

TRANSFORMING THE PREVIOUSLY BANKRUPTED WASTE OIL RE-REFINING OPERATION INTO A FINANCIALLY VIABLE, ENVIRONMENTAL BUSINESS AND A BENCHMARKING EXAMPLE IN HONG KONG - A WIN-WIN CASE STUDY

Daniel M. Cheng

Dunwell Enviro-Tech (Holdings) Ltd.

8 Wang Lee Street, Yuen Long Industrial Estate, N.T., Hong Kong

ABSTRACT

This paper identifies the key elements to maintain financial viability for the only waste oil re-refining business in Hong Kong. The facility was formerly built, operated and abandoned by an Australian company (which had been running similar operations successfully in Australia) after losing US\$10 million in 18 months. By analyzing their wrong strategies implemented within the Asian culture and recognizing the needs and potential of the waste oil re-refining industry in Hong Kong, Dunwell Group took over the facility and revitalized the operations in 1993.

To nurture essential elements for her waste oil business, Dunwell had, paradoxically, launched different strategies to promote the reduction of waste oil generation. Appropriate R&D directions and innovative technology are adopted by Dunwell to achieve operational breakthrough. At the same time, extensive marketing and lobbying (for governmental departments, private parties and general public), creating a win-win partnership between major corporations, producing value added products and services from the re-refinery process, establishing proper liaison with overseas company are the proven successful factors of Dunwell. Numerous awards and recognition have been received for the above reasons.

Up-to-date, Dunwell is an independent (without government subsidy) and profitable operation amongst her industry worldwide. Over 5000 visitors from different industries, institutions, universities and schools, from local and overseas, have visited this facility and learnt about this recycling operation. Apart from the waste oil recycling businesses, Dunwell has also developed wastewater treatment and other related environmental businesses. At present, Dunwell is stepping into another phrase of expansion by moving out from Hong Kong's market into other Asian countries.

This proposal outlines the essential development milestones of a successful, financially viable recycling operation, and the potential approach to nurture and prosper the recycling industry in Asian countries.

Key words: Waste oil re-refinery, polluters pay principle, recycling industry, environmental awareness, research & development, innovative technology, win-win situation, valued-added products, education on waste minimization, financially viable

1. DEMOGRAPHICS OF HONG KONG

Hong Kong is known as a metropolitan city located at the South end of China. By 2000, this 1098 sq. km piece of land has a population of 6.78 million. With 1885 km of public roads, there are more than 504,000 motor vehicles registered. The gross national product accounted for HK\$ 1,261 billion (equivalent to US\$ 162 billion) in 1999.

2. BACKGROUND OF HONG KONG WASTE OIL RE-REFINERY INDUSTRY

In the 1980's, factories in Hong Kong were generally located in multi-storey buildings where no proper chemical waste treatment and disposal facilities were available. Toxic wastes and chemical substances resulted from the manufacturing activities were indiscriminately dumped into Hong Kong surface waters and drainage systems. The environmental awareness in Hong Kong had not yet been properly aroused. A pressing concern about these corrosive, flammable and poisonous wastes which posed a health threat to Hong Kong's citizens have later led into the amendment of Waste Disposal Ordinance (WDO) to classify different chemical wastes and the related storage, handling and treatment requirements. Waste oil resulted from machinery, engines, etc. belongs to one of the chemical wastes classified under the WDO.

Hong Kong's waste oil re-refinery activity first started in 1989 when an Australian based company, Lubrico Ltd., invested and built the re-refinery facility in Yuen Long Industrial Estate. The business had imitated similar operations in Australia and tried to sell the re-refined base oil as end product. Mistakenly, Lubrico failed to apply proper marketing strategies and managerial skills for the Chinese culture. It was only 18 months later when Lubrico was forced into bankruptcy with a total loss of US\$ 10 million. One of her fatal mistakes lied in the source of raw material -- Lubrico paid for the waste oil available in the market. Gradually, waste oil producers were 'educated' to supply waste oil with high volume of water, garbage and other non-recyclable material for a higher return.

Since then, the Hong Kong government had been inviting different companies to take over the re-refinery facility and resume the operations; however, the lack of response had nearly forced the Hong Kong Industrial Estate Corporation to demolish the whole facility and release the land for other use. Should the facility be demolished at that time, probably there would never have any waste oil re-refinery industry in Hong Kong.

