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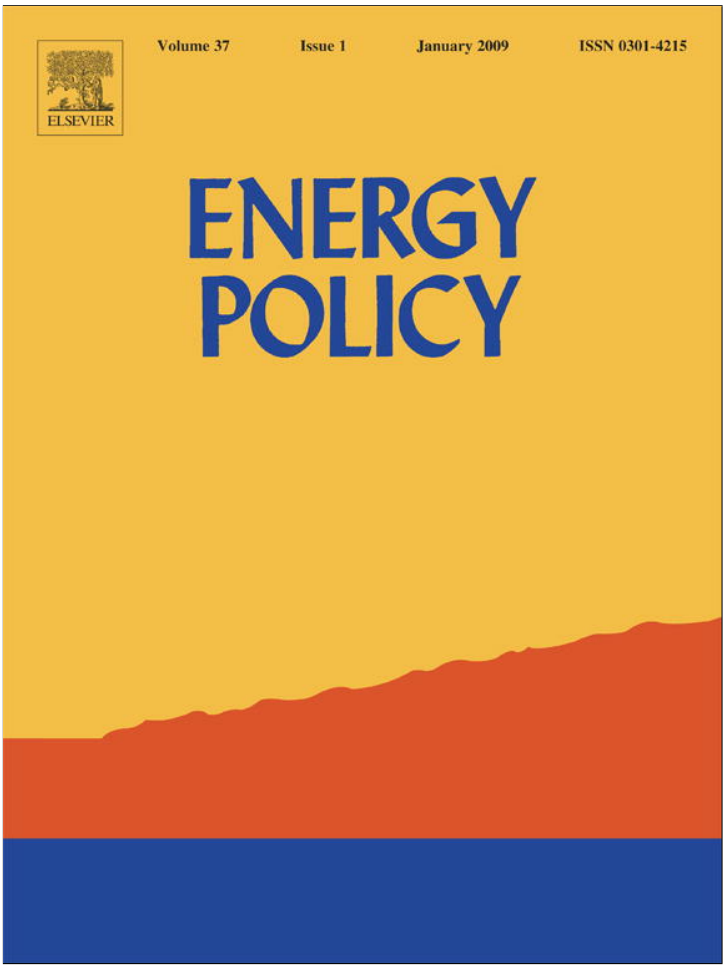

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Development challenges under the Clean Development Mechanism (CDM)—Can renewable energy initiatives be put in place before peak oil?

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ABSTRACT

The "Sustainable Development" aspect of the Clean Development Mechanism (CDM) under the Kyoto Protocol is examined, with regard to its current impact on crucial developmental issues.

The paper discusses the immediate and urgent global concerns of developmental needs, energy and climate change, whilst highlighting their influence on the poor in the developing world. The global responses to address the above concerns in terms of renewable energy technologies, policies and strategies that can be instrumental in addressing the issues are discussed, with main emphasis on the CDM under the Kyoto Protocol. The critical issue of whether the CDM can address poverty alleviation and sustainable development in developing countries is discussed in the context of existing market principles, transparency of the mechanism, economics and the daunting bureaucratic procedures involved.

The paper concludes that the CDM, if suitably modified, can go some way to address sustainable development and alleviate poverty for poor rural areas and not increase emissions by a focus on renewable energy technologies. This result can be achieved as the energy consumption of rural sectors is currently so small relative to developed economies that only small additional renewable energy generation capacities are needed to make a measurable difference.

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1. Global concerns—Urgent and immediate

The need for more and more energy across the globe to fuel economic development has resulted in an exponential growth in usage of fossil fuels since the industrial revolution. This unsustainable drawdown on finite resources is now coming to a head, as resource limits are being reached and the inevitable gap between demand and supply is poised to generate multiple challenges to our modern way of living. These challenges will affect every aspect of civilisation, including transport, resource use, food production, water supply, our lifestyle and the environment. The major global environmental problem caused by this unrestrained growth, is anthropogenic climate change (which is now universally accepted by the scientific community to be due to the addition of large quantities of anthropogenic emissions (CO_2 and other greenhouse gases (GHGs)) into the atmosphere.

The strain on the world economy is beginning to show not only in terms of ever increasing oil and gas prices but the cost of funding these increases are leaking over to the housing market in rich countries causing global financial uncertainty and to the global food supply in poor countries, as high oil prices lead to high grain prices.

Along with the rest of the world, developing and least developed countries face an uncertain energy supply future. But for poor countries this energy future is predicated by a fine balance between growing sufficient food to feed the population and having the funds to import, if local production is not sufficient. While no one can predict how high oil prices will move in the coming years, signs seem to indicate that they will rise until sufficient demand destruction occurs. In general, it is the developing countries that are at most risk, as many of these countries are heavily dependent on imported oil supplies for power generation as well as transport links with the rest of the world.

It is highly likely that the world has exceeded existing resource limits whereby, the consumptive demands of both the rich and the poor collectively exceed the capacity of the global ecosystem to provide. Nevertheless there is some chance that a reallocation of resources and an urgent movement towards renewable energy supply in the poorer countries can bridge the gap between a clearly unsustainable situation and some form of steady-state ecologically manageable equilibrium. We will argue that such a reallocation is more likely to achieve results among the rural poor because they currently use such a small proportion of the world's fossil fuel resources.

