

Sustainable Development and the Clean Development Mechanism: A South African Case Study

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The clean development mechanism (CDM) is often seen as providing the financial benefits and transfers of cutting-edge green technology that enable developing countries to reduce emissions and achieve their sustainable development goals. The process of implementing the mechanism is, however, fraught with challenges. The absence of the United States in the carbon market has induced the low price of certified emissions reductions through the CDM, while host countries desire to ensure the sustainable development benefits of the CDM is likely to result in a complex approval process, which would further increase transaction costs. This article examines the CDM implementation environment in the context of a South African case study. It is argued that a fine balance needs to be struck between the spirit of the CDM, as encapsulated in its mandate to promote sustainable development in host countries, and its economic rationale when host countries approve those projects they deem beneficial.

Keywords: *sustainable development; clean development mechanism; climate change; South Africa*

The Current CDM Regime

The twin objectives of the clean development mechanism (CDM), namely, to help Annex I countries achieve their emissions-reduction commitments and assist non-Annex I countries achieve sustainable development, place it in a unique position vis-à-vis other flexible mechanisms. Although it is based on market forces that stem from the principle of cost-effectiveness, the CDM is expected to balance economic fundamentals against environmental integrity and equity by incorporating the notion of sustainable development as well as involving clean-technology transfers and investment flows from north to south. Thus, from the perspective of non-Annex I countries, the CDM seems to hold promise, with its potential to channel financial flows and transfer cutting-edge greenhouse-gas abatement technology in a sustainable manner if the Kyoto Protocol enters into force.

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Fulfilling the seemingly promising objectives of the CDM, however, is fraught with challenges with the CDM regime having been weakened considerably at the global level. The CDM market has been considerably scaled down because of the allocation of hot air, nonparticipation of the United States, and acceptance of the principle at Bonn, Germany, that the CDM should only be used as a supplement to domestic actions (Olsen & Painuly, 2002). The absence of the United States in the CDM regime has resulted in insufficient demand for certified emissions reductions through the CDM, thereby further lowering the already-low carbon prices. In addition, high transaction costs are likely to be borne through the agreed international CDM approval process, reducing investors' attraction to the CDM even more.

The delivery of sustainable development benefits through the CDM to developing countries also seems to pose a challenge at the national level. As it has been agreed that "it is the host Party's prerogative to confirm whether a clean development mechanism project activity assists it in achieving sustainable development" (United Nations Framework Convention on Climate Change [UNFCCC], 2002, p. 20), heated debates concerning what sustainable development benefits the CDM should bring host countries continue at the national level in the absence of internationally agreed standards for sustainable development. This results in numerous sets of criteria being promoted to assess the social benefits likely to accrue from the mechanism.¹

In the following pages, the issue of sustainable development benefits and the CDM in the context of a case study in South Africa is addressed. Although South Africa is often considered to be in the best position of all African countries to host CDM projects, the country case study shows its limited capacity in terms of an effective institutional framework and an environment conducive to setting one up in South Africa. In particular, stakeholder interviews reveal that developing the approval criteria of CDM projects in South Africa is fraught with challenges, as stakeholders' perceptions are divided regarding what CDM projects should deliver in terms of contributions to sustainable development goals and so diverge from those of potential investors.

Elite interviews were used as a main method of data collection. *Elite* here refers to "people who have particular knowledge and influence on political outcomes which, for the purposes of a given research project, require that they be given individualised treatment in an interview" (Manheim & Rich, 1981).²

1. Several sets of sustainable-development criteria have been put forward by different CDM project developers such as the South South North (SSN), the Start-up Clean Development Mechanism in Africa, Caribbean, and Pacific (ACP) countries (SUSAC) and the Moving to Emission Neutral Development (MEND).

2. For the purposes of this case study, elite interviews appeared to be the most appropriate because the interviewees were required to have specific knowledge of the issues

Climate Change Policy and Key Stakeholders in South Africa

South Africa signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1993, ratified it in August 1997, and acceded to the Kyoto Protocol in June 2001. As a non-Annex I country, it has no commitment to reducing emissions under the Kyoto Protocol and is eligible to host CDM projects. Overall, South Africa's negotiating position is aligned with that of the G77-China bloc,³ the primary concerns of which are economic development and the issue of equity, as perceived by the developed and developing countries.

At the same time, South Africa occupies a unique position in the climate change regime for, although emissions from the African continent are low and expected to remain so for the immediate future, it is the continent's greatest emitter of greenhouse gases, depending as it does on coal for power production (Asamoah as cited in Doppegieter, du Toit, & Theron, 2000).⁴ According to the inventory prepared for the South African national communications report, greenhouse gas emissions in 1994 totaled approximately 380 million tons of carbon dioxide (CO₂) equivalents, or 1.6% of global emissions (World Bank, 2002). The country's 1997 CO₂ emissions placed it 15th in world ranking, with a 1994 per-capita CO₂ emissions rate of 8.5 tons, more than double the global average of 4 tons (Thorne, 2001).

