



## 廢棄物處理與資源化技術

采利環工股份有限公司

Resource and Energy Systems, Inc.  
Research Group Environmental Services, Inc.

# 廢棄物處理與資源再生

## WASTE TREATMENT/INCINERATION AND RECYCLING SYSTEMS

RESI ..... MESCO'S EXCLUSIVE LICENSEE IN TAIWAN

采利環工股份有限公司(RESI)為日本三井金屬株式會社之焚化技術專屬技術轉移與授權公司，同時也是多家國際著名工程公司的技術合作廠商。

采利環工的專業工程師曾負責主持國家級的廢棄物焚化處理技術研究發展計畫，並榮獲三項專利權及九項著作權。采利環工的專業工程師在日本三井金屬株式會社的卓越科技支援下，將時時秉持著積極的研發與全方位精神，達成提供產業界『完美與創新』的服務目標。

### 一般/有害廢棄物焚化

采利環工公司焚化工程專家曾以專業化的設計技術，主導焚化技術發展並實際應用於產業界，以實績證明可將醫院廢棄物及有害廢棄物徹底破壞。

采利環工所完成之醫院廢棄物焚化爐，證實燃燒效率可達99.99%。采利環工於所完成之產業廢棄物焚化爐可處理固體、污泥及液體廢棄物，已證實有害廢棄物之破壞去除效率高達99.999 ~ 99.9999%。

采利環工並引進美國 ENSCO Equipment & Systems Company的機動式旋轉窯焚化爐，已證實有害廢棄物之破壞去除效率高達99.99999%。

### 資源回收再利用

采利環工股份有限公司(RESI)秉持著保護環境的執著，以專業化的精神與技術，不斷的開發資源回收技術，技術成果除了具體展現為傲人的工程實績外，更進一步技術輸出海外。資源回收技術之利用不僅為產業界節省大筆廢棄物處理費用，也減少產品原料之消耗。因此，高可行性評估、技術搜尋、投資報酬率分析、到資源回收技術的開發、整廠工程服務，一直是采利環工技術開發專家們努力的方向。

### 廢有機溶劑

有機溶劑為製造業的基本原料，如電子業、汽車塗裝業、製漆業、機械製造業、化工業、合成皮製造業、化學及石化工業等均需使用大量有機溶劑，同時也會產生許多有機廢溶劑。采利環工公司協助昇利化工股份有限公司開發建設台灣地區規模最大、設備最完整的甲級有害廢溶劑處理廠，提供全台灣製造業廢溶劑處理服務，以精餾技術達成廢溶劑全面回收之目標。



(李總統登輝與本公司負責人參觀焚化爐合影)

### 聚多元醇廢汙泥

生產聚多元醇(PU)之上游原料時產生的廢汙泥，仍含大量之聚多元醇，通常以焚化處理之。采利環工公司以專業化工技術開發完成聚多元醇回收資源化專利技術，可將廢汙泥百分之百資源化，回收達到產品品質之聚多元醇，其餘殘渣尚可完全製成高價值之副成品。本項技術並世界性授權ARCO化學品公司使用。

### 輪胎熱解碳黑

橡膠輪胎一直是環保頭痛的問題，透過熱解法，可將廢輪胎完全資源化，生產製成燃料油、燃料氣及碳黑。采利環工自行研發二次加工技術，可以利用最經濟的技術，將熱解產生的重油分離成一定品質之油品，並將碳黑製成經濟價值高數倍之活性炭。

### 焚化灰渣

焚化處理各式廢棄物，為我國政府既定之政策。然而，伴隨焚化而來之大量灰渣也需有適當處理。采利環工的專家們，與美國專業科技公司合作，引進高溫熔融技術，可將焚化灰渣再利用。除使廢棄物焚化處理達十全十美，也創造了更高的附加價值。





## 硬體設備

采利環工公司除了對焚化及資源回收設施的核心技術具有最深入的心得與經驗，我們更提供全廠的整合技術：

- 廢棄物接收管理與前處理
- 能源與資源回收再利用
- 廢氣及廢水處理
- 灰渣處理

「化腐朽為神奇.....」是采利環工的哲學，我們的資深研究人員，對各類產業製程均相當嫻熟。強烈的使命感與專業的技術，使我們更加戮力研究。選擇采利環工公司的支援，您將可得到一群專家的協助，為您解決各種環保疑難雜症。



