



Alternative Fuels Vehicle and Technology

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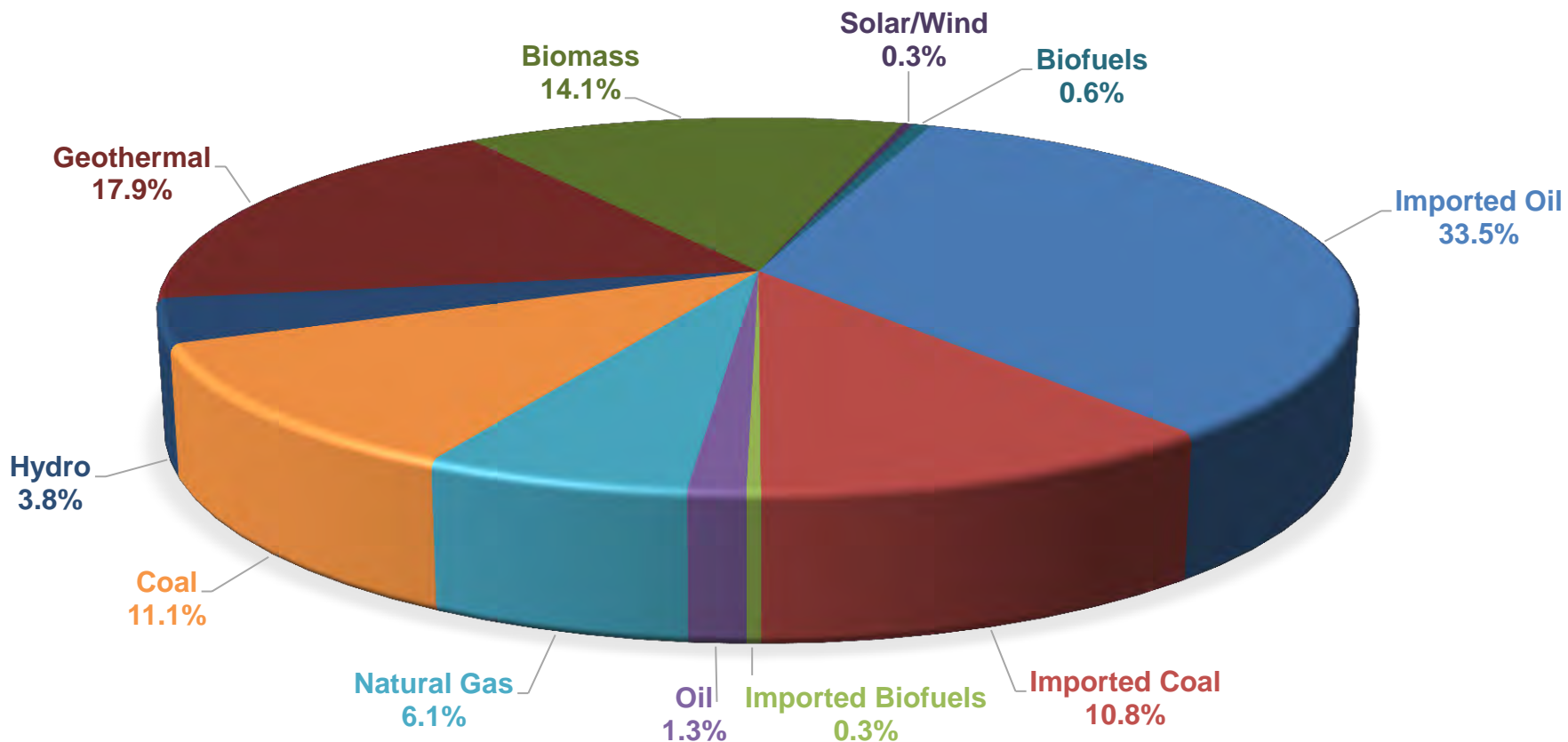
Energy Investment Forum and Stakeholders Conference

