

The 4th Session of the Technical Committee of APCAEEM

**The Strategic Approach to the
Improvement of Agricultural Productivity
towards Food Security in China**

(Country Report, 2008)

by

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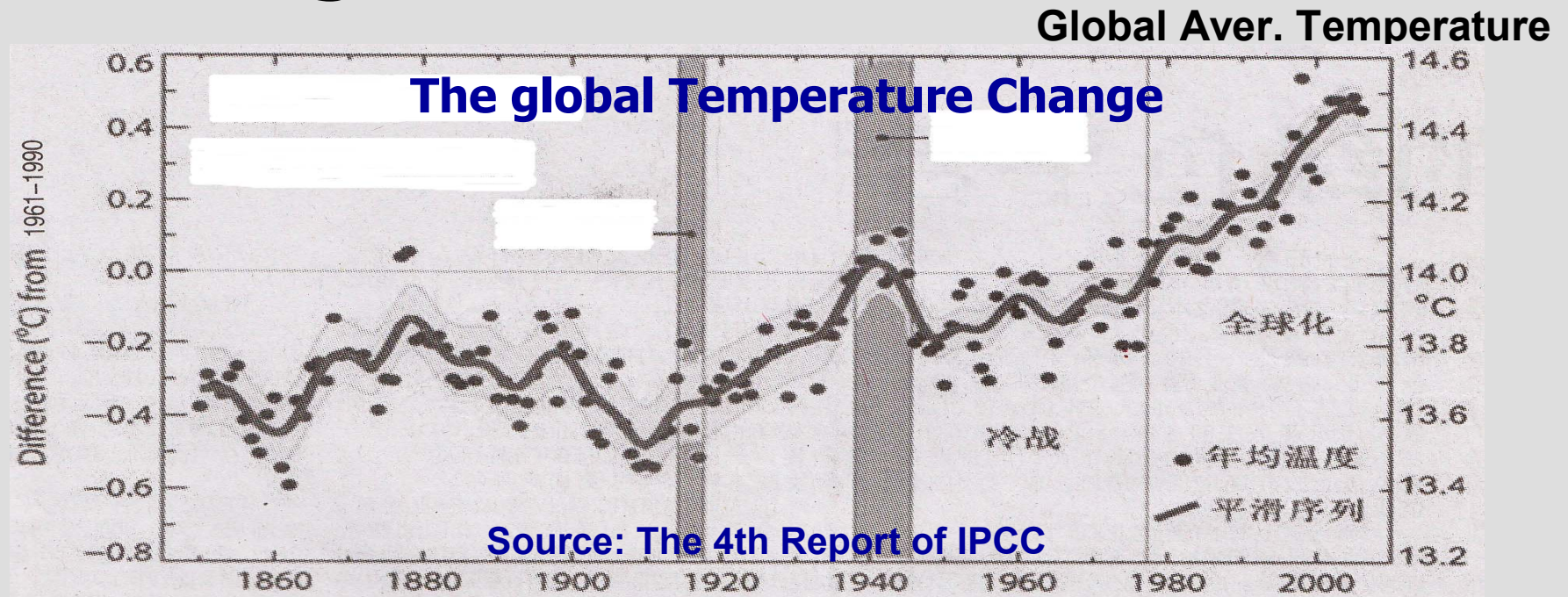
11th February, 2009, Chiang Rai, Thailand

1. Great Concern in Recent Years

1). Concern with Grain and Food Security

- **Grain Price was with fast increase:**
2006: ↑ 12%; 2007: ↑ 24%; The first half of 2008: >50%
- **The Global Grain Stock had reduced to the lowest since the past 30 years.**
- **Increasing World Population:**
2005 – 6.65 billion; 2050 – 9.76 billion;
Annual increase at about 70 millions
- **The Population of Starvation increased to 925 million in the beginning of 2008.**
- **About 4 billion population wish to claim up to higher level of food chain with consumption of more meat, milk and egg.**²

2). The Impact of Global Temperature Change



In the past 100 years:

Global average temperature : ↑ 0.75 °C

China's average temperature: ↑ 1.1 °C

In Northeast and North China: ↑ 3.5 °C

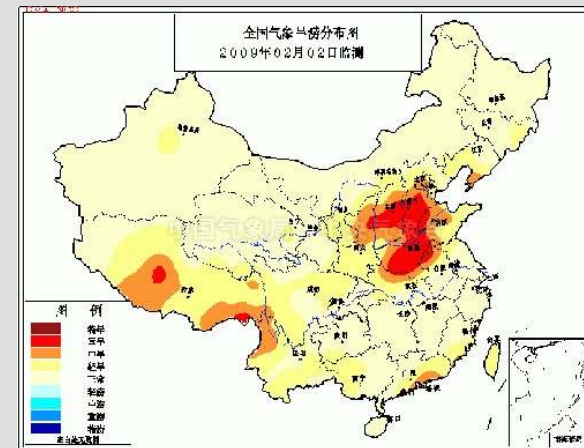
The Aver. Rainfall in Summer: ↓ 20mm

It leads to:

Changing the pattern of crop structure & incidence of pest & disease;

Reduction of crop growing period and yield decrease, crop production belt change, etc.

