



Joint Review of the Norwegian Assistance to Bhutan with regard to:

- *Institutional Cooperation for Strengthening of the Energy Sector - Phase III*
- *Accelerated Hydropower Development Programme*
- *Management of Risks Caused by Natural Hazards for New Infrastructure Development - Phase III*



Final Report

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This report

Title:

Final Report-Joint Review of the Norwegian Assistance to Bhutan with regard to:

- Institutional Cooperation for Strengthening of the Energy Sector - Phase III
- Accelerated Hydropower Development Programme
- Management of Risks Caused by Natural Hazards for New Infrastructure Development - Phase III

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Cover photo by Ueli Meier: Open air switchyard of Chukha HPP

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Acronyms

ADB	Asian Development Bank
BEA	Bhutan Electricity Authority
BPC	Bhutan Power Corporation
CDM	Clean Development Mechanism
DGM	Department of Geology and Mines
DGPC	Druk Green Power Corporation Ltd.
DHI	Druk Holding & Investment
DOE	Department of Energy
DOR	Department of Roads
DPR	Detailed Project Report
DUDES	Department of Urban Development and Engineering Services
FS	Feasibility Study (synonymous with DPR)
GNHC	Gross National Happiness Commission
GOI	Government of India
HMSD	Hydro-Meteorological Services Division (of DOE)
HPP	Hydroelectric Power Project
JV	Joint Venture
LFA	Logical Framework Analysis
Ltd.	Limited liability (as in corporation)
MOEA	Ministry of Economic Affairs
MOWHS	Ministry of Works and Human Settlement
NEC	National Environment Commission
NVE	Norwegian Water Resources and Energy Directorate
PCD	Planning and Coordination Division (of DOE)
PFS	Pre-feasibility Study
PSMP	Power System Master Plan
RBM	Results Based Management
RCSC	Royal Civil Service Commission
RGOB	Royal Government of Bhutan
RNE	Royal Norwegian Embassy
TA	Technical Assistance
TOR	Terms of Reference

Executive Summary

Background

Bhutan is endowed with considerable natural resources. The feasible hydropower potential is estimated at about 30,000 MW, of which now 10,000 MW is targeted for development under a bilateral treaty with India. The geopolitical situation of electricity supply is a key factor in planning and developing the energy sector. Bhutan has a legitimate wish to engage with donors who do not have their own agenda.

The cooperation between Norway and Bhutan has a long tradition in the energy sector and it is also in its third phase in the area of geotechnical risk assessment. Three cooperation programmes are approaching the end of three years of implementation and it has been envisaged to carry out a joint review to inform possible extension.

The Department of Energy (DOE) is leading the programmes “Strengthening of the Energy Sector, Phase III” and “Accelerated Hydropower Development”, and the Norwegian Water Resources and Energy Directorate (NVE) is the advisory partner, while the Department of Geology and Mines (DGM) is responsible for the “Management of Risks caused by Natural Hazards for new Infrastructure Development”, to which the Norwegian Geotechnical Institute (NGI), is the partner.

The objective of “Strengthening of the Energy Sector” is to support the institutions in building up capacities and capabilities to cope with accelerated hydropower development. This includes funding for training across the board from short practical courses and seminars to long-term formal training at a higher academic level. NVE specialists are engaged in support to tariffs, licensing and regulatory work of the Bhutan Electricity Authority on one hand, and in supporting the Hydromet Services division in building out the hydro-meteorological network, data collection and modelling and in transferring know-how on hydrology and the impact of climate change. The programme “Accelerated Hydropower Development” is about carrying out field studies at different levels of potential hydropower sites with a view to advance project designs. This work is being carried out by a team from Norplan and counterparts from the DOE and from the new generating company Druk Green Power Corporation (DGPC).

The “Management of Hazard Risks” programme works on the study of geotechnical problems, and on developing measures to reduce the risks of damage to infrastructures and the loss of life. The trend is to engage more in areas that benefit hydropower development.