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PHILIPPINE ENERGY MIX

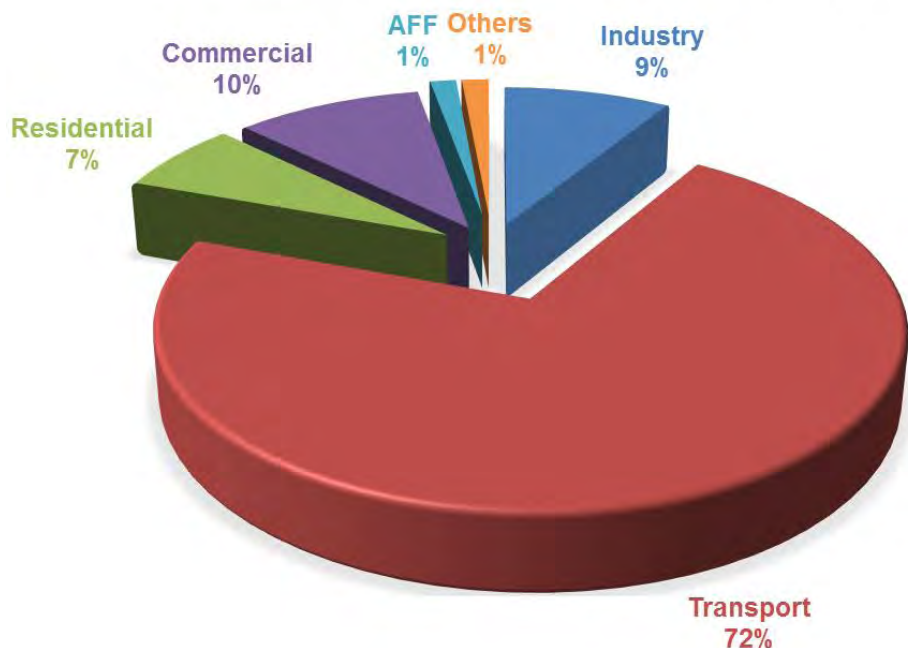


2016 TOTAL ENERGY = 53.19 MTOE

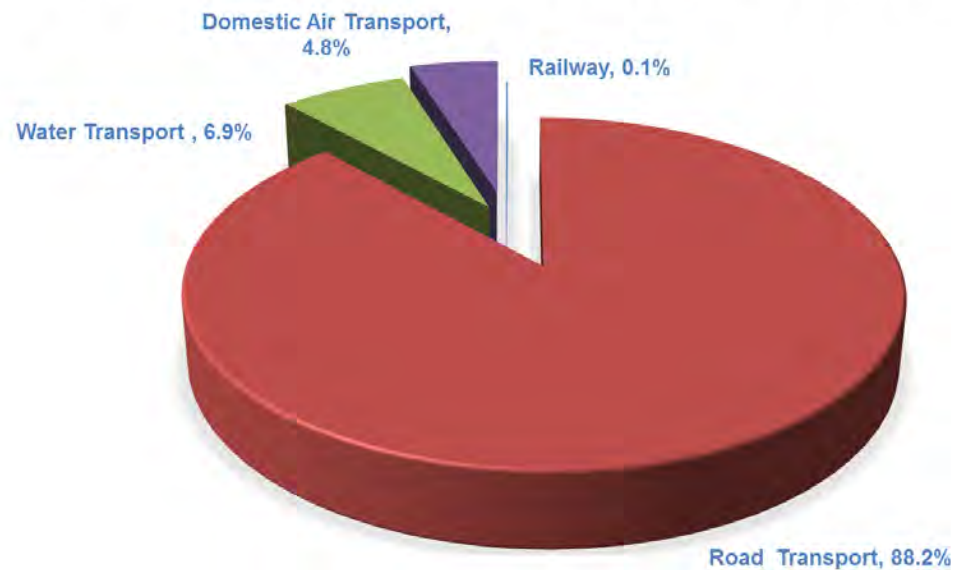
Source: DOE Planning – 2016 data

** Total Mix = Indigenous + Net imported Energy*

PETROLEUM OIL MIX, BY SECTOR



TRANSPORT FUEL CONSUMPTION, BY SECTOR



- Total Transport Petroleum Consumption = 15,043 kTOE
- Total Road Transport Gasoline Consumption = 11,881 kTOE



VEHICLE TYPE	NUMBER OF VEHICLES
1	5,329,770
Bus	29,794
3	971,750
2	1,969,351
SUV	493,223
Truck	407,357
Trailer	50,315
TOTAL	9,251,560