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1.1. The developmental concern

As one of many other contemporary issues, sustainable development envisages an argument for the present and future sustenance of mankind and is defined by the Brundtland Commission as: "To meet the needs of the present without compromising the ability of future generations to meet their own needs" (Bruntland, 1987). However, Daly and Townsend (1993) argue strongly against the Bruntland report because it allows for growth of the world economy by a factor of between five and 10 and this level of growth they suggest is impossible, due to resource constraints alone, without even considering the climate change aspect.

Several other authors also suggest that economic growth is the problem and in "Limits to Growth", Meadows et al. (1972) observed over 35 years ago that growth, if continued unabated, must lead to systemic collapse. The recent 30-year update of this series of the Club of Rome reports reinforced the conclusion that present production and consumption patterns are unsustainable. The later report also suggested in hindsight that the past 30 years had been a lost opportunity for changing the way we organise society (Meadows et al., 2004). This conclusion echoes the one made by Catton in his book on "Overshoot" (Catton, 1980). Of immediate interest is the fact that the above authors no longer believe that the concept "sustainable development" is useful and that "survivable development" may be a more appropriate concept today. Catton (1980) in particular suggests that our goal should be to come up with ways to manage the collapse of civilisation so that it does not degenerate into savagery as happened on Easter Island in the 17th century.

In recent years, sustainable development has become a buzz word extraordinaire; suggesting that the rich can maintain advanced lifestyles and the poor can emulate the same, if only we make minor adjustments to appease the environment. The bottom line, however, is that our effect on the environment is underpinned by our resource use per population multiplied by the population and the critical resource in this bottom line is energy.

1.2. The energy concern

With the price of oil in 2008 increasing by a factor of 10 over the last decade, the issue of an affordable and secure energy supply has been dominating policy agendas across the world. Arguments are raging over the timing of an inevitable peak in world oil production, with pessimists suggesting either it has already occurred (Deffeyes, 2005) or it will within a few years (Campbell, 2003). The range suggested by the optimists varies considerable from between 10 and 40 years into the future (Dorian et al., 2006). But it is becoming obvious that the optimists including the IEA are coming to the conclusion that it will probably be sooner rather than later (IEA, 2007).

Coal, the primary fossil resource, which started the industrial revolution, is documented to be the most abundant of the conventional fossil fuels. Conventional thinking, relying on decades old coal resource estimates; suggest that this resource will last for the next 150 years at the current rates of production (Heinberg, 2008). Unfortunately, such predictions may be too optimistic observing the rampant coal consumption trends in emerging economies in Asia (China and India). With China poised to surpass the US as world's largest economy in 2020 (or earlier) and India following the trend to be in third place, both China and India together are estimated to account for 72% of the projected increase in world coal consumption from 120 billion GJ in 2004 to 210 billion GJ in 2030 (EIA, 2007a; EWG, 2007).

Adding to the above concerns, it is also estimated that the peak world production of natural gas may soon follow that of oil. This conclusion is substantiated by the fact that North America (the most exhaustive consumer of natural gas), as well as Russia and Europe already are facing severe supply constraints (Bliss, 2005). The demand for natural gas worldwide paradoxically is suggested to rise from 100 trillion cubic feet in 2004 to 163 trillion cubic feet by 2030 (EIA, 2007b).

Nuclear energy too suffers from resource constraints with around 2.3 million tonnes of uranium already mined and only around 1 million tonnes (based on reasonably assured resources) in the ground and recoverable at a cost up to $130/kg. At current rates of consumption this resource would last around 70 years but if the world decides to increase the number of reactors this resource would go down substantially (EWG, 2006). Clearly the nuclear option is not viable in the long term as a secure source of world energy.

As fate would have it, just as many developing countries are set to make the transition from agricultural societies to industrial societies, peak oil is upon us, threatening to take away the fuel needed for that transition. It has been estimated (IEA, 2007) that the global primary energy demand will increase by 1.6% per year from 2004 to 2030, growing from 11.2 to 17.1 billion tonnes of oil equivalent (Btoe)/annum by 2030; a cumulative increase of more than 50%. About 70% of this projected new energy demand will be to cater to requirements of developing nations in Asia alone (Wood et al., 2007). Importantly, however, such "growth as usual" scenarios do not take into account disruptions due to climate change or resource constraints (peak oil). In the short term, highly volatile changes in prices of fossil fuels, particularly oil and gas are likely. A considerable literature is appearing, which examines the relationship between the world economy and the price of oil (IEA, 2004; Dorian et al., 2006; The Authors, 2006; Lloyd, 2007).

1.3. The population concern and inequality

The ever growing world population (approximately at the rate of 100 million/year), and currently (2008) around 6.8 billion is predicted by some to overshoot the 10 billion mark in 2050, before stabilising around 12 billion (Yoshihisa, 2007). Most of the expected increase in population is projected to take place in the less developed regions of the world, while the population of the more developed regions are predicted to remain mostly stagnant; that is without taking immigration into account (UNDESA, 2007).

