

## **CAPACITY BUILDING FOR TECHNOLOGY TRANSFER IN THE AFRICAN CONTEXT: PRIORITIES AND STRATEGIES**

Editor's note: Please note that the views expressed in this paper are those of the author and do not necessarily reflect the position of the UNFCCC secretariat

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## EXECUTIVE SUMMARY

Equitable sharing of global technological advances and their application in raising the welfare of communities has confounded international relations for some time now. This was primarily because there was no forcing basis to bring together developed and developing nations in development cooperation. A lot depended on goodwill and strategic considerations. The threat of climate change and the need for least cost mitigation, provides an unprecedented forcing mechanism for cooperation. But still this is fraught with strategic considerations. Whereas Africa is not called upon to mitigate climate change, it must call upon itself to benefit from the window of technology transfer brought about by the new forcing mechanism. Many nations in the South are eyeing the same window and developing countries are unlikely to volunteer all they have. In whatever arrangement that emerges, Africa admittedly stands to reap the least benefits – this is primarily due to its weak capacities to deal with the technology transfer aspects of the new global collaboration under climate change. In this paper we identify four levels of capacity which are critical to turning Africa's fortunes around. These include:

Policy analysis; formulation and management of policy instruments meant to achieve certain technology transfer goals; development of business skills to form a lending pad for incoming technologies and enterprises that carry the technologies, and providing capital support to allow Africans to take equity partnership in cleaner production businesses.

The skills defined above are at the practical level of capacity building for Africa. There are numerous other needs which must be pursued. The most critical of these are:

- to ensure that the African fully appreciates the rationale for climate change technology transfer and to convert this rationale to their advantage
- to help the African appreciate that any technology transfer is not about charity or goodwill even if it is under climate change. It is hard core business in which one must build a competitive edge.

These two conditions define the operational environment for any capacity-building venture in Africa. As it stands, good scope exists for Africa to embark on programmes for capacity-building using the various institutions that already exist and by involving more and more of the business interests, particularly small scale businesses which must form the basis for Africa's indigenous industrial development effort.

## 1. **Major themes**

The paper has six major themes of concern. These can be analyzed within two parallel frameworks, the first being the traditional requisites of technology transfer. These have been proved to be sufficiently difficult in their own right and Africa's ability to muster the necessary capacity to benefit from meaningful transfer has been a chronic problem. Here the paper considers capacity-building activities/initiatives necessary to build functional preparedness to technology transfer/absorption.

### ***Initial argument***

*The African person is not yet a technology person. That sounds crude, but it is unfortunately true. He may be a user and beneficiary of global technologies. Technology and let alone clean technology is not in his thought process. African development workers, policy makers and investors can choose technologies for specific purposes but they remain outside those decisions and activities which influence the direction or trend in technology development. There are quite a few technology development centers and Research and development institutions with the most advanced ones located in South Africa. The bulk of these are tinkering on rural technologies for processing produce and for energy utilization with aid money. No technology internalization has occurred in the majority of cases. South Africa, Mauritius (which has an extremely superior knowledge on sugar technology), Zimbabwe and Malawi (which have built endogenous appreciation of the ethanol technology) could represent some exceptions.*

The second framework concerns capacity-building for climate change technology transfer. At first, the two analytical frameworks may appear the same or seriously overlapping. This may be the case but an essential distinction is that the second paradigm involves possible changes in Africa's thinking about development in that there is a heavy dose of global agenda seeking to rationalize Africa's technology/development path to solve a global problem.

