

## Clean Development Mechanism (CDM) Business in Pakistan: Perceptions and Realities

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### 1. BACKGROUND

Climate change is the biggest challenge human family has ever faced in world history. It has local as well as global impacts and almost all the ethnic groups, communities, and geographical locations are exposed to it [Stern (2006)]. But comparatively developing countries are more exposed to the changes which are taking places due to climate [Stern (2006) and Barker (2008)]. The degree of their exposure which has a number of determinants varies across different regions [Karen, *et al.* (2004)]. Climate experts so far have proposed two broader solutions for this problem; mitigation of climate change by reducing the amount of emitted carbon from atmosphere, and adaptation to climate changes [Tompkins and Adger (2005) and Becken (2005)].

Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) is dealing with climate change mitigation. It is the milestone towards global carbon mitigation efforts [Miriam, *et al.* (2007)]. This protocol has resulted in the establishment of carbon markets by adopting the Clean Development Mechanism (CDM). Pakistan ratified the Kyoto Protocol in 1997 and implemented it in 2005. To ensure the smooth functioning of carbon trading business in Pakistan, CDM related infrastructure was developed. Mainly this includes the establishment of CDM Cell in Pakistan, but a number of private consultancies also came into being with the emergence of this mechanism.

These firms were encouraged to boost the carbon trading business in Pakistan. CDM which is also called Global Environmental Investment particularly facilitates the component of carbon trading in development activities of different scales. It contributes to make these activities feasible, profitable and environmentally sustainable in the longer run. In other words CDM promotes cleaner production and contributes to the reduction of carbon footprint of economic activity. Present study examines the current status of CDM business in Pakistan. Specifically it investigates about the progress of CDM in Pakistan in terms of projects which have been approved by DNA/CDM Cell as well as registered with UNFCCC.

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Moreover, analysis also sheds light on overall position of Pakistan among Annex-II countries in terms of issued CERs. Present study also discusses the hurdles in the way CDM business in Pakistan and its future prospects. Study reveals very interesting findings which highlight that although CDM could not flourish in Pakistan due to a number of technical constraints, but still its position is comparable with other countries. And investors from other countries have also shown their interests in this sector which is positive sign for CDM in Pakistan.

## **2. DATA AND METHODOLOGY**

Present study is based on detailed and comprehensive analysis of CDM business in Pakistan. It evaluates the status of carbon trading and Pakistan's position in regional scenario in the light of overall progress which has been made by different developing countries.

### **2.1. Data**

To analyse the present status of CDM in Pakistan data has been collected from different sources. Mainly data of the present study is based on secondary sources which include CDM Cell, Ministry of Climate Change Pakistan and UNFCCC data base. But in addition to this some of the data has been collected through primary sources. This is based on personal and telephonic interviews of project proponents who have registered their projects and being awarded with CERs, experts of the field, and key informants who hold important positions in some organisations regarding environment.

### **2.2. Methodology**

Study is a policy paper which highlights the present status of the CDM in Pakistan and is based on descriptive analysis. Study has adopted this approach because given the nature of the study and its objectives it was most suitable. Descriptive analysis mainly includes the tables and graphs which presents data and information in such a way that anybody can easily understand the different phenomena related to carbon trading. Purpose of the study is to highlight the present status, key policy issues and possible options to maximise the benefits of carbon trading in Pakistan which is served by adopting the descriptive analysis approach. Moreover, descriptive approach helps in understanding the current progress of the CDM business and position of Pakistan in Annex-II countries.

## **3. MAIN SECTORS OF CDM IN PAKISTAN**

To develop a CDM project in Pakistan, potential areas have been categorised into few major sectors. These sectors includes; energy, solid waste management, industrial processes, and agriculture and forestry. These are the broad areas and every project proponent select one of the suitable area in which a potential CDM

project can be developed. It is worthwhile to mention here that most of the projects from Pakistan are from energy sector. They have been registered with UNFCCC and are being awarded with CERs. Agriculture and forestry is the sector in which no project could have been approved and registered. This is because of the strict criteria and difficult conditions to meet for the registration of the agriculture and forestry projects.

