出國報告（出國類別：研討會議）

# 赴越南辦理「合作協定之後續工作研討會議暨推廣環保產業情資蒐集交流工作」

服務機關：行政院環境保護署土壤及地下水污染整治基金管理會

姓名職稱：何建仁 組長

鄭仲庭 助理環境技術師

派赴國家：越南

出國期間：106 年 9 月 18 日至 22 日

報告日期：106 年 11 月 30 日

# 摘要

本署於 105 年 9 月 8 日與越南自然資源暨環境部環境保護總局（以下簡稱越南環境保護總局）完成簽署「臺越土壤及地下水保護技術暨科學合作協定」，為達成雙方實質合作，本署於 106 年 9 月 18 日至 22 日越南河內辦理「合作協定之後續工作研討會議暨推廣環保產業情資蒐集交流工作」。除與越南環境保護總局研商討論後續合作工作外，另配合我國新南向政策，推動環保工程產業輸出，本次同時安排拜訪越南產、官、學三方，蒐集當地資訊，以瞭解並掌握我國環保產業輸出之契機。

與越南環境保護總局之合作協定之後續工作研討會議於 9 月 19 日召開，會議中越南環境保護總局表示，近年來越南經濟快速發展，環境議題已漸漸為當地民眾所重視，因此伴隨工業發展產生之環境污染目前為越南政府當前重要課題，當中包括空氣、水、廢棄物與土壤及地下水，由於土壤及地下水屬環境之末端介質，越南環境保護總局瞭解，若需妥善管理或處理土壤及地下水相關議題，完整之法規命令勢必為首要之務，越南自西元 2014 年起，已逐步針對環境法令進行檢討及修改，我國土壤及地下水法規已發展將近 20 年，越南環境保護總局認為透過雙邊協定之實質合作，能夠學習我國相關經驗，並從我國發展經驗中，快速建立適合越南之法規規範，完善整體土壤及地下水保護工作。

經由會議中雙方討論，完成簽署會議紀錄，後續合作交流工作執行方式及內容在初期以法規體系及整治技術能量為主，中期階段以農藥、除草劑污染調查與整治及砷污染之調查與整治為主，後期階段將重新審閱雙方合作協定執行成果，以及是否再簽署延續下一期之合作協定。

本次行程除與越南環境保護總局召開合作協定之後續工作研討會議外，配合我國新南向政策，為推廣我國環保產業進入越南市場，安排拜訪相關單位，包括駐越南臺北境暨文化辦事處、越南環境保護總局所屬之環境監測中心、河內國家大學所屬自然科學大學、越南科學技術院之環境科技研究所及臺商環保工程公司，藉由實地訪查產、官、學三方，蒐集當地資訊，以瞭解並掌握環保產業輸出之契機。

目前越南正處於經濟發展起步階段，經由本次行程可瞭解該國對於環境保護需求與日俱增，越南環境保護總局表示目前需要制定完善之法規來保護當地環境，因此我國與越南可藉由現階段雙方所簽署之合作協定，依據本次行程會議討論之結論發展後續合作交流工作，我國可分享土壤及地下水污染整治法之體系及架構；另一方面，倘越南後續參考我國法規而建立土壤及地下水保護相關規範，對於我國環保工程產業輸出至越南亦為利多，符合現行推動之新南向政策，預期可順利推展我國環保產業。

# 目錄

# 一、目的

本署於 105 年 9 月 8 日與越南自然資源暨環境部環境保護總局(The Vietnam Environment Administration of the Ministry of Natural Resources and Environment of Vietnam, VEA，以下簡稱越南環境保護總局)已完成簽署為期 4 年之「臺越土壤及地下水保護技術暨科學合作協定」，協定中針對目的、合作方式、合作規範、執行機關及經費等項目均有規範，惟協定架構之規範其範疇較為廣泛，為達實質交流合作，仍應擬定雙方合作細項及內容。

為配合我國新南向政策，掌握新南向目標國家環境產業輸出機會，推廣我國環保產業進入越南市場，須掌握當地市場相關需求資料，爰此，本署規劃於 9 月 18 日至 9 月 22 日赴越南辦理「合作協定之後續工作研討會議暨推廣環保產業情資蒐集交流工作」，除與越南環境保護總局進行合作協定之後續工作研討會議，針對越南當前主要環境問題與需求交流會談外，另安排拜訪越南產、官、學研相關單位，蒐集當地需求與現況情資，建立雙邊聯繫網絡資訊，以瞭解並掌握環保產業輸出之契機，本次行程如表 1-1。

本次拜訪單位包括我國駐河內臺北經濟文化辦事處、越南環境保護總局所屬之環境科學院與環境監測中心、河內國家大學所屬自然科學大學、越南科學技術院之環境科技研究所及臺商環保工程公司，針對各單位之效益評估如表 1-2，綜整摘述如下：

（一） 透過與越南環境保護總局討論雙邊土壤及地下水保護合作協定後續合作工作內容，瞭解越南當前所面臨之環境問題及需求，以及目前越南與其他國家合作交流情形及方式，建立雙邊聯繫及合作窗口，以持續推動實質交流。

（二） 拜訪越南產、官、學三方單位，可瞭解目前該國整體技術發展情形及能量，基於我國目前國際地位及情勢，透過與學術單位之拜訪及討論，尋求較為順暢之交流方式及方向，並藉由雙邊官方合作協定基礎下，找尋我國環保產業

進入越南市場之契機。

**表 1-1　本次行程**

| 日期 | | 工作內容 |
|---|---|---|
| 月 | 日 | |
| 9 | 18 | 至我國駐河內臺北經濟文化辦事處拜訪 |
| 9 | 19 | 與越南自然資源暨環境部環境保護總局及其所屬之環境科學院辦理合作協定之後續工作研討會議 |
| 9 | 20 | 拜訪越南自然資源暨環境部環境保護總局所屬之環境監測中心及河內國家大學所屬自然科學大學 |
| 9 | 21 | 拜訪越南科學技術院之環境科技研究所及臺商環保工程公司 |
| 9 | 22 | 返程 |

**表 1-2　各拜訪單位行前效益評估**

| 拜訪對象 | 預期效益 |
|---|---|
| 我國駐河內臺北經濟文化辦事處 | 與我國代表處人員透過意見交流方式，尋求協助蒐集當地環保領域商機訊息、投資規定與環保法規規範，並建立資訊傳遞窗口，定期傳遞該國環保商機以及各類法規資訊予國內業者運用。 |
| 越南環境保護總局及其所屬之環境科學院 | 為達實質交流合作目的，與越南環境保護總局召開合作協定之後續工作研討會議，討論後續合作之細項內容，瞭解越南當前對於環境保護之需求，並建立雙邊交流聯繫及合作窗口。 |
| 環境監測中心 | 瞭解越南有關環境檢驗領域之現況，包括檢驗方法、儀器種類及經費來源，並同時了解是否有與其他國家合作計畫及其執行方式，進一步尋求雙邊技術合作機會。 |
| 河內國家大學所屬自然科學大學 | 考慮國際情勢及臺灣外交處境，雙邊密切之學術合作亦能增加我國業者輸出機會，亦為提升環保產業海外輸出機會可行方法之一，透過拜訪學術機構瞭解現階段越南國際學術交流之現況，及後續有無機會持續加強雙邊交流。 |
| 越南科學技術院之環境科技研究所 | 瞭解當地環保問題與其需求，及越南科學技術院院與其他國家合作之模式，藉以尋求雙邊技術合作機會。 |
| 臺商環保工程公司 | 藉由實地拜訪在地業者，蒐集目前臺灣產業於越南投資現況及環保產業之需求。 |