Most observers investigating the carrying capacity of the earth, however, suggest that these projected figures are well in excess of the available resources to sustain the population at any level of energy use in excess basic necessities. Currently, energy consumption per capita varies greatly according to level of development, from around 500 W in developing countries to as high as 11.4 kW in the US (WRI, 2006). One consequence of the unequal resource distribution is that today almost 1.6 billion people in developing countries and emerging economies (about one-quarter of the world's population), do not have access to electricity. At present, some 2.5 billion people in the world directly depend on traditional biomass fuels and in-efficient technologies for cooking and heating.

1.4. The climate concern

In addition to global energy concerns, there is a widespread consensus, backed by comprehensive scientific and technical evidence that global climate change is caused by persistent accumulation of atmospheric green house gases (GHGs), which is in turn due to mankind's ever expanding economic activity.

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Hansen (2007) also suggests that the target of stabilising global CO_2 equivalents at 450 ppm is too high and proposes that, to be on the safer side the stabilisation should occur around the 350 ppm mark. But given the situation that the global atmosphere already has attained actual carbon dioxide levels of 383 ppm in 2007 and with unabated pumping of carbon into the atmosphere that's happening at the moment, the target is likely to be extremely difficult to achieve. It is also known that the effects will be especially severe in the developing world, which is least able to cope and adopt in all respects to the situation, with an increased risk of hunger, diseases, flooding and water shortages (IPCC AR4 WG1, 2007; Teske et al., 2007).

The 2007 report of the Inter Governmental Panel on Climate Change (IPCC) (IPCC, 2007) reiterated the initially recognised 2001 documented potential impacts and vulnerability of the poor in developing countries due to climate change. GHG emissions resulting in climate change is likely to affect the poor rural communities including children (UNICEF, 2007) in the developing world who are least able to cope and adapt as they primarily depend on locally available natural resources for their continued existence and have less financial, technical and institutional capacity for adaptation (Gitonga, 2003).

There has been an organised response from the international arena with regard to the climate change issue wherein, the main priority has been mitigating emissions from industrialised nations. In addition, attempts have been made to assimilate the developing countries, especially the larger ones, into the mitigation framework. This is because even though, on a per capita basis the emissions in developing countries will remain far below those of the developed countries, in the future decades the total emissions from developing countries are projected to surpass those of the developed countries (Heller and Shukla, 2003; WEC, 2007).

Thus, it can be implied from the above discussion that, the current developmental problems faced by the third world countries are only beginning, with the worse to come. The emissions constraint may also imply that if the poor are to grow their fossil fuel energy consumption the rich must reduce their fossil energy consumption; a politically insecure conclusion as the rich generally control the access to these energy resources.

2. Potential solutions and associated challenges

As Lloyd (2007) suggested, faced with such seemingly intractable problems, we have to look for solutions no matter how difficult or improbable they may be. Our reliance on the drawdown method of depleting finite fossil fuel reserves can be overcome by replacement with renewable energy from the Sun (Catton, 1980). Hubbert (1949) saw the inevitability of this transition very clearly many decades ago but, despite some international recognition immediately preceding the oil crisis in the 1970s, the world has not moved since towards any concerted goal to replace its reliance on fossil resources with a renewable energy paradigm.

2.1. The renewable energy paradigm

Global environmental and energy security concerns are currently driving penetration of renewable energy alternatives, as these can mitigate the vulnerability of developing economies in energy markets caused by increasing energy requirements and lack of capital (The Authors, 2006).

Let us now come to the big question, can renewable energy replace fossil fuels in terms of delivering the global total primary energy supply? There are several supporting and counter arguments on this issue. According to Cohen (2008), the earth receives 89,000 terrawatts (TW) of solar power every year compared with the present global consumption of 15 TW. What this implies is that by harnessing only 0.0002% of solar energy delivered outside the atmosphere to earth we could solve all our energy problems. But this level of extraction of course is very difficult due to problems discussed below.

Smil (2007) argues that the transition to a non-fossil fuel-based energy supply is far more difficult than generally realised due to five critical factors (the magnitude of transition required, the lower energy density aspects of potential transition fuels, the substantially lower power density of renewable energy extraction, intermittency of resource flows, and uneven distribution of resources) involved in the process. According to him, perhaps the most significant factor hindering the transition is the enormous scale of shift needed, for example, as of today (2008) to replace 100% of fossil fuels we would have to displace coal and other fossil fuel flows of about 15 TW with currently renewable energy (including large hydro) alternatives contributing only a meagre 1 TW. We can imagine the situation with the global energy needs projected in 2050 to be in the range of 25–30 TW! Even though, most of the arguments for transition to non-fossil fuel-based energy are being made in the context of climate change, the sheer extent of the problem in terms of achieving the necessary technical and infrastructural support looks challenging.

Even though Renewable Energy Technologies (RET) vary extensively in their technical and economic development, they offer progressively more attractive options whilst producing little or no recurrent GHGs as they depend on inexhaustible natural energy flows. Some of these technologies are already competitive (Teske et al., 2007). RET economics will further improve as they develop technically, as the price of fossil fuels continues to rise and as their saving of carbon emissions is given a monetary value. The difficulty is to overcome existing reliance of RET device production on fossil fuel inputs before these go into serious decline.

