Strategic Approach to the Improvement of Agricultural Productivity Towards Food Security in the Philippines

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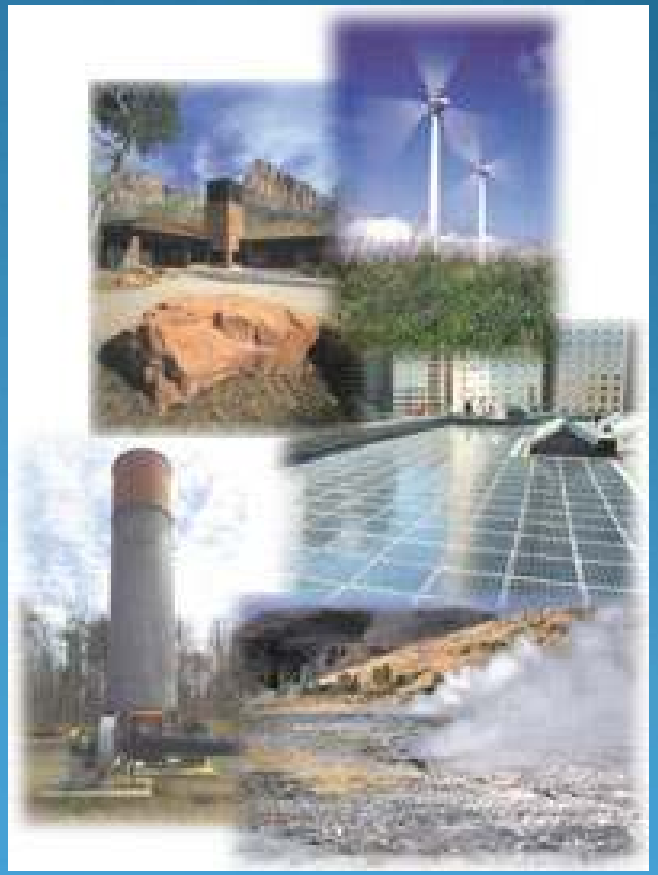

INTRODUCTION

-The prices of fossil fuels and food, such as rice and other basic commodities has been increasing over the past years.

-Damages caused by intensifying weather disturbances had devastating effects on the agricultural production performance in the past decade.

-There is a need to provide strategic approaches to address impacts of soaring prices of energy and climate change to sustain food security and improve agricultural productivity.

The government through the Department of Agriculture, implements the Agricultural and Fisheries Modernization Act of 1997 (AFMA)

AFMA was enacted into law for poverty alleviation and social equity; food security; rational use of resources; global competitiveness; sustainable development; people empowerment; and protection from unfair competition.

AFMA aims to address food security, poverty alleviation, social equity and income enhancement.

AFMA gives priority to the development and promotion of appropriate agricultural machinery and other agricultural mechanization technologies to enhance agriculture and fishery mechanization in the country.

The Philippine National Institute to APCEM, the College of Engineering and Agro-Industrial Technology, University of the Philippines Los Baños through the Agricultural Mechanization Development Program, Institute of Agricultural Engineering implements programs for the development, promotion and popularization of agricultural mechanization technologies in the Philippines.

AMDP focuses its research thrust in line with government's concern on food security and energy resources sustainability.

In recent years, AMDP concentrated on the development and packaging of technologies for corn production and processing.

AMDP is also embarking on development technologies that will harness renewable energy resources and at the same time address food sustainability.

AMDP gears its research towards corn mechanization, vegetable production machinery, primary processing machines for *Jatropha curcas,* bio-mass furnace, liquid-fuel burners and coconut particle dryer and others.

AMDP serves as the research and extension arm of the IAE-CEAT, UPLB.

This paper presents the Philippines' general scenario on the food and energy prices with respect to food security and sustainability, and the government and other institutions' efforts to address the challenges posed by soaring food and energy price increases.

It also presents the possible impacts of global climate change on agricultural sector in the Philippines, presents possible strategies to mitigate the impacts of climate change on agricultural sector; and provides some strategies or approach to cut down on fossil fuel dependence as pointed out by some socio-economic analysts.

Lastly, it reports the recent activities and accomplishments of the Agricultural Mechanization Development Program (AMDP), the Philippine National Institute to APCAEM.

SOARING FOOD AND ENERGY PRICE AND THEIR CHALLENGES ON FOOD SECURITY AND SUSTAINABILITY IN THE PHILIPPINES

In 2008, the price of rice has soared to its highest level in 34 years, causing social and political unrest.

According to Grenfell (April 2008), the Philippines was among the hardest hit in the rising prices of rice which caused an inflation rate from 2.6 percent in March 2007 to 6.4 percent in March 2008.

The price of rice in the Philippine market soared to $ 1.15 per kilo in March 2008 from as low as 50 cents few weeks earlier. This period also made most of the urban poor line up in the streets to buy rice. Thus, millions of Filipinos faced food insecurity and hunger.

Stop gap measures:

1. Importation of rice from other countries like Vietnam, Thailand and the United States amounting to 2.2 million tons.

2. The government also imposed lower tariffs and doubled the import quotas to encourage more participation from the private importers.