Source: Land Transportation Office (LTO) - 2016

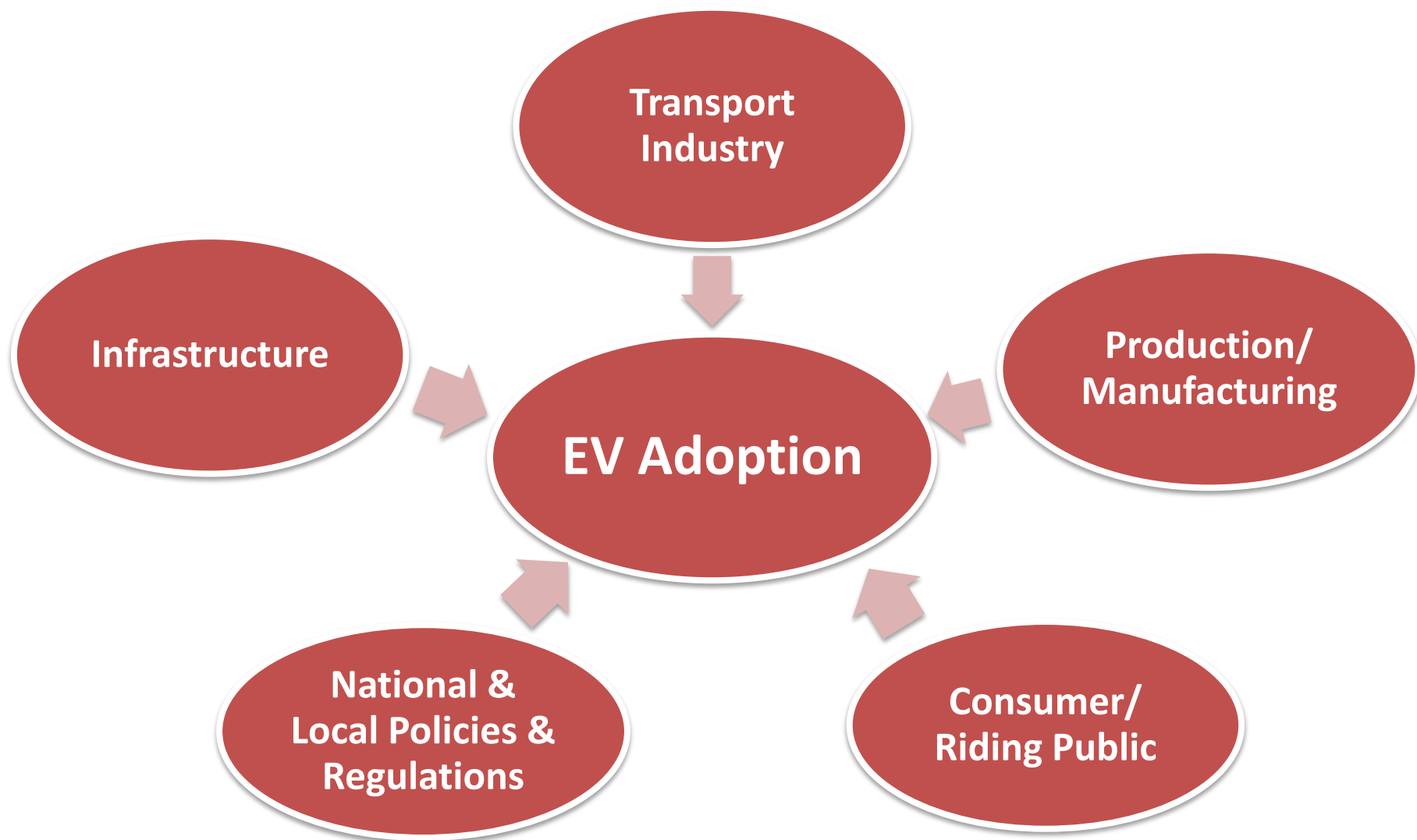
Achieving energy security and fuel diversification while meeting environmental challenges through the utilization of alternative fuels



Auto-LPG for Taxis & Jeepneys



Electric Vehicles (EVs)





Electric vehicles estimated cost:

