E-VEHICLE STRATEGY OF DEPARTMENT OF ENERGY

A. Transport Sector Overview

1. Share in Energy Consumption

1. The Philippine transport sector is the biggest energy consuming sector. As of 2009, its energy consumption share is at 37.7 percent followed by residential (26 percent) and industrial (24.5 percent) sectors. Petroleum products like diesel oil, gasoline and aviation fuel which are imported commodities are the form of energy consumed by the transport. Such high energy demand of the sector is due to heavy reliance on road transport which partakes of about 79.3 percent of the sector's total fuel consumption.

2. Road transport sub-sector which accounts for 90 percent of total passenger and 50 percent freight movement nationwide is relied on heavily specially in urban areas such as Metro Manila due to growing number of passenger vehicles. There are about 60,000 jeepneys, 4,000 buses and 200,000 tricycles plying its streets.

3. The transport sector energy consumption is projected to grow at an annual average rate of 3.2 percent from 2006–2014. It is expected to use up 34.3 percent of the country’s total energy demand. The country will continue to rely on imported fuel. Imported oil and oil products will account for the bulk share of 75 percent of total imports with an annual average growth of 3.8 percent from 2006–2014. Beyond 2006, road transport energy demand is expected to grow at an annual rate of 4.6 percent and account for 90 percent of total transport energy demand in 2030.

2. Greenhouse Gas Emission

4. According to the Presidential Task Force on Climate Change, the energy sector, including transportation, is the largest contributor to the Philippines' greenhouse gas (GHG) emissions. The largest source of GHG emissions are transport at 30 percent and power plants at 27 percent. This means that these two sub-sectors account for 14.7 percent and 13.2 percent respectively of total Philippines GHG emissions. Beyond 2006, CO₂ emissions is expected to grow at 4.6 percent per year and will reach a total of 262 million tons of CO₂ in 2030.

5. Measures to move away from fossil fuels improvement in energy-efficiency and conservation and other emission reduction programs would contribute to the slower growth in CO₂ emissions despite the economy’s robust demand growth. To this end, technology and modal shifts need to be implemented to mitigate power and transport sector emissions growth in the near future with emphasis on, among others, vehicle technology.

Footnotes:

4. Footnote 2.
5. Footnote 3.
7. Footnote 3.
B. Government’s Strategy on the Transport Sector

1. On-Going Initiative: Fuel Diversification

6. To reduce dependence of transport sector on fossil fuel, and as part of its low-carbon strategy, the government has aggressively introduced and promoted the use of biofuels mainly sugar cane and cassava-based ethanol and CME for biodiesel for transport. The Biofuels Act, which provides incentives for biofuels projects, mandates that gasoline be blended with 10% ethanol (E10) and 5% biodiesel blend (B5) by 2011.\(^6\) As of 2010, gasoline importation displaced with ethanol amounts to 32,693,151 liters while diesel importation displaced with biodiesel is placed at 368,406,384 liters. The success of the biofuels program, however, hinges on the economic viability of establishing new production facilities, increasing biofuel feedstocks and the issuance of necessary incentives to attract prospective investors. Also, a concern that the country may face in the future is the conflict between energy security and food security. If left unchecked, feedstock for ethanol and CME will compete with the current demand for sugar and coconut products (both important exports commodities) and might result again to unwarranted imports and increased prices.\(^11\)

7. The Government also adopted the use of Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) to diversify the country’s fuel resources for transport and decrease vehicular emissions. These alternative fuels are cleaner and lower priced than the conventional fuel. Under the Autogas Program, measures have been adopted to ensure safety on the use of LPG as transport fuel including installation of devices in the cylinder and promulgation of standards on technology use. As of date on nationwide scale, there are about 18,731 LPG-using vehicles plying the streets, 217 retail dispensing stations 72 of which are private garage-based and 31 accredited auto–LPG conversion shops. Thirteen women technicians completed training on the conversion of diesel vehicles to auto-LPG. This initiative has resulted in fuel displacement of 165 million liters of gasoline in 2010 and 88.6 million liters in the first half of 2011. On the use of CNG, the government launched in 2008 the pilot of the Natural Gas Vehicle Program for Public Transport (NGVPPT) and provided incentives for the program. Forty-one public buses are now commercially operating along Batangas-Laguna-Manila route under the pilot project while 21 others have completed the pre-operation technical evaluation and testing. One CNG mother station and one CNG daughter station have been put up and operating. Another 200 units of CNG buses were committed to the NGVPPT by seven bus operators. This pilot project has resulted in fuel displacement of 387,732 liters of diesel equivalent in 2010 and 630,393 liters in the first semester of 2011.\(^12\)