It was August, 1993 when Dunwell acquired the re-refinery facility (Figure 1), revitalized and invested in the whole re-refinery process. Right after the acquisition of the oil re-refinery plant, Dunwell has invested substantially to install pollution control facilities to ensure herself properly comply with Hong Kong Government's Environmental Protection Department's requirements in terms of water, air, smell and solid waste pollution; thereby Dunwell being granted the license to operate the only privately-owned chemical waste disposal center in Hong Kong. This was extremely important to make possible the proper collection and treatment of waste lubricating oil in Hong Kong.

By 1995, Dunwell was granted from the Environmental Protection Department for the chemical waste disposal license and resumed the oil re-refinery activities in Hong Kong.



Figure 1. Dunwell's waste oil re-refinery at Yuen Long Industrial Estate, H.K.

3. BUILDING UP THE ENVIRONMENTAL AWARENESS WITHIN THE COMPANY

Prior to the acquisition of the oil re-refinery facility, Dunwell has been engaging in metal stamping business for the VHS cassette industry, trading of anti-friction metal treatment lubricants and developing the epoxy related applications in the areas of flooring and electronics manufacturing. Environmental business was relatively a new direction for Dunwell. Thus, to build up a strong team with environmental expertise and awareness to revitalize the re-refinery business had become one of the biggest challenges for the management shortly after the acquisition.

As a result, Dunwell actively participates in presenting and publishing on different international conferences and journals about her experiences and insight within the liquid waste recycling business. Making use of these international contacts, Dunwell shortened the learning path and speeded up the pace of properly handling the waste lubricating oil in Hong Kong.

Dunwell has been aggressively promoting the urgency of environmental protection and substantial growth within the company, through the internal and external training, business contacts, community services, and whatever possible ways in contact with the public.

Furthermore, Dunwell strengthens the environmental awareness within his organization by co-organizing with HKIE to become the first company in Hong Kong to provide Scheme "A" engineering training for environmental engineers. Staffs at Dunwell are frequently endorsed and supported to participate in the environmental carnivals, exhibitions and conferences organized by other companies and organizations (Figure 2).



Figure 2. Dunwell's booth at China Light & Power's Safety, Health and Environmental Carnival

Dunwell has been one of the most active firms in Hong Kong with respect to developing, publishing and publicizing its environmental policy (See Exhibit 1). Through the certification of ISO 9002 and ISO 14001 systems since August 1997 and August 1999, respectively, staffs at Dunwell have been incorporating even more quality and environmental protection concepts into the daily activities. The Safety, Health and Environmental Department was setup within the company to self-implement the ISO 14001 environmental management system, without hiring other external consultants. By doing so, Dunwell's staffs have a better exposure and deeper understanding of the system, which indirectly influence outsiders getting in touch with Dunwell's staffs. This has strengthened the operations efficiency and enhanced the product quality, customer satisfaction that led to further success of Dunwell.

Throughout the years, Dunwell has participated and received HKSME Gold Award : Best Managed SME Award, three Hong Kong Awards for Industry, in the categories of productivity, technological achievement and environmental performance and many other recognition (Figure 3). These awards have helped Dunwell, as well as her counterparts, to better understand her strengths and weaknesses in the further development of the environmental businesses.



Figure 3. Awards and Recognition received by Dunwell

4. COLLECTION OF WASTE OIL AS RAW MATERIAL

In view of the failure of Lubrico, Dunwell abandoned the old paradigm of paying for the waste oil from waste producers. During the same year, the WDO was amended to tie in with the requirements of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Waste oil is restricted from exporting outside Hong Kong boundary without an approved permit and receiving facility; otherwise, waste oil could be indiscriminately burned as heavy fuel oil that results in severe air pollution. Taking advantage of this governmental policy, Dunwell started charging a service fee for collecting the waste oil.

Since the granting of disposal license to the Dunwell, a massive oil collection program was staged. Major waste producers were invited to visit the plant and educated on the advantages of having their oil properly collected and treated. Incentives were given to them to turn their waste oil to the Dunwell instead of letting them export to China and produce secondary pollution.