To see the extent of the problem we can do a simple calculation. Taking crystalline silicon photovoltaic systems with a documented energy payback time of around 2 years as a baseline, the world would have to devote around 10% of its present energy consumption each year over a 20-year time span into making the devices to replace 50% of the present fossil-fuelled energy production capacity. This calculation assumes that the energy cost of the balance of system (storage, improved transmission, etc.) will take about as much energy again (i.e. a total energy payback time of 4 years). In 20 years time it is highly likely that the world will only have access to half as much oil and gas as at present and so a 10% decrease will be onerous, on top of that implied by the decline in fossil fuel consumption. This energy consumption would need of course to be accompanied by a similar level of other resource contribution to the construction of renewable energy devices i.e. steel, copper, etc. and orders of magnitude increase in specialized resources i.e. silicon. While some RET such as wind turbines or thin film PV have a much shorter payback time (6–8 months) (AWEA, 2002; NREL, 2004). The added energy cost of providing storage, balance of system and improved transmission for a distributed system, would mean that a total 4 years energy pay back would probably be optimistic. This simple analysis, however, suggests that to find the energy capital for any scenario that allows growth in world energy use over the 20-year time span is increasingly improbable, as the amounts of energy needed for energy capital formation and other resources become implausible.

As Hubbert said in 1949, the closer we approach peak oil the more difficult it will become to transition to a renewable energy future without reducing energy use per capita (Hubbert, 1949). Thus while providing renewable energy for the whole world at

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current developed country rates of use will be problematic, providing an improved energy service using renewable energy for the poor of the developing world will be much more easier as their per capita energy demand is considerably below the world average. We will now turn our attention to this task.

3. The role of the Clean Development Mechanism (CDM)

By the end of last century, the risk of global climate change had started causing sufficient scientific and public concern that eventually resulted in the United Nations drafting and many governments adopting the Framework Convention on Climate Change (UNFCCC). The UNFCCC was opened for signature in June 1992 at the Rio de Janeiro Earth Summit and entered into force on 21 March 1994 and currently has 192 Parties. The Conference of Parties (COP) to the UNFCCC held its first session 1 year later, in 1995 in Berlin and annually thereafter, with COP-13 the most recent session having taken place during December 2007, in Bali, Indonesia. The COP-14 is scheduled to be held during December 2008 in Poznan, Poland (UNFCCC, 2008).

As part of this effort the Kyoto Protocol was finalised in December 1997 in Kyoto, Japan, when Parties to the UNFCCC agreed that developed countries and countries with economies in transition to a market economy were to reduce their overall emissions of six GHGs (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) by at least 5% below 1990 levels between 2008 and 2012, with specific targets varying from country to country. The Protocol entered into force on 16th February 2005 with 175 Parties (countries) having ratified the protocol, including 36 Parties that account for 61.6% of the total carbon dioxide emissions subject to reduction targets. The major abstainers were the USA and Australia but after a recent government change, Australia ratified, just before the Bali summit in December 2007. The Kyoto Protocol targets developed countries and "economies in transition" (Annex I countries) to restrict their GHG emissions during the first commitment period, between 2008 and 2012. Under the flexibility mechanisms of the protocol, Annex I parties can meet their targets by contributing to emissions-reducing projects in developing countries (Non-Annex I countries) through the CDM, in Annex I countries through Joint Implementation (JI) or purchasing Assigned Amount Units (AAU) from other Annex I Parties.

The CDM was offered as a tangible carrot to assist developing countries and at the same time allowing Annex I Parties to implement projects that reduce emissions in any developing country and use the resulting Certified Emission Reductions (CERs) to help meet their own targets. Such credits can be sold or traded to developed countries that have an obligation to reduce GHG emissions below the limits agreed under the Kyoto Protocol. Carbon finance generally means the support provided for a project to purchase GHG emission reductions. These are also commonly called "carbon credits" or emission reduction units.

The CDM was incorporated as one of the key policy initiatives under the UNFCCC, which would pave the way for developing countries to play a role towards less carbon-intensive development. The developed countries were envisaged to assist the developing nations to implement environmentally benign projects through technology transfer or financial investments, for a return of emission reduction units or Certified Emission Reductions (CER). However, as yet, these initiatives have not been shown to bring about the envisaged developmental benefits to the developing nations and especially to the poor in these nations (see later).

As envisaged by the UNFCCC (see later: article 12 of the Kyoto Protocol), CDM projects were designed both to assist the host country to address the issue of climate change mitigation whilst at the same time bringing about sufficient economic growth to take the poor off the poverty line. Having dual and independent objectives like this may have been a poor policy choice as both objectives cannot be maximised at the same time. Nevertheless it is also likely that developing countries would be little interested in any mechanism, which would limit emissions without giving some tangible benefit. However, looking at the current progress and status of CDM projects, the envisaged developmental opportunities appear to be more hypothetical than real and it has become clear that the sustainable development aspect of CDM projects is taking a back seat to the emissions reduction aspect.

This raises the crucial issue of determining or analysing the much debated concept of "Sustainable Development" in context of poor in developing countries especially through CDM (Brown et al., 2004). Again a cynical observer might suggest that the developed countries would worry that economic development in the developing countries may in the long-term increase their levels of CO_2 emissions. Our definition of sustainable development in terms of the CDM is identical to that of Daly and Townsend (1993). These authors give three laws of sustainability, one of which suggests that non-renewable resources, such as fossil fuels and uranium, should only be used if they are utilised to make renewable energy devices so that in the long term the non-renewable energy use would be displaced.

