

**“Control of Greenhouse Gas emissions through energy-Efficient Building
Technology in West Africa (Cote d’Ivoire-Senegal)”
project UNDP/GEF/RAF93/G32**

FINAL EVALUATION OF THE PROJECT

Final Report

April 2001

Dr Samir AMOUS (chef de la mission d'évaluation)
Mr Arona DIALLO (Consultant Sénégalais)
Mr Bénié ADOU (Consultant Ivoirien)

SUMMARY

	Page
ABBREVIATIONS	3
FOREWORD.....	4
CONCLUSIONS SYNTHESIS	5
RECOMMENDATIONS AND PRACTICAL IMPLEMENTATION	7
1. PROJECT DEVELOPMENT AFTER MID-TERM EVALUATION	12
2. STATE OF OBJECTIVES ACHIEVEMENT, PROJECT RESULTS AND ACTIVITIES.....	16
3. PROJECT IMPACTS.....	21
4. PROJECT OUTCOME	22
5. PROJECT ACTORS INVOLVEMENT	25
6. PROJECT OPENING ON THE WHOLE REGION.....	26
7. BUDGETARY SITUATION	26
ANNEXES	27
ANNEX 1 : TERMS OF REFERENCE OF THE EVALUATION MISSION	28
ANNEX 2 : EXECUTION OF THE MISSION AND PERSONS MET	37
ANNEX 3 : MISSION'S ASSESSMENT REGARDING THE ACTIVITIES AND OUTPUTS ACHIEVED	40
ANNEX 3.1 - Qualitative assessment	41
ANNEX 3.2 - Quantitative assessment	53
ANNEX 4 : BUDGETARY STATUS AS OF 23 FEBRUARY 2001.....	55
ANNEX 5 : SYNTHESIS OF APPRECIATIONS RELATED TO THE DOCUMENTS PRODUCED BY THE PROJECT	58
ANNEX 5.1 - Documents produced in Senegal.....	59
ANNEX 5.2 - Documents produced in Côte d'ivoire	67
ANNEX 5.3 - Documents produced in common by both countries	75
ANNEX 6 - Project Evaluation Information Sheet	78

ABBREVIATIONS

AIJ	Activities Implemented Jointly
BLECE	Bulletin de Liaison Energie-Construction-Environnement
BNEDT	Bureau National d'Etudes Techniques et de Développement (Côte d'Ivoire)
CCEE	Comités Consultatifs d'Exploitation Energétique
CDM	Clean Development Mechanism
CNS	National Monitoring Committee
CTN	National Technical Adviser
CTR	Régional Technical Adviser
DSM	Demand Side Management
EMO	Project Implementation Team
ESCO	Energy Services Company
GEF	Global Environment Facility
MCP	Least-Cost Planning
TPR	TriPartite Review
PRODOC	Project Document
UNOPS	United Nations Office for Project Services

FOREWORD

This document presents the main findings, conclusions and recommendations of the final evaluation mission related to the UNDP / GEF / RAF /93/G32 project entitled : **“Control of Greenhouse Gas emissions through energy-Efficient Building Technology in West Africa”**.

It covers the whole items included in the terms of reference of the mission (Annex I). Along with the evaluation of all project outcome and activities, this document presents recommendations directed to all the process participants in the two concerned countries, as well as to the UNDP-GEF with the particular intent to possibly allow the replication of the experience in the other countries of the region. Last, a **Project Evaluation Information Sheet** is enclosed with annex 6 to the present document, in conformity with UNDP evaluation requirement .

This final evaluation mission has been executed between February 20 and March 3rd 2001 . It involved three independent consultants, Dr Samir Amous (Team Leader), Mr. Bénéé ADOU (Ivorian consultant) and Mr. Arona DIALLO (Senegalese Consultant) .

The mission took place in two stages :

- A First stage at Dakar (February 20-24) to evaluate project results in Senegal .
- A second stage at Abidjan (February 25 – March 3rd) to evaluate the project results at the Côte d’Ivoire and regional levels .

The mission members do express their thanks to Senegal and Côte d’Ivoire Authorities , to the UNDP-GEF, the UNOPS and the project managers for their confidence, their availability and their support to ensure the mission success. They congratulate all the representatives of these institutions for their open mind and wisdom .

In both countries, the mission have had the great honor to meet political decision makers at the highest level, which was mostly gratifying for the Evaluation team members.

Moreover it offered them the opportunity to emphasize the stakes involved by the project and prompt the Authorities to take in charge the process generated by the project and ensure its sustainability. They pointed out that process perpetuation is a primary criterion when it comes to evaluate the project results either by the GEF or by the countries institutions .

Meeting decision makers in both countries has also been a hopeful sign that the mission recommendations would be handed to the highest decisional levels in both states .

CONCLUSIONS SYNTHESIS

0.1 This section synthetically presents the main conclusions made by the evaluation team after their mission in both countries . These conclusions are gathered around the following features :

- Project results, and anticipated outputs and objectives realization .
- Project prospects in the short term .
- Process sustainability and long term prospects.

0.2 As to the project results, the evaluation mission corroborate that they have reached very significant levels in all fields. The project has actually allowed the accumulation of a very rich capital of knowledge which may, in the long term, lay a real basis for the improvement of energy efficiency in buildings in both countries, which would lead to a significant abatement of greenhouse gas emissions.

0.3 Overall, the project produced more than 250 documents among which about a hundred were issued on various technical subjects . Some of them are related to the formulation of new regulation texts, ready for validation and promulgation. Also, more than 120 energy audits were produced as well as about 25 training reports . Most of these documents were delivered to almost all the actors involved in the project. Some essential documents were widely circulated to reach every operator concerned by the process in both countries.

0.4 Besides, the project undoubtedly allowed a significant enhancement of both countries capabilities in the field of energy efficiency in the building sector.

That will warrant a global technical capability for these countries, firstly to handle the homologation of regulation texts, their promulgation and their implementation, secondly to cope with the retrofitting of existing buildings.

By means of exchanges, training and information workshops, dozens of experts were able to strengthen their capacities to deal with the various issues of energy efficiency in buildings and hundreds of people were reached by the project activities .

0.5 In addition to the capacity reinforcement of the leading professionals involved in the project , about 25 graduate students and two postgraduates were supported and helped by the project , which contributed to promote the motivation and the training levels among university circles on the subject of energy efficiency in buildings.

0.6 The project offered numerous exchange opportunities, within each country and between the two countries , particularly through the TPR meetings and the two CNS. It did so even at the whole region level, where resources allowed that.

The regional project had a primordial contribution in reinforcing the relations between the experts and decision makers of the two countries .

The evaluation mission members are convinced that the regional approach was a most judicious choice for that proper project and it should be promoted in the future for similar processes.

0.7 Since the replication of such an experience is one of the main GEF criteria to support the project, it is obvious that the technical capabilities built by the project can be capitalized on to extend the process to the other countries of the region.

Thus the expertise developed in the two countries, may be intensively used by other countries, allowing to find out ambitious objectives aimed at reducing greenhouse gas emissions rapidly and at acceptable costs for the countries themselves as well as for the international community.

0.8 As for concrete actions , the project launched 3 retrofitting operations .

- Retrofitting of the air conditioning plant of the “Hotel Meridien” (Dakar);
- Retrofitting of the air conditioning plant of the “POSTEL 2001” building (Abidjan);
- Retrofitting of the lighting equipment of the “Assemblée Nationale building” (Dakar, the Parliament).

