

# The Role of Energy in Achieving and Sustaining MDGs -Africa

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# The Poverty Challenge

- Despite since 1950, the world's wealth has grown significantly, but its distribution has not been even, a large share live in extreme poverty
- The variation in HDI of nations is a good indicator of the social well being of people
- Comparatively, situation in Africa and South Asia are not good
- This realisation led the UN to take action in addressing poverty

Income of rich and poor countries

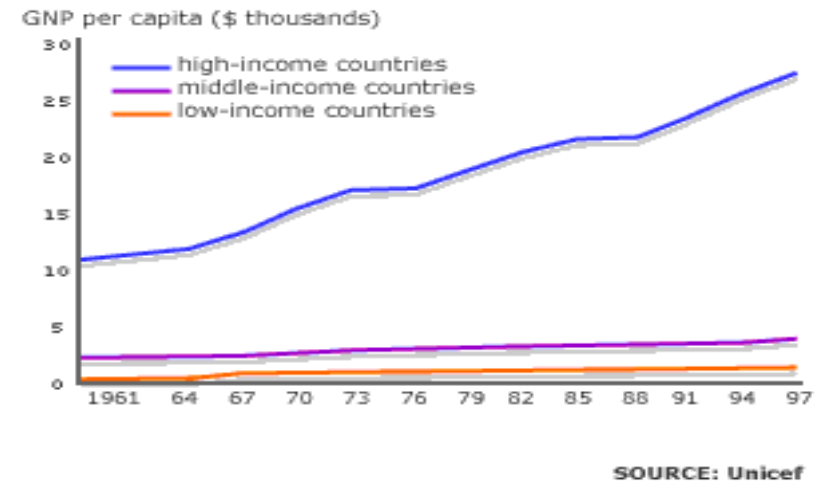
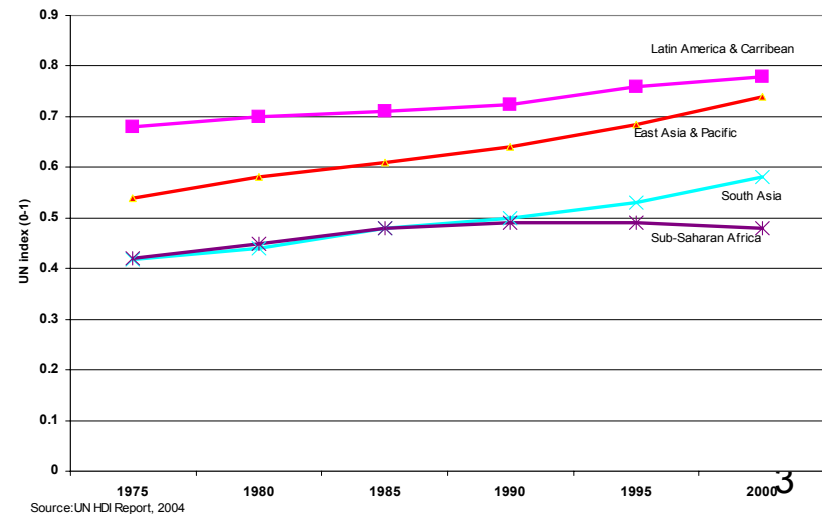


Figure 1.5  
COMPARISON OF HUMAN DEVELOPMENT INDEX FOR SELECTED WORLD'S REGIONS



# THIS UN REALISATION LED TO MDGs

- Tackling the problems of extreme poverty led the UN in 2000 to set eight broad goals with specific targets which are known as the Millennium Development Goals (MDGs).
- These are expected to be achieved by all member states by 2015 using 1990 as the baseline.
- Unfortunately, these goals which include eradicating extreme hunger; achieving universal primary education; reducing child mortality; increasing access to safe drinking water and combating certain preventable diseases, but do not include increasing access to energy.
- It has been adequately demonstrated that the efficient supply of modern energy is directly correlated to promotion of welfare and economic growth, the bedrock of MDGs.
- Hence, provision of energy is an important ingredient to the achievement of the goals as energy is directly or indirectly linked to all the different MDGs.

# THE MDGs: TARGETS AND INDICATORS

Goal	Target	Indicator
<b>1. Eradicate extreme poverty and hunger</b>	<ol style="list-style-type: none"> <li>1. Halve the prop. of people with income &lt;\$1/day</li> <li>2. Halve the share of pop. Who suffer from hunger</li> </ol>	<ol style="list-style-type: none"> <li>1. Proportion of population &lt;\$1/day</li> <li>2. Poverty gap ratio</li> <li>3. Share of poorest quintile in nat. cons.</li> <li>4. Prevalence of under-weight children &lt; 5</li> <li>5. Share of Pop. Below min. dietary cons.</li> </ol>
<b>2. Achieve universal Primary education</b>	<ol style="list-style-type: none"> <li>3. Ensure children complete full education</li> </ol>	<ol style="list-style-type: none"> <li>6. Net enrollment in primary education</li> <li>7. Share of pupils finishing primary school</li> <li>8. Literacy rate among 15-24 years</li> </ol>
<b>3. Promote Gender equality and empower women</b>	<ol style="list-style-type: none"> <li>4. Eliminate gender disparity in school</li> </ol>	<ol style="list-style-type: none"> <li>9. Girl/boy ratio in school &amp; tertiary educ.</li> <li>10. Literate women/men ratio for 15-24 yrs</li> <li>11. Share of women in wage employment</li> <li>12. Share of women in parliament</li> </ol>
<b>4. Reduce child mortality</b>	<ol style="list-style-type: none"> <li>5. Reduce under five mortality rate by two-thirds</li> </ol>	<ol style="list-style-type: none"> <li>13. Under-five mortality rate</li> <li>14. Infant mortality rate</li> <li>15. Share of 1 year immunised against measles</li> </ol>
<b>5. Improve maternal health</b>	<ol style="list-style-type: none"> <li>5. Reduce the maternal mortality by two-thirds</li> </ol>	<ol style="list-style-type: none"> <li>16. Maternal mortality ratio</li> <li>17. Share of births that see health personnel</li> </ol>
<b>6. Combat HIV/AIDS, malaria, and other diseases</b>	<ol style="list-style-type: none"> <li>6. Combat HIV/AIDS, malaria, and other diseases</li> </ol>	<ol style="list-style-type: none"> <li>18. HIV prevalence above women above 15</li> <li>19. Contraceptive prevalent rate</li> <li>20. Number of orphans</li> <li>21. Prevalence of malaria death rates</li> <li>22. Prevention against measles</li> <li>23. Prevalence and death rates of TB</li> <li>24. Share of TB cases detected</li> </ol>
<b>7. Ensure environmental stability</b>	<ol style="list-style-type: none"> <li>7. Ensure environmental stability</li> </ol>	<ol style="list-style-type: none"> <li>25. Change in Land area</li> <li>26. Protected land area</li> <li>27. GDP/energy use</li> <li>28. CO2/capita</li> <li>29. Share of people to clean water</li> <li>30. Share of people with sanitation</li> </ol>
<b>8. Develop a global partnership for development</b>	<ol style="list-style-type: none"> <li>8. Develop a global partnership for development</li> </ol>	<ol style="list-style-type: none"> <li>31. ODA</li> <li>32. Market access</li> <li>33. Debt sustainability</li> </ol>