2. Further Initiative: Scale Up of CNG and LPG Use and Use of Emerging Technologies

a) International Initiatives/Experience as Guide

8. The concerns on rising oil prices, energy security (the uninterrupted availability of energy sources at an affordable price)\(^13\) and the need to cut CO\(_2\) emissions are issues commonly shared by all countries in the world. Dwindling oil reserves, growth in global oil demand,

\(^10\) Footnote 6.
\(^11\) Footnote 3.
\(^12\) IEA’s definition of energy security
geopolitical conflicts and renewed debate on nuclear energy continue to shake the world economy. According to the International Energy Agency (IEA), the age of cheap energy is over and curbing rising fossil fuel prices will require significant investments and further development and deployment of renewable energy technologies, energy-efficiency and advanced vehicles.

9. Although the worldwide market for Natural Gas Vehicles (NGVs) has developed stronger than ever before, this technology remains a niche market as the current share of natural gas in road transportation is still very limited, with a share of less than one percent of world road fuel consumption. The countries with the highest level of market development are Argentina, Brazil, India, Iran and Pakistan. Brazil has shown remarkable average annual growth of almost 60 percent in number of NGVs during the past decade. It has, however, recently slowed down due to competition from ethanol flex-fuel vehicles and supply constraints. Among the countries in the world, India is regarded as the one with the biggest potential for use of NGVs. During the past decade, CNG programs were introduced in nearly 10 cities leading to a steady growth in the number of NGVs now estimated at 935,000 vehicles including buses, three-wheelers, taxis and small commercial vehicles. Success is partly attributed to supportive actions from the government aimed at stimulating growth of the industry. New Delhi for instance has taken the following initiatives to help develop NGV program: (i) lower interest on loans for the purchase of CNG three-wheelers and taxis; (ii) VAT subsidies to replace old diesel light commercial vehicles (LCVs) by CNG vehicles; (iii) full exemption of CNG for automotive use from sales tax; and, (iv) taxation of diesel fuel to fund clean transportation subsidies. Pakistan remains to be the world’s leading country in terms of NGVs with more than 2 million NGVs and over 3,000 CNG stations located in 50 cities. The government intends to continue the program’s growth to reduce pollution from transportation and reduce pressure on its depleting reserves of foreign currency. The Pakistani government has stimulated the introduction and growth of CNG use in transportation by partially or completely exempting CNG equipment from duties, specifically promoting the use of CNG in rickshaws and buses, subsidizing the testing of cylinders, encouraging training programs and setting a specific tariff for CNG to create a price differential.14

10. There are over a billion vehicles in the world today and as of 2010, over 14 million (1.4 percent) of these use LPG. The number has been growing at a rate of 12-15 percent per year over the last decade. Globally, 8.1 percent of LPG produced is used as fuel for transport. The top 10 countries for LPG use are South Korea, Turkey, Poland, Japan, Australia, Russian Federation, Italy, Mexico, Thailand and the USA. All of Hongkong’s taxis and 90 percent of Japan’s run on LPG. The world’s largest user of LPG is South Korea which has 1.7 million LPG cars on the road. Korean manufacturers lead the Autogas market with dedicated LPG models, and even hybrid vehicles (Hyundai Elantra, Kia Forte). In Australia, 1 out of every 3 cars that Ford produces is an LPG vehicle. General motors are also planning to introduce Autogas version of its Cruze sedan in Europe later this year, in keeping with the rest of the Chevrolet models. Fiat offers LPG versions of its most common models.15