0.9 The retrofitting of the air conditioning equipment of the “Hotel Meridien” has already been technically completed. But this operation needs to be adequately monitored, so as to bring out lessons learnt and communicate its conclusions in accordance with the project objectives .

0.10 The retrofitting of the air conditioning equipment of the POSTEL 2001 building is being completed. According to the operation managers, the equipment setting will follow immediately. As for the Hotel Meridien, this operation has to be monitored so as to bring out the conclusions and communicate them in conformity with the project requirements.

0.11 The retrofitting of the lighting equipment of the Assemblée Nationale of Senegal, Dakar, is still at its initial stage , with a limited number of actions achieved , because the project managers decided to focus their efforts on the other two operations (Hotel Meridien, Dakar , and POSTEL 2001 Abidjan).

As these operations have been completed, it is now necessary to achieve the Assemblée Nationale operation in time in order to bring out its findings and communicate its conclusions.

0.12 Beside the undeniable project outcome, it is also important to stress some weaknesses that may considerably curtail the project outputs and even jeopardize them.

0.13 **First**, and primarily, an essential condition to the project success seems not to have been fulfilled, yet. Throughout their discussions with the main process actors in both countries, the evaluation team members had some doubts about the sustainability of the process generated by the project. Despite the real and obvious motivation of the decision makers, in both countries, to make the process survive, the evaluation mission think that the authorities of both countries have underestimated the efforts to be made long before the project completion, as to secure the sustainability of the process.¹

These efforts should concretely render the authorities motivations into a number of urgent and tangible actions .

0.14 Of course the evaluation mission are aware that, in both countries , the supplementary efforts to ensure the process perpetuation may have been hindered by factors that are external to the project, particularly those related to the political changes , even political turmoil in Côte d’Ivoire. Nevertheless, the evaluation mission stress the point, because the failure in ensuring the process sustainability may jeopardize the project outcome and get its benefits lost.

It is particularly detrimental to both countries, to the GEF and the UNDP whose involvement is justified by warranted perpetuation of the project fallout.

¹ This weakness had already been identified by the mid-term evaluation, and important recommendations had been formulated by the evaluation mission at that time.

0.15 **Second**, the evaluation mission noticed that the project failed to produce solid projects portfolios fit to capture Funding Agencies attention and interest in order to involve them in projects financing .

Very few initiatives were taken towards the potential Funding Agencies, if we except the demonstrative program of 5 building retrofitting in Senegal to be performed within AII operations and for which negotiations with the Netherlands Government are proceeding .

0.16 It must be underlined that projects portfolios are among the most important results expected from the whole project . Their lacking will considerably curtail its impact . Fortunately , the project has enough information at hand and a good knowledge capital that enable it to produce very promising projects portfolios that will be welcomed by Funding Agencies at all levels , local , regional and international ones .

0.17 **Third**, the evaluation mission acknowledge that the project convened a great number of meetings , helped numerous activities and tried to reach all the operators interested in building energy efficiency process. So doing, the project promoted a valuable sensibilizing action . But the evaluation mission would draw the attention to the pioneering character of the project initiatives and to the important hindrances that prevent energy efficiency standards to be implanted in the building behaviors and practices.

The great inertia of the building sector calls for a communication action based on permanent media campaigns .

Briefly , the communication action taken by the project was insufficient as it has reached only a little part of the targeted actors , not enough to ensure the process Sustainability .

RECOMMENDATIONS AND PRACTICAL IMPLEMENTATION

0.18 This section presents a set of recommendations formulated by the evaluation team after their visit to both countries . As these recommendations are to be implemented immediately, they are accompanied by an indication of the operational modalities of their implementation. Also, all the recommendations directed to the project managers are formulated in such realistic way, that it adequately takes the limits imposed by the budgetary resources and the timing schedule proposed here after, into account.

□ Project Completion

0.19 The project completion was programmed for the end of march 2001 . From all accounts, the evaluation mission think it possible **to improve the project outcome significantly**, if some measures are taken. These measures don't entail additional activities, they only aim to exploit the project available results.

0.20 It's the evaluation view that there is no way to undertake these measures – **absolutely essential to the project success** - within the deadlines mentioned above. So, the evaluation mission recommends to postpone the project closing to the end of June 2001. However, this prolongation must be linked to the effective pledge of both countries Authorities to implement the **first group of measures** mentioned hereafter (Para. 0.21 to 0.30).

□ Recommendations directed at both countries Authorities

0.21 **The first group of measures** must be taken by the Authorities of both countries. They should immediately undertake the necessary consultations in order to get in charge of the project outcome and ensure the process sustainability.

0.22 The evaluation mission recommends that, **in each country**, a Small Action-Committee be set with the participation of the following actors :

- A representative of the Republic Presidency;
- Main representatives of the concerned ministries (environment, energy , building and finance);
- The CNS President;
- The National Technical Adviser.

0.23 We recall here that the evaluation mission had the opportunity to meet high-level representatives of the republic Presidency in both countries. Those were the Technical Advisor of the President of the Republic of Senegal and the General Secretary of the Republic Presidency of Côte d’Ivoire. The motivation expressed by these high officials, who were ready to invest their proper efforts in the process, is an important warrant to its sustainability. This motivation must convert into actions that ensure this process perpetuation.

0.24 The action Committees will take the necessary measures to settle the process definitely and secure an adequate handover between the project and the Authorities. For that purpose the Action Committees will take all the relevant actions. It will be necessary for the Authorities in each country to: (i) Outline the institutional structure that will support the process and nominate the Authority which will follow it up; (ii) Adequately take full charge of the results produced by the project, create a web site dedicated to energy efficiency in buildings and update it;² (iii) Draw the regulation texts, promulgate and enforce them; (iv) Set up the suitable framework for their enforcement, i.e. training, communication, awareness raising, monitoring, updating, etc.; (v) Ensure a satisfactory transfer of the project results, available material and existing board.

0.25 Beside these activities , the Action Committee may undertake a large communication campaign through the leading media.³

0.26 As for the training of process actors, it must target all those who are interested in building energy efficiency. Beyond the architects and the administration officers bound to scrutinize the building permission demands, the training program should also target the engineers, consultants, promoters, entrepreneurs, material importers and distributors, administration officers in charge of financial advantages and facilities granted for energy saving materials, i.e. those of the Customs an Finance departments.

Financing those training programs can be possible through the existing national plans of professional training .

0.27 Besides , the laboratories of the polytechnic Institutes involved in the new standards elaboration should introduce specific courses on the energy efficiency in buildings. It is also recommended to encourage research development in the matter, particularly by supporting finals reports and doctorate thesis related to the subject .

² In a first step, this site will harbor the results produced by the project, information on process evolution, the existing regulations and standards , the on-going operations, the leading actors addresses ... etc .For the moment the UNOPS granted the project the possibility to harbor its outcome in UNOPS Web site in New York for a transitory period .

³ It must be noticed that some actions are ongoing, for instance a documentary film is being completed by Senegal project. It will be watched on T.V presently. The Côte d’Ivoire CNS President is preparing a series of documents for the T.V and at least one will deal with energy efficiency in buildings.

0.28 Both countries should set up a permanent process to follow up the building retrofitting operations, In a first time, they will follow and evaluate the ongoing 3 retrofitting operations. The conclusions will be communicated to the UNDP Office in the two countries.

