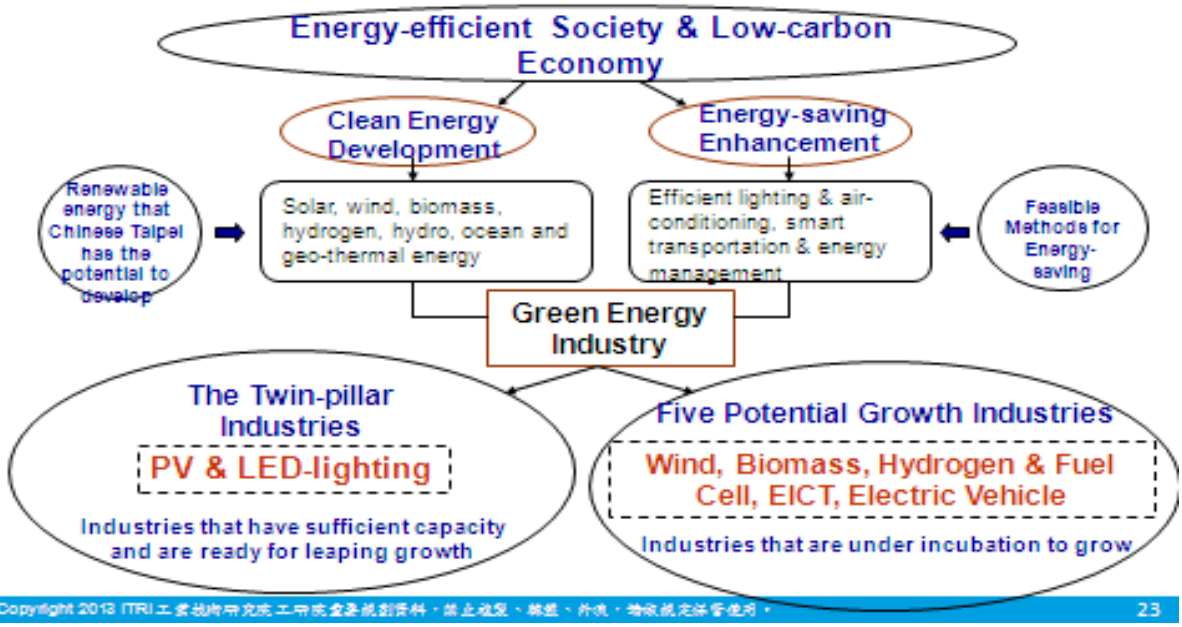
Policy Measure: Green Energy Industry

Key Industries for Development



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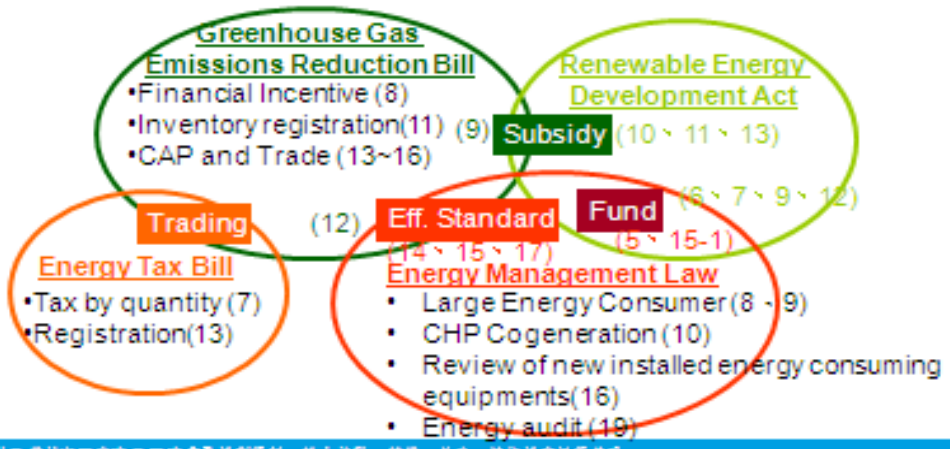
Legal Framework

1) "Renewable Energy Development Act" and the amendment of "Energy Management Law" have been effective since July 8th, 2009
2) Complete the legislation process of "Greenhouse Gas Emissions Reduction Bill".
3) Formulate the "Energy Tax Bill" to reflect the external cost of energy consumption.
4) Formulate the "Sustainable Energy Basic Law".



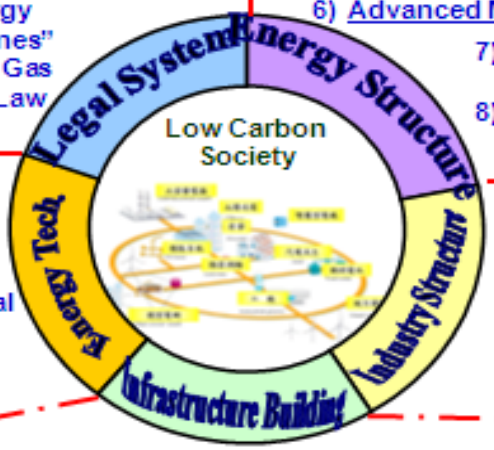
Incentives Mechanism

- Tax Exemptions: tax exemption and accelerated depreciation on capital expenditure, sale tax reduction on electric cars;
- Low Interest Loans: subsidy to banks;
- Incentive Payments: for the purchase of efficient appliances;
- Electricity Bill Discount: discount would be given for residential and school users who consume less electricity than previous year.