11. International initiatives relating to electric vehicles (EVs) is growing. The Electric Vehicle Initiative (EVI - composed of 12 countries – China, Denmark, Finland, France, Germany, India, Japan, Portugal, South Africa, Spain, Sweden and the United States-representing over 80 percent of the world’s production of cars, and the IEA, is a forum for global cooperation on the development and deployment of EVs) has been aggressively pushing for EVs with outlined

15 DOE. Presentation on Fueling Sustainable Transport Program (FSTP). 2011.
targets for 2020 and beyond. The combined targets if achieved would mean over a billion EVs on the road and 15 million barrels per day savings by 2050.\(^\text{18}\) Non-EVI member countries such as Korea and the United Kingdom have also pooled resources for EVs development. Korea developed an electric “green” bus service as the first step in Seoul’s electrification of their bus services and announced that half of its massive fleet of buses will be electric by 2020. The country’s grand plan is to have 120,000 EVs within the city by end of 2020. This will account for 50 percent of all public transport vehicles, 10 percent of sedans and one percent of trucks and vans. The British Government allocated GBP 10,000,000 to support technologies applicable for electric and hybrid buses.\(^\text{17}\) It hopes to have on the streets 1.2 million Evs by 2020 and 3 million by 2030.\(^\text{18}\)

12. Among the countries in the forefront of EV development are the United States and Israel. US eyes 1 million EVs by 2015 while Israel targets 100 percent EVs by 2020. For both countries, EV movements are collaborative efforts of entrepreneurs, government agencies, media, utilities, and established firms, with the US adding two important groups, the NGOs and research organizations, and with Israel, venture capitalists. For an EV movement to be successful, it should (i) establish network partnerships for EV technology development and public awareness; (ii) have political leadership for energy independence; and, (iii) provide incentive policies to build capacity of local industry. Incentives that may be made available are those for (i) EV manufacturing e.g. public and private financing for vehicle and battery research, demonstration and deployment (US and China), regional tax and rent subsidies to attract manufacturing plants (US), and government fleet orders of EVs (Europe and US); (ii) EV owners e.g. tax credits or reduced sales tax (UK, US, China, Israel, Denmark), fee-bates (California), preferential parking and/or traffic lanes (California), exemption from congestion policies (China) and reduced franchise fees from city governments; and, (iii) infrastructure deployment e.g. subsidies and loans for charging infrastructure equipment manufacturing and installation (US), make public/private land available for charging stations (Israel), and subsidies and loans for home-charging units for consumers (US).\(^\text{19}\)

13. In China, the use of electric two-wheelers has become popular. As of 2007, an estimated 40 million to 50 million people have been using electric bikes as mode of transportation.\(^\text{20}\) Since its take off in 2004, over 100 million have been sold and now more than 20 million are sold each year. Electric two-wheeler vehicles thus represent the first mass-produced and mass-adopted alternative-fuel vehicles in the history of motorization. But while its use proved to be advantageous because it provides low-cost and low-emission mobility, problems on safety and environment protection surfaced. This is due mainly to lose enforcement of rules pertaining to (i) speed and weight (20/40 rule mandating that two wheelers maintain a 20km/hr speed limit and 40kg weight in order to be classified as electric bicycles); and, (ii) poor regulation of battery recycling (90 percent of electric bicycles lead battery). Two-wheelers get larger and faster which resulted in confusion about how to classify them and raised concerns about their safety. Bicyclists became increasingly concerned about sharing their lanes with larger, more powerful scooters. Proliferation of industry of small, informal recyclers and manufacturers whose existence is fueled by the popularity of two-wheelers resulted in the capture of only about 70 to 80 percent of used led. This does not only undermine the environmental advantages of two-

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\(^\text{16}\) Available at http://www.iea.org/index_info.asp?id=1930.
\(^\text{17}\) Footnote 15.
\(^\text{18}\) Dr. Shannon Arvizu and Mr. Robert Hall. Presentation on Energy Efficient Electric Vehicles, Lessons from Abroad. 2011.
\(^\text{19}\) Footnote 18.
wheelers but also poses health threats to people who live near lead production and recycling facilities. In the past year, a number of high-profile lead poisoning cases have been reported around lead and battery manufacturing facilities throughout China.\(^{21}\)

