GHG MITIGATION AND CDM OPPORTUNITIES & PRIORITIES:

A Government Perspective on Clean Energy Program

The Government of the
Republic of the Philippines

SEC. VINCENT S. PÉREZ

Department of Energy

10 September 2003

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OUTLINE OF PRESENTATION

- Brief Background of the Philippine Energy Sector
- Clean Energy Programs
  - Renewable Energy Sources
    - Geothermal
    - Wind
    - Solar
    - Hydro
    - Biomass
  - Natural Gas Industry
  - Alternative Fuels
  - Compliance with the Clean Air Act
- Way Forward
  - Renewable Energy Policy Framework
  - CDM and the Philippine Energy Sector

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OVERVIEW OF THE ENERGY SECTOR

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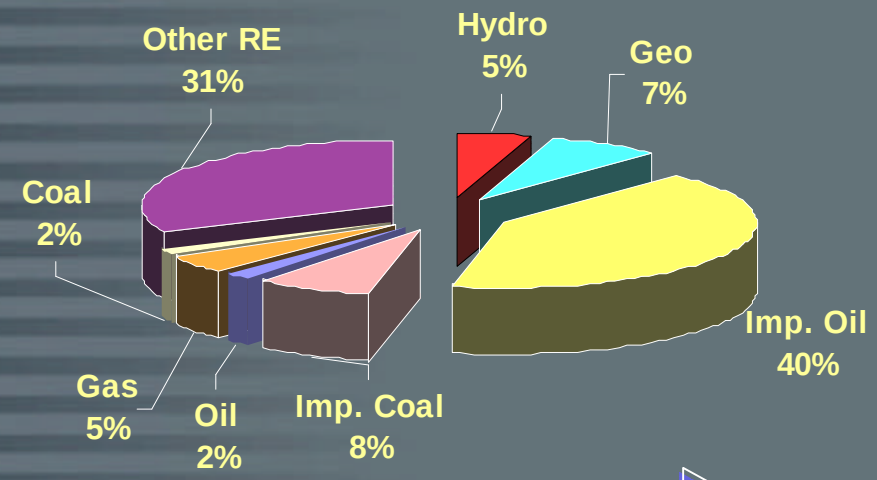
OVERVIEW OF THE ENERGY SECTOR

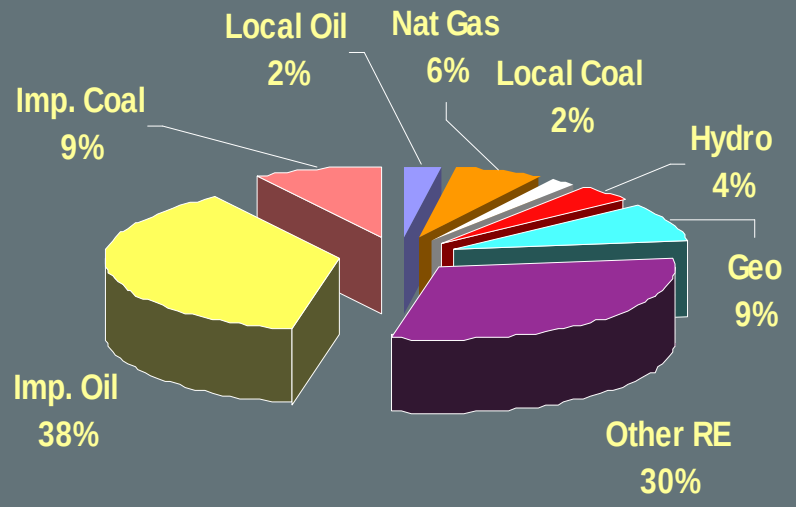
Primary Energy Mix, 2002 – 2003

Primary Energy Mix, 2002



Total Energy: 250.8 MMBFOE
Renewable Energy Level: 43%

Primary Energy Mix, 2003



Total Energy: 268.16 MMBFOE
Renewable Energy Level: 43%

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OVERVIEW OF THE ENERGY SECTOR

