



捐贈再利用 愛心又環保

Computer Donation for Reusing is Kindness and Environmental Protection.

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一、前言

自1946年誕生第一台電腦，隨著科技進步、資訊發達，高運算速度、高容量電腦不斷研發上市，電腦低價化後，平均使用年限僅4至6年。堪用電腦除可回收、修整、再利用外，不堪用電腦報廢後，將何去何從？如何再循環，兼顧環保，尚須社會大眾正視與面對，期減緩地球暖化、資源耗損。一般報廢電腦內所含的金屬元素（鉛、鉻、鎘、汞等）及有毒化學物質（CFCs、PCBs、PVC等），不能被大自然分解。若不慎進入土壤污染水源，將危害人類、動植物和微生物，所成之生態危害、污染持久且深遠。據美國加州環保報告指出，當地每戶平均2至3台廢棄電腦存放衣

I. Introduction

Since the birth of the first computer in 1946, high operation speed and high-volume computers have continuously been developed on the market along with the advances in technology and the development of information. After the low unit price of computers put on market, the average computer life span is only 4 to 6 years. Usable computers can be recyclable, repairable and reusable, but how about unusable computers? How to recycle computers as well as taking environmental protection into account still requires the community to pay great attention and to face up to the issue of slowing down global warming and halting (minimizing) resource depletion. Metal elements (such as lead, chromium, cadmium, mercury, etc.) used in the manufacture and toxic chemicals (CFCs, PCBs, PVC,

櫃或車庫，電子垃圾再利用率僅約5%到15%。報廢、扔棄電腦成嚴重問題。如何使有毒物質易回收、再使用？如何降低電腦商品汰換的環境威脅？這些問題值得被重視。國內除環保署的回收體系外，合格的代清除處理業者亦有助資源的再利用。

二、具體作為

環境破壞、全球暖化、溫室效應影響所及，氣候變遷造成天然災害，持續威脅生命、財產。電腦廢棄物多含有害物質，若不妥善處理，易對環境和人體產生危害。否則，即便美如仙境的山水美景，歷經連日豪雨，河水暴漲，沖毀作物，土石崩落、道路斷裂。美麗景色，也會化為烏有，陷入夢魘。這樣的負面循環效應，是我們需要引以為戒的。因此，我們可採行「資源回收」、「修整重組」及「捐贈弱勢」等具體作為，強化環保防護措施。

（一）資源回收

報廢電腦若僅以簡單填埋和焚燒處理，會對生態造成危害，直接傷害人體。此乃因新電腦生產需上千種化學原料，一半具破壞、毒害物質。將廢棄電腦設備回收、再利用，即是響應環保，減少資訊廢棄物，降低環境污染。為環境盡份心力，維持、創造生生不息的美麗地球，落實資源回收、再利用，善盡公民責任。

etc.) in scrap computers cannot decompose naturally. If these poisons and harmful materials are accidentally adsorbed by soil and pollute water, this will harm humans, animals, plants, and microorganisms, resulting in ecological hazards. According to the California Environmental Protection report, an average 2 to 3 computers are discarded in a storage closet or garage and the reuse rate of e-waste is only about 5% to 15%. Such abandoned discarded computers have become a serious problem. How can we make the toxic materials become recyclable and then reuse them? How do we reduce environmental threats caused by replacing computer products? These issues should be taken seriously. In addition to EPA's national take-back system, the qualified disposal carried out by the waste treatment industry will help ensure the correct re-use of resources.

II. Concrete actions

Due to the effect of environmental destruction, global warming and greenhouse gases, the consequences of climate changes cause natural disasters to occur and furthermore continually threaten life and property. Furthermore, PC multi-waste contains hazardous substances and if they are not properly handled, they will seriously harm the environment and the human body. Otherwise, even if the scenery is as beautiful as a fairyland, after days of heavy rain, river floods, destroyed crops, earth and rock avalanches and road fractures, the outcome will be a nightmare. Negative chain of effects and preventing it occurring are what we need to learn. Therefore, we must adopt "recycling", "re-assembling" and "donate the disadvantage groups" as well as other concrete forms of action in order to strengthen environmental protection measures.

