

# BIOENERGY POLICY PRINCIPLES

**These policy principles have been developed to support the sustainable, healthy and productive uses of bioenergy to meet developing countries' energy needs and increase energy access for poor people. This document aims to provide policy makers with a summary of some key policy principles required to ensure that bioenergy can be utilised effectively and efficiently as part of a healthy energy access ecosystem for a range of energy services.**

## Bioenergy and Development

Bioenergy is essential in ensuring daily energy access and livelihoods for poor people. Current trends show that by 2030, three billion people will still be cooking using traditional fuels, without improved appliances or fuels, and 30 million people will have died from smoke related diseases as a result (ibid).

If the global community is to meet the Sustainable Energy for All (SE4All) Initiative's goal of providing universal energy access from sustainable clean sources by 2030, then bioenergy, in all its forms (as defined in Box 1), will need to be an important part of the solution.

Drawing on six years of action research in South Asia and East Africa, the PISCES Research Programme Consortium has developed the following bioenergy policy principles, outlining approaches for developing sustainable bioenergy policies and implementation tools, which aim to improve rural livelihoods and to increase energy access in developing countries.

Underlying these principles is the use of the Participatory Market System Development (PMSD) approach, which focuses on transforming technology research into commercially viable delivery models that provide livelihood benefits and reduce energy poverty. This approach builds relationships and capacity across a range of bioenergy value chains, from the producers and consumers to the developers and exporters, and is being used on a range of PISCES projects including sustainable charcoal production, gasifier stoves, biomass resource modelling and land mapping and zoning (highlighted in Box 2).

Commercially, bioenergy is currently a largely untapped resource, which must undergo a transformation in order for its potential to be realised. The key actors will be the private sector, ranging from small informal enterprises to larger registered companies; civil society, to help build capacity and facilitate change; and policy makers, who need to put in place an effective and supportive enabling environment to ensure the market system delivers sustainable, healthy, affordable bioenergy for the billions that will continue to use it in the foreseeable future.

## Establishment of Information and Modelling Systems

### Resource and Technology Mapping and Zoning

Mapping and zoning studies at national and provincial level are required in order to determine the bioenergy potential available in each country, which doesn't conflict with environmentally sensitive zones and other land uses (particularly agricultural production) or with the sustainability of soil and water resources. A PISCES-UNEP study, "Environmental Suitability



#### BOX 1

### What is Bioenergy?

Within this document, bioenergy has been defined as energy derived from the following:

#### Natural Bioresources

Wood and charcoal from forests and non-agricultural land.

#### Bioresidues

Wastes from existing agricultural, forestry or industrial activities including sawdust, rice husks, coconut shells, molasses, bagasse and seedcake from processed oilseeds.

#### Biofuels

Purpose-grown energy crops such as oilseed crops for biodiesel and sugar for bioethanol; and plantations of trees grown for energy purposes, often referred to as agro-fuels.

and Agro-Environmental Zoning of Kenya for Biofuel Production”, is an example of such a policy tool, recently completed in Kenya (see Box 2), which is currently being integrated into the Kenyan Government’s draft biofuels policy.

As part of South-South learning within PISCES, a similar zoning assessment has been initiated in India in collaboration with the Tamil Nadu Energy Development Agency (TEDA). PISCES has been working with other partners to apply these lessons in other developing countries, including Tanzania.

It is important to use such top-down approaches initially, with more detailed, local level analysis being carried out later, to ensure that the production of bioenergy can be balanced with other land needs at the community level, and to ensure that the benefits reach all levels of society, not only large commercial enterprises.

Effective bioenergy delivery models must be developed at all scales, from remote rural household level to large-scale industrial operations, including the available resources, relevant market actors, appropriate technologies, scales of usage, supporting services and the specific enabling environments. PISCES has developed an on-line tool to help energy practitioners and policy makers better understand and produce specific bioenergy delivery models. In addition PISCES has developed delivery models for a number of specific bioenergy resources, such as for ethanol as a household cooking fuel in Kenya (highlighted in Box 3), biomass gasifier stoves in Sri Lanka, and pure plant oil stoves in Tanzania. These pilots provide energy practitioners with practical examples of specific energy delivery models, an increased understanding of the critical issues that allow bioenergy to be delivered sustainably, and replication and scale up in other countries and regions.

## Dissemination of Lessons Learnt

PISCES has produced a range of bioenergy case studies, to capture knowledge of best and worst practices in order to improve future projects, and to communicate to other practitioners and policy makers so they can learn what to do and avoid repeating mistakes. This has included the publication of the PISCES-FAO Small-scale Bioenergy Initiatives study, which provides policy makers with information on the conditions under which it is possible to produce bioenergy, whilst simultaneously protecting the environment, and with minimal negative impact on local communities.

