

STUDY APPROACH AND METHODOLOGY

Full case studies are provided in Annex 1 of this report and Section 3 contains a series of introductory Vignettes on each. The full Terms of Reference for the study and case templates are provided in Annexes 3 and 4. This section provides some additional background and analysis on the case selections, countries and the case study methodologies employed.

2.1 CASE SELECTIONS

2.1.1 Selection Criteria

Cases were selected in consultation between PISCES and FAO on the basis of information gathered via networks, secondary literature, awards programmes and research and consultations to date. The criteria for selection were as follows:

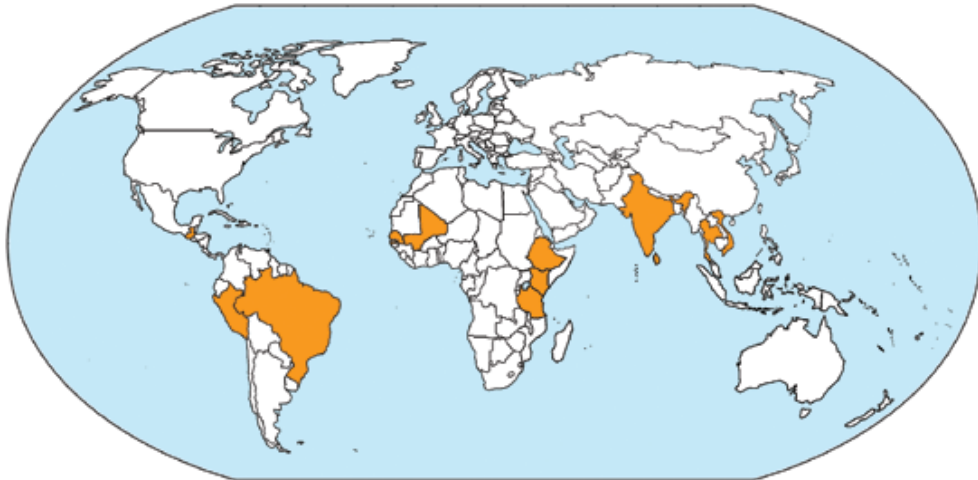
- Cover a cross-section of Bioenergy types (Bioresources, Bioresidues and Biofuels) but with an emphasis on the emerging Biofuels sector which is relatively less developed and studied to date
- Cover a range of country and regional contexts including as a minimum Latin America, Africa, South and South-East Asia including both least-developed countries as well as rapidly developing economies
- Cover a range of End-Uses illustrating the different ways in which Bioenergy can provide energy services, with an emphasis on providing local energy services
- Focus on Small-Scale initiatives with a clear local participation, leadership and focus
- Cover a range of ownership, management and business models including fully commercial, co-operative, charitable and government supported

An Inception Report was presented in September 2008 and cases were agreed at that time in line with the criteria above. One of the key challenges in meeting the requirement to cover more cases in the biofuels sector is the relatively recent emergence of this sector which means that several projects selected are in the relatively early stages of implementation, and as such wider lessons are ahead. However, with this clear it was decided to go ahead on the basis that lessons from the design and initial responses to these projects are also of important interest to policymakers and programme developers in the sector, with these projects being in the vanguard of Small-Scale Bioenergy initiatives.