(I) Resource Take-back Reclaiming Resources

If scrap computers are only handled by landfill and incineration, this will harm the natural ecology and directly harm the human body. Production of one computer needs thousands of chemical as its raw materials but half of them contain damaging and poisoned substances. To recycle and reuse discarded computer equipment requires us to respond in accordance with the principles of environmental protection and to reduce information waste and environmental pollution. To make an effort to protect the environment and to maintain and create endless beauty on earth, the implementation of resource recovery and reuse are important for us to fulfill and indeed, it's our civic responsibility.



▲ 圖三 「再生電腦希望工程」成果分享暨感恩大會合照
Figure 3: "Renewable Computer Hope Project" outcome sharing photo

(二) 修整重組

通資設備須設法進行再資源化、無害化處理。平均3到5台報廢電腦修整重組成1台再生電腦，大量報廢電腦的捐贈，可有效產出再生電腦。

(三) 捐贈弱勢

藉募集報廢電腦、回收整理維修、檢測安裝軟體後，捐贈偏遠地區低收入學童或弱勢團體，使偏遠地區有電腦，縮短城鄉數位落差。凡機關學校、公司行號或家庭個人的汰換電腦，均可透過回收、整修後轉贈，具體實踐社會責任、播種蔓延數位資訊，行動擴散環境保護，改善弱勢族群的學習環境，提升學習成效，期盼各機關團體共襄盛舉，參與電腦回收轉贈活動，共同實現愛心。

▲ 圖二 于組長哲鑫（右一）「再生電腦希望工程」感恩會獲獎照

Figure 2: Yu, the Director, "Renewable computer Hope Project" Award-winning photo

(II) Re-assembling

Computer equipment shall be factored into the management and conduct of recycling and harmless handling. An average of 3 to 5 scrap computers can be reassembled to form one regenerated computer. Therefore, large donation of obsolete computers can be recycled effectively.

(III) Donate to disadvantage groups

Collecting scrap computers, and exercising further stages of take-back, such as maintaining, inspecting and installing this software, and then donating them to lower income families in remote areas or disadvantaged groups, the digital information gap between urban and rural can be shortened. All unwanted computers disregarded by schools, businesses or families can be reclaimed through take-back, renovation and then donated. Furthermore, by taking such action, citizens can fulfill their social responsibility and embrace digital information, and environmental protection in order to improve the learning environment of disadvantaged groups and to enhance their learning effectiveness. We are looking forward to various government agencies and organizations joining in and becoming involved in computer take-back and donation activities and, by doing so, achieving goodwill.

表一：97至99年間海洋巡防總局捐贈電腦設備一覽表

單位：件 (Unit: pieces)

Table 1: 2008 to 2010 Marine Patrol General Donation list of computer equipment

年度 Year	指導單位 Guide Units	活動名稱 Event Title	個人電腦 PC	螢幕 Monitor	筆記電腦 Notebook Computer	印表機 Printers	其他 Other	小計 Subtotal
97年	環保署 EPA	二手電腦回收轉贈 Used Computer Take-back donation	336	324	37	46	42	785
98年	經濟部 Ministry of Economic Affairs	再生電腦希望工程 Renewable Computer Hope Project	44	33	8	5	117	207
99年	經濟部 Ministry of Economic Affairs	再生電腦希望工程 Renewable Computer Hope Project	79	177	43	43	0	342
合計Total			459	534	88	94	159	1,334



▲圖一 林副總局長星亨「二手電腦回收轉贈」感恩會致詞照

Figure 1: Lin, the Deputy Director General, "Second-hand computer take-back donation," Speech photo

三、實例介紹

二手設備受贈者幾乎是M型化社會的低收入戶或單親家庭，這些人需要政府資源協助。97至99年間海洋巡防總局電腦設備捐贈活動，以個人電腦、筆記型電腦、螢幕及印表機為主，因資安理由不含硬碟，分別參與環保署「二手電腦回收轉贈作業」（如圖一）與經濟部「再生電腦 希望工程」活動（如圖二），累計數量達1,334件（如表一）。藉由捐贈電腦，幫助弱勢社區學童，縮短數位落差、提升學習興趣，讓失學學童重新展開學習，培訓更多電腦人才，創造就業機會，降低城鄉學習差距。