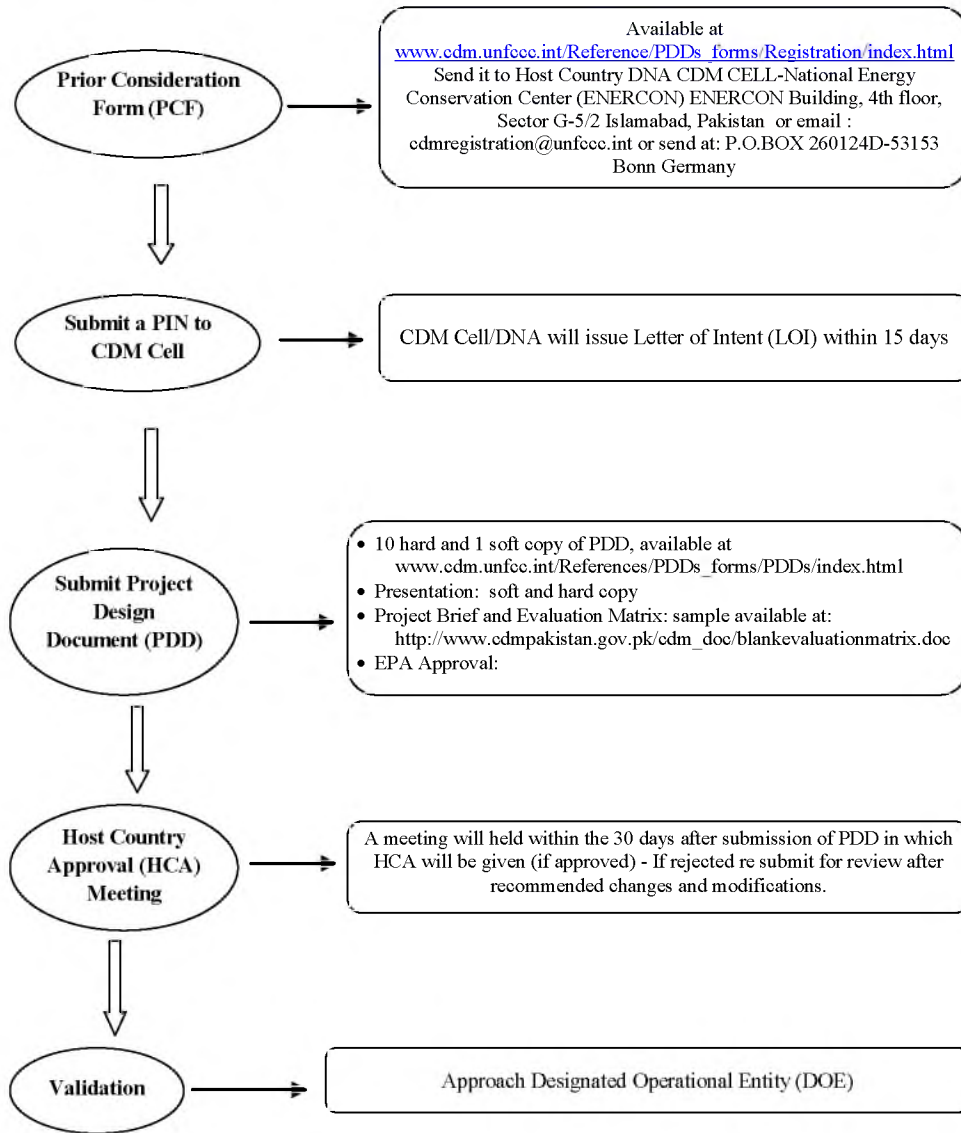
#### **4. HOW TO DEVELOP THE CDM PROJECT?**

There are mainly three steps which proponents need to undertake to develop and submit the project which has CDM component. First of all Project Idea Note (PIN) is prepared which provides the brief summary of overall project activities and its CDM component. This PIN is submitted to CDM Cell/DNA along with the request for Letter of Intent (LOI).<sup>1</sup> CDM experts conduct the preliminary evaluation of the PIN to check whether the recommended project is viable and in line with environmental criteria or not. After examining the document department decides to issue the LOI to the concerned party and ask for submission of complete Project Design Document (PDD). Once the PDD is submitted, it goes through the detailed evaluation by experts. And for every project experts submits the evaluation report which explains the project strengths, weaknesses and assessment of claims made by proponents to the Designated National Authority (DNA) focal person. DNA focal person who also chair the session for approval of the projects, decides about the fate of the projects on the basis of experts' evaluation and overall merit.