- Php 200,000 to 490,000 for E-Trikes
- Php 700,000 to 1,000,000 for E-Jeeps
- Php 8 Million for E-Bus
- Php 15,000 to 40,000 for e-bikes & e-scooters



Environmental Benefits:

- No tail pipe emission
- Less NOISE and VIBRATIONS which enhances passenger comfort



Technological Benefits:

- Has few moving parts
- Charging can be done overnight when electricity demand is low

Existing Charging Infrastructures:

- *Makati Central Fire Station for E-Jeeps*
- *Mandaluyong City for E-Trikes*
- *Bacoor City for E-Trikes*
- *Boracay Island for E-Trikes*

Omnibus Investments Code (Executive Order 226)

- *Provides fiscal and non-fiscal incentives to emerging industries listed under the Investment Priorities Plan (IPP)*
 - *The IPP already lists alternative fuel vehicles, including the establishment of charging stations for electric vehicles, as priority areas.*

Registration of Electric Vehicles

- *AO AHS-2008-014 “Guidelines in the Registration of Low Speed Vehicles (LSV)”*
 - *Covers 4-wheeled electric vehicles*
 - *Exemption from smoke emission testing*
 - *Orange plate and stickers for private vehicles*
 - *Yellow plate and orange stickers for public vehicles (for hire)*

- *AO 2006-01 “Guidelines in the Registration of Light Electric Vehicles (LEV)”*
 - *Covers 2-wheeled and 3-wheeled electric vehicles*

Ordinances and regulations by other local government units (LGUs):

- *Exemption from number coding scheme*
- *Longer years for franchise effectivity*
- *Preferential franchise/ routes for e-trike*

Electric Vehicle Manufacturer, Distributor or Assemblers:

BEMAC
EV Wealth
Tojo Motors
Philippine Electric Utility Vehicle (PhUV)
Prozza Hirose Mfg., Inc.
Kea Industrial Inc.
Phil-Etro EV, Inc.
Pinoy Ako Corporation
Pangea Philippines, Inc.
Pangea Philippines Corporation
Terra Motors Philippines Corporation
Beet Philippines, Inc.
Gerweiss MotorsKyto Prime Green Power

Clean Transport Solutions, E-Motors
Serrotma – Alternative Modern Transport (AMT)
E-Save Transport Systems, Inc.
DC Electric Vehicle Corporation
Green Eco-tech
Kenwei Electric Vehicle Philippines
Eagle Motorcycle
Mitsubishi Motors
Honda Motors
Toyota Motors
Lexus

Lead Acid Battery Manufacturer/ Supplier:

Oriental & Motolite

Market Transformation through Introduction of Energy Efficient Electric Vehicles

➤ *Objectives:*

- To encourage the adoption of electric tricycles as public transport*
- To reduce dependence in conventional petroleum products*
- To achieve emission avoidance by shifting to electric tricycles*

The Project will:

- *Significantly improve the quality of life of the beneficiaries of E-Trike*
- *Promote the use of cleaner and more efficient vehicles*
- *Reduce health cost and economic impact of lost productivity as a result to air pollution*
- *Stimulate the market for E-Trike related support services such as charging stations, repair and maintenance shops, parts and supply services*



DOE E-Trike Model

DOE



Production Model



Technical Specifications:

- 3-wheeled vehicle
- 5 passenger capacity (*excluding driver*)
- 5 kW electric motor
- 3.2 kWh lithium-ion (TOSHIBA) battery
- On-board charger
- Motor controller
- Battery management system (*BMS*)
- *40 kph speed at full load capacity*
- *Can negotiate up to 14 degrees slope*
- *Can traverse flood water up to 300mm*
- 5 year warranty on e-trike unit
- 5 year warranty on lithium ion battery or 80,000 kms (*whichever comes first*)



Japan Non-Project Grant Aid (NPGA)

Objectives:

- To support the economic and social development of developing countries through the provision of Japanese-made next generation vehicles
- Deployment of next generation vehicles to complement the government's rehabilitation efforts in areas affected by Typhoon Yolanda.
- To promote the use of efficient and environment-friendly AFVs.

