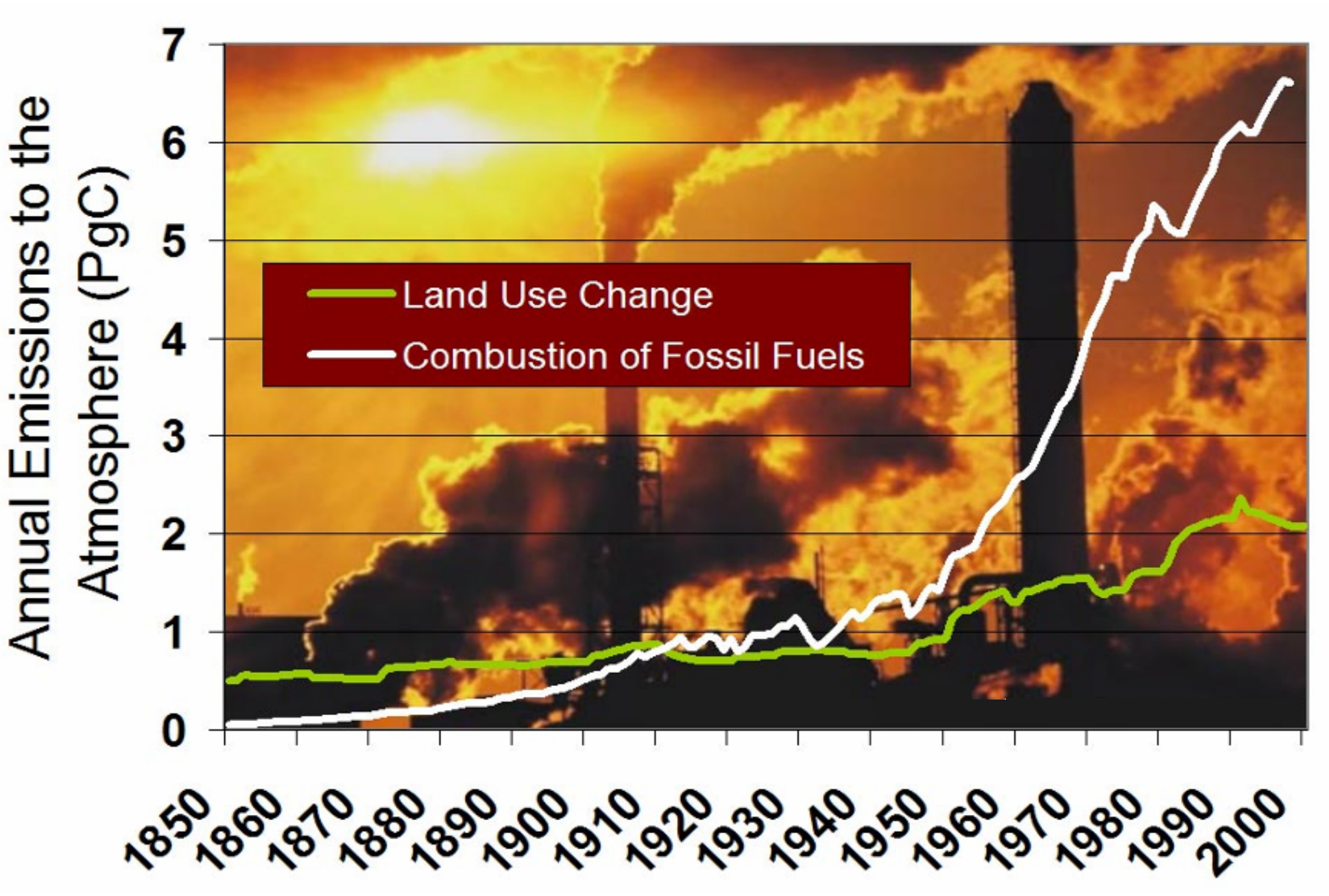
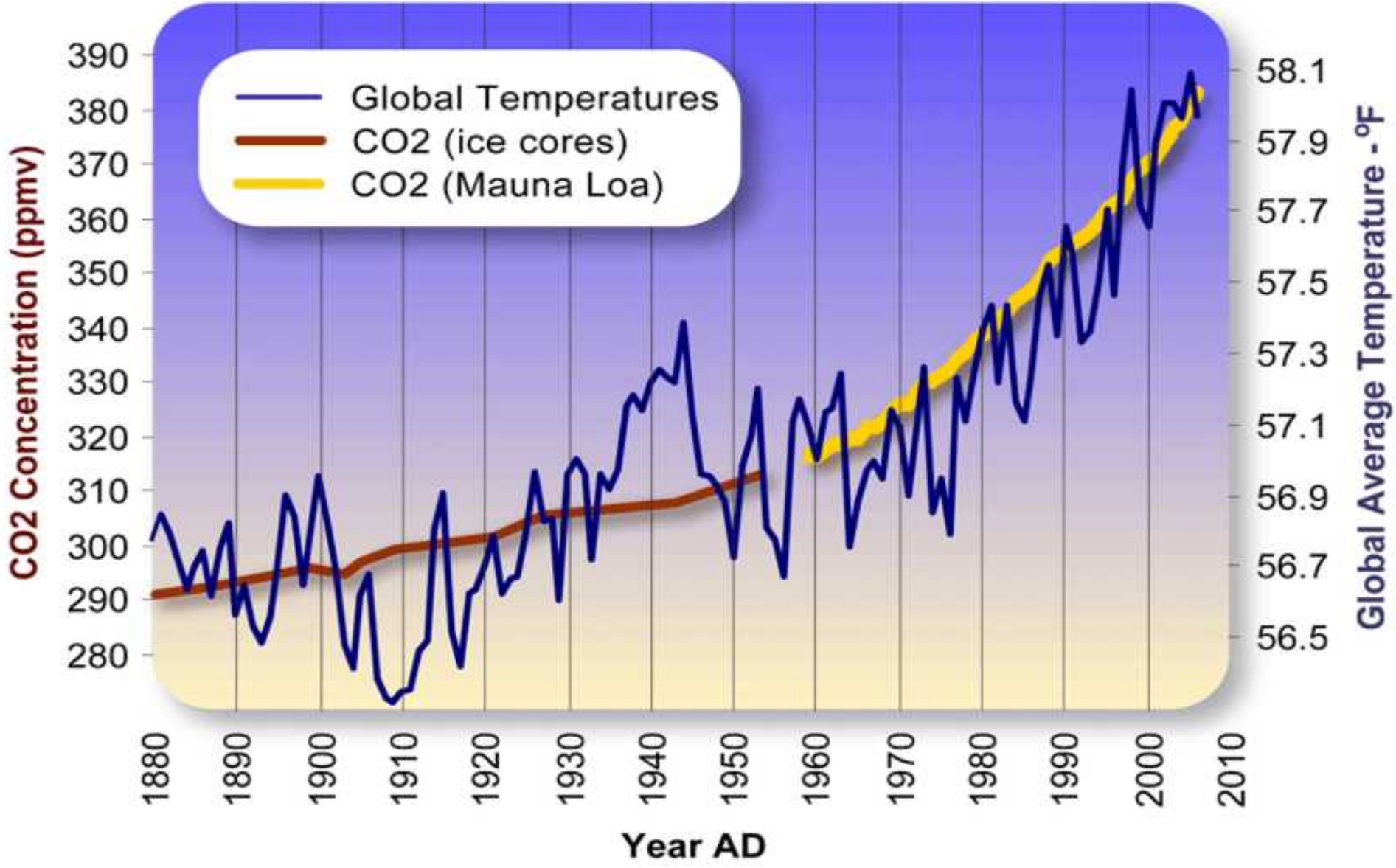
Opportunities for American Agriculture in the Voluntary Carbon Credit Market