This waste oil collection program tied in with the purchase and use of Green motor oil was launched to automotive maintenance workshop in March 1, 1996. Workshop operators (the real waste producers) were encouraged to save their waste oil in drums for proper collection and recycling instead of illegally dumping them in drainage. This program in general, helped to train workshop operators how to properly treat waste oil and that recycled oil products are comparable to virgin oil in terms of performance.

The benefits are three-fold:

1. It educates the waste producers on waste reduction (as they need to pay for every droplet of oil produced, they will now only change oil when the oil life is maximized).
2. By receiving a nominal service fee, (which results in some income to subsidize the operation costs) Dunwell has become a viable business operation in Hong Kong while similar services around the world are heavily dependent on Government subsidies.
3. It educates the waste producers that recycled oil products are comparable to virgin oil in terms of performance.

By providing a “Green” Image as the incentive, many responsible corporations such as **Shell, Kowloon Motor Bus, Hongkong International Terminals, Kowloon Canton Railway Corporation, CLP Power, Cathay Pacific Airways, Gammon Constructions**, etc. have found this program helpful to their corporate environmental development and actually re-utilize Dunwell’s related environmental services and products.

The Company has worked jointly with **Shell, Environmental Protection Department, and Friends of the Earth** to provide waste oil collection points at three gas stations around the city. Since the program has been launched in July, 1996 (Figure 4), it has helped provide commercial drivers (who change oil themselves) with channels to properly dispose of waste oil rather than dumping them illegally into sewage.



Figure 4. Dunwell commenced a joint program with Shell, Environmental Protection Department, and Friends of the Earth since 1996

Compared to the U.S. which collects only about 6% of waste oil from waste producers, Dunwell has been collecting 90% of waste oil from the market that the waste oil disposal issue in Hong Kong is properly and environmentally handled. Currently, her client range from major corporations to small sized garages scattered all over the city.

5. PROCESS OF MAKING “GREEN” OIL

The technology Dunwell applied is a major technological waste oil re-refinery process with Wiped Film Evaporation as the key element. The whole process (Figure 5) could be briefly described as follows:

- (A) Pre-treatment Process - The incoming quality of waste oil collected may have substantial variations and contain some solid particles. The pre-treatment process will take out most of the moisture and solids by centrifugal method.
- (B) Water Removal Process - Raw waste oil feed containing a maximum of 10% water is heated to approximately 150°C. The feed then enters a flash evaporator where water with trace of the lower boiling point light ends flash off at atmospheric pressure. Removed water and trace oil are then separated by an Apollo Oil-Water Separator. All the wastewater collected will be treated at the in-house wastewater treatment facility and discharge according to EPD’s requirement.
- (C) Light Ends Removal Process - The de-watered feed oil is further heated up to 220°C under 50 mmHg vacuum and then enters a flash evaporator where the light ends (6% maximum from the raw waste oil) flash off and then condense. The condensate (light ends) is pumped to underground light ends storage tank to be used as fuel for boilers.
- (D) Main Distillation Process (Wiped Film Evaporation) - Conditioned feed (without water and light ends) from flash evaporator flows to the Wiped Film Evaporator which is a jacketed vessel with thermal oil sandwiched between the evaporator

reactor column walls. A rotating device with carbon graphite blades smears the inside hot cylinder wall with waste oil. Feed is distilled under vacuum and is heated up to 340°C where the lube oil is vaporized and condensed as very pure oil distillates known as base oil.