3. DA implemented a rice conservation program like cutting the consumption of rice in most fast foods and restaurants.

Stop gap measures:

4. There was also a plan to improve the agriculture sector by launching the program "FIELDS" meaning -- F for fertilizer, I for irrigation and infrastructure, E for extension and education, L for loans and insurance, D for dryers and other post-harvest facilities, and S for seeds in the middle of the rice crisis.

5. The private sectors were encouraged to practice corporate farming or to ensure that employees are given rice subsidies through planting of rice by the country's biggest corporations

Is there a rice crisis in the Philippines?

-An artificial phenomenon created by rice hoarders and smugglers distorting rice inventories

-It is a rice distribution crisis and that supply is stable

-A political matter.

- A rice cartel scenario.

-Peasant groups on the other hand, believed that rice importation is the reason behind the worsening rice crisis and placing the country in greater food insecurity.

The 2nd and 3rd quarter of the year shows the peak price of rice and corn based from the data of the Bureau of Agricultural Statistics (2008) as shown in Table 1.

The last quarter of 2008 gave a different picture of the rice industry. After the rice harvest season, the price of rice went down and became more stable.

However, food security and sustainability specifically for rice is a far fetch reality to every Filipino. Figure 1 shows the variation of farm gate price of rice and corn while Figure 2 shows the market price of the two most important commodity in the Philippines.

Table 1. Comparative Monthly Average Farm Gate Price (FGP), Wholesale Price (WSP) and Retail Price (RP) of Palay, Rice and Corn from March to November 2008.

Source: *Bureau of Agricultural Statistics (BAS)*

CEREALS	MONTHLY AVERAGE PRICES (Price/kg)								
	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
PALAY (FGP)	13.02	15.56	16.00	18.18	17.08	14.92	13.57	13.26	13.23
CORNGRAIN YELLOW (FGP)	10.84	11.04	10.74	11.04	10.79	10.51	10.45	10.84	11.28
CORNGRAIN WHITE (FGP)	11.55	13.09	13.81	14.85	13.12	11.97	12.02	12.40	12.52
WELL MILLED RICE (WSP)	25.60	30.18	31.38	35.98	35.30	33.10	30.66	29.84	28.97
WELL MILLED RICE (RP)	27.57	32.20	33.69	38.37	38.76	36.70	34.59	33.54	32.55
REGULAR MILLED RICE (WSP)	23.61	28.12	29.48	33.98	33.01	29.70	26.82	26.03	25.46
REGULAR MILLED RICE (RP)	25.26	29.80	31.30	35.78	35.51	32.82	30.01	28.78	28.15
CORNGRAIN, YELLOW (WSP)	13.00	13.25	13.26	13.42	13.34	13.14	12.35	12.88	13.01
CORNGRAIN, YELLOW (RP)	17.94	18.30	17.71	17.81	18.23	18.70	18.06	18.05	18.14
CORNGRAIN, WHITE (WSP)	12.63	13.57	14.24	14.86	14.60	12.68	13.72	14.87	14.67
CORNGRAIN, WHITE (RP)	15.59	16.42	16.57	18.06	19.32	17.13	17.50	18.12	18.36