In next step DNA focal person gives the directive to CDM staff to call the projects for their oral presentations. For this purpose a Host Country Approval (HCA) meeting is called in which decision about the projects is announced. A panel of field experts is also invited for on spot evaluation which submits their expert opinions regarding each project. In the light of CDM Cell internal evaluation and comments of HCA meeting panel DNA focal person decide to give the approval to projects. The approved projects received the HCA Letter after meeting. Those proponents which cannot qualify the criteria are advised to revise their projects. This is the first step of project registration for CDM and carbon trading. After this is the second stage in which projects are submitted to Designated Operational Entity (DOE) for technical evaluation. DOE is a committee which verifies claims of emission reduction production of a given CDM project.

At third stage CDM project is submitted to UNFCCC for registration and issuance of CERs. After assessing the basic documents and requirements for a project, it is decided that CERs should be granted to the proponent. Following is the CDM project cycle which presents the steps; involved in project registration with UNFCCC for CERs. Left side oval shapes are the steps and right side rectangles are used to give their details.

<sup>1</sup>LOI is a document issued by CDM Cell/ DNA which acknowledge and endorse the intentions of proponents.



## 5. CDM INFRASTRUCTURE IN PAKISTAN

CDM has created many new private firms which are working to assist and promote the CDM business in Pakistan. Some of these companies were already working on environment and encapsulated the CDM aspect into their services portfolio, while few others came into being after the inception of CDM. These companies have developed their expertise in CDM, for instance emission calculation, environmental assessments, project development and offer the services to proponents. Moreover, a number of industrialists and investors have utilised their expertise and initiated different CDM projects.

This has contributed positively and created a buffer zone for economy of Pakistan in many ways. These firms have created jobs for many young and educated people. By this way unemployment has been decreased by engaging many individuals in economic activity. Most of these people are either semi skilled or highly skilled. Emergence of these firms has facilitated the economic transaction in many ways. Moreover, they also played pivotal role in attracting the investment from outside which has further generated the economic activity.

## 6. ROLE OF CDM REVENUE IN PROJECT FEASIBILITY

Development projects of different scale are undertaken in different sectors. In order to make the development activities economically viable and environmentally sustainable CDM component is included which reduces the carbon footprint of these projects. Projects which consider the CDM component reduce the carbon emission by altering the technologies, production processes, usage of less emission intensive fuels etc. Beside emission reduction CDM plays pivotal role in projects feasibility by offering the additional stimulus to implementers in terms of CERs.

Table 1

*CDM and Project Feasibility*

Projects	IRR (Without CDM)	IRR With CDM
1	11.6%	23.9%
2	10%	16%
3	14%	17.1%
4	14%	17%
5	11%	15%
6	10%	13%
7	9%	16%
8	11%	15%
9	12%	16%
10	12%	14.5%

The revenue of CERs helps the project proponents in filling the financing gap which includes debt and equity payment. (Table 1) shows that the value of IRR for the projects without carbon revenue remains far less than those projects which have the incentive of carbon revenue.<sup>2</sup> For a project to be attractive to the private sector, comparatively higher value of IRR is expected which become possible with additional revenue from CDM. Considering the financial barriers and market risks, big projects are not feasible without the support of CDM revenue. It is worthwhile to mention here that this IRR is calculated purely on the basis of benefits which are expected to accrue from project. And it does not include the non tangible social benefits for example the cleanliness of environment and reduction of emissions from atmosphere.

<sup>2</sup>Present study has used the given value of IRR which was provided in the PDDs of the projects registered with UNFCCC. Investigation about the IRR and its calculation is beyond the scope of the study.

## 7. CURRENT STATUS

The current progress of the CDM in Pakistan is very poor and projects registration rate is very slow. This slowness is at both ends; the proponents which are comparatively less informed and has low capacity to unleash the CDM opportunity to its fullest and government which is reluctant to dedicate its efforts. Due to which Pakistan is unable to accrue the total benefits of carbon trading. Presently there are only 48 projects which could be approved by DNA/CDM Cell and received Host Country Approval (HCA Letter). Among those 48 projects, so far only 14 projects were successful in getting registered with UNFCCC and are being awarded with CERs/carbon credits. Rests of the 34 projects are in process of evaluation and registration with UNFCCC.