85 Units of Next-Generation Vehicles

- 77 units of Hybrid Vehicles
- 4 units of Plug-in Hybrid EVs
- 4 units of Electric Vehicles including charging stations



Beneficiaries include the following:

- PNP police stations in Region 8 that were devastated by the Typhoon Yolanda;
- National Government Agencies (NGAs) in Region 8 that are instrumental to emergency response operations and rehabilitation;
- NGAs involved in the conduct of research, performance testing and promotion of alternative fuel vehicles.



Auto-LPG Program



Program Objectives

- To **diversify the country's fuel resources**, particularly in the transport sector, through the use of LPG as an alternative fuel source while contributing to **addressing the air pollution** caused by vehicular emission.
- To encourage **partnership between public and private sectors** to develop the market and supply infrastructure.

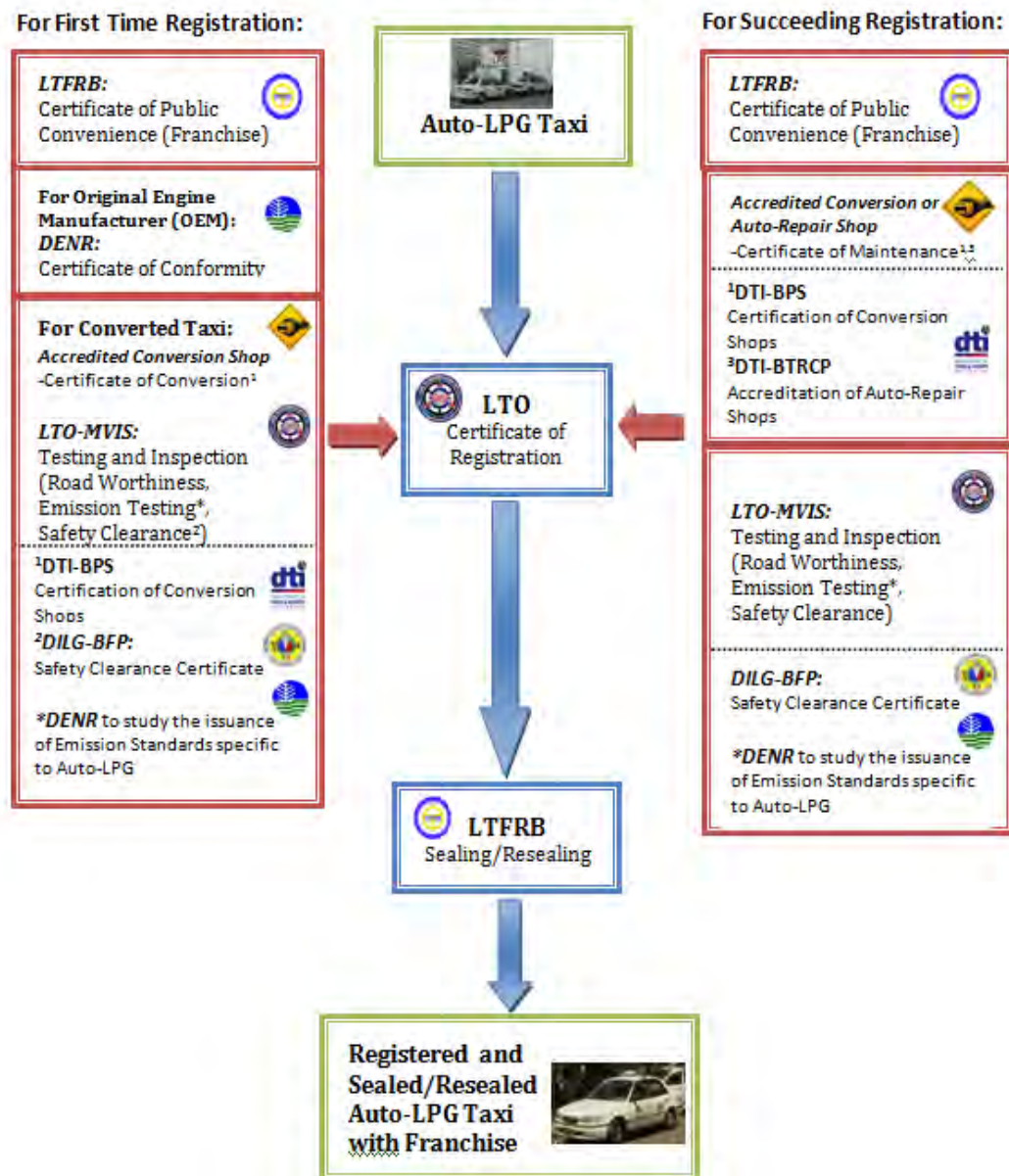
Components of the Program

- Policy formulation
- Monitoring of Infrastructure and Market development
- Standards development
- Information, Education and Communication (IEC) campaign