# ENERGY AND THE POOR NEXUS

- The provision of efficient energy services for the poor is a major challenge because they can ill-afford to pay for it
- Past efforts have been oriented around the provision of energy to solve emergency situation
- Energy for the poor should go beyond solving emergency problems but include growth activities and sector-wide activities (employment generation, increase productivity and enabling economic growth)
- Currently, the poor pay between 3-10 times more for the same energy service as the rich, a situation that is even worse for those that live in rural areas
- Major increase in energy supply options are needed for the poor at subsidised rate, and the package should include fuel diversification and inter-fuel substitution.

# ENERGY AND MDGs

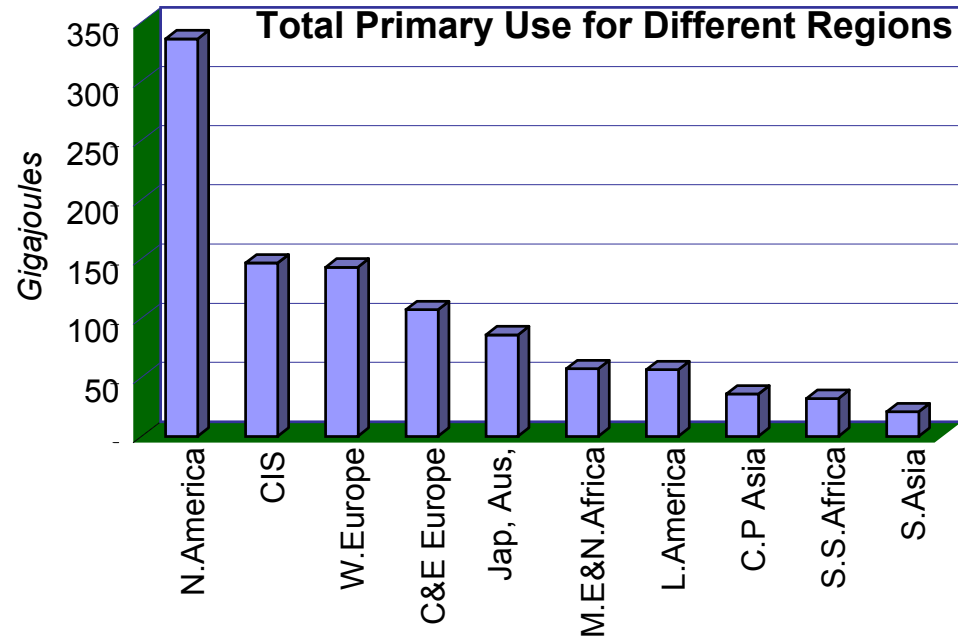
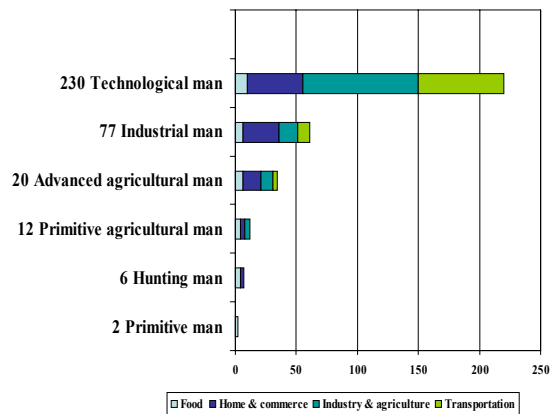
- Energy is not among the MDGs, but is the greatest multiplier to achieve the MDGs
- Improve energy access at household level reduces drudgery, save women's labour & time, reduce local air pollution and improve health and education
- However, economic sustainability demands energy beyond welfare but providing energy for the overall economic growth
- Failing to do so will allow nations to reverse back to poverty
- Energy to cope with the reliable, affordable and high quality energy services needed for development including those for SMEs is crucial
- As SMEs can lead to competitiveness, employment generation, rising incomes, the basis for wealth generation
- Hence, energy to achieve MDGs should go beyond and include energy for sustaining the society after achieving MDGs

# LINKAGE BETWEEN ENERGY AND MDGS

MDGs linked to Energy	Objectives	Energy Needs for meeting and sustaining MDGs
1. Poverty & Hunger	Half the people that live in hunger and those on less than \$1/day	<ul style="list-style-type: none"> <li>-Post-harvest processing for consumption and generate surplus (reduction of on/ off farm losses)</li> <li>- support improved nutrition</li> <li>- improve supporting infrastructure &amp; services to properly utilise surplus</li> <li>- enhance income-generating activities</li> </ul>
2. Universal Primary Education	Primary education for all by 2015	<ul style="list-style-type: none"> <li>- reduction in cost of education</li> <li>- provision of electricity for lighting &amp; heating,</li> <li>-electricity for teaching aids</li> <li>-improved energy efficiency in school buildings</li> </ul>
3. Gender Equality & Women Empowerment	Boys & girls to be in primary & secondary schools by 2005 and all levels by 2015	<ul style="list-style-type: none"> <li>-provision of better cooking fuels to free task of wood collection</li> <li>- reduce indoor air pollution</li> </ul>
4. Maternal Health	Reduce rate of maternal mortality by 75% between 1990 to 2015	<ul style="list-style-type: none"> <li>-improved medical facilities for maternal care using modern systems</li> <li>- provision of fully equipped clinics and hospitals</li> <li>- adequate training and housing</li> <li>-reduction of excessive household work load</li> <li>-effective drug manufacture and distribution</li> </ul>
5. HIV/Aids, malaria & other diseases	Halt & Reverse the trend	<ul style="list-style-type: none"> <li>-increased facilities for sterilization, refrigeration, and storage facilities for vaccines</li> <li>- improved re-use facilities</li> <li>- improved blood donation systems</li> <li>-improved distribution systems</li> <li>-improved communication system using IT</li> </ul>