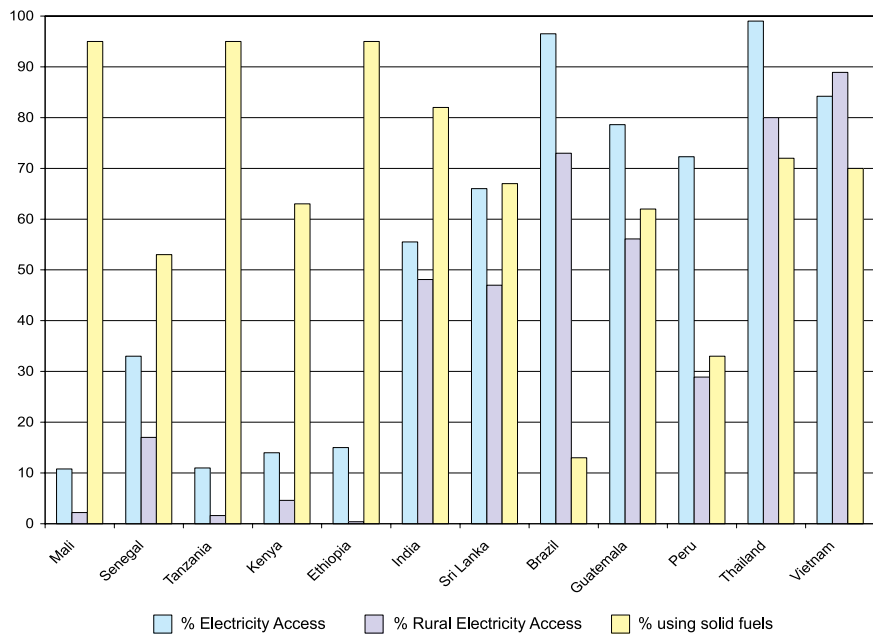


2.1.2 Case Study Countries and Regions

The map below indicates the 12 countries covered by the case studies in the six regions of Latin America, Africa and Asia:

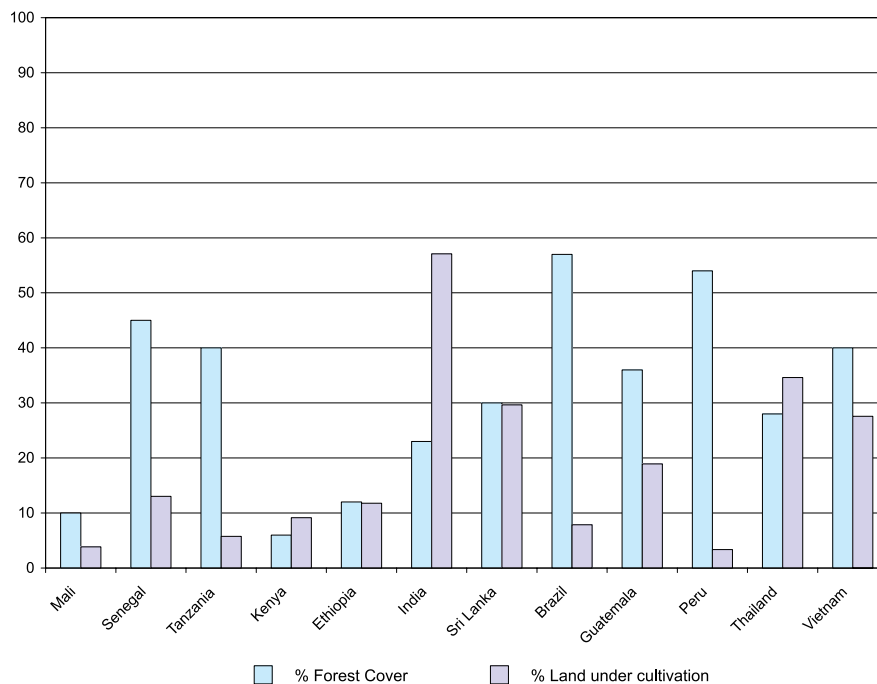


These countries represent a diversity of situations which are described at the local scale in the case studies themselves. However at the national scale, the situations are also very diverse in terms of populations, existing energy provision, Bioenergy resources, agricultural production and poverty, including food poverty, and many other indicators. The following figure presents the study countries in terms of estimates of their key energy access characteristics:



This graphically illustrates the existing very substantial reliance on solid fuels (primarily firewood although in some cases coal) for cooking in the study countries, even in the countries in which electrification has reached a relatively high level in rural areas. One of the starting points for this study is that this illustrates the vital role of Bioenergy in fulfilling basic household energy needs and that its availability and low cost makes it indispensable to the poor. However unmanaged felling of forests for firewood burned in unimproved stoves or charcoal produced in unimproved kilns, especially around urban centres, is known to contribute to environmental damage as well as health problems.