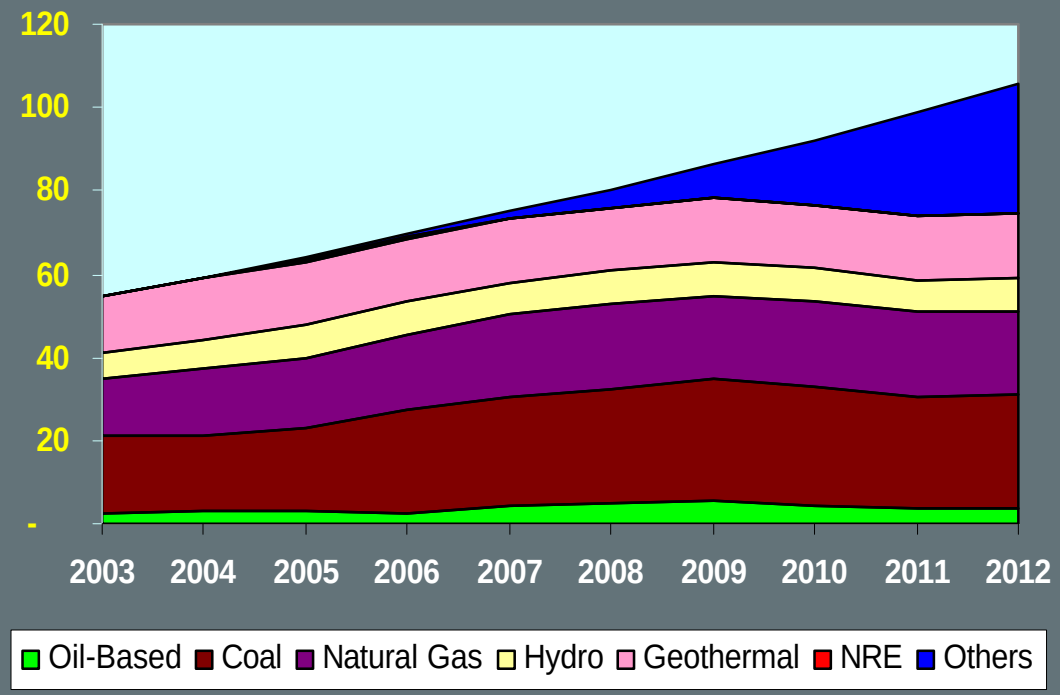
Indigenous Energy Supply, in MMBFOE (2003-2007)

	2003	2004	2005	2006	2007	Growth Rate 2003-2007
Natural Gas	16.86	26.34	26.34	26.38	26.38	11.84
Oil	6.35	17.60	15.96	13.09	7.91	5.65
Geothermal	23.53	24.96	25.09	25.15	25.16	1.69
NRE	81.52	84.34	86.73	89.06	91.18	2.84
Coal	5.25	5.98	6.55	7.87	7.91	10.79
Hydro	10.57	11.52	13.24	13.27	13.31	5.93
TOTAL	144.08	170.74	173.92	174.82	171.84	

OVERVIEW OF THE ENERGY SECTOR

Power Development Plan

- Bias on the development of renewable energy resources
- Utilization of RE in rural electrification
- Compliance with existing environmental laws, particularly the Clean Air Act



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OVERVIEW OF THE ENERGY SECTOR

Power Expansion Program, 2003-2012

- **About 6,000 MW requirement over the next ten years, of which at least 800 MW are committed projects from renewable energy:**
  - **695 MW hydropower**
  - **65 MW wind**
  - **40 MW geothermal**
  - **6,150 MW indicative (no specific fuel type)**
    - **1,200 MW geothermal**
    - **2,500 MW hydro**
    - **635 MW other renewables (wind, biomass, etc)**

CLEAN ENERGY PROGRAM

Renewable Energy Resources

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RENEWABLE ENERGY RESOURCES

Promotion of Renewable Energy

- **RE contributes in strengthening the country's energy self-sufficiency**
- **RE complements government's thrust of increased environmental awareness**
- **RE widely used in the government's rural electrification program**