### ***Initial argument***

*Within this framework we find that Africa in general has not developed a mindset for maximizing its gains under climate change technology support programme. It risks being bypassed. There is little by way of domestic agenda (policies or programmes) to access CC technologies which may maximize their gains. There are a few project-level activities which do not constitute any meaningful technology transfer.*

## **1.1 Themes in the first framework – technology transfer - plain**

Here we consider that:

technology transfer capacity must recognize and must be pegged to the following three levels of technology transfer:

- Ability to utilize/man/manage imported proprietary hardware
- Comprehensive understanding of imported proprietary technology involving the ability to alter, improve or otherwise retrofit the technology for local conditions or to bypass a problem without recourse to the supplier
- Ability to originate technology at all levels, research and development, bench scaling, piloting and commercial transfer
- Ability to influence global thinking on local technology and foreign technology development programmes – this being the most superior capability.

At which level is Africa seeking participation under the UNFCCC transfer of technology programmes/initiatives? Is there one level which presents the highest immediate benefits and is there one that represents the most strategic long term gains? Should these levels be tackled all at one time? Are there some levels which are dangerous to African long term interests?

How can we build capacity for UNFCCC Transfer of Technology at any of these four levels?

## **1.2 Themes in the Second Analytical Framework**

Technology transfer for any reason is a tactical and strategic game. No one wants to give up technology superiority, as this also relinquishes to the recipient economic and social superiority as well. So there should be no illusion regarding the strong vested interests in technology denial/transfer.

Africa here must build key tactical skills – strategic skills should be mustered in the context of the first framework.

These are:

Skills to analyze and appreciate the climate change and transfer of technology rationale. They must understand why this is important to developing country partner, and they should be able to measure their gains or advantages. It is critical that they can quantify their gains and risks. This is the leading skill at this point in time. It can change policy, it can muster national resources and it can boost public psychology to actively seek and pursue technology transfer under Climate change. This is most important because Africa is docile on matters of technology development and access.

Skills to analyze and market their development/technology requirements/needs: Africa has had a history of putting out five year development plans. These spelt out the national dreams for success and now some of the countries are working on Visions – long terms trajectories of wishes and expectations. But none of these plans ever mature or yield fruit. They only pass with time. Africans wish to prosper but they fail. Their plans perhaps are haphazard and their baselines poorly formulated. The skill to map out a national future path and to combine this social policy (development thought) with environmental policy (climate change technology path) is a critical skill the Africans must muster. The two policies must coincide.

Good public administration of technology transfer including research: Transfer of technology or national technology capability has a lot to do with public administration of factors that influence/retard or enhance technology transfer. This skill is the implementing skill/sense that the African has lacked all along. What are the analytical skills needed? What institutions need strengthening? What resources need to be put in place?

## **2. Essential conditions**

Issues described above set out the main essential conditions for Africa's engagement in meaningful technology transfer. In the absence of these conditions we may be able to purchase and import bits and pieces of devices and to learn how to run them. Perhaps with sufficient bombardment of these devices, we may develop a changed culture and therefore achieve a technology culture. Sufficient bombardment may not be achieved as we lack the financial resources to purchase devices to the level of forming a critical mass.

The process has to be long and steady and it needs deliberate support and initiative from both sides.

### **2.1 Instruments for successful transfer of technology and requisite skills**

The first instrument is for the Africans to recognize that:

- Technology transfer is not about charity or goodwill. It is serious business where the technology developers, regardless of where they are located, need commercial returns for their efforts.
- Technology transfer will be achieved more as a result of their own effort (90% perspiration for 10% inspiration) – they have to take the initiative and make the sacrifices.

No technology transfer will occur without ownership of means of production by the African. Africans are not part of the technology development business and not part of the business where technology is engaged for commercial purposes, then they are end-users or consumers of products made from imported technology. In the mindset of most people, the African public sector is a major target for technology transfer. Another target is social development where novel energy technologies, for example, can be employed using public or donor funds. This is not technology transfer.

The first is marginalization and the second is dependency creation.

What should the African really aim for – this is what capacity-building for climate change technology transfer should contribute to.