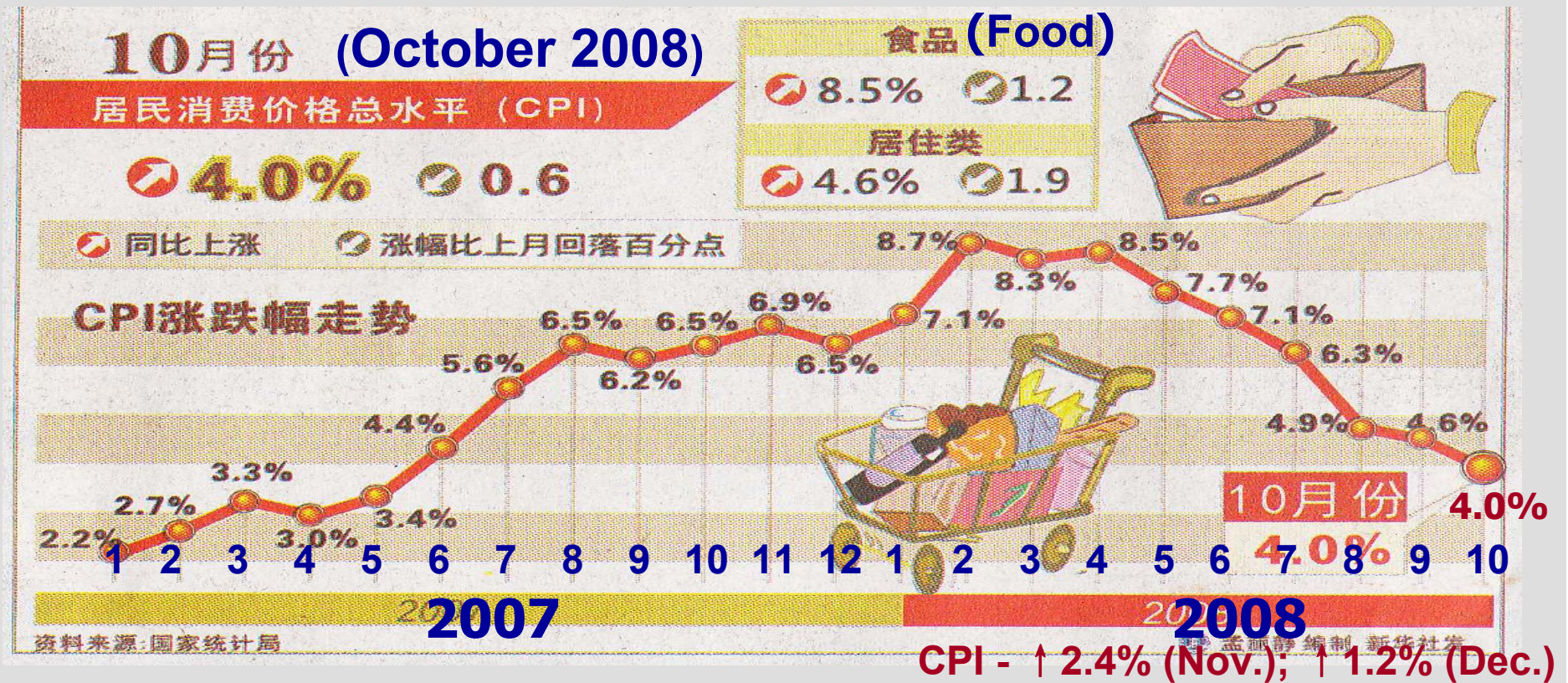
The severe drought has hit at least eight provinces in China since last November. It has affected about 20 mil. hectares of farmland and 10 mil. winter wheat growing and led 4.37 million people and 2.1 million heads of livestock with drinking water shortage by the report of 6th Feb.



研究表明，我国的干旱趋势处于扩大的态势

3). Consumer Price Index (CPI) in China had been at high level before mid of 2008

In the first half of 2008, Consumer Price Index (CPI) $\uparrow >7\%$ & the food price $\uparrow \sim 20\%$ compared with the same period of 2007



CPI Fluctuation was mainly Caused by Food Price Uprising

The Average CPI in 2008— $\uparrow 5.9\%$, it was $\uparrow 1.1\%$ higher than in 2007.