Garth Boyd, Ph.D.
Camco

Date: March 13th, 2008


Annual Emissions to the Atmosphere (PgC)
7
6
5
4
3
2
1
0
Land Use Change
Combustion of Fossil Fuels
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000

Global Average Temperature and Carbon Dioxide Concentrations, 1880 - 2006



Who Cares?

- **International Solution to the risk of climate change**:
  - Kyoto Protocol

- **US States, Market and Proposed National Solutions to the risk of climate change**
  - California AB 32
  - Western Climate Initiative
  - Chicago Climate Exchange
  - Regional Greenhouse Gas Initiative (RGGI)
  - Lieberman-Warner Bill
  - And many, many more initiatives at the state level

Who Cares?

FW: Carbon Disclosure Project - Message (HTML)

File Edit View Insert Format Tools Actions Help

Reply | Reply to All | Forward

You forwarded this message on 3/5/2008 8:17 AM.

From: Douglas Miller [dmiller@qedocctech.com] Sent: Mon 2/11/2008 6:21 PM
To: Garth Boyd
Cc:
Subject: FW: Carbon Disclosure Project

Investors Request Disclosure of Climate Emissions, Strategies

LONDON, UK, February 6, 2008 (ENS) - The Carbon Disclosure Project, a collaboration of 385 institutional investors with assets under management of $57 trillion, has issued its 2008 information request to the world's largest corporations. Companies are requested to measure and disclose their greenhouse gas emissions and report on their strategy for dealing with risks and opportunities associated with climate change.

The resulting information will be held on the website of the Carbon Disclosure Project, CDP, an independent not-for-profit organization based in London that maintains the largest database in the world on corporate climate change.

In this, its sixth information request, the Carbon Disclosure Project has requested information from over 3,000 companies, up from 2,400 in 2007. It has launched operations in five new geographic areas and widened its scope in many existing regions.

For the first time, the Carbon Disclosure Project will write to China's 100 largest companies, by market capitalization. This is a key step in leveraging investor influence to support Chinese companies in measuring and disclosing their carbon emissions and climate related strategy.

The CDP will also launch new operations in Korea, Latin America, Spain and in the Netherlands, where operations are supported by the Dutch Environment Agency.

Carbon Disclosure Project CEO Paul Dickinson said, "The momentum behind CDP represents the start of a unified global business response to climate change."

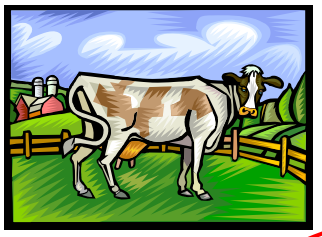
"The continued growth in investors supporting CDP and requesting the companies they invest in to respond through the CDP system demonstrates that we have entered an era when climate change has become a mainstream issue for both investors and corporations," he said.

Investors that have signed up to the Carbon Disclosure Project include Merrill Lynch, AXA, ANZ, Banco do Brazil, Mitsubishi UFJ, AIG Investments, Barclays, RBS Group and HSBC.

"The concept of low carbon footprint companies is a win-win idea," said Abyd Karmali, managing director and global head of carbon emissions with the financial

start | 3 Micro... | 2 Inter... | Adobe R... | 2 Micro... | 2 Micro... | EN | 100% | 1:35 PM