Sustainable Energy Policy Action Plans -- 16 Integrated Flagship Programs

1) Sustainable Energy Basic Law
2) Environmental impact assessment on "Energy Development Guidelines"
3) National Greenhouse Gas Emission Reduction Law and Energy Tax Bill

4) Long-term Electricity Load Forecast and Power Development Planning
5) Electricity Market Liberalization Project
6) Advanced Metering Infrastructure (AMI)
7) Renewable Energy Multiplication Project
8) Evaluation on Reasonable Use of Nuclear Energy



9) Low-carbon Industries Program
10) Green Energy Industry Program

15) National Energy Program
16) Energy Technological Talent Development Project

11) Green Transportation Program
12) Low-carbon City Program
13) Green Building and Eco-City Promotion Program
14) Energy Price Rationalization Project

Masterplan on Energy Conservation and GHGs Emission Reduction

- In May 2010, under the supervision of the committee on Energy Conservation and GHGs Emission Reduction, relevant ministries work together to build up the "Masterplan on Energy Conservation and GHGs Emission Reduction", which covers all aspects of our energy and climate policies.
- This masterplan will be implemented through action plans proposed by ministries. These action plans will be merged into the "Sustainable Energy Policy Action Plans", and be regularly reviewed together with other action plans under the supervision of the Council for Economic Planning and Development.

Masterplan on Energy Conservation and GHGs Emission Reduction

10 Landmark Programs

- Sound Legal Framework (4 projects)
- Low carbon Energy System (4 projects)
- Low Carbon Community & Society (4 projects)
- Low Carbon Industry (4 projects)
- Green Transportation (5 projects)
- Green Agriculture & Building (4 projects)
- Energy Saving and Emission Reduction Technology (2 projects)
- Low Carbon Public Construction (3 projects)
- Energy Saving and Emission Reduction Education (3 projects)
- Public Education (2 projects)

Masterplan on E C and GHGs Emission Reduction

10 Landmark Programs

- **Sound Legal Framework (4 projects)**
  - GHG Management Regulations
  - Sustainable Energy Basic Law
  - Enforcement Rules of "Renewable Energy Development Act" and the amendment of "Energy Management Law"
  - Green Tax System
- **carbon Energy System (4 projects)**
  - New Era Renewable Energy Promotion Project
  - Power Supply System Carbon Reduction Project
  - Smart-Grid Project
  - Nuclear Power Rational Utilization Assessment Project
- **Low Carbon Community & Society (4 projects)**
  - Low Carbon Community Demonstration Project
  - Low Carbon City Demonstration Project
  - Low Carbon Island Demonstration Project
  - Energy Conservation and Emission Reduction Movement
- **Low Carbon Industry (4 projects)**
  - Industry Energy Conservation and Carbon reduction Project
  - Environmental impact assessment on Energy-intensive Industry Development Policy
  - Green Energy Industry Program
  - Agriculture Energy Conservation and Carbon reduction Project
- **Green Transportation (5 projects)**
  - Seamless Road Transportation System Project
  - Convenient Rail Transport Network Project
  - Intelligent Transportation Service Project
  - Human Oriented Green Municipal Transport Environment
  - Vehicle Fuel Economy Improvement Project

Masterplan on E C and GHGs Emission Reduction

10 Landmark Programs

- **Green Agriculture & Building (4 projects)**
  - Green Architecture and Building Material Promotion Project
  - Intelligent Green Architecture Promotion Project
  - Energy Performance Certificate Scheme Promotion Project
  - Afforestation Promotion Project
- **Energy Saving and Emission Reduction Technology (2 projects) Low**
  - National Energy Science and Technology Project
  - Energy Technological Talent Development Project
- **Low Carbon Public Construction (3 projects)**
  - Rules and Promotion Scheme on Low Carbon Public Construction
  - Integration of Energy Conservation and Carbon Reduction Criteria into Public Construction Life-cycle Quality Management Scheme
  - Low Carbon Government Procurement Scheme
- **Energy Saving and Emission Reduction Education (3 projects)**
  - Educational Institution Energy Conservation and Carbon reduction Project
  - Energy Conservation and Carbon reduction Evaluation System
  - Energy and Climate Education Promotion Project
- **Public Education (2 projects)**
  - Public Energy and Climate Education Project
  - Energy and Climate Diplomacy

New Energy Policy

gradually move towards a nuclear-free homeland

(November, 2011)

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Background

Facing the challenges of energy scarcity and global climate change

Executive Yuan announced the "Framework of Sustainable Energy Policy" in June 2008, which has taken "economic development" and "environmental protection" into account on the premise of "energy security", and looked forward to creating a win-win-win solution for energy, environment, and economy.

