

Management of Agricultural Waste and potential for co-benefits

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Outline



1. **Current status of agricultural waste management in Vietnam**
2. **Agricultural waste management policies**
3. **Potential on co-benefit from agricultural waste management**
4. **Recommendation**

Role of Agricultural sector in Vietnam

- Agriculture has contributed to GDP (gross domestic production) 22,09 % (2008), 20 % (2009)
- About 70 percent of the population live in rural villages and mostly engage in agriculture
- Total rice area was about 7,3 million ha, and rice production was about 38,7 million tons, estimated in 2009 is about 39,2 million tons.
- Vietnam is one of the top countries export rice in the world



Agricultural waste generation

- Crop residue
 - agricultural wastes - after harvesting rice straw, cane trash, peanut shell, corn leaves and cobs, cassava stem, coconut shell and leaves, etc,
 - agro-industrial residues, i.e. residues that are resulted from following processing on rice husks, biogases, cassava peels, peanut shells, coffee husks,
- Hazardous wastes: excess fertilizers and pesticides
- Animals wastes

Current status and problems of utilization of Crop residues

- Crop residue is over 70 million tons per year
- Crop residue used for:
 - Organic source by burning and burying
 - Cattle feed
 - Animal-pen padding
 - Mushroom production
 - Cooking
 - Utensil making
 - Compost production

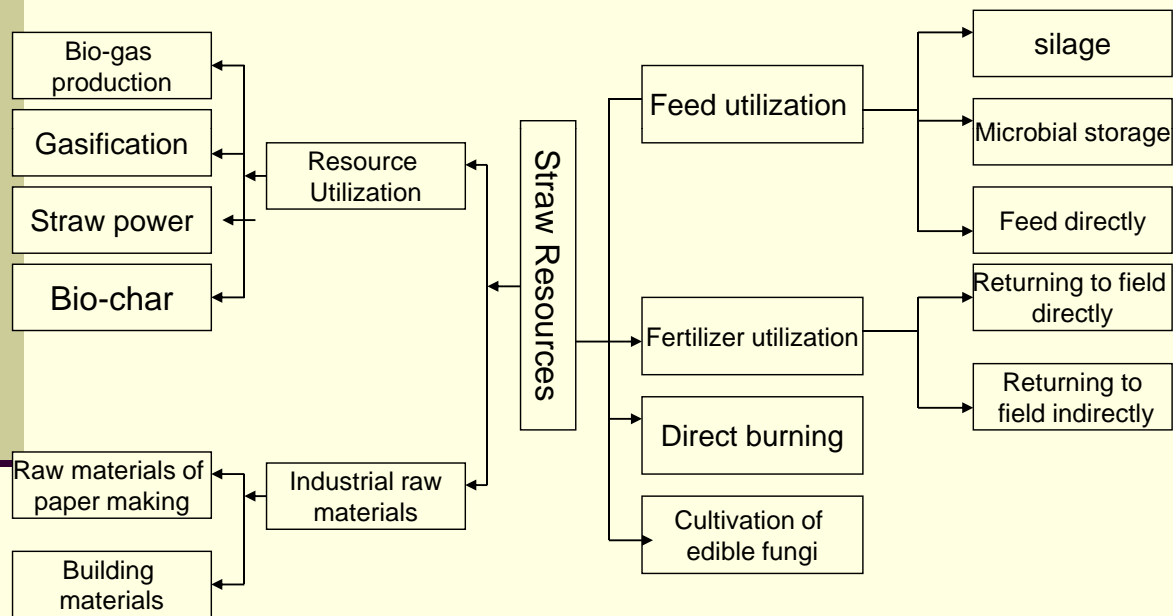


Current status and problems of utilization of Crop residues

- The comprehensive utilization rate of crop residue is rather low, a large number of them was abandoned or unreasonably used
- Environmental issues: water pollution, air pollution, global warming, negative effects to human health
- Easily causing fires, traffic accidents, effecting the road traffic safety

Sources	Million tons
Paddy straw	61.9
Rice husk	5.6
Maize husk	4.8
Cassava stem	0.6
Cane trash	1.5
Bagasse	5.0
Peanut shells	0.1
Peanut leaves	5.7
Coffee husk	0.3