GHG Emissions Cap

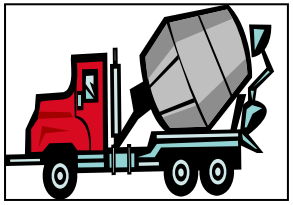


GHG Emissions Cap = 100 Metric Ton

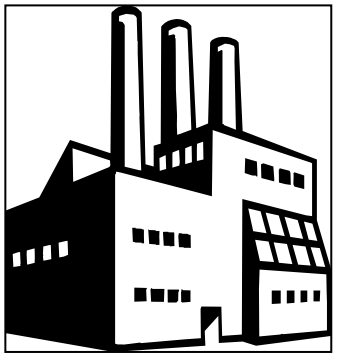
Total Allowances = 100

1 MT = 1 Allowance

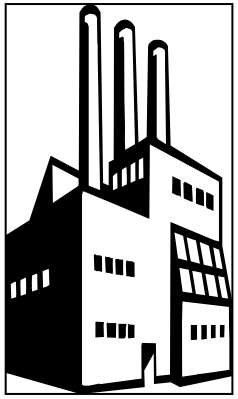
10 A



25 A

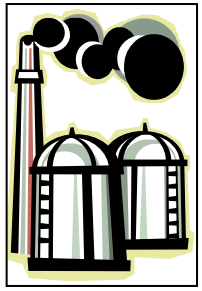


30 A



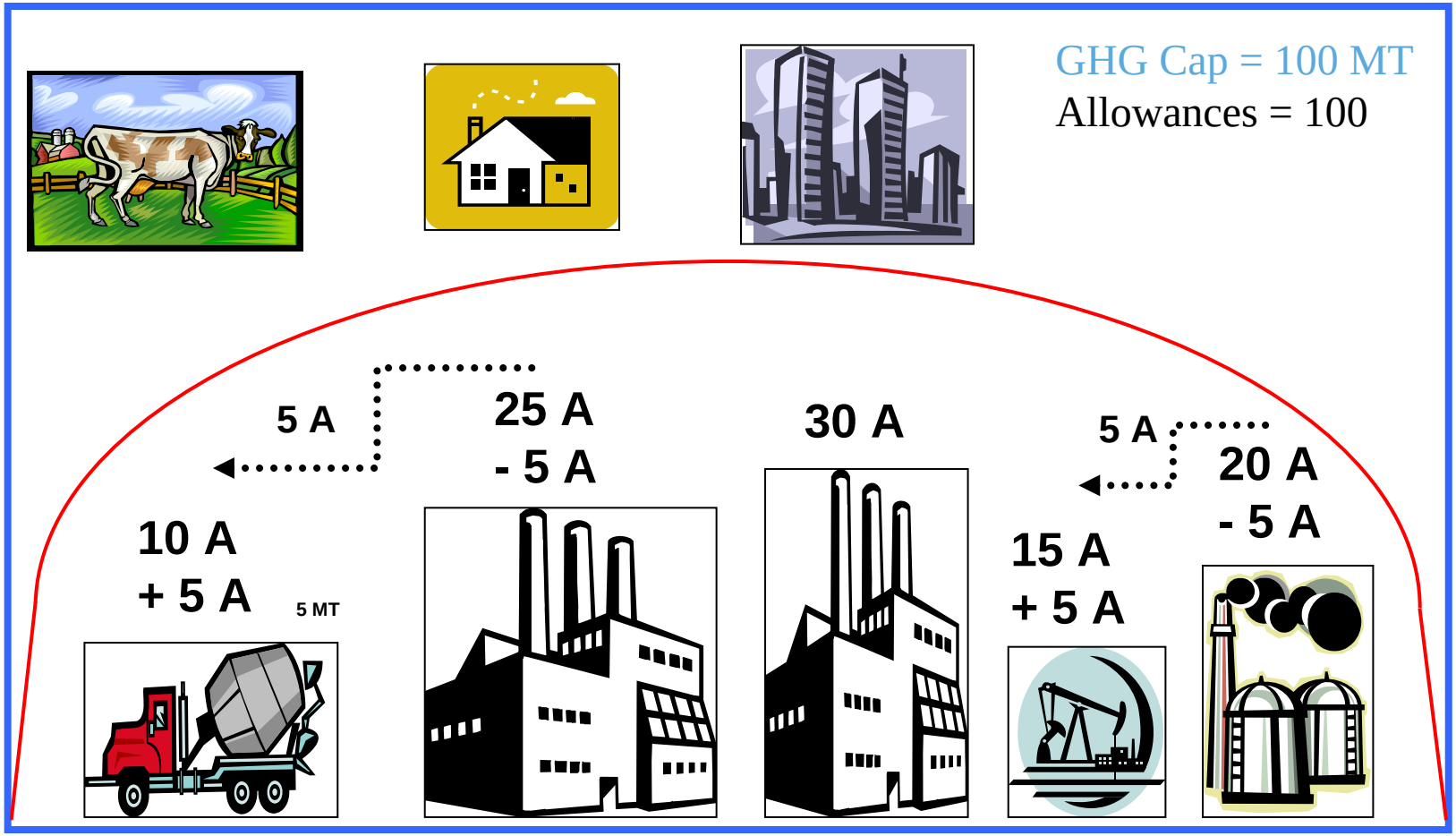
15 A

20 A



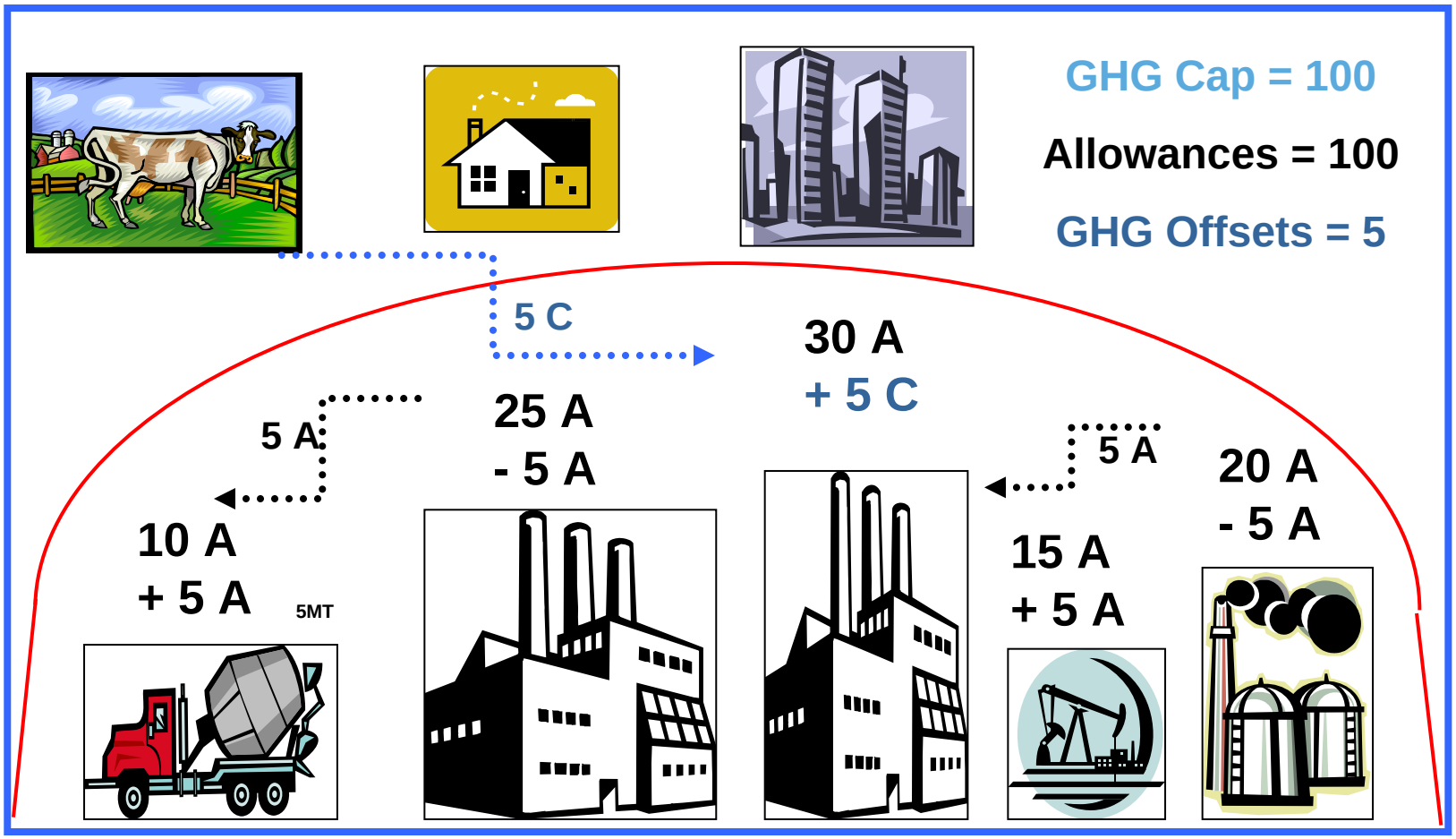
Emissions = 10 MT	25 MT	30 MT	15 MT	20 MT	= 100 MT

