Foreword

Climate change involves complex interactions between climatic, environmental, economic, political, institutional, social and technological processes. It cannot be addressed or comprehended in isolation of broader societal goals such as equity or sustainable development, or other existing or probable future sources of stress. Both adaptation and mitigation are fundamental in the climate change debate. The International Panel on Climate Change (IPCC, 2007) defines mitigation as: "Technological change and substitution that reduce resource inputs and emissions per unit of output". The Stern Review identifies several ways of mitigating climate change. These include reducing demand for emissions-intensive goods and services, increasing efficiency gains, increasing use and development of low-carbon technologies and reducing non-fossil fuel emissions (Stern, 2007).

At the core of most proposals is the reduction of greenhouse gas emissions through reducing energy use and switching to cleaner energy sources. There are opportunities to switch to less carbon-intensive fuels on both the demand and the supply sides. Demand-side fuel-switching strategies to reduce carbon emissions include the use of bioenergy to supply residential, industrial and transport energy demands. Many developing countries have already successfully pursued such options, reducing the growth of their energy demand and consequent carbon emissions.

The publication explores the scope and potential for woodfuels to replace fossil fuels thereby contributing to climate change mitigation. The potential for and implications of woodfuel development for climate change mitigation and the current woodfuel offset mechanisms in place and their relative emissions reduction potentials were analysed.

Many barriers have been identified that preclude the full use of this mitigation potential. Policy reforms to encourage environmental sustainability, increased productivity, improved infrastructure and planning are essential for large-scale implementation.

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Acronyms and units of measurement

AIJ	activities implemented jointly
ALRI	acute lower respiratory infection
ACM	approved consolidated methodology
AM	approved methodology
AMS	approved methodology for small-scale projects
ARI	acute respiratory infection
CBWP	community-based woodfuel production
CDM	Clean Development Mechanism
CEN	European Committee for Standardization
CER	certified emission reduction
CO_2	carbon dioxide
EJ	exajoule
EU	European Union
g	gram
GEF	Global Environment Facility
Gg	gigagram
GJ	gigajoule
GtC	gigatonne of carbon
$GtCO_2eq$	gigatonne carbon dioxide equivalent
ha	hectare
HS	Harmonized Commodity Description and Coding System
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
JI	joint implementation
kg	kilogram
kW	kilowatt
kWh	kilowatt hour
LPG	liquefied petroleum gas
Mbdt	million bone dry tonnes
MJ	megajoule
Mt	megatonne
MtC	megatonne of carbon
MtDM	megatonnes of dry matter
m^3	cubic metre
OECD	Organisation for Economic Co-operation and Development
PIC	product of incomplete combustion
PJ	petajoule

REDD	reduced emissions from deforestation and forest degradation
SEI	Stockholm Environment Institute
tCO_2eq	tonnes of CO_2 equivalent
TJ	terajoule
VCU	voluntary carbon unit
VCS	Voluntary Carbon Standard

Summary

Woodfuels currently account for a greater share of global energy consumption than all other forms of "renewable" energy combined. The overwhelming majority of this consumption, however, is based on the traditional use of wood and charcoal in developing countries. Due to the low efficiency of such use and the often poor quality of associated resource management, much woodfuel consumption is unsustainable.

A great deal of effort has been directed at improving access to alternative forms of energy and encouraging households to switch to them; nevertheless, traditional biomass will continue to constitute a major source of energy for the foreseeable future, especially in sub-Saharan Africa. Consequently, strategies are needed to enable the traditional biomass sector to both improve efficiency and manage woodfuel resources more sustainably.

At the same time, there is a growing market for modern and efficient bioenergy that uses wood in the form of pellets, residues and various types of dedicated feedstock supplies. Natural forests and planted forests both have distinct advantages in the provision of biomass feedstock supply. For medium-scale applications, combined heat and power systems have become cost-effective almost anywhere where there is sufficient heat demand that can be coupled to electricity demand. In large-scale applications, one of the simplest and most cost-effective options is the co-firing of biomass in coal-fired power plants.

Many other options can be usefully deployed, not only to mitigate climate change but also to address energy security concerns and to improve the quality of energy services. They include wood and charcoal use in industry, improved cook stoves, more efficient charcoal production and improved forest management that can result in the greater use of residues.

The technological and economic potential for the substitution of fossil fuels by woodfuels in heat and power generation is significant, and there is some additional substitution potential in the household, commercial and industrial sectors.

Worldwide, the use of biomass for heat and power could save more than 1 gigatonne of carbon (GtC) annually by 2030. The co-firing of biomass with coal could save nearly 0.5 GtC per year at fairly modest costs. Savings in the traditional biomass and charcoal sectors could amount to another 0.5 GtC, although considerable effort would be required in this sector to overcome the higher investment cost, the complex socio-economic and cultural issues around traditional biomass use and the transaction costs associated with providing the equipment and reliable biomass supply.

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