The management practice model of crop residues



Ways of utilization of straws resources

Waste from agricultural processing

- In general, enterprises have concerned about waste management, however, investment level in technologies still is limited caused by low finance sources. At present, there are 114 factories has used clean technology and 16 enterprises have built and applied ISO 14001
- Mostly waste from processing in traditional villages is reason of environmental pollution

Hazardous pesticide and fertilizer management

- Using of pesticide and fertilizer has been increasing rapidly.
 - 1986 – 1990: 13.000 – 15.000 ton/year pesticide, average used 0, 4-0,5 kg ai / ha
 - 1991 – 2000: 20.000 – 30.000 ton/year pesticide, average used 0,67-1,0 kg ai/ha
 - Up to now: 33.000 to 75.000 tons/ year
- Over 90 per cent of pesticides sprayed were insecticides. Of the pesticides used, nearly 20 percent are classified by the World Health Organization as extremely hazardous.
- in whole country, there are 69.237,236 kg and 43.574,179 lit pesticides need to be treated and 69.640,282 kg of chemical package discharged which are made of paper, and nylon bag
- there are no particularly regulations on collecting packages of pesticides.

Hazardous pesticide and fertilizer management

- Average using of fertilizer is 195 kg NPK per ha
- by 2007, total chemical was about 2,4 billion tons and by 5 times compared to 1985
- The efficiency of using fertilizer is only 30-50% and rest of them is absorbed into the soil or water



Animal wastes management issues

- There are 16.708 animal farms and 17.129 meat production centrals, total wastes estimated at 73 million tons per year.
- It is estimated around 60 mill. tons of manure wastes. Taking into account other wastes, such as waste foods, dead animals, etc, the total livestock wastes is around 73 mill. tons per year



Estimated animals wastes in 2007

No	Animal	Quantity (1/8/2007)	Average waste animal/per one animal/ per day	Total solid waste animal per year (kg)
1	Cow	6724703	10	24.545.165.950
2	Buffalo	2996415	15	16.405.372.125
3	Pig	26560651	2	19.389.275.230
4	Poultry	226027.1	0.2	16.499.978.3
5	Coat	1777638	1.5	973.256.805
6	Horse	103481	4	151.082.260
7	Deer	31539	2.5	28.779.337.5
	Total:			61.509.431.686

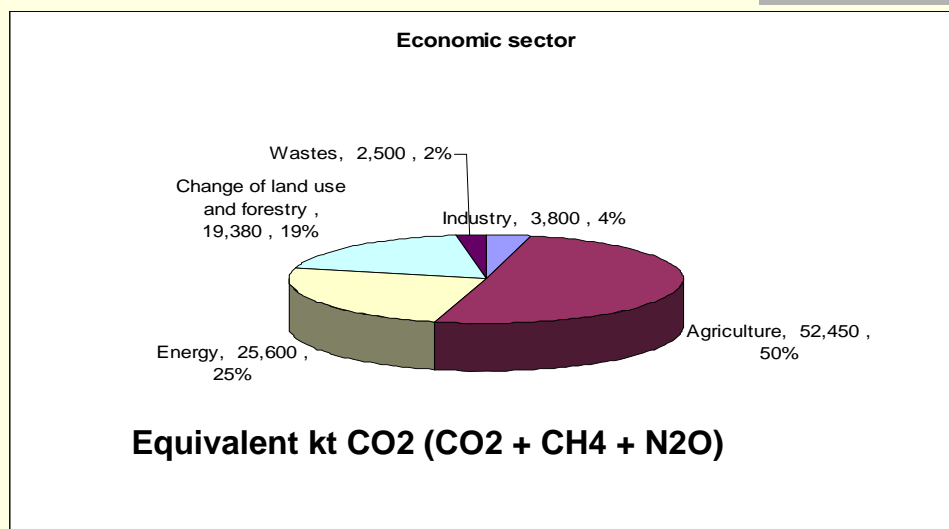
Source: Department of Livestock, Mard

Animal wastes management issues



- it is only 40% of total solid waste were treated and rest of them were discharged directly into environment. This is source of air pollution has caused by CO_2 , NO_2 and it is a notable contributing factor to global warming and climate change.
- there are only 12% of total centrals built a waste water treatment system and 74 % of animal farms are using measures of waste management and in among that 64% applied Biogas and composting as main treating method
- Up to now, more than 100,000 biogas systems have been built, most of them are of small scale (with financial support from different sources). A number of large systems are constructed in recent years.