GHG Emissions Cap & Trade



Emissions =	15 MT	20 MT	30 MT	20 MT	15 MT	= 100 MT

GHG Emissions Cap & Trade and Offsets



Effect:

Cap Broken

But

Credits from dairy offset imbalance

Emissions = 15 MT	20 MT	35 MT	20 MT	15 MT = 105 MT

What is a Carbon Credit?

- A certified reduction in GHG emissions equivalent to one metric ton (2204 pounds) of Carbon Dioxide

$$mt\ CO_2e$$

Three Ways to Reduce Carbon in the Atmosphere

- **Emission reduction:** switch to better technologies with lower emissions
- **Energy substitution:** using more renewable fuels to replace fossil fuels
- **Off-setting by sequestration:** biotic uptakes from the atmosphere (e.g. tree planting)

What is the Size and Value of the Market?

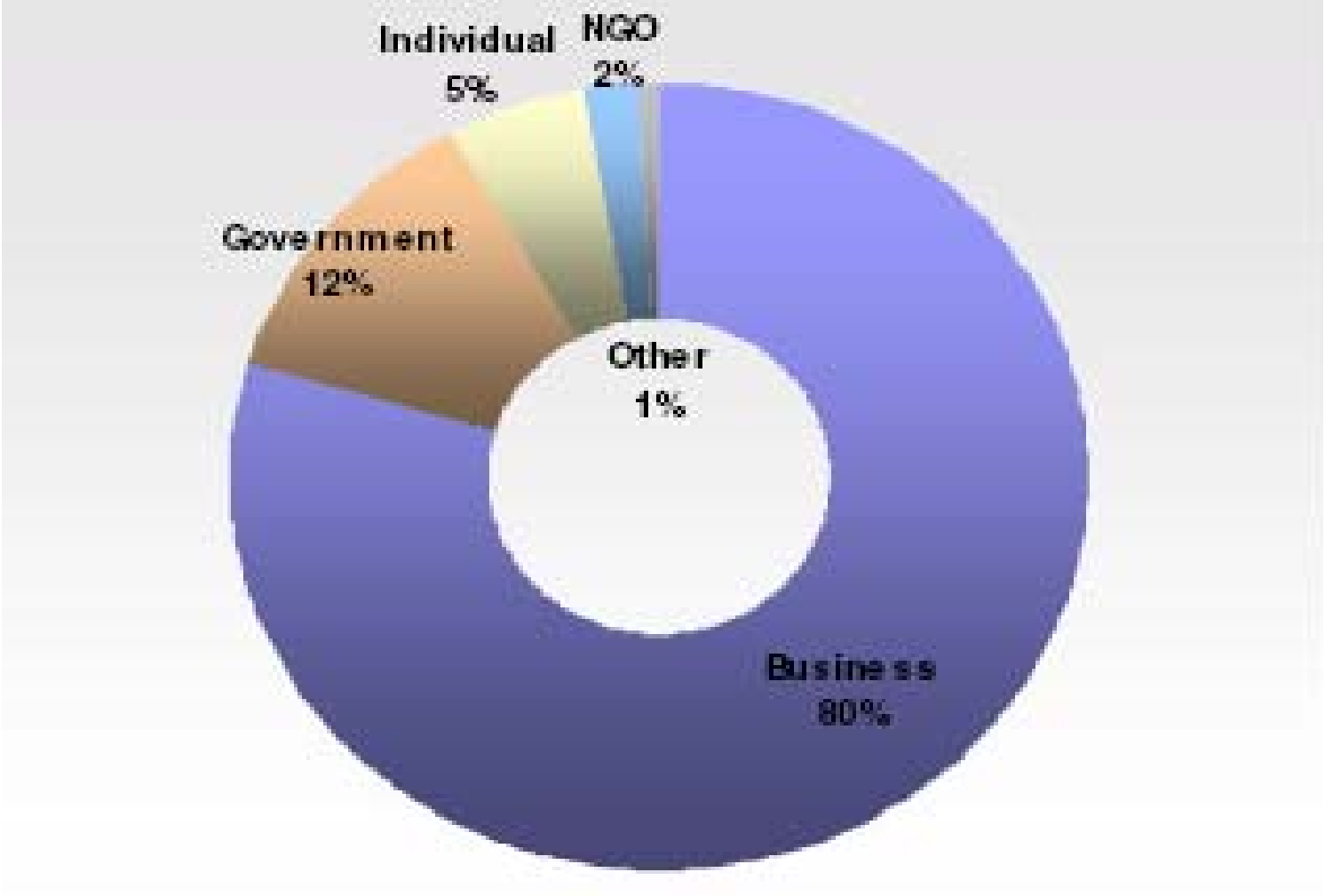
- **Voluntary 2006**
  - 23.7 million metric tons
  - $91 million USD
  - $4.10 Average wholesale price for a VER/carbon credit

- **Compliance 2006**
  - 2.7 billion metric tons
  - $58 billion USD
  - $10.90 Average wholesale price for a CER/carbon credit

