



ALTERNATIVE FUELS and ENERGY TECHNOLOGIES

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ALTERNATIVE FUELS PROGRAM

The alternative fuels program is one of the five (5) key components of the Arroyo Administration's Energy Independence Agenda, which outlines the roadmap for the attainment of 60% energy sufficiency level by 2010.

OBJECTIVE AND GOAL

- To achieve energy security and fuel diversification while meeting environmental challenges through the utilization of alternative fuels
- The goal is to develop indigenous and renewable energy fuels for long term energy security as a pillar for sustainable growth.

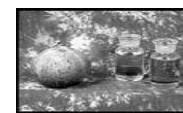


ALTERNATIVE FUELS AND ENERGY TECHNOLOGIES

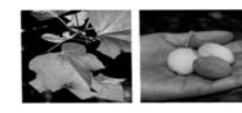
To achieve energy security and fuel diversification while meeting environmental challenges



Ethanol



Coco-methyl Ester (CME)
or *Coco-Biodiesel*



Jatropha Curcas or
"Tuba-tuba"



Compressed Natural
Gas



(AutoLPG, fuel cell, hydrogen,
EV, Solar car, hybrid)

WHERE ARE WE NOW?

- ♣ Current Biodiesel production capacity @ 302.62 million liters from 11 accredited biodiesel producers.
- ♣ 1% Biodiesel blend mandate (60 million liters diesel displacement based on 2006 actual diesel consumption)
- ♣ Voluntary 10% ethanol blend available in 105 Seaoil stations nationwide, 55 Shell stations in greater Manila area, 14 Petron stations in Metro Manila
- ♣ 5 Ethanol production plant projects endorsed and registered under BOI/IPP; 1 project endorsed to PEZA with proposed total capacity @ 343 million liters ⁵

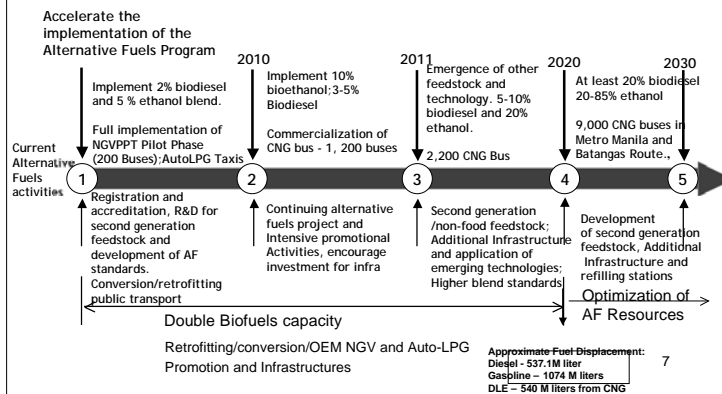
WHERE ARE WE NOW?

- ♣ 2080 hectares for jatropha initiatives planted all over the Philippines
- ♣ 13,886 Auto-LPG taxis converted
- ♣ Operations of CNG Mother-daughter stations in Batangas and Laguna in full capacity
- ♣ 11 out of 22 CNG buses are currently operating (5-ready for testing, 4-undergoing body building, 2-undego upgrading)

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ALTERNATIVE FUELS:(2008–2030)

Moving Towards Self Sufficiency and Clean Air



BIOFUELS PROGRAM

TARGET

- Implement 2% biodiesel and 5% bioethanol-blends mandate by 2009
- Implement 10% bioethanol mandated blend by 2011 and 5% biodiesel blends by 2016 and higher biofuel blends in the long term plan
- Develop standards for higher biofuel blends
- Conduct laboratory and on road tests for higher biofuel blends
- Expand the utilization of biofuels
- Diversify the use of natural gas into the transport sector

ALTERNATIVE FUELS

TARGET

- Encourage investments in alternative fuels development and utilization
- Formulate policy direction on LPG utilization
- Register and accredit biofuel production facilities
- Conduct IEC
- Undertake manpower capability and building

Natural Gas Vehicle Program for Public Transport

CNG buses

- 22 Original Equipment Manufactured-Compressed Natural Gas buses in the country:

No. of Buses	Bus Operators	Remarks
12	KL CNGBus Transport Corp.	
4	HM Transport, Inc.	
5 self-drive away (SDA)	RRCG Transport, Inc.	<ul style="list-style-type: none"> • Chassis only • Ongoing body building
1	CNG Vehicles Corp.	

