

行政院所屬各機關因公出國人員出國報告書

出國報告（出國類別：國際會議）

赴美國華盛頓特區及紐約研商 臺美雙邊合作及國際環境夥伴計畫推動事宜會議

服務機關：行政院環境保護署永續發展室

姓名職稱：簡慧貞參事兼執行秘書

張宣武主任研究員兼副執行秘書

張志偉高級環境技術師

派赴國家：美國

出國期間：106年6月11日至21日

報告日期：106年9月12日

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出國報告摘要

一、出國計畫名稱：赴美國華盛頓特區及紐約研商臺美雙邊合作及國際環境夥伴計畫推動事宜會議

二、出國人姓名/職稱/服務單位：簡慧貞/參事兼執行秘書/永續室

張宣武/主任研究員兼副執行秘書/永續室

張志偉/高級環境技術師/永續室

二、出國日期：106年6月11日至106年6月21日

四、出國行程：

6月11日 搭機啟程前往美國

6月12日 抵達美國華盛頓特區，舉行工作會議

6月13日 赴我駐美國代表處與國際永續發展協會(International Institute for Sustainable Development, IISD)舉行會議，討論國際環保合作議題。

6月14日 赴美國環保署拜訪 Jane Nishida 助理署長及 IEP 與臺美環境保護技術合作協定(IA)各計畫經理，討論國際環保合作議題。

6月15日 續與 IEP 與臺美環境保護技術合作協定(IA)各計畫經理，討論國際環保合作議題。

6月16日 中午由代表處陪同拜訪美國國務院，請其加強對臺美環保合作相關議題的支持。下午拜訪美國能源部國際事務政策官 Maria DiGiulian，討論本署與該部「大氣監測、清潔能源暨環境科學技術合作協定」活動執狀況及未來可能發展方向。

- 6 月 17 日 工作會議。
- 6 月 18 日 自華府移動至紐約，並與能源部計畫經理 Vatsal Bhatt 舉行會議。
- 6 月 19 日 上午拜會美國能源部 Brookhaven 國家實驗室，並與 Patrick Looney 主任討論雙邊合作工作項目。下午赴我駐紐約辦事處，與國際永續發展協會 Langston James 等人討論國際環境合作趨勢。
- 6 月 20 日 回程。
- 6 月 21 日 返抵台北。

五、行程成果評估及心得建議

（一）行程成果評估

1. 我國與美國環保署合作順利，美國環保署代理助理署長 Jane Nishida，代表美國環保署長歡迎臺灣環保署代表團的來訪，並表示國際環境夥伴計畫(International Environmental Partnership, IEP)工作除見證臺美的緊密合作，更代表了臺灣在區域合作上的傑出貢獻。N 氏甫參加 G7 環境部長會議，渠說明該會議重點之一為永續物料管理，且討論內容集中在資源效益 (resources efficiency)，並建議未來有第三方組織 (third party institute) 協助 IEP 運作。本署未來會持續推動 IEP/IA 的相關活動。感謝美方協助，今年 5 月在臺灣舉辦的 IEP 圓桌會議有邀請新南向國家駐臺使節與會，活動非常成功；本署 IEP 的優先項目含環境教育、空氣品質、汞監測、循環經濟、電子廢棄物等，並期待有更多的夥伴如日本的加入，以及在國際如聯合國的週邊活動中宣揚 IEP 的成果，未來在並請美方支持本署新成立毒物及化學局相關工作。
2. 與美國能源部針對「駐美國臺北經濟文化代表處及美國在臺協會大氣監測、清潔能源及環境科學技術合作協定第 1 號執行辦法」未來合作的內容進行深入的討論。美方並表示未來雙邊可藉本機制擴充合作對象至美國其他政府機構如農業部及海洋及大氣總署。
3. 美國國務院對臺美環境保護雙邊合作扮演非常重要的角色，本次行程有賴國務

院的大力支持讓相關會議均有圓滿的成效。

4. 國際永續發展協會為國際友我之重要非政府組織，本次行程之相關會議均提供本署國際最新攸關永續發展的資訊，可做為本署後續國際環保活動重要參考。

(二) 心得建議

1. 臺美雙方合作緊密及融洽，後續擬與相關業務處依據本次各項會議討論事項，研商國際環境夥伴計畫及與美國能源部雙邊合作後續事宜。
2. 聯合國永續發展目標部分項目與本署國際環境合作具有重要的關聯性，未來本署相關國際環境保護活動應以我國永續發展目標做為標的，並據以規劃後續相關活動內容。

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壹、前言

我國行政院環境保護署與美國環境保護署間的正式合作，奠基於北美事務協調委員會及美國在台協會簽訂的「駐美國臺北經濟文化代表處及美國在台協會環境保護技術合作協定」。自 82 年起，共簽訂了 11 個執行辦法，臺美合作的模式，由早期我國派員赴美實地考察與參與短期訓練，轉為邀請美國專家來臺舉辦研討會議，再轉為特定模式技術的協助建置，成功引進美國先進污染防治技術及環境管理經驗。對於我國環境保護管理政策與能力之建構，以及改善環境品質科技之引進，助益良多。

鑑於污染跨境問題挑戰，自 98 年開始臺美合作模式，逐漸轉為與美方共同執行互惠環保合作計畫，以符合雙方環保利益，100 年更對共同推展區域夥伴合作議題達成共識，擴展與區域及國際組織合作。藉由與創始夥伴美國環保署合作，協助我國與其他國家發展雙邊及區域性國際合作，遂於 103 年在台北宣布成立並正式啟動「國際環境夥伴計畫(IEP)」。其象徵臺美環保合作，業邁入另一個嶄新的階段。

本署於 106 年 6 月遂應美國環保署及相關機關邀約，赴美研商推動臺美環境保護雙邊合作及參與國際環境保護相關事宜

貳、出國人員及行程

本次會議主要由行政院環境保護署永續發展室簡慧貞執行秘書其率同該室同仁參加相關會議。出國人員詳列於表 1。

表 1、出國人員及機關

中英文姓名	機關（構）名稱	職稱
簡慧貞 Huichen Chien	行政院環保署永續發展室	參事兼執行秘書
張宣武 Shiuan-Wu Chang	行政院環保署永續發展室	主任研究員兼 副執行秘書
張志偉 Chang, Chih-Wei	行政院環保署永續發展室	高級環境技術師

出國期間為 106 年 6 月 11 日至 106 年 6 月 21 日，共 11 日，出國參與內容包含與我駐美國代表處、美國環保署、美國能源部及美國國務院等進行工作會議，行程規劃如下

- 一、 6 月 11 日 搭機啟程前往美國
- 二、 6 月 12 日 抵達美國華盛頓特區，舉行工作會議
- 三、 6 月 13 日 赴我駐美國代表處與國際永續發展協會(International Institute for Sustainable Development, IISD)舉行會議，討論國際環保合作議題。
- 四、 6 月 14 日 赴美國環保署拜訪 Jane Nishida 助理署長及 IEP 與臺美環境保護技術合作協定(IA)各計畫經理，討論國際環保合作議題。
- 五、 6 月 15 日 續與 IEP 與臺美環境保護技術合作協定(IA)各計畫經理，討論國際環保合作議題。
- 六、 6 月 16 日 中午由代表處陪同拜訪美國國務院，請其加強對臺美環保合作相關議題的支持。下午拜訪美國能源部國際事務政策官 Maria DiGiulian，討論本署與該部「大氣監測、清潔能源暨環境科學技術合作協定」活動執狀況及未來可能發展方向。
- 七、 6 月 17 日 工作會議。
- 八、 6 月 18 日 自華府移動至紐約，並與能源部計畫經理 Vatsal Bhatt 舉行會議。
- 九、 6 月 19 日 上午拜會美國能源部 Brookhaven 國家實驗室，並與 Patrick Looney 主任討論雙邊合作工作項目。下午赴我駐紐約辦事處，與國際永續發展協會 Langston James 等人討論國際環境合作趨勢。
- 十、 6 月 20 日 回程。
- 十一、 6 月 21 日 返抵台北。

表 2、會議規劃

日期	星期	活 動
6/12	一	抵達華府，並進行工作會議
6/13	二	12:30- 於我駐美代表處與國際永續發展協會 (International Institute for Sustainable Development, IISD)舉行會議 18:00 與駐美代表處工作餐會
6/14	三	13:30- 與美國環保署進行工作會議 17:30 會議結束
6/15	四	8:00- 與美國環保署進行工作會議 16:30 會議結束 18:00 與美國環保署進行工作餐會
6/16	五	13:00- 與美國國務院進行工作會議 15:00- 與美國能源部進行工作會議
6/17	六	13:00- 進行工作會議 1500
6/18	日	移動至紐約 1700 與能源部計畫經理 Vatsal Bhatt 進行工作預會
6/19	一	10:30- 拜會美國能源部 Brook Haven 國家實驗室 Patrick Looney 主任 14:00 於我駐紐約辦事處與國際永續發展協會 Langston James 等人會議

參、出國內容

一、與國際永續發展協會(International Institute for Sustainable Development, IISD) 舉行會議

6月13日中午於駐美代表處

參與人員 Dr.Lynn Wagner、陳前署長重信、盧組長道揚、張組長和中、呂學祥秘書、及本署代表團。

會議摘要為：

- (一) IISD 同意協助本署檢視或評論我國達到永續發展目標的方法論及自願性國家檢視報告(voluntary national reviews, VNR)
- (二) IISD 同意在其專刊上刊登我國永續發展目標及國家自主報告。
- (三) IISD 同意署長訪美時專訪
- (四) 雙方討論於聯合國相關活動或周邊活動中，由 NGO 或其他國家協助報告我國 VNR 的可行性 IISD 會協助提供其他國 VNR 的資料如芬蘭，及蒐集世界銀行參與聯合國永續目標的現況。



圖 1、於駐美代表處與國際永續發展協會舉行會議



與 IISD 討論 SDGs



陳大使與 IISD 討論國際合作趨勢

三、與我駐美代表處舉行會議

6月13日晚間

參與人員陳公使立國、盧組長道揚、張組長和中、呂學祥秘書、林主恩秘書及本署代表團。

會議摘要為：

- (一) 陳公使欲瞭解 IEP 計畫執行情形
- (二) 簡執行秘書說明 IEP 的相關成效
 - 1. 在大家的通力合作下 103 年總計執行了 17 項國際環境夥伴計畫活動，總共 28 個國家參與；104 年總計舉辦 33 項活動，更擴大到 40 國參與；105 年共舉辦 18 項活動 40 國參與；106 年亦規劃環境教育、亞太汞監測網、國際電子廢棄物管理網路、環境執法訓練、土壤及地下水汙染整治、空氣品質管理平台及永續物料工作坊等 7 大計畫準備或已經執行
 - 2. IEP 有效協助本署推動與新南向國家簽署雙邊協定。
 - 3. 說明 Asia Pacific Mercury Monitoring Network (APMMN)儀器致贈相關事宜及始末。
- (三) 陳公使讚揚 IEP 成效顯著，並將積極協助。

四、與美國環保署舉行工作會議

6月14日及15日於美國環保署總部

美國環保署代理助理署長 Jane Nishida 及本署簡執行秘書慧貞共同主持，並請陳前署長重信蒞臨指導，美國環保署、美國在台協會總部、我駐美國代表處、民主進步黨駐美國代表處、及本署同仁約 30 人與會。

會議重點如下：

- (一) 美國環保署代理助理署長 Jane Nishida，代表美國環保署長歡迎臺灣環保署代表團的來訪，並表示國際環境夥伴計畫 (International Environmental Partnership, IEP) 工作除見證臺美的緊密合作，更代表了臺灣在區域合作上的傑出貢獻。N 氏甫參加 G7 環境部長會議，渠說明該會議重點之一為永續物料管理，且討論內容集中在資源效益 (resources efficiency)，並建議未來有第三方組織 (third party institute) 協助 IEP 運作。
- (二) 簡執行秘書慧貞表示李署長應元覺得美方在 IEP/臺美環保雙邊執行辦法 (Implementing Arrangement, IA) 活動中展現非常多的誠意及善意，本署未來會持續推動 IEP/IA 的相關活動。感謝美方協助，今年 5 月在臺灣舉辦的 IEP 圓桌會議有邀請新南向國家駐臺使節與會，活動非常成功；本署 IEP 的優先項目含環境教育、空氣品質、汞監測、循環經濟、電子廢棄物等，並期待有更多的夥伴如日本的加入，以及在國際如聯合國的週邊活動中宣揚 IEP 的成果，未來在並請美方支持本署新成立毒物及化學局相關工作。
- (三) 簡執行秘書慧貞建議在 N 氏與署長會談時，討論如何以教育角度，在 UN 的週邊活動宣傳 IEP 美國領導及臺灣貢獻的區域合作成果。Martin Dieu 幕僚長回應表示，會轉達我方提議，並願意明年 Basel COP 會議時，從教育的角度辦週邊活動來宣揚 International E-Waste Management Network (IEMN) 的工作成果。
- (四) 陳前署長重信非常支持及期待簡執秘領導的團隊與 N 氏在臺美環境合作的成果，並建議 N 氏 7 月來臺時，能覲見副總統，討論兒童健康風險及臺美環境合作；並讚揚臺美環境合作備忘錄是臺美最成功的合作計畫，有許多很傑出的成果如鹿林山空氣監測。
- (五) 美國環保署表示該署 IEP 的優先項目不變：環境教育、空氣品質、大氣汞監測、土壤及地下水污染整治、及電子廢棄物。
- (六) IEP 及 IA 各計畫經理人會議

1. 本署去年針對贊助計畫的會計核銷作業，造成各計畫的困擾，將提供本署相關案例，期能辦理通案探討，以簡化核銷作業。
2. 兒童健康風險工作部分，陳前署長鼓勵本署同仁未來在擬定相關標準時，能將兒童健康風險當初重要依據，並請本署於第 12 號執行辦法續支持本工作項目。
3. 空氣品質管理平台，美方同意修改議程將機車議題納入今年的平台活動，並建議有空氣品質平台啟動儀式，惟開會日期 9 月 25 日可能撞期日本領導的空氣平台 AMNet，如有變化儘速通知美國環保署，並請本署提供邀請名單及議程規劃。
4. 國際電子廢棄物管理網路部分，本署許執行秘書永興非常支持這活動，簡執行秘書慧貞建議未來選擇一到二個國家做為 model，能因為 IEMN，設定減少 10-20%的電子廢棄物量目標，臺灣並樂意運用台灣經驗協助；另針對網站議題，本署會在 N 氏來台時，請計畫委辦公司向她做進度及規劃簡報；由於 10 月報名人數眾多，目前經費缺口約美金 15000 至 25000，需要想辦法解決。
5. 亞太汞監測網
 - (1) 美國建議由學術機構協助儀器致贈以避免政治干擾。
 - (2) 美方希望先送儀器過去，再考量致贈儀式及後續操作維護的事
 - (3) 雙方同意設置計畫表頭將優先兩字及順序移除，留時程表
 - (4) N 氏來臺時會討論儀器致贈表及網站規劃相關事宜。
 - (5) 美國原先規劃在 Minamata COP1 舉辦周邊活動宣傳 APMMN 或環境教育，但實際狀況美方還要和 State Department 討論。我方亦表示針對 Minamata COP1，本署毒物及化學物質局已經有參加整體計畫規劃，將藉由工研院的名義，未來希望能和美方一起合作。
6. 植生鑑識技術部分，美方建議本署土污基管會能派員赴美國，俾利美方提供更多的資源及協助本署瞭解相關應用。
7. 美方下週會再確認印尼土污染計劃一次，如沒有回應就將目標轉向越南，美方並建議將經費轉給 IEMN。
8. Air Now International 部分，美方建議臺灣環保署派員參加 9 月 11-13 日在美國 Austin 的 National Air Quality Conference，並能多加利用該平台，積極申請使用帳號瞭解其他國家的污染情形。

9. 循環經濟部分

- (1) E-waste 及 food waste 是美國環保署的循環經濟重點工作項目，亦美國環保署 SDG 的重點之一(12.3)，並希望在 2050 年減少食物垃圾 50%的目標。
- (2) 美國環保署在討論 SMM 時，他們不僅看廢棄物減量及處理，亦從源頭控管著手。
- (3) 美方將分享 G7 環境部長會議有關循環經濟得相關資訊。

10. 環境執法部分

- (1) 我方感謝美方在我申請加入 Asian Environmental Compliance and Enforcement Network (AECEN)會員國的協助。
- (2) 美方非常欣見我們複製臺美環境執法合作方式，訓練越南及泰國，並期待這種 twin-twin 模式能複製到其他夥伴國家。
- (3) 期待臺灣能在不同機制如雙邊、IEP、AECEN 等機制下共同推動國際環境執法合作。美國為因應美越雙邊合作，將會於今年 8 月赴越南執行環境執法訓練（採樣及監測），未來將會與本署合作，共同設計 8 月及 9 月的訓練教材。請總隊儘速和美方窗口聯絡，設計課程，及討論後，將資料及議程給美國環保署，該署好安排專家於 9 月 25 日來臺灣與會。