Another important set of properties of interest in the case study countries with respect to Bioenergy in particular are existing forest cover and land under cultivation as estimated in the table below:



Forest cover in the case study countries goes from as low as 6% in Kenya to as high as 57% in Brazil. At the same time percentage of land under cultivation goes from less than 4% in Peru up to 57% in India. These figures indicate the dramatically different situations in terms of Forest cover, which could roughly be equated with natural Bioresources, and in terms of the proportion of land being currently farmed. This latter measure is a broad indicator for the extent of agricultural development in the country although it does not measure “available” land for cultivation which is an important variable in the Biofuels debate. These are clearly gross figures and the cases themselves provide more context of the regions within the countries where the initiatives take place, which often have very different profiles in terms of agricultural production and forest cover compared with the national average.

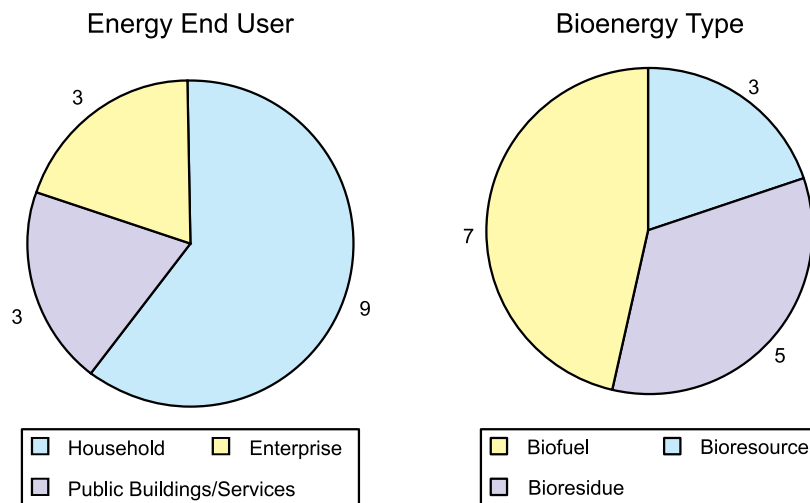
2.1.3 Bioenergy Type, Users, Uses and Vectors

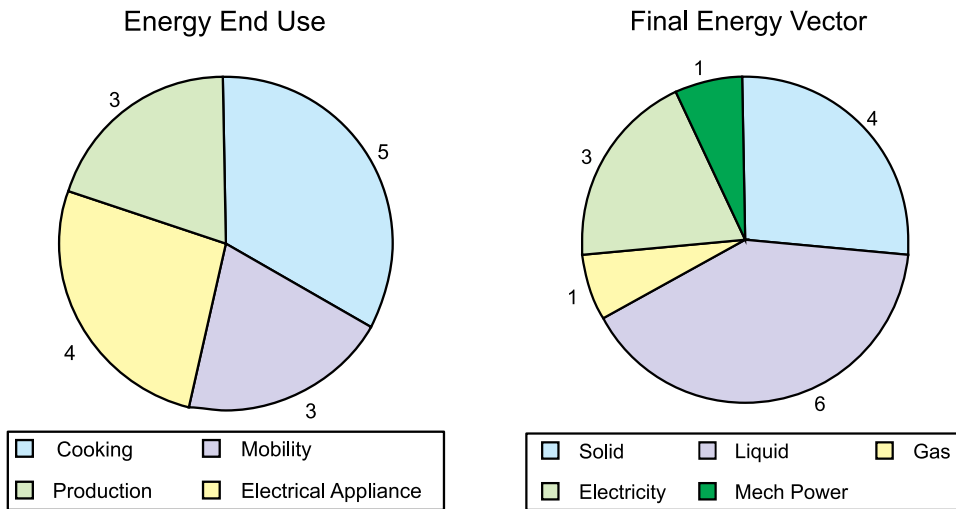
The 15 case studies cover energy services derived from a range of bioenergy resources as illustrated in the pie chart right. Natural Bioresources are defined as naturally growing plants which are not cultivated by humans in any way including natural forest and river reeds for example. Bioresidues are defined as the wastes from existing agricultural, forest or industrial activities including sawdust, husks, shells etc. Biofuels are defined as purpose grown energy crops and in this definition include oil and sugar crops for Biodiesel and Bioethanol, as well as plantations of trees for energy purposes including coppicing.