Since the inception of the UNFCCC perhaps more acrimony than cooperation has been generated in the global dimensions of climate change, especially between the developed and developing countries. One of the reasons could be that climate change is yet to become a crucial political concern of development policy of the poorer countries; they have more pressing concerns. In addition, while host countries seek to maximise the benefits of CDM projects in terms of sustainable development, these benefits may not extend to the poor people or the local communities who are in real need of the same. If you are poor and hungry the long-term health of the planet is a far away concern. The acrimony between north and south obviously hides a more fundamental dilemma.

Despite the fact that the bureaucracy and procedures for implementation of CDM projects have evolved after considerable discussion at the international level, of late many concerns are being raised to immediately improve the way in which the mechanism is functioning (Heller and Shukla, 2003; Brown et al., 2004; Sterk and Wittneben, 2006). The CDM has also recently been criticised as not being able to bring about the urgently needed livelihood development benefits to the unprivileged as suggested earlier (Rio, 2007). Even though the CDM was initially designed to provide incentives and innovations for climate change mitigation and to transfer technology and resources necessary for less greenhouse-gas-intensive development, there are several arguments indicating that the high transaction costs involved are making CDM market increasingly favour large, high CER volume projects. Small community-based projects, on the other hand are often not economically viable under the CDM, due to the high transaction costs and complex bureaucratic procedures (Brown et al., 2004; Taiyab, 2006).

Furthermore, it is also the case that the majority of existing and pipeline CDM projects are concentrated in the larger developing countries, the countries with sufficient support infrastructure such as China, India and Brazil, and that the mechanism has virtually bypassed the smaller least developed countries (LDCs) especially in Africa. In such countries, small-scale renewable energy and energy efficiency projects, which are needed to meet the urgent needs of rural people by alleviating poverty and fostering livelihood development, are facing challenges due to the low carbon savings per installation on a household scale (Bhardwaj et al., 2004). It is just plain difficult to save carbon if

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your fossil fuel energy use is currently very low. As mentioned, there are presently no tradable personal carbon allowances, which would make such low carbon emitters potentially wealthy. The carbon is currently being traded by nations and large corporations effectively ensuring that the present inequalities hold (Carbon Equity, 2008; Fawcett, 2005).

The developing countries also have been pushing hard at the international level to stay away from any obligations of emission reductions under the cap-and-trade regime, mainly putting forward the reason of late historical development and existing inequitable energy consumption per capita as a very plausible ethical excuse. The industrialised nations, on the other hand, are acting some what lethargic when it comes to the issue of technology and resource transfer to developing nations as committed under the international climate policy (Heller and Shukla 2003; UNEP & Eco Securities, 2007).

Given the fact that the CDM project pipeline is currently booming with the cumulative number of CERs expected by 2012 (accumulated emission mitigation potential of 2.5 billion tonnes of CO_2 equivalent) (URC, 2008), the initial set of concerns may have been too pessimistic or it may be that the market is responding with what it knows best, that is growth. However, apprehensions about the CDM's contribution to economic development of host countries continue to be valid.

3.1. Clean energy for the developing world

The United Nations Commission on Sustainable Development has called for access to affordable and reliable energy as a requirement for halving poverty by 2015. Rural and remote communities in the developing world are often blessed with abundant natural resources, which can be harnessed using suitable de-centralised renewable energy devices such as PV arrays, wind turbines and micro hydro systems, without having to consider the standard investment in the development of extensive electrical grids. De-centralised solar energy projects, not requiring interconnections indeed appear to be promising in the above context and it is argued by some to be achievable, especially if coupled with significant demand reduction and a lower storage capacity than is currently available on most developed country grids (Cohen, 2008).

In developing countries, small-scale renewable energy projects such as micro hydropower, biomass and solar PV have been successful in providing electricity, heat, motive power and energy for pumping water for millions of poor communities in remotest regions of the world. Developing countries have more than 40% of existing RE capacity including 70% of solar hot water capacity and 45% of bio fuel production. Renewable energy has provided the much needed break for many poor communities in terms of economic development in agriculture, small industry, homes, schools, and community needs. It is estimated that currently 25 million house-holds cook and light their homes with biogas and 2.5 million house-holds use solar lighting systems (REN21, 2008).

In addition, Holm and Mclntosh (2008) notes that improved access to clean modern energy in developing countries are a fundamental step to poverty reduction, and a key to attaining the UN Millennium Development Goals. The authors also take note of the ISES white papers (ISES, 2003, 2006) on renewable energy policy measures and incentives needed to steer a RE transition in the developing world and emphasise that, it is in the direct global interest that the RE transition be immediate, rapid and orderly which requires shouldering the responsibility of national policies and international cooperation.

One of the reasons for the limited success could be that a technology push approach has been commonly used. Here a particular technological solution has been often thrust on the users, without taking into account their needs, the available resources within that area to meet the needs, as well as providing solutions that caused minimal disturbance/adaptation needs to the end users (Kopi, 2005; AusAid, 2001). Added to this problem is the fact the people in rural areas in developing countries are usually poor and cannot afford the costs associated with high capital RE technologies such as PV systems, thereby making such solutions unsustainable without economic development preceding energy access (UNDP, 2006). A cynical observer might suggest that the developed countries may not wish to advance the developing countries as, if and when they do develop, they will only compete for scarce energy and other resources (as is happening currently in India and China).