11. 有關本署會計室針對 IA 建議註明每年財報事項，美方建議不改變合約文字，因該署業依據本署匯款書說明段，於每年年底將財報寄給本署。

12. 有關水保處參訪部分，將協調第 5 分署接待；化學局邀請美國環保署專家參與 11 月舉辦之研討會部分，美方亦同意協助，並請水保處及化學局提供進一步的資料。



簡執秘與美國環保署代理助理署長共同主持雙邊高層會議



簡執秘與美方官員討論 G7

圖 2、與美國環保署工作會議



美國環保署為臺灣環保署代表團舉辦歡迎會



美國環保署代理助理署長歡迎簡執秘到訪



環境教育工作會議



兒童健康風險工作會議



環境執法工作會議



循環經濟工作會議



環境執法工作會議



計劃管理工作會議

四、與美國國務院舉行會議

6月16日中午

參與人員 State Department Luke Durkin, Ian Wallace，民進黨彭光理主任，駐美代表處林秘書主恩、本署代表團。

會議重點如下：

- (一) Luke Durkin 請教我方是否感覺美國新執政團隊上任後，對國際環境夥伴計畫有所改變？簡執行秘書慧貞表示，美國環保署於本年兩次組團派員到我國來顯示對國際環境夥伴計畫及台美環保合作協定的支持。D 氏據其瞭解美國環保署對國際環境夥伴計畫亦持正面看法。
- (二) D 氏藉此機會向我方表示，美國雖然宣布退出巴黎協定，惟離正式退出生效時間尚有 3 年，在此期間美國仍為巴黎協定締約方，將會積極維護美國利益。美國現在正重新檢討(re-evaluate)氣候變遷的國家目標及優先順序，惟我國仍可與美國州政府及城市在氣候變遷議題上合作。



圖 3、與美國國務院會議

五、與美國能源部工作會議

6月16日下午

參與人員含美國能源部國際合作處 Maria DiGiulian 及 Vatsal Bhatt，科技組呂學祥秘書、本署代表團

為討論本署與該部「大氣監測、清潔能源暨環境科學技術合作協定」活動執狀況及未來可能發展方向，本署與 Ms. Maria DiGiulian 及 Margaux Fimbres 於3月23日上午在能源部總部進行工作會議，會議重點如下：

- (一) 有鑒第1號執行辦法將於今(106)年12月31日到期，美方會內部評估是以展延或提出新案方式辦理。
- (二) 邀請美方共同支持今年參加臺灣的國際空氣品質會議，美方表示很有興趣，亦請臺灣儘速寄發邀請函給該部高階官員（應與美國環保署國際暨部落事務辦公室雙邊事物主任 Mark Kasman 同等級）。



圖4、與美國能源部工作會議

六、與美國能源部 Brookhaven National Laboratory 工作會議

6月19日上午

參與人員含 Dr. Patrick Looney Chairman Sustainable Energy Technologies, Vatsal Bhatt Senior Energy Policy Advisor 及本署代表團

會議重點如下：

- (一) 美方表示未來雙邊可藉本機制擴充合作對象至美國其他政府機構如農業部及海洋及大氣總署。
- (二) 美方表示未來合作項目可考慮鍋爐燃燒效率(boiler combustion management and efficiency)、生質能源(biomass combustion efficiency and management)。
- (三) 交換資訊
 1. 臺灣提供新的能源管理政策與空氣排放標準的關聯，如 NO_x, CO₂ 等。
 2. 美方建議我們未來合作邀請能源局、能源辦、縣市政府參與。
 3. 美方將提供永續發展能源管理指引的相關資料。

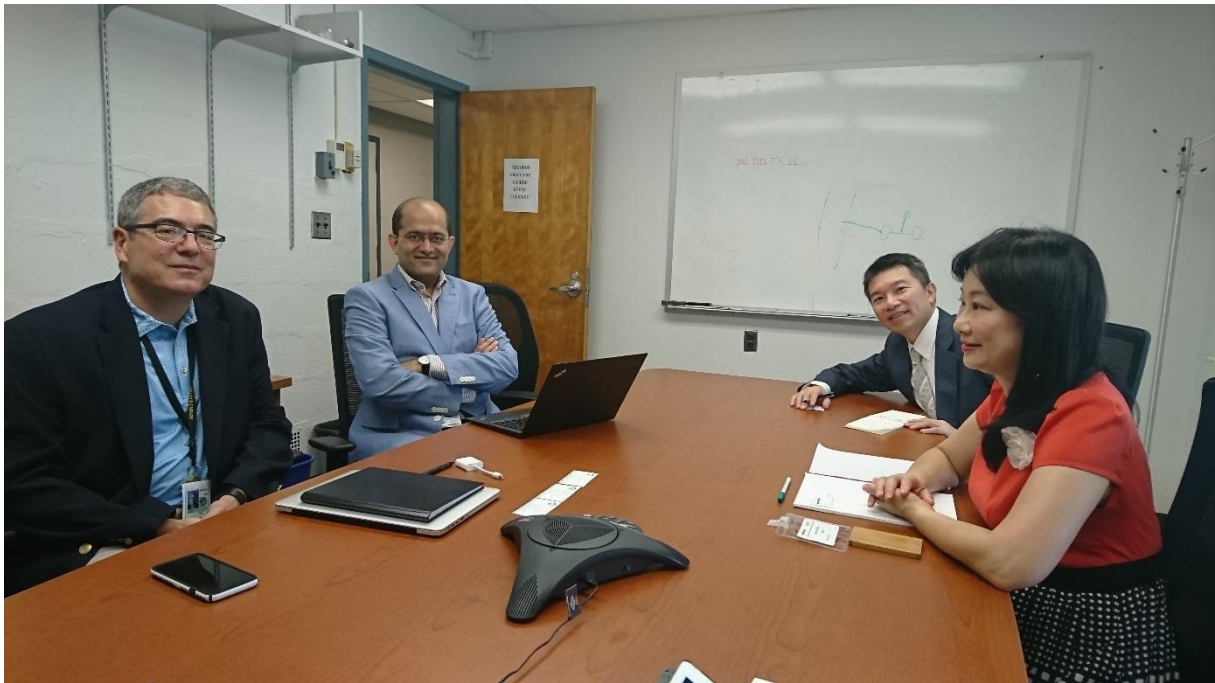


圖 5、與美國能源部 Brookhaven Laboratory 工作會議

七、與國際永續發展協會工作會議

6月19日下午於我駐紐約代表處

參與人員含 IISD Vice President Reporting Services and UN Liaison, Langston James Kimo Gorge VI, Thematic Expert, Ana Maria Lebada，我駐紐約辦事處 歐組長江安、梁領事玉珊、方副領事崇宇、李組長冠德，及本署代表團
會議重點如下：

- (一) 簡執秘感謝 IISD 及代表處，並期待未來的活動中能與 IISD 合作宣揚臺灣 SDG VNR，並提出前瞻計畫的基礎建設將與 SDG 連結，如再生能源
- (二) IISD 感謝臺灣雖然不是聯合國會員，仍然堅守執行 SDG 相關工作，願意將臺灣的 SDG 努力及資訊分享給國際社會，並在其專刊上刊登我國國家自願報告。同時期能針對我國永續發展目標專訪本署署長，及未來期待能藉跨國視訊會議，與 2 至 4 個夥伴國家共同分享資訊。



圖 6、於駐紐約代表處與國際永續發展協會舉行會議



簡執秘與 IISD 代表團及駐紐約代表處同仁合影留念



簡執秘與 IISD 代表合影留念



於我駐紐約代表處予 IISD 舉辦會議

肆、行程成果評估與建議

一、行程成果評估

- (一) 本次相關工作會議共與美國環保署、能源部及美國在台協會進行工作會議，會議過程及相關安排均充分展現臺美間合作順利的現況。
- (二) 我國與美國環保署合作及溝通順利，美國環保署代理助理署長 Jane Nishida，代表美國環保署長歡迎臺灣環保署代表團的來訪，並表示國際環境夥伴計畫(International Environmental Partnership, IEP)工作除見證臺美的緊密合作，更代表了臺灣在區域合作上的傑出貢獻。N 氏甫參加 G7 環境部長會議，渠說明該會議重點之一為永續物料管理，且討論內容集中在資源效益 (resources efficiency)，並建議未來有第三方組織 (third party institute) 協助 IEP 運作。本署未來會持續推動 IEP/IA 的相關活動。感謝美方協助，今年 5 月在臺灣舉辦的 IEP 圓桌會議有邀請新南向國家駐臺使節與會，活動非常成功；本署 IEP 的優先項目含環境教育、空氣品質、汞監測、循環經濟、電子廢棄物等，並期待有更多的夥伴如日本的加入，以及在國際如聯合國的週邊活動中宣揚 IEP 的成果，未來在並請美方支持本署新成立毒物及化學局相關工作。
- (三) 本次與美國能源部的工作會議亦針對「駐美國臺北經濟文化代表處及美國在臺協會大氣監測、清潔能源及環境科學技術合作協定第 1 號執行辦法」，就執行上碰到困難與挑戰進行深入的討論。美方並表示未來雙邊可藉本機制擴充合作對象至美國其他政府機構如農業部及海洋及大氣總署。
- (四) 美國國務院對臺美環境保護雙邊合作扮演非常重要的角色，本次行程有賴國務院的大力支持讓相關會議均有圓滿的成效。
- (五) 國際永續發展協會為國際友我之重要非政府組織，本次行程之相關會議均提供本署國際最新攸關永續發展的資訊，可做為本署後續國際環保活動重要參考。

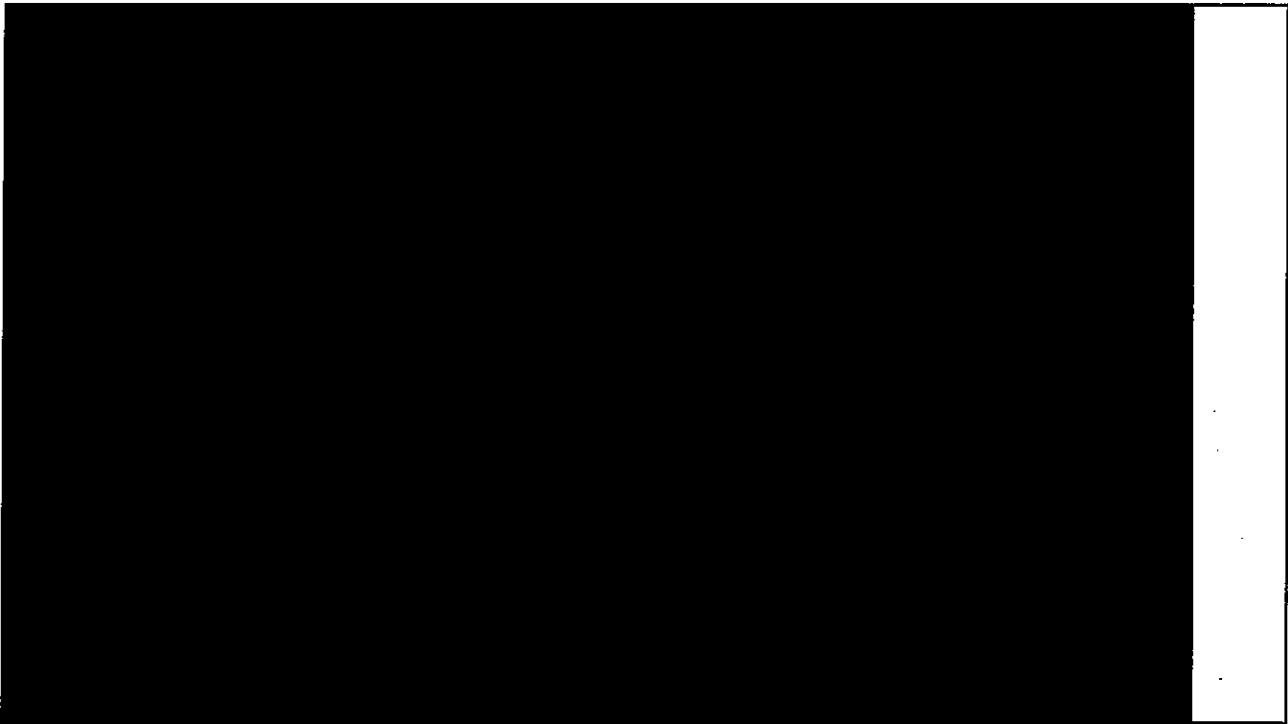
二、心得建議

- (一) 臺美雙方合作緊密及融洽，後續擬與相關業務處依據本次各項會議討論事項，研商國際環境夥伴計畫及與美國能源部雙邊合作後續事宜。

(二) 聯合國永續發展目標部分項目與本署國際環境合作具有重要的關聯性，未來本署相關國際環境保護活動應以我國永續發展目標做為標的，並據以規劃後續相關活動內容。

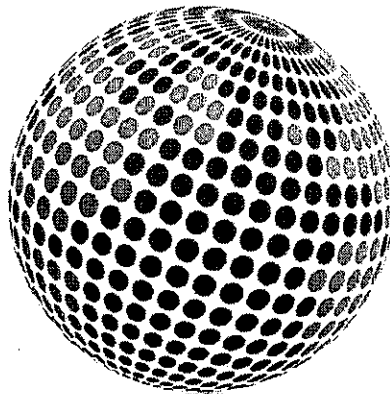
伍、附件

簡報



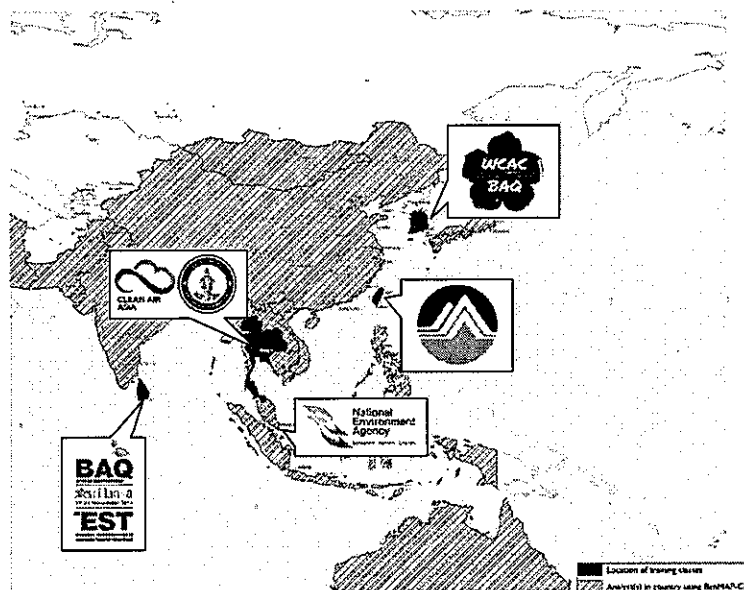
What is BenMAP-CE?

