



Anthony Dixon is CEO of ASB Biodiesel (Hong Kong) Ltd
Anthony Dixon 是ASB生物柴油（香港）有限公司總裁

Biodiesel from Waste: the Case for Mandatory Blending in Hong Kong



More than 62 countries have adopted mandatory biodiesel blending regulations as part of a portfolio of measures to tackle vehicle emissions, writes **Anthony Dixon**

逾62個國家已採取強制性生物柴油混合法規，作為應對汽車廢氣排放的措施之一

Anthony Dixon

ASB Biodiesel

KITMAN PHOTOGRAPHY

Much of the effort to improve air quality and reduce carbon emissions in Hong Kong has focused on using cleaner fossil fuels, burning them more efficiently, or where possible, scrubbing the emissions with end-of pipe solutions. There have been many valuable initiatives in this area including the introduction of so-called “Euro V” standard motor vehicle fuel in 2010, the Fair Winds Charter – which led to the recent low-sulphur fuel regulations for the shipping sector – the current consultation on the future fuel mix for electricity generation, the scheme to retire pre-Euro 4 diesel commercial vehicles, and the subsidy for replacement of catalytic converters in taxis and public light buses, to name a few.

All of these are important steps in the right direction, but a quick glance out the window will confirm that it takes time for the impact of these measures to be realized. It’s also clear that there is no single solution – a portfolio approach is required and we must always be asking: what more can we do?

One solution that hasn’t received much attention, despite its many benefits, is the use of alternatives to fossil fuels, such as biodiesel. Biodiesel is a clean-burning renewable transport fuel, which can be used in a blend with fossil diesel without any engine modifications or infrastructure changes. A typical blend ratio is 5% (B5) and B100 (pure biodiesel) are possible.

Biodiesel is produced from vegetable oils using methanol and a catalyst. This is not new – the chemistry has been known since the mid-nineteenth century and the fuel has been produced commercially since the 1980s. Today, 24 million tons of biodiesel are consumed every year. It is distributed by the oil companies in retail petrol stations in more than 60 countries around the world (but not yet in Hong Kong), and all the major vehicle engine manufacturers support its use in their engines.

In Hong Kong, a thriving biodiesel manufacturing industry has grown up in the last five years – three local companies now operate production facilities here with

the capacity to produce about 130,000 tons per year of biodiesel – enough to supply all the diesel vehicles on the road with a 10% biodiesel blend.

What sets the local producers apart is their focus on the use of waste vegetable oils, like used cooking oil and grease trap oil, as raw material. This is a technically challenging task that traditional producers lack the technology or the know-how to process it. Biodiesel made from waste is free from the food-versus-fuel and sustainability concerns that surround biodiesel made from virgin oils like palm, rapeseed and soy. About 20,000 tons of used cooking oil and 170,000 tons of grease trap waste are generated in Hong Kong every year and the local biodiesel producers perform a valuable service to the community in collecting and recycling a large portion of this waste and converting it into a clean fuel, preventing it from being dumped down the drain or reprocessed illegally back into the food chain. All of this is done without subsidies.

The industry is a successful example of what Hong Kong aspires to achieve with other waste streams – source separation, high recovery rates, and conversion to a high value-added product with environmental and socio-economic co-benefits. Having attracted more than HK\$ 1.3 billion in capital investment and created more than a hundred permanent new jobs, the industry is also a reminder that recycling is not just a “mum and pop” business, and that environmental solutions are also good for Hong Kong’s economic development.

Another benefit of biodiesel is that it contributes to better air quality, reducing pollution and the associated health risks. A significant body of recently published, peer-reviewed scientific research shows that biodiesel reduces emissions of particulates (PM10, PM2.5 and ultrafine), unburned hydrocarbons, carbon monoxide, polycyclic aromatic hydrocarbons (PAHs), aldehydes and volatile organic compounds (VOCs). It is also an ultra-low sulphur fuel. These are the main constituents of outdoor air pollution – now officially recognized as a carcinogen by the World Health Organization, and as the world’s leading environmental health risk.

A third benefit of biodiesel is that it lowers greenhouse gas emissions. Biodiesel made from waste is, in fact, the lowest carbon transport fuel currently available at scale, with 85% lower CO2 emissions than fossil diesel. ASB Biodiesel’s annual production of 100,000 tons of biodiesel will avoid 257,000 tons of carbon dioxide annually, or about 3.6% of the carbon dioxide emissions from the transport sector in Hong Kong.

There is a lot of interest from companies in Hong Kong wanting to use biodiesel. A handful of com-

Chamber Visits Biodiesel Processing Plant

“Hong Kong is an ideal place for a biodiesel plant, given the high population density and efficient transportation network to support the logistics of supplying used oil, as well as delivering biodiesel to customers,” Anthony Dixon, CEO, ASB, told 40 members during the Chamber’s visit to ASB Biodiesel Plant in March.