The programmes have been reviewed in the period February to March 2011 by a team of two consultants from Scanteam, Norway. Document study has been undertaken, and Norwegian as well as Bhutanese stakeholders have been interviewed, the latter during a ten day field visit in early March 2011. Comments to the draft report have been taken into consideration for preparation of the final report.

Review Findings

The programmes are successful and increasingly complementary. Bhutanese stakeholders unanimously perceive future developments as very challenging and to cope with this, request further assistance of Norway. Hydropower development is on a path of fast growth, and in order to direct, manage and supervise this process, sector institutions are envisaged to require significant growth. To sustain such growth, further individual training and education, as well as institutional capacity building are required. Hydropower scheme construction and associated roads require new geotechnical expertise, in particular for tunnelling and landslide control, and

this is where institutional cooperation between DGM and NGI – redirected to an extent – is the most rational in the view of the review.

The key findings are that:

- The accelerated hydropower development programme is complementary to the institutional cooperation programme in the energy sector. The programme on geotechnical hazard risk management has its own agenda, but it appears to draw closer to results relevance for the energy sector.
- Road construction is most likely the prime contributor to human-induced landslides. Road tunnelling has the potential to reduce the scale and frequency of landslides due to road construction. At the same time, it may be possible to circumvent areas prone to natural landslides with road tunnels. Hence, the programme can definitely make a positive contribution to offset environmental impact due to infrastructures. Moreover, experiences in solving geotechnical problems in road tunnelling can inform tunnelling challenges in hydropower development.
- Training appears to have resulted in positive outcomes: enhanced skills and knowledge. Many participants have experienced training as an eye opener, widening the perspective, and as enabling them to contribute more to the institution.
- Higher education has enabled staff to take on important positions in management and as specialists.
- Two types of inputs have contributed to overall success. On one hand exposure and short-term and long-term training of personnel, and on the other hand, advice and cooperation of NVE/NGI and other specialists in producing outputs, while conducting on-the-job training. The perception of Bhutanese stakeholders is that the relevance of Norwegian assistance is high due to this combination. It increases the relevance beyond what each component alone could achieve.
- The energy sector has come far, and it is today clearly structured and competent institutions are in place to cater to future challenges of accelerated growth. However, the growth of staff numbers that is envisaged, and the increased needed staff efficiency will only be feasible if further human resource development, i.e. training and education in a significant number of key areas, and for large numbers of staff at all levels, is emphasised more than ever before. Further Norwegian assistance in this area will be a key contribution to sustainability, and will therefore be highly needed and appreciated by the RGOB.
- With the experiences that counterparts have made, the wish is nurtured in DOE and DGPC to take on more responsibility in future work and also to expand the scope of study to river-basin development, hydropower design optimisation and the study of the need for storage projects.
- The accelerated hydropower development programme is producing study reports that will be highly relevant in further project implementation. It is considered useful in both, the present bilateral modality and other modalities that may be implemented in the future.
- There is some concern that accelerated hydropower development may further the risk of environmental degradation. The review finds that environmental concerns should be addressed at a strategic and overall level, rather than at the project level only. It is found that achieving and maintaining environmental sustainability will require emphasised attention to environmental management approaches in an extension phase. Strategic

Environmental Assessment (SEA), versus project-based Environmental Impact Assessment (EIA) is considered more suitable for the large projects undertaken.

- The programme of institutional cooperation between DGM and NGI in the geotechnical field is thematically very broad. The review finds that the breadth of engagement is stretching the resources too thin, and is at the cost of a clear focus. While to the energy sector have only been indirect in the past, Phase III tends now to move towards geotechnical study that is also directly relevant to hydropower infrastructure construction. This is regarded as a positive development, as synergies appear attainable, and the focus can be sharpened.
- As an overall observation, the review finds there is room for improving reporting. Reporting on progress is detailed at the activity level in all programmes. Following the results chain is not a conceptual practice, and it is therefore a challenge to identify the causality between activities on one hand and outcomes and ultimate impacts on the other hand. This is unfortunate, as results-based management is not only useful for comprehensive reporting but is also a management tool.