Although these categories, developed in consultation through the PISCES Programme, are useful, it was noted in the case studies that lines often blur between categories when considering whole market systems where combinations of feedstocks are used, and by-products mix with natural resources etc.

Of the 15 case studies, 9 of the initiatives are aimed at ultimately serving primarily household energy needs with the remainder split between use in enterprises as a means of production, or in public buildings or services. Services include mobility and transport in this case as well as water pumping and street lighting for example. In practice again there are usually overlaps between different types of use and for example electricity often supplies households as well as enterprises. However it is important to note also that all cases selected emphasise local consumption of the end energy product or service. This will be shown to have important implications for distribution of Livelihoods benefits from the end product as well as from participation in the market system.

The types of energy end use are grouped as cooking, mobility, electrical appliances and production in the graph right with a roughly equal split of end uses between the 15 cases. Cooking is a significant use of Bioenergy by rural people in the case study countries and as such innovative initiatives for meeting this need, including use of Bioresidues and Biofuels for improved cooking fuels rather than natural resources, merit particular attention in this respect. Again in several cases there is spill-over between these categories with end-use selection, particularly in commercial projects, driven by relative pricing in different applications.

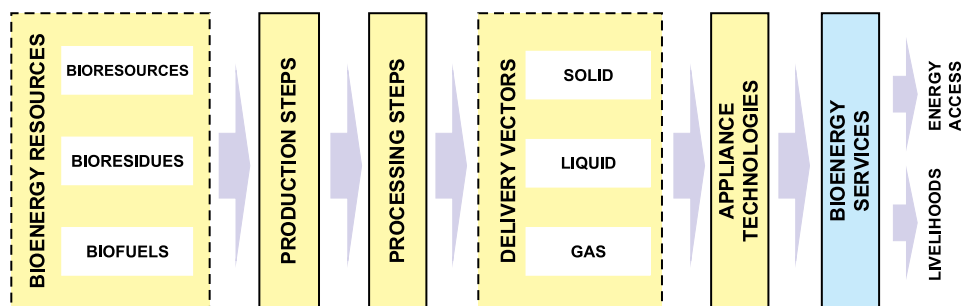




The final categorisation of cases which should be highlighted is the form of the energy at the point where it provides the energy service to the final consumer. In many cases the fuel may go through several forms via solid, liquid and gas for processing or transportation purposes before being converted into useful energy in the form of heat, electricity or mechanical power. The graph illustrates the selection of cases in showing a bias towards liquid which was selected in 6 of the 15 cases. This reflects the relatively recent emergence of liquid biofuels as a significant factor in Bioenergy provision which had until relatively recently largely been dominated by solid fuel use. Advantages of liquid fuels in terms of flexibility and energy density are clear, as well as their linkages with agricultural production which imply important questions in terms of crop and land use selection.

2.2 STUDY METHODOLOGY

Understanding the full impact of Bioenergy systems on rural livelihoods requires improved understanding of the nature of the complete market chains, and of the different business models, technologies, institutional arrangements and power dynamics at the various stages in the chain, which can lead to very different livelihoods outcomes. PISCES conceptualises Bioenergy systems as energy pathways which may be illustrated as below:



This diagram shows the various Bioenergy Resources and how they are converted ultimately into energy access and livelihoods outcomes. However, not only does the use of the energy result in Livelihoods opportunities via energy access and productive uses in enterprises, but each step and sub-step in the system (as well as wastes, co-products and supporting services) represents a separate livelihoods opportunity and has its own interlinked characteristics in terms of possible technologies, capacities required, financial implications, governance issues, access rights, risk characteristics, environmental impacts etc.