## 軟體服務

采利環工公司認為環保工業是以解決問題、降低成本、創造附加價值為主的服務工業。針對每一項計畫，我們不僅提供由觀念衍生、設置許可、環境影響評估、整廠建設到操作服務的全方位服務；我們更提供包括財務規劃、人員訓練等軟體服務。



## 最專業的工程服務

針對一般/有害廢棄物之焚化處理，采利環工公司擁有控氣熱解多燃燒室型焚化爐、流體化床焚化爐及旋轉窯高溫焚化爐之模擬、設計與整廠建造技術。我們可以針對客戶的需求，提供各種專業的服務：

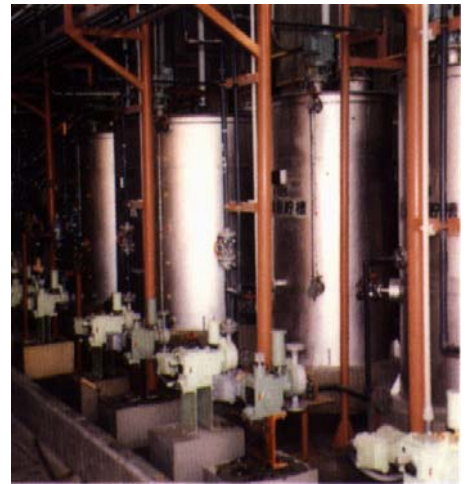
- 顧問諮詢服務、工程計畫管理
- 廢棄物處理整合規劃設計
- 資源回收與焚化爐整合規劃設計
- 投資財務及經濟分析與規劃
- 設備設計與供應、統包工程服務
- 代理操作與營運
- 試車/試燒
- 設置許可與操作許可申請





### Resources Recovery from Polyol Sludge

A resources recovery process for Polyol sludge has been developed and patented by RESI. The patented technology has been tested in a demonstration plant located in ARCO Chemicals' Lin-Yuen plant, Taiwan. Chemical grade Polyol and other valuable products are produced by this unique process. The process is capable to recover polyol from waste sludge completely. The process know-how and patent has been licensed to ARCO Chemicals for their process modification internationally.



RESEARCH GROUP Environmental Services, Inc. (RESI) is the exclusive licensee of MESCO (Mitsui Engineering and Smelting Company) for incineration technology. RESI's spirit of waste handling is **Recycling, Reuse and Regeneration whenever possible**. Through RESI's engineering efforts and innovation, industries have proved the high profitability of resources recovery.

### Incineration

RESI's senior managers were leading the incineration technology development projects, granted by MOEA of ROC Government, for several years before they joined RESI. Three patents, nine design software and more than hundred technical articles have been completed and published by them when they were working in the Industrial Technology Research Institute (ITRI).

RESI has completed several important waste treatment applications in Taiwan. RESI has demonstrated incineration technology for medical waste treatment with combustion efficiency higher than 99.99%, and completed several hazardous waste incineration plants, which were demonstrated to have a DRE higher than 99.999%.

RESI cooperated with Ensco Equipment & System Company to import transportable rotary kiln incinerator into Taiwan. The system 2000 has demonstrated to have a DRE higher than 99.9999%

### Waste Solvents Recovery

Solvent is one of major industrial raw material. It is useful in industry but is harmful to the environment in most cases. Every day, large quantity of waste solvent was disposed without proper treatment in Taiwan before RESI completed the solvent recovery plant, invested by a private company, Shenly Chemicals. With the RESI's proven technology, engineering design and innovative R&D efforts, the waste solvent plant with a capacity of handling 50% of waste solvent generated in Taiwan has been completed and permitted in 1995. From then on, eighty to hundred tons of waste solvents are recovered completely everyday. The plant is operating by RESI's brother company, Shenly Chemical Industries Co. Ltd. successfully.



### Byproducts from Waste Tire Pyrolysis

Huge amount of waste tires is generated by automobile everyday. Pyrolysis is one of the successful technologies for waste tire treatment. RESI developed an innovative process to further convert Carbon Black, from pyrolysis, to activated carbon, which has much higher market price than its original.



### **Resources Regeneration of Residue from Incineration**

Tons and tons of incineration residues are being produced each year. Utilization of pyrolysis is capable of generating Carbon Black from waste tire. An integrated technology has been developed by RESI to manage the residue problem.

### **Other Wastes**

RESI's philosophy is "To turn waste into gold...". Our specialists have devoted themselves to the innovative technology development of waste recovery. With RESI's support, you can access a team of experts who solve a wide range of environmental problems-simple or complex, from start to successful finish.