- An open-source and community-developed tool for estimating the benefits of improving air quality
- Used throughout the world to quantify the number and economic value of air pollution deaths and illnesses
- The tool is pre-loaded with the data needed to run an analysis in most parts of the world



BenMAP
COMMUNITY EDITION

Building Regional Capacity in Asia: 2013-2017



Deploying Train-the-Trainers Workshops

- **Goals:**
 - Increase the quantity, quality and policy-relevance of air pollution health impact and benefits assessments performed in each region
 - Build self-sustaining expertise in air quality benefits analysis
Attendees: civil servants and researchers (paired)
- **4-day agenda**
 - **Days 1-2: Train-the-trainer**
 - Inviting experienced BenMAP-CE analysts
 - Trainers will learn how to deliver class modules including: GBD, Basics of benefits analysis, importing data and valuing results
 - **Days 3-4: Present research and practice training**
 - Experienced analysts from days 1-2 deliver the 1-day training class
 - Researchers paired with civil servants to work through the design of a benefits analysis
- **April 2017: South America train-the-trainers event in Lima**
- **August 2017: Asia train-the-trainers event in Manila**

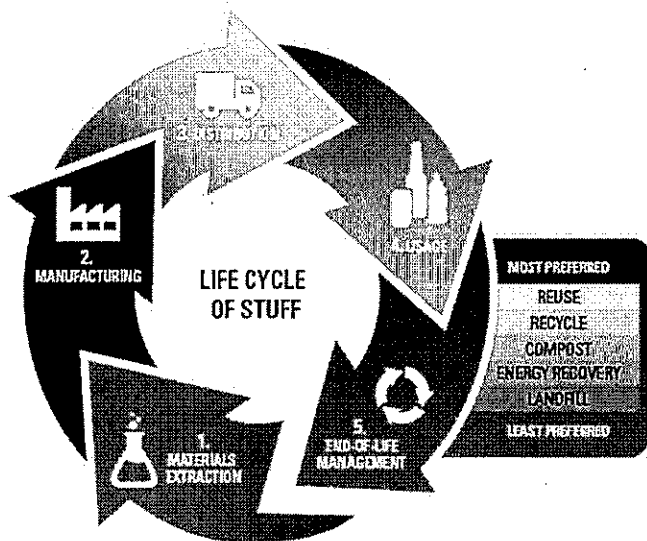
Sustainable Materials Management

Elizabeth Resek, Chief
Municipal Source Reduction Branch
Resource Conservation and Sustainability Division
Office Resource Conservation and Recovery
U.S. Environmental Protection Agency



Taiwan
June 15, 2017

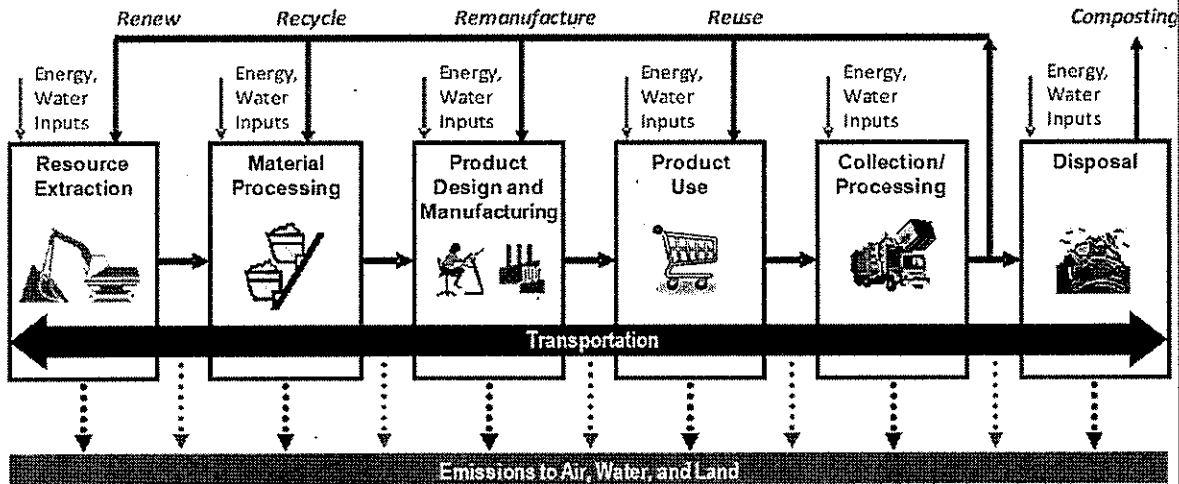
What is Sustainable Materials Management?



“An approach to serving human needs by using/reusing resources productively and sustainably throughout their life cycles, generally minimizing the amount of materials involved and all associated environmental impacts.”

Sustainable Materials Management: The Road Ahead, EPA (2009)

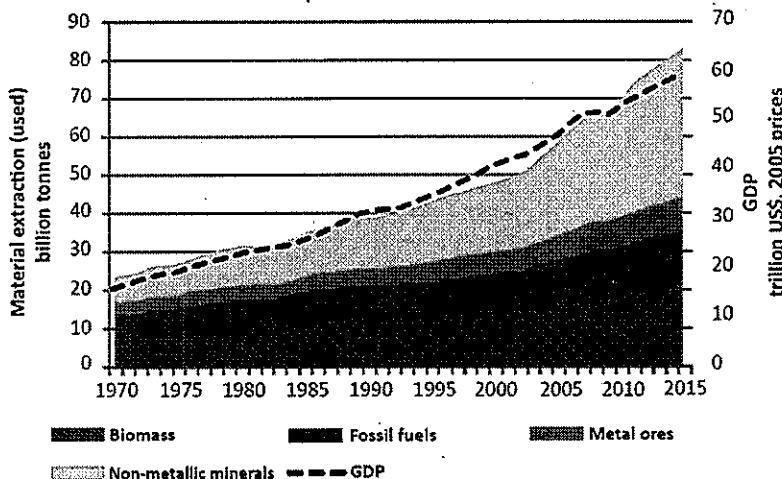
Material/Product Life Cycle



Hidden material flows account for up to 75% of the total materials moved, but are not accounted for in the gross domestic product.

Why is SMM so Critical? A Global Issue

Global material extraction and gross domestic product



- Global material resource use during the 20th century rose at about twice the rate of population. (UNEP)
- Global demand for materials will increase by more than 35% over the next 15 years, reaching 100 billion metric tons per year. (OECD)
- One half to three quarters of annual resource inputs to industrial economies is returned to the environment as wastes within just one year. (WRI)

Source: Material extraction data from UNEP (forthcoming in 2016b), GDP data from UNSD (2015)

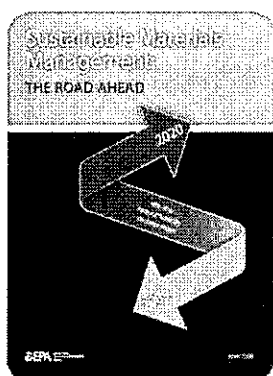
Externalities: What are the Real Costs of Environmental Damage?

- “Costs of pollution, ecosystem depletion and health impacts have grown steadily.”
 - Now exceed \$ 1 trillion/year for US companies - ~equal to 6.2% of GDP.
 - \$3 trillion/year for global companies.
- Access to life cycle information helps us better understand the real costs associated with the products and services we demand.



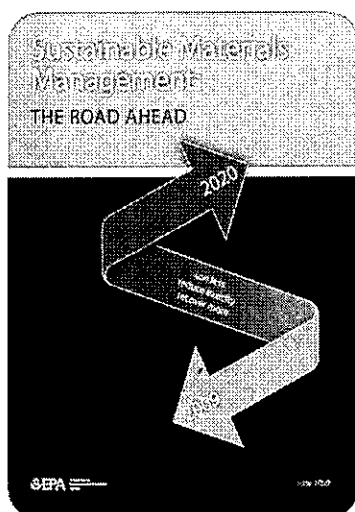
Source: State of Green Business 2015 by Joel Makower and the editors of GreenBiz.com

U.S. EPA Transition to SMM



- In 2002, EPA published “*Beyond RCRA: Waste and Materials Management in the Year 2020*”:
 - Key finding was the need for society to shift focus away from waste management to material management.
- In 2009, EPA published “*Sustainable Materials Management: The Road Ahead*” using life cycle assessment to evaluate material use across the US economy:
 - Laid out the case that we are on an unsustainable trajectory in our use of resources.
 - Argues that we need a systems approach to materials management in order to effectively and efficiently use materials, minimize negative environmental impacts and unintended consequences of actions.

U.S. EPA Transition to SMM (cont.)



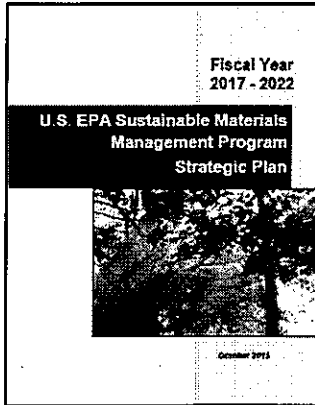
- Recommendations and analysis serve as the foundation for current and future materials management efforts.
- Identified 38 materials, goods and services with potential significant environmental impacts.

Advantages of Life Cycle Thinking

- Life cycle information offers greater “return on investment.”
 - Prioritizing and strategic planning.
 - Life cycle information can help target program resources to where they may be most effective (i.e., hotspots with real opportunities) in achieving significant environmental impact reductions.
 - Challenging preconceived ideas about where and how agencies should target their efforts and policy approaches to mitigate environmental issues.
- Avoiding unintended consequences.
- Identifying key partners and stakeholders.



U.S. EPA's SMM Strategic Plan



- Built Environment (buildings, roads, bridges, infrastructure)
- Sustainable Management of Food
- Sustainable Packaging
- Sustainable Electronics Management
- Life Cycle Thinking
- Measurement
- International Efforts



Sustainable Management of Food *maximizing opportunities to reduce food loss and waste*

- Food Recovery Challenge
- U.S. 2030 Food Loss and Waste Reduction Goal
- Call to Action
 - Seek Prevention Strategies
 - Increase Public Awareness
 - Improve the Data
 - Forge New Partnerships and Expand the Existing Ones
 - Clarify Date Labels and Food Safety
 - Build Food Loss and Waste Infrastructure
 - Sectors: production, manufacturing, retail/food service, consumers/donation, recovery/recycling and regulators/policy makers



Advancing SMM through Policy Instruments

- Applied Research
 - SMM Prioritization Tool
 - Business Models
- Convening Stakeholders
 - Identifying common goals and developing solutions
 - Spurring collaboration through voluntary partnerships

Advancing SMM through Policy Instruments (cont.)

- Information and Guidance
 - Waste Reduction Model (WARM)
- Voluntary Standards (life cycle-based)
 - Electronic Product Environmental Assessment Tool (EPEAT) standard
- Procurement Practices
 - Draft Guidelines for Product Environmental Performance Standards and Ecolabels for Voluntary Use in Federal Procurement



Sustainable Materials Management in Practice



Uses Hotspot Analysis



Created an Auto Recycling Center to develop recycling info and training



Created Life Cycle-Based Design Handbook

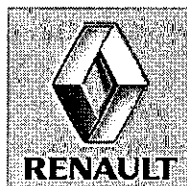


Department for Environment Food & Rural Affairs

Shared Resource Efficiency Manager for SME's



Developed Life Cycle Assessment & Management Tools



Recovering strategic materials through Joint Venture on ELVs



Developed Closed Loop Plastics Recycling Program

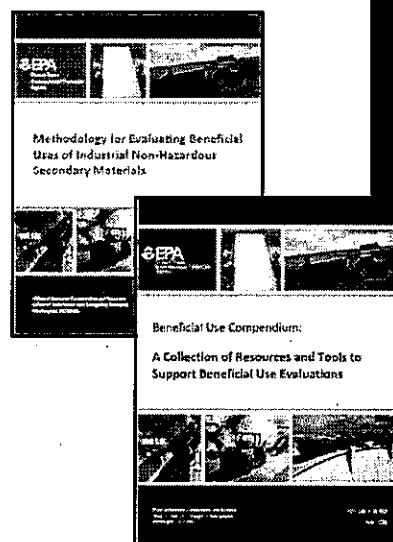
SAVOR...

Works with Stakeholders to Implement Sustainable Food Programs

SMM and the Beneficial Use of Secondary Materials

- Over 500 million tons of non-hazardous industrial secondary materials are generated each year in the United States, which can potentially be beneficially used
- Two key EPA documents:
 - *Methodology for Evaluating the Beneficial Use of Industrial Nonhazardous Secondary Materials*
 - *Beneficial Use Compendium: A Collection of Resources and Tools to Support Beneficial Use Evaluations*

<https://www.epa.gov/smm/methodology-evaluating-beneficial-uses-industrial-non-hazardous-secondary-materials-and>



SMM and the G7 Alliance on Resource Efficiency



"We will work with business and other stakeholders to improve resource efficiency with the aim of also fostering innovation, competitiveness, economic growth and job creation. We encourage all countries to join us in these efforts." – G7 Leaders Declaration, May 2016

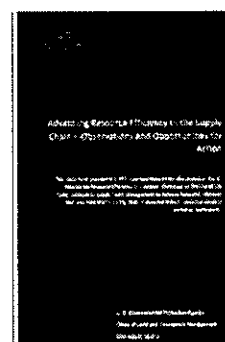
G7 Leaders' Summit June 2015 established the Alliance on Resource Efficiency to:

- Serve as a forum to share knowledge and create information networks on a **voluntary basis**.
- Collaborate with businesses and other relevant stakeholders to advance opportunities offered by resource efficiency, promote best practices and foster innovation.

EPA's Perspectives on the Workshop

Seven Critical Needs to Advance Resource Efficiency Broadly in the Supply Chain and Economy on a voluntary basis.

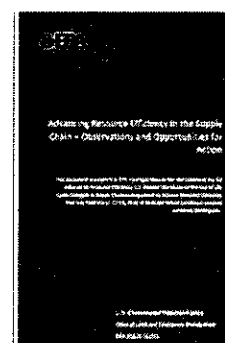
- Collaboration and information exchange for resource efficiency innovation across the life cycle.
- Public and private sector procurement practices that demand resource efficient products and services.
- Mechanisms for sharing resource efficiency information and resources to a range of audiences.



<https://www.epa.gov/smm/advancing-resource-efficiency-supply-chain-observations-and-opportunities-action>

EPA's Perspectives on the Workshop (cont.)

- Resource Efficiency Buy-in Within and Across Organizations.
- Life cycle thinking in design and decision-making to achieve resource efficiency.
- Design with the “next life” of materials in mind – end of use is not the end of life.
- Effective use of applied research and analysis to support innovation.



<https://www.epa.gov/smm/advancing-resource-efficiency-supply-chain-observations-and-opportunities-action>

Next Steps for the U.S. EPA and SMM

- Advance ease of access to data, tools and measurement domestically and internationally.
- Build on momentum around resource efficiency and advancing the use of life cycle thinking in design and decision-making.
- Continue to work with global public and private leaders (e.g., United Nations Environment Programme, World Economic Forum, and G7/G20 countries) to scale-up best practices in the supply chain and institutionalize resource efficiency.



Thank you!

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@EPALand


FB: Environmental Protection Agency




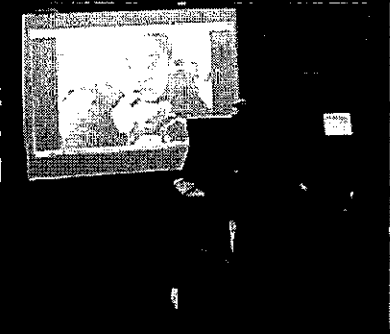

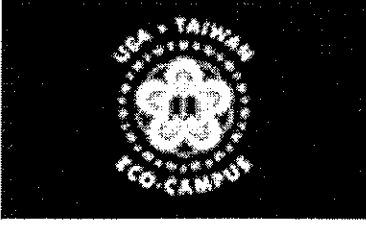

International
Environmental
Partnership



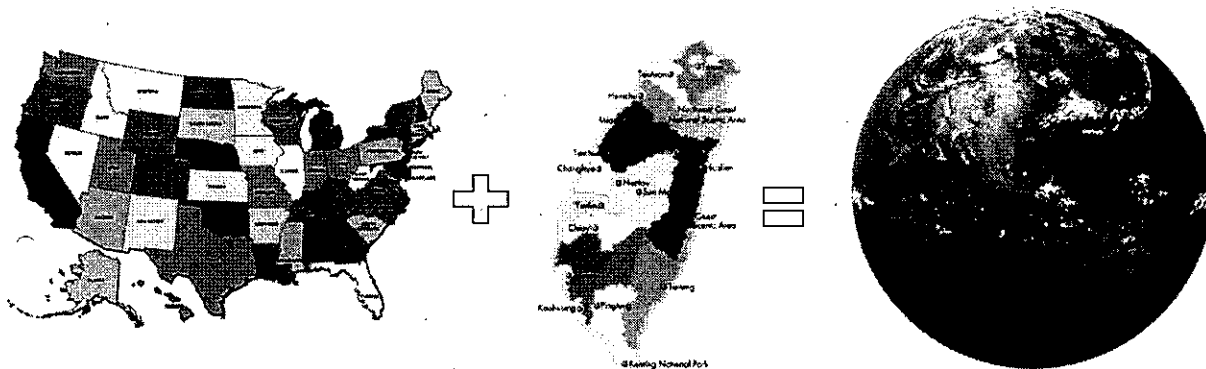
U.S.-Taiwan Eco-Campus Partnership Program



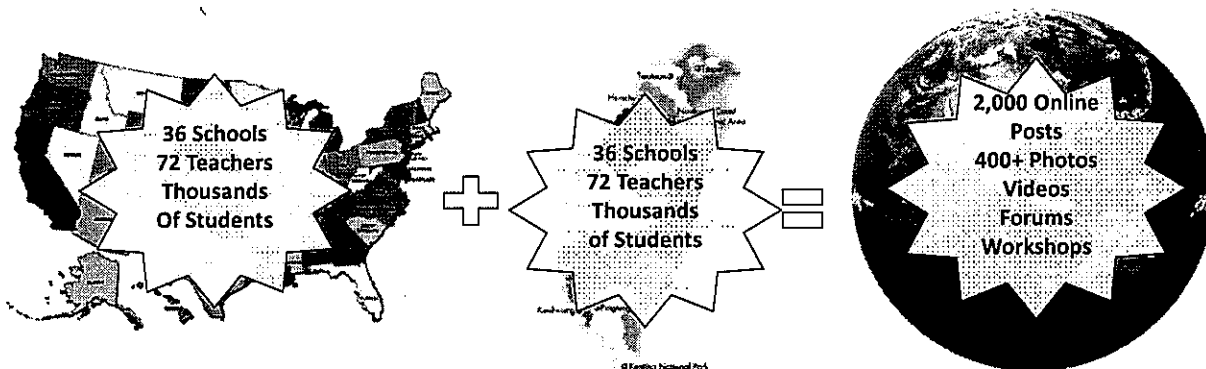
Eco-Schools USA
NATIONAL WILDLIFE FEDERATION®