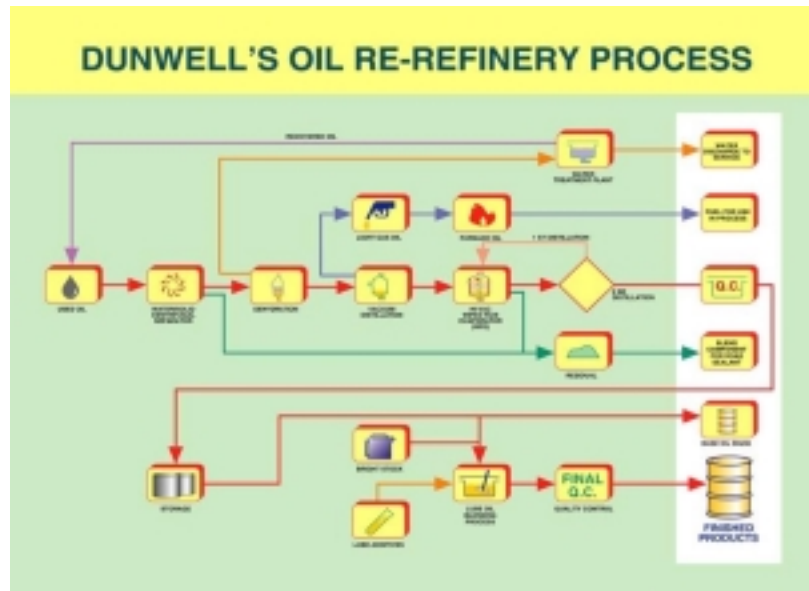


Figure 5. Dunwell's Waste oil Re-refinery Process

With appropriate additive packages, base oil is blended into various lubricating oil products (which worth three to five times more than that of the base oil) for industrial and automotive use (Figure 6). Compared with Lubrico's re-refined base oil which ended up sold to the oil majors at a lower cost, Dunwell has taken a key value-added step to increase her revenue by selling the following (Green) environmental lubricants:

- * Hydraulic oil, using recycled oil as base oil
- * Motor oil, using recycled oil as base oil
- * Metal cutting fluid, using recycled oil as base oil
- * Mould release agent, using recycled oil as base oil
- * Rope oil, using bottom residue as material
- * Low-grade grease, using bottom residues as material
- * Industrial diesel oil, using light ends as material



Figure 6. Green oil manufactured by Dunwell

6. APPLYING ADVANCED AND INNOVATIVE TECHNOLOGY

Apart from the waste oil re-refinery activities, Dunwell has developed new services to collect and treat oily wastewater from the waste producers. The technological capability developed at Dunwell even results in profitability businesses through design, build and installation of wastewater treatment systems for clients having specific environmental needs.

To cope with the changing market demand as well as to continuously improve the quality of the re-refined oil, Dunwell has maintained a strong team comprises of chemical engineers, environmental engineers, mechanical engineer and industrial engineers, on the design and engineering capability for R&D activities, investment in new or better materials, equipment and technologies for the re-refinery process, wastewater treatment system, quality assurance, blending and packaging operations. In addition, outside facilities and institutions are utilized to conduct long term R&D and provide advisory functions.

The following technologies are the fruitful results being developed / adopted in Dunwell's production processes:

(A) Double distillation with Wiped Film Evaporation

Re-engineered the waste oil re-refinery technology to undergo processes of dewatering, desludging, defueling and wiped film evaporation to produce top quality base oil. Dunwell upgraded the technology and eliminated the clay treatment process generally adopted by re-refinery plants around the world and resulted in two tons less of oily chemical waste for fuel application.

(B) Apollo Oil-Water Separator

Researched for and adopted Apollo Oil-Water Separator in the pre-treatment stage of waste oil to separate water from oil. Apollo functions by force coalescing method to increase the separation efficiency by forcing droplets together to aid coalescence. Because of the effective results, Dunwell subsequently introduced, sold and installed Apollo to **Shell** and **Esso** Hong Kong.

(C) Pulsair blending system

Adopted Pulsair blending system in the blending operations of the plant. It produces big air bubbles to mix fluid and speeds up mixing process by 75 to 80%. Dunwell installed the system in its blending tanks which help to thoroughly mix additives with base oil to produce products of consistent quality at a minimal energy level. Because of the effectiveness of the system, Dunwell subsequently introduced, sold and installed Pulsair to major oil companies such as **Shell** and **Caltex** in Hong Kong, **Mobil**, **Esso** and **British Petroleum in Singapore**, **Mobil** and **Shell in Tianjin**, China.

(D) Induced Air Flootation system

Developed and adopted a modified Induced Air Flootation system [IAF] in the wastewater treatment system of Dunwell to efficiently and effectively treat wastewater produced as a side material from the re-refinery process, without the use of air compressor. IAF removes most of the suspended solids, oil and grease by the fine bubbles generated by the patented designed aerator lifting up large flocs to the wastewater surface. The flocs will then be scrapped away by the scraper and discharged as sludge. The system was later introduced, sold and installed to **Esso**, **Garden Bakery**, **BMW Concessionaries**, **Ground Support Engineering Ltd. at Hong Kong International Airport** and other operations.