“We collect 6,000 tons of used cooking oil annually from 4,000 restaurants in Hong Kong, which we process into biodiesel. We also import waste vegetable oils from around the region. We see significant growth opportunities for the biodiesel market, not only in Hong Kong but also in the Mainland and Southeast Asia.”

Led by Dr Jeanne Ng, Vice Chairman of the Environment & Sustainability Committee, members learned that the 18,000 sq. foot biodiesel factory in Tseung Kwan O Industrial Estate has an annual capacity to produce 100,000 tonnes of fuel from waste cooking oil. This is enough to fuel every diesel engine on Hong Kong’s roads with B10 (10% blend), offsetting 257,000 tonnes of greenhouse gas emissions, or 3.6% of the total emitted by local transport sector. Biodiesel is an ultra-low sulfur fuel which also reduces other roadside emissions including PM10 and PM2.5 and can contribute to improved air quality.

“Biodiesel is a clean, low-carbon fuel that can substitute for fossil diesel, and without the need for engine modification and without any noticeable difference in the performance of the engine,” Dixon said. Currently, 62 countries have established blending mandates, requiring the use of biodiesel in a blend with diesel. B5 is a typical blend ratio, but it is technically possible to use higher blends including B100.



panies in the transport and construction sector are already using it, as are some Government departments (on a trial basis) such as the Police Department, the Environmental Protection Department and the Logistics Department, as well as statutory bodies such as the Airport Authority. One of the oil companies has begun supplying B5 to a few of its wholesale customers.

But these initiatives are the exception and, at present, are only possible for the few companies who have on-site fuel depots or special fuel delivery arrangements with the oil majors. More than 95% of the biodiesel produced in Hong Kong this year will be exported to Europe where mandatory blending regulations require its use. This is likely to remain the case as long as the use of biodiesel here is voluntary.

The key to widespread biodiesel use in Hong Kong is distribution, and the key to distribution is mandatory blending. If biodiesel use remains voluntary, blending must be done on a case-by-case basis for selected wholesale customers (operationally complicated for the oil majors), and retail distribution isn't an option as gas station operators lack the forecourt space to distribute it through a separate, dedicated pump. But once blending becomes mandatory, biodiesel would be distributed in a blend from the same pumps we now get our diesel from. Problem solved.

More than 62 countries around the world have adopted mandatory blending regulations, including the EU28, the U.S., Taiwan, South Korea, Malaysia, Indonesia, the Philippines and Thailand. In 2010, the Government's Climate Change Strategy and Action Agenda consultation document recommended introducing mandatory blending regulations in Hong Kong, but it has yet to be adopted.

The price impact of a B5 biodiesel blend is very small. ASB Biodiesel estimates that the retail price of B5 in



KITMAN PHOTOGRAPHY

Hong Kong should be about 0.5% or 6 cents more than the retail price of diesel which is currently HK\$12.70 per litre. System-wide, this implies a cost of about HK\$104 million per annum – a small price to pay, it would seem, for the many environmental benefits. ★

總商會考察生物柴油廠

總商會於3月份率領40位會員參觀ASB生物柴油廠，該公司的行政總裁Anthony Dixon向會員表示：「香港人口稠密，加上四通八達的交通網絡，能支援廢油回收的物流，並把生物柴油運送給客戶，故此是經營生物柴油廠的理想地點。」

他續稱：「我們每年從全港4,000家食肆收集6,000噸廢食油，再轉化成生物柴油。公司亦會向亞洲地區進口廢植物油。我們看到生物柴油市場有重大的增長機遇，除了香港，內地和東南亞都商機處處。」

是次考察團由環境及可持續發展委員會副主席吳芷茵博士率領，會員了解到這個位於將軍澳工業邨佔地18,000平方呎的生物柴油廠房，能年產10萬噸由廢食油轉化成的燃

料，足以按B10（即10%生物柴油的混合比例）注滿全港路上柴油車的油箱，抵銷25.7萬噸的溫室氣體排放量，相當於香港交通運輸總排放量的3.6%。生物柴油是一種超低硫燃料，更可減少PM10及PM2.5懸浮粒子等其他路邊排放物，有助改善空氣質素。

Dixon表示：「生物柴油是一種清潔、低碳的運輸燃料，可取代化石柴油，適用於一般柴油引擎，無需任何改裝，性能和表現亦與化石柴油相近。」現時，全球已有62個國家制訂了強制性的混合規定，要求生物柴油與普通柴油混合使用。B5是典型的混合比例，但現行技術可支援更高比例，例如以B100純生物柴油作為燃料。

產自廢物的生物柴油： 香港的強制性混合方案

為改善空氣質素和減少碳排放，香港一直集中使用更潔淨的化石燃料及更有效的燃燒方法，或採用可行的終端處理方案。很多相關的有效措施已相繼實施，包括在2010年推出所謂「歐盟五期」的標準機動車燃料、最近由《乘風約章》促成的航運業低硫燃料法規、未來發電燃料組合的諮詢、淘汰歐盟四期前的柴油商業車輛計劃，以及向的士及公共小巴提供更換催化轉換器的補貼等。