0.29 The two countries should adequately follow up the fund raising operations related to the projects portfolios mentioned here after. Once the funds are granted , the implementation of the retrofitting operations should be followed up an evaluated to ensure their success.

Also, the Côte d'Ivoire Authorities should permanently support the EECC (Energy Exploitation Consultative Committees) and help to perpetuate their network . The Senegalese Administration should promote the creation of such building energy management committees and help them set a sustainable network .

0.30 Eventually, the Authorities in both countries should set an example to the private sector by systematically committing themselves to comply with the new energy efficiency rules either in existing buildings or in those to be built. They should also contribute to create a sound sector dealing with building energy efficiency . For that purpose they should encourage the experts, architects, consultants , engineers , importers and distributors , not only by creating a critical building market, through the public works , but also by setting incentive mechanisms, such as tax and customs exemptions , fiscal and other specific advantages .

□ **Recommendations directed at the project**

0.31 **The second group of measures** is addressed to the remaining project staff. Their implementation is crucial to obtain the results anticipated by the project .

0.32 First of all it is to be mentioned that the remaining operations budget amounts to US \$ 120,000 equivalent to CFA 80 million . Out of this amount CFA 31 million are destined to start the retrofitting of the Assemblée Nationale of Senegal building, and CFA 10 million to hold the last TPR. Consequently , about CFA 40 million will be available to achieve the program within the end of June 2001, and this is quite a sufficient amount.

0.33 The EMO should remain in charge in the form of reduced teams. In Côte d'Ivoire, the National (and Regional) Coordinator, Dr Mamadou KONE, should remain in the project track despite his new responsibilities in the BNEDT. Above all, he should help in the actuation of the first measure, i.e. the set up of the Action Committee. He should also ensure the minimum follow up of the consultants' works that will be launched and remain in connection with Senegal NTC. To fulfill these tasks, Dr Mamadou KONE will need about one day a week until the end of June 2001.

0.34 Because of the new role of the Regional Technical Coordinator inside the BNEDT, it is possible to undertake these activities within the frame of his new functions, knowing that the BNEDT will likely be involved in managing the Government's building retrofitting in the future.

On the whole, the BNEDT participation in the process may constitute a worthy plus in favor of its perpetuation. The evaluation mission would view it as an additional sign of the Ivorian Authorities determination on the subject.

0.35 Beside the RTC , all the project logistics must remain in place with the secretariat personnel (one person) and the driver (one person) until the end of June 2001 to ensure a good performance of the remaining operations. In particular the Senegal NTC who should have to take some coordinating responsibilities at regional level, of the remaining operations , should be allowed to benefit from the office facilities until the end of June 2001.

0.36 In Senegal, and beside Mr. Seydou SY Sall, the NTC, a similar light team should remain in place until the end of June 2001. As Mr. Seydou Sy Sall will have been present since the beginning of the project until its completion, he somehow represents its “live memory”. Thus it is recommended to entrust him with widened responsibilities. In particular, he could be responsible for the coordination of some remaining activities at the regional level.

0.37 At the regional level, Mr. Seydou Sy Sall will coordinate the last and important activities of the project which are crucial for its success. He will focus on five fundamental types of activities : (i) Finalization of the project impact studies; (ii) Finalization of the project portfolios, the holding of a Funding Agencies round table conference; (iii) Targeted training, and; (iv) Communication and retrofitting operations.

0.38 It is necessary to correct, refine and finalize the reports on project impact in terms of greenhouse gas emissions reduction⁴ for each of the two countries as well as for the whole project. Once finalized, those documents will represent perfect tools of communication and should consequently be widely disseminated.

0.39 On the other hand it would be interesting to evaluate the impacts of the audits, using a sample of audited buildings. In fact, there is a tendency to think that the audits, once done, result by themselves spontaneously in concrete actions. It would be interesting to know to what extent such a hypothesis is verified and to quantify its real impact in terms of energy saving investment as well as in terms of modification of energy managing methods.

0.40 Then it will be necessary to build up projects portfolios, for fund raising purposes, that are clearer and more “professional” than the existing ones,⁵ through direct contacts, e-mail and on the occasion of a formal meeting to be convened by the project .

0.41 For that purpose , it is recommended to entrust independent consultants with the portfolios constitution. To cover these works costs a global amount corresponding to 30 h-days should be allocated by the project and shared between the two countries .

The projects portfolios should be of high professional quality level and inciting enough for potential Funding Agencies .However, they should be founded on the documents available in both countries and should highlight the project results .

0.42 Once the portfolios are finalized, the project will **convene a meeting of leading Funding Agencies**, either on a regional level, or for each country alone, the first option being undoubtedly more appropriate. The meeting will have to be accurately organized. It will have to judiciously exploit the information capitalized by the project and display the potentials of energy saving and emissions reduction comprised in the identified projects in the most convincing way. Other Funding Agencies who would miss the meeting would be contacted via Internet .

0.43 The project will also **hold 6 training workshops** (3 for each country) targeting the architects and the Administration officers who examine the building permission demands. In addition to the available documents to be distributed, an accessible and user-friendly memorandum about the regulations and standards, should be edited and disseminated in order to facilitate their enforcement .

⁴ Specific recommendations are formulated in front of document n° 1 of Annex 5.1 and document n°2 of Annex 5.2

⁵ Special recommendations are formulated in front of document n°2 of Annex 5.1 and document n°3 of Annex 5.2.

0.44 In the matter of communication , the project will **publish a closure issue of its bulletin : BLECE**. This issue will represent the keystone of the project communication actions. Of course it should be more substantial than the other issues. It should present the most important project results as well as the process prospects. The final report, which is being prepared by the Project Technical Adviser might be an excellent source for this issue. This will be very widely circulated , even in the other countries of the region.⁶

0.45 As to the retrofitting actions, the project should immediately **start the retrofitting operation** related to the lighting equipment of the Assemblée Nationale building in Dakar.

0.46 It will be necessary to **follow up the retrofitting operations and to set up a global assessment** of these experiences by June 2001. Then communication actions may be taken on the basis of these results. Such a document may be submitted to the Funding Agencies meeting.

0.47 In order to perform these regional activities adequately, it will be necessary for Mr. Seydou Sy Sall to plan some coordinating missions in Abidjan.

□ **Recommendations directed at UNDP bureaus in both countries and at UNOPS**

0.48 During the next three months , it is recommended that both UNDP bureaus at Dakar and Abidjan and UNOPS grant a permanent support to the project team to facilitate the completion of the remaining operations. Not only will they rapidly hand over the requested funds, but they will also follow up on the implementation of the current recommendations.

0.49 UNDP bureaus will also get the proof that retrofitting operations are well run and ask for follow up reports during at least one year after the project end . These reports should be transmitted to UNDP – GEF in New York .

0.50 Since the process assessment is possible only in the long term, it is also important that UNDP bureaus appoint an evaluation mission to assess the project impacts, two years after the project completion. This evaluation should be transmitted to UNDP-GEF in New York in order to bring out the necessary teachings.

□ **Recommendations directed at UNDP-GEF (New York)**

0.51 In connection with the last recommendation, the UNDP-GEF bureau in New York will have to analyze the monitoring and evaluation reports related to the retrofitting operations, to store the data and to compile them in view of replicating such kind of operations elsewhere.

