



Biogas Consortium Afghanistan (BCA)

گروه مشارکین بیوگاز



Biogas and Climate Change

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Overview

Biogas technology, in addition to supplying energy and organic fertilizer, provides an excellent opportunity for mitigation of greenhouse gas (GHG) emission through substituting firewood for cooking and heating and chemical fertilizers. Additionally, biogas can play a part in building rural communities resilience to climate change through increased income and other benefits. This paper will summarize some key linkages between biogas and climate change mitigation and adaptation.

Afghanistan's changing climate

Afghanistan is a country with a diverse landscape, varying widely in altitude, rainfall and ecosystems. A common characteristic across Afghanistan's 34 provinces is the fundamental reliance of household income on livelihoods based on the countries ecosystem services and natural resources.

Afghanistan has been identified as one of the most vulnerable countries in the world to the impacts of climate change¹. Meteorological data is showing that the country is experiencing an increase in the number and intensity of drought and flooding events that are set to worsen in the coming years.

The negative impact of these extreme weather events is heightened because Afghanistan's ecosystems; rangelands, forests, rivers, and wetlands are increasingly becoming degraded. When ecosystems are degraded they lose their ability to absorb and store water and carbon, remove pollutants, and therefore protect people against the adverse effects of these more intense weather events.

In order to limit the disastrous effects of climate change, global temperature rise has to be limited to 2°C. To achieve this, GHG emissions have to be reduced by 40 to 70 percent compared to levels in 2010 by 2050 (IPCC 2014).

GHG emissions from land use change

The degradation of Afghanistan's ecosystems can be strongly linked to both agriculture expansion and the countries requirement for fuel. Widespread overgrazing and overharvesting of woody species and trees for fuel has left large swathes of the country with bare, unproductive and

unstable soil. Additionally, erosion of this vulnerable soil results in large amount of carbon to be released. Consequently, Afghanistan's main source of greenhouse gas (GHG) emissions² can be attributed to land use, land use change and forestry sectors.

Greenhouse effect and greenhouse gases

GHG's lead to warming of the earth's surface; GHG's allow solar radiation to enter the earth's atmosphere but prevents the heat from escaping back to space. According to the Intergovernmental Panel on Climate Change (IPCC) the continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system. In the coming years, the surface temperature of the earth is projected to rise and it will be very likely that heat waves will occur more often and last longer, extreme rainfall events will become more intense and frequent.

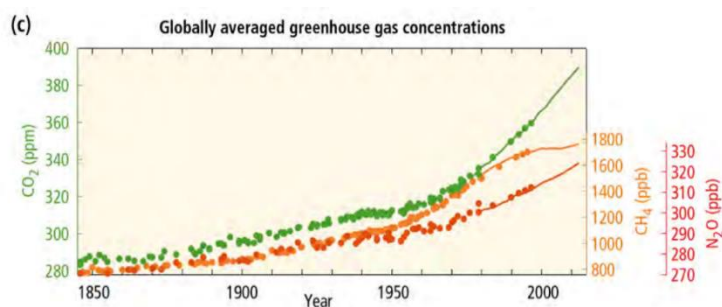


Figure 1. Atmospheric concentrations of the greenhouse gases carbon dioxide (CO₂, green), methane (CH₄, orange), and nitrous oxide (N₂O, red) determined from ice core data (dots) and from direct atmospheric measurements (lines) (IPCC Fifth Assessment Synthesis Report 2014) In order to limit the disastrous effects of climate change, global temperature rise has to be limited to 2°C. To achieve this, GHG emissions have to be reduced by 40 to 70 percent compared to levels in 2010 by 2050.

GHG emissions from burning biomass

Additionally, people living in rural areas (over 80% of Afghanistan's population) rely on woody biomass as their primary domestic fuel resulting in significant emissions of GHGs, as well as other factors such



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as: i) deforestation and environmental degradation; ii) poor health as a result of smoke inhalation; and iii) large financial cost of purchasing fuel.

Mitigation and adaptation with biogas

A well maintained biogas system has the capacity to reduce household use of biomass fuel for cooking and heating water by 50% which means reducing (mitigating) GHG emissions as well as increasing people capacity to cope with climate change impacts (adaptation).

Mitigation

Domestic biogas plants can mitigate approximately 3, 4 and 5 tons of CO₂ per plant per year³. The systems provision of an organic fertilizer can substitute the use of energy intensive production of manufactured mineral fertilizers and their transport over long distances.

Adaptation

Biogas energy can contribute to climate change adaption though saving households income⁴, improving health, reducing hardship⁵ and saved time. All of these benefits can contribute to the adaptive capacity of people with biogas systems. It is broadly accepted that reduced poverty and improved livelihood basis is an important measure of increasing community resilience to the negative effects of climate change⁶.

Furthermore, biogas extends the opportunity of claiming carbon credits through the Clean Development Mechanism (CDM)⁷ project. To date there have been no CDM projects in Afghanistan.

1. <http://www.unep.org/disastersandconflicts/CountryOperations/Afghanistan/ClimateChangeAdaptation/tabid/133225/Default.aspx>

2. Shrestha, R.P., Acharya, J.S., Bajgain, S. and Pandey, B. (2003). Developing the biogas support programme in Nepal as a clean development mechanism project, 3. Renewable Energy Technology for Rural Development.

Manandhar, U., & Bhatta, G. D. (2013) Biogas for climate justice: a story of change in Nepal. In Irish Aid Programme. A New Dialogue: Putting People at the Heart of Global Development.

5. Li, Z., Tang, R., Xia, C., Luo, H., & Zhong, H. (2005). Towards green rural energy in Yunnan, China. Renewable Energy 30, 99-108.

6. National Planning Commission (2011). Climate- Resilient Planning, A Tool for Long-term Climate Adaptation.

7. http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php



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