### **HARDWARE**

The combustion, incineration and resources recovery systems supplied by RESI constitute the core of turnkey plants or components for waste recycling, treatment and disposal. In addition, our product range covers plant units fulfilling the following requirements:

- Waste management and pretreatment
- Energy and resources recovery and reuse
- Flue gas cleaning and pollution control
- waste water treatment
- Ash disposal
- Disposal of residues

### **SOFTWARE**

RESI provides the total engineering services to our client from concept to completion. We also offer services that are required after completion of the plant, such as permitting, personnel training and operational management.

### **PROFESSIONAL SERVICES**

RESI offers professional services for individual components, for partial systems and for turnkey plant. Our services for the thermal treatment of waste include:

- Consulting & Project management
- Disposal scheme
- Engineering
- Equipment design, supply
- Turnkey Service
- Operation and training
- Trial Burn & Permitting



# 化學廢棄物收集系統

## RESI ChemWaste System

### 全自動安全可靠的化學廢棄物處理系統

RESI 是台灣最有經驗的廢溶劑資源再生工廠設計建造專家。RESI 為了協助電子工業解決廢棄化學品及廢溶劑處理問題，特別精心設計一套全自動化的模組化廢棄化學品暫存、泵送、貯存及處理系統 **ChemWaste System**。

**ChemWaste** 系統提供電子工業 Process Tools 一個安全、有效且經濟的廢棄物清理方案。此系統是由 MPS(模組化泵送系統)、連接管線、貯存槽及全自動圖控電腦控制系統所組成。

MPS 通常安裝於 Process Tools 下方，作為廢溶劑之暫存設施，以便將廢溶劑泵送至集中貯存區，降低廠區廢溶劑處理之風險。

**ChemWaste** 系統適用於各種製程廢化學品之處理，且可因應各廠特性作元件之選用。所有元組件均設計成符合 NFPA 及 FM 防爆級要求。安全是工業的基本要求，RESI 與客戶一樣關切。

**ChemWaste** 系統已經使用於台灣積體電路製造股份有限公司、昇利化工股份有限公司、嘉義縣大林鎮廢棄物焚化廠等廢溶劑應用場所，並證實性能優異。

### Safe, Reliable, and Fully Automatic Waste Handling System

**RESI ChemWaste** System is a modularized chemical waste holding, transportation, storage and handling system. **ChemWaste** System provides safe, efficient, effective and economical waste removal from process tools. The system consists of Mini-Pump Stations (MPS), inter-connecting pipes, storage tanks and computer control system. The MPS are typically located beneath process tools and act as intermediate holding and pumping stations to move chemical waste over long distances to a centralized waste solvent storage tank farm.

**ChemWaste** Systems are designed to meet a variety of process chemical waste removal needs and plant constraints. All components have been designed to be compliant with NFPA codes and Factory Mutual (FM) explosion-proof approval. Safety and reliability are of our top priority concern.

### System Components

- Mini-Pump Station (MPS2000, MPS2100)
- Inter-connecting Piping & Fittings
- Storage Tanks
- Computer Control System
- Safety Interlock and VOC Monitors

**ChemWaste** System is a proven technology. It has provided continuous services in Taiwan Semiconductor Manufacturing Co. Ltd. (tsmc), Shenly Chemical Industries Co. Ltd. and Da-Lin Incineration plant successfully.