Recognizing the enormous threat that the international community's commitment to a carbon-less economy poses to South Africa's coal-dependent economy, the government is striving to respond to the economic impact of climate change-related activities by formulating an emissions reduction strategy. To that end, in 2000 South Africa launched a country study program reflecting the requirements of the UNFCCC. The mitigation-related study included such aspects as a greenhouse gas emissions inventory, vulnerability, and adaptation; mitigation options; and the process of policy development. It explored the options available between 1999 and 2001, with a view to assisting policy makers develop strategies, and to identifying opportunities to develop and improve efficiency and skills, especially in the sphere of technology transfers.

The study identified seven sectors in which are found most of the mitigation opportunities: electricity, liquid fuels (natural and synthetic gas),

involved, which are very recent, obviating the likelihood that there would be ample documentary evidence.

3. In 1991, the G77 countries—77 developing countries—together with China formed a single negotiating bloc in the climate change regime.

4. South Africa is the world's fifth-largest producer and second-largest exporter of coal. The country's coal exports provide a substantial portion of its revenues, and indigenous coal accounts for approximately 75% of its primary energy needs.

the commercial and residential sector, transport, mining, industry, and agriculture. The greatest mitigation potential was identified in the electricity sector, in which CO₂ could potentially be reduced by some 1,320 million tons during the 2001-2025 period (Thorne, 2001; World Bank, 2002).

The agency leading the promotion of climate change-related activities in South Africa is the Department of Environmental Affairs and Tourism, under which the Directorate of Climate Change and Ozone Layer Protection was created to deal with overall climate change strategy and policy.⁵ In an endeavor to respond to the climate change-related movements in the international community, the Department of Environmental Affairs and Tourism has set up mechanisms to orchestrate climate change-related activities, namely, the National Committee on Climate Change and the Government Committee on Climate Change. The National Committee on Climate Change is a multisectoral advisory body set up in 1996 to advise and support the Department of Environmental Affairs and Tourism. It comprises representatives from central and provincial governments, nongovernmental and community-based organizations, business, mining, labor, and the research community and is responsible for informing stakeholders about climate change-related issues (Thorne, 2001; World Bank, 2002). The Government Committee on Climate Change has been set up specifically to advise the Directorate of Climate Change and Ozone Layer Protection by discussing proposed global climate change projects, including proposals under the CDM and other flexibility mechanisms. The Government Committee on Climate Change equally participates in the National Committee on Climate Change to strengthen the government's position (Department of Environmental Affairs and Tourism, 2003).

The Department of Environmental Affairs and Tourism identified the Department of Minerals and Energy as its main partner in addressing climate change, with energy policy being an important determinant of the country's emissions profile. The Department of Minerals and Energy has begun to look at the impact of implementing Kyoto Protocol commitments on the South African coal market (Interviewee #2, personal communication, see the appendix). The Department of Trade and Industry is also becoming more interested and involved in climate change-related issues, although progress is slow as it appears unable to grasp the overall relevance and role of climate change. It has launched a few initiatives in connection with climate change-related policies at the local and international levels, the first of which was in 2001, to examine the impact of climate change-related policies on the South African economy through the National Economic Development and Labour Council, a tri-

5. A designated national authority (DNA) has yet to be decided because the Department of Environmental Affairs and Tourism and the Department of Minerals and Energy have laid claim to the DNA.

partite (government, labor, and business) body (Thorne, 2001; World Bank, 2002).

A number of industry associations are actively involved in climate change-related issues in South Africa, including the Chamber of Mines and the Chemical and Allied Industry Association. Representing the majority of chemical firms in South Africa, the Chemical and Allied Industry Association has been playing an active role in the National Committee on Climate Change. Contributing 5.3% of the country's GDP, the chemical industry in South Africa accounts for 23% of the manufacturing sector in value terms (Chemical and Allied Industry Association, 1997). A number of activity implemented jointly (AIJ) projects have been carried out in the chemical industry, including a natural-gas conversion and an energy-efficiency project.

One of the most active players in this industry is Sasol Technology (Pty.) Ltd., which is exploring potential CDM project opportunities and, as a first step, in 2001 stated its intention to launch a natural gas-conversion project as a unilateral CDM initiative (Sasol Technology, 2001). The Chamber of Mines, an association representing the mining industry, plays a role in connection with climate change as it informs members of opportunities and challenges arising from the climate change regime. As a member of the National Committee on Climate Change, it has been intimately involved in developing South Africa's climate change-related policy.