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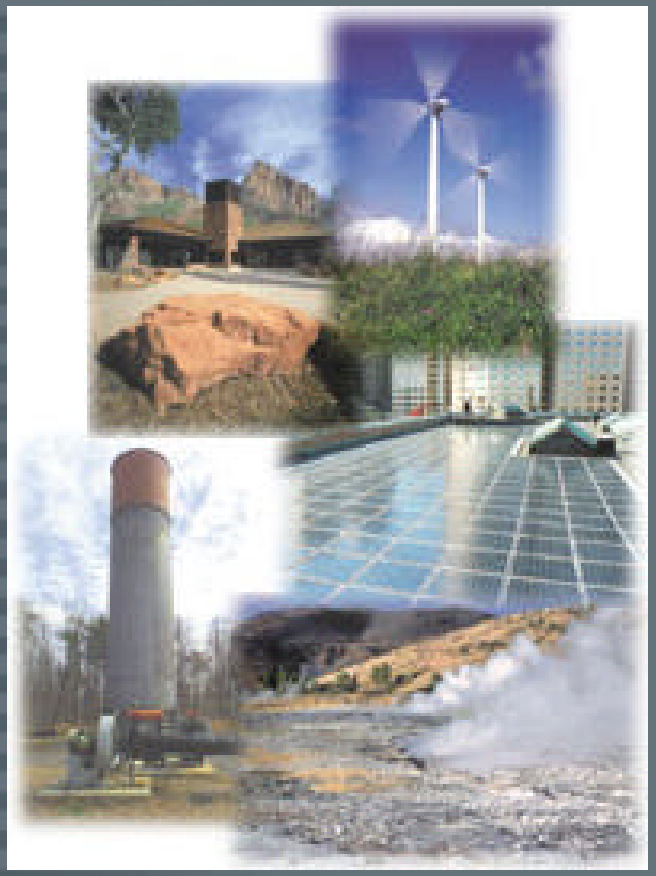
RENEWABLE ENERGY RESOURCES

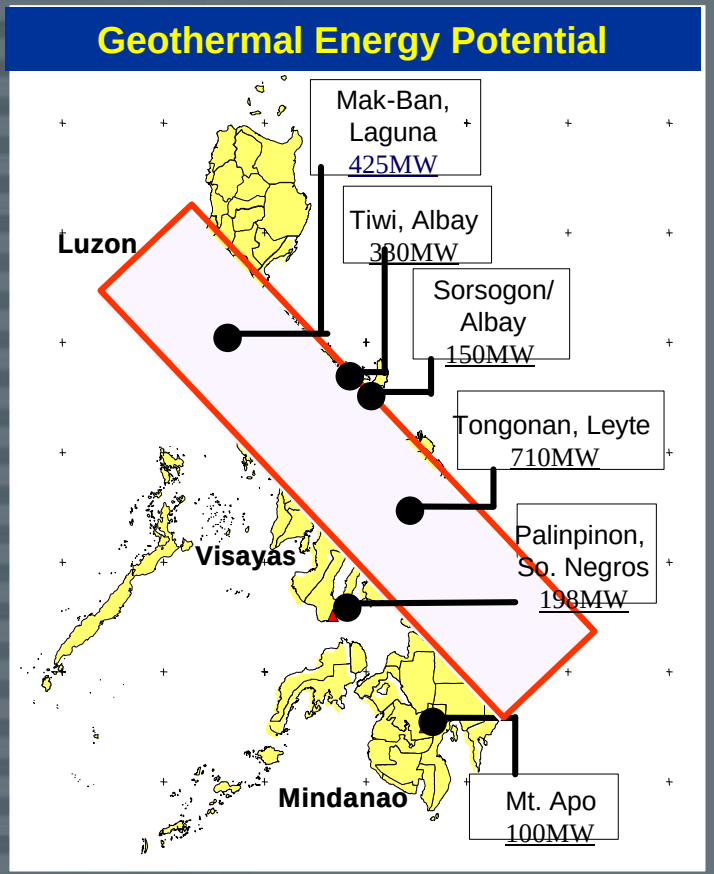
Resource Overview



- **A US-NREL study shows :**
  - **Wind resources has over 10,000 km² with 76,600 MW of potential installed capacity**
  - **Micro-hydro applications has potential capacity of at least 500 kW in N. Luzon & Mindanao**
  - **Solar radiation nationwide has an annual potential average of 5.0 - 5.1 kWh/m2/day**
- **Mini-hydro potential capacity of 1,784 MW from 888 sites**
- **Ocean energy resource has, theoretically, potential capacity of about 170,000 MW**
- **Biomass total potential of 139 MMBFOE**

RENEWABLE ENERGY RESOURCES

Geothermal Resources



- Installed capacity of **1,931 MW, 2nd highest in the world**
- **Largest user of geothermal energy resources for power generation (24% for power)**
- Target of additional **820 MW** by 2015