0.52 Also, the UNDP-GEF should carry out an adequate follow up during the post project period. It will particularly support the activities related to funds raising for the retrofitting operations. It should envisage to involve itself in financing these operations either as a leading sponsor or as a co-funding institution. In fact, the operations submitted by the projects portfolios are suited to UNDP-GEF involvement as they are related to concrete actions fitting in GEF objectives.

0.53 It is also recommended that the UNDP- GEF should envisage to implement a similar project for other West African countries. This kind of project proved to be promising in terms of greenhouse gas emissions reduction. It would allow the countries of the region to gain undeniable advantages in the energy field as well as the economic and social ones. In addition it would help to significantly enhance their competencies and support interactions and cooperation among their institution at both national and regional levels.

⁶ For the Interstate school of Architecture of LOME it would be worthwhile receiving all the project results. Particularly , the closure issue of the BLECE should be sent to the head of that school.

0.54 When setting up such a project, it would be wise to utilize the experience and knowledge capitalized by the present project and capitalize on the expertise capabilities created in both Senegal and Côte d'Ivoire. It would be valuable to get advantage of the recommendations proposed by the mid-term and final evaluation missions of the present project.

0.55 The project frame would be quite similar to that of the present project, but the implementation modalities and their timing would be different. In particular, the suggested project would stress on the following caveats :

- Planning a project that lasts longer ; 5 years instead of the 3 years usually envisaged;
- Starting audit operations early at the beginning of the project;
- Starting demonstrative retrofitting operations immediately after the completion of the first audits;
- Selecting the buildings to be rehabilitated judiciously in such a way that the financial support of the project is conditioned by the real willingness of the building managers to get themselves involved in the process;
- Setting from the beginning a financial system almost similar to that of the ESCO;
- Preparing rigorously the necessary conditions for the concerned countries Authorities to get in charge of the process;
- Communicating the project development and results adequately;
- Planning for a wide training Programme;
- Concluding with an adequate financial scheme to raise funds for the projects portfolios inside each country and abroad , at international level.

1. PROJECT DEVELOPMENT AFTER MID-TERM EVALUATION

1.1 The mid-term evaluation mission had formulated a series of recommendations aiming at improving the project efficiency as well as its outputs and activities.

1.2 It had been particularly recommended to ensure a better follow up of the consultants activities. This was implemented at the stage of the formulation of their terms of reference, but the strict observance of these was not always effective, despite the efforts of the two NTCs and the RTC. It seems that they had failed to bring the consultants to abide by the terms of reference. In fact, the consultants used to consider that their report's first version is systematically sound, particularly in its substance, and that only the form can be commented and revised by the project. So, the consultants generally made little effort to revise their reports to the NTCs or the RTC requirements. Two reasons explain such difficulties:

- A relatively new experience in the consulting field⁷ in general, and particularly in relation with the specific subjects dealt with in the project.
- Relatively low remuneration for the consultants.

1.3 As to the first reason, it is obvious that we are in presence of a learning process. Knowing that one of the GEF objectives is also to improve the national capabilities in these fields, it is clear that these deficiencies are to be endured until a more solid consulting expertise will be built.

⁷ There is no real consultant "profession". The persons assigned to the consulting mission belong preponderantly to university circles, the Administration or to private institutions.

However, it is necessary to insist on having upgraded output from the national consultants in order to reach some improvement of their capacities.

1.4 The second reason is linked to the first: it is its cause and its effect altogether. Even if a slight increase of consultants' remuneration was consented – partly as a response to a mid-term evaluation recommendation – the UNDP consultants' remuneration remain low and allow only to practice consulting as a second activity. In such conditions, it is difficult to insist on the quality factor.

1.5 The mid-term evaluation mission also recommended a more frequent recourse to international consultants whenever it would have significantly enhanced the existing capabilities and improved the project output quality. We may consider that this recommendation was somehow achieved as the project had recourse to international consultants. It did so in particular to organize a training on DO2 software for the Senegalese experts; and to support Ivorian and Senegalese experts in upgrading the energy audits.

1.6 The third recommendation asked for a training workshop on energy modeling with the help of an international expert (activity 222 of the PRODOC). The workshop and the expert would have allowed the national experts of both countries to gain the necessary mastery of energy projection tools and thus to be able to perform the project impact assessment in the future, in terms of energy saving and greenhouse gas emissions reduction.

Eventually, the project dropped this activity for budgetary reasons. The consequence is that the project denied itself an important acquisition in terms of capabilities enhancement, which already resulted in a hardly reliable evaluation of the project impacts. This state of affairs may lower the credibility of the whole project results and thus hinder the preparation of projects portfolios that are fit to be agreed on by the potential Funding Agencies.

1.7 As to the gathering of workshops to elaborate regulation texts, the recommendation was followed. Also, national consultants were assigned to coordinate the working groups that were preparing the regulation texts. And so, the working speed and the outcome quality were improved.

1.8 The recommendation calling for an estimate of the governments contributions in order to integrate them into the resources allocated to the project were not considered. That is really regrettable, because the global cost of the project can only be determined approximately. Thus, the evaluation of the necessary resources to replicate the project in other countries, particularly in West Africa, would be based on data that are not much reliable.

1.9 The project opted voluntarily for a “from the bottom” approach to reinforce capabilities , as it supported some students taking their finals in preparing their memoirs. The mid-term evaluation mission recommended to develop this kind of action and supported about 25 final memoirs, a number of which being qualitatively very good. The project can take credit for this kind of initiative which is among its best contributions to the process.

1.10 The project supported a researcher from Benin in preparing a doctorate thesis entitled “Thermal comfort in tropical zone owing to better building conception” This was an important contribution to capability enhancement and to the process dissemination in neighboring countries .

1.11 As for the training of the actors involved in the regulation process related to the building sector, the project could not target a really significant proportion of the leading actors, despite the recommendation made by the mid-term evaluation mission which asked for an increase of the budget allocated to training.

So, only a limited proportion of architects and building managers could participate in the workshops .

In that respect, the recommendations that have been formulated in the dedicated section, should be implemented before the project completion. They aim at training the leading operators on the use of the regulation guide book produced by the project.

1.12 Concerning communication, the recommendations were not on the whole implemented. In fact there was no real communication plan for Senegal and the one drawn for Côte d'Ivoire did not reach the requested quality level and did not adopt the pragmatic and targeted approach recommended by mid-term evaluation.

Nevertheless and following the mid-term evaluation, the Ivorian communication plan identified and defined some communication and sensibilization actions aimed at the population. However, the plan did neither specify the ways these actions might be implemented, nor the financial modalities.

1.13 On the other hand, the BLECE which was quite an effective communication tool, was not issued as frequently as desired, despite the mid-term evaluation recommendation, which praised this initiative and solicited its reinforcement .

The BLECE was to be issued twice a year, but only 4 issues have been published so far, the last one in the second semester of 1998.

The primary reason for this failure was the lack of articles feeding the publication and the poor quality of available articles . It is a particularly regrettable failure because the project produced a profusion of matters and picking out good articles from it was relatively easy .

1.14 Obviously, the interruption of BLECE publication cut off one of the project most important communication channels, lowering its impact in terms of process popularization and implantation among the leading operators in the building sector.

A few propositions were formulated in the recommendation section to supply at least another issue of this bulletin , the closure one .