### **2.2 Ability to utilize/man/manage imported proprietary hardware**

Key limitations:

Two major complaints about Africans and technology transfer at the receiving end through external investment initiatives are:

- Inadequate infrastructural support for the imported technology. Investments which must encompass the new technology cannot yield expected gains since the support infrastructure is weak. Typical infrastructure are electricity, telecommunications, water and transportation. An investor coming in sees toil upon setting foot on Africa as one cannot effectively communicate, faces long downtimes when there are electricity shortages and operations must stop, cannot get raw materials in on time due to poor road networks. In Zimbabwe, the Post and Telecommunications Corporation only succeeds in putting through 30% of calls attempted. In Zambia, it takes more than three hours to travel a distance of 150 km by road where an hour and a half would be sufficient, airline schedules are at best disregarded. To get a telephone line or electricity connection one must meet incredible bureaucratic hurdles.
- We should treat policy as infrastructure – indeed for a foreign investor it is the basic infrastructure. The one thing any investor will want is predictability of anything that affects their business, returns and cash-flow alike. It does not matter if this is a local patriot or a greedy foreigner. Predictability is essential. Policy in Africa is not predictable. In many cases there is no policy so the officer one is facing across the counter is almighty since the incomer cannot fall back on any stated policy to assert his rights. The simplest form of unpredictability is with regard to energy pricing. An African Development Bank exercise on energy pricing in Africa showed that of all of Africa's energy policy problems, energy pricing remains by far the most critical.

By way of examples we can state the following capacity-building needs as relating to the technology transfer level of ability to absorb and utilize incoming proprietary technology.

- Construction and maintenance of a stable infrastructure to support novel future bound technology.
- Construction and servicing of policies which are robust and predictable.

The first is a matter of public sector investment. This remains the domain of bilateral public sector cooperation. Various approaches have been tried in this sector. The first was state monopoly of critical infrastructural industries, then came privatization and commercialization as well as the concepts of build, operate and transfer etc. This shows genuine effort by Africa to develop the infrastructural requisites for development. But successes remain low.

The second is an issue of trust and self-confidence. Trust in the sense that the African cannot trust the incoming investor because primarily they have no self confidence because they feel they have no control of their local environment and therefore don't understand the result of external intrusion, whatever form it takes. ***This is because they lack one instrument – policy analysis skills.*** Construction and servicing of robust and predictable policies include developing policies on educational curricula for academic and vocational institutions, policy on fuel pricing, policies on entrepreneurship development, policies on investment and profit repatriation with clear and transparent safeguards. Very few African governments have in-house skills to develop and critique such policies.

We did not mention human skills to manage imported hardware. That indeed is not a major problem, Africans are generally well educated and there numerous vocational schools on the continent churning out graduates who remain unemployed. That cannot be a problem.

### **2.3 Comprehensive understanding of imported proprietary technology involving the ability to alter, improve or otherwise retrofit the technology for local conditions or to bypass a problem without recourse to the supplier**

This capability is perhaps the most critical for Africa at the present point in time because it is as unlikely that Africa will develop its own endogenous technology any time soon, and in any case technology will flow across countries regardless of any endogenous capability in developing new technology. Examples from history show that Japan's transition to industrialization benefitted significantly from the second hand approach to technology transfer and capacity-building. This approach could lead to serious problems for Africa as it could create a sink for dead and dying northern technologies. But if a critical mass of ingenuity is developed sufficiently to allow the improvement and retrofitting of these technologies, the approach could work. In any case, Africa cannot avoid being a sink for obsolete technologies in the northern sense. The research and development pressure toward cleaner production systems and the rapid obsolescence we see today in the Information technology sector will ensure a diffusion cycle where Africa will find itself (positively) at the tail end of the cycle. The climate change Research and development pressure could indeed work out well for Africa.

At this level of technology transfer we can identify two key skills Africa could be assisted in building. These are:

- \$ Effective technology intelligence to include technology assessment, dealing with patents and patent laws, development of internet bulleting boards on technology – availability, cost and applications. This is to allow the African development worker, planner, plant designer to know of the options available in first hand and used technologies.
- \$ The second is local engineering skills in process re-engineering, fitting and turning and allied skills. Numerous machine shops in the continent offer services in tool manufacturing and fitting and turning to refurbish old equipment. This skill can be enhanced through training.