Conclusion

It is found that the ongoing projects build on previous collaboration. Capacity building on a practical level appears as the key strength of all programmes, and formal training at Master's level is another key measure.

Overall, the three programmes make a difference – individually and amplified in combination – to institution building in the Ministry of Economic Affairs, and in particular the sub-ordinate departments DOE and DGM, and affiliated institutions. Commensurate with the economic importance of the energy sector, further growth and associated capacity building is indispensable. Further Norwegian cooperation is considered more important than ever, as significant challenges loom ahead. These need to be addressed in good time with further opening of the sector. Bhutan sincerely wishes the extension and prolongation of the programmes for at least three years.

The review expresses some concern that the environment is at risk of being compromised in the course of accelerated hydropower development. Therefore, the objective will be to increase national benefits while effectively mitigating and managing environmental and social impacts.

From an overall perspective, Norwegian assistance is conceptually well adapted and carried out in a spirit of genuine partnership by the involved institutions of Bhutan and Norway.

The Review Team is impressed by the high quality and dedication of the management and staff of all Bhutanese agencies and institutions collaborating with the Norwegian partners. This appears as a sound professional basis for future collaboration.

Recommendations

A summary version of all recommendations is given here. Please refer to section 6.2 for the full text version.

At the Programming Level

1. Extend all programmes to complete by 30 June 2014 in order to be able to complete further important work.

2. Realign the programme on natural hazard management to contribute more meaningfully to infrastructure construction with major significance for Bhutan, i.e. hydropower plants and major roads.
3. Reformulate the task “preparing the Detailed Project Report of one project”, with a view to assign the responsibility for the task to the Bhutanese partner institutions DOE and DGPC, and to define the consultant’s role as supportive.
4. The review recommends to conduct a participatory planning exercise for all three programmes combined, in preparation for the extension phase, with a view to align and coordinate programme Goals and Purpose, and to put in place results-based management and reporting.
5. Establish baselines for the extension phase to report against, in the semi-annual reports per the end of June 2011.

At the Institutional Level

6. Develop and introduce a staff performance monitoring system, or adapt from existing system at the Royal Civil Service Commission, at the level of each organisational entity and use it in capacity strengthening programme reporting.
7. Strengthen the collaboration between DGM/NGI and the Department of Roads (DOR) with regard to landslide mitigation and tunnelling in the road sector, as well as between DGM/NGI and DGPC on the subject of hydropower-related tunnelling and other geotechnical issues.
8. Clarify possible overlap between DGM/NGI and DGM/UNDP/GEF as well as DOE/NVE regarding work on Glacial Lake Outflow Floods (GLOF).

At the Thematic Level

9. The review recommends that support to training efforts is intensified as per identified needs.
10. Focus on tunnelling in the road sector and on hydropower schemes in the Natural Hazards Management programme, as this appears to be the most relevant work activity and creates synergies.
11. Include the optimisation of hydropower scheme design as a study area, as well as optimal utilisation of basin potentials for hydropower development in the Accelerated Hydropower Development Programme.
12. Apply best-practice Strategic Environmental Assessment (SEA) as a tool, rather than only EIA.
13. River ecology is an issue, as large dams disrupt it, and fish ladders do not work at this scale. One way to mitigate the problem is to breed local fish species, and to put them into the river upstream and downstream of the dam. To follow up on this, the review recommends establishing contact with experts at the Trondheim University of Technology and Science (NTNU) in Norway.
14. It is recommended that the Accelerated Hydropower Development Programme include support to projects smaller than 25 MW as and when opportunities arise.

15. In order to gain a sharpened focus across all programmes, it is recommended not to include support to other Renewable Energy initiatives in DOE, or seismic mapping and related activities in DGM in the programme extension period.