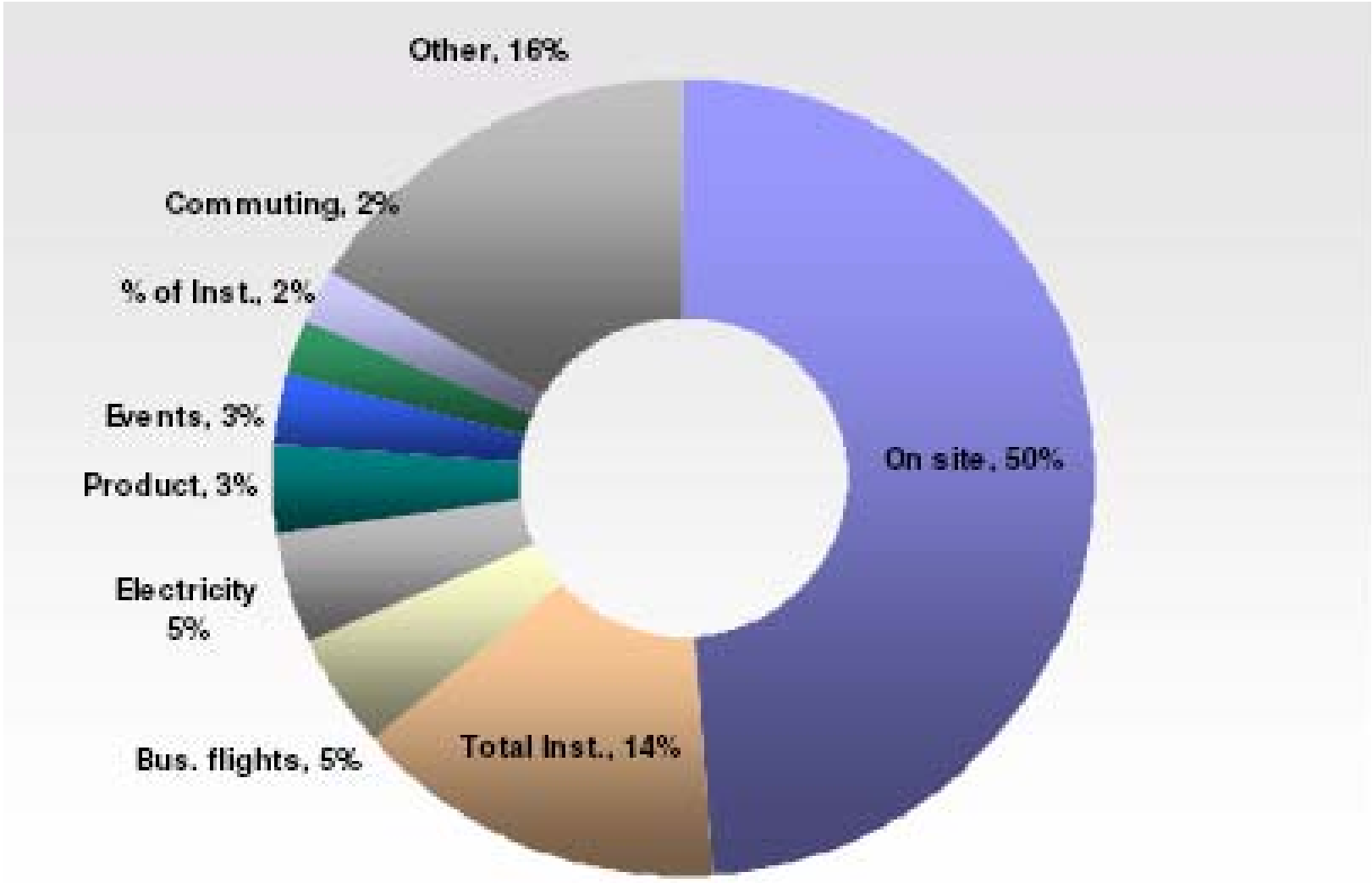
Why Voluntarily Buy Carbon Credits?

- Corporate social responsibility/environmental ethics
- Public relations/branding
- Sales of carbon neutral products
- Anticipation of regulation