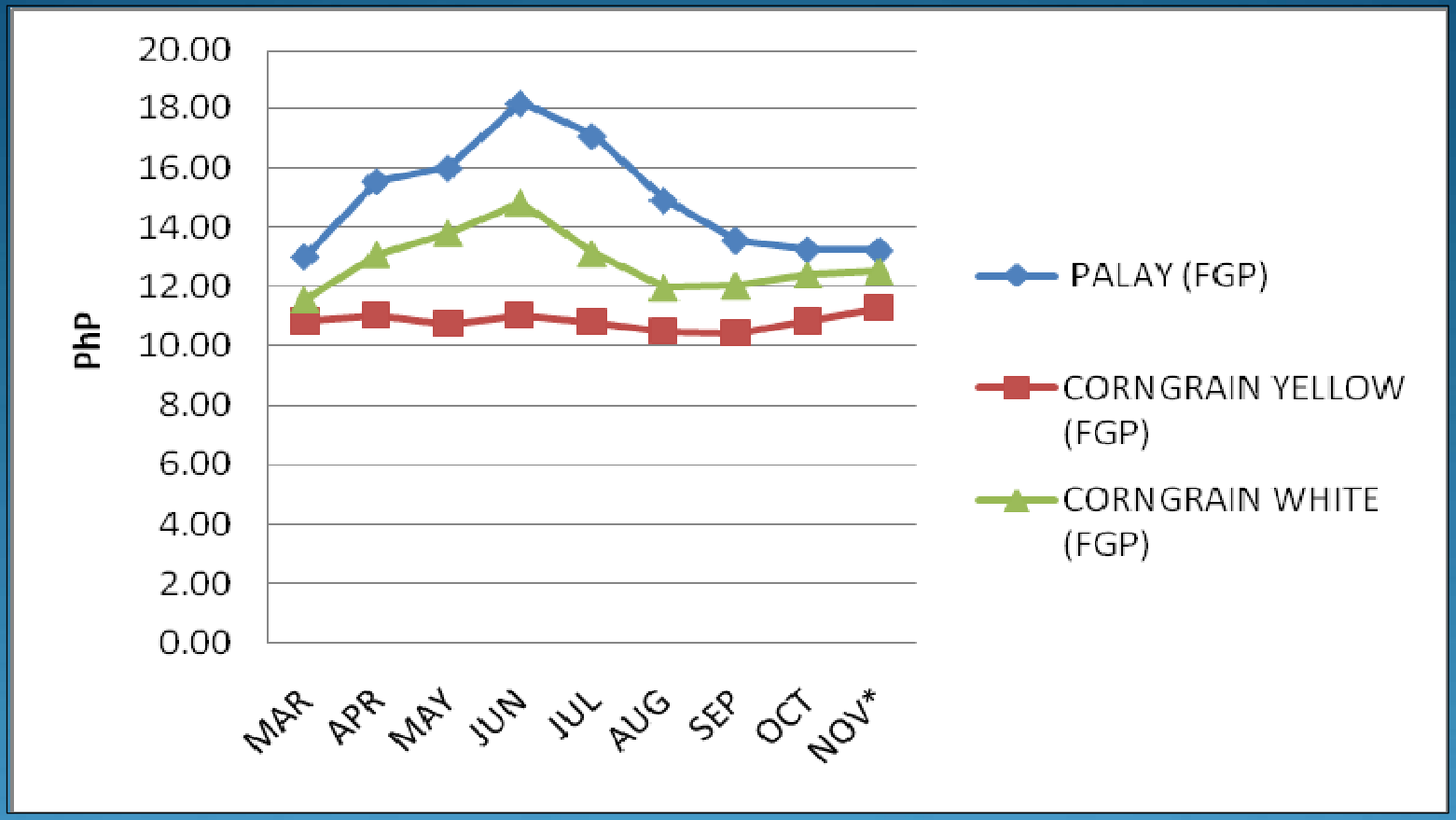

Figure 1. Farm gate price of rice and corn in the Philippines, Mar- Nov 2008.