### **2.4 Ability to originate technology at all levels, research and development, bench scaling, piloting and commercial transfer**

A survey carried out in Zimbabwe (1984) showed that none of the private companies there conducted any research and development activities or supported any research and development projects in the country, the main reason being that the companies were either too small to maintain a research and development budget or they were subsidiaries of external companies which conducted research and development or product development at home base. Further, even if these companies wanted to support research and development, there were no research and development institutions in the country at that time to absorb the support. A number of countries are now attempting to set up scientific or industrial research and development centers. Zimbabwe has already established one and South Africa has strong capability in this area already. Namibia is investigating options for setting up one. A number of the countries have research councils and are better equipped to conduct research in agriculture and veterinary services.

Industrial research and development is weak or non-existent.

From this segment we can deduce two critical areas of capacity-building:

The first is to build a culture of research and development in existing institutions and to engender the appropriate industry support for research and development. This culture will take a long time to develop but if this develops as an industry from which developers can gain full professional support, useful results could be achieved. Initial linkage with technology-testing organizations in other parts of the world could be facilitated.

This level of capability is expensive to develop and maintain. In any case, it would not be a priority area for Africa at the moment. It must be developed but perhaps with less emphasis than technology transfer and repackaging which can yield ready results.

The second is bombarding Africa with technologies resulting from external research and development through pilot projects. The GEF solar photovoltaic project carried out in Zimbabwe is a typical example of this effort and effect. Today in Zimbabwe, households can on their own place resources in purchasing and installing photovoltaic units. There has been high level bombardment and a critical mass for acceptance has been reached and should be maintained.

The third is market development which includes support for financing mechanism to support the market for results of cleaner technology research. This includes a number of considerations such as:

- \$ Establishing revolving funds
- \$ Enticing commercial banks to support new technology purchases
- \$ Supporting the income base of the end-use groups
- \$ Supporting access to capital so that Africans own businesses involving transferred technologies.

The above activities do not sound like research and development but they mobilize transfer of research and development results and help African keep close to latest innovations.

## **2.5 Ability to influence global thinking on local technology and foreign technology development programmes – this being the most superior capability.**

Research and development is governed by commercial interests of technology development companies. The bulk of this is carried out with support from public funding by nations with an interest in maintaining superior position on the global technology market. The interests of Africa are not in the equation in this regard unless it is seen that certain technologies will gain a market in Africa. Africa's ability to send effective signals to the research and development community is, therefore, critical in determining its ability to influence trends in new technology development. To this effect, Africa can be assisted through:

- \$ Programmes for enhancing participation in global technology development and transfer
- \$ Concerted research on policies on science and technology
- \$ Programmes to engender the passage of the science and technology dialogue from foreign developers and governments in Africa to dialogue with private investors in Africa. This is a critical transition which unfortunately is hampered by the perception that dealing directly with government yields better and bigger results. Sometimes it does but, as indicated already, government deals with matters of



public interest and technology transfer is more effective around private commercial interests.

An important aspect of such a programme will include educating the foreign developer of technology or investor using new technology in an African project that they need a genuine African partner who should be groomed to the level of an effective partner in order to sustain long term gains from an investment opportunity in the continent. The channel for influencing research and development programmes increases significantly where the two commercial partners bring to bear their interest and the interest of their market to bear on those wishing to sell research and development results.

Africa already has areas of keen social and commercial investment interest. Various studies have indicated market sizes for new areas of investment such as household energy and devices for new and renewable sources of energy. Table 1 and 2 show results from studies in Zimbabwe and Zambia. In a number of other SADC countries, Angola, Namibia, Lesotho, South Africa and Malawi, detailed assessments of business opportunities for NRSEs and attending problems of interest to research and development have been identified.