4) Energy Price Fluctuation and Uncertainty



The Price Trend in 2008



2008-10-22

~ 70 \$ / barrel

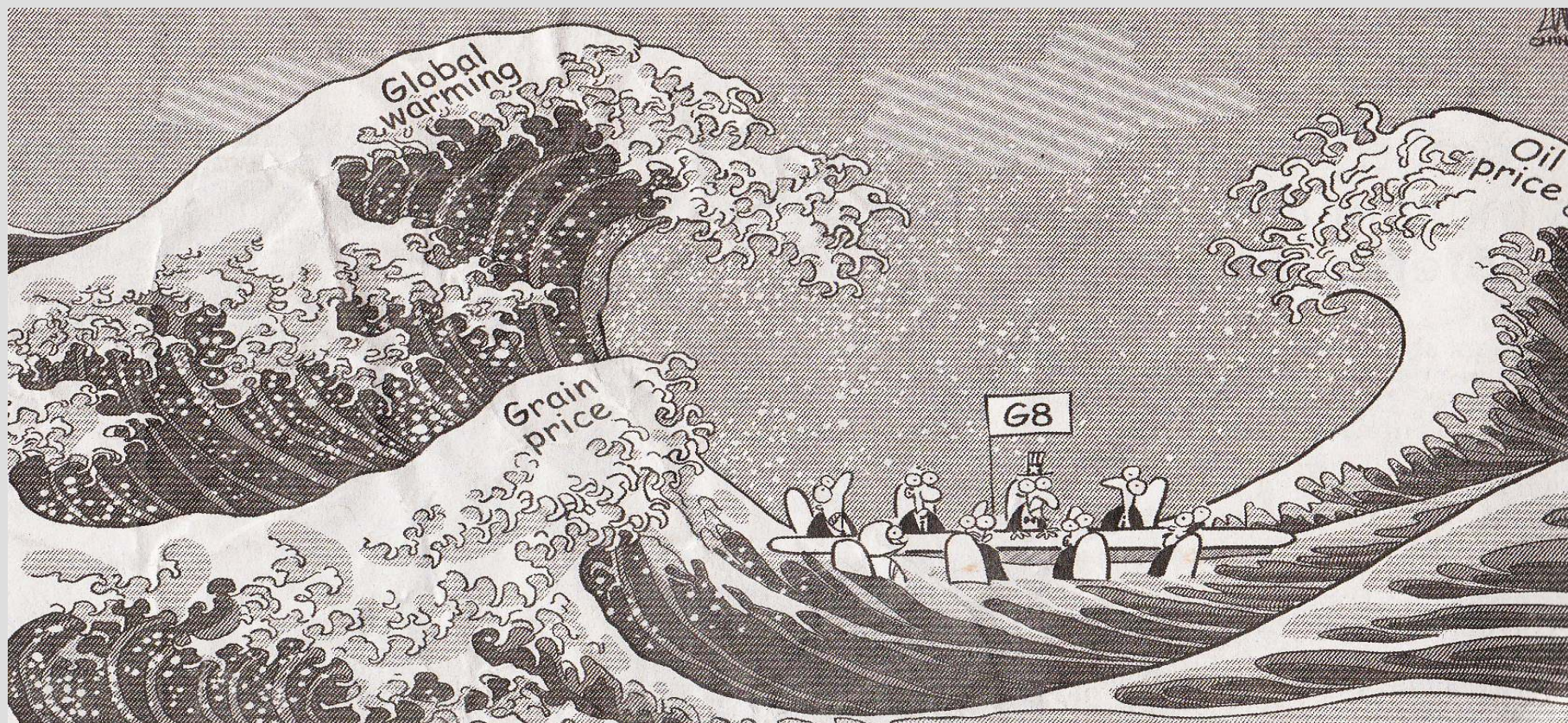
2008-12-19

33.87 \$ / barrel

2009-1-28: 41.58

**The Aver. Price of Crude Oil: 2004 - 40\$; 2005 - 50\$;
 2006 - 60\$; 2007 - 70\$. 2008.7.11 147.21 \$/barrel.**

5)、 The World Financial Crisis

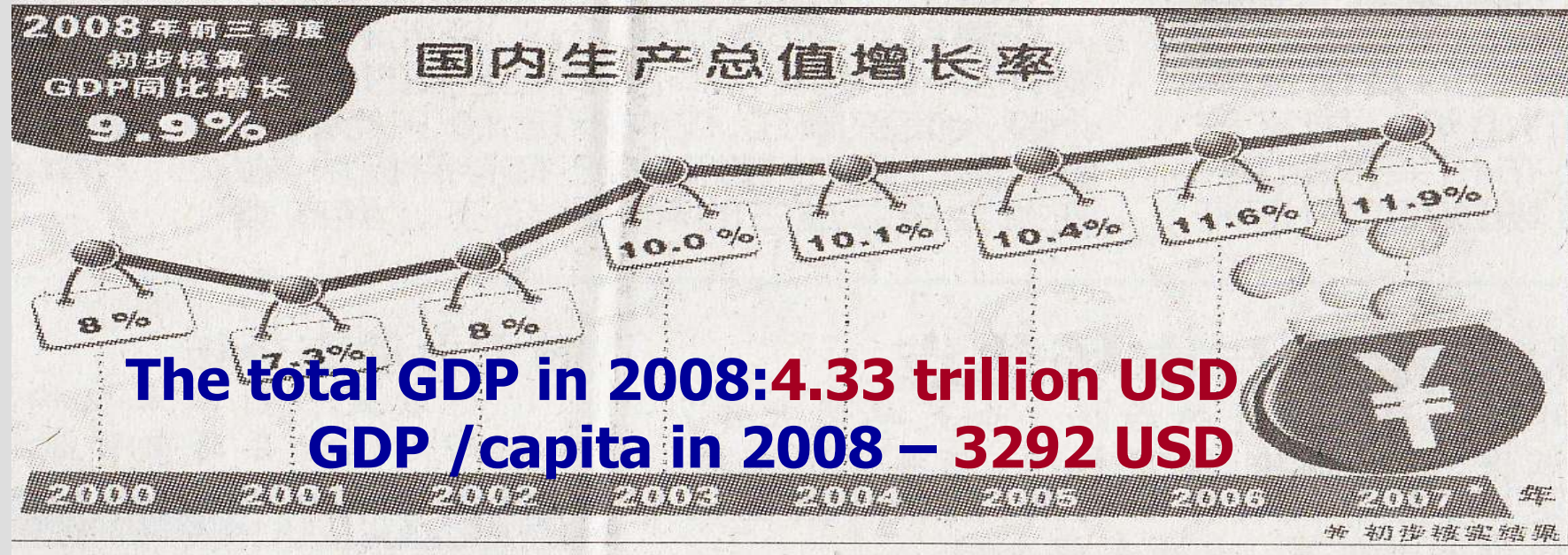


- The direct impact to China' agri-system are: more 20 mil. Migrant workers (1/6) have lost jobs in city; agro-products export reduced and with difficulty to increase purchase price for agroproducts.
- China is offering a **\$586 bil.** stimulus package to boost its potential domestic market

- **The China's Financial System has kept Relatively Stable:**
 - High savings deposit **more 1.5 times of GDP** in 2008;
 - The Resident **savings deposit by the end of 2008** is about at **\$ 2.9 trillion**.
 - The **total foreign exchange reservation by the end of Dec. 2008** is at **\$ 1.95 trillion, ↑ 27.3 %**.
 - The China's financial system has kept stable with the unhealthy assets rate at about **2.5 % only**.
- **Taking policies on "*Maintaining economic growth, expanding domestic demand, restructuring economy, transforming growth pattern*" to face Global Crisis.**

6). Chinese macro-economic monitoring remained stable:

- China's GDP increase kept at 9.0% in 2008



- China's GDP increase in 2009 will be at 8 % by the recent estimation.
- The monthly data showed a early signs the national economy may be bottoming out.

■ **Needs to pay great attention to rural & agricultural development.**

➤ **The Hardest Challenges for Agriculture, Rural Areas and Farmers due to Financial Crisis:**

- ✓ **The pressure of agro-product price decreasing**
- ✓ **About 20 million of China's rural migrant workers (15.3 % of total) had returned home jobless in city.**