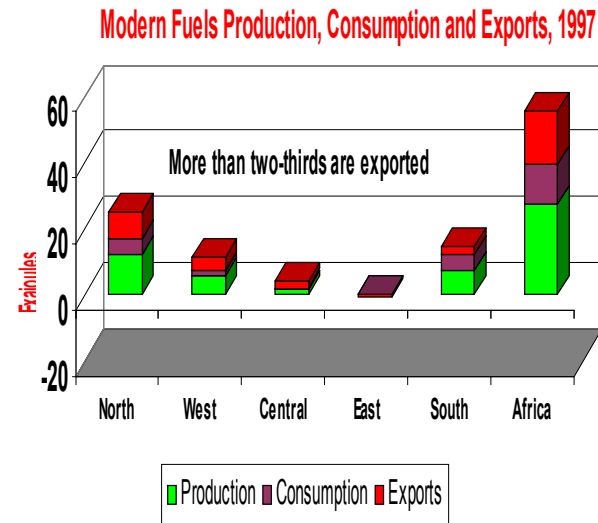
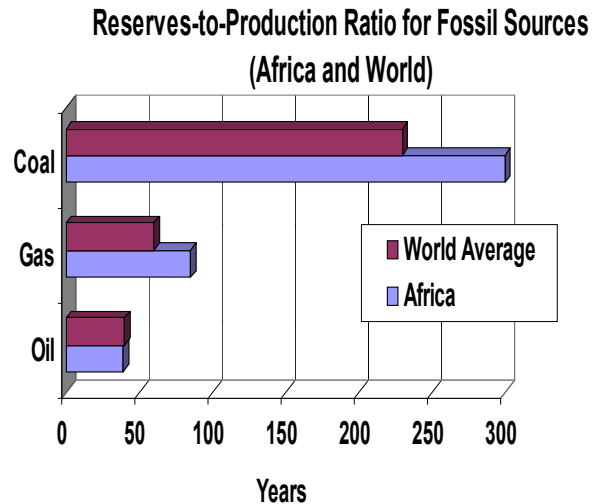


# Historical Development of Energy and Global Energy Situation



- Since industrial revolution, energy consumption has witnessed substantial growth in energy consumption. However, for regions as S. Asia and SSA the situation has hardly changed
- Many regions are yet to reach the threshold needed for take-off in the industrial and transportation sectors

# Africa: Substantial Resources, yet least modern energy consumer

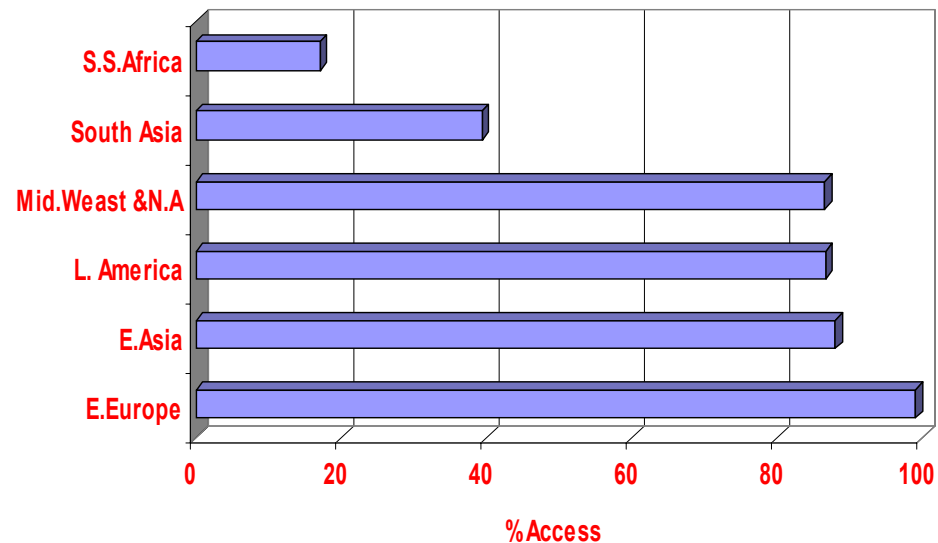


- Africa has significant fossil and renewable energy sources that are yet to be exploited for the benefit of Africans
- On an average, two-thirds produced is exported
- Developing a viable downstream fossil fuel sector remains a major challenge

# Electricity Access in Africa is very low

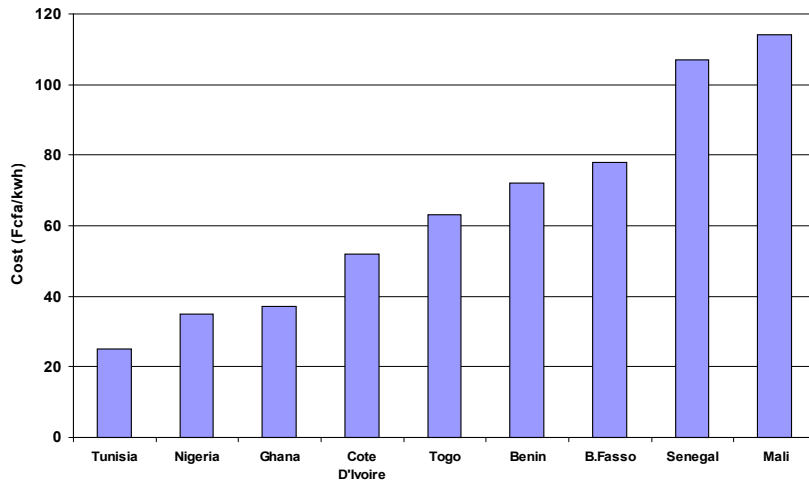
- Electricity is crucial to the overall economic and social development of a region/country, but access in Africa is the least among developing regions, under 20%
- 40% of electricity is used each by North & South, while the remaining 46 countries uses 20%
- Electricity access to rural areas is less than 10%