Through investment in innovative R&D, Dunwell has developed effective environmental solutions that further translated into new businesses to design, make and install wastewater treatment systems for other companies having similar needs.

7. MARKETING OF “GREEN” OIL - CREATION OF A NICHE MARKET

Benefit from the Polluters Pay Concept, Dunwell has been able to subsidize part of the production cost via receiving nominal service fees during waste oil collection. At the same time, ‘better quality’ raw materials for re-refinery process are made available. These help make Dunwell’s high quality “Green” lubricants more competitive in the market and fulfill the increasing environmental demands of public listed companies in particular.

With a higher level of environmental consciousness, the followings are identified as customers' new demands in the last couple of years.

1. Economical yet reliable oil products;

2. "Green" lubricant that reduces the continuous tapping of natural resources; reduces waste and encourages reuse of recovered materials;
3. The use of "Green" products that could contribute positively to the corporate image;
4. "Green" products that would help meet the requirements of ISO 14000 environmental management system.

With the adoption of the re-refinery technology, Dunwell becomes the only independent and profitable company in Hong Kong that is in a position to provide "Green" lubricant products. The quality of Dunwell's "Green" Lubricants has enabled herself to participate in the tendering of lubricant from the HKSAR Government since 1998. This is a *niche market* as companies, industrialists, automotive workshop operators and establishments looking for "Green" oil products in Hong Kong will have no other alternative except Dunwell. The oil blending capability at Dunwell has added a higher value by turning the re-refined based oil to different grades of high quality lubricating oil. This has provided Dunwell a higher profit margin and larger room to grow.

8. EDUCATING THE PUBLIC

The general public are the ones that recycling industries should never neglect. Through participating in the public events, Dunwell let the public know more about waste oil recycling:

- * Safety and Environment Day organized by China Light & Power Co., Ltd.
- * Cathay Pacific Environmental Day organized by Cathay Pacific Airways Ltd
- * Open exhibition jointly organized by OSCIC and Kwai Tsing District Board for the local community.
- * Supported and sponsored the Arctic Expedition organized by the Hong Kong Association for the Advancement of Science and Technology. Scientists evaluated the impact of pollution on eco-environment in the North Pole.
- * Green Christmas Campaign organized by Friends of the Earth (Hong Kong)

Dunwell has deliberately made her facility available for the waste producers from the power plants, industries, service stations, and automotive workshops, etc. to visit. During the plant tour, the visitors are introduced about the re-refinery process and the proper means to handle waste lubricating oil. Some of the companies that have visited Dunwell thus far include the following with participants over 3800 since April 1995 :

- Associated Engineers, Ltd.
- Caltex Oil Hong Kong
- Cathay Pacific Airways Ltd.
- China Cement Company (Hong Kong) Ltd.
- China Light & Power Co., Ltd.
- Citybus Limited
- Dah Chong Hong (Motor Service Centre) Ltd.
- Electronic Devices Ltd.

- Esso Hong Kong Ltd.
- Gold Peak Industries
- Hongkong International Terminals Ltd.
- Hong Kong Air Terminals Ltd.
- Hong Kong Aircraft Engineering Co., Ltd.
- Hong Kong Electric Co., Ltd.
- Gammon Constructions Ltd.
- Kowloon Canton Railway Corporation
- Kowloon Motor Bus (1933) Co., Ltd.
- Modern Terminals Ltd.
- Sea-Land Orient Terminals Ltd.
- Swire BFI Waste Services Ltd.
- Swire Coca-Cola Ltd.
- Shell Companies in Greater China
- Toyota Crown Motors Ltd.
- Yau Lee Constructions Ltd.