1 Introduction

1.1 Energy Sector Background

The feasible hydropower potential of Bhutan is estimated at about 30,000 MW, of which now 10,000 MW is targeted for development under a bilateral treaty with India. Compared to the existing about 1,500 MW of generating capacity, the potential for Bhutan is large, and ongoing developments are hugely ambitious. In a geopolitical context, Bhutan can make a small contribution only to clean energy generation on the Indian subcontinent. The total installed capacity of India is almost 172,000 MW, of which about 56,000 MW is hydro and other renewable and almost 5,000 MW nuclear. The remaining two thirds is thermal, mostly coal (about 92,000 MW), but it also includes 18,000 MW gas and 1,200 MW diesel capacity. Hence, 10,000 MW contributes less than 6%, and the total feasible potential would contribute about 13% to the existing capacity in India. In terms of energy production it is much less, as capacity availability is somewhat less than 50%, due to a lack of water in the dry season. In summary, the hydropower potential and its development is very important for Bhutan, but it is modest at best for India. The low cost of power is probably more significant to India than the possible volume. In fact, it appears that the average selling price of Bhutanese power to India is lower than the average sales price of Indian generators.¹

The geopolitical situation of electricity supply is a key factor in planning and developing Bhutan's energy sector. Getting a fair deal and creating win-win situations is a huge challenge for the country's political leadership, the Ministry of Economic Affairs (MOEA) and its Department of Energy (DOE), and affiliated institutions. Obviously, selling out Bhutan's renewable resources on one hand and maintaining its pristine natural beauty and biodiversity on the other hand are two opposing extremes between which development must find the path to Gross National Happiness, which is the nation's credo and philosophy.

The energy sector is structured transparently under the Ministry of Economic Affairs, and established institutions have a clear mandate, in place as of 1 January 2008.

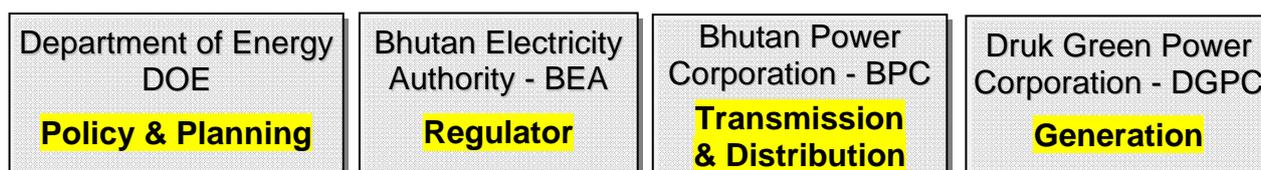


Fig. 1: Bhutan's Energy Sector Structure

The role of external donors without own agenda is considered of great importance. Norway plays such a role since many years. The present phase of cooperation constitutes the end of a ten-year period. Subject to review is the period from July 2008 to the present.

The review has been carried out jointly for three programmes that have been implemented in parallel and that are interlinked to an extent.

After the study of project and related documents and interviews with Norwegian stakeholders, numerous Bhutanese stakeholders were interviewed during a field visit from 27 February to 10 March 2011. The review was carried out by Ueli Meier senior partner in Scanteam, Norway, and Werner Kuelling of Switzerland, independent consultant, who knows Bhutan since many years and who was the resident coordinator of Swiss assistance in the years 2006-2008.

¹ Data are from: http://www.cea.nic.in/power_sec_reports/Executive_Summary/2011_02/index.htm

1.2 Objectives of the Review

The annual meetings between the Government of the Kingdom of Norway and the Royal Government of Bhutan held in May 2010 decided that a joint review of all three programs should be carried out. This is the basis for the present review. The respective programmes are:

- Institutional Cooperation for Strengthening of the Energy Sector – Phase III
- Accelerated Hydropower Development Programme
- Management of Risks Caused by Natural Hazards for New Infrastructure Development – Phase III

The overall purposes of the joint review of the three above listed programmes are to:

- i) Assess the programme performance against the planned inputs, activities, outputs, outcomes and, if possible to measure, impacts
- ii) Give the foundation for decisions on possible corrective measures for the rest of the programme periods.
- iii) Obtain information and advice with regard to the preparations of possible extensions of the existing programmes after the completion in June 2011, as well as possibilities for changes and expansions of the existing programs and possible new areas of cooperation.