- A total of 11 CNG buses (10-KL CNGBus and 1-HM Transport) plying Batangas/Laguna-Cubao route currently operating
- 5 buses are ready for test runs
- 4 SDA is undergoing local body building
- 2 buses have to undergo upgrading

Natural Gas Vehicle Program for Public Transport

CNG Daughter Station

- Daughter station is operating at full capacity
- Further minimized standard refilling time from 30 to 20 minutes/bus

Possible Sites for Additional CNG Stations

- Vicinity SM Mall of Asia
- Proposed inter-modal terminal between Quezon Avenue and Trinoma, Quezon City

Natural Gas Vehicle Program for Public Transport

Available Technology

- **Original Equipment Manufactured** – CNG engine originally manufactured using natural gas as fuel
- **Conversion** - the process of converting compressed ignition engine to run on natural gas fuel, or spark ignition engine to run on natural gas fuel;
- **Re-powering or Retrofitting** - replacing an existing engine with brand new natural gas powered engine on an existing vehicle chassis.

Auto-LPG Program

Statistics of AutoLPG vehicles, facilities and conversion shops

- 13,886 autoLPG vehicle/taxis registered
- 94 retail dispensing stations nationwide
- 64 private garage-based dispensing stations
- 10 accredited with PS License autoLPG conversion shops

Available Technology

- **Conversion** - to the process of converting spark ignition engine and adding some components (kits) to run on LPG and/or gasoline:
 - } Spark ignition engines
 - } Dual fuel (LPG-Diesel)
 - } Four (4) Stroke Motorcycle Engine

Bioethanol Program

Status : Voluntary use of bioethanol

Technology: Bioethanol at 10% with gasoline fuel

The World Wide Fuel Charter allows up to 10% Blend of Bioethanol without engine modifications. The Philippines is into voluntary blending of 10% Bioethanol or E10 and supply is available in all Seacoil and 55 Shell and 14 Petron gasoline stations in Metro Manila.

Technology: Bioethanol at Higher Blends with gasoline fuel

We need Flex fuel vehicles to run on higher blends. Flex fuel vehicles are designed to run on either conventional gasoline or gasoline mixed with bio-ethanol especially if blended with higher blends up to 85% or E85.

Bioethanol Program

Ongoing Projects

- ♣ San Carlos Bioenergy, Incorporated
- ♣ Leyte Agri Corporation

Endorsed to PEZA

- ♣ Pampanga Industrial Park Corporation

Endorsed to BOI

- JG Summit Holdings
- Biofuels 88 Corporation
- Southern Bukidnon Bioenergy Inc.
- Basic Energy Corporation
- Biofuels International Philippines, Inc.
- Solar Plastics Corporation
- Cavite Biofuel Producers, Incorporated

Bioethanol Program

Other Interested Groups (endorsed for SEC registration)

- ♣ Negros Southern Integrated Biofuels Corporation
- ♣ B.M. SB Integrated Biofuels Corporation
- ♣ Negros Green Resources Incorporated
- ♣ Kanlaon Alcogreen Incorporated
- ♣ JGC/Itochu
- ♣ Renewable Alternative Fuel Incorporated
- ♣ Negros Biochem Corporation
- ♣ Eastern Renewables-Fuels Corporation
- ♣ Isabela Alcogas Corporation
- ♣ Capas Tarlac Bioenergy Incorporated

Potential Fuel Displacement (Biofuels)

Blend (ethanol)	Gasoline Displacement (million liters)	FOREX Savings* (million \$)
5%	223	115.91
10%	482	250.8

Blend (Biodiesel)	Diesel Displacement (million liters)	FOREX Savings* (million \$)
1%	78.8	43.34
2%	163.9	90.15

*Forex Savings is based on 2007 Average Import Price for Refined Petroleum Products:
Diesel = \$ 0.55/liter; Gasoline = \$ 0.522/liter

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Potential Fuel Displacement (Compressed Natural Gas)

No. of Buses	Diesel Displacement (million liters)	FOREX Savings (million US\$)
200	8.9	4.25
1,000	44.6	21.27
2,000	89.1	42.54
3,000	133.7	63.82
4,000	178.2	85.09
5,000	222.8	106.36