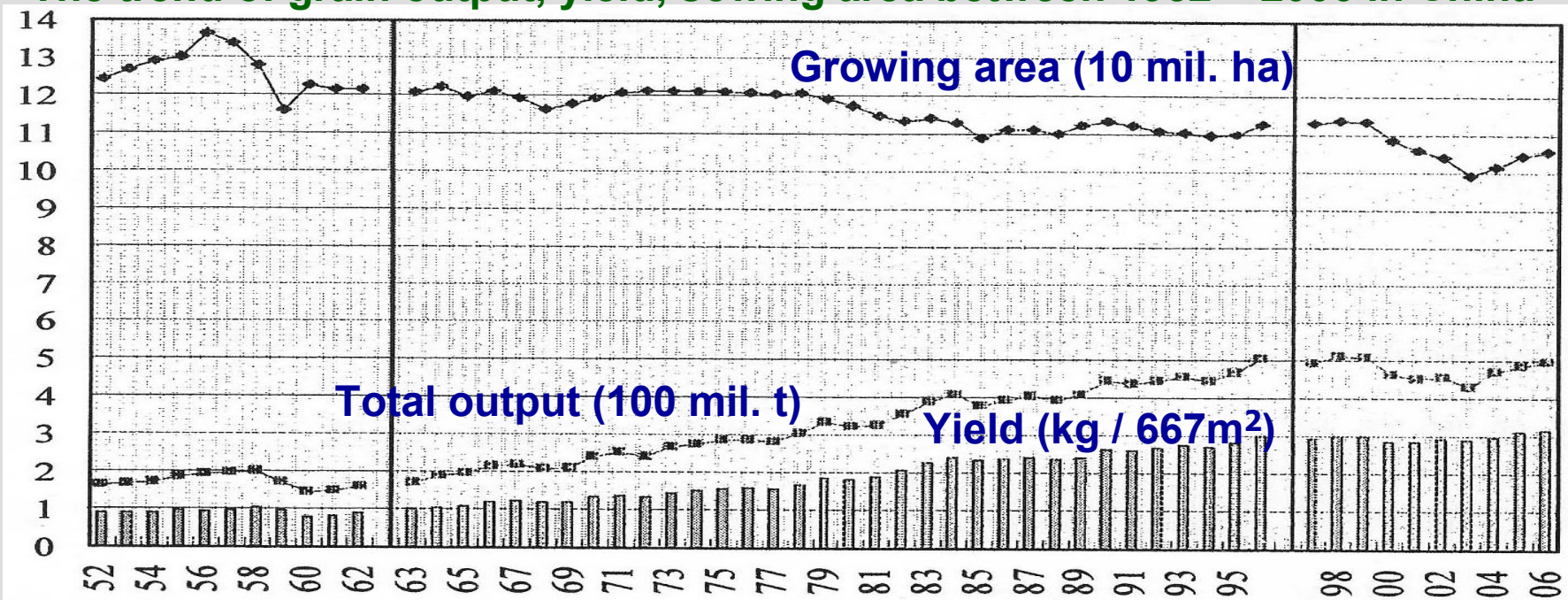
➤ **An strategic thought to face the challenges:**

- ✓ **The biggest potential for boosting domestic demand lies in rural areas;**
- ✓ **The foundation for securing steady and relative fast economic growth is based upon agriculture;**
- ✓ **The toughest work of securing and improving people's livelihoods stays with farmers.**

2. The Challenge facing China's agricultural Production

1). Grain security is the first issue to govern the country and create a harmonious society

The trend of grain output, yield, sowing area between 1952 ~ 2006 in China



Target to Reserve Sowing Areas, Capture High Yield & Save Consumption !

2). The inefficient agricultural production pattern

- 2/3 low & mid-low yielding farmland, backward infrastructure & technical equipment, potential farmland exploitation
- Small-scale farming, low intensification & standardization of agricultural production.
- The seed quality has been much improved, but soil quality has degraded

43 high yield demo farms can achieve get corn yield at 15~21 tones / ha; but other farms can only get 6 tones /ha with the same seed variety.

3). Large unbalanced development of urban and rural areas

- *"The highest increase rate of farmer's Income in 2007, but the income gap with others has reached the maximum too".*

In 2007, the net farmer's income increase rate was the highest year between 1985-2007, but the gap it was the biggest in the past 30 years too.

[1978-2.6:1; 1984-1.8:1; 2005-3.28:1; 2007-3.33:1]

- **To coordinate the urban & rural economy & social development becomes core problem for building a harmonious society.**

3 . The Newest “Decision on Major Issues Concerning the Advancement of Rural Reform and Development”, Oct. 2008

- *Liberating farmers’ land use right to boost rural development*
- *Vowing to strive for balanced rural and urban development*
- *Pledging to build modern industrial system for agriculture*
- *Developing modern agriculture, promoting agricultural S & T progress, enhancing the material equipment to improve land productivity, resources conservation and increase labor productivity*

■ ***Implementation of Mid & long-term Program for National Grain Security***

- **A bumper Grain harvest in last five years:**

Year	2003	2004	2005	2006	2007	2008
Output (mil.tons)	430.7	469.47	484.02	498.04	516.6	528.5

- **Targeted grain output reaches 500mil. tons by 2010;**
- **Target grain output reaches 540mil. tons by 2020;**
- **The long-term grain self-sufficiency keeps over 95 %;**
- **Strictly control of total farmland at 120 million ha. and basic cropland no lower than 100.4 million ha. by 2020**
- **Increase grain purchase price at about 15 % in next year**

■ **Developing Modern Agriculture & Increasing Agricultural Comprehensive Production Capability**

- Target for **high yield, good quality, high efficiency**, and *optimal ecology and safety transfer farming pattern*; Promote agricultural Technology innovation; Enhance agricultural material & technology equipment
- Perfect the agro-industry system by improving **farmland productivity, resource utilization rate, and labor productivity**
- Strengthen agricultural infrastructure construction and improve soil fertility and land output
- Enhance standardization and quality control of agro-products.