Table 2

*Current Status of CDM Projects in Pakistan*

Status	No. of Projects
Registered Projects (with UNFCCC)	34
In Process of Registration	14
Total Approved Project ( with DNA/CDM Cell)	48
Applied for Letter of Intent (LOI)	05

## 8. EMISSIONS REDUCTIONS OF THE PROJECTS

There are comparatively very less number of projects from Pakistan which has been registered with CDM Executive Board/UNFCCC. It is worthwhile to mention that most of the registered projects are from energy sector of CDM which is considered as the biggest sector anywhere to produce the emission reduction. Projects which were successful in getting registered with UNFCCC have reduced a significant amount of carbon. And against those carbon reductions, proponents are being awarded with carbon credits (CERs). Below is the table which presents the emission reductions of the projects along with the respective crediting periods.<sup>3</sup> Crediting period of the projects is provided in Project Designed Documents (PDDs), and varies with the project nature, size, and potential of the technologies being installed or used.

Most of the registered projects from Pakistan have either 7 or 10 years of the crediting period. However, some of these projects have renewable crediting periods which are renewed at the ending of first crediting period. This renewal is based on the evaluation of the project activity and in depth investigation of the carbon emission reduction potential which may last for some more years. For this purpose UNFCCC and appointed Designated Operational Entity (DOE) conducts evaluation of the project activities to monitor the carbon emissions. Based on these reckonings renewal of the crediting period is decided. Emission reduction of the projects is based on a number of factors for instance; type of technology, scale of the project, crediting period, and intensity of the emission in status quo or before the implementation of technology etc. Present analysis reveals that the total estimated emission reduction of all the projects which has been provided in their respective PDDs is 13139966 tCO<sub>2</sub>.

<sup>3</sup>Not all emission has been reduced and not all credits have been issued, because the provided emission data is for whole crediting periods which may not be ended.

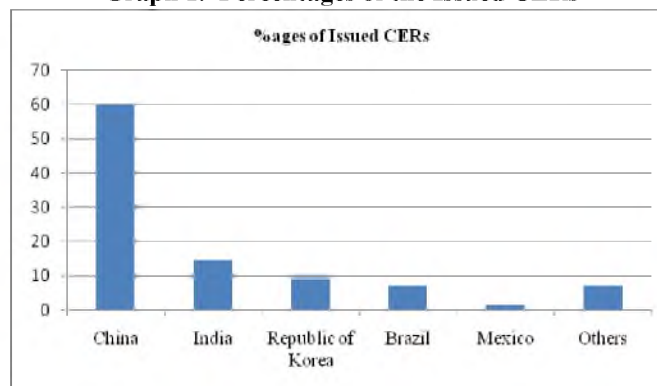
Table 3

*Emission Reductions of the Projects*

Projects	Crediting Period (Years)	Total Emission Reductions (tCO <sub>2</sub> )
1	7	7370000
2	7	163,233
3	7	612,342
4	7	760,801
5	7	249,595
6	7	1,532,916
7	7	78,252
8	10	338,450
9	10	187,030
10	10	214,860
11	10	315,520
12	10	480,600
13	8	836,367
<b>Total</b>		<b>13139966</b>

**9. AN OVERVIEW OF THE ISSUED CERS**

There are a number of the countries which are being benefited by the CDM business in terms of CERs. Study provides the following graph that depicts the overall picture in terms of share of different countries in issued CERs which have been utilised as revenue from carbon trading. Detail of CERs for every country is presented in next section, whereas this section provides the overall information about the major players of game of carbon trading in the town. In terms of percentage, graph shows that the biggest share (60 percent) belongs to China which has accrued maximum benefits out of this opportunity. Being the big producer of emission reduction and CERs, one can expect the influence of China in carbon trading business. India has second big share (15 percent) from the pool of issued CERs but comparing to China's (60 percent) it is very low. Third country in this order is Republic of Korea which has also big share (9 percent) in issued CERs. In overall share of the CERs, Brazil stands at fourth position with a reasonable percentage (7 percent) of issued amount of CERs. Comparing the other countries Mexico has low share of (2 percent) which is at 5<sup>th</sup> position. All the rest of the countries have (7 percent) of the total issued CERs.