14. With China’s experience and the pressing issues on high oil prices, energy security and \( CO_2 \) emissions, the right set of policies pertaining to electric vehicles could be those that will: (i) establish a target and a roadmap for energy independence; (ii) build public-private partnerships between the EV network of stakeholders; (iii) drive demand from early adopters to the mainstream market; (iv) take into consideration clean energy usage and the lifecycle of vehicles and batteries; and, (v) create a culture and economy of clean technology innovation.\(^{22}\)

**b) The Fueling Sustainable Transport Program (FSTP)**\(^{23}\)

15. The Department of Energy is set to implement as its newest strategy the Fueling Sustainable Transport Program (FSTP). Aimed at bolstering its on-going initiative on fuel diversification, this program seeks to synchronize and integrate all efforts into one comprehensive government program to mitigate the impact of continuously increasing oil prices, lessen dependence on oil and encourage migration from petroleum/diesel-fed vehicles to low- and zero-emission vehicles to reduce carbon footprint. The program will accelerate the promotion and utilization of alternative fuels for public transport such as CNG, LPG and the use of new technologies such as electric buses, cars, jeepneys and tricycles.

16. To stimulate the growth of the program, the following components shall be considered in its implementation: (i) market development which will involve the government, LGUs and private enterprises as market actors e.g. input supplier, end-user and producers; (ii) financing program that will provide reasonable financing packages to producers and end-users; (iii) infrastructure development which will include putting up of charging stations, CNG daughter stations and disposal facility for phased out vehicles; (iv) development of standards and regulations that will require review of existing Philippine National Standards (PNS) for EVs and autogas vehicles, establishment of testing/accreditation/certification group and forging ties with related agencies and academe; (v) technology development through R&D by forging ties with the Department of Science and Technology (DOST) and the academe and by encouraging foreign manufacturing to invest for technology upgrade; (vi) manpower training and development through capacity building and training programs that will equip regulators, operators, drivers and mechanics with technical and operational skills; (vii) information education campaign through roadshow, demonstration and test drive and tri-media advertisement; and, (viii) proposed incentives program that will include fiscal incentives relating to, among others, excise tax, motor vehicle users’ charges and EVAT (for EVs and LPG jeeps) and income tax holiday and zero rate importation duties (for NGVs); and non-fiscal incentives e.g. exemption from number coding, simplified LTO registration processes, grant of new franchise, non-grant of new franchise on petroleum-fed vehicle and stricter implementation of Clean Air Act (for EVs and LPG jeeps); and compliance with emission standards, preferential and exclusive franchises to newly opened routes, issuance of ECC by DENR, manpower development and technology transfer program and attractive CNG price (for NGVs).

17. The Department of Energy has set the following targets for the program: (i) pilot run of e-trikes, e-jeeps, LPG jeeps in Metro Manila, and demonstration run of e-buses and e-cars and

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\(^{21}\) Christopher Cherry. ACCESS: the Magazine of University of California Transportation Center. 2011.

\(^{22}\) Footnote 18.

\(^{23}\) Footnote 15.
commercial run of CNG buses on selected routes by 2011; (ii) 10 percent reduction of petroleum and diesel-fed transport and construction of CNG daughter station in Metro Manila by 2012; (iii) 20 percent reduction of petroleum and diesel-fed transport in Metro Manila by 2015; and, (iv) 50 percent reduction of petroleum and diesel-fed transport in the Philippines by 2020.

18. The program if implemented in Metro Manila will result in the displacement of 200,000 units of tricycles, 60,000 units of jeepneys and 4,000 units of buses, and potential savings of 2.9 million barrels of oil or 383 million USD (at 130 USD per barrel). If implemented on a national scale thereby displacing 3,500,000 units of tricycles, 260,000 units of jeepneys and 35,000 units of buses, the potential savings is 28 million barrels of oil or 3.7 million USD (at 130 USD per barrel).