# 二、過程

（一）合作協定之後續工作研討會議

本次與越南環境保護總局之研討會議於該局所屬之環境科學研究院(Environment Science Institute, ESI)召開，環境科學院隸屬環境保護總局，主要任務及目標有三大部分：(1) 研擬環境相關策略及政策工具(2)透過科學方法針對環境政策決策提供建議及解決方案(3)針對環境議題提供諮詢及訓練。

本次會議於環境科學院召開（會議照片如圖 2-1 及 2-2），主要出席人員詳如表 2-1 及表 2-2，越南近年來經濟快速發展，越南環境保護總局表示環境議題已漸漸為當地民眾所重視，伴隨產生之環境污染目前為越南政府當前重要課題，包括空氣、水及廢棄物等，當中亦包括土壤及地下水，該局亦瞭解，若需要妥善管理或處理土壤及地下水，完整之法規命令勢必為首要之務，越南自 2014 年起，已逐步針對環境法令進行檢討及修改，由於我國土壤及地下水法規已發展將近 20 年，越南環境保護總局認為透過雙邊協定之實質合作，能夠學習我國相關經驗，並從我國發展經驗中，快速建立適合越南之法規規範，完善整體土壤及地下水保護工作。

其中特別針對土壤議題，越南環境保護總局表示，該國目前稻米產量為全球前 10，出口產量亦為全球前 5，但目前所遭遇之問題為稻米品質不佳及出口價格偏低，遠不及鄰近之另一稻米生產大國－泰國，經研判應是種植環境問題，因此目前越南亟欲發展高品質農產品，期望能夠提高農產品之品質，同時提升價格。農產品之品質與農地管理息息相關，越南環境保護總局亦瞭解土壤及地下水之維護為相當重要之課題，臺灣可提供分享農地管理之經驗，包括調查與改善工作之標準作業程序提供該國作為參考，除能夠有效掌握土地狀況，亦能一併提升農產品品質。

經由會議上熱烈討論及經驗交流分享，雙方於會議後，分別由環境保護總局所屬之環境科學院院長范文利及我方環保署土污基管

會綜合企劃組組長何建仁完成簽署會議紀錄（會議記錄全文如附件1），簽署照片如圖 2-3 後續工作執行方式及內容摘述如下：

（1）越南與臺灣將針對相關法規體系及土壤與地下水污染議題進行合作，越南環境保護總局指定其所屬之環境科學院為執行與協調各項活動之單位，合作主要分為 3 階段，初期以法規體系及整治技術能量為主，中期階段合作項目將以農藥、除草劑污染調查與整治及砷污染之調查與整治為主，詳細內容越南將於本（106）年 10 月 15 日提供，後期階段將重新審閱雙方合作協定執行成果，以及是否再簽署下一期之合作協定。

（2）執行方式為雙方各自成立指導委員會，由環境科學研究院擔任執行窗口，每年輪流由臺灣與越南舉辦會議，搭配土壤及地下水整治技術論壇與場址參訪進行經驗分享與交流工作，並舉辦訓練課程，另針對農藥、除草劑污染調查與整治及砷污染之調查與整治兩項議題執行學術合作計畫。

**表 2-1　合作協定之後續工作研討會議我方主要出席人員**

| 姓名 | 單位 | 職稱 |
|---|---|---|
| 李通藝 | 我國駐河內臺北經濟文化辦事處 | 組長 |
| 何建仁 | 環保署土污基管會 | 組長 |
| 鄭仲庭 | 環保署土污基管會 | 助理環境技術師 |
| 紀凱獻 | 國立陽明大學 | 副教授 |
| 吳俊興 | 國立陽明大學 | 博士生 |
| 王詩清 | 財團法人金屬工業研究發展中心 | 計畫主持人 |
| 趙哲碁 | 財團法人金屬工業研究發展中心 | 計畫經理 |
| 蔡玉珍 | 財團法人金屬工業研究發展中心 | 計畫經理 |

**表 2-2　合作協定之後續工作研討會議越方主要出席人員**

| 姓名 | 單位 | 職稱 |
|---|---|---|
| 阮世同 | 越南環境保護總局 | 副總局長 |
| 阮越勝 | 越南環境保護總局國際合作處 | 副處長 |
| 范文利 | 環境科學院 | 環境科學院院長 |
| 黎清娥 | 環境科學院 | 研究員 |



**圖 2-1　合作協定之後續工作研討會議討論情形**



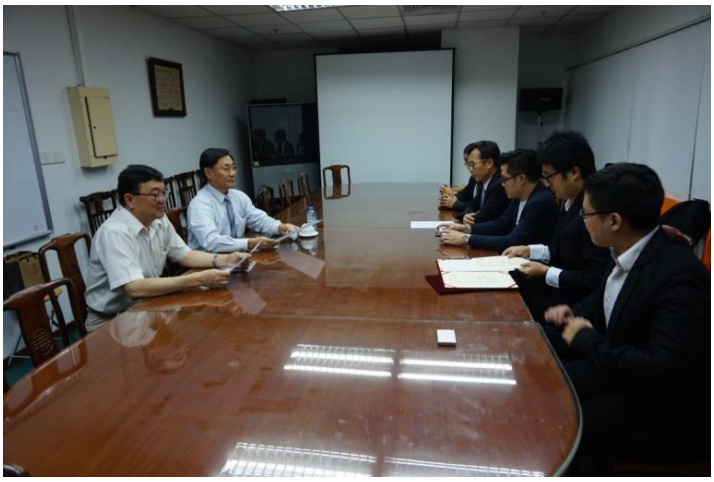


**圖 2-2**　何建仁組長與阮世同副總局長（左上）、范文利院長（右上）及阮越勝副處長（左下）合影與大合照（右下）

**圖 2-3　合作協定之後續工作研討會議紀錄簽署**

（二）我國駐河內臺北經濟文化辦事處

我國於 81 年與越南簽署相互設辦事處協定，並於同年在河內市「駐越南台北經濟文化辦事處」，主要為推動強化我國與越南在各領域之交流與合作，以提升兩國全方位實質關係。本次行程拜訪陳文煙副代表及科技組李通藝組長，越南全國企業約 97%為中小企業，結構與臺灣類似，目前我國科技部與越南有進行學術交流合作，經費來源大致為我國出資 2 萬美金，越南出資 5 萬至 9 萬美金，雙方教授所提出之合作計畫交由各自國家科技部審核，須雙邊均通過審核後，交流合作計畫始得執行，因此雙方目前已具備既有學術交流網絡及機制，藉由此次拜訪，與我國代表處人員透過意見交流方式，尋求協助蒐集當地環保領域商機訊息、投資規定與環保法規規範，並建立資訊傳遞窗口，定期傳遞該國環保商機以及各類法規資訊予國內業者運用。