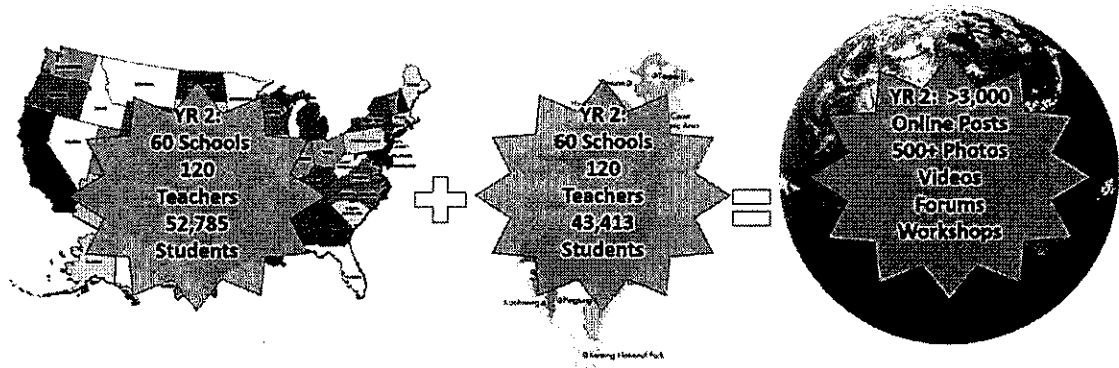
Endless Possibilities



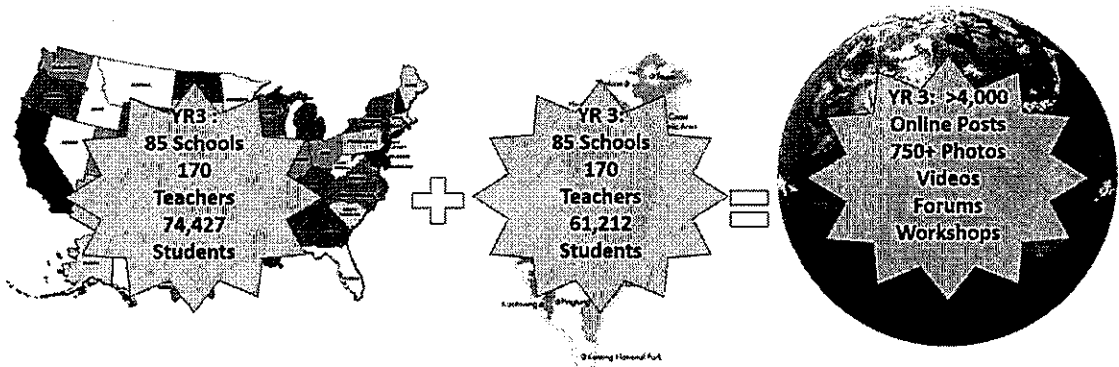
Year 1 Outcomes:

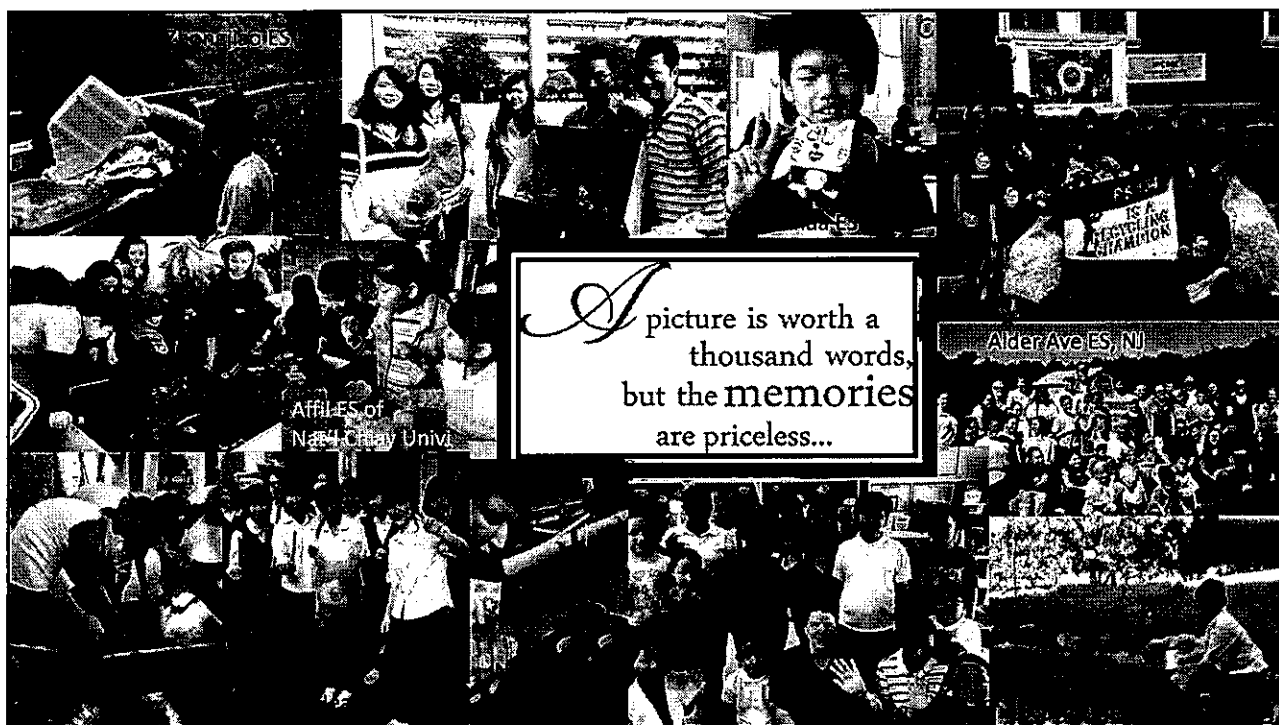


Year 2 Outcomes:

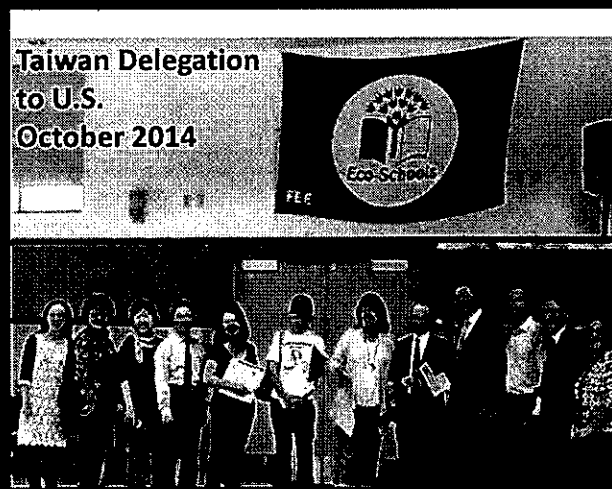


Year 3 Outcomes:





In-Person Educator Visits





International
Environmental
Partnership

"Time flies like an arrow. I would like to thank all the teachers and Eco-Campus group members. Your opinions and experiences really widen my horizon."

~ Ya-lun Wang, Nanhua Elementary

"It's been a pleasure working with all of you! My own students have really enjoyed seeing the projects that are happening in other schools."

~ Jessie Gorant, Benjamin Franklin Elementary

"This gives students a cross-cultural concept and global perspective. I learned how to guide students to solve problems on their own and make friends with people from all over the world."

~ Jiun Fan Lin, Tainan Kuang Hua High School

"Everyone shared such great ideas and I learned so much. A Day in the Life was a great way to experience how our peers in Taiwan and within the US approach sustainability."

~ Jacque Sanchez, Griffin Elementary

"It's been a wonderful online journey to learn from partners of this course group. Each post provides a window open to future project ideas."

~ Ting Hsuan Tseng, National Tainan Chia-Chi Girls Senior High School

"It's been a great online forum. I think I will improve my teaching by this."

**Tseng Yu-Lin,
Ping Tung County
Nan Jung English
Village**

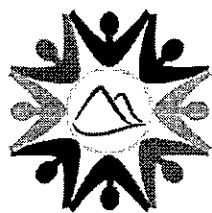


"I particularly enjoyed the opportunity to become familiar with the Eco-School program and to collaborate with schools in Taiwan. I am looking forward to sharing our project with our sister school in Tainan. Thank you for this excellent learning experience."



The U.S.-Taiwan Eco-Campus Partnership Program was Designed to Be:

- **Flexible, Project-Based**
- **Usable by K-12 Schools in Any Country**
- **Geographically Relevant**
- **Help Students and Teachers to Become More Environmentally Literate**
- **Help Schools Become Sustainable Places of Learning**



International
Environmental
Partnership

THANK YOU
谢谢





Phytotechnologies in Taiwan

*Using Green and Sustainable Approaches to
Identify and Remediate Contaminated Soil
and Groundwater in Taiwan*

James E. Landmeyer, Ph.D.
USGS, South Carolina and Florida Research Centers

U.S. Department of the Interior
U.S. Geological Survey

2012, Taipei



2012, Kaohsiung City

A graphic design featuring several thick, curved, overlapping lines that create a sense of motion and depth. In the upper left, there are three small inset images: one showing a landscape with trees, one showing a dark, possibly underground, environment, and one showing a building or industrial site.

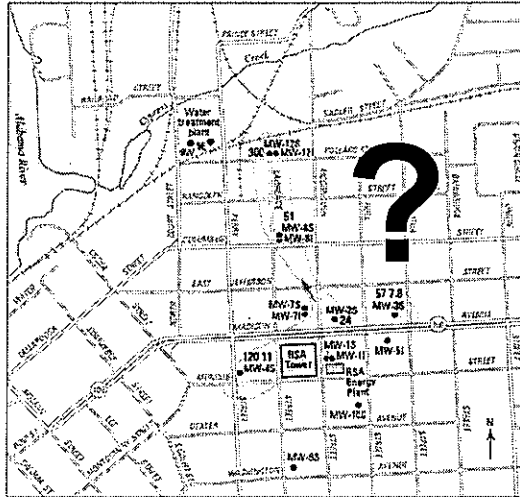
**Phytoscreening: A Rapid
Approach to Characterizing
Subsurface Contaminant
Distribution**

James E. Landmeyer
USGS

A small circular logo located in the bottom left corner of the page, which appears to be the logo of the National Center for Environmental and Estuarine Science (NCEES).

Data Drive Decisions

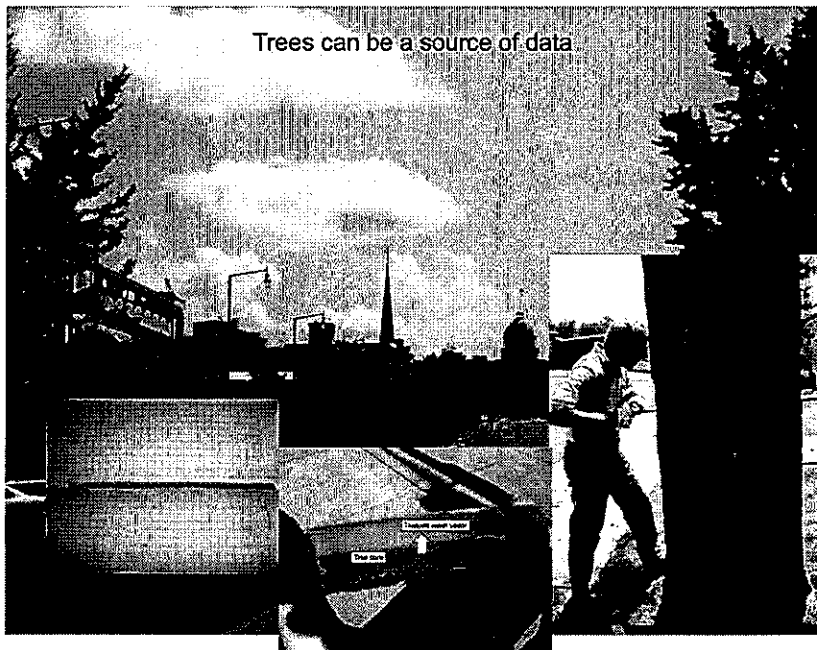
- Plumes drawn from data available
- Wells
- Soils
- Cores
- Plume maps drive Source area assessments
- Source areas drive PRP identification



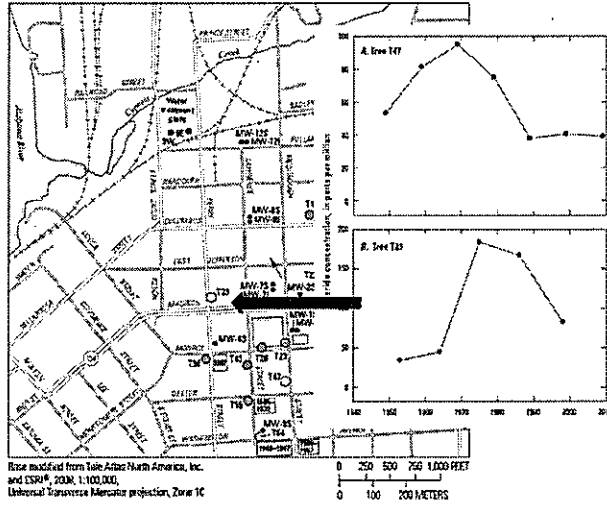
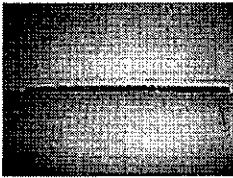
Example: Capital City Plume, Montgomery, AL



Trees can be a source of data

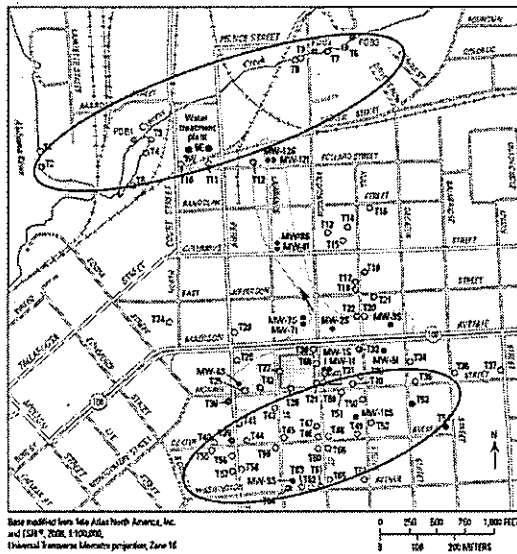


- Tree-ring chloride revealed timing of VOC releases



- Tree VOCs identified contaminated areas (yellow-shaded areas) not revealed using other methods.