1.3 Methodology and Implementation

1.3.1 Work Methods

The review team has studied available documentation. Key documents were the Project Documents and Bilateral Agreements, as well as a review report of 2007 that informed the review with regard to the overall and specific objectives of the assistance and cooperation.

Progress- and annual reports, as well as minutes of annual meetings have informed the review on progress and the status of implementation of the projects. Reporting is in general at the level of activities carried out, with commensurate periodical financial reporting. Reporting on the output level has been provided partially. Also, annual work plans and budgets have been looked into, and audited accounts statements have been reviewed.

As a next step, a number of personnel of the three Norwegian actors NVE, NGI and Norplan have been interviewed. In general, interviews served to broaden the reviewers' understanding of the scope of the projects and the challenges encountered, in particular on the input side.

A major activity was the field visit to Bhutan for data gathering and verification of written information. In this, an inclusive approach was chosen, i.e. within time limitations, a broad range of stakeholders, across disciplines and institutions, was heard. Key stakeholders at middle and high management level were interviewed individually, while others were invited to participate in five different focus groups, where all had the opportunity to provide feedback on their personal experience with the respective programme, and their general perceptions of results. As a work hypothesis, it appeared of particular interest to identify linkages and synergies between natural hazard risk management and hydropower development.

With regard to gender, out of 103 persons contacted by the review, 19 were women, of which three on the Norwegian side.

The review attempted to follow the results chain: Inputs – activities – outputs – outcomes – impacts, by making the connections between the different elements and levels visible. This

intention proved to be ambitious, as the links were not fully evident or visible in available reporting.

It is noted that conceptually, the causal links between outputs and specific activities required to produce the outputs have not been established in the project design of each of the programmes. An overview log-frame or similar tool is lacking. In other words, the causality between activities and outputs has not been pre-defined, making results-based management of the programme difficult. Also, it means that documented evidence of results is lacking to an extent. For the review it meant that an attempt needed to be made to “construct” causality, in order to assess the results chain, and to determine to what extent results can actually be attributed to the programme efforts. Methodologically, extensive interviews with stakeholders have aided the review process.

The thematic focus was on capacity building and institutional development efforts and results, because the summary objectives of all three programs are to achieve competent staff, both men and women, in the relevant sectors. Also, functional institutions with clear mandates and division of labour, with good coordination on a peer level and supervision and oversight at the level of the departments, the corporations and the regulatory authority involved, and the Royal Government of Bhutan (RGOB).

1.3.2 Implementation Time Frame

The field mission was planned and carried out as follows:

Date	Event/Activity
27 February 2011	Arrival of Review team in Paro/Thimphu
28 February	Initial meetings with review coordinator and start of planned interviews
28 February to 4 March	Energy sector review: DOE, BEA, BPC, DGPC, RCSC, GNHC, (2 programmes)
5 March	Field trip to Punatsangchhu site, Wangdue, and to Basochhu 64 MW HPP
6 March	Field trip to Chukha 356 MW HPP and Tala dam 1020 MW
7-9 March	Review of Natural Hazard Risk Management, Phase III: DGM, DOR, DUDES
Afternoon of 9 March	Debriefing at Department level and appropriate Division of GNHC
Morning of 10 March	End of mission/departure: Travel to Paro (Bhutan) and Delhi (India)
11 March	Debriefing of Norwegian Embassy Delhi by team leader Ueli Meier
12 March 2011	Homebound travel New Delhi to Norway

Table 1: Schedule of Review Field Mission

1.4 Structure of the Report

The present report consists of an Executive Summary, an Introduction (chapter 1), and 5 substantive chapters to provide a differentiated view of all three programs:

Content	Chapter
Review of Institutional Strengthening of Energy Sector Institutions	2
Review of Support to the Accelerated Hydropower Development Programme	3
Review of Management of Risks caused by Natural Hazards in Infrastructure Development	4
Common Aspects	5
Conclusions and Recommendations	6

Table 2: Review Report chapters

Several annexes contain terms of reference, stakeholder and documentation information.