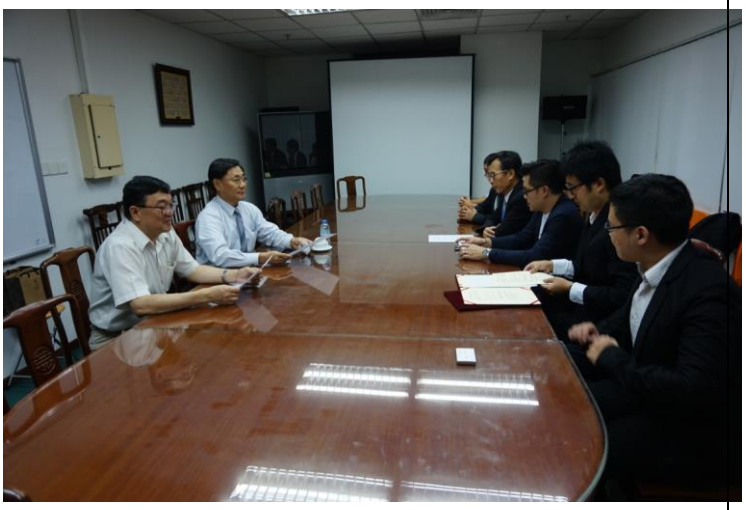


**圖 2-4　與我國駐河內臺北經濟文化辦事處拜會**

（三）越南環境保護總局所屬之環境監測中心

越南環境保護總局所屬之環境監測中心(Centre for Environmental Monitoring, CEM)隸屬越南環境保護總局，為政府官方分析機構，中心部門包括行政事務辦公室、環境監測部門、環境監測設備之校正實驗室、環境實驗室及資料分析與資訊系統部門。

環境監測中心擬訂越南當地環境監測計畫，向越南自然資源暨環境部申請預算執行計畫，計畫內容應包括經費、期程、分析項目、執行地點及所需之檢測設備，越南自然資源暨環境部再向世界銀行提出計畫申請之執行經費，計畫通過審核後，世界銀行資金將會撥予越南自然資源暨環境部，該部將預算再撥予環境監測中心，後續該中心即依計畫內容執行相關環境監測或檢測工作，其中環境實驗

室主要檢測設備來源係源自此計畫申請機制，拜訪會議情形如圖 2-5、實驗室概況如圖 2-6、相關設備如圖 2-7。

環境監測中心非屬研究單位，該中心應親自派員執行現場採樣及檢測分析工作，所得數據經彙整分析後，亦須撰寫報告，此報告即為越南官方認證之報告，經由本次拜訪該中心進行討論後，目前環境監測中心負責台塑公司河靜鋼廠周圍之環境監測作業，定期至當地進行採樣後，再將樣品送至實驗室進行分析。

該中心另有校正部門，負責越南所有檢測設備之校正工作，以確保所有分析結果之正確性及可靠性，相關檢測設備每年須經由該中心之校正部門進行校正作業，通過校正後即核發認證資格，始可進行各項分析作業，以保持數據之公正性。

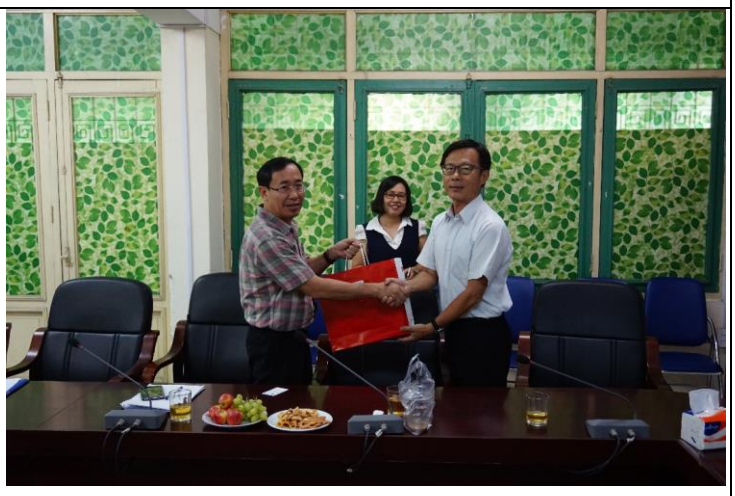


**圖 2-5　拜訪越南環境保護總局所屬之環境監測中心**

**圖 2-6　環境實驗室概況**



**圖 2-7　環境監測中心之檢測設備**

（四）河內國家大學所屬自然科學大學(Vietnam National University Hanoi, VNU)

河內國家大學，為越南僅有 2 所國立聯合大學其中之一，所屬共有 6 個大學，分別為自然科學大學、人文社會科學大學(VNU University of Social Sciences and Humanities)、教育大學(VNU University of Education)、語言暨國際研究大學(VNU University of Language and International Studies)、經濟與商務大學(VNU University of Economics & Business)及工業技術大學(VNU University of Engineering and Technology)。本次拜訪河內國家大學所屬自然科學大學之環境科學研究院，該學院為越南第一個環境領域之學院，針對土壤學、環境觀測、生態環境變遷、水管理及地下水等議題均有研究，該學院亦有眾多國際學術合作經驗（包括日本、澳洲、美國、比利時、瑞典與韓國），該學院副院長提及目前越南環境問題逐漸受到重視，尤以廢棄物為重點項目，目前越南仍以垃圾掩埋為主要處理方式，後續臺越雙方可以研究計畫或技術分享模式進行雙邊交流合作，例如可整廠輸出台灣廢棄物回收處理流程，拜訪情形如圖 2-8。

**圖 2-8　拜訪河內國家大學所屬自然科學大學之環境科學研究院**

（五）越南科學技術院(Vietnam Academy of Science and Technology, VAST)

越南科學技術院為越南學術研究單位，類似我國中央研究院，本次拜訪其所屬之環境科技研究所，該所主要從事環境科技類別之研究，其任務包括環境領域基礎研究、應用研究成果協助環境政策及計畫訂定、協助國家環境管理朝向永續發展、進行環境訓練課程與環境技術研究與發展之國際合作交流；目前該所與越南環境保護總局有進行合作計畫，亦協助環境警察進行環境樣品之採樣分析，並針對工業區及礦區之土壤進行研究，另亦與台塑公司河靜鋼場合作，主要協助為廢水之控制監測與廢水之回收處理，拜訪情形如圖 2-9。

**圖 2-8　拜訪越南科學技術院所屬之環境科技研究所**

（六）越南在地臺商公司

本次拜訪之臺商為環保、建築工程公司，該公司於越南已經營逾 20 年，依據其在越南之經驗，中小企業深根生存有一定困難性，資質認定屬當地中央政府或地方政府權責，需完成認證後取得證照，始能開始經營，現階段多數臺灣環保廠商在越南之合作多半與臺商為主，要能直接進入越南市場除當地政府因素外，亦將受到日本、韓國或其他國家競爭，較佳契機為尋找在地所欠缺之技術，另建議除與越南政府進行合作外，因學術界學者地為在當地備受敬重，且越南政府制定相關政策時亦會徵詢學者意見，因此亦建議應與越南學者保持聯繫，尋求適當之合作機會。