Population with Access to Electricity in Developing Regions, 2000

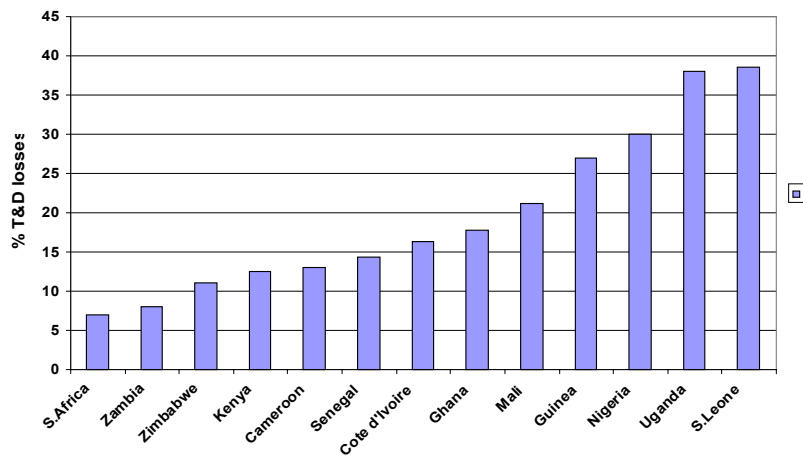


# Performances of Electricity Utilities vary

Electricity Tarriffs in Selected African Countries

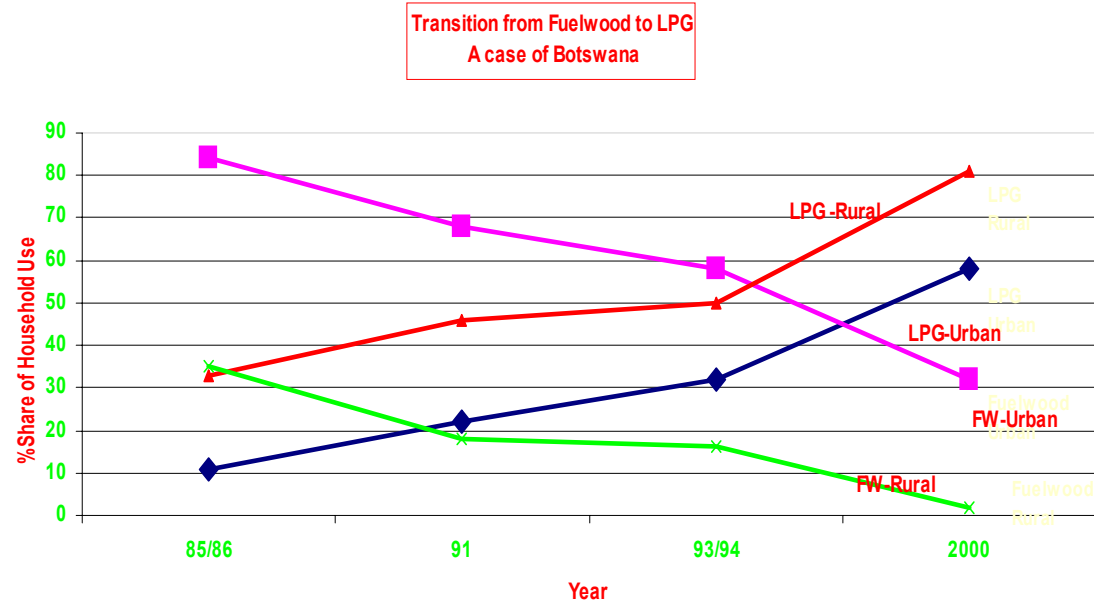


Electricity T&D losses in Selected Countries



- Electricity generation in Africa, only 3.1% of global, despite 14% of pop.
- Though performance vary, but most suffer from poor managerial, technical, and financial performance:
  - High T&D losses, but countries with good economies show up far better
  - High unsustainable tariffs, but countries with good economies generally have lower tariffs
- Power brownouts and blackouts, common in poor countries
- Unnecessary government involvement
- Poor attraction of FDI – Between 1990-98, SSA energy FDI was only 6% of total FDI
- Results of those with FDI are mixed – Senegal & Uganda

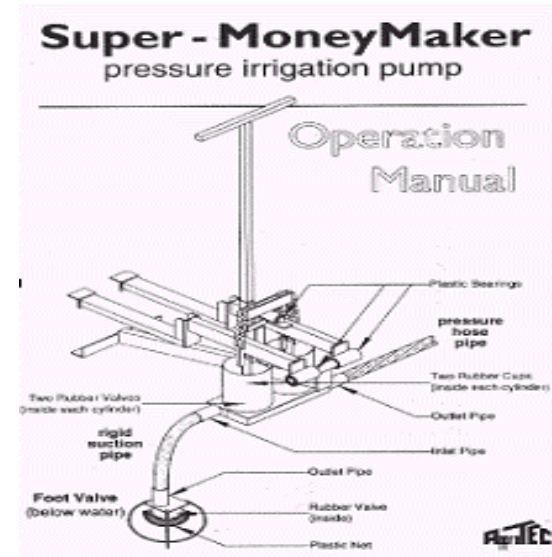
# Case 1: LPG Transition in Botswana



- Botswana is one of the few middle income countries in the continent
- It used its wealth from mining and service sectors to develop its energy sector including introducing LPG for cooking in both urban and rural areas
- This programme led to significant replacement of firewood and charcoal in both areas
- As a result, significant increase in HDI, hence the MDGs