4. SPEEDING UP AGRICULTURAL MECHANIZATION DEVELOPMENT

- *Fast promotion of industrialization & Urbanization Requires Transferring Large Labor Forces from Rural Areas*

- *The labor cost is increasing progressively*

The labor input cost for main crop production (2006)

	Wheat	Rice	Corn	Soybean	Rape seed	Cotton
Labor cost %	29.5 %	36 %	36.4 %	43.4 %	49.3 %	50.9 %

Source: China Agricultural Yearbook 2007

- *China increases subsidies for agri-machinery purchase from central gov. (Unit – mil. Yuan) : 2004 –70 ; 2005 –300; 2006 –600; 2007– 2,000; 2008 – 4,000; 2009 – 10,000 (\$ 1.46 billion)⁷*

■ ***Stressing the Role of Agricultural Mechanization (AM) in Building Modern Farming***

- **AM leads to renovation of agronomic technologies;**
- **AM leads to development of farmers' cooperative organizations;**
- **AM leads to strengthening rural S & T forces;**
- **AM leads to extension of new agro-technologies.**

Agricultural mechanization is an essential component of agricultural engineering.

Agricultural Mechanization → Building Mechanized Agriculture!

■ **The Status of Agricultural Mechanization in 2008**

➤ **The total farm power has kept steady and relatively fast development:**

Total farm power **800 mil. kW** (766 mil.kW in 2007, ↑ 4.4 %)

Large & mid-scale tractors: **2.4 mil. Units** ↑ **17 %**

Small-scale tractors: **16.6 mil. Units** ↑ **2 %**

Combine harvesters: **0.71 mil. Units** ↑ **12 %**

Rice trans-planters: **0.2 mil. Units** ↑ **28 %**

➤ **The comprehensive tillage, sowing and harvesting mechanization level: **45 %** (42.5 % in 2007)**

➤ **The rice harvesting mechanization lever : **> 50 %****

■ **Steady Advancement of Agricultural Machinery Industry (Jan.- Nov. 2008)**

- **The increase rate of total production value:**

25 billion USD; ↑ 30.4 %.

- **Output of:**

Large-medium tractors:	0.209 mil. Sets,	↑ 19.44%
Small sized tractors:	1.7715 mil. Sets,	↓ 6.19%
Cereal harvesters:	0.2987 mil. Sets,	↑ 19.98%

- **Import value: 1.238 billion USD,** **↑ 21.71 %**

- **Export value: 5.882 billion USD,** **↑ 51.36 %**

*Obvious slump down of increase rate & profit
in next half year of 2008.*

- **Tractors, implements and machinery for agricultural production can be basically supplied by the domestic industry.**
- **Mechanization development for cash crops, such as rape seeds, cotton, sugar cane, sugar beet, fruits and vegetables are much falling behind.**
- **Development of environment-friendly straw, biomass and waste treatment machinery become an attractive area for equipment innovation.**