In response to Fukushima accident in Japan on March 11, 2011

Taiwan's government reviewed energy situation, and formulate the New Energy Policy to "ensure nuclear energy security, steadily reduce nuclear energy dependence, create a friendly low-carbon green energy environment, and gradually move towards a nuclear-free homeland" in a pragmatic and responsible manner

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Policy & Planning

Mission

For the eternal well-being of citizens

Purposes

- Ensure nuclear energy security
- Steadily reduce nuclear energy dependence
- Create a friendly low-carbon green energy environment
- Gradually move towards a nuclear-free homeland

Principles and Supporting Measures

- Principles: ensure no restrictions of electricity use, maintain reasonable electricity rate, and fulfill the international carbon reduction commitment
- Supporting measures: actively implementation measures of energy saving and carbon reduction, and stabilization of electric supply

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Ensure Nuclear Energy Security

- **Conduct a comprehensive nuclear security examination and management**
  - Review the security items and assessment criteria in compliance with the international standards to adjust our regulatory approach
  - "10-year overall security assessment" for all plants have been implemented in advance, and pressure tests in compliance with the EU nuclear power plant have also been performed
  - Hierarchical supervision and management form government to industries
- **Strengthen the complex disaster preparedness and response capabilities**
  - Strengthen the earthquake resistance, landside flood resistance and tsunami resistance of the existing nuclear units.
  - All plants must establish emergency procedures and exercised regularly to be equipped with appropriate capacity
- **International Recognition for new nuclear power plant**
  - Newly nuclear power plant must be assessed by World Association of Nuclear Operators (WANO)
  - Experts from international nuclear security and control institutions will be invited to assist our Atomic Energy Council to carry out the survey and inspection.

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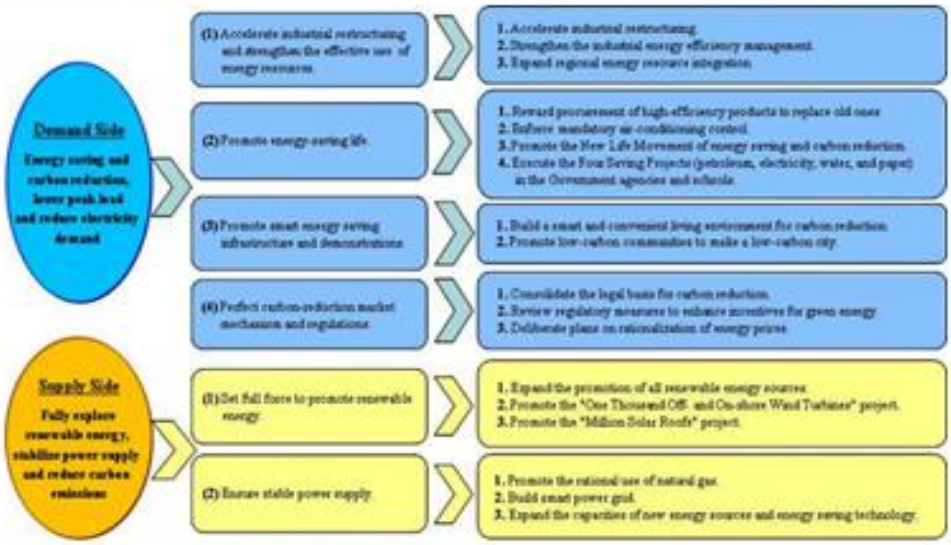
Steadily Reduce Nuclear Energy Dependence

- Actively decline the electricity demand, and reduce the peak of electricity consumption.
- Develop energy technology and promote the construction of alternative power resources, to ensure a steady supply of electricity.
- No extended service of existing nuclear power plant, and the decommissioning plan of the existing nuclear power plants should be launched by rules.
- The security of Nuclear Power Plant IV must be ensured before the commercial operation can be allowed.
- If the two reactor units of the Nuclear Power Plant IV has steadily operated by 2016, the Nuclear Power Plant I will be terminated in advanced.

Create Low-Carbon Environment

Promote energy saving and carbon reduction for a green energy development environment, we will push forward from both the demand side (energy saving) and the supply side (low-carbon energy exploration).



Gradually Move Towards a Nuclear-Free Homeland

- Yearly inspect the progress of energy technology development, effectiveness of implementation of nuclear and carbon reduction measures, and status of control over carbon emission
- Overall review of nuclear reduction schedule every 4 years for gradual reduction of dependence on nuclear power
- Provision of clean, healthy, and affordable electricity service.
- Effective control over carbon emission in order to fulfill international carbon reduction commitment.
- Construction of intelligent energy saving and carbon reduction environment for realization of sustainable living and consumption.
- Creation of green employment to drive green growth and achieve sustainability of Taiwan.

Conclusion Remarks

- Taiwan has a robust framework of policies, programs, laws and action plans for promoting renewable energy (EE) that align the objectives of improving EE with the broader economic and energy goals
- Green energy development relies on specific technologies and materials. Focused and paralleled energy research is needed.
- Wind, bio-mass, and PV require advanced technologies to boost Taiwan's industry development. Through new business model of integrating with cement plant, CCS technology will create great benefits