The UNDP through implementation of various developmental projects globally has observed that community-based energy initiatives offer an important mechanism for expanding access to energy services that aim to improve human development and achieve the Millennium Development Goals (MDG) at both the local and national levels. The case studies from various projects in developing countries demonstrate that MDGs can be confined to a small area through a community-based approach by scaling up micro-level energy initiatives for energy services provision. There is a need for concerted effort between the government, private sector, civil society and community, together with the key policy initiatives to scale up, replicate and mainstream community-based RE projects. The advantage of community-based approaches is that they can result in having significant positive development impacts at the macro-level by influencing national policies and development priorities.

On the other hand, it is likely that access to renewable energy alone will not alleviate poverty, unless it is seen as a development issue rather than energy issue (AusAid, 2001). Renewable energy, at the scale currently being adopted i.e. solar home systems, automatically cannot be assumed to benefit the economies of the rural communities in developing world, but in order to do so, the RE initiative needs to be linked with, or be part of a larger developmental project (e.g. fishing agriculture, local industry handicraft, etc.). In addition, the rural poor may also need additional entrepreneurial skills to benefit fully from the opportunities provided by extended RE projects.

The conclusion is that although a variety of RE technologies are being successfully taken up on a global scale, they can only contribute to development in poor rural communities in the developing world if the technology transfer can be appropriately funded and managed. We will now look to the CDM as a conduit for this transfer.

3.2. Sustainable development through CDM—are we loosing ground?

What has the CDM under Kyoto to do with sustainable development? Article 12 of the Protocol states that "the purpose of the Clean Development Mechanism shall be to assist Parties, not included in Annex I, in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their [Kyoto] commitments".

The assessment of CDM in the so-called "Sustainable Development" perspective, especially in the context of the poor in the developing countries, is of significant importance, as it implies a hope for a better future, which may be difficult to realise in terms of protecting the climate. The modalities and procedures for the CDM do not specifically define what sustainable development means and it has transferred the onus of doing this to the host countries. This responsibility has resulted in the concept being usually being interpreted as economic growth rather than Daly's

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interpretation, which encompasses the possibility of a steady-state economy. In this respect the worry that economic development will lead to a growth in emissions is warranted. Such an increase is currently occurring in China and India with China mooted to overtake the US in gross emissions by 2009 (IEA, 2006). Additionally, the conceptual interpretation has been greatly influenced by the project participants who are mostly from the more influential private and corporate sectors who value economic growth above all else, rather than livelihood development.

The CDM, since its launch in 1997, has been partially able to assist some developed countries (Annex I) in meeting their commitment under Kyoto through mitigating emissions in developing countries. On the other hand, the mechanism has been unequal in that a similar set of benefits have not usually accrued to developing countries in terms of helping them achieve the sustainable development (read as economic growth) that they so desperately need. This omission might be attributed to the limitations discussed above including structural and practical aspects of the mechanism (Ott, 2007).

On the other hand there have been several attempts by social groups and NGO's (The Gold Standard, 2008) to establish standards, which can evaluate the sustainable development benefits of projects under CDM. Even though there is a general consensus on adopting these standards, the challenge of quantifying the actual benefits accrued due to projects at grassroots level has been acting as a major constraint.

3.3. Can the CDM benefit the poor?

A good policy according to Mallon (2006) is one which has a clear unambiguous target. That is, a policy to alleviate poverty should have as its sole goal the alleviation of poverty. The CDM, however, was constructed to have two goals, global atmospheric carbon reduction and sustainable development. Global carbon reduction without the widespread substitution of carbon-free energy technologies (which has not yet occurred) must mean a reduction in global economic activity. Thus, the twin CDM goals are odds with each other and that increased economic activity in the developing countries will lead to overall increases in world emissions unless the developed countries agree to further reduce their emissions to make up for the increases in developing countries

As per the requirements of CDM projects, every potential emission reduction project, which intends to qualify under CDM needs to develop a Project Design Document (PDD). The PDD should clearly demonstrate that the project will create additional GHG emission reductions beyond what would have occurred in its absence, and that the project should support the host country's sustainable development path. The requirement of the PDD falls short in terms of quantifying tangible benefits (sustainable development benefits) making its way down to the marginalised poor communities, probably for reasons discussed above.

It is also evident from the UNFCCC statistics that most of the CDM projects that have been successfully registered with the CDM Executive Board for generating carbon revenues through Certified Emission Reductions (CERs) are owned by, or associated with, large corporate and private sectors or multi-national companies operating in developing countries. It cannot be expected that the benefits generated from these projects will "trickle" their way down to reach the needy and are thus unlikely to create any significant impact in addressing rural poverty issues (Frank, 2007). It fact it seems to be appearing that CDMs might be construed as a money-making mechanism for the industrial conglomerates in developing countries under a so-called disguise of Corporate Social Responsibility (CSR) or as international interest in reversing economic inequality. This sentiment in essence is what Lloyd (2007) argued with regards to the unsuitability of using a market-based trading mechanism to fix faults, which were caused by the market in the first place.