Voluntary Carbon Credit Buyers by Volume

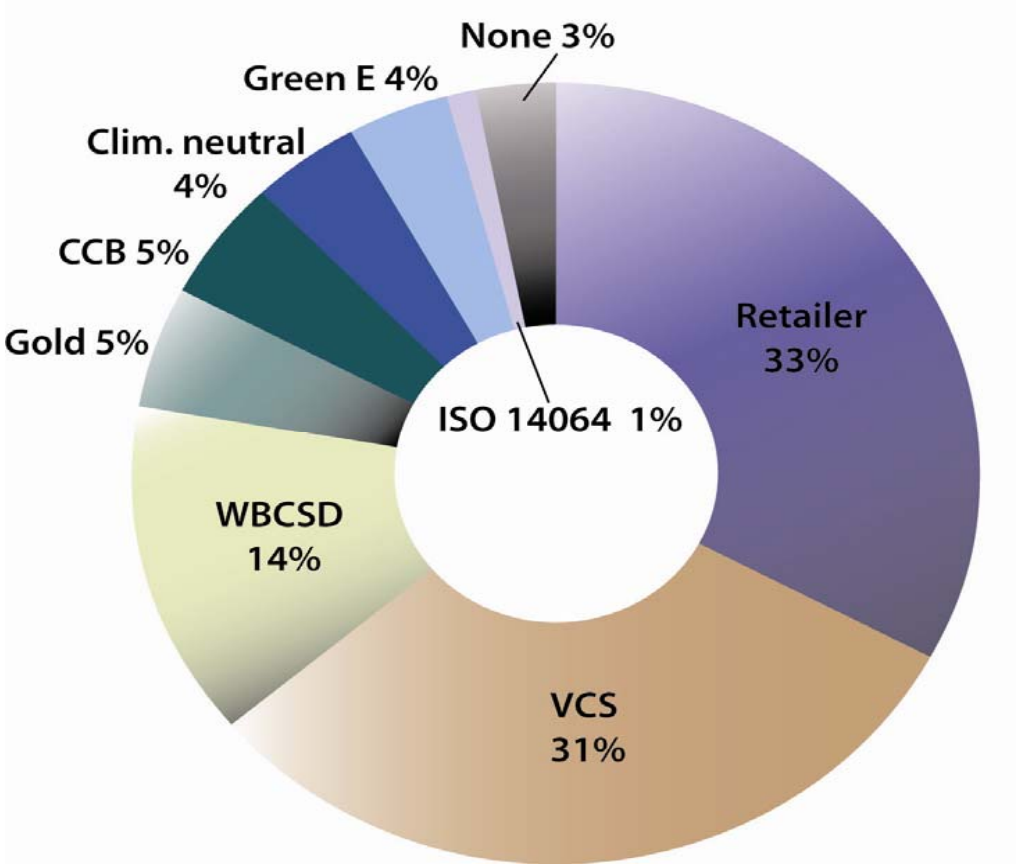


Carbon Neutral: Type of Emissions Offset

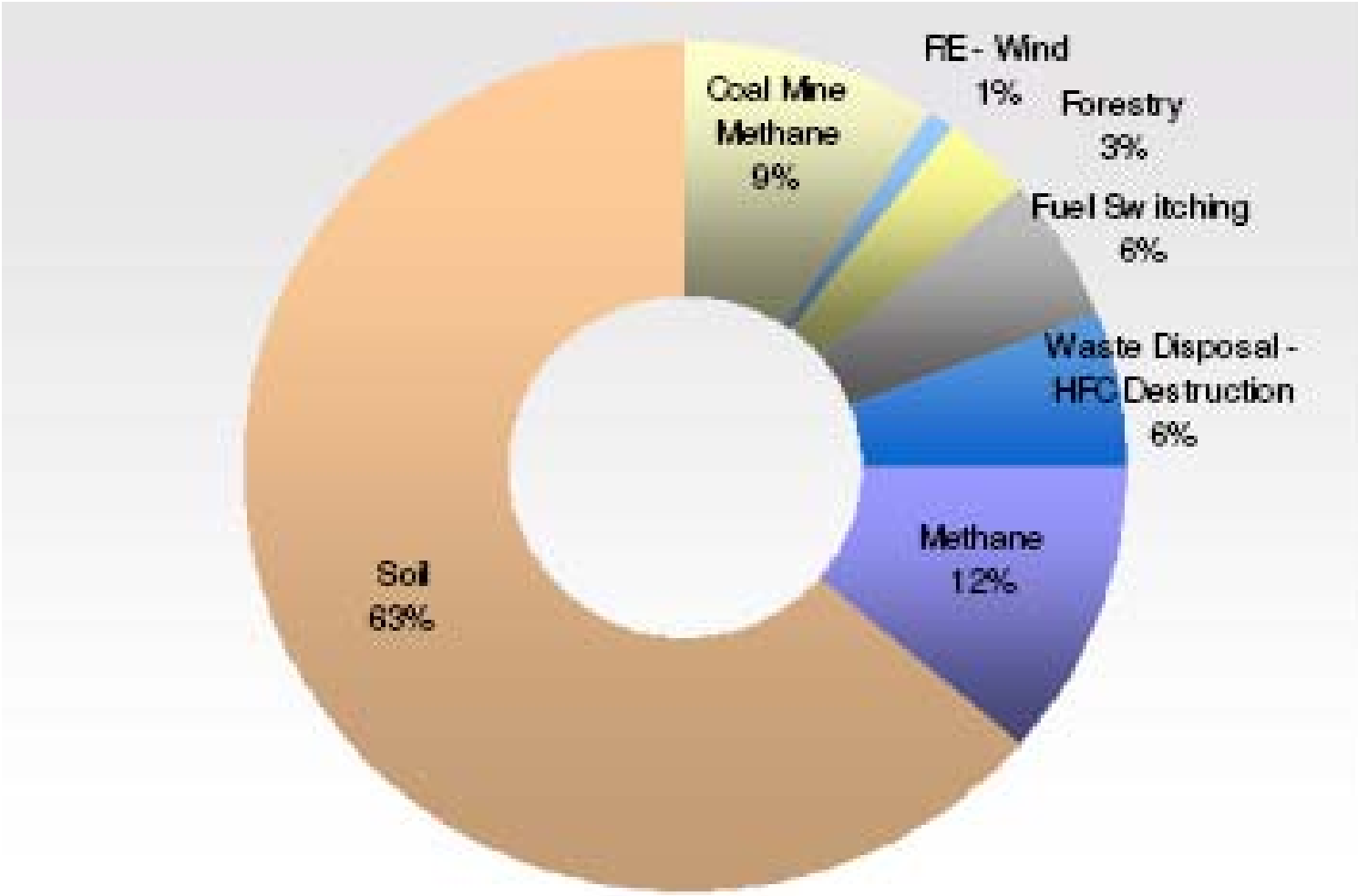


	Description	Focus on Env. & Social Benefits	Reporting/ Registration	Certifica'n Logo?	Includes LULUCF Method'y?	Geographical Reach	Start Date
Gold Standard	Certification for offset projects & carbon credits	Yes	VER registry in development	Yes	RE & EE projects	International	1st project validated 2006, 1st credits verified 2007
The VCS	Certification for offset projects & carbon credits	No	Use Bank of New York; other registry TBD	Yes	Yes, Methodologies TBD	International	Expected mid-2007
Green-e	Certification program for offset sellers	No	Registry Incorporated	Yes	Accepts other standards that include LULUCF	Aimed at N.A., International possibilities	Expected mid-2007
CCB Standards	Certification program for offset projects	Yes	Projects on Website	Yes	Only LULUCF	International	1st project certified in 2007
CCX	Internal system for CCX offset projects & CCX carbon credits	No	Registry Incorporated w/ trading platform	No	Yes	International	2003
Plan Vivo	Guidelines for offset projects	Yes	No	No	Community based agro forestry	International	2000
Climate Neutral Network	Certification program for offset sellers & carbon neutral products	No	No	Yes	Yes	Primarily North America	1st project certified 2001
Greenhouse Friendly	Certification program for offset sellers & carbon neutral products	No	No	Yes	Yes	Australia	2001
WBCSD/WRI Protocol	A set of guidelines for projects & corporate GHG accounting	No	Does not include registry	No	Protocol created For LULUCF	International	2001
CCAR	A Registry Protocol	No	Reporting protocols used as standards	No	Yes, first protocol	Currently California	1st protocol in 2005
VER+	Certification program for offset projects, carbon credits & carbon neutral products	No	TÜV SÜV Blue Registry	Yes	Includes a JI or CDM meth's	International	Expected launch mid-2007
ISO 14064	Certification program for emissions reporting offset projects, carbon credits	No	No	No	Yes	International	Methodology Released in 2006
VOS	Certification for offset projects & carbon credits	No	TBD	No	Follow CDM or JI meth's	International	TBD
Social Carbon	Certification for offset projects & carbon credits	Yes	Creating its own registry system	Yes	Reforestation & Avoided deforestation	South America & Portugal	1st Methodology applied in 2002
DEFRA	Proposed consumer code for offsetting & accounting	No	Does not include a registry	No	Follow CDM/JI standards	UK	TBD