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PREVAILING CHALLENGES & OPPORTUNITIES

- | | |
|--|--|
| <ul style="list-style-type: none"> • Biofuel threaten Food Supplies <ul style="list-style-type: none"> – Biofuel crops displacing food crops in productive lands, hence, compromising food security | <ul style="list-style-type: none"> • Accelerate development of non- food biofuel feedstocks such as jatropha sweet sorghum, crop wastes, grass or municipal waste and other second generation feedstock |
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PREVAILING CHALLENGES & OPPORTUNITIES

- | | |
|--|---|
| <ul style="list-style-type: none"> • Cost of biofuels higher than petroleum fuels • Increased biofuel production may lead to deforestation, excessive use of pesticides/fertilizers, loss of diversity | <ul style="list-style-type: none"> • Construct Biofuel production facilities with cogeneration capability for plant's in-house energy requirements • Biofuel facilities that can produce other high value products • Develop new technologies to improve crop yield and biofuel production |
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STRATEGIC PROGRAMS FOR CHALLENGES AND GAPS

- } Improving cultivation and diversification of feedstock
- } Meeting demands in terms of quantity and quality for local requirements
- } Developing cost effective technologies for extraction and refining
- } Improving support infrastructure such as farm-to-market roads, ports terminals, etc.
- } Increasing investments

STRATEGIC PROGRAMS FOR CHALLENGES AND GAPS

- } Implementing sustainable Incentives
- } Improving condition of retail competition
- } Monitoring of quality, quantity and price
- } Improving enforcement of guidelines and industry standards
- } Strengthening DOE capability in its management role of the new industry.

WAY FORWARD

- Strengthen strategic alliances with countries successfully implementing Biofuels program
 - Information exchange on lessons learned and best practices
 - Technology transfer of optimum biofuel production technologies
 - Training and capacity building
- Promote investments by developing an enabling policy environment
 - Incentives, mandates
 - Increase production of flexi-fuel vehicles
- Enhance research and development
 - 2nd Generation technologies using other potential feedstocks and non-food feedstock
- Establish financial mechanisms

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POTENTIAL ETHANOL CAPACITIES

Bioethanol Projects In Visayas Endorsed to BOI

Ethanol Projects	Location	Capacity Liters/da
San Carlos Bioenergy	Negros Occidental	100,000
JG Summit Holdings Inc.	Negros Oriental	100,000
Leyte Agri	Ormoc, Leyte	30,000
Biofuels International Phil.	Negros Occidental	200,000
	Total	430,000

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Bioethanol Projects In Visayas Endorsed to SEC

Ethanol Projects	Location	Capacity Liters/day
Negros Southern Integrated Biofuels	Negros Occidental	200,000
BM SB Integrated Biofuels	Negros Occidental	150,000
Negros Green Resources	Negros Oriental	130,000
Kanlaon Alcogreen	Negros Occidental	60,000
	Total	540,000

BIODIESEL

- 556 HECTARES IN TAMLANG VALLEY, NEGROS ORIENTAL and 5 HECTARES IN DACONG COGON, NEGROS OCCIDENTAL JATROPHA PLANTATION

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RESOURCE PROFILE

a. EXISTING RE/ALTERNATIVE FUEL RESOURCES IN REGION 6

PROVINCE	RESOURCE DESCRIPTION	CAPACITY	REMARK	
			CURRENT TOTAL POWER DEMAND, kW	RE CONTRIBUTION, kW
San Carlos City, Negros Occidental	San Carlos Bioenergy Inc. Fuel Ethanol Plant	30 million liters/year (target date of operation December 2008)		8 MW cogen. plant

b. RESOURCE OPTIONS THAT CAN BE COMMITTED

PROVINCE	DESCRIPTION	WITHIN 5 YEARS		WITHIN 10 – 20 YEARS	
		YEAR	INVESTMENT COST	YEAR	INVESTMENT COST
Bago City, Negros Occidental	Biofuels International Phils. Inc. Fuel Ethanol Plant	2010	Php 1.569 Billion		
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MARAMING SALAMAT PO!

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ethyl alcohol (ethanol) C₂H₅OH