Greenhouse Emissions in Vietnam



Source: Monre, 1994

Agricultural waste management policies

- Law on environmental protection, 2005
- National strategy on Environmental Protection up to year 2010 and Vision to 2020
- Decree No. 59/2007/NĐ-CP dated April 9, 2007 of the Government promulgating the Regulation on the solid waste management activities, the right and duty of the person related solid wastes

Agricultural waste management policies

- Directive No. 36/2008/CT-BNN dated February 20, 2008 by Minister of Agriculture and Rural development promulgating the plan on protecting the environment in agricultural sector, in which major missions are identification and treatment waste in original source, development and improvement waste treatment technology, primarily, encouragement in reusing and recycling agricultural waste.
- Circular No 38/2010/TT-BNNPTNT dated June 28, 2010 and come into force on August 12, 2010 by Minister of Agricultural and rural development has assigned management of pesticides in which emphasize collection and destruction the package of pesticides.
- Official letter No. 2835/BNN-KH dated September 07, 2009 by Minister of Agricultural and rural development approving development plan from 2011-2015 in Agriculture sector and rural development. This document identified specific goals need to be reached in next five years. In husbandry field, aim is minimizing environmental pollution and building animal waste treatment account for 78-80%.

Existing problems

- Lack of detailed regulations on agricultural wastes management for environmental protection, especially specific decree under Laws, circular to guide implementation.
- Agricultural environmental management system has just established since 2008 while responsibility of functional departments under Ministry of Agriculture is not clear, many environmental dimension is ignored.
- There is not yet detailed policy addressing advantages when investing into this sector
- Limited awareness of agencies, enterprises and communities about potential of agricultural wastes
- Limited technologies

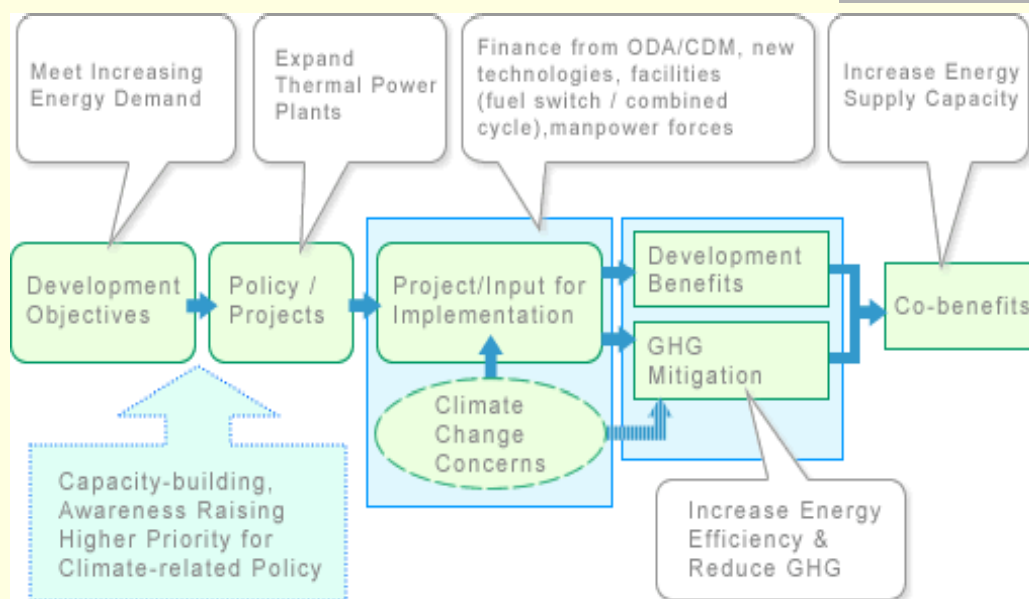
Opportunities for approach 3R on agricultural management wastes