**Table 1: Market share of cooking stoves for 1995, 2010 and 2030**

Area	1995			2010		2030	
	Stove	Number	%	Number	%	Number	%
URBAN	Electric	130732	9	500000	22	1300000	31
	Imp. charcoal	0	-	250000	11	410000	10
	Coal briquette	0	-	100000	4	150000	4
	Charcoal	388785	27	201368	9	262554	5
	Firewood	34559	2	17808	1	19124	1
	Kerosene	8640	1	8904	1	9562	1
RURAL	Electric	0	0	0	-	0	-
	Charcoal	68208	5	116792	5	198576	5
	Firewood	784392	56	1051298	47	1787184	43
	Kerosene	0	0	0	-	0	-
<b>Grand total</b>		1415316	100	2246170	100	4137000	100

Source: Methodological Development, National Mitigation Analysis and Institutional Capacity Building in Zambia – 1998

**Table 2. Projected growth in number of photovoltaic systems in Zimbabwe**

Application	Demand in number of systems				
	1991	1994	1996	2010	Saturation
	2 500	4 500	9 000	40 000	100 000
Business units	70		210	3 000	5 000
Health centers	40		80	150	200
Schools	10		20	150	3 000
Pumping systems	16		141	450	4 000
<b>EST. Total</b>			<b>9 450</b>	<b>43 750</b>	<b>260 000</b>

Detailed assessment on energy use in small scale rural industries in Tanzania, Mozambique and Zimbabwe have shown significant gains that can be made from technology upgrades in rural industries such as fish smoking, brick making and beer brewing. These results show energy efficiency improvements as high as 40% in brick making and over 50% in fish smoking.

As is the case with NRSE devices, business uptake of these options is low. The primary reason is not lack of knowledge but lack of capital to engage in this new business and associated risks.

The risk of novel technologies is always high and Africans do well to be apprehensive and cautious. *Programmes to buy down the initial high costs of entry and the risk associated with new technologies would very significantly see greater diffusion of novel research and development results in Africa. The same applies to risk sharing. The financial and performance risk of introducing cleaner novel technologies passes to the end-user. In some cases, risk also passes to the national governments which must make certain concessions such as tax rebates to prop up the new technology. Mechanisms for sharing the risk with the technology developers, guest countries and the end-use community would reduce fear of loss associated with risk.*

### 3. **Skills to analyse and appreciate the climate change technology transfer rationale**

The above initiatives would set up an appropriate environment for science and technology transfer to Africa in general. That can be achieved much faster in the conducive climate change environment if and only if Africa realizes the relationship between climate change technology operational framework and his development technology imperative. That is if he can build convergence between his own development technology needs, his environmental security needs and the global environmental dilemma and the resulting global quest for environmental technology partnerships.

This condition sets up new opportunities which Africans need to understand and play their role well in order to maximize their benefits. To date, Africans have shown great enthusiasm in terms of participating in the negotiations and related studies on climate change. Most of the countries have signed and ratified the convention and a good number have participated in country studies on climate change with bilateral assistance. These activities, however, have not been converted to any strategic use by Africans. This is for three main reasons:

African governments and investors have not considered the potential of climate change technologies seriously and they have taken only a passing look at the implications of climate change for development. They, therefore, have very little appreciation of how this paradigm can support their development interests.

The present African participation in climate change activities is limited to only a few people and there is little national discussion on the subject such that the potential gains are known only to a few. The few involved still have or appear to have their focus on diplomatic gains in the climate change debate. They have not had time to apply economic instruments to convert their gains in negotiations to economic gains for their constituents.

A mechanism for supporting negotiations with well-studied economic and social position is essential.