The strong developed country interest in CDMs has resulted in creating a big money-making opportunity from CDM business in the developing world. Of late, there has also been a spate of interest in the CDM by the business sector in developing countries, which has resulted in a mushrooming of the CDM projects pipeline, global consultants, traders, brokers and other CDM commercial interests. As a consequence, the very basis of the CDM is being sidelined or lost and it is not surprising that it has also become known in come circles as the "Corruption" Development Mechanism. In this case the benefits from carbon revenues may be working more as an incentive to already deep-rooted corruption in most of the developing world (CSE, 2005; Green Left, 2006).

It can thus be concluded that CDMs as they exist today with the dubious commitment to "Sustainable Development" will be unable to address the deep-rooted issues of poverty alleviation and socio-economic development in third world countries.

The question then has to be asked: can the principle underlying CDMs, that is the transfer of carbon-free or carbon-reducing energy technologies to developing countries, if configured with unambiguous goals, assist such countries in the times ahead? Times when adaptation to climate change will need to be attended to while simultaneously dealing with shortages in fossil fuel supplies and climbing prices, not only the fuels themselves but for food supplies, fertiliser inputs, other agricultural inputs and resources in general.

In this respect there is a small number of examples of using CDMs to achieve the dual goals of emission reduction and sustainable development (in the sense of Daly and Townsend, 1993). The Pembina Institute's Small Project Facilities in India, Kenya and Nigeria have demonstrated that small community-based CDM projects can in fact deliver local sustainable development benefits while contributing to developed countries efforts to meet their emission reduction targets set under the Kyoto Protocol (Brunt and Knechtel, 2005). However, the experience of project developers participating in the facilities also indicated that there were significant barriers to developing such projects. They suggested that for the dual objectives to be realised the CDM should be specifically targeted and strengthened to support the development of small-scale projects.

It has also been observed that NGOs and community groups in developing countries have contributed cumulatively to climate change abatement (Gitonga, 2003). The GEF study also found that the local communities remained an essential constituent in meeting the mandate and the commitments of industrialised and developing nations under the UNFCCC.

Being mired with several controversies such as being built on the same market principles that have been responsible for economic inequality (Sathaye et al., 2006), being non-transparent, having high transaction costs and a hidden conflict of interests among the stakeholders, it does look like CDM as in its current state needs quite a bit of serious re-structuring.

4. The road ahead—the Bali road map

The UNFCCC believes that a global effort is needed to combat climate change. There is an obvious and urgent need to garner wider participation from developing countries in order to make the current international climate change framework achieve its objectives. The first commitment period of the Kyoto Protocol ends in 2012. Several forums are being organised globally within the UNFCCC auspices and elsewhere wherein a dialogue about post-2012 commitments on emissions reductions and adaptation measures is happening. Some of the proposed recommendations

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include mandatory economy-wide targets, sector-specific emission reduction targets on all countries, bilateral and/or multilateral agreements, voluntarily GHG emission reductions and so on. Most of the developed countries, except for the US, are favouring economy-wide targets during post 2012 negotiations (UNEP & Eco Securities, 2007).

During the recently completed international climate conference in Bali, Indonesia, world governments agreed on a negotiating framework to decide a new global climate policy (to be in place by 2009) for the post-2012 period. According to the "Bali road map", the developed countries are mandated to commit quantified GHG reduction targets, whilst developing countries managed to "get away with" only committing to non-mandatory general mitigation actions. On the other hand, much to the discontent of the environmental lobby (Shamsuddoha and Chowdhury, 2008; Athanasiou, 2008; CSE, 2008), the road map suggested no overall tangible post 2012 emission reduction targets but generally agreed on tackling emissions from deforestation, enhancing technology development and transfer, and on stimulating financial flows to fund all climate change-related action. However, one of the most significant outcomes from the conference and one of the toughest issues discussed at the meeting, included a consensus on new modalities of climate mitigation technology transfer to the developing countries.

It was generally agreed that the current market mechanisms have to be supplemented with appropriate government decisions on the mode of technology transfer in order to get technology disseminated as quickly as possible to all the places where it is needed. The key proposals included a creation of a technology leveraging mechanism and a technology fund (UN, 2007), which basically meshes with the CDM principle of developed countries assisting the developing nations for implementing environmentally benign projects through technology transfer or financial investments for a return of emission reduction units or CERs.

As discussed above, it is quite obvious that CDMs alone cannot mitigate climate change and solve the developmental problems in the third world as they are presently configured. However, it is also important for the developing and emerging economies to realise that they cannot follow the same fossil-fuelled energy-intensive path that the developed world mistakenly took (Catton, 1980; Hubbert, 1949; Rees, 1992; Heller and Shukla, 2003; WWF, 2006).

When we talk about poverty alleviation in developing countries, the rural communities in the developing world constitute the major chunk. Based on the experiences of several funding agencies and action research (Gitonga 2003; Sundberg, 2004; AusAid, 2001; UNDP, 2006; Richards, 2003; Rio, 2007) and not withstanding the general conclusions given above, it has been observed that well-configured, small, community-based RE-CDM projects can have the capability to deliver local sustainable development benefits while contributing to developed countries efforts to meet their emission reduction targets set under the Kyoto Protocol.