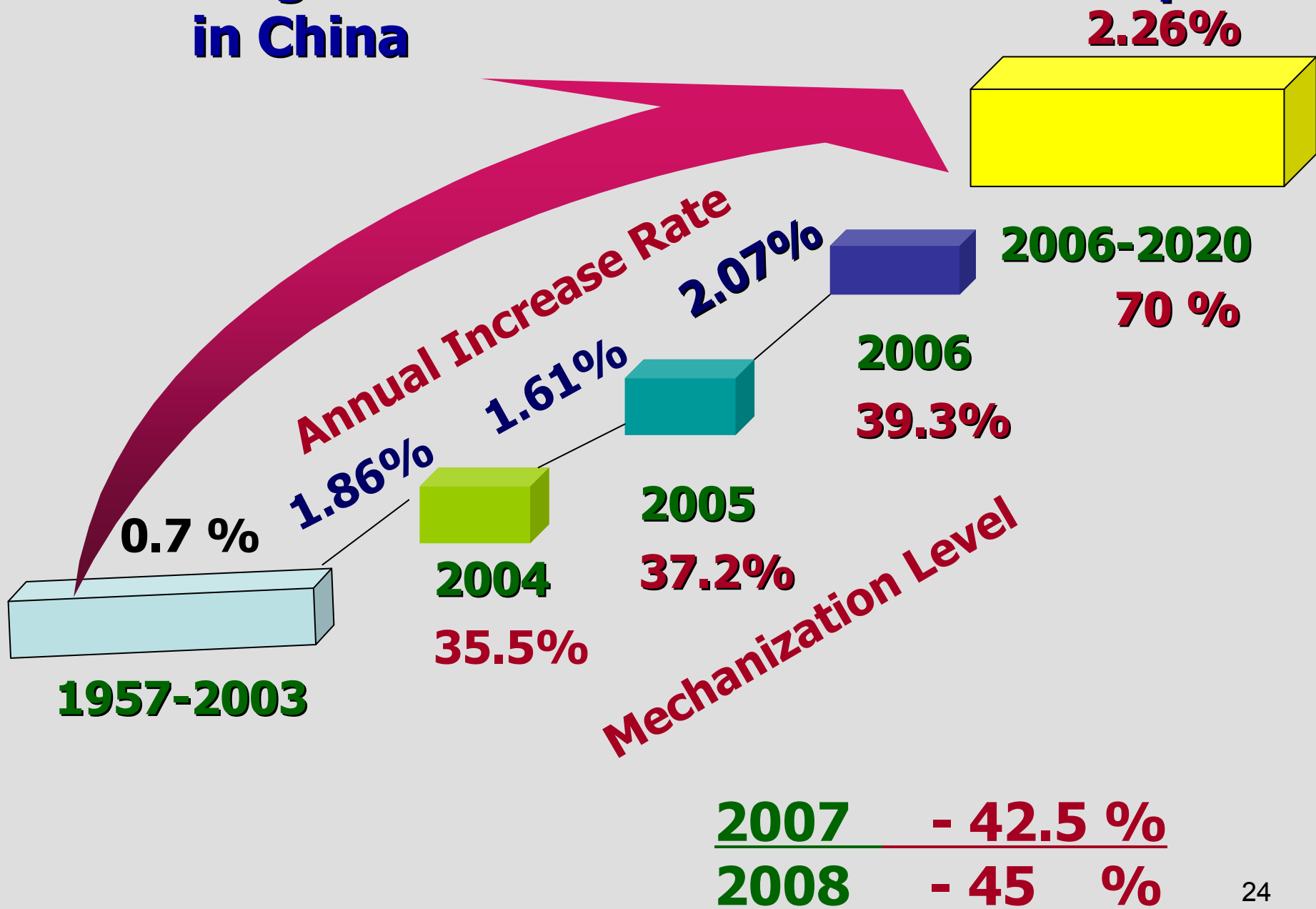
■ **Expanding Agricultural Mechanization Service in Rural Areas**

- **Farmers urgently require agricultural mechanization services**
- **More 41 millions farmers were involved in AM service industry in rural areas**
- **The return for machinery investment can be balanced in 2-3 years.**
- **Smooth expansion of diverse AM services for the agro-system**

- **Expanding Agricultural Mechanization Services for basic operations of cereal crops during key farming periods into full process mechanization of full agro-industry.**
- **Promotion of mechanization for hilly & mountainous areas needs great attention, but it will be a great challenge.**



■ The Agricultural Mechanization Development in China



■ **The Vision to the Mid & Long-term Development Strategy by 2020**

(by a strategic research report, CAE, 2006)

- **Comprehensive Mechanization Level: 70 %**
- **Farming Scale per Agri. Labor Force: 1.6 ha**
- **Total Farm Power: <1 billion kW**
- **Fuel Consumption Decrease: 30 %**
- **Extend areas of technology innovation on new machinery development for Cash Crops, Fruits & Vegetables, Livestock Farming, Post-harvest Processing**

4. Technological Innovation on Agricultural Mechanization

- Various rice machinery is available in use

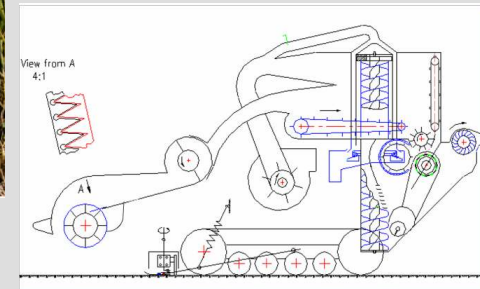


■ A new rice direct sowing machine

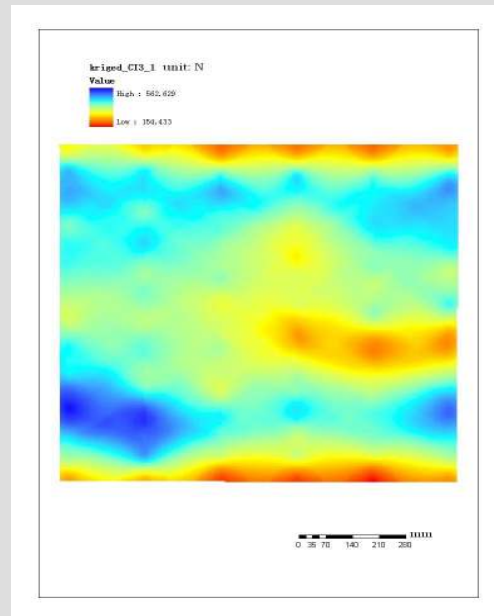


- The 20 % global temperature rising results in the Methane Emission;
- The 20 % of global methane emission results in an increasing rice field;
- The organic manure applied in field results in CH₄ emission
- Direct dry-sowing technology may largely out down CH₄ emission.