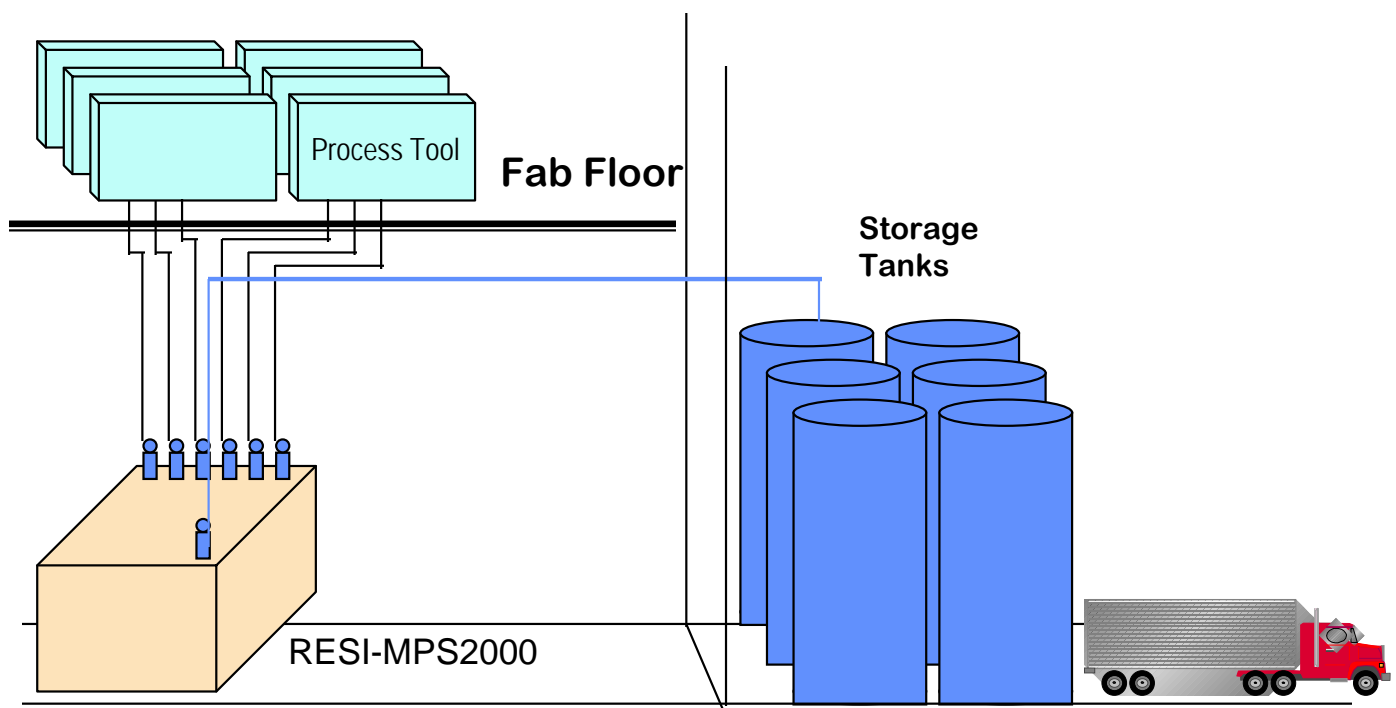
### MPS - Efficient and Effective Mini-Pump station

- Strainer Module - Removing process debris
- Pump Module - Air driven diaphragm pump
- Air Drive Module - Air supply/control system
- VOC Monitor - Spill and leakage detection
- Nitrogen Blanketing System
- Capacity 2, 3, 5, 10, 20, 50 gallons

### System Specifications:

- Constructed of chemically resistant material
- All stainless steel structure and Teflon packing
- Displays chemical storage and removal graphically
- Automatic spill and leakage detection
- Design codes: ASME, ANSI, CNS, FM, NFPA, UFC, JIS, CFR, OSHA
- Overfill alarm and interlock
- Audible and visual alarms
- Central computer control
- On-line event reporting
- Windows compatible man-machine interface

System Performance Reliability  
Minimum time between failure 7,000 hrs

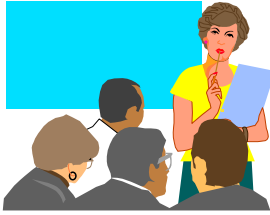


# 廢棄物清除處理諮詢服務

## Collection, Transportation, and Treatment Services Industrial, Hazardous & Infectious Wastes

### 諮詢/輔導

RESI 的清除處理專家隨時提供各事業單位，有關廢棄物分類收集、貯存、包裝、處理、環保相關工程及人員訓練之諮詢與輔導，同時積極協助各事業單位擬定事業廢棄物管理計畫，並進一步協助輔導各事業單位人員落實計畫之執行。



### CONSULTATION

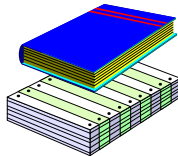
RESI experts help assess client's regulatory compliance requirements, waste segregation efficiency, packaging, treatment and training needs. RESI assist in the analysis of on-site risk exposure, as well as preparation of a management plan for industrial / medical waste in compliance with ROC regulations. RESI then conduct in-service training with client's staff, to enable them to implement the plan.

### 包裝/儲存

各事業單位於廢棄物產生點作分類收集時，RESI 可協助規劃提供符合環保署規定之儲存容器，以利收集事業廢棄物。所收集之廢棄物經密封後貯存，以利定期清運至焚化廠集中處理。貯存容器應依環保署規定，黏貼環保署認可之事業廢棄物標籤。

### PACKAGING

RESI supplies specially designed Industrial / Medical Waste Packaging Systems for in-situ waste packaging. These include special container, sharp container, reusable plastic barrels and fiber boxes. All of them are labeled with industrial waste, hazardous waste, or infectious waste label.



