

4.1.1. Evaluation on the GHG reduction potentials

Calculation results of the 5 GHG emission reduction solutions in solid waste and wastewater management sectors showed that Vietnam could potentially reduce up to 34.8 million tons of CO₂-eq in 2020. CH₄ recovery from landfill solution is proven to be most effective in term of GHG reduction. The solution will contribute to reduce about 22.4 million tons of CO₂-eq in 2020, accounting for 64,4% of the total GHG reduction of the 5 solutions. In addition, CH₄ recovery from biogas systems in livestock waste handling and wastewater treatment sectors will reduce 5 and 4.8 million tons of CO₂-eq respectively. GHG reduction potentials of composting and urban wastewater treatment are insignificant, only 1,8 and 0,6 million tons of CO₂-eq respectively.

Table 4.1. GHG reduction potentials of the 5 solutions in 2020

Unit: million tons

No	Policies/Solutions	GHG reduction potentials in 2020
1	CH ₄ recovery from landfills	22.429.065
2	Composting	1.840.051
3	CH ₄ recovery from biogas systems	5.068.105
4	CH ₄ recovery from industrial wastewater treatment	4.882.689
5	GHG reduction in urban wastewater treatment	621.563
6	Total	34.841.473

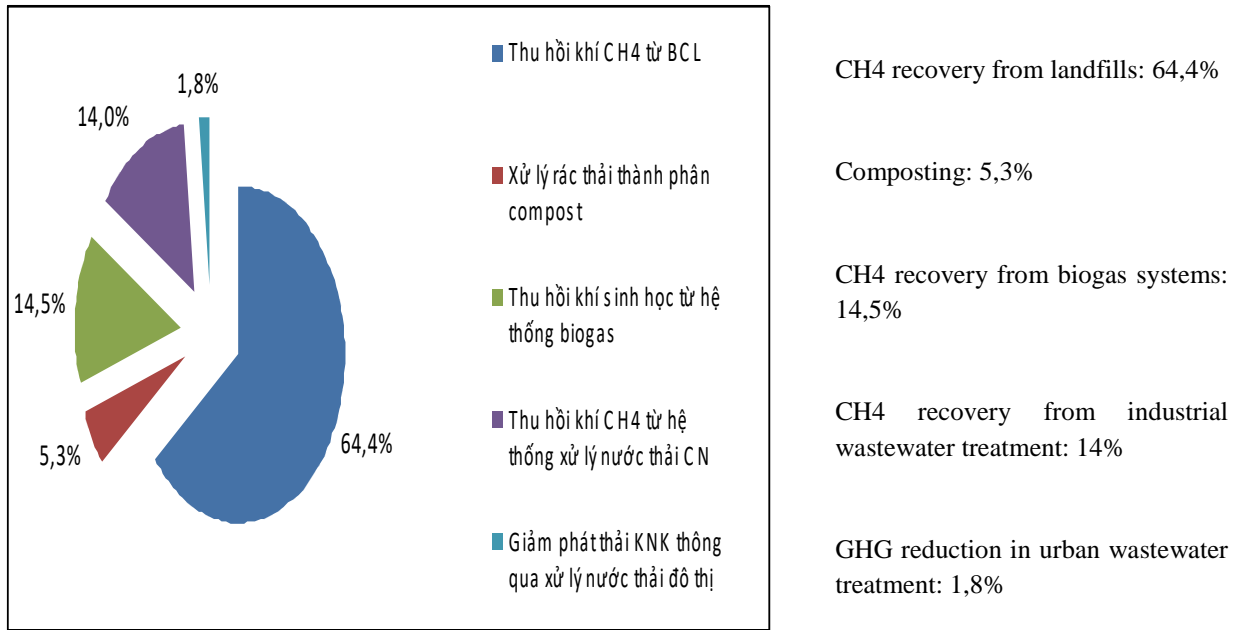


Figure 4.4. GHGs reduction of the 5 solutions

4.1.2. Evaluation on the economic benefit

To evaluate the environmental and economic benefits that would accompany the attainment of these policy goals, it is first important to understand the connections between the policies and management strategies and their benefits. These connections are illustrated in Figure 1.