- Helped ID PRPs



Tree-ring chloride with VOC detected above MCL in soil beneath remaining a tree ring
 (1) The location of the tree ring
 (2) The location of the tree ring
 (3) The location of the tree ring
 (4) The location of the tree ring
 (5) The location of the tree ring
 (6) The location of the tree ring
 (7) The location of the tree ring
 (8) The location of the tree ring
 (9) The location of the tree ring
 (10) The location of the tree ring

This EPAT/EPA/USGS relation with IEP funding led to:

- 2014 EPAT-EPA-USGS Interagency Agreement signed
- 2016 USGS month-long mission to Taiwan
-Meet with EPAT government officials
-Tech transfer
 -Classroom lectures
 -Field demonstrations (2 sites)



Met at EPAT main office, Taipei

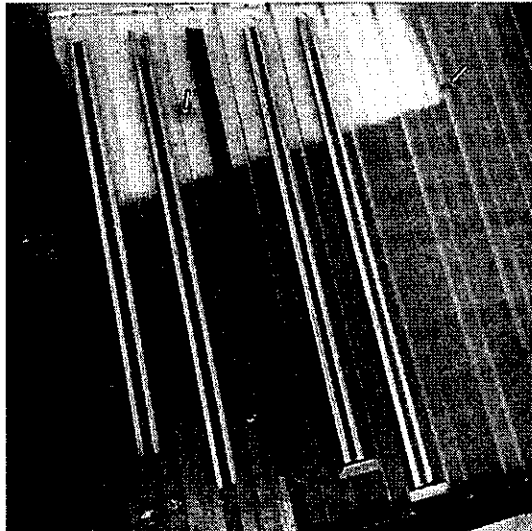


Met with NTU Dept .of Forestry and Resources Conservation



 USGS

Use elements in tree rings to understand contamination



 USGS



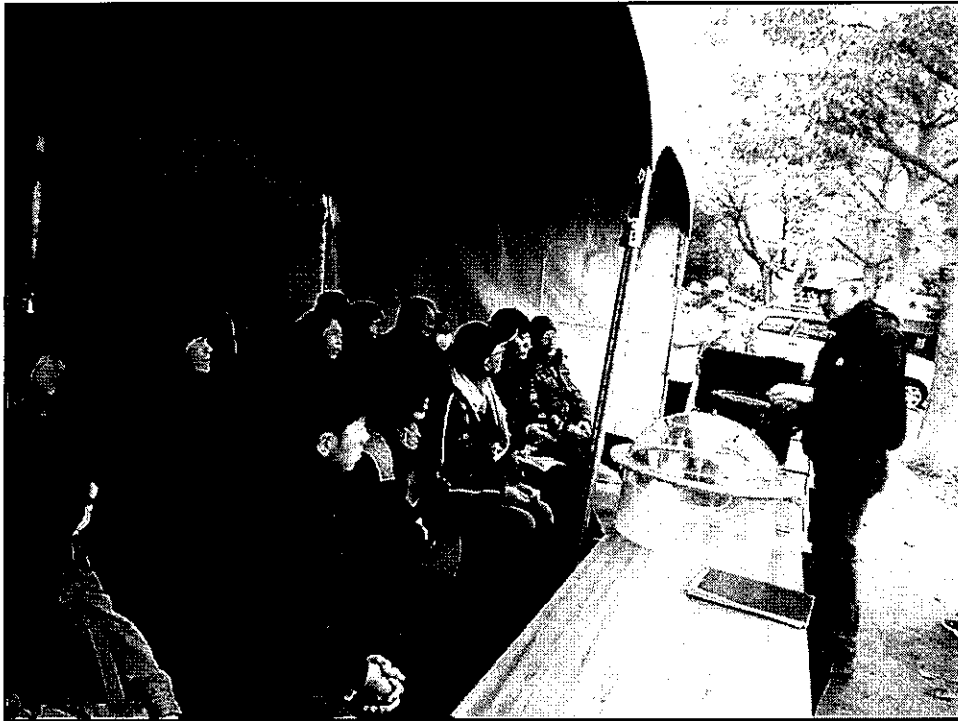
 **USGS**

Listening to Dr. Guan

Provided a 8-hr indoor classroom training session in Taoyuan
Environmental Analysis laboratory, EPAT



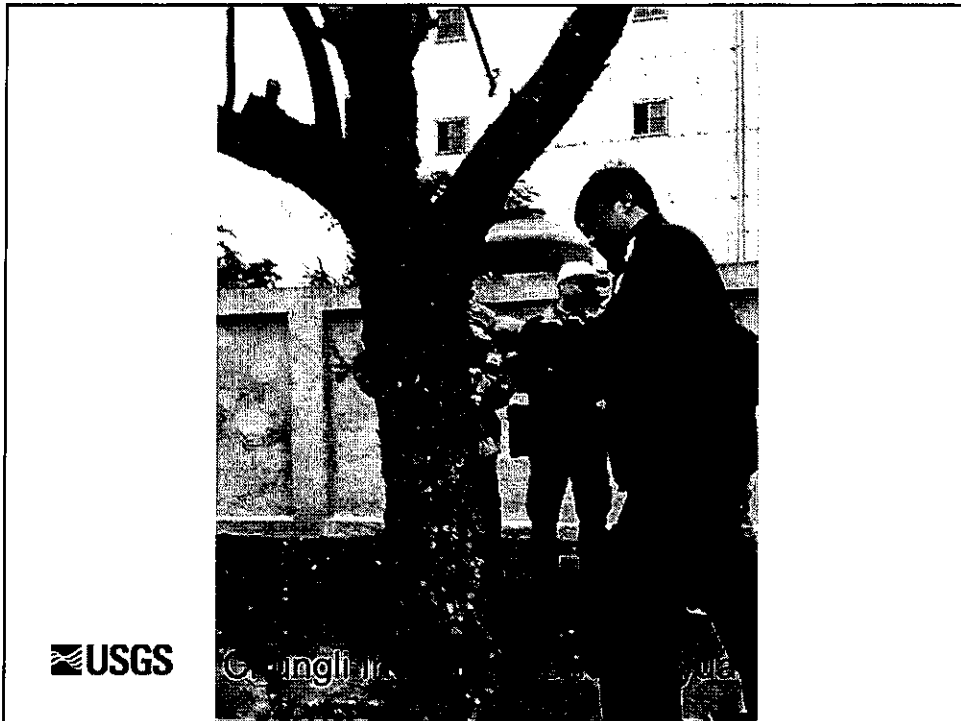
 **USGS**



Participants get to core a "tree"



 USGS



Participants get to collect leaf samples



 USGS

Participants get to see results of leaf and tree samples



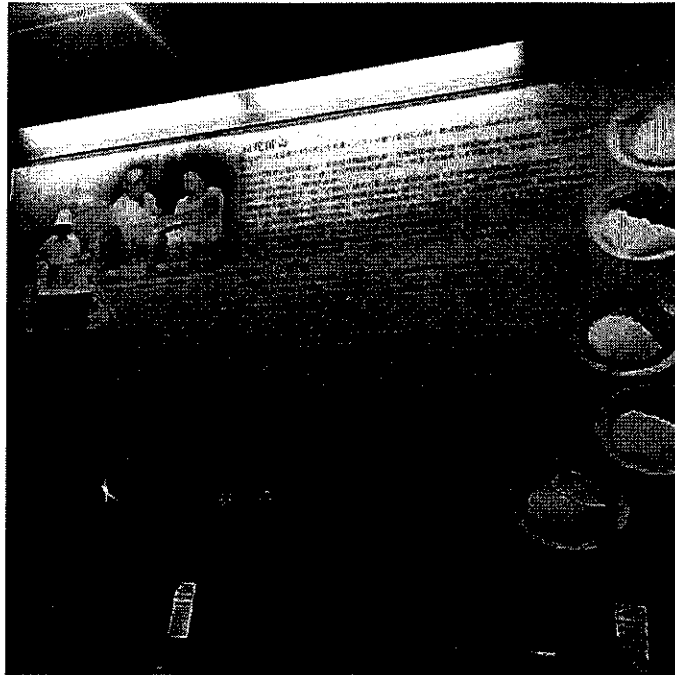
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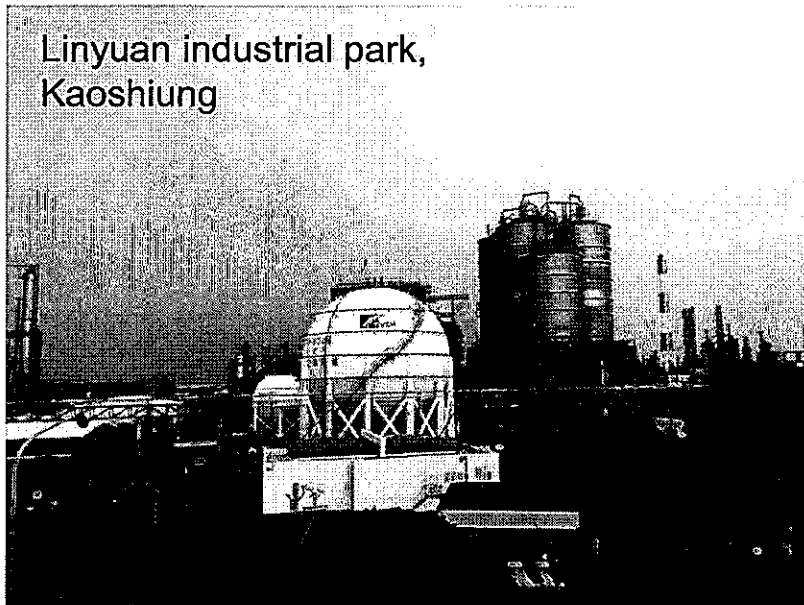
TOF-MS
(SETL, Inc.)

 USGS



Linyuan industrial park,
Kaoshiung

 USGS





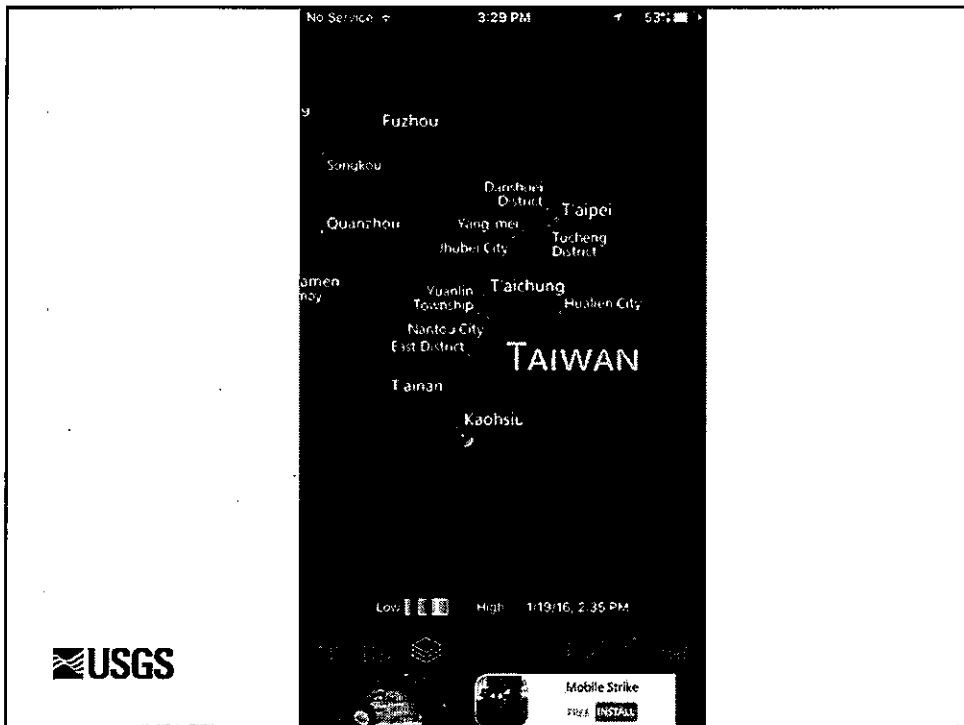
 USGS




 USGS




Provided a 8-hr indoor classroom training session in Linyuan Industrial Park Education building





 Provided an 8-hr outdoor classroom training session at Linyuan industrial park



 The "first" phytoremediation site, Pintung County



 USGS

Last day, in Tainan

Post-trip activities:

- Recommend that EPAT form a Phytotechnology Working Group.
- Provided review comments on Guidance Document being prepared for EPAT.
- Discuss renewing an old phytoremediation site in Pintung County,
- Discuss providing technical assistance to EPAT on other groundwater-contamination sites

 USGS

Post-trip activities:

- Discuss providing technical assistance to EPAT government officials/Contractors for EPAT sites on basic principles of groundwater contaminant studies.
- Workshops in United States?
- Site visits to established phytoremediation sites in U.S.?
- Assist EPAT in training other governments in SE Asia about phytotechnologies



On behalf of USGS...

**Welcome to the United States, and Thank you
for your support of this program through the
IEP!**

U.S. Department of the Interior
U.S. Geological Survey

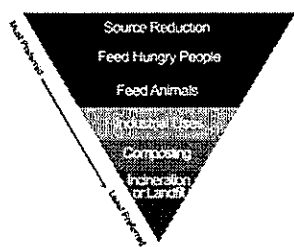
The U.S. Environmental Protection Agency's Sustainable Management of Food Efforts

March 2017

A Brief History

The U.S. Environmental Protection Agency (EPA) has focused on wasted food issues since the 1990s. In 1999, we co-published a report called *Waste Not, Want Not: Feeding the Hungry and Reducing Solid Waste through Food Recovery*. This report detailed the waste management options for food and described the cost, ease of access, and common practices. From these descriptions, a ranking of waste management options emerged. A few years later, the Food Recovery Hierarchy was created.

Sustainable Materials Management Program



The food recovery hierarchy existed for about 10 years when EPA's Sustainable Materials Management (SMM) program began. SMM is a systematic approach to using and reusing materials more productively over their entire lifecycles. EPA is challenging organizations to think about the materials they are using or manufacturing and look at what they could do differently. Can we use less material? Can we manufacture in a way that

facilitates reuse or repurposing? As part of this movement, the Sustainable Management of Food program began.



CHANGING HOW WE THINK ABOUT OUR RESOURCES FOR A BETTER TOMORROW

SMM and the Food Recovery Challenge

As part of the SMM effort around Sustainable Management of Food, we needed a way to work with organizations and associations to come up with solutions on how to operationalize the food recovery hierarchy. In 2011, EPA launched the Food Recovery Challenge (FRC). The FRC had three initial focus sectors: grocers, universities, and venues. These sectors were some of the largest food waste



Food Recovery Challenge

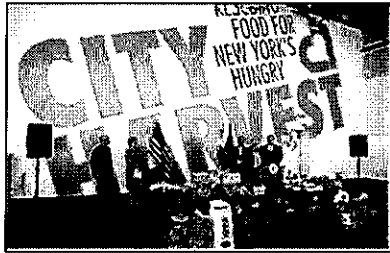
generators at that time. Since 2011, the FRC sectors have grown to include hospitality, restaurants, faith organizations, and all educational institutions, adding K-12 schools. The Food Recovery Challenge continues to grow and expand to new sectors and new participants. The FRC offers them two options for membership: as an endorser or a participant. As an endorser, the organization would work with its community and/or congregation to donate food or divert leftover food to places that need it. As a participant, the faith organization itself would reduce its own wasted food by donating or using leftover food at events. Resources are available to EPA's FRC participants through our website and Regional recruiters.

Food: Too Good to Waste Implementation Guide and Toolkit

Consumers account for over half of all food waste generated in the U.S. To help households reduce waste in their kitchens, EPA developed Food: Too Good to Waste, a tool that can be implemented by communities to help consumers understand how much they waste at home and assist them in making small shifts in how they shop for, prepare and store food.

The 2030 Food Loss & Waste Reduction Goal & Food Recovery Summits

The success of our Sustainable Management of Food program and our partnerships around wasted food launched EPA into a monumental year in 2015. On September 16, 2015, EPA and USDA announced a national goal to cut America's food loss and waste in half by the year 2030. Since then, EPA has co-hosted three food recovery summits: 2015 Food Recovery Summit, Reduce and Recover: Save Food for People, and California Resource Recovery Association Conference. These summits brought key stakeholders together



for in-depth discussion on how to address the problem of wasted food and who is willing to take action. Panel discussions and sessions at the summits offered opportunities to share inspiring success stories, innovative best practices, and the remaining challenges to meet the 2030 goal. Topics covered included reducing wasted food in all sectors (e.g., government, consumer, education, and business), as well as highlighting grassroots and community-based initiatives in food recovery. EPA will co-sponsor the Midwest Food Recovery Summit in September 2017.

A Call to Action by Stakeholders

As a result of the summit, EPA is sharing a *Call to Action by Stakeholders* in order to come together as a nation and jointly make progress toward the 2030 food loss and waste reduction goal. We have summarized stakeholder input, gathered demonstrated best practices and looked for commitments for real action from within the food system to expand networks and improve efficiencies to avoid unnecessary waste.

The lessons learned from stakeholder dialogues help shape EPA's future role in leading the fight against excess wasted food in America. Government in particular can help by measuring and quantifying national food loss and waste so that people and organizations can better account for and mitigate their contributions.

One potential path to success is for local communities working among businesses, charities, the faith community, and local/state governments to identify opportunities to first prevent wasted food and in cases where that is not possible, recover it. Additionally, there is a real need for everyone--private and public sector--to better communicate the costs and impacts of wasted food along with the social, environmental and economic benefits we can obtain by managing our food more sustainably.

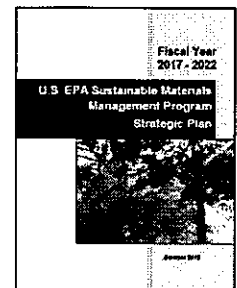
Further with Food



USDA and EPA joined a public-private partnership with non-profits to develop a virtual resource center that provides comprehensive information about food loss and waste in the U.S. and solutions dedicated to reducing it. Launched in January 2017, *Further with Food: Center for Food Loss and Waste Solutions* provides centralized access to information, tools, educational materials, research, and programs to reduce food loss and waste.

Looking Ahead to the Future

EPA's 2017 - 2022 SMM Strategic Plan outlines a vision for EPA's future work to advance SMM for the next 5 years. Sustainable Management of Food is identified as a key strategic priority area in the plan. Moving forward, EPA will continue to support collaborate, public-private efforts to achieve the 2030 goal. Key EPA actions will include efforts to: improve measurement of food waste; implement and expand our



incentive-based programs (e.g. the Food Recovery Challenge); and encourage stakeholders to review their business operations to identify areas where they can reduce food loss and waste and share those best practices with others in the food system.