1.15 We must underline that the recommendation related to increasing the budget allocated to a targeted communication, couldn't be followed to the desired extent due to the lack of funds.

Nevertheless, some initiatives were carried on, particularly a documentary film on the Senegalese project results which is under finalization. Considering the importance of this aspect, some recommendations have been formulated in this document.

1.16 As for the assessment of the project results in terms of GHG emission abatement, the recommended specific studies were conducted in each country by an appointed consultant. However, according to the evaluation mission, the reports produced insufficient and unreliable results.

In fact, the approaches of these studies as well as the assumptions and the scenarios they developed, did not match the actual energy system in both countries and did not take the dynamics of their building sector development into account.

Anyway, the project cannot afford avoiding the revision of these reports as they are the glass cases where it will be exhibited.

Assessment reports of good quality will be significantly influential in the future to secure the access to funding sources. It is an important issue for both countries and for the whole West African sub-region.

1.17 Among the envisaged options, the revision of these reports would be carried by the Technical Adviser for the project.

1.18 The mid-term evaluation mission also recommended to conduct an assessment of the economic, social and environmental impacts of a long term building energy efficiency program. At last this recommendation was not considered because the EMO faced a great difficulty to implement it.

In fact, it should be admitted that such an assessment was probably a much ambitious goal, when envisaged within the project limits. However, it would have been worthy to assess at least the cost-effectiveness of the project, including parameters as economic impacts, energy savings included, in one hand, and the additional investments required by the enforcement of the new regulations, on the other hand.

1.19 Regarding the fund disbursement procedures, the transfer of the UNOPS offices from New York to Abidjan helped to improve the coordination between the EMO and UNPOS, which improved the project progress and facilitated the activity performing. So, the mid-term evaluation recommendation was considered, except for some delays due to a weak fluidity in exchanges between UNOPS Abidjan and UNOPS New York.

1.20 The mid-term evaluation recommendation to extend the project was followed, even repeatedly. Obviously, the project innovative character and the complexities raised by its execution added to the inertia of the building sector, necessitated more than the 3 years planned by the PRODOC for its achievement .

1.21 The recommendation relative to the consultation process with potential funding agencies was partially followed. In fact, one single request was introduced by Senegal to the Netherlands to raise funds for demonstrative projects of building retrofitting.

The initiatives towards Funding Agencies was rare. That is regrettable because the potential energy saving identified by the audits is considerable and the mentioned unique fund request which is very likely to be granted is related to only 5 consuming units out of 120 audited by the project.

Considering the importance of this subject, some propositions have been presented in the recommendation section of this document.

1.22 Besides , some efforts were made at the beginning to raise some funds for the purpose of disseminating the project results in the other countries of the region, but they were fruitless.

Since the mid-term evaluation mission, nobody among the actors has made additional efforts in that sense. Hence, supplementary recommendations have been formulated in the present evaluation report in order to improve the project results in this field.

1.23 The mid-term mission recommended that the leading institutional actors involved in the process provide more support to the project and organize for the perpetuation of the process. These recommendations do not seem to have been observed and the sustainability of the process generated by the project is not ensured.

1.24 Eventually, and to sum up, four propositions should be highlighted. They were crucial to the project success but they were neglected :

- To give real guarantees , by a concrete political pledge for the process perpetuation;
- To put this pledge in practice by systematically complying with the project results in public building retrofitting program;

- To contribute largely to disseminate the project results among all important process actors;
- To prepare for the institutional and financial mechanisms which should be created to ensure the process sustainability.

1.25 It is important to notice that the political changes that occurred in both countries resulted in a great mobility among leading decision makers and employees of the concerned ministries. This mobility somehow affected the execution of the mentioned recommendations. Other unpredictable events, like the political problems faced by Côte d'Ivoire, also contributed to this failure.

As they are important recommendations, the final evaluation mission have integrally formulated them again.

1.26 Similarly, the setting up of retrofitting operations encountered important administrative obstacles and procedural obstructions,⁸ which largely delayed their completion. Thus their impact as demonstrative operations was curtailed. Recommendations have been made on this aspect by the final evaluation mission.

2. STATE OF OBJECTIVES ACHIEVEMENT, PROJECT RESULTS AND ACTIVITIES

2.1 It is interesting to recall that the project includes five immediate objectives which must contribute to the development objective, that is to reduce (or stabilize) gas emissions resulting from the production of electrical energy for building purposes in both Côte d'Ivoire and Senegal – and even in the whole of West Africa.

The five immediate objectives are the following ones:

- Technical capacity building;
- Institutional capacity building;
- Demonstration of feasibility of retrofitting and designing buildings;
- Formulation of investment projects in the area of energy efficiency in buildings;
- Publication of outputs in both countries and regional dissemination.

2.2 These 5 immediate objectives can be concretely reached by the achievement of 15 outputs which are carried out by means of 34 various activities. Many of these activities are strongly intermingled, and their sync is necessary because it is decisive for the project success.

2.3 The tables of annex 3.1 present a detailed analysis of the progress state of the project activities and the quality of the outputs derived from them. The table of annex 3.2 shows a quantified approximation of the achievement levels of the project outputs. These approximations are based on the quantitative and qualitative achievement state of the activities that contribute to the output achievement.

The key lessons of the project progress state evaluation are stated in the following paragraphs.

⁸ Particularly the POSTEL 2001 operation.

□ **Objective 1** : Technical capacity building.

2.4 In general the activities planned within this first objective were satisfactorily carried out, despite the important delays registered at their beginning. This objective is made up of 4 outputs.

• **Output 11: Energy data on buildings collected and treated**

The activities 111,112 and 113 was almost completed before the mid-term evaluation. Since then, the fourth activity (114 Synthesis of diagnoses) has been satisfactorily achieved. Thus, 122 audits were carried, 73 in Côte d'Ivoire and 49 in Senegal, which means more than what had initially been planned. It's the evaluation view that the building selection was appropriate, because the sharing between public and private buildings respected the building circumstances of each country with a slight emphasis on public buildings in Côte d'Ivoire and on private buildings in Senegal.

The audits synthesis reports were also satisfactorily made and a unique data base is available for the two countries. It gathers the buildings energy characteristics, the potential energy savings, the investment needs and the pay-back period. However, as the audits synthesis report deals with only 108 out of the 120 effectively performed audits, the synthesis actual version must be corrected and updated.

• **Output12: improved operation of buildings and Energy Operating Committees (CCEE) in place**

This output is made of 3 various activities. All three were launched but none was completed. Globally and in both countries, the reached results related to this output are mixed, as compared to the expected results stated in the PRODOC. Thus activity 121 (**training the trainers and animators**) was partially achieved. A training program allowed the training of some twenty engineers, coming from audit offices, in energy audit technique with satisfactory results. But the training of trainers and instructors, which was intended to support the energy exploiting committees, did not take place.

Furthermore, activity122 (**Self-diagnoses**) was achieved with weak but differentiated level in each country. In Côte d'Ivoire, this activity realization was broadly satisfactory. Five building technicians and managers, followed by some other twenty received a training in self-diagnosis technique and juridical incitement mechanisms. They were all trained in the utilization of the guide book on the functioning of Energy Exploitation Consultative Committees(EECC).This activity was not performed in Senegal.