- Increasing CH₄ generation ⇒ GHG generation ⇒ affect global climate change;
⇒ needs to reduce the amount of agricultural wastes
- Low awareness on environmental issues and potential benefits of agricultural wastes
⇒ need to Increase environmental awareness among government agencies, business sector, and the general public;
- Rising cost of fossil fuels ⇒ need to raise the use of biomass and biogas;
- Incompletely technologies ⇒ Development of researches on biological decomposition and new technologies ⇒ potentials of new environmental sound products;

Case study “biogas project”

- The pilot Project “Biogas Program for the Animal Husbandry Sector in Vietnam” is implemented by the Department of Livestock Production (DLP) of the Ministry of Agriculture and Rural Development (MARD) in cooperation with the Netherlands Development Organization (SNV)
- Overall objectives of the Project:
 - Installing effectively domestic biogas technology
 - Developing a viable commercial biogas sector
 - Contributing to rural development and environmental protection via provision of clean and affordable energy to rural households
 - Improving communities sanitation and rural people’s health
 - Creating of jobs for rural labor
 - Reducing of greenhouse gas emissions
- Aiming to install 166,000 biogas systems by the end of 2012, the programmer has so far installed some 88,000 systems

Co-benefits Approach



Co-benefits refers to multiple benefits in different fields resulting from one policy, strategy or action plan

Source: <http://www.kyomecha.org/cobene/e/cobene.html>

Co-benefits: 2 definitions

Co-benefits from the **global climate change perspective**: additional benefits beyond GHG reductions resulting from climate change mitigation measures

- ❖ Reduced air pollution
- ❖ Associated health benefits
- ❖ Improved energy security through reduced energy costs and dependency on oil imports
- ❖ Increased access to energy

Co-benefits from the **Asian regional/local perspective**: additional GHG reductions resulting from measures aimed to address

- ❖ Development issues, such as air pollution and associated health
- ❖ Problems, lack of energy access and security and other socio – economic problems

Sources: Sophie Punte, Clean Air Initiative for Asian Cities Center (CAI-Asia), January 2009

Co-benefits in biogas project

■ Benefits:

■ For biogas users

- expenditure saved by the substitution of other energy sources with biogas (if applicable, income from the sale of biogas)
 - Instead of wood: saved 240.000 Vnd per month
 - Instead of coal: saved 160.000 Vnd per month
 - Instead of gas: saved 800.000Vnd per month
 - Calculated followed the price in 11/2007: total expenditure saved per household 4,5 million Vnd per month
- expenditure saved by the reduction of using chemical fertilizers (If applicable, income from the sale of bio-fertilizer) estimated about 1,9 million Vnd per month
- Time saved for colleting and preparing previously used fuel materials estimated opportunity cost about 2,3 million Vnd per month
- Reduced health costs about 1,5 million Vnd per month