# 三、心得與建議

（一）世界各國於越南發展狀況

累計自西元 1988 年至 2015 年為止，我國在越南投資案共 2,475 件，投資金額達 306 億 9,304 萬美元，排名第 4 位，占 11.00%；韓國居第 1 位，投資金額為 449 億 59 萬美元，占 16.09%；日本投資金額為 384 億 1,086 萬美元，居第 2 位，占 13.77%；新加坡投資金額達 347 億 1,633 萬美元，居第 3 位，占 12.44%;英屬維京群島投資金額達 192 億 1,591 萬美元,居第 5 位,占 6.89%,1988 年至 2015 年越南受各國投資金額統計如圖 3-1。

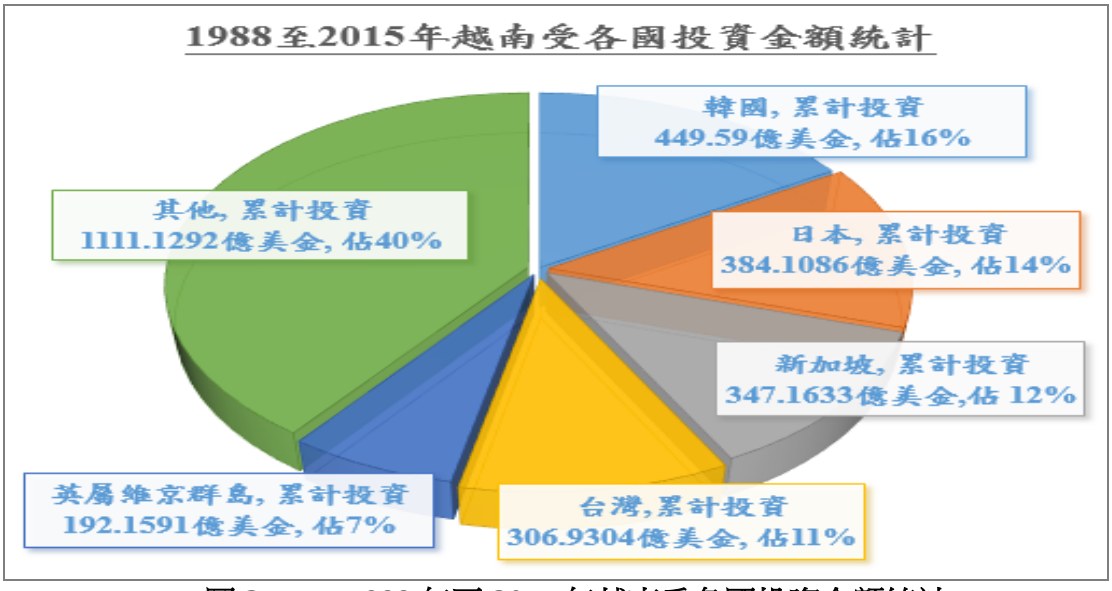



**圖 3-1　　1988 年至 2015 年越南受各國投資金額統計**

2015 年越南核准外商投資案共 2,013 件，金額為 155 億 7,761 萬美元，其中我國投資計 110 件（占 5.46%），居外資第 5 位，投資金額為 9 億 4,040 萬美元（占 6.04%），亦居外資第 7 位。

同期，其主要投資國之投資情形：韓國居首，投資金額高達 26 億 7,852 萬美元；馬來西亞居第 2 位，投資金額高達 24 億 4,749 萬美元；薩摩亞群島排名第 3，金額為 13 億 1,404 萬美元；日本排名第 4，金額為 12 億 8,498 萬美元；英國排名第 5，金額為 12 億 8,498 萬美元；新加坡排名第 6，金額為 10 億 3,501 萬美元，2015 年各國於越南投資金額如圖 3-2。

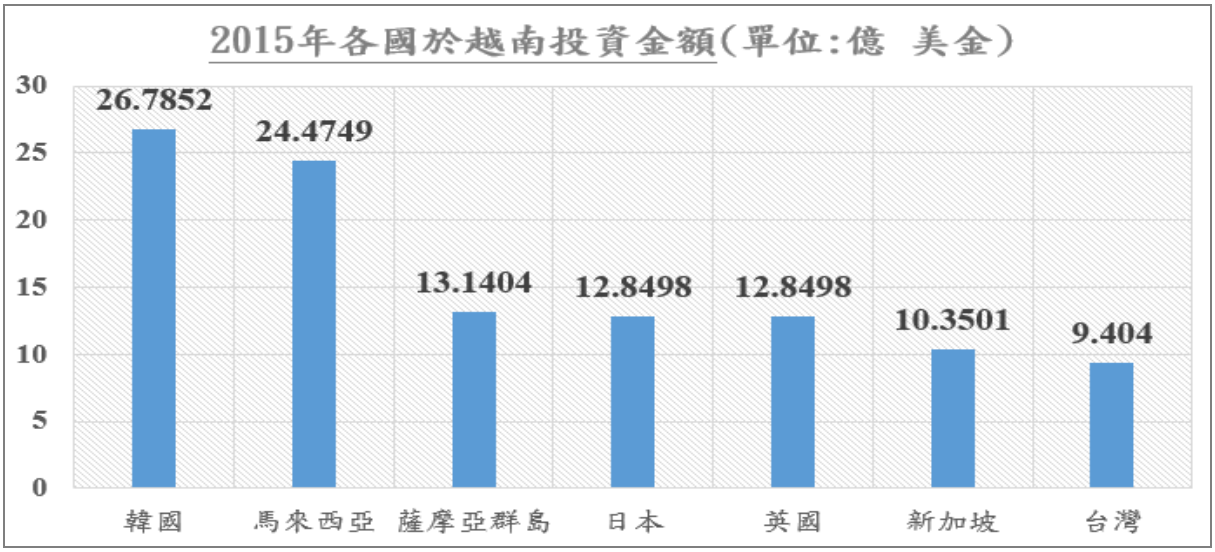



**圖 3-2　　2015 年各國於越南投資金額**

目前日本及韓國的作法，都是利用政府開發協助(Official Development Assistance, ODA)模式，替國內業者尋求商機及去除障礙、改善環境，並善用援外機制拓展開發中國家市場。日本自 2000 年至 2014 年 ODA 的總支出約達 1500-1600 億美元間，平均每年約達 100 億美元規模；韓國 ODA 援助規模自 2011 年至 2017 年間總計約達 140 億美元，平均每年約為 20 億美元。