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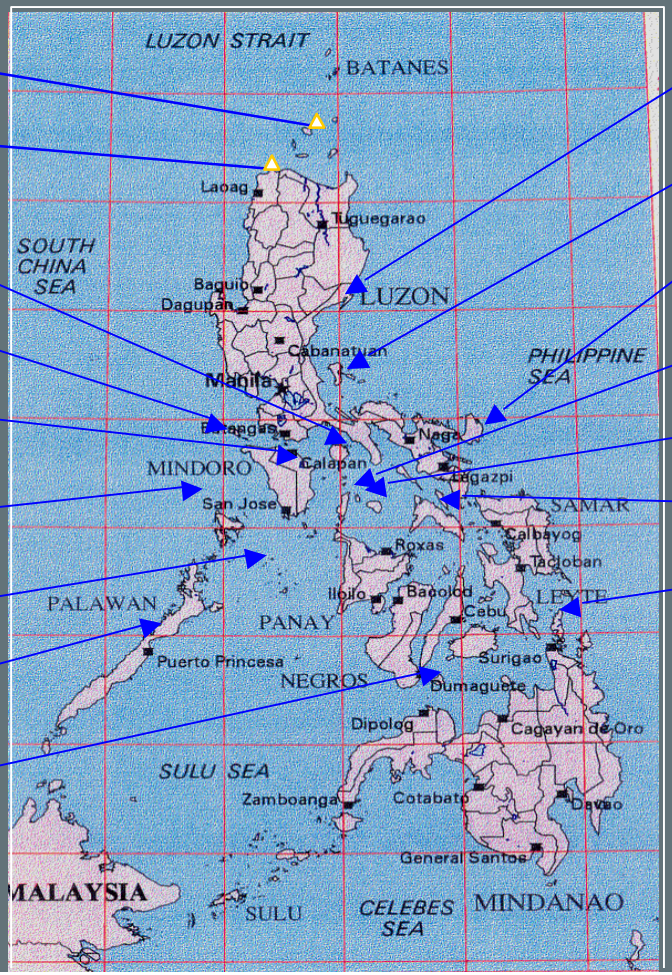
RENEWABLE ENERGY RESOURCES

Potential Windfarm Sites

- **BATANES** 1,100 KW
- **NORTHERN LUZON** 120 MW
- **MARINDUQUE ISLAND** 3,000 kW
- **LUBANG ISLAND** 330 kW
- **MINDORO ISLAND-ORIENTAL** 13,500 kW
- **BUSUANGA ISLAND** 330 kW
- **CUYO ISLAND** 330 kW
- **PALAWAN ISLAND** 9,000 kW
- **SIQUIJOR ISLAND** 1,000 kW



- **CASIGURAN** 500 kW
- **POLILLO ISLAND** 500 kW
- **CATANDUANES** 2,250 kW
- **TABLAS ISLAND** 1,500 kW
- **ROMBLON ISLAND** 1,000 kW
- **MASBATE ISLAND** 3,000 kW
- **DINAGAT ISLAND** 3,000 kW

POTENTIAL CAPACITY:

160,340 kW

RENEWABLE ENERGY RESOURCES

Wind Power Projects

- **PNOC-EDC's 40MW wind farm**
  - **Estimated project cost of P3.0B located in Burgos, Ilocos Norte**
  - **To start commercial operation in 1Q 2006**
- **Northwind's 25 MW**
  - **Located in Bangui Bay, Ilocos Norte**
  - **To be funded by Northwind Power of Denmark**
- **50 Islands targeted for wind-diesel hybrid**