The climate change debate including technology transfer associated with it have various hidden gains and implications but the rational is simple. The North want a cheaper way to reduce emissions and Africa offers good ground for doing so. ***Activities to clearly define these two interests and for showing where they merge or compliment would add value to the cooperation environment needed to enhance technology transfer.***

***A catalogue of where Africa's gains lie and how they can be attained would be a useful step in defining a more practical focus for African.***

#### **4. Skills to analyse and market their development/technology requirements/needs.**

Africans are hard pressed to resolve immediate issues of debt and poverty. It is not clear where climate change (which appears novel) can help resolve these urgent problems. No analytical processes have been put in place to clearly indicate where the gains lie and to table areas of gain for consideration.

There are two views about development in Africa. One pits Africa against the environment by projecting Africa as a rural continent where solutions should focus on rural poverty and rural technology needs. The other suggests that Africa wishes to expand in industry and reduce dependency on exporting raw products. The world's research and development programme is not about Africa's rural problems. The real research and development budget far exceeds some of the responses Africa is seeking today and if a transition is not made from the "rural thinking" to a more aggressive path which also includes access to industrial technology, Africa will fall farther behind and become even poorer and more indebted to the north.

A programme to support participation in industrial technology transfer as well as rural technology transfer would broaden the technology transfer arena. ***Activities to package such areas of intervention and participation and to market them to both African stakeholders and vendors of climate change technology*** would enhance Africa's preparedness to participate in climate change technology transfer.

#### **5. Good public administration of technology transfer including research.**

Technology transfer is affected by various instruments of public administration. The key ones include:

##### **5.1 Overall national policy on economic development**

In general African development policies tend to focus on social and infrastructural programmes. Little is achieved in industry. This is because infrastructure is important and that is where Africa's level of development is. But it is also because the public sector which has better access to capital through taxation and donor cooperation works better on large scale infrastructural projects. This has build a mindset that Africa is about government investment and infrastructure building. Technologies which transfer to this sector are docile and yield only long term benefits.

Climate change technologies heading for Africa would be biased toward these sectors or to those social programmes with government and donor support. A

widening of focus to include areas of private investment would yield significant benefits.

## 5.2 Policy on science and technology

In many instances there is no policy on science and technology. Where this is in place, capacity to develop and implement appropriate policy support instruments is limited or absent. The necessary policy instruments would include:

Supportive human development programmes in favor of the preferred technology. In the late 1970s, Nigeria foresaw significant demand for civil engineers to build its new capital, Abuja and posted large numbers of young people to study architecture, construction and allied fields. In Mauritius today, almost everyone is an expert on sugar technology and of late textiles. Mauritius was conscious of the importance of this technology to its survival and guided its manpower development policies appropriately.

It is important that African countries in different circumstances are assisted in developing clear *guidelines or criteria for technological preferences and that international support be provided to enable appropriate policy instrumentation and manpower development. The guidelines should show the preferred technological path, policy instruments for supporting the path and mechanisms for meeting the criteria.*

## 5.3 Ownership of industry

Industry in Africa is owned on the bulk by external majors on the manufacturing and mining side and in some cases in agriculture. The infrastructure side (electricity, coal and petroleum included) are owned mainly by government, although effort toward privatization is evident. Managing technology transitions is therefore, outside the hands of the African majority. It cannot be said therefore, that there is an African culture on how to deal with technological decisions. Government, perhaps through its parastatals which are controlled both by the etiquette of public funds management, and must be slow and cautious. There is no personal gain in making innovative and sometimes risky decisions on technology. In fact there is danger in appearing “so reckless” with public funds. The public sector would, in general, be the last place to look for innovativeness and “absorptivity for new technologies.” Large scale industry is foreign owned and major technological decisions are made elsewhere. Perhaps this could be a vehicle by which to channel innovations to Africa. But by and large, again the African’s opinion here is of no consequence.