Source: BAS, 2008

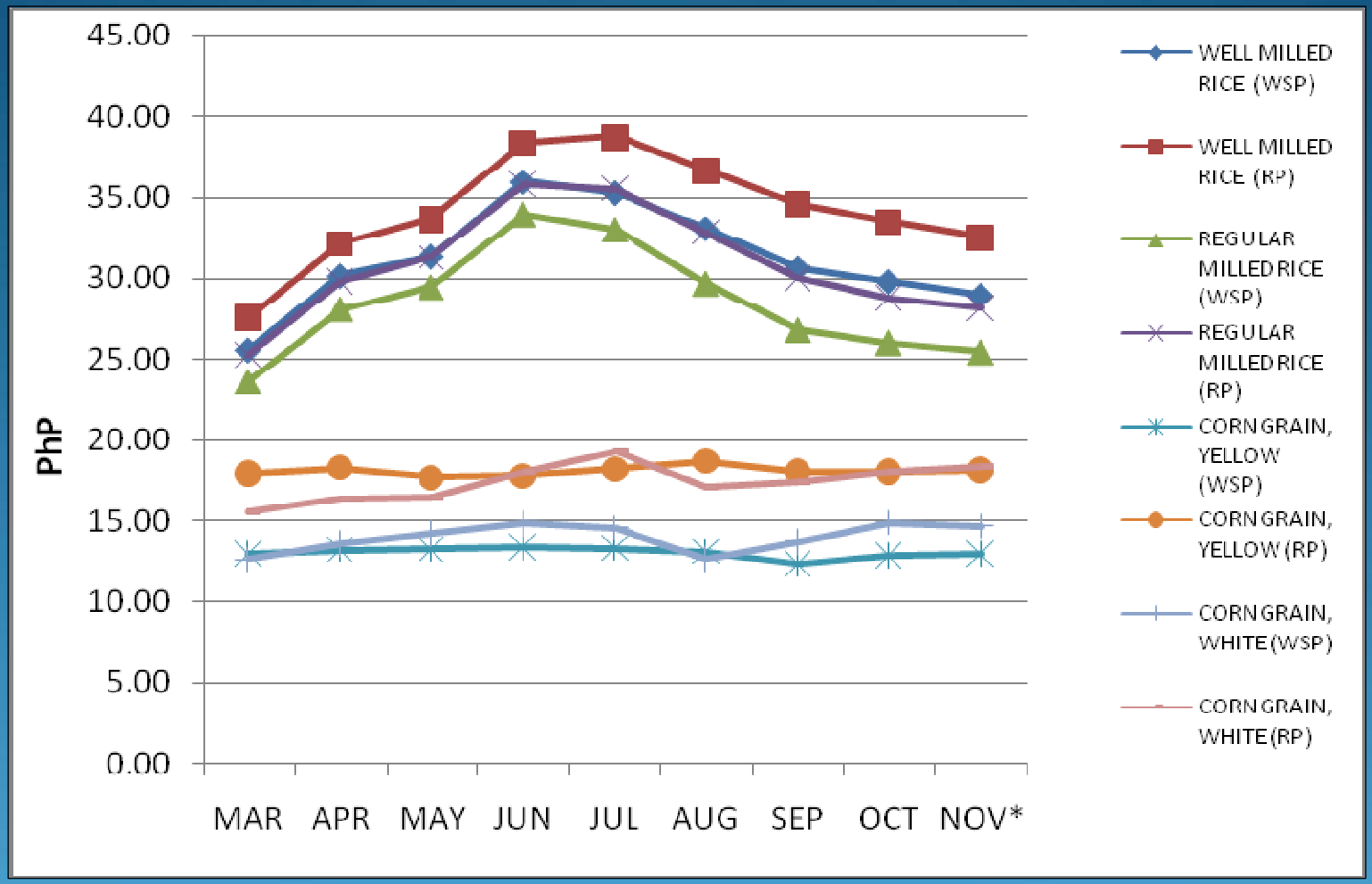

Figure 2. Wholesale and retail prices of rice and corn in the Philippines, Mar-Nov 2008.

Source: *BAS, 2008*

Government Efforts:

1. Implementation of the Ginintuang Masaganang Ani (GMA) Rice Program of the Department of Agriculture.

- The overall goal is to attain 89.64%, 92.83%, 96.33%, and 98.65% rice self-sufficiency by 2007, 2008, 2009, and 2010, respectively.

- GMA Rice Program also aims to improve rice productivity and income of rice farmers and other stakeholders.

Table 2. Department of Agriculture-GMA Rice Program: Rice Self Sufficiency Level For 2007-2010.

ITEM	2007	2008	2009	2010
Population[1]	88,618,599	90,346,662	92,108,422	93,904,536
Palay Production	16,125,176	16,827,783	17,569,217	18,107,986
Production (Rice)[2]	10,481,364	10,938,059	11,419,991	11,770,191
Total Requirement	11,730,531	11,868,447	12,117,299	12,359,008
Requirement - food (mt)[3]	**10,456,995**	**10,660,906**	**10,868,794**	**11,080,735**
Requirement - seeds (mt)[9]	**277,806**	**277,806**	**277,806**	**277,806**
Requirement - feeds/waste (mt)[8]	**995,730**	**929,735**	**970,699**	**1,000,466**
Sufficiency Level (%)	89.35	92.16	94.25	95.24
Surplus/Deficit	(1,249,166)	(930,389)	(697,308)	(588,817)

Assumptions:

[1]-Population increase at a growth rate of 1.95%

[2]-Milling Recovery at 65%

[3]-Per capita consumption of rice at 118 kg.

*[4]-Projectred GMA Rice Program Increment (0.0334*0.70)*

[5]-Hybrid Seeds + LSI at 1.2mt/ha

[6]-Certified Seeds + LSI at 0.5 mt/ha

[7]-Rehab/Resto at 1.2mt/ha X 1.6(efficiency) X Area to be Restored

[8]-Feed/Waste Reqiurement 9.5% of Rice Produced

[9]-Seed Requirement (converted to Rice) = (Area X Seed Consumption (105kg) X 65% Milling Recovery)/1000

[10]-Postharvest Savings from losses 1% annually

Source: *Malabanan (2007)*

2. With GMA Rice Program the national average yield for irrigated rice is only 4.10 MT/ha. However, yields of 5-6 MT/ha from high-yielding varieties were already attained since 2001 in technology demonstration areas located nationwide.

   Significant accomplishments of government efforts in rice production were the increased in annual growth rates (i.e. 3% in 2001 to 2003, 7% in 2004, and 5% in 2006) (DA, 2007).

3. Provision of financial assistance for high-yielding rice varieties (e.g. hybrid rice);

4. Rehabilitation/restoration of irrigation facilities in coordination with the National Irrigation Administration.

5. There is a plan is to restore 368,000 hectares of non-functional irrigated lands from 2006 to 2010. The country has accumulated 560,710 hectares of non-functional irrigated lands or 40% to the total irrigated lands (Malabanan, 2007).

6. Provision for the improvement of postharvest drying facilities for the agricultural sector.

7. The GMA Rice Program together with the Bureau of Postharvest Research and Extension, Philippine Rice Research Institute (PhilRice), National Food Authority, National Irrigation Administration, NABCOR, DA-Regional Field Units, and Local Government Units (LGU) has designed package of technologies that will complement each other in lessening postharvest losses (Malabanan, 2007)

8. The National Food Authority implements the NFA Grains Highway to improve the postharvest situation and reduce production and postharvest losses.

   The grains highway is defined as “the supply chain that links production, post harvest and marketing activities in both the major rice/corn production and consumption areas, including their support infrastructure for the efficient delivery and timely movement of quality grains and cereals from the farmers to ultimate consumers.”