以經濟部指導的「再生電腦·希望工程」為例（如圖三），透過廠商幫忙，提供電腦產品壽命終了拆解、粉碎及毒物處置，至98年12月為止，共250家公民營機關團體參與該活動，產出3,103套再生電腦，受贈對象逾百餘個弱勢團體，回收廢資通訊產品總重量達304公噸，有效防止毒害物質溢散19公噸。溫室氣體二氧化碳之排放量減少823噸，少砍伐68,572棵樹木，有效疏緩環境負擔。

III. Example to illustrate

The recipients of second-hand equipment are almost all low-income households or single parent families within an M-oriented society and are people who need the assistance of government resources. From year 2008 to 2010, several donation activities involving personal computers, notebook computers, monitors and printers were held by the Marine Patrol Directorate General. (Because of the security reason, hard drives were not included.) The EPC's "second-hand computer take-back donation operation" (shown in Figure 1) and the Ministry of Economic Affairs' "Regenerated Computer Hope Project" activities (Figure 2) have accumulated a quantity of up to 1,334 units (such as in Table I). By donating computers to help disadvantaged communities and school children, we shorten the digital information gap and enhance educational interests so that children who dropped out of school can start learning all over again. A further consequence is to train more computer professionals in order to create more job opportunities and to reduce the gap in terms of opportunities and income between urban and rural areas.

Take for example the "Regenerated Computer Hope Project" guided by Ministry of Economic Affairs (Figure 3). Through the help of manufacturers, who provided the means to execute the dismantling, crushing, and toxic disposal of computers, by December 2009, a total of 250 government agencies as well as other organizations had participated in the activities which resulted in the recycling of 3,103 computer sets, while the recipient objects were enough to fulfill the needs of more than hundreds of disadvantaged groups. The recycled computer products weighted, in total, 304 tonnages and effectively prevented 19 tonnages of toxic substances being emitted. The greenhouse gas carbon dioxide emission was reduced about 823 tonnages which can reduce cutting down 68,572 trees, and effectively respite the burden of the environment.

四、實際效益

為善盡社會責任，海洋巡防總局配合國內產業，共同參與資源回收再利用之循環型社會，建立社會公益之典範模式，融入「逆物流領域」，配合再生電腦捐贈弱勢團體活動，實行節能減碳、讓地球溫室效應降溫，免於大自然的反撲。以下謹就「喚醒環保議題」、「關懷弱勢族群」及「消弭數位落差」等三項實際效益析述。

（一）喚醒環保議題

環保跟經濟發展須並重，各機關團體應落實環保、減碳行動。購買新機時，採購符合台灣綠色環保標章或美國能源之星（Energy Star）認證之通資設備。處置舊機時，依序透過回收（Take Back）、修整（Refurbish）、再利用（Reuse）及再循環（Recycling）之逆循環程序，利用符合環保方法處置舊機，減少電腦廢物，減輕環境負荷，自助助人。

（二）關懷弱勢族群

環保署、經濟部紛紛辦理報廢電腦捐贈活動，受贈對象以偏鄉地區低收入戶的學生與弱勢團體。其困難處，不僅是擴大回收數量，更須逐戶安裝這些再生電腦，確認電腦正常操作及指導簡易電腦維修。弱勢社區孩子，因經濟能力、家庭型態、教育環境等不利因素，面臨困境，捐贈活動結合社會資源幫助貧困學童，促進資源再生利用。

IV. The actual effectiveness

For fulfilling social responsibility, the Marine Patrol Directorate General now participates in resource take-back and re-use of a recycling-based society in partnership with domestic industry in order to the establish the social welfare model. In this way, they aim to merge an ethos of "reverse logistics" with certain other activities such as the donation of the recycling computers to disadvantaged groups and related activities as well as the implement of energy-saving reduction of carbon, thus averting the worse scenarios of global warming and preventing nature's counterattack. Moreover, the following issues, "Wake-up environmental issues", "The care of disadvantaged groups" and "The digital information gap elimination" are now described with actual effectiveness.