The present ownership structure of industry does not enable the African to make radical decisions on technology transfer. *Small scale industries with new entrepreneurs at their helm perhaps offer the best option. Supporting these should be beneficial to any climate change technology transfer initiative.*

## 5.4 National laws on environment

In the introduction of climate change technologies we must expect a fundamental change in development planning and plant level environmental management must be expected. It will be difficult to enforce such change for global benefits only. This is an agreed fact but it still remains apparent that there is much more effort in pressing for the global benefits and very little in terms of local benefits. A parallel programme to country studies on climate change could be developed focusing on the identification and highlighting of the joint benefits to the local social and

economic environment. Present reporting procedures for clean development mechanism do provide for such information but indeed the search for climate change information does not give the necessary depth to the subject.

Once the benefits are clarified, it may turn out that even national environmental regulations (which if weak will not engender any transfer of climate change technologies) can be strengthened for mutual benefit.

## **6. Expressions of African interests to date**

At least three major African meetings have been held to discuss technology transfer or related matters in the past two years. From discussions at these meetings it appears that African interests have focused on:

Ensuring that there is equity in participation in global resources/technology transfer mechanisms.

Aware of its relative disadvantage in accessing the cut throat commercial transfer of resources through investment by the private sector, Africa has sought to include provisions for soft support through “seed funds” or GEF type enabling activities.

Africa has specifically requested (Uncem meeting Nairobi) UNEP to assist with capacity-building for sustainable development and particularly demonstration projects. Areas specifically mentioned include infrastructure, waste management, energy supply, demand side management, industrial processes, transport, land-use, agriculture and livestock. This is a rather exhaustive list – without prioritization. Africans, however, have made clear support to develop sub-regional and regional priorities.

At an African expert meeting on clean development mechanism, Nairobi (1999), some specific capacity- building needs were identified with respect to clean development mechanism but with common application in technology transfer under the UNFCCC. These included:

- Ability to identify requirements for gaining access to TT mechanisms
- Ability to select and develop marketable projects
- Ability to screen projects for national priority interests
- Ability to undertake all stages of the project life cycle and perhaps more importantly,
- Ability to organize project/investment teams locally.

All these capabilities if built, point to a proactive approach by the Africans. And at the end of the day this cannot be done by a large group of people together or by government. This is why the tone of this paper insists on breaking down the operational unit to business interests supported by overall national and international guidelines suggested earlier. It is at the entrepreneurial level that the African, however, fails the most – primarily because they cannot be effectively capitalized to take equity in the process of technology transfer.

### **• Conclusion and recommendations:**

African is well aware of the importance of technology transfer under climate change instruments. It has pressed hard *for conditions which guarantee effective*

*joint benefits* to local interests. It however, lacks the necessary *policy perspective and instruments* to convert any gains they may make in negotiations to actual competitive investment using new technology.

Any programme for supporting Africa would do well to focus on this gap above all else.

From this conclusion we can suggest a few programmes and an institutional focus for the programmes.

After all is said and done, we can mesh all the noise above into three key levels of capacity-building:

- Policy-making and policy analysis, particularly the ability to formulate policy and to analyse its impact on the stated national goals – e.g. sustainable development and technology access;
- Policy instrumentation, particularly creative policy instruments to encourage or discourage certain action;
- Entrepreneurial skills to engage in business that derive from climate change technology transfer,
- Resources to capitalize the African entrepreneur for purposes of enhancing the local absorption base for climate change and technology transfer.

Below is a table showing possible approaches to building capacity in each of these four areas.

<b>Type of skill</b>	<b>Focal Institution</b>	<b>Key activity</b>	<b>Timing</b>
Policy analysis	Government, universities, independent consultants	Training in quantitative policy analysis techniques	Long term, but a busy programme needs to be initiated to evolve an early critical mass
Policy instrumentation	Government, industry, independent consultants	Training in impacts analysis, public policy assessment	Long term, but immediate programmes with focus on climate change and technology transfer
Entrepreneurship	Small scale industries, new business, industry, colleges	Business skills, project definition, risk management, negotiations, partnerships, joint ventures	Long term, but immediate partnerships can be formed
Capitalization	Industry, small scale industries, banks	Seed funding, low cost financing, market support	Immediate until local institutions mature and need is erased.

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