Preferred Standard/Certification Procedures



Distribution of Project Types on the CCX



Voluntary Market

- **Quality, Quality, Quality: Challenge for the Voluntary Market**

- **A high quality carbon credit must be:**
  - Real (project has happened that created it)
  - **Additional** (beyond business-as-usual activities)
  - Measurable
  - Permanent (not temporarily displace emissions)
  - Independently verified
  - Unique (not used more than once to offset emissions)
  - Transparent (public disclosure)
  - Conservative (assumptions, values, procedures)

High Quality Ag Generated Carbon Credits:

- Command higher prices
- Improve rural economies
- Avoid potentially damaging revelations that ag is getting a free ride by getting paid for “business as usual” farm and ranch management
- Promote the use of new technologies that otherwise are dependent on government subsidies
- Involve an unregulated (GHG’s) sector of society in solving climate change issues through financial incentives
- Provide numerous ancillary environmental benefits from GHG reduction projects

One Example - Camco Dairy Lagoon Cover Program

- **Simple, reliable lagoon cover technology**
  - Low cost, effective
  - Utilizes/improves existing facilities
  - Builds on farmer's investments in manure collection and storage
- **Environmental benefits**
  - Air quality: greatly reduces odor, ammonia, particulate and greenhouse gas emissions
  - Water quality (prevents storm water from entering lagoon)
- **Economic benefits**
  - Generates carbon credits
  - Provides additional farm income
  - Opportunity for on-farm electricity generation and heat energy utilization

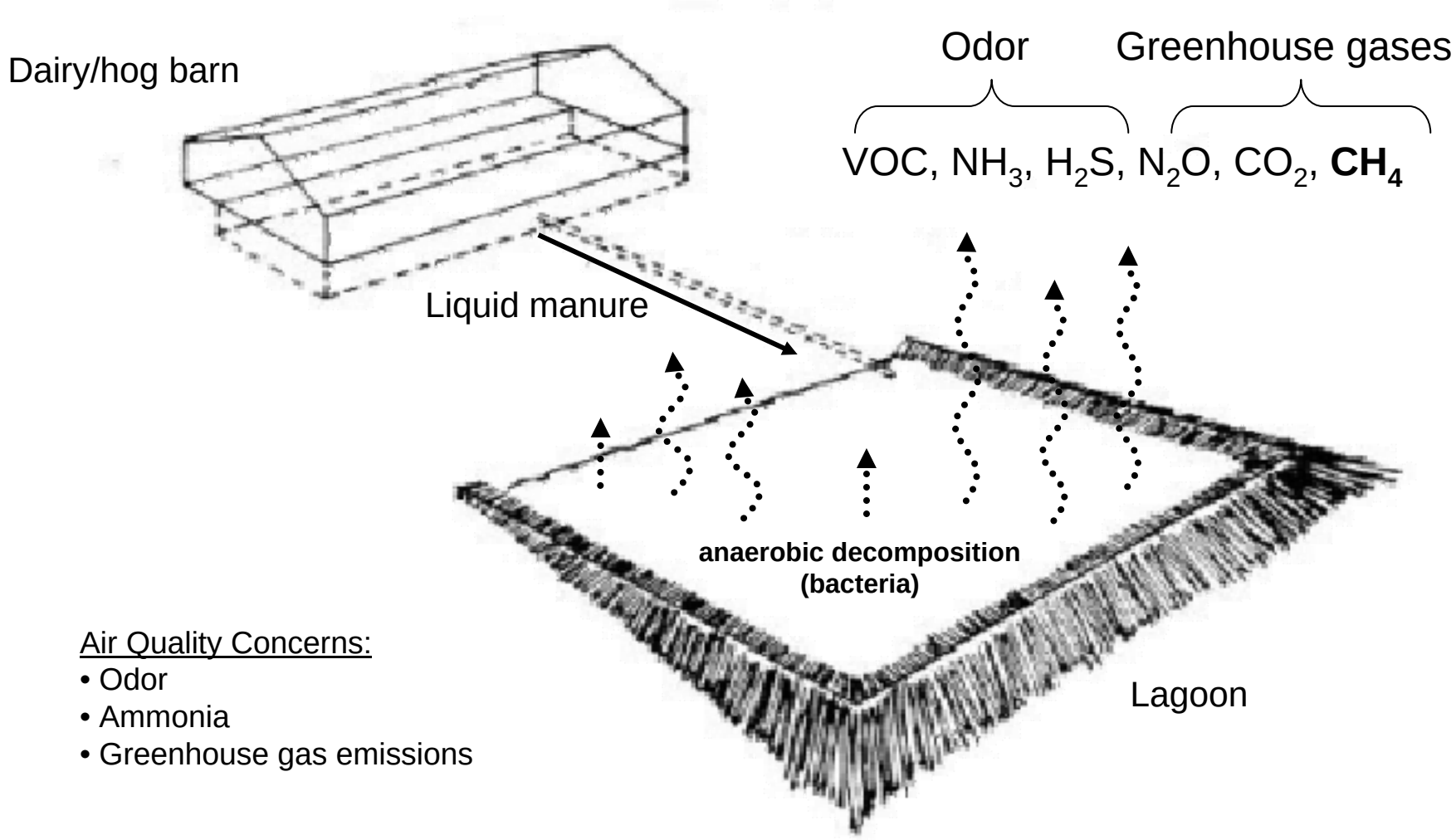
Why Dairy Cows?