Another key industry player in the climate change arena is Eskom, the largest and most significant national energy supplier in South Africa and, hence, the biggest greenhouse gas emitter.⁶ Although it does not have an exclusive right to generate electricity, Eskom has a monopoly in bulk electricity sales (Eberhard & Trollip, 1994). In particular, the country's centralized, supply-oriented energy policy, coupled with Eskom's self-financing capacity, has put the firm in a very powerful position in the energy market. Although the Department of Minerals and Energy is only responsible for electrification policy issues, Eskom has been mandated, by the Electricity Act, No. 41 of 1987, to be responsible for electrification planning. It has been able to provide cheap electricity from the country's abundant coal supplies, thereby serving the government's best interests. In addition, Eskom is known to possess world-class technology in the areas of coal combustion and nuclear energy (Interviewee #2, personal communication, see the appendix).

Despite the growing awareness in civil society of climate change-related issues, its capacity to tackle them appears to be still very limited. In addition, there is a huge capacity gap among nongovernmental organizations (NGOs). Only a handful, particularly those involved with AIJ and Global Environment Facility (GEF) projects, have the capacity to

6. Eskom is state owned but run by a private firm.

engage the issues; most local NGOs have only a limited comprehension of what is involved (Thorne, 2001; World Bank, 2002).⁷

CDM Implementation Environment in South Africa

Successful implementation of the CDM requires an effective institutional framework and an environment conducive thereto in host countries. The limited capacity of developing countries often has been blamed for hindering CDM implementation, and South Africa is no exception. Stakeholders have pointed out its limitations, ranging from a lack of physical and human resources to inefficient governance, as well as a lack of leadership and decision-making procedures at the ministerial level. The fundamental reason for its lack of CDM initiatives, however, appears to be rooted in stakeholders' skepticism concerning the benefits that could result from CDM projects, as well as fear of the CDM's potential impact on its economy and technology market.

Developing the approval criteria for CDM projects is also full of challenges, as stakeholders' perceptions of what the CDM projects should deliver in terms of sustainable development benefits appear to be divided and to diverge from those of potential CDM investors. The difference in views between the two parties is cause for concern on the part of the stakeholders because it implies that the aspirations to achieve sustainable development goals through the CDM might lead only to doom and gloom. This section focuses on stakeholders' perceptions of the CDM's benefits and how their expectations differ from those of potential investors.

Although the government appears to generally support and encourage domestic firms' engagement with the CDM, it remains reluctant to take a clear stand on the mechanism, mainly because of the deep skepticism concerning its principles. South Africa's negotiating position has also played a role in its taking a reactive, rather than proactive, position on the CDM. Because it stresses the minimum impact of its climate change-related commitment on economic growth, its primary focus is on such issues as equity and complementarity.⁸

The 6th Conference of Parties to the UNFCCC witnessed that suspicions regarding the CDM still prevails among most G77 countries. Con-

7. Of those NGOs at the forefront in the context of climate change-related issues, the International Institute for Energy Conservation, the Minerals and Energy Policy Centre, the Earthlife (a local environment NGO), as well as academic institutes, such as the Energy and Development Research Centre, have been developing greenhouse gas-reduction schemes and have begun investigating potential CDM projects in South Africa.

8. The principle of complementarity requires that domestic measures be used as a primary source of greenhouse gas reduction and be supplemented by the use of flexibility mechanisms.

cern was voiced among developing countries, at the introduction of AIJ projects, that advanced nations might use the CDM to exploit all the easy, cheap options, leaving the developing countries with no choice but to tackle the expensive options when it is their turn to take on commitment (Mathy, Hourcade, & Gouvello, 2001). Profound skepticism is also evident among stakeholders, government circles, as well as the public and private sector in South Africa. Thus, a representative of a business association stressed that the business sector in South Africa needs to take a cautious approach to the CDM because it is a highly political and sensitive issue (Interviewee #13, personal communication, see the appendix).

In particular, a number of key private-sector players appear to be alarmed by the introduction of the CDM in South Africa, fearing its potential impact on the coal market as well as domestically developed technology. Thus, because the mining industry has a vested interest in coal, the Chamber of Mines has been striving to ensure that climate change-related initiatives have minimum impact on coal exports. Although the industry concedes that instruments such as the CDM can lead to improved energy efficiency, which is one of its key agendas, it believes that CDM projects such as large-scale gas pipelines or renewable-energy projects may pose a threat to the mining industry (Interviewees #14, #15, and #21, personal communication, see the appendix).