(I) Wake-up Environmental issues

Environmental protection and economic development must be paid equal attention, and all government agencies and organizations should implement environmental protection, including carbon reduction. When purchasing new machines, green marks should be in line with Energy Star (Energy Star) certification issued by Taiwan or the United States. When disposing of old machines, all stages of the reverse circulation process, such as Take-back, Refurbishing, Reuse, and Recycling should be followed and then environmentally friendly ways should be used to dispose of old machines, reduce computer waste, and to reduce the environmental load.

(II) The care of disadvantaged groups

The Environmental Protection Department and the Ministry of Economic Affairs have been handling scrap computer donations and the recipient objects to remote geographical areas, low-income households and vulnerable groups of students. The difficulties involve not only expanding the number of such recoveries, but also making door-installation of these renewable computers and verifying the normal function of each computer and supervising simple computer maintenance. Because of unfavorable circumstances regarding economic skills, family patterns, education, environment, as well as other negative factors, disadvantaged communities and children face difficulties. With donations, which combine with social resources, are available to poor children now, while promotion of resource recycling can be undertaken.

(三) 消弭數位落差

社經階層愈高的人，愈有機會接觸、運用資訊科技，改善生活環境，成為「資訊富有者」；社經階層愈低的人，反成為「資訊貧乏者」，這種社經貧富懸殊轉化成資訊貧富差距的社會現象，稱為數位落差。向各機構回收報廢電腦，重組電腦，修復後轉贈予需求人士，讓參與檢修人員學習電腦拆解與維修技能，開創資訊機會。把不能組合的電腦零件，以ISO環保規例處理，循環再造，減低環境損害。經修復重組的電腦優先捐贈弱勢團體，縮減城鄉數位落差，增進數位學習機會，降低數位落差。

五、結語

資訊科技發達，電腦廢棄物隨之增加。廢舊電腦為電子垃圾，捐贈電腦再利用，是節省排碳、惜物愛物、珍惜資源的事。透過環保減碳救地球，響應「報廢電腦回收轉贈」作業，減輕環境負荷，促進資源再利用，縮減城鄉數位落差，已為偏遠地區學校、低收入家戶學童，帶來更多吸收新知機會，深獲肯定。為支持綠色奇蹟、珍惜美好地球，讓再生電腦傳達愛的訊息。期盼各機關團體共襄盛舉，共同實現愛心，做就對了！

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(III) The digital information gap elimination

The higher social-economic class, the greater opportunities for those people from that class have to access and to use information technology to improve their living environment and therefore become "information rich"; contrastingly, the lower social-economic classes of people may easily become "information have-nots", and the social and economic disparity between those rich or poor, in terms of information, has become a social phenomenon, which is known as "the digital differential". To recycle scrap computers discarded by agencies and donate them after reassembling, enable less fortunate citizens to learn skills of reparation and maintenance and further create information opportunities. To fulfill the ISO environmental regulations, those computer parts, which cannot be combined, are recycled and reproduced to minimize environmental damage. These reassembled computers are then donated to disadvantaged groups as a priority to reduce the urban and rural digital information gap and thus enhancing digital learning opportunities while reducing the digital information gap.

V. Conclusions

Along with the development of information technology, computer waste has increased. Scrap computers should be regarded as e-waste while the reuse of donated computers aims to save the emission of carbon, care for all living things on the planet as well as treasuring all of the earth's natural resources. Through carbon reduction in particular, as well as environmental protection in general, initiatives like "Scrap computer take-back donation" activities, reduction of the environmental burden, promoting the recycling of resources and narrowing the urban and rural digital information gap have brought new knowledge that leads to more opportunities for children from low-income families as well as schools in remote areas. All these endeavors aim to support the green miracle, cherish the wonderful earth and convey the message of love through regeneration computers. As such, we look forward to all government agencies and organizations joining in the effort. Together we achieve love and just get it done!

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