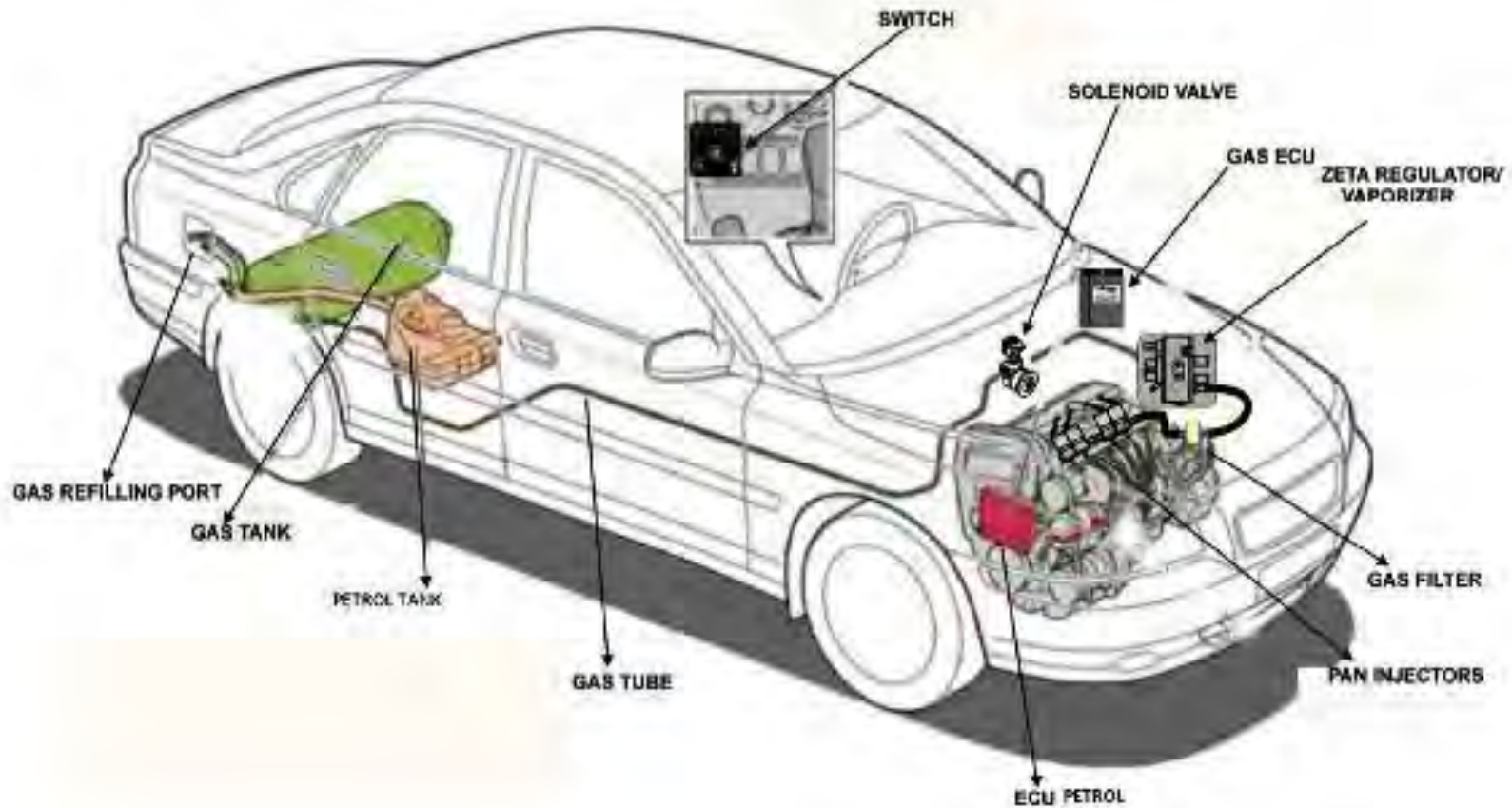
Policy Formulation

- Development of guidelines for the registration of AutoLPG-fed taxis (Joint Administrative Order);
- Adoption of JAO to institutionalize the AutoLPG TWG composed of different NGAs with jurisdiction over the AutoLPG Program.