EPA Sustainable Materials Management International Efforts

June 15, 2017

G7

The G7 Communique and Appendix from the Environment Ministers' Meeting held (June 11-12, 2017). Documents specifically highlight resource efficiency and sustainable materials management.

http://www.minambiente.it/sites/default/files/archivio_immagini/Galletti/G7/communique_g7_environment_-_bologna.pdf

Communique:

32. There is strong evidence that Resource Efficiency, 3Rs, Circular Economy and Sustainable Material Management can be a major driver to attain economic growth and employment, and can bring about environmental and social benefits together with long-term economic competitiveness and prosperity. This is fully recognized in the 2030 Agenda for Sustainable Development, where many Sustainable Development Goals (SDGs) and targets will only be attained if we improve resource efficiency globally.

33. National and regional policy decisions play an important role in resource efficiency. We also recognize that collective actions internationally are key if we are to ensure widespread benefits amongst countries on a global scale. As a result, we encourage international cooperation and the promotion of integrated approaches and policies as an important condition to achieve tangible results. These actions should take into account all dimensions of sustainable development as well as 7 cooperation with business and stakeholders.

34. We support the main findings of the IRP and OECD reports² that resource efficiency can improve the overall economic and environmental resilience of our countries. We consider that substantial increase in resource efficiency is essential to meet the SDGs and associated targets and climate goals in a cost-effective manner and we will consider the relevant policy recommendations of both reports.

35. In this context, building on the outcome of the 2015 Elmau Summit, the 2016 Ise-Shima Summit, the Toyama Framework on Material Cycles, we adopt the enclosed "5-year Bologna Roadmap" which aims to advance common activities on resource efficiency. We will endeavour to participate fully in the 10-Year Framework Programmes on Sustainable Consumption and Production Patterns.

36. In reaffirming our commitment to the G7 Alliance on Resource Efficiency, as a useful forum to exchange and promote best practices together with business and other stakeholders, we warmly welcome and fully support the initiative of the German G20 Presidency to establish a G20 Resource Efficiency Dialogue.

37. At the next meeting of the G7 Alliance on Resource Efficiency, which will be held in November 2017 in Italy, under the lead of the G7 Italian Presidency, we will define a planning document with a tentative list of workshops and other activities to follow up on the above-mentioned actions.

Annex to the Communiqué "5-year Bologna Roadmap":

We, the G7 Environment Ministers and high representatives, and European Commissioners responsible for environment and climate, taking into account the Toyama Framework on Material Cycles and the key messages and recommendations produced by the IRP and the OECD

reports, have decided on next steps to advance resource efficiency and adopt the following roadmap as a "living" document to prioritize actions that advance life cycle based materials management, resource efficiency, and the 3Rs, including in the supply chain.

To this aim, acknowledging that 12 out of the 17 SDGs refer to resource efficiency and that by 2030 countries are called on "to achieve the sustainable management and efficient use of natural resources", recognizing the value of knowledge-sharing and building on the ongoing work, we decide to carry out the following concrete actions, by taking the lead or contribute on a voluntary basis as appropriate, recognizing that each member might not contribute to all areas.

In doing so, we recognize the importance of stakeholder involvement. We acknowledge the significant role of business in achieving resource efficiency and welcome the active contribution from the Business 7. We want to engage closely with business, International Organizations and other stakeholders active in this field to promote resource efficiency in the following focus sectors and areas.

We will review progress periodically on the implementation of the actions under the roadmap and the Toyama Framework through workshops and other fora in conjunction with the G7 Alliance on Resource Efficiency meetings.

Resource Efficiency indicators

- Continue work to develop our joint capability to measure and monitor resource efficiency outcomes and impacts. Building on the expertise of the OECD, the IRP, the G7 statistical institutes and other relevant bodies, we will work collaboratively to review and share existing practices, identify gaps in measurements as well as develop possible new global, regional and national indicators, and advance existing ones, where needed.

Resource Efficiency and Climate Change

- Further assess the potential GHG reductions of resource efficiency policies with the aim of pursuing co-benefits by identifying the most promising resource efficient 14 measures in regard to their GHG abatement potential. To this end, we invite the IRP to conduct a study on the above, including providing emission scenarios connected to the implementation of RE/CE/3R/SMM policies and comparing these with the implementation of conventional policies. An assessment of the deployment of low carbon technologies relevant for the implementation of RE/CE/3R/SMM should also be provided. Italy will provide financial support to develop the study.

Sustainable material management at international level Share information on

- Initiatives, best practices and approaches on environmentally sound international material management including the national and regional aspects related to it (e.g. standards and regulations, recycling facilities and business operators, and applicable technologies);
- Barriers to repair, refurbishment, remanufacturing, reuse and recycling from a business perspective, regarding international material management.

Economic analysis of resource efficiency

- Work with relevant organizations to develop a robust and credible analysis of the macroeconomic impacts, including a gender sensitive perspective, of the shift to a resource efficient global economy and the microeconomic drivers that will enable this transition. This work will seek to build on the existing activities of the IRP and the OECD and identify knowledge gaps, barriers and key priorities for future action to guide our activities. Co-benefits and possible trade-offs with other relevant areas of policy (e.g. employment) will be considered.

Citizen involvement and raising public awareness

• Citizen awareness and engagement is central to achieving lifestyles consistent with resource efficiency goals. We will engage with civil society and business to identify the necessary solutions and innovations to achieve sustainability through actions towards a circular economy. We recognize youth as agents of positive change and promote increasing their awareness of resource efficiency to foster innovative ideas and drive actions in support of global efforts (e.g. G7, G20, OECD, and IRP).

Private sector actions

• Through active engagement of the private sector, develop case studies on industry best practice on resource efficiency, providing concrete information on the cost savings achieved, jobs created, and reduction in pollution.

Food waste

• Through webinars, workshops, or other platforms, share experiences on (1) developing policies or plans for reducing food loss and waste and (2) measuring food loss and waste and associated negative environmental and economic impacts, in line with target 12.3 of the UN Sustainable Development Goals.

Plastics

• Assess the economic benefits and opportunities for improved product design and address barriers to recycling and reuse of plastic, in view of reducing the use of primary resources, the negative environmental and economic impacts over its lifecycle and avoid plastics leakage into the environment, in particular the seas and oceans (in coordination with relevant G7 work).

Green Public Procurement - GPP

• Share experiences on integrating resource efficiency criteria into the procurement process and exchange views on how to build capacity to apply GPP to products with significant environmental impacts, especially by sharing information on aspects such as reusability, reparability, the use of recycled materials.

Lifetime extension product policies

• Assess the impact of Remanufacture, Refurbishment, Repair and Direct Reuse (RRRDR) practices compared to recycling, create clarity on the RRRDR definitions used, identify and address barriers, including reverse logistic chains, and consider what role the G7 could play. Share practices on activities identifying relevant ecodesign criteria for longer life time of products and on their implementation.

Resource Efficiency and Next Production Revolution – NPR

• Explore engagement in the collaboration launched at the G7 Summit in Taormina by exploring how NPR enabling quality infrastructure can contribute to achieving greater resource efficiency.

G7 Background:

The G7 Leaders' Summit in June 2015 established the Alliance on Resource Efficiency to:

- Serve as a forum to share knowledge and create information networks on a voluntary basis.
- Collaborate with businesses and other relevant stakeholders to advance opportunities offered by resource efficiency, promote best practices and foster innovation.

U.S. Workshop Under the G7 Alliance (2016):

As part of the G7 Alliance on Resource Efficiency, EPA hosted a workshop in March of this year (2016) that focused on the use of life cycle concepts in supply chain management to achieve resource efficiency.

- The workshop used several examples from the auto sector to generate discussion.
- The workshop included approximately 190 representatives from the governments of nine countries (all G7 countries, as well as from South Korea and the Netherlands), individual industries and industry associations, non-governmental organizations (NGOs), international organizations, academia, and others.

An important shift was noted: in general discussions centered on implementing life cycle concepts as opposed to trying to understand life cycle concepts.

EPA recently released a report entitled, *“Advancing Resource Efficiency in the Supply Chain – Observations and Opportunities for Action.”* This report conveys our perspective on the workshop discussions. In the report, we identify seven critical needs to advance resource efficiency and SMM broadly in the supply chain and economy on a voluntary basis that appear to emerge from the workshop discussions. The critical needs include:

- Collaboration and information exchange for resource efficiency innovation across the life cycle.
- Public and private sector procurement practices that demand resource efficient products and services.
- Mechanisms for sharing resource efficiency information and resources to a range of audiences.
- Resource Efficiency Buy-in Within and Across Organizations.
- Design with the “next life” of materials in mind – end of use is not the end of life.
- Life cycle thinking in design and decision-making to achieve resource efficiency.
- Effective use of applied research and analysis to support innovation.

Additional information plus the proceedings and final reports can be found on the EPA website:

<https://www.epa.gov/smm/g7-alliance-resource-efficiency-us-hosted-workshop-use-life-cycle-concepts-supply-chain>

Key G7-Related Reports:

EPA is currently sitting on the Steering Committee of the United Nations International Research Panel (IRP). The following are recent, key reports by the IRP and the Organisation of Economic Co-operation and Development (OECD) related to resource efficiency.

- “data suggest that while long-run relative decoupling of material extraction from GDP can be observed at a global level, this relative decoupling is not sufficient to prevent a persistent increasing trend in absolute resource extraction. Indeed, in contrast to the long-run relative decoupling trend over the 20th century, recent years’ data suggest that resource extraction has begun to increase at a faster rate than GDP, suggestive of ‘recoupling’.” (UNEP IRP 2016)
- “On current trends of population and economic growth, global material resource consumption is expected to double by 2050.....Unless environmental management and resource efficiency are significantly improved, natural assets will continue to degrade and become scarcer, with potentially serious adverse economic, social, and environmental consequences.” (OECD 2016)
- “Realizing the benefits of resource efficiency requires concerted and coherent policy action by governments in order to respond to the systemic challenge that is posed.” While their recommendations mainly focus on government policy at the domestic level, the OECD notes: “as the globalisation of our economies continues and value chains stretch across multiple jurisdictions, there is an increasing need for co-ordinated approaches at the international level.” (OECD 2016)

- The OECD noted the importance of life cycle thinking in the creation of policy mixes that cover the full product life cycle and of strengthened data and analysis to support policy development, including improving economic analysis of resource efficiency. (OECD 2016)
- OECD's Policy Guidance on Resource Efficiency report OECD (2016), Policy Guidance on Resource Efficiency, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264257344-en>
- UNEP IRP's Resource Efficiency: Potential and Economic Implications. A report of the International Resource Panel. UNEP (2016) Resource Efficiency: Potential and Economic Implications.
- A report of the International Resource Panel. Ekins, P., Hughes, N., et al. <https://www.env.go.jp/press/files/jp/102839.pdf>

G20

While there is no G20 Environmental Ministerial, a G20 Resource Efficiency Partnership is proposed based on the outcomes of a workshop held under the German G20 Presidency in Berlin on March 16-17, 2017.

United Nations Environment Programme (UNEP)

Life Cycle Assessment (LCA):

EPA participates in the Global LCA Data Access network (GLAD). GLAD forwards the vision to create a network of independently-operated and interoperable LCA databases that connects multiple data sources to support life-cycle assessment in a way that facilitates sustainability-related decisions.

Sustainable Production and Consumption/Sustainable Public Procurement Initiative:

EPA participates on UNEP's working group on Product-service Systems launched under the Sustainable Public Procurement Initiative that was established under UNEP's 10 Year Framework of Programmes (an outcome of Rio+20).

Sustainable Electronics Management

International E-Waste Management Network (IEMN):

EPA and the Environmental Protection Administration Taiwan (EPAT) have collaborated since 2011 to build global capacity for the environmentally sound management of waste electrical and electronic equipment (WEEE), which is commonly called e-waste. To support this goal, EPA and EPAT coordinate the International E-Waste Management Network (IEMN). The IEMN enables environmental officials from within and beyond the Asia-Pacific region to exchange information and best practices on e-waste management. Work is currently underway for the next meeting (Fall 2017).

Sustainable Management of Food

North American Commission for Environmental Cooperation (CEC)

- This is a trilateral project between U.S., Canada, and Mexico on food waste, the goal of which is to enhance the capacity in the three countries for reducing the disposal of food waste in landfills by exploring opportunities to achieve food waste reduction and recovery within relevant North American industry, commercial and institutional sectors.
- This project aims to:

- Improve measurement of FLW across the food supply chain, including approaches to correlate food loss and waste prevention, recovery and recycling with associated environmental and socio-economic impacts.
 - A multi-stakeholder expert group will be established to support the development of the project outputs. These include a report identifying, comparing and assessing existing FLW measurement methodologies and their correlation with measuring environmental and socio-economic impacts; an inventory that identifies and briefly describes FLW measurement approaches; and the creation of practical guides on how to measure FLW.
- Engage youth to raise awareness of food loss and of waste issues through the development of learning tools and resources to prevent, recover and recycle food waste.
 - Activities will include the establishment an advisory group and the engagement of partner organizations such as 4H, Scouts, schools and local communities. Working in collaboration with these groups, CEC will create learning and communication tools and a strategy to promote the adoption of these tools will be developed and implemented.

Organisation for Economic Co-operation and Development (OECD)

- EPA's work on food loss and waste with OECD is through the Working Party on Resource Productivity and Waste
- We are participating the week of June 12, 2017 in a roundtable policy dialogue focused on the topic of food waste prevention initiatives, particularly good practices in measuring and assessing the effectiveness and efficiency of food waste prevention policies.
- We look to share information on food waste initiatives and good practices in measuring and assessing the effectiveness and efficiency of food waste prevention policies and are interested in how countries are measuring food waste generated from households and whether they are using that information to assess their policies.

Champions 12.3

- At the 2015 United Nations General Assembly, countries of the world formally adopted a set of 17 Sustainable Development Goals, including a target (Target 12.3) that calls to cut per capita global food waste in half at the retail and consumer level, and reducing food losses along production and supply chains (including post-harvest losses) by 2030.
- Our national US food loss and waste goal mirrors this commitment to cut food loss and waste by 50% by 2030.
- EPA works with other members of Champions 12.3 who have also committed to this goal to share how we are pursuing food loss and waste reduction, overcoming barriers, and achieving economic, food security, and environmental benefits.
- We publicize our new analyses on food loss and waste, success stories of effective food loss and waste reduction, and remaining barriers that need the attention of policymakers, companies, financiers, researchers, and innovators.

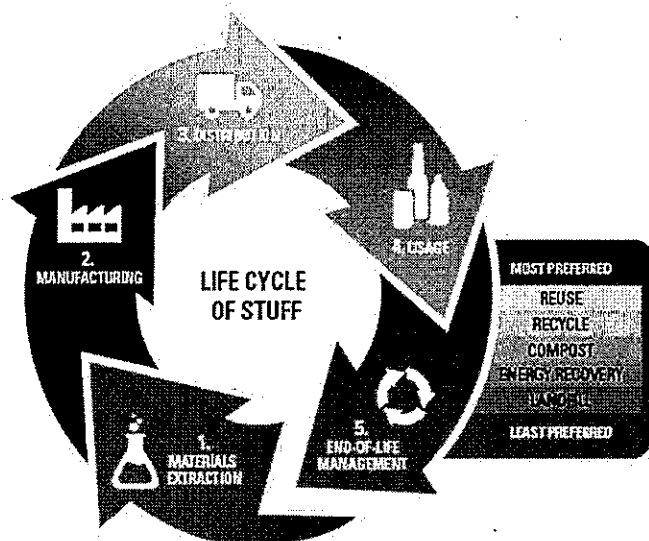
Sustainable Materials Management

Elizabeth Resek, Chief
Municipal Source Reduction Branch
Resource Conservation and Sustainability Division
Office Resource Conservation and Recovery
U.S. Environmental Protection Agency



Taiwan
June 15, 2017

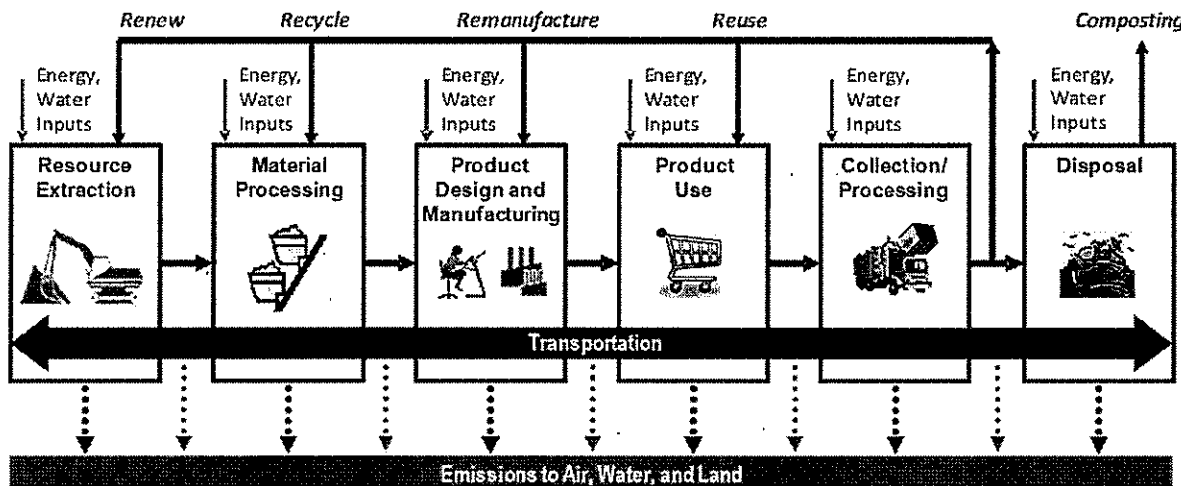
What is Sustainable Materials Management?