Co-benefits in biogas project

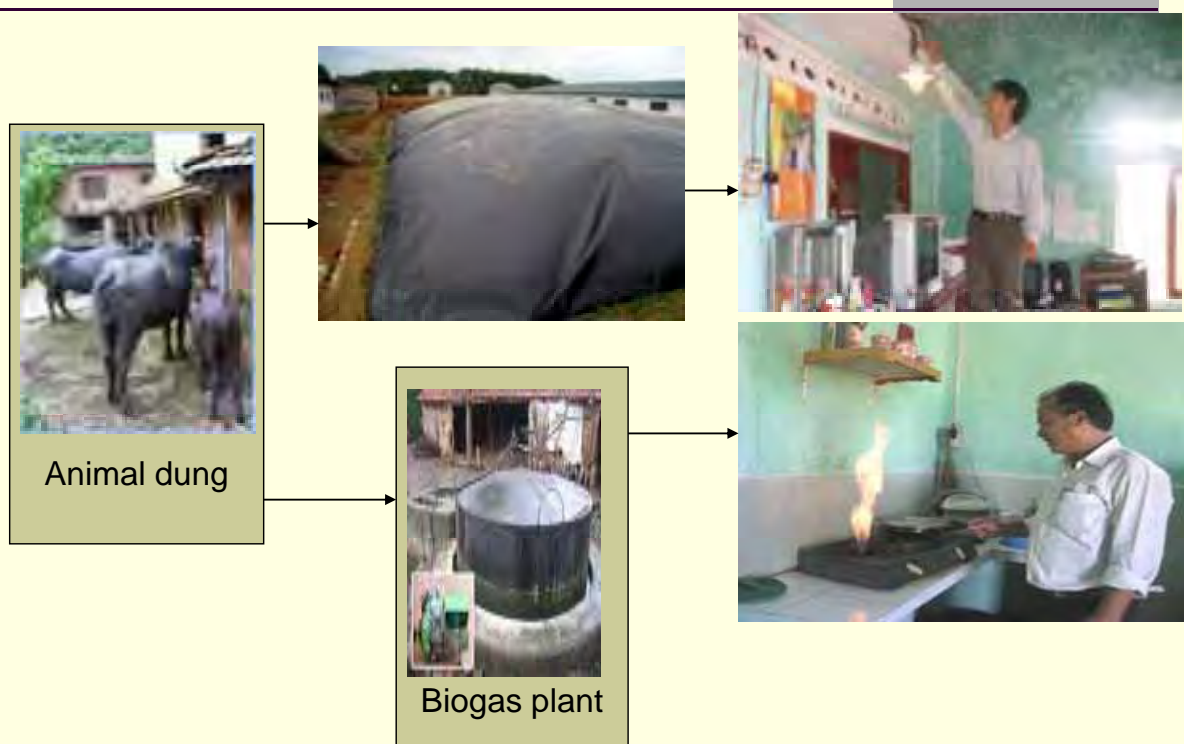
■ The benefits for the environment

- Less consumption on firewood – less forestation
- Reduced CO₂ emission

Total reduced CO₂ emission per year = 88.000 plants x 2 tones of CO₂ saving per plant per year = 176,000 tones per year

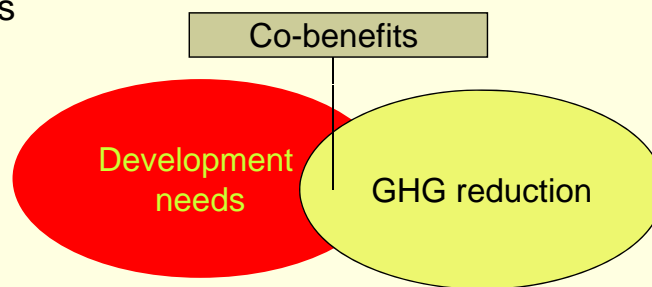
Item of benefit	Amount
CO ₂ emission reduction	176 thousand tones per year
Number of beneficiaries	440,000 people
Saving expenditure for energy consumption	591,6 million VND per year

Biogas production



Co-benefits in biogas project

- Secondary Co-benefits:
 - Reduced smoke inside kitchen and enhanced health by improving sanitation, hygiene, living conditions
 - Mitigating climate change
 - increased yield by using bio-fertilizer
 - Improved soil quality by using bio-slurry
 - Reduced pressure on forests
 - Reduced work load for women and children – enhance education opportunities and cultural knowledge
 - Provided of skill enhancement and employment for rural areas



Major Developmental Challenges with Potential Co-benefits on agricultural waste in Vietnam

- Financial economical barriers:
 - For mostly farmers, cost for biogas installation is high, in some cases, it is probably the largest investment made by a farmer
 - Lack of supportive mechanisms for farmers to access to credit
 - Low income generation from crop and inflation has adversely affected the farmer's affordability

Major Developmental Challenges with Potential Co-benefits on agricultural waste in Vietnam

Technical barriers

- *Research & Development*: lack of research and development to continuously improve and innovate the technology to improve efficiency and additional end uses for income-generating activities;
- *Orientation of the construction companies*: the companies engaged in plant construction have some negligence about the quality control and after-sale-service.

Policies barriers and social awareness

- Lack of detail regulation on renewable energy and incentive mechanisms to users and business operate in biogas field
- Low awareness on potential co-benefits on biogas projects

Recommendations

- Complete legal framework for managing agricultural wastes, approach 3R should be considered as a priority orientation.
- Research and Development of biogas/compost fertilizer production is encouraged for reducing environmental pollution and effective exploitation of clean energy
- Improve knowledge and awareness of community
- Enhance financial for managemental activities and science research
- Create policy forums to discuss co-benefits approach with participation from decision-makers at different levels of governance (regional, national and local)..
- Enhance international Co-operation and exchange experiences