## Developing Appropriate Regulatory Processes

### Policy and Regulation Framework Development

Appropriate policy frameworks and political will, together with the setting of realistic usage targets, are required to ensure that bioenergy can be managed sustainably. Since bioenergy crosses many ministerial departments, it is vital that all relevant government policy-making departments are involved in this process, including the environment, energy, forestry, agriculture, health and finance departments.

Policies also need to provide incentives, such as flexible tax regimes, for reaching the remote and rural poor; and to ensure that these incentives are not exploitative or detrimental, environmental and social safeguards need to be established on a case by case basis through impact assessments. It is important to note that over-regulation may be just as damaging as deregulation, as highlighted by PISCES’ work on increasing the efficiency of the charcoal market in Kenya, following the scrapping of the law banning its production (highlighted in Box 4).

#### BOX 2

### PISCES/UNEP Kenya Biofuels Zoning & Mapping Study

Policy makers and practitioners need suitable tools and guidelines in order to use bioenergy sustainably. In 2010, PISCES and UNEP carried out an agro-climatic and environmental zoning study of Kenya, producing maps showing the country’s biodiversity, variety of land uses, and protected areas. This led to the development of a tool to outline the zones suitable and available for growing various biofuel crops.

A specific goal of the study was to define the area of land available, that could be devoted to particular crops, with the guiding principle being that the production of biofuel feedstocks should not jeopardize Kenya’s ability to ensure food security, or endanger their environmental priority of forest and wildlife protection; and should prevent soil degradation and safeguard water resources.

The study compiled maps of the available and suitable growing condition sites for 12 biofuel crops, highlighting environmental, social and economically sensitive areas which should be excluded from biofuels production.

#### BOX 3

### Ethanol as a household cooking fuel, Kisumu, Kenya

To help overcome the major issues of indoor air pollution and unsustainable biomass utilisation for household cooking, new sustainably produced, clean fuels are required.

PISCES, in collaboration with the Kenyan Ministry of Energy and UNDP, have been piloting the use of ethanol in clean cook stoves in the Nyalenda slum settlement of Kisumu, western Kenya, to develop an affordable supply chain which reduces the environmental and health burden associated with the current reliance on charcoal and biomass in this semi-arid region. The pilot has generated data for policy makers on the potential of ethanol as an alternative household cooking fuel to kerosene and fuelwood, significantly reducing household air pollution (HAP), whilst contributing to improved environmental management and employment opportunities in rural areas.

The use of ethanol as a household cooking fuel has been shown to significantly reduce HAP, due to significantly lower particulate matter and carbon monoxide levels, in addition to burning longer than the same volume and cost of kerosene.

In addition, PISCES' experience of convening national Policy Working Groups (PWGs) has demonstrated the importance of involving a wide range of stakeholders in developing targeted policy documents, backed up by peer-reviewed and ground-based research, including research from ministries, the private sector and civil society actors, and from regional organisations such as NEPAD and the African Union, as well as implementation plans with clear timetables and deliverables for each organisation involved.

## Quality Standards

National, and/or, regional minimum standards are required to ensure that bioenergy is sustainably sourced, and to increase end-user awareness regarding health and efficiency performance, and quality issues such as durability and safety. PISCES has been engaging policymakers in Sri Lanka to develop national guidelines and standards for household air pollution and household cooking, ensuring that the different government departments required were involved, as well as a long lead time to ensure that the commitment and concerns of the end users and market actors could be effectively translated into policy and then enforced (highlighted in Box 5).

In addition, a single internationally recognised Sustainability Standard must be developed for bioenergy, and then implemented, to ensure that ethical production standards are met and community development needs are addressed, particularly in relation to biofuels.

Certification is also required to increase transparency with respect to the production location, so that international and national laws and procedures are respected and that the producers fulfil their community development obligations, to maximise the benefits to local livelihoods.

## Support to Markets and Innovation Systems

### Development of Appropriate Funding Mechanisms

In order to scale-up the efficient use of bioenergy, appropriate funding mechanisms are essential, including innovative financial services, including carbon finance, rolling funds and mobile payments that can meet the needs of the very poor and marginalised. Finance is also required for Research and Development (R&D) into small-scale clean and efficient technologies appropriate for rural household use, as well as for loans and investment finance to support the scaling-up of successful initiatives (such as the Saran biomass gasifier enterprise in India, which PISCES has been analysing). To support more sustainably produced fuels, the international enabling environment needs to be addressed, including shifting subsidies from fossil fuels to sustainable energy sources, including subsidies for farmers to produce biofuels ethically and locally. The biofuels sector must become a driver of rural development, and investment in its production must augment rather than displace local livelihoods.