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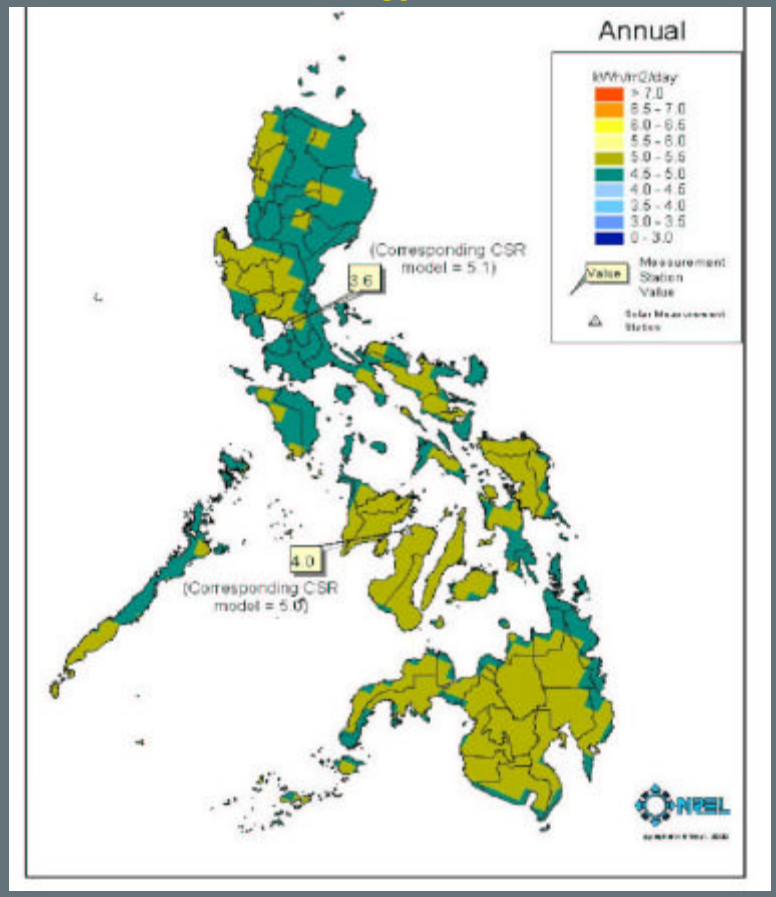
RENEWABLE ENERGY RESOURCES

Solar Power

- 3,957 systems installed throughout the country
- On going projects:
  - PNOC 15,000 Solar Homes Project
  - Solar Power Technology Support (SPOTS) Project to 30 ARCs
  - AMORE Project for 160 bgys. in ARMM
- 1 MW solar farm project planned in Northern Mindanao
- 25MW solar wafer manufacturing facility by SunPower

Solar Energy Potential



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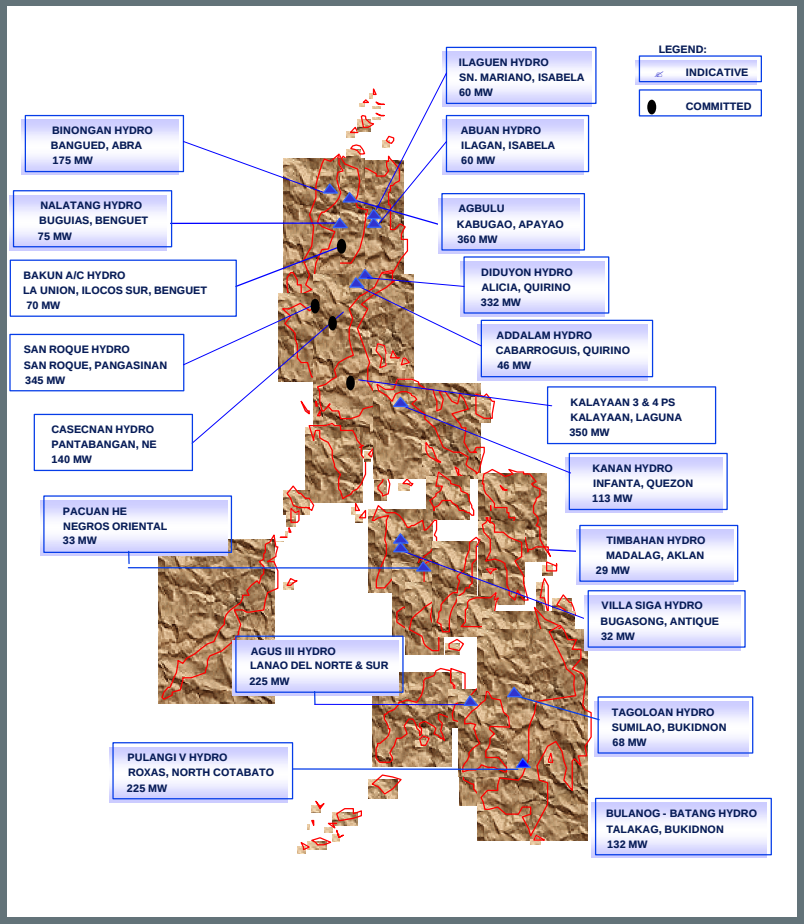
RENEWABLE ENERGY RESOURCES

Hydropower

- 51 existing installations of small hydro plants with more than 82 MW
- Total planned capacity of at least 111 MW
  - Installed capacity anticipated to increase to 3,820 MW (incl. large hydro) by 2011