■ Rice fresh straw for feed silage



Rice fresh straw for feed silage

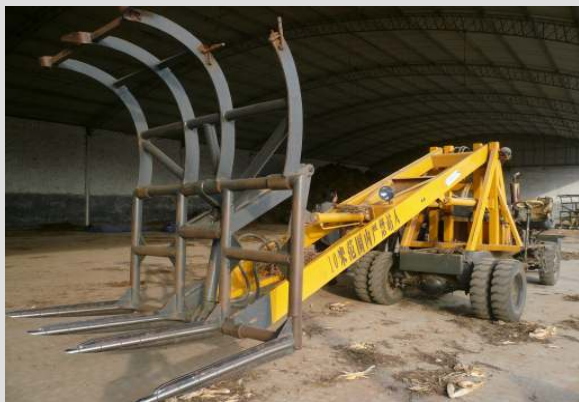


Bale quality mapping

■ Potato seed breeding and mechanization



■ Crop straw and stalks collection and processing for feedstuff, bio-energy & raw materials



■ Varies new machinery investigation



77 hp sugarcane chopper harvester



Rape seed seeder



Pine apple harvesting

■ Need for engineering input to specific crop production



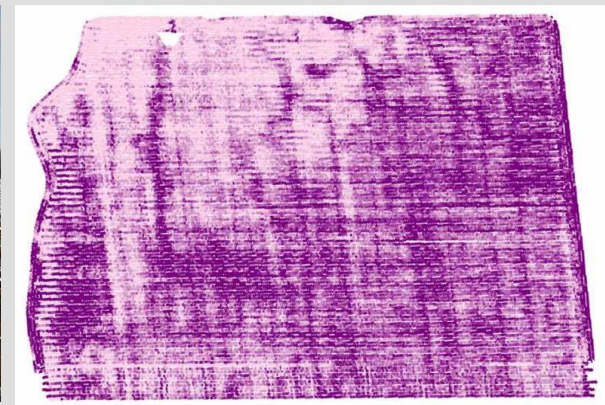
■ Engineering innovation for facility horticulture



■ Extension of Low-cost Laser-controlled land leveling Technology



■ Soil management as the first issue for crop production



5. Information Technology Leads to Agro-industry Technological Renovation

■ The General Trends of ICT:

- *Technology becomes **more uncomplicated** instead of being more complicated*
- *Products are **more popular**, instead of being more luxury*
- *ICT science is required not only for studying "**complexity**", but also "**simplicity**"*
- *Computers recede into the background of our lives which lead to "**ubiquitous computing**"*

■ **A new opportunity to promote low-cost, high-tech for farming users**

- **ICT research shall provide scientific guidance for developing appropriate technology to transfer difficulty into easy for use**
- **Develop low-cost technologies and tools for information acquisition, processing, transfer and utilization for farmers' adoption.**
- **The ICT industry investigates the next billion new users market**
- **Infrastructure for ICT extension has fast advances**

By the end of 2008: The total InterNet Users in China: **298 million.**

Increase rate in 2008: **41.9 %**; Population Rate: **22.6 %**

Mobil users: 641 million; population rate: **48.5 %**; Short messages: **700 bil.**

■ **Prior Subjects to Promote Extensive Applications**

- **Key technologies and tools development for high efficient information acquisition and processing;**
- **Low-cost spatial location technology, data merging and system integration technology;**
- **Process monitoring and control technology & advanced equipment development;**
- **Product quality, process safety monitoring technology, product traceability and equipment development;**
- **DSS for farming process management & knowledge engineering;**
- **Precision Agriculture practice in less developed and smaller-scale farming system.**

Summary

The advent of AET has freed up millions of workers from farms to manufacturing & service industries in developed countries & fertilized the industrial revolution process. It is accelerating agricultural modernization in less developed world and will brought to humankind with better working & living conditions, flourishing the rural economy, liberating drudgery of farmers and promote poverty reduction. Entering into the new century, Asia countries were suddenly appeared on the horizon of global economic development. The average annual GDP increase rate have reached 8.3 % and the total amount of GDP reached about global 25 %. Promotion of regional cooperation between AET communities will be mutually beneficial to speeding up agricultural modernization, contributing to the global economy and promote common efforts to face new challenge!



Thank You!