8. The objectives of the program are to:

   a. improve and broaden the base to reduce post-harvest losses;

   b. facilitate the inflow of rice and corn at any time;

   c. make the rice and corn quality requirement available to traders and consumer;

   d. eliminate wide price fluctuations in the market and wide gaps between supply and demand; and

   e. allow access to NFA warehouses and other post-harvest facilities to small and medium scale food businessmen.

   The budgetary requirement for the program is PhP 2 billion from 2007 to 2010 (Navarro, 2007).

9. The University of the Philippines Los Baños currently holds the leadership of the Philippine Rice Postproduction Consortium composed of 5-government agencies and the International Rice Research Institute as collaborating agency.

   The consortium is an alliance of primary institutions in the Philippines concerned with rice postproduction research and extension to address numerous problems of the grains industry.

   The government member agencies include: of Bureau of Postharvest Research and Extension (BPRE), National Food Authority (NFA), Philippine Rice Research Institute (PhilRice), the University of the Philippines Los Baños (UPLB), and the National Agricultural and Fishery Council (PRPC Brochure, *undated*).

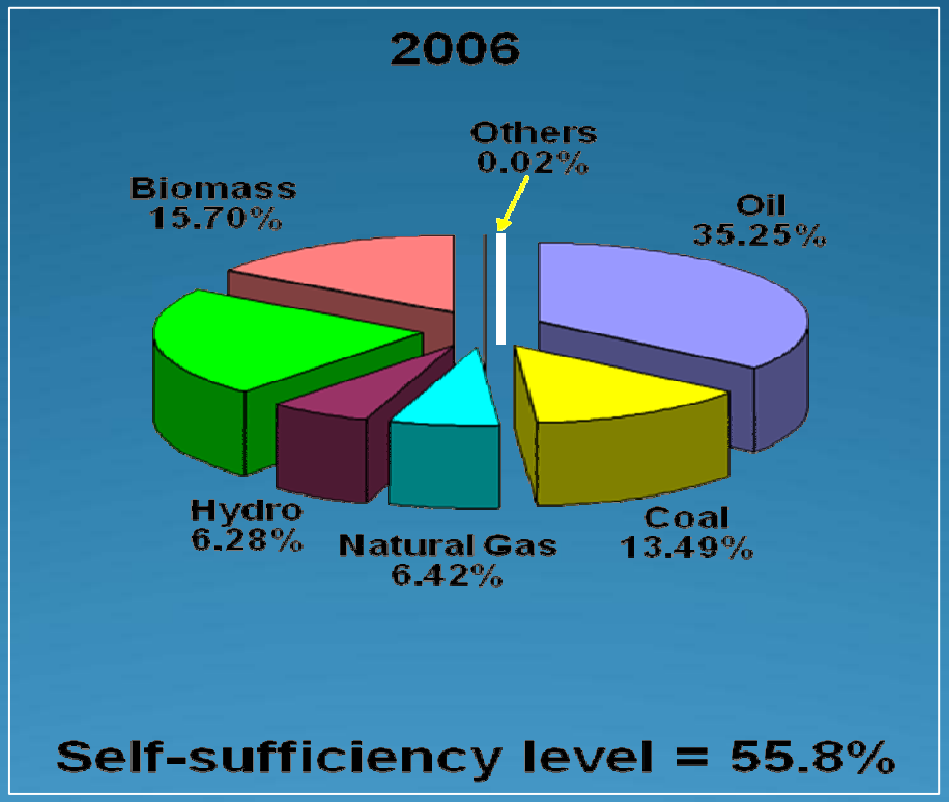

Figure 3. Primary energy supply mix, 2006.
Source: Marasigan, 2008.