Projected Hydro Power Plants



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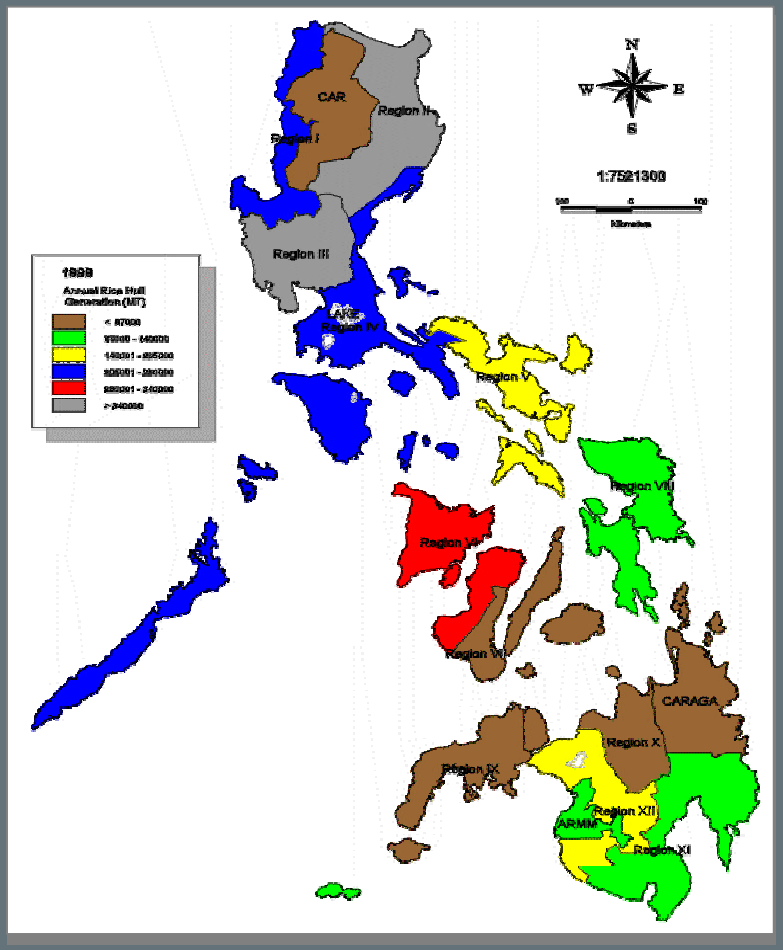
RENEWABLE ENERGY RESOURCES

Biomass

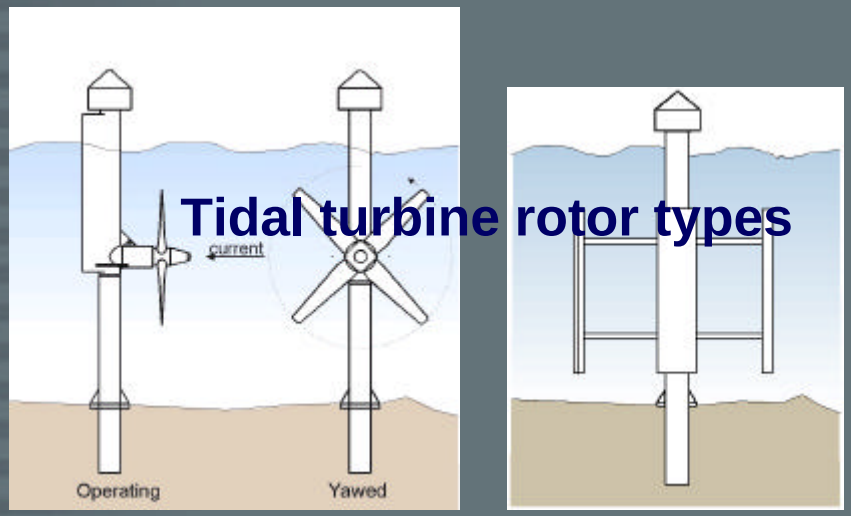
- **Sugar Cogeneration**
  - 39 mills spread over 16 provinces w/ an ave. of 4,600 tons of canes per day
  - US NREL Study: 540 MW potential
- **Ricehull Power**
  - 2.26 million tons per year
  - US NREL Study: 360 MW potential
- **Coconut Residues**
  - Few opportunities for heat and power
  - UNDP/ESMAP: 20 MW grid potential
- **Municipal Solid Waste**
  - Clean Air Act requires new strategies for solid waste & garbage management
- **Project in Victorias Milling developing 51MW Bagasse-fuelled power plant**