（二）我國環保產業輸出建議

1.我國土壤及地下水法規已發展將近 20 年，目前越南正處於經濟發展起步階段，對於環境保護需求與日俱增，越南環境保護總局表示目前需要制定完善之法規來保護當地環境，因此我國與越南可藉由現階段雙方所簽署之合作協定，依據本次行程會議討論之結論發展後續合作交流工作，我國可分享土壤及地下水污染整治法之體系及架構，包含各項子法，越南可參照我國法規發展歷史，快速完備該國之法規架構，減少經濟發展過程中遭遇之陣痛期；另一方面，倘越南在合作協定之架構下，參考我國法規而建立土壤及地下水保護相關法規，對於我國環保工程產業輸出至越南亦為一項利多，相關廠商在臺灣耕耘已久，對於我國法規架構已相當熟悉，若越南法規體系能夠仿效我國建立，各廠商將保有一定競爭優勢，亦符合現行推動之新南向政策，順利推展我國環保產業。

2.鑒於土壤污染環境問題具多樣性及複雜性，僅限定單一領域合作無法實際解決整體環境問題，建議可依據雙方目前合作協定之基礎，於合作過程中瞭解越南目前對於其他環境保護發展之需求，以多邊合作及示範案例合作之方式，研擬擴大雙方合作之範疇，以拓展跨領域環保合作，建立雙方長期合作基石，並進一步提升國際環保外交成效。

3.為鼓勵研究機構及學術研究單位進行土壤及地下水相關研究，本署自 99 年起推動「土壤及地下水污染整治基金」補助補助研究及模場試驗專案工作，為活絡我國與越南之學術交流，後續建議可於徵求土水相關研究或模場專案時，設定雙邊具發展性之題目，並要求申請之研究機構或學術單位團隊應包括越南研究或學術單位，以實際達成雙邊合作交流，後續執行方式可參考目前我國與越南科技部之學術交流執行方式。

4.越南環境監測中心其分析設備及技術足以參加國家型計畫，惟越南環境採樣或送樣標準作業程序並無嚴謹規範，因此提升整體程序之完整性有其必要，此外對於採樣地點之選擇亦為該中心經驗不足之項目，臺灣目前針對整體採樣、送樣及分析均有相當嚴謹之規範，且對於採樣點之規劃、擇定、分析亦有相關經驗，後續可以此範疇作為相互交流項目，並建議與我國環檢所納入，協助相關品保品管技術交流；亦可進一步協助越南環境保護總局撰寫計畫申請世界銀行補助，活絡雙邊合作，進而帶動我國環保產業進軍越南市場機會，紓解長久以來業者因資金短缺而限制海外市場輸出困境。

5.現階段許多越南學生選擇至臺灣留學，取得碩士或博士學位後返回越南公家體系或研究機構將所學貢獻予越南，為持續與越南長期之學術交流，我國大專院校可以提供全額或部分獎學金之方式吸引優秀學生來臺，同時可考量降低學生簽證費用；後續可進一步運用學術單位資源，與各大學院校東南亞中心合作以學分授予課程模式，廣納越南中階官員來臺參加相關環境議題課程研習，行銷並展現我國環保法規與管理制度、環境檢驗技術、調查、監測與整治完善技術能力，達成環保外

交效果；另一方面，可透過教育部協助提供越南留學生名單，以掌握留學生回國動態，進而建立商情可能聯繫管道，以利掌握未來潛在合作機會。

6.目前越南對於土壤及地下水相關之需求包括農藥污染及地下水砷、氨氮之問題，此需求亦為臺越雙方合作協定之中期合作項目，我國對於農地及地下水管理制度亦已趨於成熟，建議後續可依相關議題，設計相關訓練交流課程，並辦理學術論壇，邀請越南官員及學者一同參與，培育受訓人員成為種子教官，回國後可將我國經驗及技術廣為分享，以建立雙方長期合作基石，並進一步提升國際環保外交成效。

7.建議可透過與外貿協會或外商合作模式，運用越南當地駐點，聯合成立海外服務中心，聘任當地專員進行問題需求與商情蒐集，包括當地政府採購案、亞銀或世界銀行標案、中日韓外資合作案，並進一步建立產官學研關係網絡，提供我國環保工程產業輸出越南市場評估與諮詢管道，以提升我國業者南進意願與成功機會；另建議以網路平台方式，規劃建置環保工程海外市場輸出商情網，整合所蒐集之情資，並結合外交及經貿單位相關資訊，定期發布海外商情訊息，使國內有意願輸出之業者能夠在短時間內獲得完整之資訊。

# 附件一

# 臺越土水合作協定之後續工作研討會議紀錄

# Minutes of Meeting

# Implementation of Agreement of Technical and Scientific Cooperation in Soil and Groundwater Protection between the Taipei Economic and Cultural Office in Viet Nam and the Viet Nam Economic and Cultural Office in Taipei

September 19, 2017

1. Vietnam Environment Administration of The Ministry of Natural Resources and Environment of Vietnam and The Soil and Groundwater Remediation Fund Management Board of the Environmental Protection Administration of Taiwan will cooperate with each other on the relevant legal systems and issues of soil and groundwater pollution remediation. This is divided into three stages: early stage, middle stage and following stage. In the early stage, it will be focused on the legal systems and technology capabilities of "Soil and Groundwater Pollution Remediation". In the middle stage, the two major collaborative projects will be "Detection, Investigation and Remediation of Pesticide/herbicide persistence (including: Dioxin pollution)" and "Detection, Investigation and Remediation of Arsenic Pollution".

2. Early Stage
   (1) The Advisory Committee of Soil and Groundwater Pollution Remediation will be discussed and agreed by both sides. Vietnam Environment Administration assigns the Environmental Science Institute who is implementation focal point of activities. In the early stage, the meetings of the Advisory Committee will be held every year alternatively in Taiwan and Viet Nam.
   (2) The contents of early stage will focus on: (a) review, study of environmental legal systems of each other, to support developing legal documents (if necessary); (b) A list of collaborative content will be sent to The Soil and Groundwater Remediation Fund Management Board by Vietnam Environment Administration for discussion and consideration before 15 October 2017.
   (3) The forum on soil and groundwater pollution remediation technologies and the visiting tours will be held every year alternatively in Taiwan and Viet Nam (including the experience exchange of industrial technologies, the visiting tours to soil and groundwater pollution sites and the business fair). These activities will be supported by The Soil and Groundwater Remediation Fund Management Board.
   (4) The Advisory Committee of Soil and Groundwater Pollution Remediation will discuss the two collaborative projects in the next stage, "Detection, Investigation and Remediation of Pesticide/herbicide persistence (including: Dioxin pollution)" and "Detection, Investigation and Remediation of Arsenic Pollution", as well as academic collaborative projects between The Soil and

Groundwater Remediation Fund Management Board and Vietnam Environment Administration.

3. Middle Stage

(1) The advisory meetings will be held annually (the frequency is subject to change according to the actual situations).

(2) In the Advisory Committee meeting, the details of the collaborative projects - "Detection, Investigation and Remediation of Pesticide/herbicide persistence (including: Dioxin pollution)" and "Detection, Investigation and Remediation of Arsenic Pollution will be discussed (including academic collaborative projects and learning exchange programs).

(3) The training courses on "Detection, Investigation and Remediation of Pesticide/herbicide persistence (including: Dioxin pollution)" and "Detection, Investigation and Remediation of Arsenic Pollution" will be held.