Environmental and Economic Benefits of Actions to Reduce GHG Emissions from Solid Waste and Wastewater Treatment

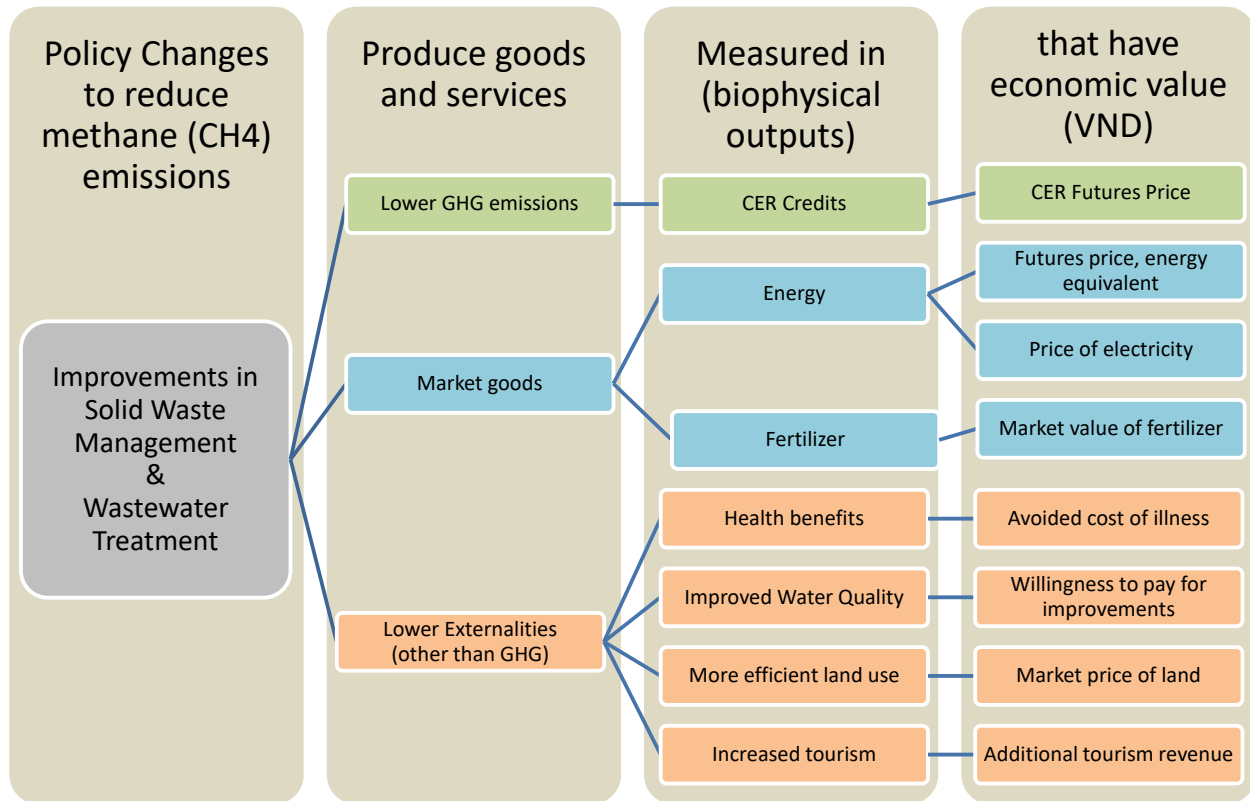


Figure 1: Policy and management changes that reduce greenhouse gas emissions also produce other environmental and economic benefits.

The figure 1 illustrates the connections between the methane emission reduction strategies of the solid waste management and wastewater treatment along with their environmental and economic benefits. As it is showed, improvement of solid waste management and wastewater treatment will lead to various benefits, which are divided into 3 categories: GHG emission reduction, market goods and lower externalities.