Biomass Potential



RENEWABLE ENERGY RESOURCES

Tidal



Tidal turbine rotor types

Axial-flow (propeller)

Cross-flow (Darrieus)

- **Tidal current systems or "underwater mills" being considered in Hinatuan passage (Surigao) & in Bernardino Strait (Samar)**

"Underwater Windmills"

Natural Gas Developments

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NATURAL GAS SECTOR

Downstream Infrastructure

Limay
620 MW
(2008)
Conversion

Add'l. Luzon Capacity Req't.

300 MW (2010)

1,200 MW (2011)

600 MW (2012)

Santa Rita
1000 MW (2002)
San Lorenzo
560 MW (2002)

Sucat
300 MW
(2008)
600 MW
(2009)

Malaya
600 MW
(2010)
Conversion

Ilijan
1200 MW
(2002)

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NATURAL GAS SECTOR

Downstream Profile

- **Proposed nat gas pipeline to connect Batangas & Manila (BatMan 1)**
  - **Will service industrial estates along the Batangas-Laguna corridor**
  - **Target commencement of operation by 2007**
- **Batangas-Manila 2 (BatMan2)**
  - **To receive LNG importation & supply industrial ecozones in Subic & Clark**

Alternative Fuels

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ALTERNATIVE FUELS

Universe of Alternative Fuels

BIO- FUELS

Coco-diesel

Alcogas / diesel

Natural Gas

LPG

Water-based

Wind

Solar

Hydrogen

Electric

Fuel Cells

FUEL BLENDS

HYBRIDS

DUAL

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ALTERNATIVE FUELS

Inter-Agencies Collaborative Efforts

- **Compressed Natural Gas (CNG) buses in Metro Manila and Calabarzon**
- **LPG taxis in Metro Manila and Cebu**
- **Coco-diesel in copra-growing areas**

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ALTERNATIVE FUELS

Natural Gas for Public Transport Program

- Launched in October 2001 to promote the use of natural gas as an alternative transport fuel
- Pilot conversion of DOE/PNOC shuttle buses to natural gas vehicle (NGV)
- 6 units of Enviro taxis arrived from Malaysia, a collaborative work between PNOC & Petronas
- DBP signed MOA with RRCG Bus Company to provide financing package for the conversion of CNG buses

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ALTERNATIVE FUELS

Promotion of Natural Gas for Public Transport Program

Inter-Agency Collaboration:

Dept. of Energy

- Lead agency in the promotion of NGVPPT

Dept. of Science & Technology

- Promote & develop locally manufactured conversion kits

Dept. of Trade & Industry

- Enhance existing incentives package

Dept. of Env't. & Natural Resources

- Fast track issuance of ECCs for NGV facilities & refueling stations

Dept. of Transportation & Comm.

- Grant franchise for NG Bus Operators

Metro Manila Dev't. Authority

- Open dedicated routes to NG Public Buses

Compliance with the Clean Air Act

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COMPLIANCE WITH THE CLEAN AIR ACT

Government's Efforts in Partnership with the Private Sector

- **Introduction of 35% Aromatics & 2% Benzene contents for unleaded gasoline on Jan. 1, 2003**
- **Covenant among oil companies signed last 12 Aug. 2003 to accelerate compliance with the CAA 0.05% sulfur (diesel) requirement by Nov. 2003**
  - **Under R.A. 8749, oil companies are required to reduce sulfur content of automotive diesel from 0.2% to 0.05% effective Jan. 1, 2004**
- **5 new oil companies (City Oil, Eastern Petroleum, Jetti, Seaoil & Unioil) introduced Pure Diesel, a low sulfur content automotive diesel, on 18 Aug. 2003**

WAY FORWARD

Renewable Energy Policy Framework

WAY FORWARD

Renewable Energy Policy Framework, 10-Year Targets

- **Double hydro capacity by 2012**
- **Be the No.1 geothermal energy producer in the world**
- **Be the No. 1 wind energy producer in SE Asia**
- **New contribution of biomass, solar and ocean by 100 MW**
- **Make Negros island an epicenter showcase for renewable energy**

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RENEWABLE ENERGY POLICY FRAMEWORK