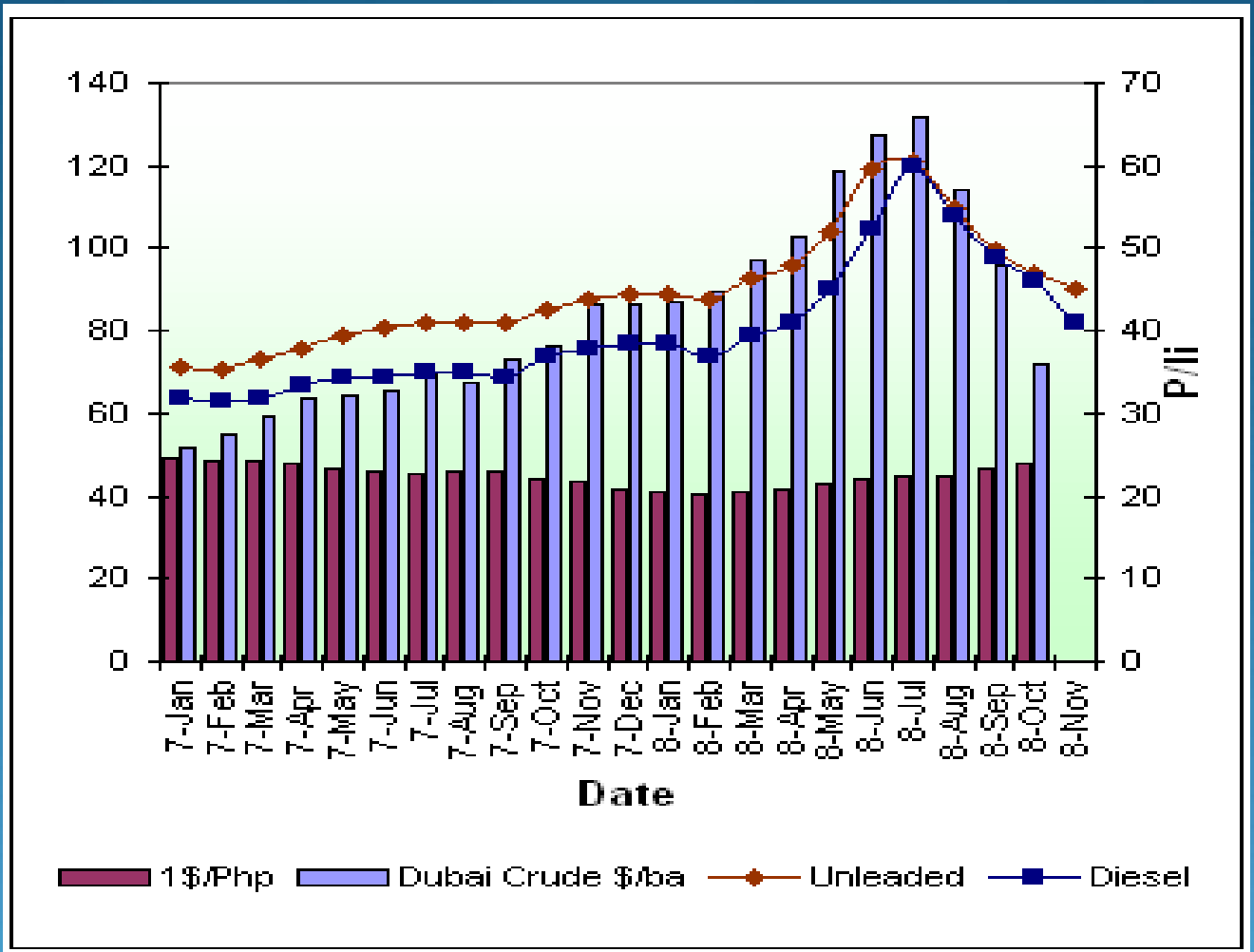

Figure 5. Average Philippine gasoline prices 2007-2008.