Systems such as this are known in economics as “joint production systems,” because the production of one good or service (a reduction in GHG emissions) necessarily or automatically produces other goods and services. Therefore, when the government of Vietnam undertakes policies to reduce greenhouse gas emissions, it will produce additional benefits, like improved health, expanded opportunities in the tourism industry, and valuable energy resources.

The primary good produced in this system is lower GHG emissions (CH₄). Lower emissions result in “Certified Emission Reduction” credits, which are a financial asset that can be sold on world markets and generate some revenue paid directly to the Vietnamese government. The economic value of the GHG emission reduction will be based on the current price of CER credits.

The second benefit category is market goods jointly produced with GHG emission reductions. When the method of reducing GHG emissions involves capturing methane, the methane can be used or sold as fuel or used to generate electricity. These energy resources can be valued by the price of an equivalent amount of energy from other sources or by the price of electricity that can be generated from captured methane.

In addition to energy resources, policy and management changes in the solid waste and wastewater treatment sectors also jointly produce fertilizer that can substitute for chemical fertilizer in agriculture. The market value of this fertilizer production is based on the current market value of fertilizer.

The third category is a reduction in environmental externalities – pollution of land, air and water – that can lead to illness, inefficient land use, and loss of visual or aesthetic quality. When these externalities are reduced, improved health, improved water quality, more efficient land use and increased tourism (which is sensitive to visual and aesthetic quality) are expected to be the result. For health benefits, the economic value of GHG emission reduction is calculated by avoided cost of illness. Improved water quality’s economic benefit is based on willingness to pay (WTP) for improvements. In addition, the economic benefit of more efficient land use is estimated by market price of land saved. Lastly, increased tourism will lead to additional tourism revenue.

Economic calculation results of the 5 solutions showed that Vietnam can potentially gain approximately 12.360 billions VND in 2020, among which economic benefits of CH₄ recovery from biogas systems is the biggest accounting for about 4.739 billions VND. Ranking the second and the third are CH₄ recovery from urban and industrial wastewater treatment with economic benefits of 3.861 and 2.575 billions VND respectively. Though CH₄ recovery from landfills has the largest GHG reduction potential of about 22.4 million tons of CO₂ –eq, its

economic benefit is insignificant in comparison to others solutions, only 855 billion VND. Finally, economic benefit of composting solution is the smallest, 343 billions VND.