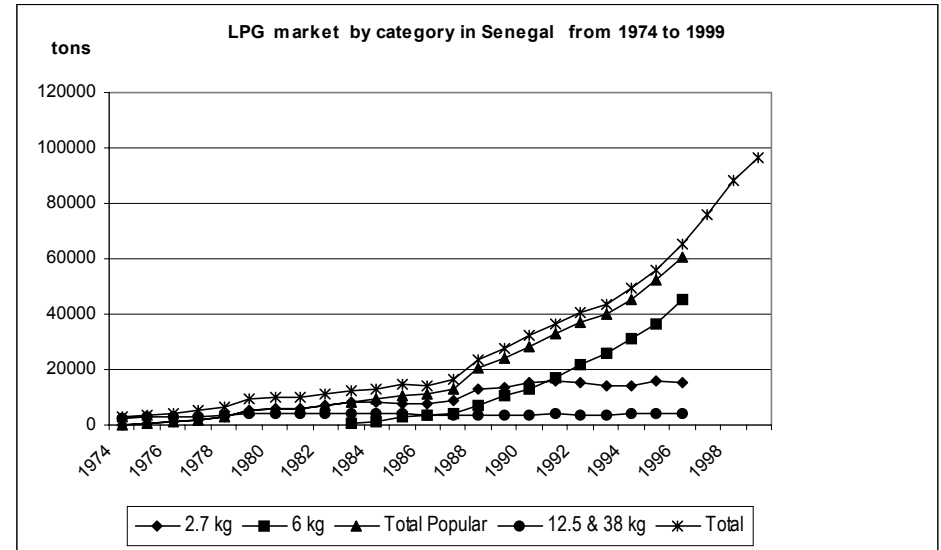
# Case 2: Small Energy Development in Kenya

- Access to clean water and for irrigating farmlands are problems in Kenya
- Since introduction of treadle pumps in 1991, 24,000 have been used by 120,000 urban and rural people for irrigation and household activities
- Development of associated services – technical back-up
- Provide economic and social benefits



# Case 3: LPG PROGRAM IN SENEGAL

- The LPG program was introduced in 1974 to substitute charcoal due to droughts and growing deforestation
- Program led to introduction of technical innovations
- Wider use as a result of tax exemptions and subsidies
- Program led to economic and social benefits, hence MDGs

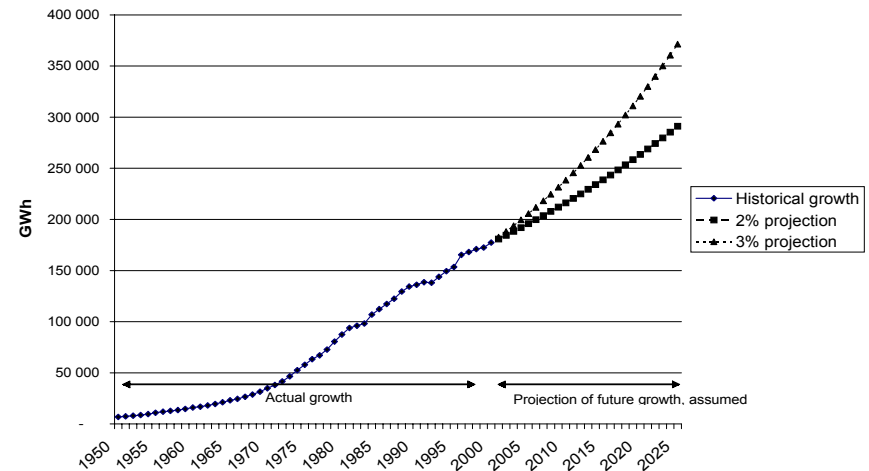
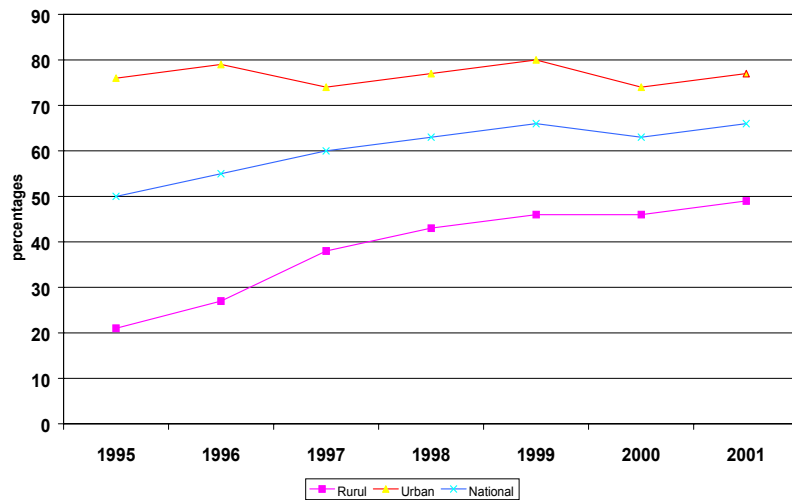


# Case 4: Multi-Functional Platform in Mali

- This joint program between Mali and UNDP involves the provision of modern motive power to relieve the drudgery and time wastage associated with traditional fuels.
- This program started in 1993 with 4 platforms and grew to 48 by 1999, and 394 by 2004 serving 80,000 women
- The platform is engine powered milling and de-husker unit
- The program has led to significant time savings and economic benefits for families, especially women and girls
- This program has helped significant share of the population to achieve health and education MDGs and also reduce poverty among women and children



# Case 5: National Electrification: South Africa

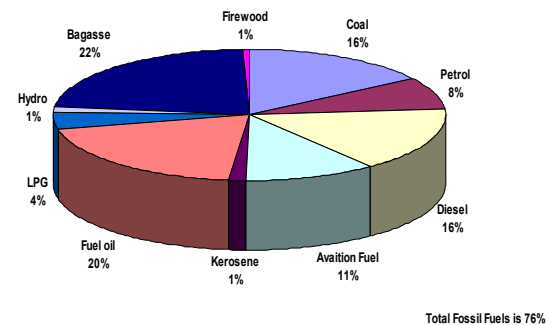


- Two phases of the self-financed electrification has been implemented, the first 1994-99 led to 2.5 million connections, and second is 300,000 annually
- This program include schools and clinics in addition to households
- The program led to technical innovations such as reduction in cost of connection and pre-metering system
- Major economic and social benefits were accrued by the project