Source: http://www.alternat1ve.com/biofuel/2008/05/15

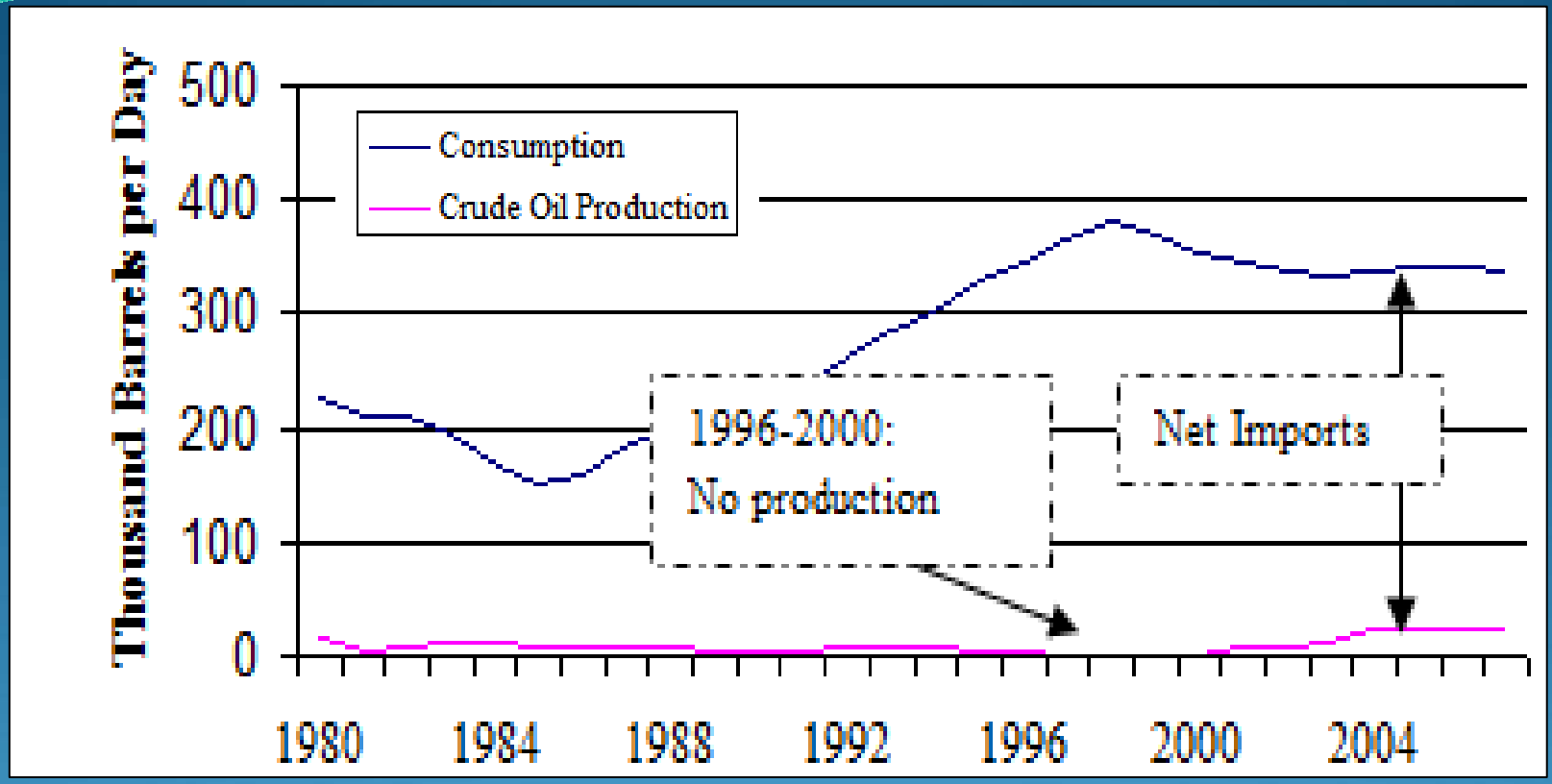

Figure 6. Oil production and consumption in the Philippines, 1998-2007.

Source: EIA, 2008. (*2007 figures are estimates)

Solutions to address our dependency to oil and to stabilize the prices thru its line agency, the Department of Energy.

1.Energy independence and savings which they targeted 60% self-sufficiency level by 2010, and

2. Power market reforms whose goal is to have a fair and reasonable energy prices in a competitive environment (Marasigan, 2008).

To achieve these goals, DOE has undertaken the following activities:

1.Enhancing energy security by aggressive exploration and development of indigenous energy resources from fossil fuel and renewable energy.

2. Increasing use of alternative fuels.

3.Strengthening energy efficiency and conservation program.

4.Implementing energy sector reforms in the power sector by expanding rural electrification and moving towards open access of power.

5.Down streaming the oil dependency from other countries and exploring more sources of oil and natural gas in the country.

Other strategies of the government to address the energy crisis are the following (PNOC - Alternative Fuels Corp., 2008):

Creation of PNOC-AFC *(13 June 2006)* with an expanded mandate to:

> *Explore, develop and accelerate the utilization and commercialization of … and carry on the business of alternative fuels and other related activities*

"The PNOC Alternative Fuels Corporation shall have the primary responsibility over the Biofuels Project and shall be the one to coordinate with the concerned agencies." *Pres. Gloria Macapagal-Arroyo (NEDA/NAPC Cabinet Meeting, Malacañang, 8 Aug. '06)*

Approval of the Biofuels Act (R.A. 9367) on 12 January 2007

> First of its kind in Asia
>
> Mandates the blending of biofuels (biodiesel and bioethanol) with petroleum fuels (diesel and gasoline)

Impacts Of Global Climate Change On Agricultural Production And Challenges For Agricultural Technology And Food Security In The Philippines

The World

- Increased greenhouse concentrations for the last 50 years are attributed to:
  - fossil fuel use
  - land use change
  - agriculture
- Rise in sea level for the last 100 years: 10-20 centimeters
- 1995-2006 was the warmest years on record

Source: *UN-IPCC (2007)*

The Philippine Scenario

- Current scientific evidence strongly suggests that hurricanes and typhoons tend to become more destructive as ocean temperatures rise.

- Tropical cyclones caused an annual average damage to property of PhP4.5 billion (around US$90 million), including damage to agriculture amounting to Php3 billion (around US$ 60 million).

- 1995-2006 was the warmest years on record

- Tropical cyclones caused an annual average damage to property of Php4.5 billion (around US$90 million), including damage to agriculture amounting to Php3 billion (around US$ 60 million).

Source: *Amadore (2007)*

- 2006 typhoons affected at least 11 million Filipinos and inflicted damage to agriculture and infrastructure amounting to almost Php20 billion (around US$400 million).

Source: National Disaster Coordinating Council (2006)

Table 3. Top 20 Provinces in the Philippines which are vulnerable to a one meter rise in sea level (Greenpeace, 2007).

RANK	Province	Region	Area vulnerable to a 1 meter sea level rise (in square meters)
1	Sulu	ARMM	79,728,300
2	Palawan	Region 4B	64,281,600
3	Zamboanga del Sur	Region 9	37,818,900
4	Northern Samar	Region 8	33,882,300
5	Zamboang Sibugay	Region 9	32,740,200
6	Basilan	ARMM	30,294,000
7	Cebu	Region 7	27,888,300
8	Davao	Region 11	27,005,400
9	Bohol	Region 7	23,895,000
10	Camarines Sur	Region 5	22,680,000
11	Quezon	Region 3	21,124,800
12	Tawi-Tawi	ARMM	17,390,720
13	Masbate	Region 5	14,256,000
14	Occidental	Region 6	13,996,800
15	Camarines Norte	Region 5	13,591,800
16	Capiz	Region 6	10,748,700
17	Catanduanes	Region 5	10,643,400
18	Samar	Region 8	10,635,300
19	Zamboanga del Norte	Region 9	10,570,500
20	Maguindanao	ARMM	9,169,200