**Graph 1. Percentages of the Issued CERS**

Source: (UNFCCC Website August 2012).

## 10. CROSS COUNTRY COMPARISON

There are a number of countries which have participated in carbon trading and earned the CERs against the emission reductions from different CDM projects. However there were only few countries which were able to make use of the opportunity properly. These countries include China and India which have mainly dominated the CDM business. This is attributed to various factors for instance; friendly policies of CDM business and arrangements made by government which includes training of all stakeholders, awareness raising, trainings of concerned staff, and overall facilitation. These were some of the areas where other countries were failed to invest and reap the return of carbon trading.

And as far as Pakistan is concerned, it is at twelfth number which is comparatively satisfactory given that, the total number of participating developing countries (Annex-II) countries is fifty.

Table 4

*List of Countries Wise Issued CERs*

Country	CERs	Country	CERs
China	592,089,725	Nicaragua	751,011
India	145,577,555	Philippines	551,281
Republic of Korea	90,222,590	Costa Rica	520,609
Brazil	71,480,326	Morocco	388,564
Mexico	16,460,218	Cuba	379,663
Chile	9,745,772	Jamaica	259,629
Argentina	9,144,457	Georgia	247,283
Egypt	7,826,474	Sri Lanka	241,812
Viet Nam	6,884,075	Papua New Guinea	215,424
Indonesia	5,240,170	Panama	160,390
South Africa	4,397,154	Nepal	92,278
<u>Pakistan</u>	<u>3,258,705</u>	United Arab Emirates	91,746
Malaysia	3,000,561	United Republic of Tanzania	56,463
Colombia	2,493,726	Dominican Republic	53,308
Peru	1,802,503	Mongolia	51,269
Thailand	1,725,698	Zambia	43,702
Israel	1,567,056	Armenia	41,452
Bolivia	1,420,799	Uruguay	40,613
El Salvador	1,398,331	Fiji	35,550
Ecuador	1,355,751	Uganda	20,095
Guatemala	1,286,427	Iran	18,552
Uzbekistan	1,049,729	Cambodia	10,758
Nigeria	1,015,112	Bangladesh	7,131
Jordan	985,992	Lao People's Republic	2,168
Honduras	773,935	Bhutan	474

Efficiency of CDM business in Pakistan has often been called into question. And present study has also recognised this fact that country could not unleash the total potential of CDM. Since the inception of CDM Cell/DNA in Pakistan it remained in sorry state of affairs. In this regard the role of high ups remained very crucial in determining the efficient functioning of CDM. The sluggishness and delays always remained at government side which is still a serious problem for project proponents. Despite the fact that CDM in Pakistan started very late and constantly facing with a number of technical constraints, it is still in top slot and positioned at 12th number among



the list of Annex-I countries. The current progress of the CDM is attributed to the involvement of private sector which has actively participated in CDM projects registration and earned the revenues. This shows that private sector in Pakistan is vibrant and have the potential to do more in this regard. But there is need to develop the efficient practices and smoothness in statutory procedures at government part.

### 11. PARTICIPATING COUNTRIES IN CDM OF PAKISTAN

Following is the list of the countries which have directly or indirectly participated in CDM activities in Pakistan. These countries have offered their financial as well as technical assistance to the project proponents which have encapsulated the CDM component in their projects. Financial assistance of these partners includes the initial cost of the equipment and technology which was implemented to replicate the old one to reduce the GHG emission and achieve the subsequent fruits in terms of CERs. Whereas technical assistance ranges from project preparation, technologies transfer, investment decision, to effective planning and management of the CDM activity.

Table 5

*CDM Partner Countries of Pakistan*

S. No.	Country Name
1	Japan
2	United Kingdom
3	Ireland
4	Netherland
5	Canada
6	Denmark
7	Italy
8	Finland
9	Sweden
10	Luxemburg
11	Switzerland
12	Austria
13	Norway
14	Spain
15	Belgium
16	Germany

These partner countries invest their efforts to reap the reward of CDM projects in which proponents share the earned revenue with them, against their services and assistance. Countries which participated in CDM activities in Pakistan are the Annex-I countries which finance the GHG emission reduction in developing world (Annex-II countries) through market based mechanism of carbon trading.