“An approach to serving human needs by using/reusing resources productively and sustainably throughout their life cycles, generally minimizing the amount of materials involved and all associated environmental impacts.”

Sustainable Materials Management: The Road Ahead, EPA (2009)

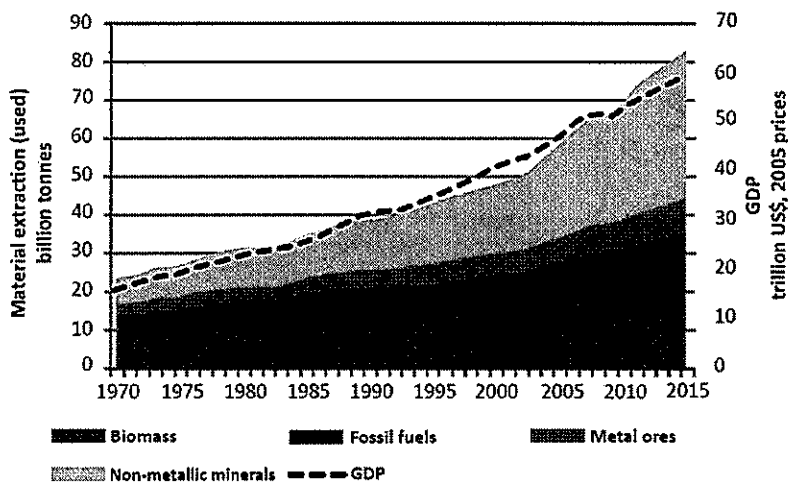
Material/Product Life Cycle



Hidden material flows account for up to 75% of the total materials moved, but are not accounted for in the gross domestic product.

Why is SMM so Critical? A Global Issue

Global material extraction and gross domestic product

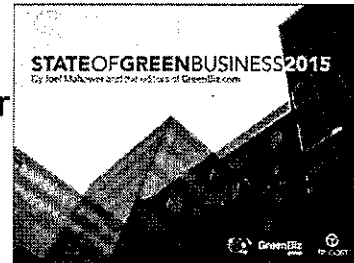


- Global material resource use during the 20th century rose at about twice the rate of population. (UNEP)
- Global demand for materials will increase by more than 35% over the next 15 years, reaching 100 billion metric tons per year. (OECD)
- One half to three quarters of annual resource inputs to industrial economies is returned to the environment as wastes within just one year. (WRI)

Source: Material extraction data from UNEP (forthcoming in 2016b), GDP data from UNSD (2015)

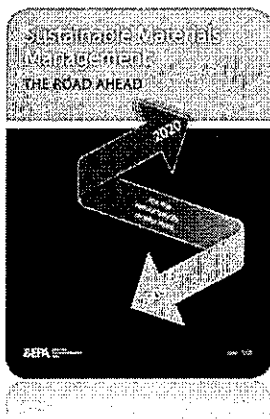
Externalities: What are the Real Costs of Environmental Damage?

- “Costs of pollution, ecosystem depletion and health impacts have grown steadily.”
 - Now exceed \$ 1 trillion/year for US companies - ~equal to 6.2% of GDP.
 - \$3 trillion/year for global companies.
- Access to life cycle information helps us better understand the real costs associated with the products and services we demand.



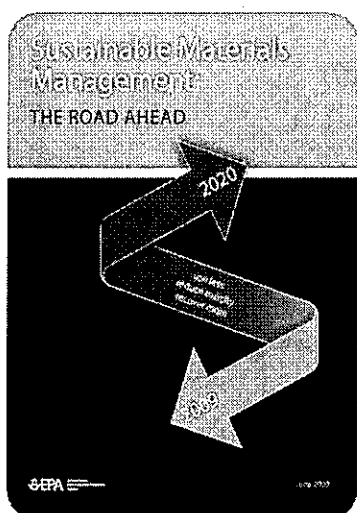
Source: State of Green Business 2015 by Joel Makower and the editors of GreenBiz.com

U.S. EPA Transition to SMM



- In 2002, EPA published “*Beyond RCRA: Waste and Materials Management in the Year 2020*”:
 - Key finding was the need for society to shift focus away from waste management to material management.
- In 2009, EPA published “*Sustainable Materials Management: The Road Ahead*” using life cycle assessment to evaluate material use across the US economy:
 - Laid out the case that we are on an unsustainable trajectory in our use of resources.
 - Argues that we need a systems approach to materials management in order to effectively and efficiently use materials, minimize negative environmental impacts and unintended consequences of actions.

U.S. EPA Transition to SMM (cont.)



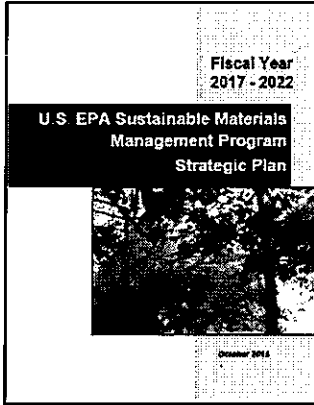
- Recommendations and analysis serve as the foundation for current and future materials management efforts.
- Identified 38 materials, goods and services with potential significant environmental impacts.

Advantages of Life Cycle Thinking

- Life cycle information offers greater "return on investment."
 - Prioritizing and strategic planning.
 - Life cycle information can help target program resources to where they may be most effective (i.e., hotspots with real opportunities) in achieving significant environmental impact reductions.
 - Challenging preconceived ideas about where and how agencies should target their efforts and policy approaches to mitigate environmental issues.
 - Avoiding unintended consequences.
 - Identifying key partners and stakeholders.



U.S. EPA's SMM Strategic Plan



- Built Environment (buildings, roads, bridges, infrastructure)
- Sustainable Management of Food
- Sustainable Packaging
- Sustainable Electronics Management
- Life Cycle Thinking
- Measurement
- International Efforts



Sustainable Management of Food *maximizing opportunities to reduce food loss and waste*

- Food Recovery Challenge
- U.S. 2030 Food Loss and Waste Reduction Goal
- Call to Action
 - Seek Prevention Strategies
 - Increase Public Awareness
 - Improve the Data
 - Forge New Partnerships and Expand the Existing Ones
 - Clarify Date Labels and Food Safety
 - Build Food Loss and Waste Infrastructure
 - Sectors: production, manufacturing, retail/food service, consumers/donation, recovery/recycling and regulators/policy makers



Advancing SMM through Policy Instruments

- Applied Research
 - SMM Prioritization Tool
 - Business Models
- Convening Stakeholders
 - Identifying common goals and developing solutions
 - Spurring collaboration through voluntary partnerships

Advancing SMM through Policy Instruments (cont.)

- Information and Guidance
 - Waste Reduction Model (WARM)
- Voluntary Standards (life cycle-based)
 - Electronic Product Environmental Assessment Tool (EPEAT) standard
- Procurement Practices
 - Draft Guidelines for Product Environmental Performance Standards and Ecolabels for Voluntary Use in Federal Procurement



Sustainable Materials Management in Practice



Uses Hotspot Analysis



Created an Auto Recycling Center to develop recycling info and training



Created Life Cycle-Based Design Handbook

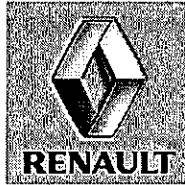


Department for Environment Food & Rural Affairs



Developed Life Cycle Assessment & Management Tools

Shared Resource Efficiency Manager for SME's



Recovering strategic materials through Joint Venture on ELVs



Developed Closed Loop Plastics Recycling Program

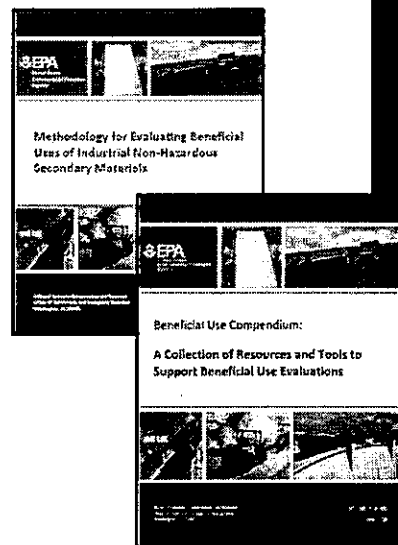
SAVOR...

Works with Stakeholders to Implement Sustainable Food Programs

SMM and the Beneficial Use of Secondary Materials

- Over 500 million tons of non-hazardous industrial secondary materials are generated each year in the United States, which can potentially be beneficially used
- Two key EPA documents:
 - *Methodology for Evaluating the Beneficial Use of Industrial Nonhazardous Secondary Materials*
 - *Beneficial Use Compendium: A Collection of Resources and Tools to Support Beneficial Use Evaluations*

<https://www.epa.gov/smm/methodology-evaluating-beneficial-uses-industrial-non-hazardous-secondary-materials-and>



SMM and the G7 Alliance on Resource Efficiency



"We will work with business and other stakeholders to improve resource efficiency with the aim of also fostering innovation, competitiveness, economic growth and job creation. We encourage all countries to join us in these efforts." – G7 Leaders Declaration, May 2016

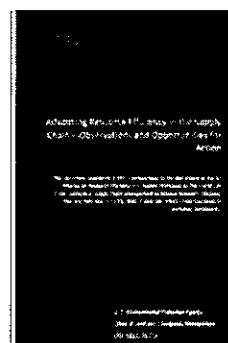
G7 Leaders' Summit June 2015 established the Alliance on Resource Efficiency to:

- Serve as a forum to share knowledge and create information networks on a **voluntary basis**.
- Collaborate with businesses and other relevant stakeholders to advance opportunities offered by resource efficiency, promote best practices and foster innovation.

EPA's Perspectives on the Workshop

Seven Critical Needs to Advance Resource Efficiency Broadly in the Supply Chain and Economy on a voluntary basis.

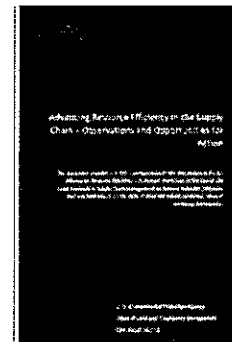
- Collaboration and information exchange for resource efficiency innovation across the life cycle.
- Public and private sector procurement practices that demand resource efficient products and services.
- Mechanisms for sharing resource efficiency information and resources to a range of audiences.



<https://www.epa.gov/smm/advancing-resource-efficiency-supply-chain-observations-and-opportunities-action>

EPA's Perspectives on the Workshop (cont.)

- Resource Efficiency Buy-in Within and Across Organizations.
- Life cycle thinking in design and decision-making to achieve resource efficiency.
- Design with the "next life" of materials in mind – end of use is not the end of life.
- Effective use of applied research and analysis to support innovation.



<https://www.epa.gov/smm/advancing-resource-efficiency-supply-chain-observations-and-opportunities-action>

Next Steps for the U.S. EPA and SMM

- Advance ease of access to data, tools and measurement domestically and internationally.
- Build on momentum around resource efficiency and advancing the use of life cycle thinking in design and decision-making.
- Continue to work with global public and private leaders (e.g., United Nations Environment Programme, World Economic Forum, and G7/G20 countries) to scale-up best practices in the supply chain and institutionalize resource efficiency.



Thank you!

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Monitoring of Mercury Deposition Across Asia

Asia-Pacific Mercury Monitoring Network (APMMN)



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⁴ Department of Environmental Monitoring and Information Management, Taiwan Environmental Protection Administration, chiahui.lin@epa.gov.tw

The basics...



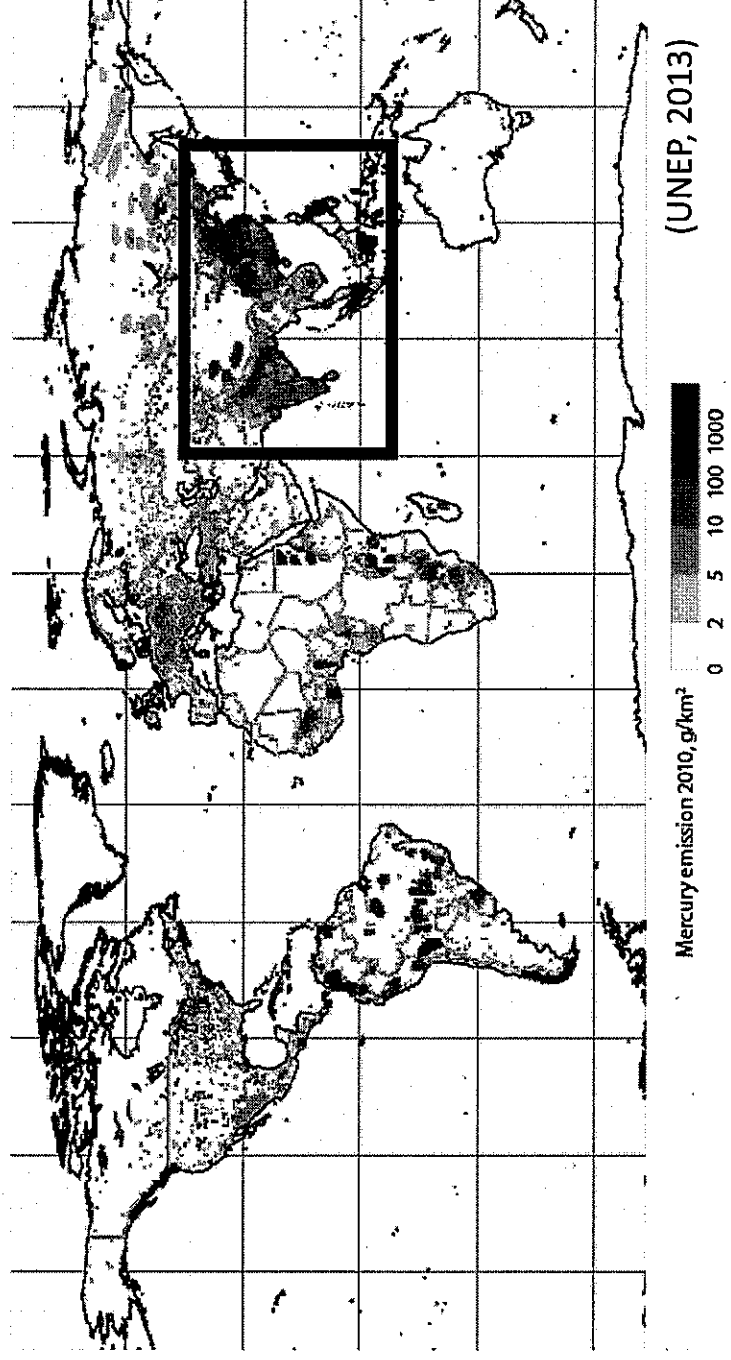
- Interferes with brain and nervous system growth and development
- Impacts cognitive thinking, memory, attention, language, and fine motor and visual spatial skills in children exposed to methylmercury (MeHg) and *in utero*