Domestic companies such as Eskom, with its interests in the coal and nuclear-energy sectors and supported by its advanced technology, also appear to be on guard against certain types of technology transfer that might threaten the market for its own technology. Eskom is particularly keen to develop nuclear energy, which employs domestically developed technology, while the renewable-energy sector depends on imported technology. Moreover, Eskom is evaluating the future capacity of renewable energy in an energy facility research project and is involved with a number of renewable-energy projects ranging from wind power to solar home systems (Interviewees #22 and #24, personal communication, see the appendix). While it is seeking out a niche market for its own renewable-energy technology where it can have a competitive advantage (Interviewee #7, personal communication, see the appendix), it may remain reluctant to open the market to clean technology transferred through the CDM. In short, stakeholders' profound skepticism, combined with the potential threat that some key private-sector players perceive the CDM to pose for the domestic coal and technology markets, seem to have contributed to the slow development of CDM projects.

NATIONAL DEBATE ON THE SUSTAINABLE DEVELOPMENT ATTRIBUTES OF THE CDM

According to the fundamental spirit of the CDM, host countries should be enabled to attain their sustainable development goals, to

which end the countries concerned have the right to accept or reject CDM projects based on their development benefits. Such a decision at the negotiating level certainly inflamed national debates on what sustainable development benefits CDM projects must deliver, and what criteria are required for them to be considered appropriate. Continuous consultations with various stakeholders are going on in South Africa through the National Committee on Climate Change forum.

Stakeholder interviews revealed that, overall, stakeholders' views converged on the principal factor: Social benefits of the CDM should be in line with South Africa's integrated-development policies:

Development is to ensure, in one way or another, the upgrading of people's lives and the enhancing of the capacity of certain areas to perform certain functions. In order to do that, integrated policy guidelines that include all development-related policies in South Africa must be incorporated in sustainable-development criteria for CDM projects. (Interviewee #7, personal communication, see the appendix)

The result of the interviews also identified some of the key sustainable-development indicators, which are enshrined in legislation and policy guidelines: principal indicators, environmental benefits, local economic development, and public participation (Table 1).⁹

Stakeholders' views also converged on the fact that South Africa must address sustainable development issues through the principal indicators—equity, job creation, and poverty eradication—to which are linked virtually all legislation in South Africa. One of the pivotal pieces of legislation addressing these issues is the Reconstruction and Development Programme, a government-formulated strategy devised to facilitate the fundamental transformation required to jump from apartheid to a people-centered society. Under the Programme, the government is committed to redistributing resources to redress the inequalities inherited from the days of apartheid and achieve integrated, coherent socioeconomic progress (Ministry in the Office of the President for General Information, 1994).

The Programme comprises a number of programs, one of which aims to meet people's basic needs: jobs, land and agrarian reform, food, housing, water and sanitation facilities, energy supplies, transport, the provision of health care information and facilities, information on environmental concerns, and social welfare and security. For these needs to be met, the infrastructure must be suitably developed, and

9. These indicators were put together based on interviews with 31 stakeholders from various sectors—including the government, industry, and civil society, as well as document analysis.

Table 1
List of Sustainable Development Indicators

<i>Theme</i>	<i>Sustainable Development Indicators</i>
(a) Principal indicators	Equity (empowerment of disadvantaged people) Job creation Poverty eradication
(b) Environmental benefits	Environmental improvement Enforcement of environmental regulations
(c) Local economic development	Rural development (affordable energy) Human resource development (adult basic education; skills development) Sustainability of projects (technology training; provision of basic infrastructure)
(d) Public participation	Empowerment of disadvantaged people Participatory environmental governance Sustainability of projects (through sense of ownership)

Source: Interviews with clean development mechanism stakeholders in South Africa, 2001-2002.

the people encouraged to participate in making decisions concerning infrastructure-related development projects.

The Programme is one of the most comprehensive policies to address the issue of equity between the privileged and the disadvantaged: the urban and rural populations, men and women, and large conglomerates and small- to medium-sized enterprises. Reflecting the country's historical background, it seeks to redress, through a human resources development program, the distorted skills profiles and distribution of resources resulting from past discrimination.

Through a process of consultation and joint policy formulation, the Programme works with formerly disadvantaged groups and small businesses to create jobs. Municipalities, meanwhile, are seeking to eradicate poverty by empowering poor, marginalized communities through their redistribution and development that they link to profitable growth and investment. Furthermore, firms that supply goods and services to these municipalities can be required by them to invest in training, affirmative action, and community development (Ministry for Provincial Affairs and Construction Development, 1998).