In addition, professional organizations, tertiary institutions, high schools, primary schools and other interest groups, etc. (Figure 7) with more than 1300 people have requested to visit Dunwell:

- Airport Authority of Hong Kong
- Cathay Pacific Pioneer Group
- Centre of Environmental Technology
- Federation of Hong Kong Industries
- Friends of the Earth (Hong Kong)
- Hong Kong Association for the Advancement of Science and Technology
- Hong Kong Baptist University
- Hong Kong Institution of Engineers
- Hong Kong Polytechnic University
- Hong Kong University of Science and Technology
- Institute of Industrial Engineers (Hong Kong)
- Institute of Motor Industry (Hong Kong Chapter)
- Jardine Ambassador
- Jiaotong University, China
- St. Stephen's Girl's College
- The Solar Programme
- Tsing Hua University, China

Over the years, it was found that the public that has learnt about the oil recycling process will exert direct and indirect influence in promoting and adopting Dunwell's green products.



Figure 7. Plant Visit by The Solar Program in Summer of 2000

9. CRITICAL SUCESS FACTORS

Comparing between the success of Dunwell and the failure of Lubrico, one could realize that Dunwell has possessed some distinctive competitive advantages while making use of the sustainable business environment at the right timing.

9.1 Distinctive competitive advantages

- 9.1.1 The innovative vision of investing in the oil re-refinery industry and related technologies has proven to be valid and has led Dunwell become a leader in the industry.
- 9.1.2 The entrepreneurial spirit and the forward looking management style has helped Dunwell resolve the technical and marketing difficulties, and led Dunwell become a profitable business nowadays.
- 9.1.3 The business flexibility and the clear managerial directions from the top management have crucial impact on the cost effective corporate development. The young, energetic and aggressive technical staffs at Dunwell are proven assets in managing such an environmental business. As a result, many of the innovative ideas to smoothen the operations are generated from time to time.
- 9.1.4 Over the years, Dunwell has successfully educated the public the concept of “Polluters Pay Scheme”. The incoming waste oil quality has in turn, be controlled as waste producers would segregate the waste appropriately. As a result, the operation efficiency for Dunwell has been ensured.

- 9.1.5 Apart from the waste disposal license issued by the Environmental Protection Department, Dunwell also processes the waste collection license which has enabled herself to directly collect waste oil and oily effluent from the public. This has enhanced Dunwell in collecting more feedstock and generated more revenue.
- 9.1.6 The oil blending capability at Dunwell has added a higher value by turning the re-refined base oil to different grades of high quality lubricating oil. This has provided Dunwell a higher profit margin and larger room to grow.
- 9.1.7 The environmental concern of the public has been generally raised over the past few years. Dunwell recognizes the need of green images for major corporations such as Shell, Mobil, Gammon Constructions, Cathay Pacific, etc. Wherever appropriate, oil re-refinery services and green oil products are sold to these clients.
- 9.1.8 To Dunwell, the raw material imposes virtually no cost to the accounting, not to mention that the collection of waste oil generates revenue to substitute part of the operations overhead. As a result, the low retail price of the Green Oil Product becomes a strong competitive advantage, when compared to those refined from the natural crude oil.

9.2 Business Sustainability

There are numerous positive factors that have been ensuring Dunwell's outstanding performance and sustainable business growth:

- 9.2.1 The external factors that promote the environmental protection in Hong Kong will be continuously intensified. More environmental concerns from the Green Groups, general public, small and medium enterprises, will create a market pull for the waste oil recycling services and the need of Green Oil.
- 9.2.2 Since the acquisition of the re-refinery facility in 1993, Dunwell has been actively promoting the concept of waste oil recycling through different public channels, business and industrial liaisons, plant visits, conferences, publications, social activities, etc. Dunwell has been recognized by her expert status among the waste producers and potential green oil users. This intangible and yet valuable leading position, not only in Hong Kong but also in Asia, will undoubtedly enhance Dunwell's development in this direction.
- 9.2.3 Governmental directions such as the "Waste Reduction Framework Plan" issued on November 5th, 1998 has clearly stated the future environmental direction in Hong Kong. "Polluters Paid Scheme", Waste Reduction", etc. will lead the society of Hong Kong moving toward the recycling direction.
- 9.2.4 The general acceptance and requirement of ISO 14000 from the corporations will create more pressure in committing themselves to the environmental activities. Being certified for ISO 14001 has created another competitive advantage for Dunwell and aligned herself closer to other corporations.
- 9.2.5 The continuous commitment in R&D as well as technology advancement for

Dunwell will improve her operation efficiency in making better, quality products for the market.