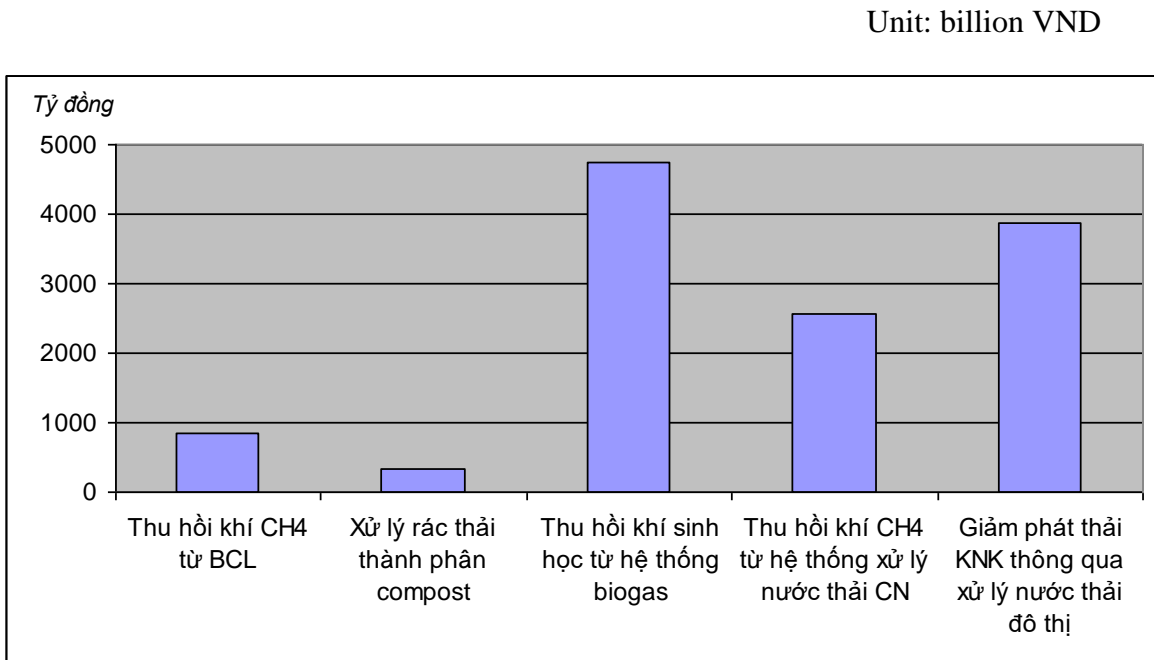


Figure 4.6. Economic benefits of the 5 solutions

The 1st column: CH₄ recovery from landfills

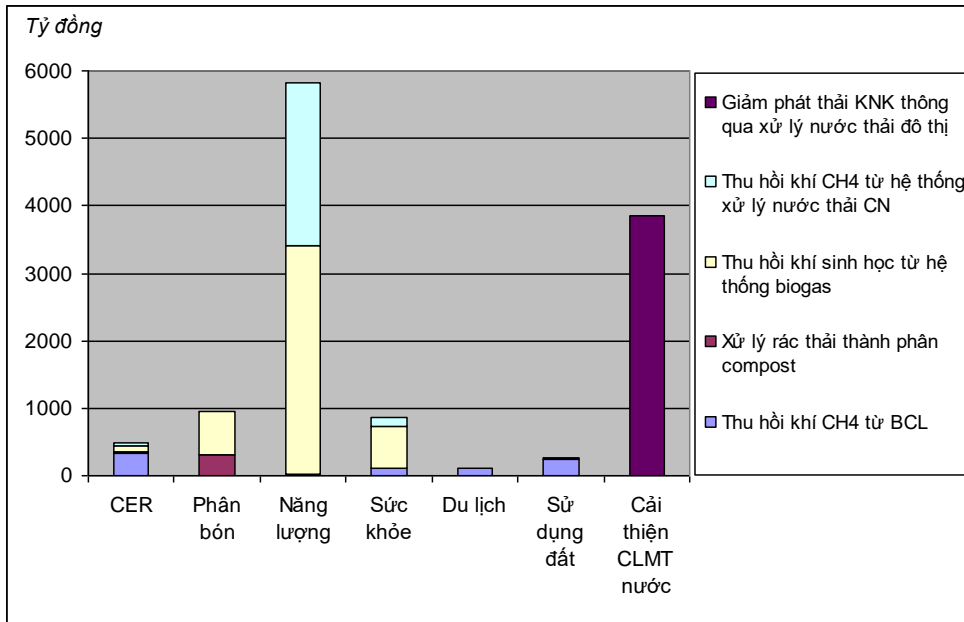
The 2nd column: Composting

The 3rd column: CH₄ recovery from biogas systems

The 4th column: CH₄ recovery from industrial wastewater treatment

The 5th column: GHG reduction in urban wastewater treatment

According to the calculation, revenues gains from energy sale or use an alternative fuels is the largest at over 5,800 billions VND, accounting for about 47% of the total benefits. Next is revenues gained from water quality improvement of 3,852 billion accounting for 31%.



- GHG reduction in urban wastewater treatment
- CH4 recovery from industrial wastewater treatment
- CH4 recovery from biogas systems in agriculture
- Composting
- CH4 recovery from landfills

Figure 4.7. Economic evaluations on different co-benefits

The 1st column: CER

The 2nd column: Fertilizers

The 3rd column: Energy

The 4th column: Health

The 5th column: Tourism

The 6th column: Land use

The 7th column: Water quality improvement