In setting the criteria to evaluate the environmental benefits of CDM projects, most of the stakeholders pointed to the National Environment Management Act, which places particular emphasis on integrated environmental management and local environmental sustainability (Ministry of Environmental Affairs and Tourism, 1998). Based on the assump-

tion that ecosystems are all closely interrelated, integrated environmental management requires that an environmental impact assessment be applied to all projects likely to affect the overall environment. With regard to the application of the assessment to CDM projects, however, stakeholders were divided in two groups. Some, particularly those representing industries, argued that streamlined environmental impact assessment can be applied to selective CDM projects, while those from NGOs and the government were of the firm belief that all CDM projects should be subject to assessment. In time, the government expects these CDM projects to improve the enforcement of environmental legislation in South Africa (Interviewee #14, personal communication, see the appendix).

Another sought-after result of CDM projects is the sustainability of local economic development. According to the *White Paper on Local Government* (Ministry for Provincial Affairs and Construction Development, 1998), the principal goals that local government should achieve in pursuit of sustainable development encompass local job creation, training programs for employees (particularly of small businesses), the empowerment of marginalized communities, and the provision of a sufficient supply of affordable energy.

Focusing on rural areas in which there is a high level of poverty, incomes are constrained by economies that are not sufficiently vibrant, the population is sparse, and there is little access to the natural-resource bases to provide rural people with a means of subsistence—which problems are compounded by those related to the legacy of the former homeland system¹⁰—the government has put forward an integrated sustainable rural development strategy, which emphasizes the need to empower poor and marginalized communities by providing guidelines for rural development programs (Ministry in the Office of the President for General Information, 2000).

In this context, many stakeholders strongly supported the use of local workers and the procurement of local goods and services for CDM projects. An expectation was also expressed that community-based CDM projects would provide the necessary training programs and education, as stakeholders stressed the importance of human resources development for building up local economies. One stakeholder interviewed echoed the argument of many:

Local economic development is one of the key development priorities. It covers skills development, promotion of the standard of living and adult

10. The apartheid regime devised a homeland system whereby tenant laborers were replaced by contract laborers; between 1960 and 1982, roughly 3.5 million people—almost one half of whom were indigenous Africans who had lived on White-owned farms—were forcibly removed by the state to homelands, which were densely populated ghettos isolated from economic opportunities. About 700,000 more people were subsequently removed from urban areas declared White.

basic education, a central notion of education policy in South Africa. To this end, employers or job providers are called upon to provide basic education skills to the community and basic infrastructure such as for health. In this respect, CDM project sponsors need to create more sense of ownership in the community. Past experience shows that many projects in rural areas collapsed because of a lack of training and sense of ownership. Thus, whatever technologies come into the community, they should be understood at the local level. (Interviewee #4, personal communication, see the appendix)

Another critical indicator of sustainable development identified by most of stakeholders is public participation, which is embedded in many policies and areas of legislation. The principles of the National Environment and Management Act, for instance, embrace the notion of participatory environmental governance, with a particular emphasis on disadvantaged people, including women and youth (Ministry of Environmental Affairs and Tourism, 1998). The integrated sustainable rural development strategy also recognizes that the participation of local communities in development projects, from start to finish, is critical to project sustainability, encouraging a sense of shared ownership and responsibility among those beneficiaries who also participate in the financing of subprojects. According to the strategy, technical assistance, training, as well as infrastructure should be provided to rural communities, so that they might identify, prepare, and implement their own subprojects (Ministry in the Office of the President for General Information, 2000).

INVESTORS' VIEWS OF THE SUSTAINABLE DEVELOPMENT BENEFITS OF THE CDM

Another critical challenge facing the development of CDM approval criteria in South Africa is to bridge the gap between the stakeholders' perception of CDM sustainable benefits and that of potential CDM investors.¹¹ Although some stakeholders in South Africa expect CDM projects to address a wide range of development issues, investors are inclined to believe that a host country's primary interest is in the financial, rather than social, benefits accruing from CDM projects. Consequently, investors tend to assume that host countries are unlikely to require complex sustainable development criteria for CDM projects because they are competing with other developing countries to attract foreign investment.

11. Because the majority of the stakeholders in South Africa pointed out the Prototype Carbon Fund (PCF) as a potential CDM investor, four private-sector investors that are major participants in the fund were selected for interviews along with Shell International, which is financing and developing a pilot CDM project in South Africa (see the appendix for details of the investors).