9.2.6 Successful stories of Dunwell over the past few years have drawn attention and attracted interests from the venture capitalists or business enterprises to invest into this new industry. External fund might help Dunwell in expanding its environmental business at a much faster pace.

9.2.7 After years of actual testing and extensive marketing efforts, there is increasing acceptance and understanding on the functionality and quality of recyclable oil products. Furthermore, the competitive pricing of the green oil products will attract more purchase from local and overseas markets, especially after the economical turmoil in the Asian region.

10. NUTURING THE LOCAL RECYCLING INDUSTRY

Having gone through the development stages for the past seven years, Dunwell has become the successful and leading example for the recycling industry (which also include paper, metal, plastic, glass recycling operations) in Hong Kong. At the same time, Dunwell has appreciated the many similar difficulties other companies are facing. It is Dunwell's belief that the presence of recycling park will definitely benefits the industry as a whole. Establishing a recycling park in Hong Kong to facilitate different recycling operations with a better location and facilities was one of the subjects Dunwell started to lobby few years ago; currently, this subject is going through the feasibility studies by the related governmental departments.

In order to consolidate the efforts and nurture a better business environment for the industry, Dunwell has also taken the lead to form the Hong Kong Environmental Industry Association (HKEIA) in May, 2000 and served as the chairman of the executive committee. By doing so, it is hoped that a consolidated voice will be available to express different opinions, needs, concerns, etc. from the recycling industry when there are chances to respond to governmental policies and cooperate with other business sectors in Hong Kong. In October 2000, the HKEIA has signed a cooperative agreement with the Guangdong Provincial Environmental Industry Association (GPEIA) (Figure 8) which has more than 400 members in the southern part of China. Thus, an even stronger network has been established to allow experience, knowledge and technology transfer and business cooperation between the member companies on each side of the boundary.



Figure 8. Signing of cooperative agreement with the GPEIA

11. PROVEN APPROACH IN RUNNING A SUCCESSFUL, FINANCIALLY VIABLE RECYCLING OPERATION

Despite the recent financial turmoil within the Asian Pacific Region, Dunwell still achieves a sound profitable picture. This is particularly comparable to the former owner of the waste oil facility, Lubrico Ltd., which had lost US \$ 10 million in an 18 months period (from the building of the facility until the day of bankruptcy).

The steps Dunwell taken to transform a scrapped business to a viable profitable recycling operation involve:

1. License Applications
2. Collection of Raw Material
3. Technology Development and Adoption
4. Provision of Value-added Products and Services
5. Marketing Locally
6. Marketing Regional

Having gone through the first five steps, Dunwell Enviro-Tech (Holdings) Ltd. is established to undergo strategic partnership (and eventually IPO) to expand her environmental businesses in the Asian Pacific Region. Venture capitalists and corporate development funding have been approaching Dunwell for potential investment as well. In conclusion, Dunwell has already established a successful role model for the recycling industry in Hong Kong.

Furthermore, Dunwell is now being studied by China and other Asian countries, as a successful working model whose technology and experiences may also be feasible to transfer and start similar programs to tackle the waste oil pollution problems within the region.

Environmental Policy

To help preserve the earth's natural resources and minimize adverse impact on our environment

It is the policy of Dunwell to achieve and maintain a high standard of environmental care in conducting its business as an environmental and industrial company.

Dunwell's approach to environmental management seeks to continuously improve its performance by keeping abreast of emerging environmental technology, changing customer needs and community expectations.

Specifically, it is Dunwell's policy to:-

- comply with or exceed all applicable laws, regulations and standards; and minimize any adverse environmental impact resulting from its operations, products or services;
- ensure that its employees, contractors and suppliers of goods and services are fully informed of this policy and are aware of their environmental responsibilities in conducting business with Dunwell;
- continue providing personnel training to enhance employees' awareness of environmental protection;
- adopt 14000 Environmental Management Systems to identify, control and monitor environmental impact arising from its operations;
- conduct continuous research and establish or support programs to conserve and recover resources, minimize waste generation, use recycled products and improve processes;
- help educate local industrialists and the public at large their environmental responsibilities, and the proper means to dispose of wastes, to recycle and reuse precious resources.