上述措施均朝著正確方向邁進，但卻需要一定時間方能奏效。再者，有關議題顯然沒有單一的解決方案。本港需要制訂組合政策，並時刻反思：我們還可做些甚麼？

事實上，以生物柴油取代化石燃料的好處眾多，卻一直備受忽略。生物柴油是一種潔淨的再生燃料，可與化石柴油混合使用，而無需改裝任何引擎或基礎設施。兩者典型的混合比例為5%（B5），有關比例更可高達100%（B100）。

生物柴油以植物油、甲醇及催化劑提煉而成。實際上，這種化學物質並非新科技，自19世紀中葉已被廣泛知悉，自1980年代起已被生產作商業用途。時至今日，我們每年消耗2,400萬噸生物柴油，由燃油公司分發至全球超過60個國家的零售加油站（香港尚未實行），所有主要汽車引擎製造商所生產的引擎均支援生物柴油。

香港的生物柴油製造業在過去五年發展蓬勃。現時，三家本地生產商在這裡設有生產設施，每年生產約13萬噸生物柴油，在傳統柴油中加入10%的生物柴油後，有關混合燃油足以供應所有道路柴油車輛。

本地生產商的與眾不同之處，在於懂得善用廢食油及隔油池廢油等廢植物油作為原料。傳統生產商對有關技術或缺乏掌握不多，因此在技術上面對一定的挑戰。有別於傳統用初榨棕櫚油、菜籽油和大豆油製成的生物柴油，產自廢物的生物柴油具有可持續性，而且不會與糧食供應構成競爭。鑒於香港每年產生約2萬噸廢食油和17萬噸隔油池廢物，本地的生物柴油企業正好為社會提供實用的服務，透過收集和回收大部分相關廢物，並將之轉化成潔淨的燃料，以避免其被運送至堆填區，或經非法加工後重返食物鏈。這些廢物處理服務均沒有得到補貼。

生物柴油製造業為本港其他廢物再生方案的成功典範，包括廢物源頭分類、高回收率，以及把廢物轉化成環境和社

會經濟效益兼備的高增值產品，因而吸引了超過13億港元的資本投資，同時創造了過百個長期職位。業界亦說明了回收業不僅是家庭式小業務，有關的環保方案還能造福香港的經濟發展。

生物柴油的另一好處是能夠改善空氣質素、減少污染和相關的健康風險。最近一項經同行評審的科學研究指出，生物柴油可減少懸浮粒子（PM10、PM2.5和超微粒子）、未燃燒的碳氫化合物、一氧化碳、多環芳烴（PAHs）、醛，以及揮發性有機化合物（VOCs）的排放，它同時亦是一種超低硫燃料。這些都是導致戶外空氣污染的主要成分，現已被世界衛生組織確認為致癌物，以及世界環境健康風險的主要來源。

生物柴油還能減少溫室氣體的排放。事實上，由廢物製成的生物柴油是目前可用的最低碳運輸燃料，對比使用石化柴油，可降低85%的二氧化碳排放。ASB每年生產的10萬噸生物柴油，將可避免25.7萬噸二氧化碳排放，相當於香港運輸業約3.6%的二氧化碳排放量。

本港企業對使用生物柴油深表興趣，少數運輸和建築公司已率先使用有關柴油。機場管理局等法定機構，以及多個政府部門如警務處、環境保護署和政府物流服務署，亦正對其作試驗性使用。其中一家主要燃油公司已開始向其若干批發客戶供應B5柴油。

然而，這些例子實際上寥寥無幾，並只局限於擁有油庫場地或與大型石油公司訂下特殊燃料輸送安排的少數企業。因此，逾95%今年在本港生產的生物柴油將出口到歐洲，因當地已有強制性混合使用生物柴油的法規。假如使用生物柴油仍然只以自願性質實施，這種情況將會持續下去。

在港廣泛使用生物柴油的關鍵在於分銷，而分銷的關鍵在於強制性混合規定。如果使用生物柴油仍屬自願性質，混合方式必須按批發客戶的個別情況而定（燃油公司在操作上非常困難）。零售分銷亦不可行，原因是油站經營商放置獨立生物柴油專用泵的空間有限。然而，混合模式一旦強制執行，傳統柴油泵將可用於分銷生物柴油，問題亦就此得以解決。

全球超過62個國家已實施強制混合規定，包括歐盟28國、美國、台灣、南韓、馬來西亞、印尼、菲律賓和泰國。早於2010年，政府的應對氣候變化策略及行動綱領諮詢文件已提出在本地引入強制性混合安排，但有關建議仍有待採納。

使用B5生物柴油混合燃料對價格的影響極微。ASB估計，與目前柴油每公升12.70港元的零售價相比，在港使用B5柴油的成本只會增加0.5%，相當於0.06港元，全年成本約1.04億港元。

只需付出甚少的代價，便可換來莫大的環境效益。✿