Host countries that are ready for the CDM will not apply complicated or strict sustainable development criteria. To do so would mean that the host country does not understand what the CDM is and is not ready for it. When host countries realize that they are competing with one another for CDM investment, they might mediate the complexity of sustainable development criteria. (Interviewee #24, personal communication, see the appendix)

With regard to the list of sustainable development goals outlined by CDM stakeholders in South Africa (Table 1), some of the investors expressed difficulties in delivering such indicators as equity and human resources development. For instance, many investors indicated difficulty in meeting the requirements for addressing the subject of equity by prioritizing disadvantaged people and communities, and engaging with small-scale businesses to create jobs and provide energy-related services, redistribute resources, and develop skills (Table 2).¹²

Some investors particularly stressed that the ability and skills of local employees need to be considered in their employment, rather than any equity-based criteria: "Prioritising disadvantaged groups in job creation, or using local workers depends on their skills and capacity. In addition, targeting disadvantaged people and small businesses in energy services depend on the scale of the project" (Interviewee #29, personal communication, see the appendix).

We get a project in a host country through competing against other foreign companies. Thus, we want the highest-quality workers. If [hiring local workers] is a condition that applies to all investors, so that we are not disadvantaged by hiring additional workers from a particular group, then perhaps we could do that. (Interviewee #30, personal communication, see the appendix)

With regard to such requirements as local employment, the procuring of local goods and services, and the supply of technology training, investors were of the view that the procuring of local goods and services, and the supply of technology training, were easier to deliver than local employment (Table 3). Some investors expressed their willingness to use local goods; however only if they were good quality and compatible with their equipment (Interviewee #27 and #30, personal communication, see the appendix).

Investors were, however, concerned about the requirement that local workers be used, and expressed the caveat that this should depend on the ability of the workers. One investor said that

12. Interviewee #28 argued that any CDM project would have merits similar to sustainable-development goals.

Table 2
Investor Perceptions of Equity-Sustainable Development Link

<i>Indicators of Equity</i>	<i>Investor 1^a</i>	<i>Investor 2^b</i>	<i>Investor 3^c</i>	<i>Investor 4^d</i>
Prioritizing disadvantaged groups in job creation	Quite difficult	Depends on skills/capacity	Not too difficult	Very difficult
Targeting disadvantaged households, communities for provision of affordable energy	Very difficult	Depends on project scale	Not too difficult	Very difficult
Redistribution of resources to disadvantaged people	Very difficult	Depends on project location	Depends on help from government or project partners	Very difficult
Skills development for disadvantaged people	Quite difficult	Very difficult	Not too difficult	Very difficult

Note: Scale of difficulty (escalating): *not difficult, not too difficult, difficult, quite difficult, very difficult*.

a. Interviewee #27.

b. Interviewee #29.

c. Interviewee #30.

d. Interviewee #31.

[The use of local employees] is hard, although it depends on the type of CDM project. If the project involves high technology, which means that it needs highly skilled employees, it might be difficult to use local workers. If it is a large project that requires less specialised staff, then perhaps it is easier. (Interviewee #27, personal communication, see the appendix)

Investors' uneasiness about addressing issues such as equity, human resources development, and use of local employees through the CDM clearly indicates that accommodating such requirements would incur not only high transaction costs, but that there is a limit to the degree to which the sustainable development requirements outlined by the stakeholders can be delivered. The solar home system project, a pilot CDM project to provide solar electricity in rural areas of South Africa, is one example of how the social benefits it can deliver diverge from stakeholders' expectations.

The solar home system project implemented by the Eskom-Shell Solar Home Systems (Pty.) Ltd.,¹³ is a rural electrification undertaking

13. This is a 50-50 joint venture set up by Eskom and Shell Renewable International, a separate entity from Shell Solar Southern Africa, as well as Shell South Africa.

Table 3
Investor Perceptions of the Use of Local Employees, Goods, and Services

<i>Area of Sustainable Development</i>	<i>Investor 1^a</i>	<i>Investor 2^b</i>	<i>Investor 3^c</i>	<i>Investor 4^d</i>
Use of local employees	Difficult	Depends on skills, capacity	Not too difficult	Difficult
Procurement of local goods, services	Not too difficult	Not too difficult	Not too difficult	Depends on transaction costs
Provision of technology training	Not too difficult	Not difficult	Not too difficult	Not too difficult

Note: Scale of difficulty (escalating): *not difficult, not too difficult, difficult, quite difficult, very difficult.*

a. Interviewee #27.

b. Interviewee #29.

c. Interviewee #30.

d. Interviewee #31.

designed to provide solar electricity to replace candles, batteries, and paraffin in these isolated and impoverished rural provinces of South Africa.¹⁴ This joint Eskom-Shell project aims to provide 50,000 households with solar home systems to reduce the amount of greenhouse gas produced by the candles and paraffin burned to provide light, and the car batteries that are regularly recharged to power TV sets (Figure 1).