# Case 6: Energy as a motive force for development – A case of Mauritius

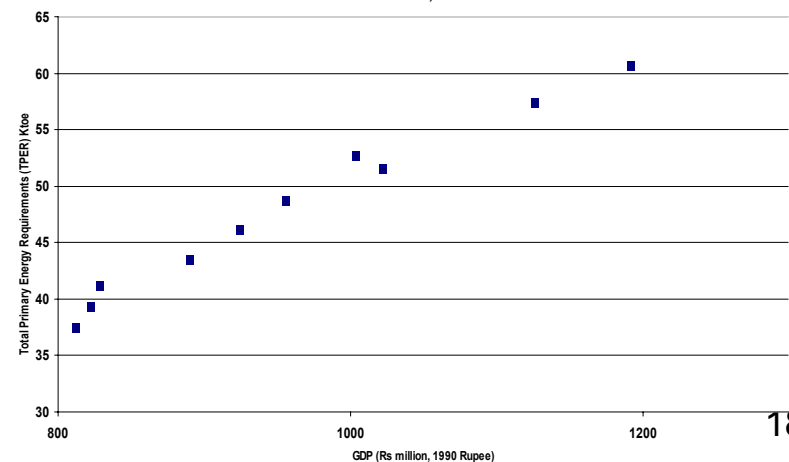
- Mauritius a small island of 1m was transformed from LDC to medium income country in 20 years
- Development of sugar industry and fully exploiting tariff advantages fuelled its economy
- A very good energy system has led to major social advancement

Primary Energy Consumption in Mauritius, 2001  
Total Consumption 1,191,532



Source: <http://www.inlet.mu/els/index.htm>

RELATIONSHIP BETWEEN TOTAL ENERGY REQUIREMENTS AND GDP  
A Case of Mauritius, 1992-2002



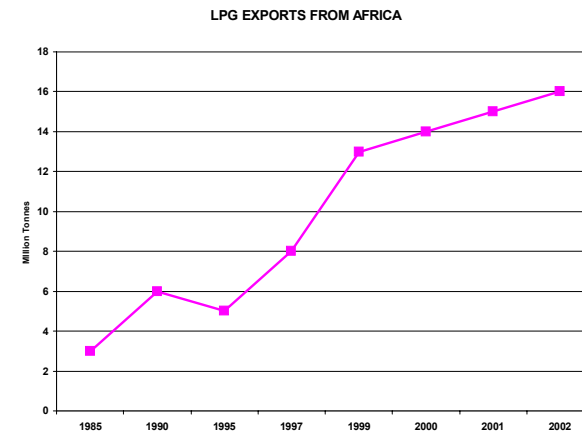
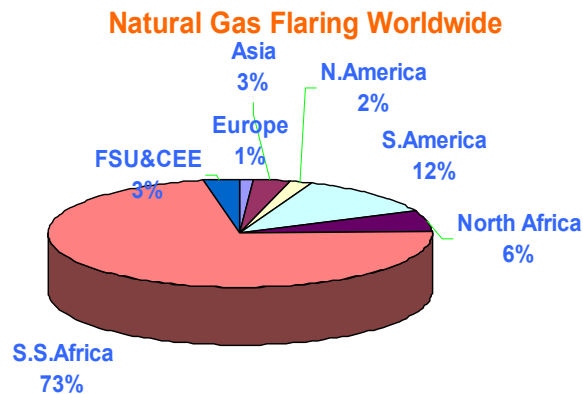
## COMPARATIVE ANALYSIS OF CASE STUDIES

Country	MDG 1	MDG 2	MDG 3	MDG 4	MDG 5	MDG 6	MDG 7
<b>Botswana</b> Urban and rural LPG program	X	X	X		X		X
<b>Kenya</b> Irrigation program	X		X				X
<b>Mali</b> Multi-functional platform	X		X				X
<b>Mauritius</b> National electrification program	X	X	X	X	X	X	X
<b>Senegal</b> Urban and rural LPG programme	X	X	X		X		X
<b>South Africa</b> National electrification program	X	X	X	X	X	X	X
<b>Tunisia</b> National electrification program	X	X	X	X	X	X	X

# Lessons: Case Studies

- Energy is a major driving force for social and economic development, hence can assist in achieving MDGs
- Government role in a national energy program is important:
  - Commitment
  - Provision of finance
  - Exploitation of opportunities
- Partnership between various actors locally and with external actors can assist programs
- The need for supporting institutions is crucial – technical, standards, regulation, etc
- Flexibility in policy formulation and implementation is needed for project success
- Creation of enablers to attract foreign interests are important to facilitate energy projects
- Mobilisation and organisation of local capital for energy projects is important
- Countries should use local funds to undertake projects at the lower end of the cost curve and search for external funding for more expensive projects

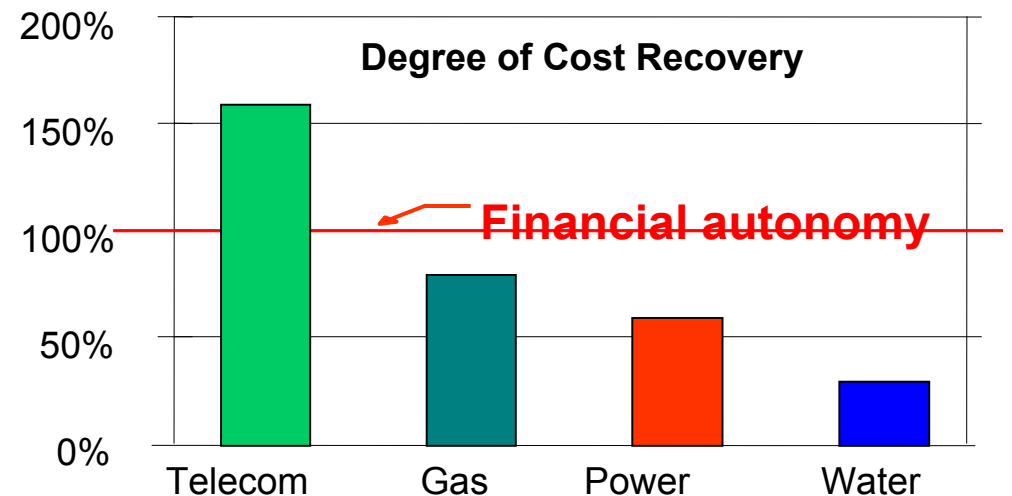
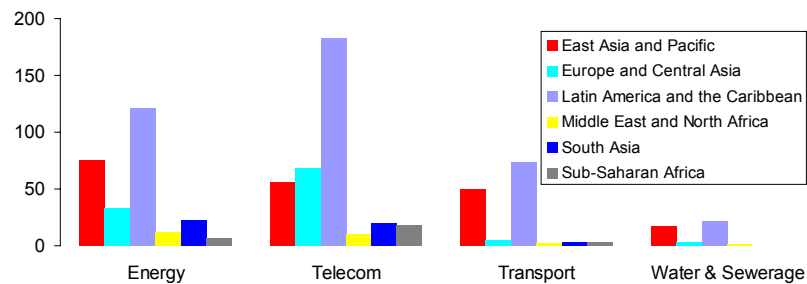
# Option 1:LPG Future For Africa