On the other hand, activity 123 (Establishment and operational support to CCEEs) was not appropriately worked out. In Côte d'Ivoire, it started with the installation of 25 EECC, but it is not quite sure that they are real committees. They are more probably energy responsible individuals of the buildings. Of course, such a conception of the committees, even if it represents a progress, has not the weight of real committees where the responsibilities are shared and the motivations defined. Among these EECC, 15 federated in the form of a network since February 2000. This network includes now 35 members. They complained about the lack of support from the project and they were very dubious about the process perpetuation after the end of the project. In Senegal, this activity was not carried out at all.

At last, activity 124 (**finalization of incentive clauses**) was not started in Senegal and was partially carried out in Côte d'Ivoire, where the project committed an Ivorian jurist as a consultant to gather the incitement texts elaborated in the early 90's, to make their analysis and to deliver a training for building technicians and managers on the subject of incitement contracts.⁹

It is important now to question the approach of maintenance companies incitement in both countries. In the absence of a rigorous juridical and regulatory frame and with the lack of sure economic foresight, it's the view of the evaluation that the incitement contracts system would likely lead to a similar experience, that was unsatisfactorily performed in Côte d'Ivoire in the early 90's.

In addition, the risks and uncertainties that, in both countries, surround the energy efficiency projects added to the financial obstacles that they encounter, do not support the setting up of such systems, within the terms imposed on the project for their achievement. Actually, the system described by the PRODOC is rather similar to the ESCO approach which is experimented now in Côte d'Ivoire. Provided that the right regulations are in place, the project might have better envisaged the creation of ESCO rather than involving maintenance companies in the process.

- **Output 13: Regional Energy-efficiency code for buildings**

Globally this output, which regards the buildings to be air conditioned, was satisfactorily carried out. It is made of three essential activities that were completed in the best way, even though some weaknesses were identified in some cases. These weaknesses called for some recommendations in the present evaluation report.

Activity 131 (**finalization of Ivorian energy-efficiency code**)¹⁰ was completed. The realization of this activity was globally satisfactory (cf. document 12 in Annex 5.2). Thus, the standards generated by the code were validated and submitted to the public inquiry.

However, a number of weaknesses has to be noticed. For instance, the project could not offer a training to all the influential targets, particularly the architects and the concerned administration officers. None of the two countries tried even partially to conform to these codes in the public building projects either new or renovated. Finally, the definitive enforcement of the codes (or guides) will occur only if the administrations and the actors of the two states really mobilize. The present report has formulated recommendations on that aspect.

Activity 132 (**the elaboration of a regional energy-efficiency code**) was satisfactorily completed in general (cf. document 9 Annex 5.1). In fact, the purpose was to rewrite the Ivorian code and adapt it to the Senegalese context with regards to the climatic and building specific characteristics.

Activity 133 (**training the operators**) was initiated but its realization level was insufficient. The training was very solid upstream at the level of teachers, researchers, code writers, dependents of concerned polytechnic schools (Yamoussoukro, Thiès, Dakar), or a certain number of technicians and engineers. On the contrary, downstream, the training reached a relatively limited number of operators, such as administration officers who control the code observance, promoters, architects, consultants, supervision bureaus, entrepreneurs, material suppliers, etc. In any case, the results were

⁹ The evaluation mission did not obtain the document prepared by the consultant and then couldn't evaluate it.

¹⁰ Indeed the term GUIDE would be more appropriate than the term CODE.

largely under the expected PRODOC's goals (a minimum of 150 persons in Côte d'Ivoire and 120 persons in Senegal). They were very low and should not allow for an effective observance of the new regulations. Some recommendations have been made by the evaluation mission on the subject.

- **Out put 14 : Regional Comfort code for buildings**

This output is made of the same activities as the previous output, except that it is related to the buildings which are not destined to be air conditioned, but which would benefit from a better thermal comfort, thanks to the code.

As for the results, this activity is at the same stage as the previous one.

- **Objective 2 : Institutional capacity building.**

2.5 Globally the activities of this second objective proceeded very well. The objective is made of 3 outputs :

- **Output 2.1 : Markets studied and improvements proposed**

All the activities intended for realization of this output were completed, in particular, activities 211, 212 and 213 were globally achieved, the fourth activity, i.e. the development of national capacities for testing and certification was not particularly successful. In fact, the documents generated are rather descriptive and do not formulate real proposals as requested by the PRODOC.

- **Output 22 : Capacities in demand and supply Management of electricity in buildings (Demand Side Management : DSM, and Least Cost Planning: LCP)**

Globally, this output was weakly carried out, with the consequence that the assessment of the "avoidable" emissions made by the project did not match the reliability standards. On the other hand the project will have lost the opportunity to train some national experts in many subjects related to Demand Management, integrated Supply planning and energy forecasting.

The activities of this output are two. The first activity (creating national capacities in DSM and LCP) was not carried out. The project managers justified this failure by budgetary constraints.

As to the second activity (222 : elaboration of scenarios for demand management), it was very partially realized, as only one final memoir was produced on the subject by an Ivorian student.¹¹

Another document, produced in parallel by a Senegalese consultant addressed the analysis of electricity demand in Senegal.¹² Nevertheless and despite its quality, this document does not fit the project concerns which rather asks for a rigorous and quantified estimation of the electricity demand in the medium and long terms.¹³

¹¹ Even though this report is of a rare quality as a memoir, it needs to be improved in order to obtain reliable results.

¹² Cf. Report 31 in Annex 5.1.

¹³ Projections for electricity demand till 2004 only and for the low tension in professional and domestic sectors exclusively.

- **Output 23 : Finalized procedures and institutional texts .**

Globally, three activities out of the five ones fixed in the PRODOC were adequately realized. Activity 233 (Finalize the regulation texts related to the environment) was not realized. In fact the PRODOC had planned the elaboration of texts dealing with climate change. Obviously such texts were largely beyond the project framework and was rather linked to the international negotiations progress. At last, activity 235 (decision makers sensitization) was realized. However a permanent awareness raising action is necessary to ensure the process perpetuation .

- **Objective 3 : Demonstration of feasibility of retrofitting and designing buildings**

2.6 Only one was carried out of the three outputs which made this objective (output 3.2. Retrofitted equipment).

The project was not able to perform any operation aimed at retrofitting the buildings themselves (output 3.1 Retrofitted buildings cover principally). This kind of work proved to be very costly. It was also difficult to perform such activity given the project contingencies, such as the timing, the funding available, and the decision making procedures in the buildings.

In that respect, no funding mechanism (third party paying for example) could be implemented). The same difficulty hindered the realization of output 33 (New buildings designed according to code specifications).

For these two outputs, the PRODOC had plausibly underestimated the obstacles and overestimated the project capacity to produce the expected leverage effect.

2.7 Conversely, the output 3.2 (Retrofitted equipment) was adequately realized in general. Thus the equipment retrofitting operations were already completed in Senegal (Hotel Meridien) and were ongoing in Côte d'Ivoire (POSTEL 2001).

A third operation will be carried out in Senegal (Assemblée Nationale Parliament). The retrofitting operations started with great delays so that there was neither room left for setting novel financing schemes, nor monitoring and evaluation activities or media coverage. The result was that their impact as demonstrative operations were curtailed.

Recommendations have been formulated by the evaluation mission on this aspect.