Building on this understanding, the methodology applied to each case, according to the ToR developed between PISCES and FAO and copied in Annex 3, was as follows:

- **Mapping the market/value chain of the initiative**

This step was primarily to ensure that all aspects of the initiative were accounted for in the later Livelihoods Analysis. The market mapping method employed drew heavily from that developed by Practical Action¹ and was developed using a combination of participatory, interview and research methods. These not only highlight market actors but ensure that Enabling Environment issues and Supporting Services to the market chain are captured since these also contribute to Livelihoods outcomes and provide broader information about the context within which initiatives are operating. In some cases there was initially concern from researchers or initiatives about whether a market chain actually existed but when prompted all realised that these existed even in the case where several functions were performed by the same organisation, and the systematic approach provided a new window into the wider connections of the project proponents with other organisations.

- **Analyse the Relationships, Rights, Responsibilities and Revenues (4 R's) balance between the actors**

Based on the full range of actors identified through the market mapping the researchers were asked to consider the Relationships, Rights, Responsibilities and Revenues of the key actors in the market system drawing on the 4 R's approach developed by IIED.² This approach provides a structure for analysing power dynamics between actors as well as ensuring that all of these key aspects are covered for each actor. In this way important features relating to vulnerability and risk in particular can be addressed.

- **Assess the impacts of the initiative on the Livelihoods Assets of the actors in the chain, addressing also the sustainability of these impacts**

After an initial assessment of the vulnerability context for communities involved with initiatives presented in the background to each case and in the light of the full market map and 4R's analysis, researchers were then to identify the contributions of the project to the five Livelihoods Capitals of participants namely: Human, Social, Physical, Financial and Natural Capital. This approach utilised the Livelihoods Framework supported by

1 http://practicalaction.org/docs/ia2/mapping_the_market.pdf

2 http://www.policy-powertools.org/Tools/Understanding/docs/four_Rs_tool_english.pdf

DFID³ and placed an emphasis on assessing where possible the sustainability of these impacts.

■ **Draw conclusions on the impact of the overall initiative on Rural Livelihoods and lessons learned**

Finally researchers were asked to draw preliminary conclusions on the initiative and lessons learned which can then be compared with those of other cases and these are used extensively in this consolidation report.

Tools used in the research included field visits, surveys, existing literature, interviews and workshops as well as the previous experience of researchers and contributors. Consultees typically included participants, actors and beneficiaries from the market map as well as initiative leaders. The ToR for the case studies and the template for the presentation of the cases are common to all cases and provided in the Terms of Reference and Case Study Templates in Annexes 3 and 4.

Case studies in all regions were co-ordinated from the PAC UK office by Steven Hunt (Senior Energy Consultant and International Projects Manager, also interim PISCES Project Manager on behalf of ACTS). Responsibilities included co-ordination of inputs from researchers, feeding back to researchers on case contents and compiling the final set of cases, as well as producing the consolidation report, including analysis and conclusions in consultation with the researchers.

Cases in West Africa, Latin America and South-East Asia funded by FAO were managed by PAC Regional Offices and staff with studies conducted by local consultants, initiative participants and PAC regional staff, supervised by the PAC Regional Management teams for Quality Assurance and oversight. Cases in East Africa and South Asia were funded by PISCES and conducted by PISCES partner researchers under QA and oversight of the PISCES partner leaders and the PAC UK Project Manager. The full list of case study researchers, managers and contributors is provided in Annex 2

3 http://www.livelihoods.org/info/guidance_sheets_pdfs/section2.pdf

