Retrofit Dirty 2-Stroke Vehicles in Philippines

Tricycle Taxis On the Streets of Manila

These hyper-polluting engines are omnipresent in Manila. They are an inexpensive, convenient, and a necessary part of the transportation system, but their environmental impact must be negated.
A Sea of Tricycle Taxis

There are over 50 MM carbureted two-stroke engines in use in Asia. In the Philippines alone there are over 1.5 MM being used in tricycle taxis.

Tricycle Taxi Drivers in Manila

Tricycle taxis not only provide vital transportation to Manila’s masses, they also provide over 1.5 MM jobs for working class Filipinos. Banning tricycle taxis would not only paralyze transportation, but it would also mean the loss of all those jobs. Elimination is therefore impossible, while retrofitting is a cost-effective solution.
Tricycle Taxis On the Streets of Manila

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Tricycle & Drivers Associations (TODA)

Tricycle taxis in the Philippines are organized into TODA’s, which function like local unions. The support of TODA’s is crucial to any retrofit program, and to date TODA’s have been extremely supportive of Envirofit’s retrofit plans. They see the environmental benefits, but they are most pleased with the money drivers save from reduced gas and oil expenses. What union does like to provide significant salary increases to its members?
Field Tests

Envirofit has performed over 150,000 km or ~12,000 hours of testing on 40 pre-production vehicles. Field validation testing has occurred in 5 different cites in the Philippines. These tests has shown that hydrocarbon emissions are reduced by 89%, CO emissions by 76%, CO2 emissions by 26%, and that fuel and oil efficiency are increased by 35% and 50%, respectively.

A Family Rides in a Tricycle Taxi

Working class Filipinos are the primary users of tricycle taxis, and bear the brunt of the disastrous emissions they leave in their wake. These people have no real choice, given their need to get to work, go to school, etc. A cleaner tricycle taxi will not only improve environmental conditions, but will also result in healthier and happier urban populations.
Retrofitting a Tricycle Taxi

It only takes a single trained technician ~4 - 6 hours to install Envirofit's retrofit technology onto a carbureted two-stroke engine. Envirofit has an ongoing relationship with Don Bosco Technical College to train young men and women to become certified technicians. This provides an additional class of Filipinos with professional opportunities they would otherwise not possess.

Emissions from Tricycle Taxis

Each carbureted tricycle taxi emits pollution equal to that of approximately 50 modern cars. In the Philippines alone, that equates to the emissions of over 90 million automobiles! The blue-grey smoke trailing behind tricycle taxis is primarily unburned hydrocarbons, a major contributor to greenhouse gases. The Envirofit retrofit kit eliminates virtually all visible smoke emitted from taxis.
President Visit

Photo from Progress Report 'Donations support retrofit of 1500 trikes in Philippines'

President, Governor, Mayor and Envirofit personnel

Photo from Progress Report 'Donations support retrofit of 1500 trikes in Philippines'
Demonstrating Envirofit technology to the President

Photo from Progress Report 'Donations support retrofit of 1500 trikes in Philippines'

Summary
Promote the use of retrofitted two-stroke vehicles by Filipino taxi drivers. These vehicles significantly reduce emissions and fuel consumption and enable drivers to save money and increase income.

What is the issue, problem, or challenge?
The 1.8 million two-stroke vehicles in the Philippines produce the pollution equivalent of 5 billion automobiles. 1.3 million taxi drivers & millions of working class Filipinos rely on them for income/transportation respectively. Our retrofit dramatically reduces emissions: carbon monoxide 76%, carbon dioxide 35%, & hydrocarbon 89%. In addition, fuel consumption is reduced by 35%, oil consumption by 50%. This increased fuel efficiency saves taxi drivers $500 per year, a 33% increase in income.

How will this project solve this problem?
Envirofit currently has pilot projects in 3 historic/tourist cities: Vigan, Puerto Princesa, and Boracay. These projects aim to retrofit nearly 4000 vehicles. We are looking to replicate this project throughout the Philippines and to other countries.

Potential Long Term Impact
Our 3 pilot projects will ANNUALLY remove 127,000 automobile equivalents of pollution and infuse $1.1 million dollars into the local economy. We expect incidence of respiratory disease to decline with an improvement in the drivers’ quality of life.
Project Message
After 6 months of using Envirofit’s kit I was able to save up enough money to use as matching funds for a housing grant. I rebuilt my home & my neighbor’s home, which provided housing for 6 families!
- Rolando Santiago, Envirofit field test participant

Funding Information
This project has been retired and is no longer accepting donations.

This project has provided additional documentation in a Microsoft Word file (projdoc.doc).


Look also www.Land.PhilippineTransport.ph
Envirofit

New solutions to global challenges

Mission

Envirofit develops and disseminates products and services that address major environmental problems in the developing world. Established as a U.S. tax-exempt corporation, Envirofit utilizes initial donations and institutional support to fund product development and early stage product commercialization, and then uses operating income to develop and expand its businesses. Envirofit’s goal is thus to build and operate self-sustaining businesses as an entrepreneurial, commercially-driven, independent, non-profit organization.

Background

Envirofit developed from research work undertaken at the Colorado State University Engines and Energy Conversion Laboratory (“EECL”), a world leader in designing energy efficient, low emissions engines. The Director of the EECL had worked extensively with the natural gas pipeline industry to retrofit its large two-stroke engines as a means of reducing operating cost and emissions, and in 2001 was involved in the design of a direct injection retrofit kit for two-stroke snowmobiles. That research eventually evolved to consider the feasibility of a direct injection retrofit for a third world application. EECL was soon contacted by an Asian Non-Governmental Organization (NGO) regarding its potential application to the rampant two-stroke pollution problems in the Philippines. Several months later, Professors from EECL and Colorado State University College of Business agreed to jointly supervise a graduate student team investigating the feasibility of taking the demonstration kit developed at EECL and commercializing it into a
sustainable business. That exercise led the formation of Envirofit in October, 2003. Subsequent, substantial funding from the Bohemian Foundation allowed Envirofit to undertake extensive product development and field testing, then to commercialize its initial retrofit kit.

**Vigan Project Proposed Scope**

Envirofit’s VTRP proposes to commercially introduce our two-stroke engine retrofit kit into the Vigan market, and over the course of 12 months to retrofit all 3,000 of the two-stroke engine tricycle taxis operating in Vigan City. The VRTP also plans to incorporate noise reduction measures into the installation of the retrofit kit. Finally, a combination of emissions, roadside, and ambient air quality testing will quantify the resulting improvement to Vigan’s environmental conditions.