### Promotion and Awareness-Raising

Effectively sharing knowledge of new products and services is critical in allowing end-users to make informed choices of how bioenergy is used, and for what. National-level awareness campaigns, using a range of communications methods including radio, TV and on-the-ground workshops, can effectively highlight the multiple benefits of using biomass appropriately, particularly in rural areas. In Sri Lanka, PISCES used an innovative approach to raising awareness of bioenergy, by organising in

#### BOX 4

### Kenya's Sustainable Charcoal Market

Charcoal is a key bioenergy resource in Kenya, providing domestic cooking fuel for 82% of urban and 34% of rural households. The industry employs over 700,000 people who support more than 2 million dependants, from wood and charcoal producers, to transporters and vendors; yet it has remained an informal and illegal sector until recently, thus limiting its ability to attract investment and to operate efficiently and sustainably. Since 2009, the establishment of the Energy and Forestry Policies and Acts has led to the legalisation of sustainably produced charcoal, and by 2011 efforts were underway by government agencies, including the Kenya Forest Service (KFS) and the Ministry of Energy, to take forward its implementation.

In 2009, PISCES organised a participatory market development workshop, bringing together various market system actors and stakeholders (charcoal producers, transporters, retailers and government representatives), highlighting different charcoal market value chains in Kenya. The workshop applied a Participatory Market Mapping (PMM) approach, a tool used in Participatory Market Systems Development (PMSD), which is a conceptual framework for analysing and improving markets. The key recommendation from the workshop, to increase awareness of the current policy, was then taken forward by PISCES.

#### BOX 5

### Guidelines and Standards for Household Air Pollution (HAP) and Improved Cook Stoves (ICS)

The importance of guidelines and standards for efficient and clean household cooking stoves has been recognised internationally through initiatives such as the Global Alliance on Clean Cookstoves (GACC), and the World Bank's ACCI programme. PISCES has been working with local communities in Sri Lanka to highlight efficient ICS models currently available on the market, as well as developing and trialling new models where appropriate, such as wood gasifier stoves.

A review of the market development process for the Anagi two-pot ICS in Sri Lanka led to the start of a process of developing national ICS guidelines and national HAP standards, which PISCES has supported in an advisory role. Once approved, these will set production standards, as well as permissible levels of HAP when cooking with biomass (wood, charcoal or animal dung) stoves, which will lead to the development of lower emissions stoves and give positive health benefits, particularly for women and children.

collaboration with the UN Foundation, a school competition to design a postage stamp on the theme of sustainable energy. It was run throughout every school in the country, and the winning stamp design was issued in April 2012.

## Development and Use of Appropriate Technologies

There is an urgent need to adopt a range of appropriate technologies, including low emission cooking stoves and efficient charcoal kilns, and to ensure that these are affordable and meet the needs of the end users, particularly women.

PISCES research has shown that, if directed well, public funds can drive nationally appropriate research and development (R&D), such as the development of locally appropriate crops, improving seeds and strains for increased oil production, and the establishment of new rural markets, as highlighted in Box 6 from Tanzania. Such R&D must ensure that the technology producers maximise the benefits to the local communities and the region without compromising the ecological integrity of the environment. This can be supported through the development and enforcement of policies on environmental and social sustainability.

Despite the on-going need for targeted R&D, it is important to ensure that this does not simply “reinvent the wheel”, but instead build upon research carried out elsewhere, whilst also adapting products already in the marketplace. In order to do this, the sharing of knowledge, including the identification of common barriers and strategies for overcoming them, is critical.

## Market Development

Bioenergy must be viewed as a commercial product which, when sustainably managed, can improve livelihoods and increase decentralised energy access. Although the use of bioenergy must be regulated, it is also necessary to develop a market chain approach, which includes all the relevant actors, to support its sustainable use. If a case can be demonstrated for the sustainable export of bioenergy, it is important that as much of the product value as possible is retained in the country (e.g. such as refining the fuels, rather than just exporting the raw materials or feedstocks). Bioenergy production should ideally involve community-centered activities including Public-Private Partnerships (PPPs), preferably with partial ownership by the communities themselves, as highlighted by PISCES’ work on sustainable charcoal cooperatives in Kenya.

### BOX 6

## Modified Plant Oil (MPO) for Stationary Engines in Tanzania

Engaging the private sector in rural development has remained a challenge, particularly concerning the production and use of bioenergy. To address this, PISCES has been developing a new technique to modify pure plant oil (PPO) so it can directly replace fossil fuels in stationary engines commonly used in various rural applications. Such systems generate essential energy from what would otherwise be waste agricultural products, and contribute to job creation in rural areas of Tanzania.

PISCES has been working with Tanzania Petroleum Development Corporation (TPDC) to successfully develop a new technique to modify PPO, which can lead to the improvement of energy services and livelihoods. This process is carried out via the physical chemical treatment of PPO followed by blending with a modifier to obtain MPO. Field testing and business viability have also been assessed. If successful, such techniques will be transferable to other developing countries.

## About PISCES

PISCES is a six-year action research project, funded by the UK’s Department for International Development (DFID). Working in Kenya, Sri Lanka, India, Tanzania and the UK, the project has been providing new policy-relevant knowledge aiming to widen energy access for the rural poor. For detailed reports on each of the case studies highlighted here, please visit [www.pisces.or.ke](http://www.pisces.or.ke)