- **Objective 4 : Formulation of investment projects in the area of energy efficiency in buildings**

2.8 This objective is made of two outputs : the first one (4.1) is related to investment projects in public buildings and the second (4.2) to investment projects in private buildings. The portfolios were actually gathered, three for each country.¹⁴

In principle a coherent list of projects had to be established according to their cost level :

- Projects with an avoided CO₂ ton at low cost;
- Projects with an avoided CO₂ ton cost below US \$ 30;
- Projects with an avoided CO₂ ton cost around or over US \$ 30

2.9 Actually, 5 projects identified in Senegal have a good chance of getting funded by the Netherlands AIJ program as a demonstrative operation . The remaining projects portfolios are not likely to attract Funding Agencies' attention in their present format .

¹⁴ Document 2, 3, 4 and 5, Annex 5.1 for Senegal and documents 3, 4, 5 an 6 , Annex 5.2 for Côte d'Ivoire.

- The PRODOC judiciously states that this objective is the **reason for which the project exists**. It even insists that the project would not reach its goals if post-project investments were not raised. In that respect, the present project results are substantially below the expectations;
- The project collected such a huge capital of relevant information, that it will be really easy to bring out more sound and professional portfolios;
- The energy saving potential, and consequently, the greenhouse gas emissions reducing potential, as well as the economical characteristics of the identified projects, are so impressive that it should be regrettable not to capitalize on it, by identifying the Funding Agencies and approaching them for their contribution, as explicitly encouraged by the project framework.

2.10 Recommendations have also been formulated by the evaluation mission on project portfolios and on more productive contacts with Funding Agencies.

□ **Objective 5 : Publication of outputs in both countries and regional dissemination.**

2.11 This objective is made of three outputs. The first one (output 511) which is relative to information exchange and coordination among operators, was adequately carried out during the project course. The second one (output 512) which is related to information dissemination –on project works and results- among professionals and institutional partners, was adequately carried out too.¹⁵

A deficiency regards the reduced number of BLECE issues. It appeared only four times whereas a biannual frequency was projected in the PRODOC. The very rich accumulated material should have allowed for very good and substantial issues.

Recommendations have been formulated by the evaluation mission to envisage the delivery of a conclusive issue of BLECE.

2.12 The third output is related to the dissemination of the project results in the region. Other African countries were to be associated to the project on bilateral complementary financial schemes. This output was only partially carried out because of the lacking funds.

However, the output results are valuable with regard to the available resources. Project representatives participated in numerous regional meetings to present it along with its results . The project supported trainees from other countries of the region as well as a doctorate thesis entitled “Contribution to the comfort improvement in the tropical region : climatic approach in building design”.¹⁶

3. PROJECT IMPACTS

3.1 In general, the project regional and national coordinating bodies launched an adequate debate and information process with the concerned actors. The project teams and the CNS openly and regularly held meetings, conferences, seminars and workshops were organized with the participation of all the building sector operators , university circles, Finance and Customs officers included.

The produced documents were widely disseminated and the project spared no pains to make all its knowledge capital available for interested individuals and institutions .

¹⁵ The reader is referred to Annex 3 for more details.

¹⁶ Cf. document 24 - Annex 5.2.

3.2 In conclusion, the project generated a very open process to the building sector in both countries and its impacts was indeed considerable. Thanks to the project, the two countries were in condition to exploit its results during its course and after.

3.3 However and despite the real motivation showed by the leading operators – particularly the ministries in charge of environment , energy and building- to perpetuate the process, it seems that the necessary efforts for that perpetuation have been underestimated and inappropriately sized.

Consequently further important efforts should be consented by concerned institutions in both countries in order to urge all building sector operators to actually and definitely capitalize on the project results and the new standards in building practice and management. Recommendations have been formulated by the evaluation mission to fill this gap.

3.4 On the technical side a considerable work was made by the project. It led to a significant reinforcement of the technical capabilities in both countries in addressing the energy efficiency issues in building-related activities. But further efforts should be consented, in the short and long terms, to consolidate the gained results, enhance them and spread their impact.

In particular , a complementary training program should be launched in the future in order to reach a greater number of operators in the key ministries (building, environment, energy) and the intermediary Administrations, finance, customs, scientific centers).

The professionals too, like architects, counsel – engineer bureaus , building entrepreneurs , equipment suppliers, etc. should be supported and reached by the training program. Recommendations on this subject have also been made by the present evaluation report.

4. PROJECT OUTCOME

4.1 It is realistic to state that, in the short-term, - actually in its 5-year duration – the project yielded effective results. Beside its gains, presented above (studies, data bank, audits, regulations, training, building retrofitting, etc.), the project is also worth the framework it generated and which should lead to significant mitigation of greenhouse gas emissions in both countries.

4.2 Of course, the ultimate outcome of the project, in terms of greenhouse gas emissions mitigation will be valued only in the long term, it depends on the consolidation of the generated process and on its perpetuation. For that purpose and as already mentioned, recommendations have been formulated in the present report.

4.3 The project could not carry out reliable assessment in terms of energy savings and greenhouse gas emissions reduction impacts as compared to the business as usual scenario. The studies made by the project were not sufficiently coherent and reliable, and, as a result, the evaluation mission was not able to have a quantitative appreciation of the extent to which the expected objectives were achieved.

Recommendations have been formulated in the present document in order to correct this weakness.

4.4 Nevertheless, numerous results produced by the project supported the evidence of the achievement of the PRODOC original expectations, or so, provided that the process is effectively sustained.

□ **Energy , economical and environmental impacts**

4.5 The audit operations performed in the selected 122 buildings in both countries led to the identification of an important energy saving potential, that is 25% in Côte d’Ivoire and 16% in Senegal. It is important to notice here that for resource-contingencies reasons,¹⁷ the auditors were instructed to carry out only the following items :

- To Identify only the saving measures with pay-back period below 3 years;
- To Identify only the saving measures targeting the equipment, the cover-related measures being excluded;
- Not to integrate the savings realizable by the recourse to new technologies based on renewable energies, like solar water heaters in particular.

4.6 Similarly numerous measures contributing to energy saving were identified by the audits but their impact , always in terms of energy saving, was not quantified. These measures were relative to training, awareness raising actions, motivation of energy managers, etc. Yet these measures have an important impact in terms of consumption reduction.

4.7 Consequently, if all these impacts were to be integrated, the realizable saving related to the existing buildings should be substantial; i.e. at least in the lower level of the range mentioned by the PRODOC (30-50% of saving), particularly in the buildings using air conditioning.

4.8 As for the new buildings, the compliance with the new regulations should mean a more significant improvement of their thermal efficiency and so should lead to higher levels of both energy saving and comfort improvement. To illustrate this statement, the data gathered in Senegal showed that in optimal conditions, the realizable saving on air conditioning are near 50 % in housing, from 51 % to 58 % in office buildings, and from 56% to 57 % in hotels.

The following table presents the details of realizable savings in new optimized buildings, as related to basic buildings in Senegal.