Shell International developed this undertaking as a CDM pilot project based on the assumption that it could provide development benefits, such as economic development, through the creation of jobs, the payment of taxes, and an increase in labor productivity; environmental protection by delivering a carbon-free source of energy; and social development by delivering electricity to rural areas, encouraging skills development, and reducing migrations from rural to urban areas (Shell International, 2000).¹⁵

14. Since 1998, Eskom-Shell Solar Home Systems (Pty.) Ltd., as part of the country's off-grid program in northwestern Eastern Cape and the southern part of KwaZulu-Natal, has been running the Solar Home System project.

15. According to household surveys, the eight liters of paraffin consumed on average each month are likely to be replaced by electricity from a Solar Home System. Given the current level of energy consumption, it is expected the substitution of solar power for that produced by paraffin will reduce CO₂ emissions by an estimated 230 kilograms (kg) annually. Although the annual amount by which CO₂ emissions are said to be reduced varies depending on the criteria used to measure reductions, it has been calculated at 40 kg for grid-based power supplies. Thus, were the crediting time that applies to the project to be 10 years or 21 years at maximum, CO₂ emissions could decline by between 400 kg and 2,300 kg, or between 840 kg and 4,830 kg. The reduction of emissions is calculated only on the



Figure 1: Solar Home System

The project developer claimed that electricity generated by these systems had boosted small businesses such as chicken farms and local *spaza* shops,¹⁶ and so far had created 160 jobs, mostly for local employees. It was also claimed that access to electricity and better-quality lighting was also contributing to improving people's health at the household level by reducing the amount of indoor smoke, the incidence of fires, and eye-related medical problems. In addition, the availability of electricity in households was seen as possibly enhancing educational opportunities by increasing popular access to news programs on the radio and television (Interviewee #19, personal communication, see the appendix).

Although the above-mentioned benefits can contribute to improving the standard of living of the beneficiaries, the limited energy capacity of the solar home system and infrastructure deficiencies that plague the water supply and sanitation of, and roads giving access to, rural households appear to diminish the system's sustainable development benefits. For instance, one solar home system generates enough electricity to power a 12-volt black-and-white TV set, a radio, and lights for 4 hours a day (Shell International, 2000). Stressing the importance of energy supply to sustainable development, a government representative argued

basis of the amount of CO₂, not other greenhouse gases. For more details, see Cloin (2000) and Ybema, Cloin, Nieuwenhout, Hunt, & Kaufman (2000).

16. *Spaza* is a colloquial term used in South Africa to denote a local shop run by indigenous Africans.

that CDM energy projects must supply affordable and sufficient energy to address wider sustainable development issues.

Energy is an input and engine for development. Energy sources should contribute to other needs of the community, such as access to water, safety, health, telecommunications, and education. Thus, renewable energy should also serve other purposes of sustainable development such as job creation, water provision, and agriculture uses. In this respect, the sustainable development benefits of the Solar Home System project are too limited, since the System only provides lighting and limited electricity. CDM projects should address wider sustainable development issues. (Interviewee #2, personal communication, see the appendix)

The project developer agreed that components such as infrastructure development and affordable energy services could not be delivered because energy generated by the undertaking is very limited and there is virtually no infrastructure (Interviewee #27, personal communication, see the appendix).

Conclusion

Some studies show that CDM projects can have significant benefits in terms of sustainable development, particularly when they involve small-scale projects in the domestic sectors of the least-developed countries, because they free up time and energy for other activities (economic, cultural, and educational), help save money, and improve living conditions (Begg et al., 2000).

However, fulfilling the sustainable development mandate of the CDM is still riddled with complex challenges, including its incremental transaction costs. As the preceding analysis of the South African case study shows, prolonged and conflict-laden national debates on what social benefits might accrue from CDM projects could result in complex domestic approval criteria being drawn up for CDM projects that could, in turn, be perceived by investors as representing additional barriers and risk factors, thereby further diminishing the attractiveness of the CDM. Successful implementation of the CDM in South Africa, thus, requires CDM project-approval criteria that reflect the likelihood of a project being implemented in practice.

Because the CDM requires that projects be given government approval, it is ultimately up to stakeholders in South Africa to decide those projects they consider beneficial. Given the competing interests of the relevant parties, however, some major trade-offs need to be made and a fine balance struck if both economic and social benefits are to accrue from CDM projects.

Appendix

Interviewee Details

The individuals interviewed in connection with this article have been identified below by number to ensure their privacy.