Major steps to curb the rising global greenhouse gases and initialize the development of mechanisms to sustain the agriculture sector

- Cut down fossil fuel consumption and instigate massive uptake of renewable energy combined with aggressive energy-efficiency measures
- Develop sustainable resource (food, water, etc.) management and distribution;
- Promote the development and use of RE-based agro-industrial technologies and crop varieties that are more resistant to drought and flood;
- Develop a comprehensive land-use and coastal development plan that integrates risk reduction;
- Integrate climate change into the national, regional and local development planning process (Habito, 2006).

Mitigating Actions

- The government must stop the construction of new coal-fired power plants and phase out the existing ones;

- It must pursue demand-side management and establish stringent standards for all energy-consuming appliances, buildings and vehicles. This can result in energy savings of as much as 30%

- It must eliminate all direct and indirect subsidies to fossil fuels to create a level playing field for new renewable energy players.

Source: Jabines and Inventor (2007)

AGRICULTURAL TECHNOLOGIES FOR FOOD SECURITY AND AGRICULTURAL SUSTAINABILITY

Summary of the R&D activities of the Philippine National Institute to APCAEM related to agricultural technology for food security and agricultural sustainability

Core Projects:

- Design and Development of a Multi-crop Pneumatic Seeder with Fertilizer Applicator
- Development of a Burner for Crude *Jatropha curcas* Oil and Other Liquid Fuel
- Development of Corn Sheller for High-Moisture Shelling
- Design and Development of Pneumatic Dryer for Agricultural By-Products
- Development of Oil Expeller for *Jatropha curcas* seeds.

- Development and Introduction of Appropriate Mechanization Technology for Local

  Vegetable Production

The modified UPLB root crop slicer

Vegetable washer

The fabricated sprayer

Fabricated soil sterilizing machine

Faculty-based Projects:

- Anthropometric Survey of Farmers in the Calabarzon area
- Development of Rice Hull/Corn Cob Furnace for Non-Power Applications

Fabricated rice-corn hull furnace

- Design and Development of Corn Harvester

- Mechanization of Heat Treatment of Carabao Mango for Quarantine Disinfestation and Disease Control Production

Hot water tank system

- Development of a Gravity-Driven Tramline for Hauling of Highland Tomato

- Evaluation of the Sustainability of a Drip Irrigation System and its Potential in Increasing the Level of Mechanization in a Corn-Based Farm

- Evaluation of the sustainability of a drip irrigation system and its potential in increasing the level of mechanization in a corn-based farm in Kay-anlog, Calamba City, Philippines

Deep well rehabilitation process

- Process Development for the production of Biodiesel from *Jatropha curcas* oil with studies on

    1) Solvent Esterification Process from Crude *Jatropha curcas* Oil
    2) Solvent Extraction of Crude Oil from *Jatropha curcas* Seeds
    3) By-product Separation of Glycerol Layer from Esterification of Jatropha curcas oil
    4) Development of Treatment Processes for Wastes Generated during the Production of Methyl Ester from *Jatropha curcas* oil and

- Design and Installation of a Micro-hydro Generator
    1) Testing and Evaluation of a 200W capacity micro-hydro generator
    2) Matching of Alternative DC/AC generator for a 200W capacity turbine
    3) Design of alternative components for a 200W capacity turbine

Training, Extension and Information Communication Section major activities

- Introduction of Appropriate Mechanization Technologies in Cebu Province
- Publication of printed materials for information dissemination of agricultural mechanization, and
- Promotion of AMDP developed agricultural mechanization technologies.

SUMMARY

Soaring food and energy prices have negative impacts eventually to the urban and rural poor.

Increasing energy prices contribute to increase in prices of basic commodities such as rice and corn since processing operations such as drying, milling, shelling, among others, require use of fossil fuels.

Handling and transportation costs of rice and other commodities which entail use of fuel add to their selling prices in the market.

SUMMARY

The efforts of R&D institutions like AMDP to develop and package appropriate farm technologies that will harness the available renewable sources from farm biomass (e.g. rice hull, corn cobs, and other agricultural wastes), and fuel from *Jatropha curcas* are significant contributions to mitigate the impacts of soaring food and agricultural commodity prices.

It may also contribute to the government's plan to attain self sufficiency in energy in the years to come.

SUMMARY

Tthe government's move to attain self-sufficiency in energy supply targeted at 60% sufficiency level by 2010 is a favorable scenario for stabilizing the prices agricultural products, which currently rely heavily on energy for their processing and distribution.

The concerted efforts of government from various sectors (DA, NFA, PNOC, PRPC, UPLB through AMDP-IAE-CEAT, etc.) and initiatives from the private sector, may help achieve food and energy security/sustainability and improve agricultural productivity.

END OF PRESENTATION
Thank You!