### 12. BENEFITS OF CDM

CDM is a market based mechanism that facilitates the carbon trading which is a golden opportunity for developing nations to get benefit of, in terms of revenue generated from CERs. This can be a stimulus for developing economies because it generates the economic activity in many ways e.g. creation of employment and livelihood opportunities for semi skilled and skilled youth, transfer of technology, enhanced production efficiency, cleanliness of environment etc. It is a suitable way of reduction of amount of CO<sub>2</sub> which is being mitigated by financing the mitigation activities.

By adopting this mechanism developed countries, which have dumped the intensive amount of GHGs in natural environment, finances all those development activities in developing countries which have the component of carbon CDM. The benefits of CDM business can be categorised into direct and indirect benefits.

### **12.1. Direct Benefits**

There are several benefits of carbon trading which are being accrued by the parties in developing segment of the world. It is a stimulus for economic activity and ensures sustainable development. The earned revenue is being invested to adopt new technologies and switch to more sustainable and environmental friendly solutions. In addition to environmental cleanliness, carbon trading contributes to energy conservation, increased efficiency of production processes, and minimisation of the intensive use of inputs and scarce resources. With the inception of new projects and development initiatives having the component of CDM, new employment opportunities are created.

It reduces the youth unemployment by engaging the young skilled people in various productive activities. Carbon trading has another important aspect and that is, to increase the pace of technology transfer by offering incentives to efficient production. Due to the attraction of CERs many people have imported and installed new technology which is environmental friendly, energy efficient, time saving, and yield more output which is also the positive outcome of carbon trading.

### **12.2. Indirect Benefits**

In addition to the direct benefits of CDM, there are a number of indirect gains associated with this market based mechanism. For instance; it has increased the level of awareness among international community and made individuals and organisations more sensitised for conservation and protection of environmental resources. CDM has developed the consensus and brought the nations to one agenda of reducing the amount of carbon which has been dumped to natural environment. This consensus is an intangible and indirect benefit of CDM which will have long lasting positive impacts for environment and climate. Furthermore, these measures proved to be very useful in diverting the attention of global community to invest in conservation activity. Due to which huge funding is being made to protect the environment.

## **13. WHY CDM CAN'T FLOURISH IN PAKISTAN? TECHNICAL BARRIERS**

Present study has found that CDM in Pakistan has been engineered by some of the factors of political economy, and it is still the victim of vested interests. Due to which the department (CDM Cell/DNA) could not rightly serve its purpose and remained fail to deliver what it was supposed to deliver. There are various reasons of sluggishness of CDM business in Pakistan. First and foremost thing in this regard was the late conception and start of the CDM activities in Pakistan as compare to other regional countries. Coupled with late start, slow movement in materialising and establishment of CDM Cell/DNA has also contributed to the problem.

This slowness is the construct of a number of determinants for instance; lack of technical skills and capacity of high ups, unfamiliarity and poor understanding of the project's importance, no or less knowledge of gains associated with CDM, unnecessary bureaucratic intervention, corruption, nepotism in hiring the CDM staff, lack of staff capacity building, lack of independence of staff, appointment of non technical people as DNA focal person etc. Secondly, CDM was a new buy and sell and very few people were familiar with this business. Due to lack of information dissemination, awareness about the benefits of carbon trading, and technical knowhow; potential parties could not exploit the opportunity as it was expected at the start.

There are many potential areas and sectors for CDM business which are still untouched and to make use of. In other words, CDM which facilitates carbon trading is more of academic subject with abstract ideas, and for that academia is suitable for its promotion which was not properly utilised to promote it in Pakistan. Instead, it has been neglected due to apathy and selfishness of the high ups and concerned authorities. In this regard role of media was also very crucial to educate the ordinary masses about this opportunity but this institution had low capacity and also not been taken on board.

Thirdly, there were some technical and financial hurdles in the way of projects registration which has created problems for proponents who were willing to initiate the CDM projects. Moreover, some proponents have also faced the problems in development and approval of the projects because there was limited support from concerned organisations. It also is worthwhile to mention here that due to unfavourable economic conditions and security issues, technical experts and investors refrained from coming into Pakistan. Due to lack of inflow of financial and technical resources from abroad large potential of CDM in Pakistan remained untapped.