AUTO-LPG TAXI REGISTRATION FLOWCHART



Schematic Diagram



AutoLPG Conversion

1. Installation of Tank

There are two types of tank installation:

- a) Open Vehicle Installation
- b) Enclosed Vehicle Installation

AutoLPG Conversion

2. Installation of LPG Supply Line

Things to consider during the installation of LPG Fuel Line System

- a) Is the regulator far from the radiator?
- b) Are all filters complete for the fuel line?
- c) Are all valves in the right direction?
- d) Is the injection point properly holed and there are no metal chips in the manifold?
- e) Are there any leaks in the connections?

AutoLPG Conversion

3. Installation of AutoLPG Regulator
4. Installation of Fuel Injector System
5. Installation of Electronic Control Unit
6. Testing, Calibration, and Commissioning of the Engine.

Monitoring of Infrastructure and Market Development

➤ Dispensing Stations (Nationwide)

(data from DOE-OIMB, as of June 2016)

- About 125 retail dispensing stations
- 67 garage-based dispensing stations

➤ Registered AutoLPG vehicles

- Around 8,415 AutoLPG vehicles (mostly taxis) operating (data from LTFRB, as of June 2016)

➤ AutoLPG Pricing

- Monitoring of AutoLPG prices in the market reflected in the DOE website

Monitoring of Infrastructure and Market Development

- PNS/DOE FS 3:2006 – Auto-LPG Dispensing Station
- PNS/UN ECE 67:2006 – Uniform provisions concerning
 - Approval of specific equipment of motor vehicles using LPG in their propulsion system
- Approval of a vehicle fitted with specific equipment for the use of LPG in its propulsion system with regard to the installation of equipment
- PNS/UN ECE 115:2006 – Uniform provisions concerning the approval of specific LPG retrofit systems to be installed in motor vehicles for the use of LPG in their propulsion system
- PNS 04:2006 – Road vehicles – Automotive LPG components (Containers)
- PNS 05:1983 – Code of Practice for the Use of LPG in Internal Combustion Engines

Monitoring of Infrastructure and Market Development

- **Trainer's Training on AutoLPG Conversion**
 - August 1-8, 2016, SICAT Santiago, Isabela
- **Capacity Building on Inspection of AutoLPG Vehicles and Dispensing Stations**
 - October 24-25, 2013, TESDA Women's Center Taguig
- **AutoLPG Technical Working Group Training-Workshop**
 - February 6, 2013, TESDA Women's Center, Taguig
- **Training Program on AutoLPG Repowering and Retrofitting**
 - March 8-24, 2011, TESDA Training Center, Taguig

Facts about AutoLPG:

- Total of 8,415 auto-LPG taxis, 122 dispensing stations nationwide
- Completed the conduct of Phase 1 and Phase 2 of on-road and laboratory performance testing for AutoLPG Jeepneys
- Institutionalization of the AutoLPG Technical Working Group for the harmonization of AutoLPG related government policies and guidelines through a Joint Administrative Order (JAO)
- Integration of AutoLPG Technician Course to State Universities and Colleges curriculum offering automotive course
- Entered into cooperation with DILG-BFP for the formulation of emergency response protocol for alternative fuel vehicles
- Partnership with Isabela State University on the expanded use of LPG as fuel for farm equipment
- Review and updating of applicable AutoLPG standards for transport

Way Forward

- Memorandum of Agreement (MOA) between DOE and State Universities, Colleges, and Technological Schools/Universities to establish Auto-LPG technician course:
- MOA with partner SUC on the expanded use of LPG as fuel to farm equipment
- Review and update of the PNS 05:1983
- Development of an Auto-LPG Emergency Response Protocol
- Coordination with the LTFRB on the monitoring of Auto-LPG taxi registrations & dissemination of informational materials for drivers
- Conduct of IECs and Capacity Building Seminars and Workshops.



Thank You!



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