Realizable electricity savings in air conditioning end-use in Senegal , in new buildings, as a result of the introduction of some energy efficiency “good practices”

	Housing	Offices	Hotels
Optimal orientation	1 – 1.5 %	9- 11 %	5- 6 %
Wall thickness	4 – 5 %	4- 5 %	5 – 6 %
Type of roofing	1.5 – 2%	Hardly significant	Hardly significant
Roof isolation	15 – 18 %	Hardly significant	2 %
External wall isolation	8 – 10 %	15-19 %	24 – 28 %
Roof color	2 – 3 %	1 %	2 %
External walls color	3 – 5 %	16 – 20 %	14 – 20 %
Windows glazing	12 – 13 %	29 – 32 %	22 – 26 %
Aggregated savings	49 – 51 %	51 – 58 %	56 – 57 %

¹⁷ Resources in time and funds allocated to audits

4.9 Thus the measures adopted for a better building design, would obviously lead to over 50% energy savings in the air conditioning end-use. As the energy audits state that the air conditioning end-use represents between 46 % (Senegal) and 69 % (Côte d'Ivoire) of electricity consumption in tertiary buildings, all types mixed, it is then possible to plan for 25% energy savings in Senegal and 38% in Côte d'Ivoire, as related to the total electricity consumption in tertiary buildings, if their design was optimized.

4.10 Adding these results to those realizable with better managing the equipment, the saving potential in building reaches huge proportions, quite comparable to PRODOC expectations.

This optimism ought to be tempered because of the building sector inertia and the difficulties to introduce new building design and equipment management practices.

However, the realizable savings in the buildings should remain relatively valuable , being situated between 30% and 40% of the present consumption levels.¹⁸

4.11 The electricity consumption of the audited 122 buildings exceeds 200 GWh annually . So the anticipated electricity savings exceed 50 GWh annually owing to buildings retrofitting and equipment management modalities, which represent about CFA 2.5 billion annually.¹⁹

This saving potential would be actually reached only if all identified measures were implemented, which means that the needed investments, about CFA 1.6 billion, should be raised.²⁰

If the project portfolios could be put in place, and assuming that the impact of the envisaged measures could last for 5 years , the savings would reach 250 GWh , representing CFA 12.5 billion along with a reduction of about 300,000 CO₂ tons.²¹

4.12 It is obvious that these estimations are to be considered as somehow pessimistic, even if inertia has to be integrated, because the impact of the measures would last longer than 5 years. In fact, following this initial period, the building managers, being totally convinced by the impact of the adopted measures, would be inclined to continue with the same energy managing modalities and even to renew the investments .

4.13 On the basis of these data and with the stated reservation, the unit **investment** cost of this retrofitting program designed for the audited buildings amounts to less than US \$ 8 per avoided CO₂ ton. And the net unit cost for the same program, taking into account the realized savings, would be about - 50 US \$ per avoided CO₂ ton .

4.14 On a wider scale and for the whole building sector, the process generated by the program should produce results as valuable as those indicated, if adequately handled by the two countries and if the necessary resources are raised .

¹⁸ Though , the electricity consumption by m² retained by the audits is lower than that retained by the PRODOC (on average, 140 kWh/m² in both countries against 240 kWh / m² mentioned by the PRODOC).

¹⁹ Estimation made on the basis of document 1 Annex 5.3 . Remember that when issued this document was related to only 108 audits out of the 122 ultimately realized . The evaluation mission has extrapolated this outcome, assuming that the following 14 audits have the same average characteristics as the previous ones .

²⁰ About US \$ 2.3 million.

²¹ In the absence of reliable evaluation made by specific studies conducted by the project, these are approximations set by the evaluation mission based on the hypothesis stating that one GWh saving corresponds to an avoided emission of about 1,200 tons of CO₂. This hypothesis was adopted after a discussion with the technical Adviser for project implementation, but it should be refined on the basis of actual data related to the electric systems of both countries.

4.15 On the basis of rather restrictive hypothesis, it would be possible to realize annual average savings of about 260 GWh in the two countries if the existing buildings were treated, which represents more than 300,000 avoided CO₂ tons annually. In the long term (after 2010) and integrating the realizable savings due to a more appropriate design of building, more than 2000 GWh a year should be saved on average in the two countries, which represents 2.4 million avoided CO₂ tons annually .

4.16 Consequently, the project environmental and economic impact was undeniably significant. It is up to the project to refine the estimations in order to present them appropriately. That will be one of the most persuasive project results to be used by the communication campaign that should be organized before the project ending. It should be addressed to the decision makers in both countries and to Funding Agencies concerned by climatic changes.

□ ***Enhancement of Capabilities***

4.17 As it has been stated before, the project contribution in the field of capacity building was undeniable. Actually, dozens of experts were involved in the numerous training sessions held by the project and related to all aspects of building energy efficiency. In addition, numerous regulation texts, audits, technical studies, etc., which include dozens of documents, were elaborated and carried by national experts in the two countries.

4.18 Most of the produced documents were widely circulated, which contributed to reach all the building sector operators and to extend the knowledge and expertise basis.

4.19 Hundreds of persons have been in contact with the project (seminars, workshops conferences, etc.) granting it a very good visibility and generally contributing to reinforcing the interactions between all the operators interested in building energy.

□ ***“Demonstrative” objective***

4.20 Owing to the delays suffered at the start of the retrofitting program, the results related to this objective were not satisfactory. Such an objective supposed an early launching to allow an effective monitoring and evaluation of the results, in order to publicize them . For the moment this can be achieved only partially. The way the project carried out the activities associated with this objective is analyzed in this document in paragraph 2.6 and on.

5. PROJECT ACTORS INVOLVEMENT

5.1 As it was stated above , the project had a strategy widely open to quite all the operators concerned by the building energy efficiency process . It should be noted however that the participation and of energy Departments and of the building promoters and entrepreneurs was timorous.

As to the energy Departments, there were no really objective reasons for their scarce involvement. In the future , they should involve themselves and play their role in the process. Promoters and entrepreneurs should be more involved too. They should benefit from all training opportunities, and get acquainted with the new standards of building energy efficiency in order to comply with them .

5.2 It is also important to notice the scarce involvement of the financial sector and the Funding Agencies in the building retrofitting operations. Consequently, one cannot consider that the project laid the foundations for the financing of the identified actions among the sample of audited buildings, not to mention the remaining buildings presenting significant energy savings in both countries.

The recommendations formulated by the evaluating mission on the subject are crucial.

6. PROJECT OPENING ON THE WHOLE REGION

6.1 Despite many attempts to involve the other countries of the area in the process, such as communication initiatives relative to project results or even to financing requests, the project did not achieve the desired impact on the other countries of the region. Analyses of this particular point are presented in this evaluation document , from paragraph 2.11 and on .

7. BUDGETARY SITUATION

7.1 The evaluation mission along with UNOPS, was able to assess the project budgetary situation. The great number of approved but not yet achieved operations added to undone disbursements do not allow an accurate balance.

However, some budgetary cross-checking were made and the following delineation may be considered as a good approximation of the project reality , being assumed that the information delivered to the evaluation missions are reliable.

7.2 When all the disbursements relative to the proceeding operations are made, about US \$ 120.000 (CFA 80 million) will remain. Out of this amount, CFA 31 million will be used to launch the Assemblée Nationale of Senegal building retrofitting, and CFA 10 million to hold the last TPR.

About CFA 40 million will be used to start the operations that should be performed before the end of June 2001, as proposed in the recommendations section of this document. The amount would be enough for that purpose.

**“Control of Greenhouse Gas emissions through energy-Efficient Building
Technology in West Africa (Cote d’Ivoire-Senegal)”
project UNDP/GEF/RAF93/G32**

**FINAL EVALUATION OF THE PROJECT
ANNEXES**

Dr Samir AMOUS (chef de la mission d’évaluation)
Mr Arona DIALLO (Consultant Sénégalais)
Mr Bénéé ADOU (Consultant Ivoirien)