#### **14. FUTURE PROSPECTS OF CDM IN PAKISTAN**

Analysis has revealed that so far Pakistan cannot properly avail the opportunity of CDM to earn the revenues of CERs and utilising it in a productive ways. This was a new experience and Pakistan should learn from it especially considering the China and India as role models. So far there is complete uncertainty about the future of CDM and a number of agencies and countries are strongly against the extension of Kyoto Protocol. But still many people are optimistic about its extension because it has many stakeholders who have their vested interests in favour of Kyoto's extension. Moreover, there is huge infrastructure of CDM business all over the world which includes the firms, consultancies, experts of environment which are dealing with this business and have their strong lobby in favour of CDM.

Beside this Reducing Emissions from Deforestation and Forest Degradation (REDD) mechanism is also one opportunity which going to replace the forestry component of CDM. And in near future, it will be materialised in all participating countries. In addition to that a number of experts are of the views that even if Kyoto Protocol is not extending the market forces are still there to cater the demand of this virtual trade and to keep this business alive. Based on these presumption and expectations one can say that there is the future of carbon trading and it will remain functioning in some shape, may it be CDM, REDD or some other mechanism.

Considering the chances of extension of Kyoto, study accentuates that there is huge potential for carbon trading in Pakistan. Despite the fact that there are a number of constraints and problems for stakeholders and proponents, they have not given up and still have the interest in CDM to accrue its benefits to its fullest. It is worthwhile to mention that in past, services delivery at government side remains very poor which has seriously hampered the progress of CDM. Moreover, performance of the CDM Cell has also often called into question. And it is expected that in future government's role will be comparatively more proactive and positive.

### 15. POLICY RECOMMENDATIONS

Present study recommends the following policy measures to eradicate the problems encountered to CDM in Pakistan and make use of the opportunity to its fullest.

- (1) Since CDM is a technical subject with a number of abstract ideas, first and foremost thing is to make sure that all stakeholders understand it properly. In this regard government should mobilise all its resources to aware and educate the people by taking academia, experts and media onboard.
- (2) Second recommendation which springs from present study is regarding the capacity building of stakeholders by offering them trainings to develop technical skills. In this regard, a number of international organisations have the expertise which can be utilised.
- (3) Study has also unveiled that potential proponents have been facing difficulties in developing their projects. Present analysis advises to give particular attention to assist the potential proponents in initiating and developing their projects.
- (4) Present analysis also recommends that, there should be zero tolerance for nepotism, corruption, and biasness. In this regard strict rules should be developed and implemented.
- (5) Hiring of efficient staff with relevant skills is very crucial for every organisation. CDM staff should have the desired skills, proper incentives to work, independence, and right working environment which can nurture their skills. By this way staff will be able to deliver the better quality services.
- (6) Appointment of DNA Focal Person is as crucial as the other CDM staff. Because CDM staff has to follow the directives of DNA Focal Person. Present study also recommends that DNA Focal Person should be a technical person with a reasonable understanding of the CDM as a subject.

### REFERENCES

- Barker, Terry (2008) The Economics of Avoiding Dangerous Climate Change: An Editorial Essay on The Stern Review. *Climatic Change* 89, 173–194 DOI 10.1007/s10584-008-9433-x.
- Becken, Susanne (2005) Harmonising Climate Change Adaptation and Mitigation: The Case of Tourist Resorts in Fiji. *Global Environmental Change* 15:4, 381–393.
- Emma, L., W. Tompkins, and Neil Adger (2005) Defining Response Capacity to Enhance Climate Change Policy. *Environmental Science and Policy* 8:6, 562–571.

- Karen, O. Briena, Robin Leichenko, Ulka Kelkar, Henry Venema, Guro Aandahla, Heather Tompkinsa, Akram Javed, Suruchi Bhadwal, Stephan Barg, Lynn Nygaard, and Jennifer Westa (2004) *Global Environmental Change* 14:4, 303–313.
- Miriam, Hinojosa, Chia Chen Cheng, Xianli Zhu, and Jorgen Fenhann (2007) Potential and Barriers for End Use Energy Efficiency Under Programmatic CDM. Capacity Development for the Clean Development Mechanism. (Working Paper No. 3).
- Stern, Nicholas (2006) What is the Economics of Climate Change? *World Economics* 7:2.