It is thus recommended that the future of CDMs in the next commitment period (2012–2016) be targeted and strengthened in the area of small-scale community renewable energy projects with a lower focus on emissions reductions, in lieu of the fact that poor rural communities cannot achieve significant reductions if their current use of fossil fuels is so low. Mechanisms for transferring fossil fuel profits to CDM projects should be sought.

It is clear from an embodied energy argument that implementing clean energy technologies, particularly in developing countries will be expensive in terms of foreign exchange, infrastructure development, human resources, access to land and a multitude of other inputs. But at least the energy levels on a per capita basis are comparatively low.

On the other hand, serious global-level consideration needs to be given to the fact that the world governments, who are negotiating a complex system for mitigating carbon emissions, are still deliberately subsidising fossil fuels, the very root cause of these emissions, in the disguise of development. One has to just have a glimpse of some staggering facts to believe this. Since 2000, at least $61.3 billion of international money has gone towards subsidising oil and gas industry. The World Bank, with a complete turn around on its mission of development of poor, is the single largest multilateral donor for fossil fuel projects ($8 billion since 2000) with more than 80% of the financed oil extraction projects (since 1992) designed for export than alleviating energy poverty (OCI, 2007). If one counts funding for the Iraq war as a further "subsidy" for the US oil and gas industry the numbers go up by several orders of magnitude. These amounts are far in excess of the value of the current CDM pipeline.

As per the IPCC's fourth assessment report, if the world is determined on massive cuts in global emission, there is need to impose an overarching energy tax or a carbon tax as suggested by Lloyd (2007). If CDMs continue, there is a need to ensure only genuine emission mitigating projects qualify through fixing a minimum price for carbon. There is also clearly a need to transfer a proportion of the obscene profits accruing to both multinational oil companies and national oil companies to such technology transfer. This could be made to benefit poorer countries in terms of mobilising the much needed financial incentives for re-structuring technology transfer. But the real catch is, global consensus needs to be reached urgently to achieve the above before we move down the Hubbert curve; as once we pass the peak the cost of transition to renewable energy alternatives will increase dramatically. This increase is of course happening at the present.

What clearly comes out of the discussion to date is that, CDM projects are potentially able to create beneficial and meaningful impacts both in terms of access to energy and poverty alleviation for the poor communities in the developing world. But only if the most crucial issues hindering the realisation of the same are addressed with immediate urgency. The CDM procedures need to be reframed in terms of adopting appropriate sustainability (economic) development standards, which can demonstrate tangible economic developmental benefits to the poor. In addition, the projects under CDM need to be constructed with robust qualifying mechanisms so that they will indeed deliver the envisaged benefits. The host countries needs to be more proactive, less corruptible and more determined (including not bowing down to the business and corporate sector pressures) to only support projects, which can generate not only the much needed carbon revenues to boost the economy but also simultaneously assist in solving the burning survival issues of the poorer communities.

5. Conclusions

Climate change issues appear to be not sufficiently pressing in terms of on the ground issues to capture the sustained attention of developing countries. That is, compared with the more urgent issues such as access to clean water, food security, poverty alleviation and equitable energy access. In addition, the issue of the immediate cost effectiveness of renewable energy technologies in developing countries is often considered marginal compared with the uncertain costs associated with climate change and unsecured energy supplies. However, the global

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agenda of environmental and energy security concerns are currently driving the penetration of renewable energy alternatives. Thus, it makes sense to capture the benefits of this agenda for developing countries. In this regards there is some considerable urgency, as implementing renewable energy projects will become more difficult as we move past peak oil. This urgency is currently being amply illustrated by the current (2008) food crisis in many of the developing countries.

The current formulation of CDM does not appear to be able to deliver both goals of decreased emissions and sustainable development but it is clear that a mechanism to promote clean carbon-free energy for developing countries is a good idea and that a modified CDM could deliver both a reasonable quantity of cost-effective emission reductions and increase the flow of technologies and finance to some developing countries during the second commitment period (2012–2016). For the modified CDM to appreciate its full potential in this regard, several key barriers will need to be overcome, specifically increasing developing country engagement and the ability of such countries to effectively access the carbon market. In addition, targeting the mechanism to small-scale renewable energy supply to rural areas and increasing the overall funding substantially as recommended in Section 3.1.

In particular, small-scale renewable energy projects can help local communities to access energy services and expand livelihood opportunities, thereby collectively contributing to poverty alleviation and increasing their resiliency to climate change. For host countries, such initiatives will also contribute to meeting national development objectives and strengthening developing countries long-term capacity to limit emissions. From an international perspective, a CDM that delivers on its dual objectives will contribute to meeting the priorities of the Millennium Development Goals (MDGs) while contributing to the reduction of global GHG emissions. CDM need to be urgently exploited to deliver these benefits.

It looks like there is still light at the end of tunnel for reaping the sustainable development benefits from CDM provided urgent action is taken to bridge the existing gaps and make good the loopholes. There is a need for immediate further research on strengthening the inter linkages between energy, climate and sustainable development in the context of CDM and to develop a fair and efficient post 2012 framework to tackle the global climate challenge.

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