(4) The next four-year Taiwan-Viet Nam Agreement on Cooperation and the renewal on current agreement will be discussed.

4. In the following stage, the Agreement of Technical and Scientific Cooperation in Soil and Groundwater Protection between the Taipei Economic and Cultural Office in Viet Nam and the Viet Nam Economic and Cultural Office in Taipei will be extended and renewed. The details of the collaborative projects will also be revised.

**For the Comprehensive Planning Section**

**The Soil and Groundwater Remediation Fund Management Board**

Ching Jen Ho

**Dr. Ching Jen Ho**
Representative

**For the Environment Science Institute**

**Viet Nam Environment Administration**

**Prof. Pham Van Loi**
Representative

MTR

# 附件二

# 越南環境保護總局所屬之環境科學研究院簡介

MÔI TRƯỜNG VIỆT NAM

# Vietnam Environment Administration

# ENVIRONMENTAL SCIENCE INSTITUTE

# Missions and objectives

The Environmental Science Institute (ESI) is a research institution under Vietnam Environment Administration. ESI's objectives include:

1. Study environmental strategies and policy instruments;

2. Provide scientific and practical advice and solutions for environmental policymaking through scientific research, and

3. Provide consultation and training on the environment.


# Tasks and rights

1. Develop and propose strategies, programs, schemes, plans, solutions for environmental protection and sustainable development in Vietnam;

2. Develop, study and implement national programs, projects, plans on environmental science; review and approve research programs and projects on environmental science;

3. Study scientific basis and practice to serve policymaking and improvement of legislation, system of organizational management on environmental protection in Vietnam;

4. Study policy mechanisms, economic instruments in environmental management; evaluation methods of goods, environmental services and biodiversity; determine the economic damage caused by environmental pollution, environmental degradation and climate change;

5. Study, evaluate and forecast inter-relations between socioeconomic development and the environment, environmental issues and international economic integration, and global and national environmental concerns;

6. Study, evaluate, forecast, warn pollution, degradation, load capacity and the level of vulnerability of environmental components by areas; propose solutions to prevent and overcome pollution and environmental incidents;

7. Study, identify, warn environmental factors are at high risk for human health; propose solutions to prevent and minimize the impact of environmental pollution on public health; determine liability to pay for environmental damage caused by pollution and degradation;


8. Study and propose models of sustainable development, conservation measures, environmental restoration and sustainable utilization of natural resources in exploitation, production and consumption;

9. Study and develop monitoring indicators, assess sustainable development on environment, climate change adaptation under industrial parks, urban areas, crafts villages, rural, mountain and other areas as prescribed;

10. Study and apply scientific advances and technologies in environmental protection; develop and implement of experimental models and technology transfer for production and sustainable consumption, cleaner production and renewable energy;

11. Provide consultation and services related to science and environmental technology;

12. Develop the database of environmental science; coordinate the implementation of management, statistics and information storage;

13. Conduct and cooperate with domestic and foreign research and training institutions to conduct education and training on environmental science, and

14. Implement international cooperation projects on the environment.

## Organizational structure

1. Division of Science and Environmental Technology

2. Division of Environmental Economics

3. Division of Environmental Management and Sustainable Development

4. Division of Information Training and Consultancy

5. Division of Administration

# ENVIRONMENTAL SCIENCE INSTITUTE

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**Director of ESI: Assoc.Prof.Dr. Pham Van Loi**

- PhD in Law from Lomonosov Moscow State University, Russia
- Over 25 years experience in research, teaching and consultation on institution, law, regulation, environmental policy and sustainable development, state management.

Email: loipv2004@yahoo.com

**Deputy Director of ESI: MSc. Bui Hoai Nam**

- PhD candidate in Public Health at National Institute of Hygiene and Epidemiology. Master in Health Environment and Environmental Management from University of Science, Vietnam National University, Hanoi
- Over 15 years experience in research, guidance and teaching in the field of environmental management policy, pollution control, environmental health and public health

Email: nambh76@yahoo.com.vn

# 附件三

# 越南環境保護總局所屬之環境監測中心簡介


CEM

## MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT
## VIETNAM ENVIRONMENT ADMINISTRATION

# CENTRE FOR ENVIRONMENTAL MONITORING


http://www.quantracmoitruong.gov.vn

Add: 556 Nguyen Van Cu, Long Bien, Hanoi
Tel: 84.4.35771816 - Fax: 84.4.35771855

## FUNCTIONS AND MANDATES

Centre for Environmental Monitoring (CEM) is a subsidiary body under the Vietnam Environment Administration (VEA) which was established pursuant to the Decision No. 132/2008/QĐ-TTg of Prime Minister regulating the functions, mandates, responsibilities and organization of VEA. CEM is responsible to assist VEA in organizing and implementing the national environmental monitoring, to develop and manage environmental data, to apply information technology in environmental monitoring, to prepare reports on environmental quality within the VEA's functions and mandates; to be a focal point in drafting and submitting the legal documents relating to environmental monitoring, calibration of environmental monitoring equipment and environmental reporting; to be a coordinator of national environmental monitoring network.

## SUBSIDIARY DIVISIONS

- **Administration Office**
- **Division of Environmental Monitoring**
- **Calibration Laboratory for Environmental Monitoring Instrument**
- **Environmental Laboratory (including the Dioxin Laboratory)**
- **Division of Database and Information System**

## DIRECTOR

**Mr. Nguyen Van Thuy**

## VICE DIRECTOR

**Mrs. Le Hoang Anh, Mrs. Nguyen Thi Nguyet Anh**

## HEAD OFFICE

**No. 556 Nguyen Van Cu Street, Long Bien District, Hanoi - Vietnam**
**Tel: 84.04.3577 1816/ 3872 6845**
**Fax: 84.04.3577 1855/ 3872 6847**
**Http://www.quantracmoitruong.gov.vn - Email: webmaster@cem.gov.vn**

# MAIN ACTIVITIES

## ENVIRONMENTAL MONITORING

- To be a focal point in directing and providing guidance of environmental monitoring activities nationwide;
- Develop and conduct the national environmental monitoring programs of river basins, key economic regions, trans-boundary environment;
- Provide guidance and examine the local agencies, enterprises, industrial zones on conducting environmental monitoring programs, complying to the technical regulations, quality assurance and quality control (QA/QC); applying regulatory economic - technical norms and unit price in environmental monitoring;
- Maintain and improve the quality management system for environmental monitoring activities, testing at fields in accordance with ISO/IEC 17025:2005. The Division of Environmental Monitoring was recognized to conform with the requirements of ISO/IEC 17025:2005 for monitoring and testing 16 parameters of air and water at field (VILAS 596);


- Operate the automatic and continuous monitoring stations of water and air;
- Appraise the qualifications of the agencies providing the environmental monitoring services;
- Research and develop technologies, methods of environmental monitoring;
- Provide the testing, consultancy and training services and technology transfer, etc. in the field of environmental monitoring.