### 遞送聯單

RESI 協助依照環保署規定，建立遞送聯單制度，以確保廢棄物之清除處理能在嚴格的品管下進行。聯單上詳細記載運送及處理單位、日期、廢棄物型式和數量。清運人員於接運廢棄物時，將主動簽發遞送聯單，並由各事業單位收執一聯，該聯單可追蹤證明該單位之廢棄物提供最終處理完善服務。

### MANIFEST

RESI assist our client to establish manifest system in compliance with EPA regulations. The manifest generates invoice data and provides evidence of compliance. This provides documentary proof that transporter have handled waste responsibly from pick-up through final disposal.

### 收集/運送

RESI 協助客戶建立符合環保法規之車輛運送廢棄物，清潔衛生無公害。RESI 協助訓練清運人員，每天或定期準時赴各事業單位，收集以貯存容器裝妥之廢棄物，並將廢棄物運送至集中處理廠，以確保該廢棄物之適當處理。



### COLLECTION AND TRANSPORTATION

RESI assist our client to establish TSDF system which offers outstanding flexibility in waste pick-up, daily, weekly or monthly. All wastes are collected and transported to the treatment facility via EPA certified refrigeration vehicles.

### 焚化處理

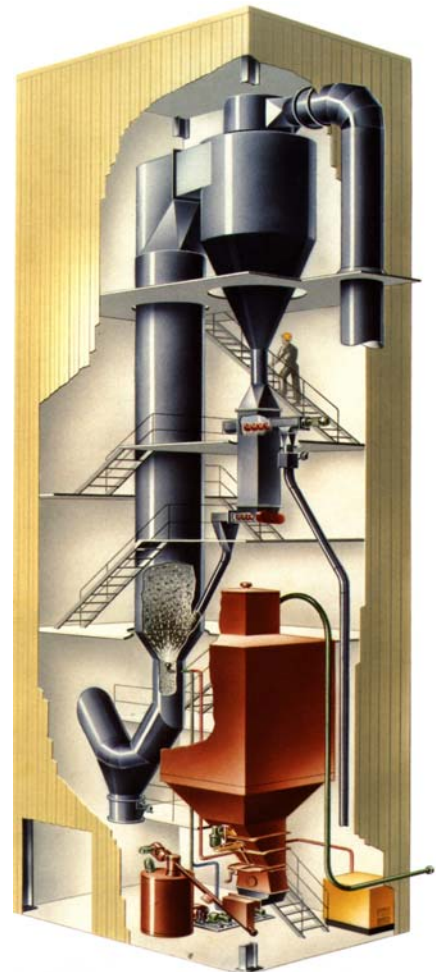
RESI 是國內少數具有焚化技術且自有焚化處理廠之工程公司，RESI 將收集之廢棄物直接利用焚化爐在高溫下有效處理，經焚化後之灰燼由專業公司清運至依規定設置之設施掩埋。RESI 所興建之焚化爐已經試燒證實能在高溫下有效處理事業廢棄物，並取得環保主管機關核發之操作許可，其各項性能均遠優於環保單位之要求。

### TREATMENT

RESI is the licensee of MESCO incineration technology. High temperature incinerator are used in the plant. The plant renders the waste non-hazardous, and / or non-infectious through high temperature incineration. After treatment. The plant dispose of the residual ash in an EPA approved disposal facility. A trial burn has been conducted. Treatment efficiencies were better than EPA requirements.

### 燃燒室效能：(Tao-Yuen, 1996)

項目	法規	實際值
PCC Temp (°C)	-	> 823
SCC Temp (°C)	> 1000	> 1021
Residence Time (s)	> 2	> 2.15
Combustion Eff. (%)	> 99.9	> 99.99
DRE (%)	> 99.999	> 99.99999



### 空氣污染防治效能：(Trial Burn, 1996)

項目	法規	實際值
O <sub>2</sub> (%)	-	9.53
CO (ppm)	220	4.3
CO <sub>2</sub> (%)	-	8.57
HCl (ppm)	60	5.43
NO <sub>x</sub> (ppm)	180	41
SO <sub>x</sub> (ppm)	180	8.67
Particulate (mg/Nm <sup>3</sup> )	180	17
Pb (mg/Nm <sup>3</sup> )	3	ND
Cd (mg/Nm <sup>3</sup> )	0.5	0.0306
Hg (mg/Nm <sup>3</sup> )	0.5	ND

# 采利環工股份有限公司

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