- Neurological disorders in children

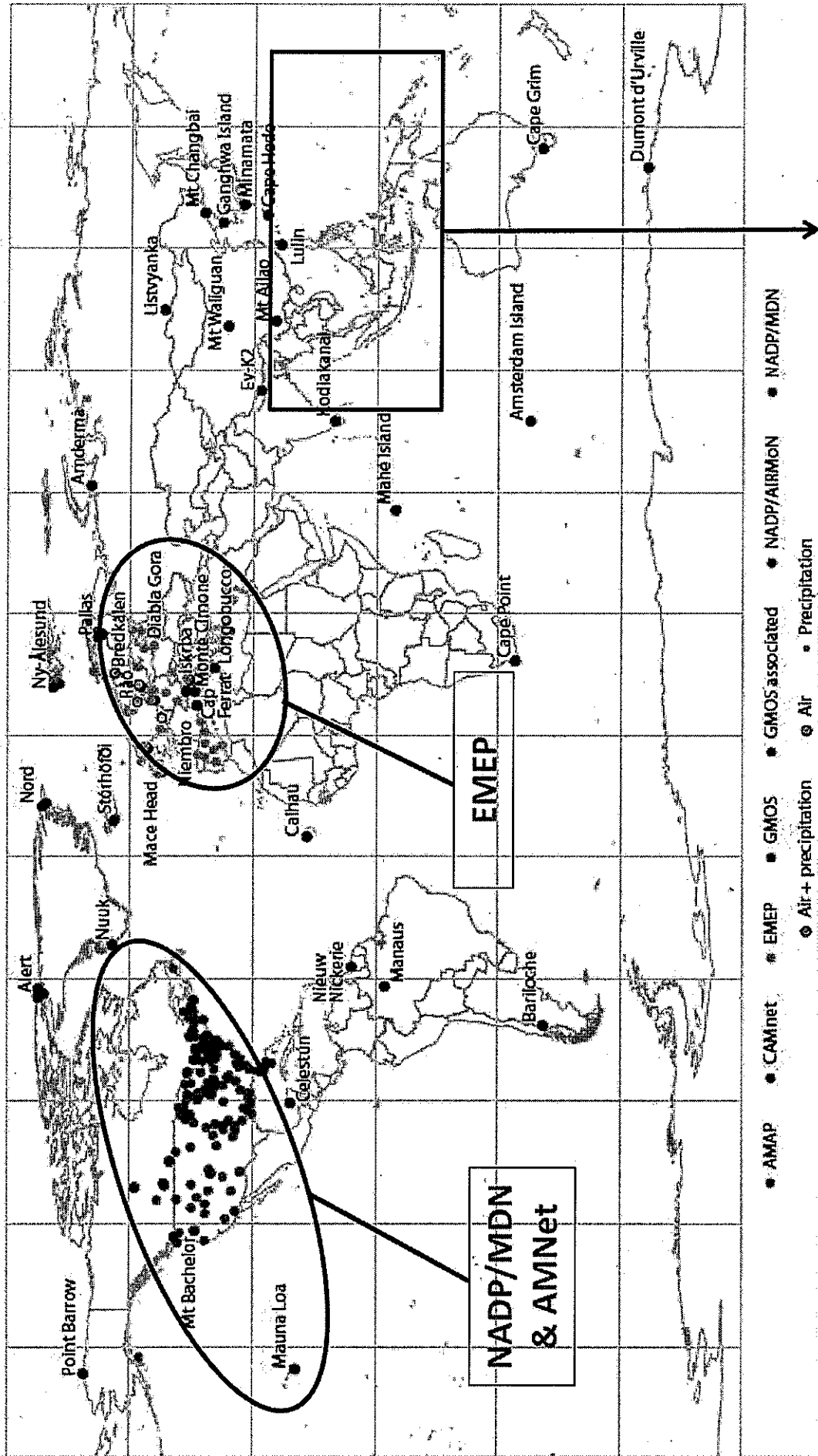
- Emissions are highest in Asia

- Minamata Convention now in force

Anthropogenic Hg Emissions in 2010



Few long-term mercury measurements made in Asia



Currently, there is no long-term wet deposition Hg monitoring activity in SE Asia, outside of China; few measurements in East Asia; limited accessible data; no regional network

APMMN goal and objectives

- **Goal**
 - Systematically monitor wet deposition and atmospheric concentrations of mercury in a network of stations throughout the Asia-Pacific region

- **Objectives**
 - Determine the status and trends in concentrations of ambient mercury species, and wet, dry, and total atmospheric deposition of mercury

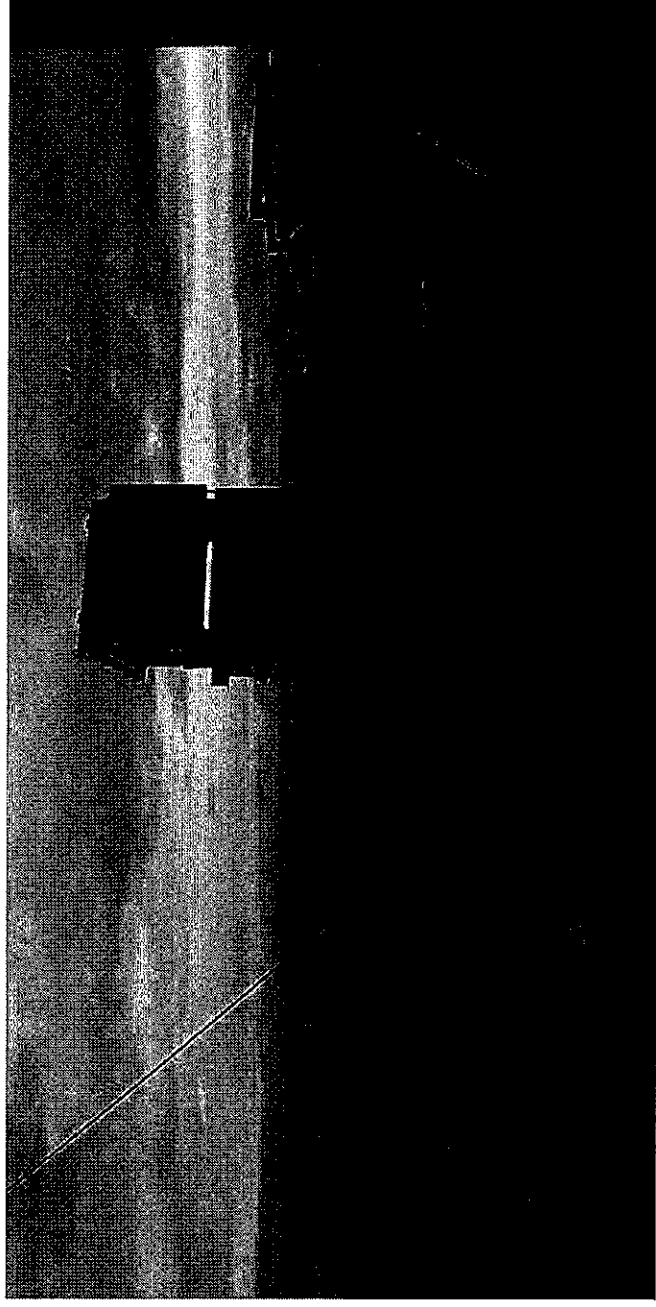
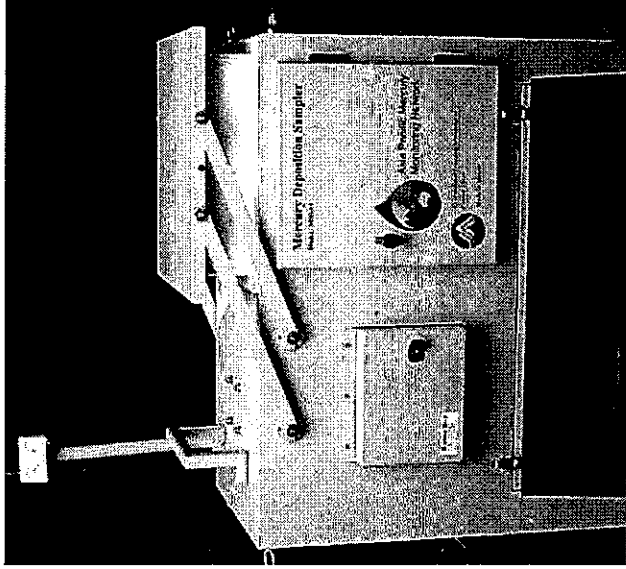
 - Develop a robust dataset for regional and global modeling

 - Assist partner countries in developing monitoring and assessment capacity

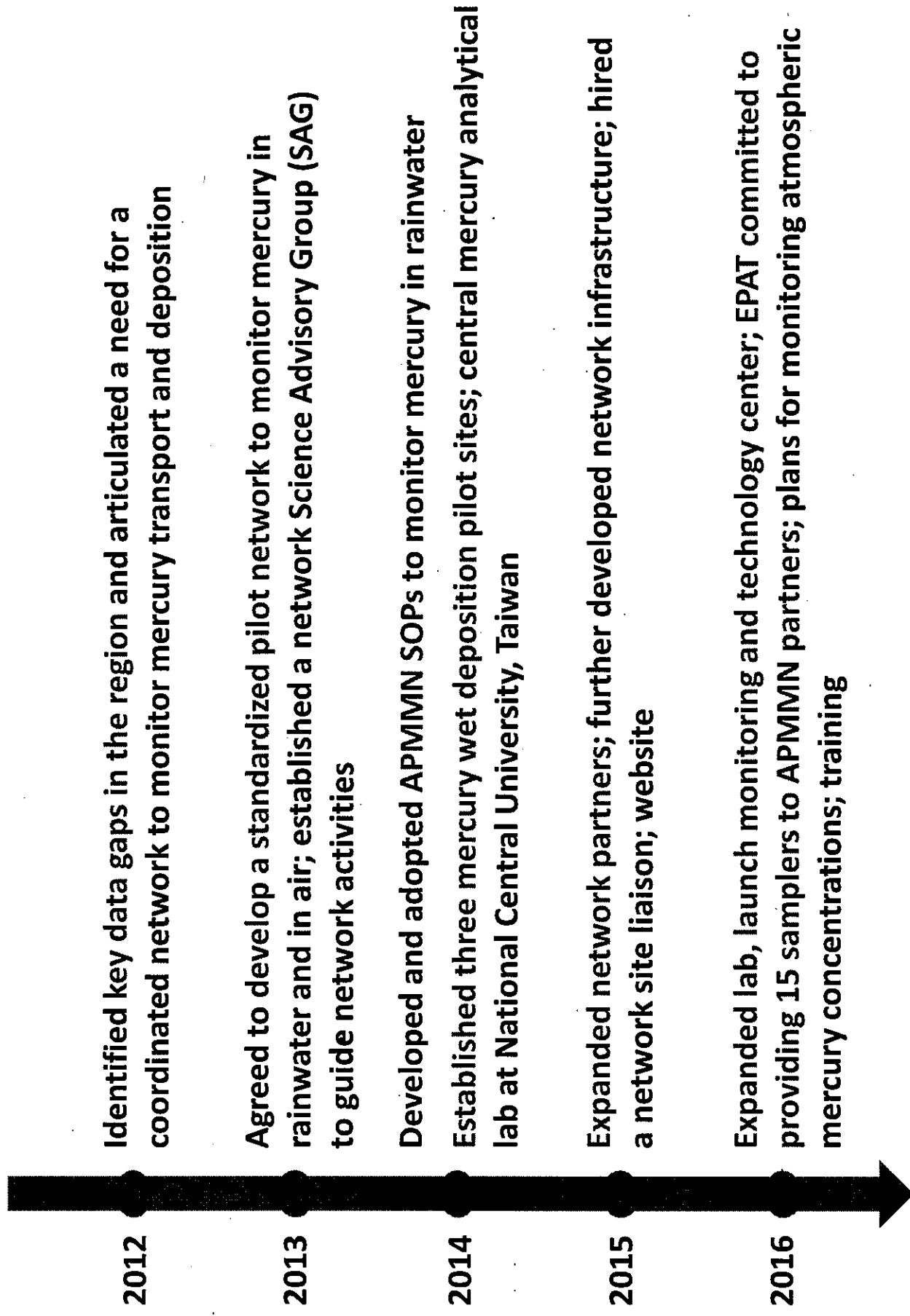
 - Share data and monitoring information

APMMN focus is mercury deposition

- **Mercury in rainwater and in the atmosphere**
 - Deposition is major source of mercury to many water bodies
 - The atmosphere is the first place to identify changes in emissions
- Lots of monitoring experience; many experts regionally/globally
- We have an opportunity to help
 - Improve monitoring coordination
 - Fill data gaps



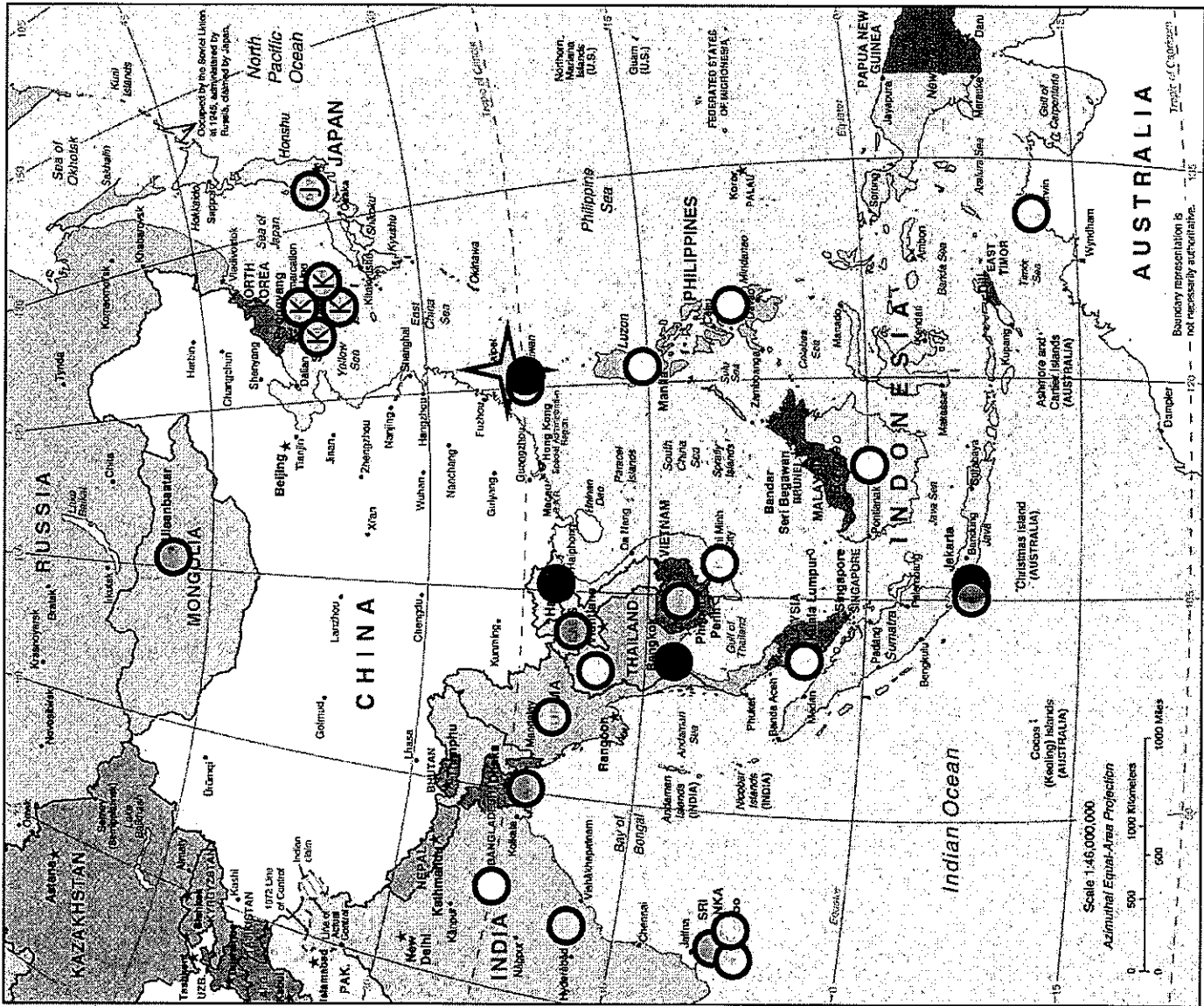
APMMN milestones 2012-2016



Asia Pacific Mercury Monitoring Network

Wet Deposition Sites

- Operating
- ⊗ Affiliated Networks
- Phase I (by 8/17)
- Phase II (by 12/17)
- Phase III (2018)
- ★ Central Laboratory (NCU)
- Initial Interest/Acceptance



What's next?

- 1. Bring in new partners and expand existing wet network**
 - Deploy 14 new mercury wet deposition collectors in three phases
 - 9 collectors before the end of 2017; 5 in 2018
 - Next sites: Vietnam, Philippines by August 2017

- 2. Continue training and network organizational development**
 - Annual Partners Meeting and training, site visits
 - APMMN Special Session at ICMGP

- 3. Network atmospheric mercury monitoring stations**
 - Continue to explore networking atmospheric mercury monitoring systems into a harmonized network in the Asia-Pacific region
 - Scientific paper featuring results of the Continuous Atmospheric Monitoring (Tekran) Workshop held in Japan, November 2016

- 4. Data acquisition, management and distribution**
 - Assist Taiwan in developing a database of measurements; update website where data will be distributed
 - Invite monitoring stations and data streams into APMMN (e.g., Korea, Japan)

Summary

The Asia-Pacific Mercury Monitoring Network (APMMN) is...

- A group of countries, agencies, academics and monitoring groups
- Making measurements of mercury
 - Wet deposition
 - Atmospheric mercury in the future (for dry deposition)
- Using the same instruments and standard operating procedures across Asian countries and consistent with NADP
- Sharing data to solve the mercury problem