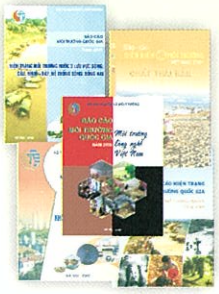
## ENVIRONMENTAL EXPERIMENT AND ANALYSIS

- Act as the national environmental reference laboratory. Providing guidelines and conducting the investigations on complying with the procedures, technical guidelines, QA/QC and regulatory norms on environmental analysis;
- The Environmental Laboratory is equipped with advanced equipment providing accurate analysis results. The laboratory officers are well trained and required to take periodic skills evaluation to ensure the high accuracy results for analyzing samples of water, soil and sediment, biota, etc. The quality management system was affirmed to conform the requirements of ISO/IEC 17025:2005, to be granted VILAS 430;
- Conduct annually environmental inter-laboratory tests in accordance with the technical procedures of ISO/IEC 17043:2010. To participate in assessing and recognizing the agencies qualifying for providing environmental analysis;
- Provide services of analysis, assessment, consultancy for develop quality management system; environmental technology; laboratory equipment, etc.;
- Participate in international cooperation of technology, sciences and training activities.

## ENVIRONMENTAL MONITORING EQUIPMENT CALIBRATION

- Implement, provide guidance and supervise the compliance to the regulations on testing and calibrating the environmental monitoring equipment; the certification procedures for the qualified equipment, environmental monitoring devices.
- Calibration Laboratory for Environmental Monitoring Instrument is equipped with advanced equipments with high accuracy to calibrate the automatic air monitoring stations (for the parameters of $SO_2$, CO, NO-$NO_2$-NOx, $O_3$, THC, BTEX, etc.), the automatic water monitoring stations (for the parameters of pH, DO, EC, TDS, ORP, etc.) and the semi-automatic equipments such as portable meter for air, portable meter for water, multi-parameter water meter.
- The modern equipped mobile car specializing for equipment calibration is ready to serve at place upon request, providing the best service of calibration, time ensuring and cost effective.
- Calibration Laboratory for Environmental Monitoring Instrument applies the quality management system in accordance with the requirements of ISO/IEC 17025:2005 and was granted VILAS 575 on the field of measurement-calibration for 10 accredited calibrations. Annually, the Laboratory continues to maintain and expand the VILAS accredited measurand/calibrated equipment.

## DATA ANALYZING, PROCESSING AND ENVIRONMENTAL REPORTING



- Act as the national coordinator in consistently managing environmental monitoring data and implementing environmental surveys. To take main responsibility in developing, managing and exploiting databases as well as information systems on environmental monitoring;
- Develop, manage and exploit environmental information systems, Geographic Information System (GIS), and environmental databases. To take main responsibility for developing and providing technical guidelines on collecting, managing and exploiting national environmental indicators and statistics;
- Prepare and provide guidelines on preparing national/ministerial/sectoral/local State of the Environment Reports; thematic reports on various environmental issues.

## INFORMATION TECHNOLOGY DEVELOPMENT AND APPLICATION

- Act as the coordinator of the National Environmental Monitoring network as regards data and information and be responsible for establishing IT infrastructure for the network;
- Develop databases and software for management and exploitation of environmental monitoring data;
- Apply remote sensing technology, telecommunication and information technology in environmental monitoring. Establish and develop Tele-monitoring system and software to be applied in environmental monitoring.


## INTERNATIONAL COOPERATION

To be the implementing agencies of the following projects:

- Disclosure of environmental information to the public (funded by World Bank): 2001- 2002;
- Environmental Information and Reporting (funded by the Danish International Development Agency): 2004- 2006;
- Project Registration of contaminated sites in Vietnam (Germany);
- Clean Air for Smaller Cities in Asean Region.

## DIOXIN LABORATORY


- Project for Establishment of Dioxin Laboratory funded by The Bill and Melinda Gates and Atlantic Philanthropies Foundations;
- The project's objective is to improve the capacity in analyzing polychlorinated dioxins and furans as well as other persistent organic pollutants (POPs) in Vietnam.

## SERVICES, CONSULTANCY AND TRAINING SUPPLIER

- Supply consultancy and training services on environmental monitoring, environmental analysis, calibration of equipment; implement and apply IT in environmental monitoring and process environmental monitoring data;
- Provide services on environmental monitoring, calibration of environmental monitoring equipment, environmental analysis, establishment of environmental information systems, GIS, environmental databases, preparation of environmental reports.

## MAIN OUTPUTS

- Successfully conduced projects on disclosure of environmental information to the public; environmental information and reporting (EIR);
- CD-ROMs "Green Environment" were prepared annually from 2000 to 2008. They provide plentiful information on numerous environmental issues serving for environmental protection management; CD-ROM on Vietnam Red Book (on species of plant and animal); CD-ROM ATLAS on environment of 8 key economic regions of Vietnam; Map of Vietnam's natural conservation areas;
- Developed and operate the Environmental Monitoring Portal, portals of Cau, Nhue Day and Dong Nai river basins;
- Established database on Management of environmental monitoring data, Environmental legal documents, Vietnam Red Book; and developed software on Chemical substances, Vietnam's environmental standards, Environmental statistical indicators;
- Contributions to prepare legal documents, technical guidelines on environmental monitoring and environmental reports;
- Installation and operation of two (2) electronic boards in Hanoi and Ho Chi Minh city aiming at providing environmental information to the public;
- Strengthening the capacity of automatic water and air quality monitoring, eg. installation and operation of automatic water and air monitoring stations at Hanoi, Khanh Hoa, Hue, Phu Tho, Bac Ninh, Binh Duong, Da Nang, Quang Ninh, Thai Nguyen, etc.


## HISTORY MILLESTONES

### 1996 - 2002: Division of Database and Computer network National Environmental Protection Agency (NEA) Ministry of Science, Technology and Environment

- Established on October, 1996;
- From 1997, it built and managed NEA's website specializing on Vietnam's environmental issues. It designed, built and maintained the operation of NEA's Local Access Network (LAN); implemented the project aiming at strengthening the capacity of NEA regarding to IT; established environmental databases, information and reporting system, email system; applied GIS in the field of environment; and implemented the project of strengthening capacity on applying information technology for NEA.

### 2003 - 2006: Office of the Data and Information (ODI) Vietnam Environmental Protection Agency (VEPA) Ministry of Natural Resources and Environment

- Managed IT infrastructure, LAN, website of VEPA; continued to build up environmental databases; to collect and disseminate environmental information to the public;
- Prepared Vietnam Environmental Monitor VEM 2003, 2004, 2005 on Water, Solid Wastes, and Biodiversity, respectively, a project coordinated by World Bank;
- Acted as the national coordinator in managing, monitoring data and other environmental data.

### 2006 - 2008: Centre for Environmental Monitoring, Data and Information (CEMDI) - Vietnam Environment Protection Agency Ministry of Natural Resources and

- Acted as the national coordinator in collecting, storing and consistently managing environmental monitoring data and environmental investigations. Prepared documents and guidelines for implementing procedures, regulations on environmental monitoring, regulations and technical guidelines on how to collect and assess environmental information and data;
- Conducted a number of environmental monitoring programs;
- Prepared Annual State of the Environment Report and other thematic reports on environment.