- **Law:**
  12 cubic feet of biogas produced/lb of VS digested
- **Proven Assumptions:**
  - 17 lbs of VS/day per 1375 lb lactating dairy cow
  - 17 lbs VS x 50% destruction efficiency = 8.5 lbs VS
  - 8.5 lbs VS x 12 cu ft/lb VS =102 cu ft biogas/cow/day
  - 102 cu ft x 60% CH_4 in biogas = 61 cu ft/CH_4/cow/day
  - 61 cu ft/cow/day x 365 days/yr = 22,338 cu ft CH_4/cow/year
  - 21 GWP multiplier x 22,338 cu ft CH_4/cow/yr = 469,098
  - 469,098 x .0448 lbs/cu ft CH_4 = 21,016 lbs CO_2e
  - 21,016 lbs/2204 lbs/mt = **9.5 mt/cow/year CO_2e**
- **2000 cows x 9.5 = 19,000 mt CO_2e/year**

Free Stall Flush System

Lagoon or Holding Pond

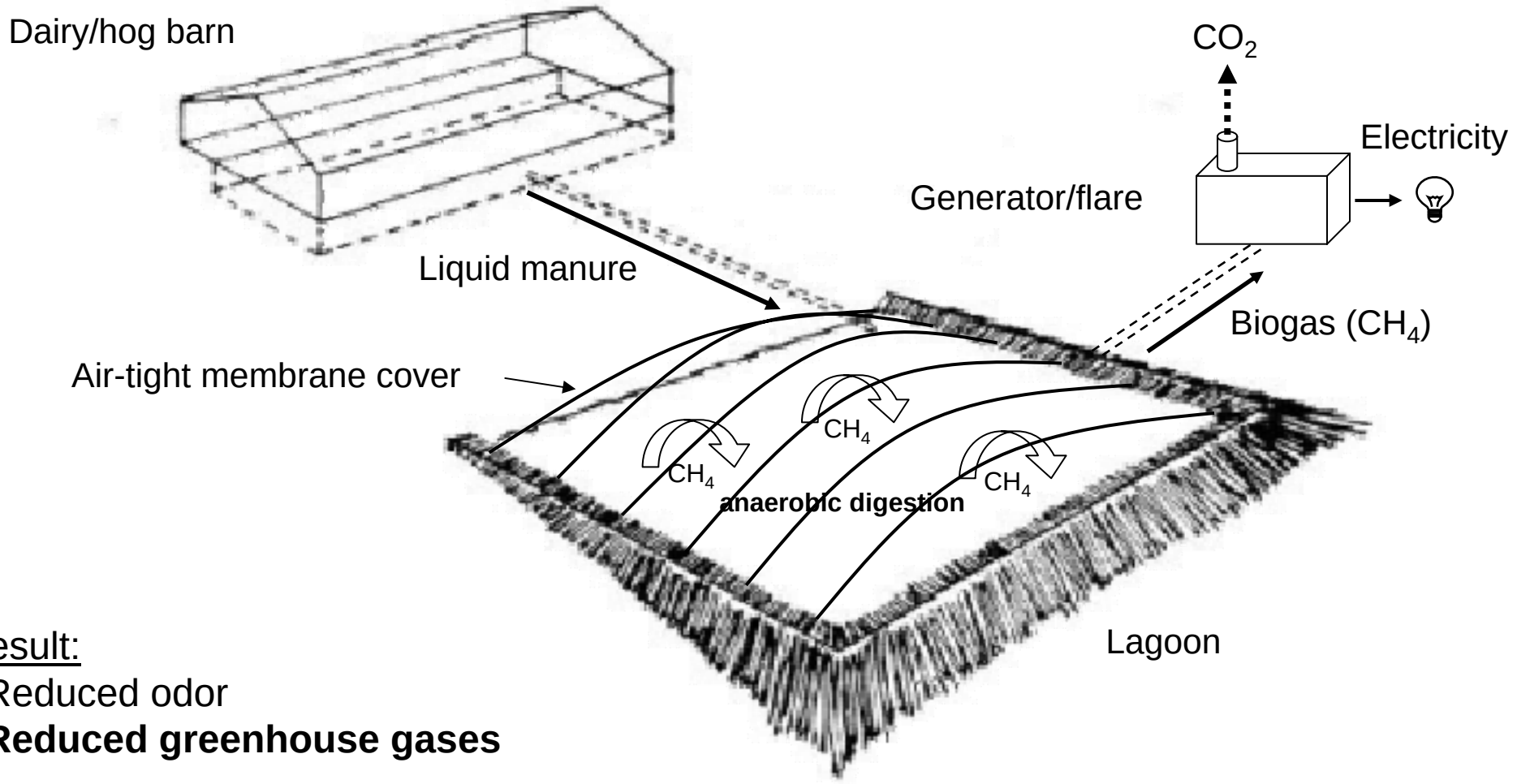
Open-air Manure Lagoons ("*baseline scenario*")



Air Quality Concerns:

- Odor
- Ammonia
- Greenhouse gas emissions

Covered Manure Lagoons (emission reductions)



Result:

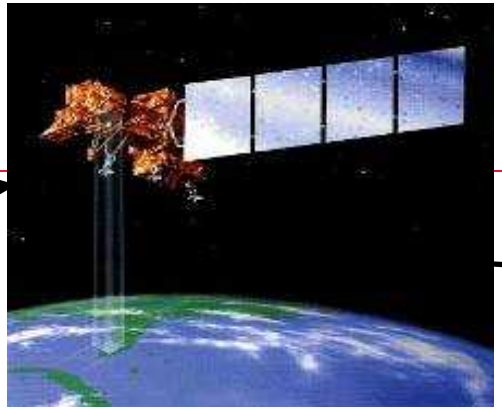
- Reduced odor
- **Reduced greenhouse gases**

Lagoon Cover and Biogas Pipe

Camco Lagoon Cover Program - Dairy Example

- ~2,000 cow dairy
- Capital cost for installation = $200,000
- 10,000 credits per site
  - Average 5 metric tons of credits per cow per year
- Carbon price = $5/mt
- Amortize capital over 5 years
- Gross proceeds = $500,000 over 10 years

Figures may vary based on site specific conditions



Earth Observation System

Carbon Sellers

Satellite Database
Data Analysis

Carbon Models
Carbon Accounts

WWW

Markets
Buyers

Global climate change issues

=

opportunity for Agriculture

Camco - Leaders in Carbon Market Solutions

- **Camco's business is "solutions to climate change"**
  - Carbon assessment and footprinting
  - Carbon management
  - Project identification & evaluation
  - Carbon Asset Development
  - VER asset generation
  - Policy, strategy & technical advisor
- **Leader in global climate change business**
  - 18-year legacy
  - Listed on the London Stock Exchange
  - Over 220 staff worldwide, operating out of 17 offices
  - Across 11 countries – Austria, Bulgaria, China, Kenya, Malaysia, Russia, South Africa, Tanzania, UK, USA, Vietnam
- **Service orientation**

Garth Boyd, Ph.D.

garth.boyd@camcoglobal.com

www.camcoglobal.com

Camco

Denver, CO

910-328-4454