<i>Interviewee Number</i>	<i>Stakeholder Group</i>	<i>Organization</i>
1	Government	Department of Environmental Affairs and Tourism (DEAT) (Directorate Climate Change and Ozone Layer Protection)
2		Department of Minerals and Energy (Energy Planning Department)
3		Department of Minerals and Energy (Electricity Directorate)
4		Department of Minerals and Energy (Renewable Energy Directorate)
5		Department of Trade and Industry (Standards and Environment Directorate)
6	Quango	Eskom
7		Eskom/Technology Service International
8		National Electricity Regulators (NER)
9	Development Bank	Development Bank of Southern Africa
10		World Bank in South Africa
11 and 12	Industry	Prototype Carbon Fund (PCF)
13		Industrial Environmental Forum of Southern Africa
14	CDM Project developer	Chamber of Mines
15		KPMG
16		Eskom-Shell SHS (Pty.) Ltd.
17		Palmer Development Group
18		Rural Area Power Solutions (RAPS) Ltd.
19	NGO	Shell Solar Southern Africa (Pty.) Ltd.
20		South South North/Energy Transformation
21		Minerals and Energy Policy Centre (MEPC)

(continued)

Appendix (continued)

<i>Interviewee Number</i>	<i>Stakeholder Group</i>	<i>Organization</i>
22 and 23		Energy and Development Research Centre (EDRC)
24		Earthlife/a local nongovernmental organization
25 and 26		International Institute for Energy Conservation (IIEC)
27	Investor	Shell International
28	Investor	British Petroleum
29	Investor	Tokyo Electric Power Co.
30	Investor	Mitsubishi Corporation
31	Investor	Mitsui Corporation

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References

- Begg, K., Parkinson, S., Mulugetta, Y., Wilkonson, R., Doig, A., & Anderson, T. (2000). *Initial evaluation of CDM type projects in developing countries* (Final report of DFID project 7305). Guildford, UK: University of Surrey, Centre for Environmental Strategy (CES).
- Chemical and Allied Industry Association. (1997). *Responsible care report 1997*. Johannesburg, South Africa: Author.
- Cloin, J. (2000). *Towards a streamlined CDM process for solar home systems: Case studies in selected countries: Republic of South Africa*. Available at www.ecn.nl/library/reports/2000e/c00110.html
- Department of Environmental Affairs and Tourism. (2003). *Climate change: Responsibility in South Africa*. Unpublished manuscript.
- Doppegieter, J. J., du Toit, J., & Theron, E. (2000). *Energy futures 2000/2001*. Cape Town, Republic of South Africa: University of Stellenbosch, Institute for Future Research.
- Eberhard, A., & Trollip, H. (1994). *Background on the South African energy system*. Cape Town, Republic of South Africa: University of Cape Town, Energy for Development Research Centre (EDRC).
- Manheim, J. B., & Rich, C. R. (1981). *Empirical political analysis: Research methods in political science*. Englewood Cliffs, London: Prentice Hall.
- Mathy, S., Hourcade, J. C., & Gouvello, C. (2001). Clean development mechanism: Leverage for development? *Climate Policy*, 1, 251-268.
- Ministry of Environmental Affairs and Tourism. (1998) *National Environmental Management Act of the Republic of South Africa*. Pretoria: Republic of South Africa: Author.
- Ministry in the Office of the President for General Information. (1994). *White paper on reconstruction and development*. Pretoria, Republic of South Africa: Author.
- Ministry in the Office of the President for General Information. (2000). *Integrated sustainable rural development strategy (ISRDS)*. Available at www.info.gov.za/reports/2000/isrds.pdf
- Ministry for Provincial Affairs and Construction Development. (1998) *White paper on local government*. Pretoria, Republic of South Africa: Author.

- Olsen, K. R., & Painuly, J. P. (2002). The clean development mechanisms: A bane or a boon for developing countries? *International Environmental Agreements: Politics, Law, and Economics*, 2, 237-260.
- Sasol Technology (Pty.) Ltd. (2001). *Sasol natural gas conversion project: Statement of intent regarding registration of the project as a clean development mechanism*. Unpublished manuscript.
- Shell International. (2000). *Shell CDM demonstration project*. Unpublished manuscript.
- Thorne, S. (2001). *The South South North (SSN) Project: Final report for South Africa*. Available at www.SouthSouthNorth.org
- United Nations Framework Convention on Climate Change. (2002). *Report of the Conference of the Parties on its seventh session, held at Marrakech from 29 October to 10 November 2001, Addendum part two: Action taken by the Conference of the Parties, volume 2*. Bonn, Germany: Author.
- World Bank. (2002). *South African national strategy study on the clean development mechanism*. Washington, DC: Author.
- Ybema, J. R., Cloin, J., Nieuwenhout, F. D. J., Hunt, A. C., & Kaufman, S. L. (2000). *Toward a streamlined CDM Process for solar home systems: Emission reductions from implemented systems and development of standardised baselines*. Available at www.ecn.nl/library/reports/2000e/c00109.html

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