### From December, 2008: Centre for Environmental Monitoring (CEM), Vietnam Environment Administration Ministry of Natural Resources and Environment.

# 附件四

# 越南科學技術院簡介








VIETNAM ACADEMY OF SCIENCE AND TECHNOLOGY

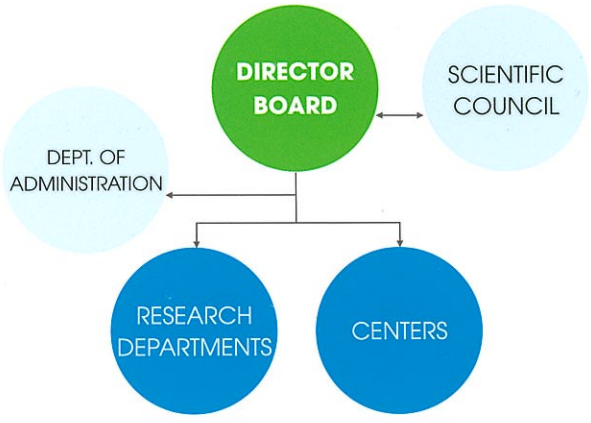
# INSTITUTE OF ENVIRONMENTAL TECHNOLOGY

# FUNCTIONS AND TASKS

Institute of Environmental Technology which belongs to Vietnam Academny of Science and Technology, was established by the Government. The institute is a leading scientific and technological organization in the field of environmental technology research.

The institute serves the following fucntions: to perform fundamental research in the environmental field; to apply research results to support the formation of environmental policies, strategies, and plans; to support state management of the environment toward sustainable development; to provide high-quality and professional training in the environmental field; and to organize and perform cooperative international activities in the field of environmental technology research and development.

# ORGANIZATION STRUCTURE




Dept. of Environmental Planning;
Dept. of Environmental Enhancement Solutions;
Dept. of Environmental Friendly Technology;
Dept. of Physico-chemical Environmental Technology
Dept. of Environmental Hydrobiology;
Dept. of Environmental Microbiology;
Dept. of Water Treatment Technology;
Dept. of Solid Waste and Air Pollution Treatment Technology;
Dept. of Environmental Quality Analysis; *
Dept. of Environmental Toxic Analysis; *
Center of Environmental Technology in Ho Chi Minh city; *
Center for Research and Application of Technology on Environment; *
Center of Environmental Technology in Da Nang city;
Vietnam - Russia Center for Scientifical and Technological Cooperation.

IET has achieved Standard on Quality Management System TCVN ISO 9001:2008;

VILAS achieved laboratories are marked "*"

# SCIENTIFIC AND TECHNOLOGICAL RESEARCH

## ENVIRONMENTALLY FRIENDLY TECHNOLOGY

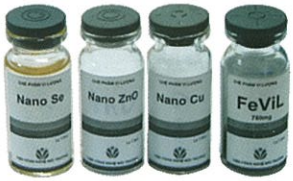
Learn to design and manufacture water treatment facilities, systems, and equipment to produce disinfection solutions and other products for practical applications;

Study waste reuse technologies;

Learn to manufacture and use nano materials in living and production activities.

Air treatment experiment box

Equipment for manufacturing super-oxidized solution




Trace nano products

## TECHNOLOGY FOR ENVIRONMENTAL TREATMENT

Learn the scientific background and develop advanced technologies for:

- Treatment of chemicals, microorganisms and odors in the air using photo-catalysis, activated electrochemical solutions, adsorption and new catalytic materials;
- Treatment of drinking water and wastewater using ozonation, Fenton reactions, SBR, MBR, improved biofilters and AAO combinations;
- Treatment of medical solid waste and hazardous wastes using burning and carbonization methods;
- Treatment of husbandry waste using microorganisms.

Returned activated sludge Module

Experimental Pilot System

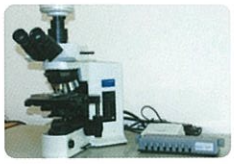
## ENVIRONMENTAL BIO-TECHNOLOGY

Study the structure and function of microalgae and microorganism biomes in ecosystems;

Learn to produce microorganism products for environmental pollution treatment;

Study and develop wastewater, solid waste and exhaust gas treatment biotechnologies.

Box for micro-organism development



Olympus BX 51 Microscope

## ENVIRONMENTAL ANALYSIS

Perform fundamental studies to develop environmental, botanical and mineral analytical methods;

Learn methods to analyze the environmental toxicity, assess environmental impacts and risks to assess humans and ecosystems;

Learn to upgrade and manufacture environmental analysis equipment.

ICP-MS

GC/MS

## ENVIRONMENTAL PLANNING

Learn to assess and forecast environmental quality;

Develop technological solutions to prevent and reduce the impacts of waste and to improve environmental conditions;

Learn to establish environmental strategies, plans and integrated river basin and coastal management to support sustainable development.

Experimental Pilot Sysem

Distribution of $BOD_5$ in river network

# APPLICATION ACTIVITIES

Perform environmental quality monitoring and analysis;

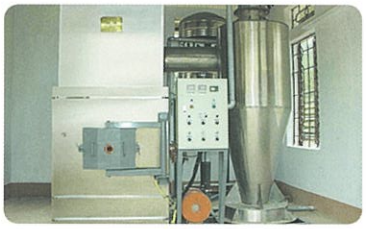
Consult on Environmental Impact Assessment (EIA) and Environmental Strategic Assessment (ESA);

Consult on the compilation of Economic – Technological Reports; the design of environmental monitoring and pollution treatmer systems;

Construct and perform technology transfer for environmental monitoring and treatment facilities;

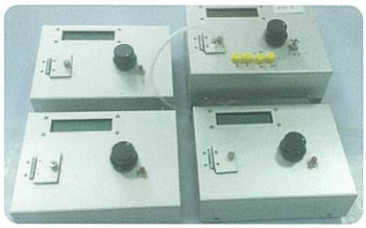
Produce and provide materials, tools and facilities for environmental protection and cleaner production.


**Hoa Sen washing and disinfection table**



**Medical solid waste incinerator VHI-18B (Pantent and trademark awarded product)**

**Wastewater treatment plant in Hanoi Milk JointJoint Stock Company**



**Instrument for quick measurement of COD**


**Sagi Bio - Microbial, product that quickly process organic waste to compost**

**Air purification equipment KK500**

**Equipment for Natri hypoclorit production (Trademark provided product)**


**Nano-Silver mask for disease protection and prevention**

# INTERNATIONAL COOPERATION

Perform international cooperation with counterparts from various countries (Japan, Korea, Russia, Canada, France, Germany, Belarus, Ucraina, China...) on scientific and technological research, application and training.

# TRAINING ACTIVITIES

Provide PhD. training on Environmental Engineering;

Cooperate with universities (Hanoi University of Science, Hanoi University of Technology, Phuong Dong University...) and research institutions to provide under-graduate and post-graduate trainings;

Organize and co-organize domestic and international courses for fundamental and advanced short-term trainings.



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