- The quantity of associated gas flared in SSA could be used to provide energy for most countries in SSA
- The rising exports could be curtailed to meet local demands
- However, development of the downstream and supporting infrastructure is important
- Policy environment need to developed to restrict flaring

# Option 2: Inclusion of private investments in infrastructure

Total Private Investments in Infrastructure, 1990-2002 US\$ bn



- Generally, private investments in infrastructure is low except in countries with good creditworthy status
- Hardly any investments in Africa, especially in the Sub Saharan region
- Only telecommunications has attracted investments due to high cost of recovery
- Use of private investments need caution

# Option 3: CDM, but for effectiveness major reforms needed

## Problems

- High transaction costs relative to expected price of CERs - approval and monitoring as SD projects may be small and have lower paybacks
- Bundling of projects need a higher priority, but not of interest to developers
- Involvement ODA and IF with clear rules
- More defined range for SD
- Post -2012 era could be a problem

## Measures

- More professional and transparent  
EB/Methodological Panel
- A more policy-based CDM to accommodate large projects
- Use of ODA and bilaterals for creating enabling environment in poor countries to attract major energy projects
- Use of Export Credit Agencies on Risk mitigation activities

## Option 4: Use of Renewable Energy in Niche Markets

- National governments may be unable to supply grid electricity to remote areas
- Renewable energy systems can be used –stand alone or mini-grid system
- Such systems must be based on
  - Needs assessment
  - Provision of wide technology choice
  - Facilitation of technical back-up
  - Provision of subsidised financial system
  - Support existing cooperatives or promote new ones



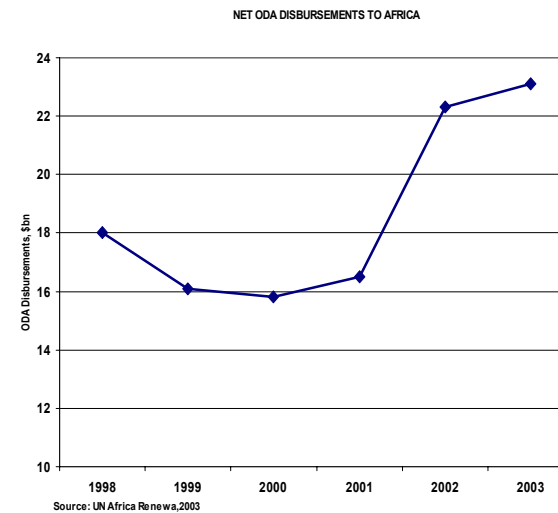
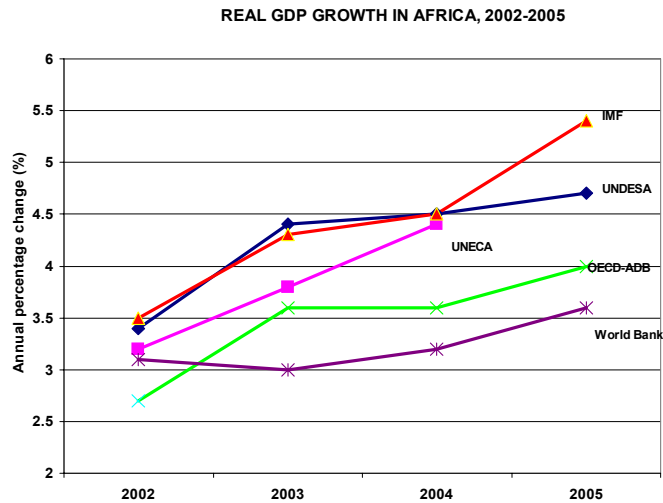
# Option 5: Involvement of Public-Private Partnership (PPP) or Independent Power Producer (IPP)

- Privatisation is selling off public assets to generate revenue, improve service delivery and reduce managerial burden
- 22 of the 53 countries have private participation
- The continent yet to see positive results, but has led to rising prices, job losses and poor returns on sale of public assets
- Embarking on PPPs and IPPS, results mixed
- These can be useful provided that:
  - Realisation of its complexities and time consuming
  - At best, the government should be the initiator
  - Government should use local or regional experts to undertake needs assessment, feasibility studies and risk assessment
  - Financial and technical studies can involve international experts but with local or regional involvement.

# Threats to Energy Development

- Nationally, threats can come from the following:
  - Political interference
  - Inability for government to keep to its obligations
  - Technology choice or limitations to technical options
  - Poor enforcement of regulations
  - Poor risk mitigation
- Internationally, threats from:
  - Current decline in Energy R&D in OECD countries the main source for energy innovation
  - Rapid decline in public and private investments in energy. In 2004, it is 20% of 1997 levels. Impacts on energy reform has been a disaster
- Impact of continued high oil prices
- Poor credit worthiness of countries to have access to commercial lending
- Continued bad image of Africa by the western press