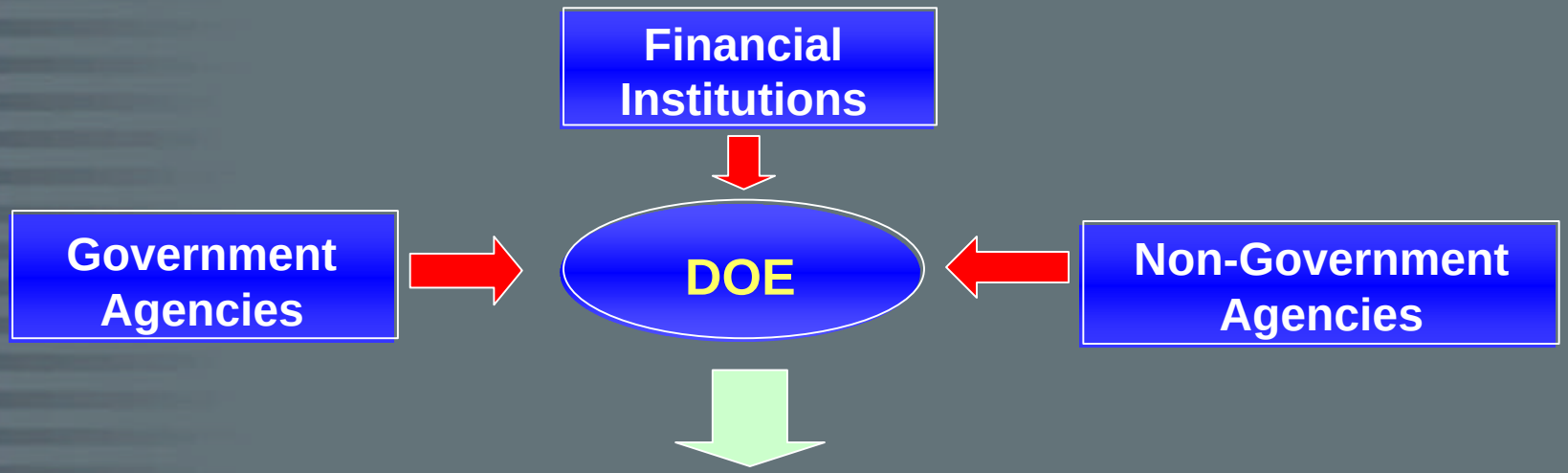
Way Forward, Regulatory & Structural Reforms

- **Newly created DOE Renewable Energy Division**
- **Newly issued Renewable Energy Policy Framework**
- **Newly established PNOC New & Renewable Energy Subsidiary**

CDM and the Philippine Energy Sector

WAY FORWARD

CDM & the Philippine Energy Sector



- Development of CDM protocols
- Implementation of Clean Development Mechanism (CDM) projects
- Promotion of renewable and energy efficiency including greenhouse gas abatement technologies among the industries and private sectors

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WAY FORWARD

PREGA Project

Promotion of Renewable Energy, Energy Efficiency and Greenhouse Gas Abatement (PREGA)

OBJECTIVES:

- to promote investments in REGA technologies that will increase access to energy services by the poor, realize other strategic development objectives and help reduce GHG emissions
- to generate pipeline of investment projects for financing
- to identify policy and institutional barriers and study and develop financing models for investment projects

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WAY FORWARD

Possible CDM Projects in the Philippines

- **New and Renewable Energy:**
  - Wind Power
  - Photovoltaic (PV) Solar Electric System
  - Solar Thermal Electricity
  - Ocean Energy Systems
  - RE Systems
  - Fuel Cells
- **Efficiency Projects:**
  - Rehabilitation of Existing Coal Plants
- **Supply Side:**
  - Heat Rate Improvement
  - New Electricity Generation Technologies
- **Demand Side:**
  - Energy efficient domestic appliances and industrial plants

Summary

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SUMMARY

- Policy bias on the development of renewable energy resources to increase self sufficiency, cleaner environment and sustainable rural electrification
- Commitment to adhering to strict environmental laws, particularly the Clean Air Act
- Renewable energy complements government's thrust of increased environmental awareness
- Preferential bias with ambitious 10-year targets in natural gas, geothermal and wind power
- Philippines would like to encourage its ASEAN neighbors to likewise promote renewable energy as part of its energy planning

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THANK YOU!

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