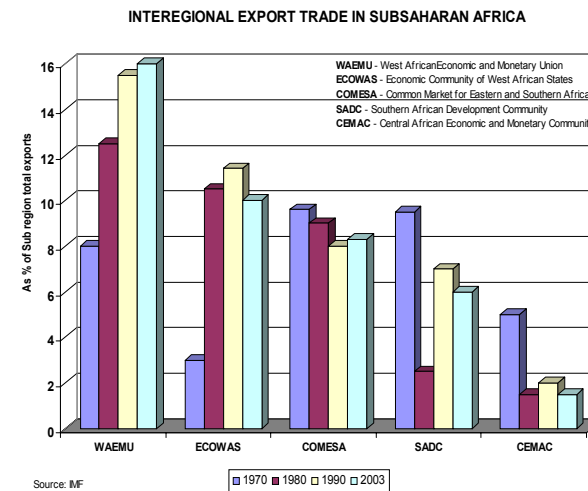
# Prospect 1: African Economy Getting better



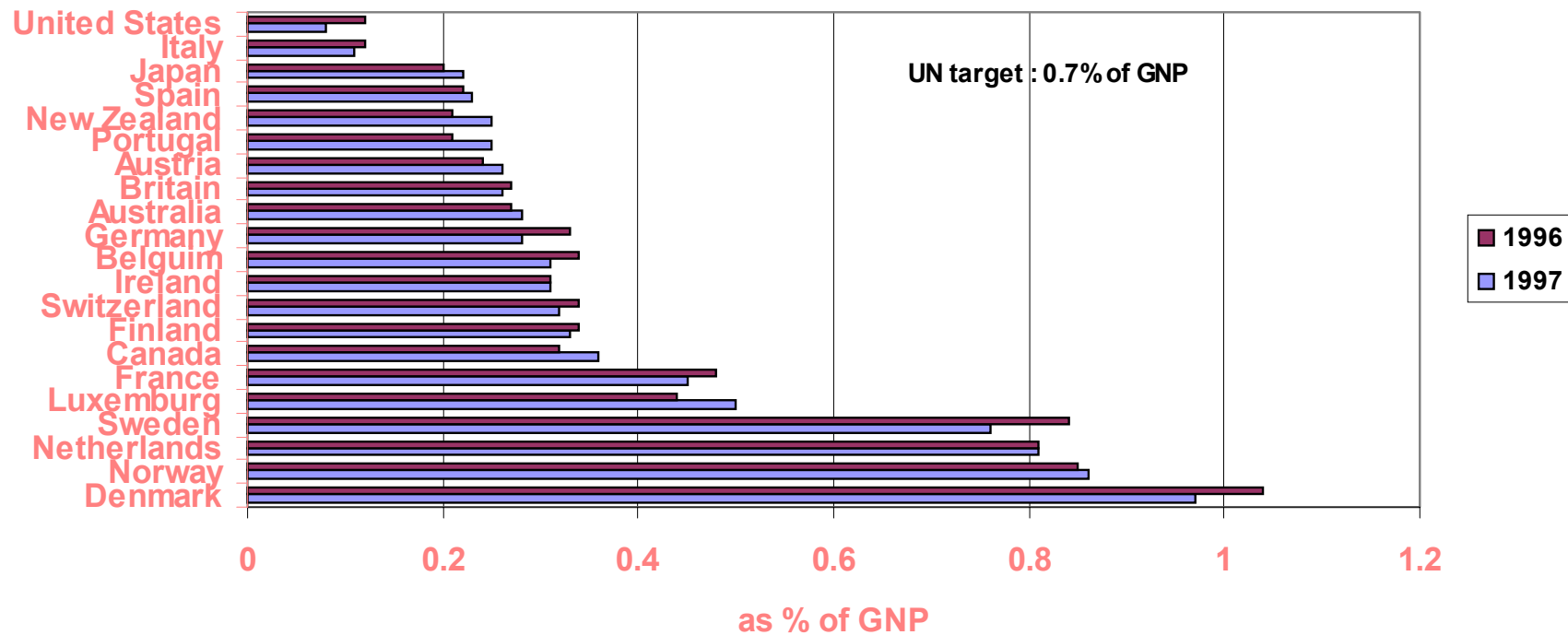
- Though they vary due to geopolitical assumptions, but they all record higher growth rates beyond population growth rates
- The continent is yet to achieve the 7% estimated growth needed to achieve MDGs
- Unless energy systems improves to support increased industrial productivity, this growth will be fragile
- ODA has regained, but unless used to develop infrastructure such energy, expected multiplier benefits will not be realised

# Prospect 2: Rising trade but declining share in global exports

- Almost unlimited access to African markets
- African countries are yet to fully exploit existing access to industrialised markets – ACP & All but arms
- Countries that have done so have benefited – Mauritius
- African countries need to develop high value exports – processed food than raw materials
- Lack of infrastructure such as energy and transport make countries fail to exploit market access to EU under ACP, though low wages
  - Ghana with Cocoa
  - Ethiopia with coffee
- Increasing intra-African trade is good but should only be a first step, hence suspicion, wars and corruption at borders should be reduced
- More enforcement of existing treaties



## PROSPECT 3: INCREASING ODA, BUT EXISTING UN OBLIGATIONS HARDLY MET BY DAC



Source: OECD database

All the countries with recent plan for Africa's development (UK, FRANCE, ITALY, USA) has hardly given beyond 0.36% of GDP as ODA

However, ODA funds can be used to create or strengthen the enablers to attract foreign energy investments

# Conclusions I

- Energy is not among the MDGs, but a major multiplier of MDGs
- Improving the overall macro-economic environment can have significant impact on energy projects that will assist countries to achieve and sustain MDGs
- Energy projects differ between urban and rural needs but, they should have both social and economic considerations
- The role of government in energy public and private projects is crucial. This role could include political commitment, mobilising financial resources and selection of projects
- Exploiting new opportunities for advancement of energy projects is important for African countries

# Conclusions II

- Need to embark on dedicated projects for the poor but certain facilitation is needed:
  - Provision of financial assistance, subsidy or free service
  - Allow communities to be fully involved at every stage of the project
  - Encourage rural entrepreneurs
  - Provide support systems to promote productive activity (roads, market, standards)
- Private participation in power production and use can be useful provided government is prepared to do the following:
  - Undertake needs analysis and feasibility studies
  - Risk transfer/management analysis
  - Include systems to promote technology transfer, employment opportunities, cost minimisation.
- The pricing of energy is crucial as the transition from a price reflecting social and political concerns to that reflecting full market value is a major challenge
- Exploiting international opportunities to develop overall macro-environment can assist the poor far greatly than other projects