1.5 Acknowledgements and Disclaimer

The review team wishes to express its thanks to all the stakeholders who graciously gave their time and shared information freely. A special thanks goes to the various programme coordinators, Mr. Hari Sharma, assisted by Mr. Jambay Lhundup of the Department of Energy (DOE), and Mr. Yeshi Dorjee of the Department of Geology and Mines (DGM), as well as Mr. David Wright of the Norwegian Water Resource and Energy Directorate (NVE) and Mr. Rajinder Kumar Bhasin of the Norwegian Geotechnical Institute (NGI), all of which have made great efforts to make information available and in particular have made effective arrangements so that a considerable number of stakeholders could be interviewed in the limited time available.

The present report and its findings are the sole responsibility of the review team, and do not necessarily reflect the views of the client or the institutions participating in the reviewed programmes. The review team has received comments to the draft report from stakeholders, largely concurring to the findings and recommendations of the review. Amendments in the final report version are therefore limited to adding a project comparison table, a brief gender assessment, and some more detailed comments on various findings, and references related to comments received.

2 Review of Institutional Strengthening of Energy Sector Institutions

2.1 Description of the Programme

The first phase of the institutional cooperation resulted in the updating of the Power System Master Plan for Bhutan as well as other activities. Phase II, which started in January 2004 and was planned to be concluded at the end of 2007 but was extended into 2008, included development of the electricity regulator, preparation of guidelines for water structure safety standards, development of the departments' GIS capabilities for the energy sector, and strengthening of the management information systems for the energy sector.

During the third Annual Meeting between the governments of Norway and Bhutan in May 2006 the need for further assistance was expressed and it was agreed to prepare a Phase III programme. Since Phase I and II had made substantial contributions to the development of the institutional capacity of the sector, it was anticipated that Phase III would build upon the past achievements to enable the energy sector to meet its future strategy mainly focused on accelerated hydropower development. Climate change was also becoming noticeable in the Himalayas like in many other areas around the globe. The impact this would have on the hydropower projects of the accelerated hydropower development was unknown but considered important. This, and strategic extension of the hydrometric network of Bhutan to support the upcoming development projects and their need for reliable data, also needed to be addressed.

Phase III includes a budget of NOK 14.823 million over three years. This amount is split into two components, i.e. Human Resource Development (training) managed by DOE, amounting to NOK 5,170,000, and Support by NVE, amounting to NOK 9,653,000. The programme is intended for five years to coincide with the 10th Five Year Plan of Bhutan (2008-2013). Norwegian support beyond the initial three years however, is understood to be the subject of review. The budgeted activities are based on the assumption that the institutional capacity of the DOE will be enhanced through restructuring and recruitment of additional manpower and other resources commensurate with the ambitious development plans.

DOE is the executing agency for the phase III cooperation, and it entered into a contract with NVE for activities as described in the Project Document of April 2008, and as further specified in Terms of Reference for the contract.

Within the framework of the available resources in DOE, emphasis is on project management in order to secure efficient handling of the Project and continuity in project management and staff.

Phase III cooperation started in July 2008 and is designed to last for five years, to be reviewed after three years.

2.2 Goal

The development objective is the accelerated development of the hydropower resources of the country, and for attracting investors for implementation of hydropower projects, thereby leading to socio-economic development and poverty alleviation/reduction. Furthermore, to ensure the required regulatory capacity to allow the growth of the power sector in an orderly and cost effective manner, and in this way also to contribute to the accelerated hydropower development strategy of the 10th Five Year Plan for Bhutan².

² Reference is made to the Project Document of April 2008, which, however, uses different terminology for the Goal

2.3 Purpose

The purpose of the programme is to ensure the gradual availability of local expertise for planning and development of hydropower resources and strengthening of the regulator capacity needs.

2.4 Outputs and Activities

2.4.1 Planned Outputs

The Project Document of April 2008 listed the following target outputs:

- Certificates, diplomas, etc. given to the personnel upon completion of the training
- Improved performance level as documented in Department of Energy (DOE) annual reports/statistics
- Increased Human Resource capacity of DOE, Druk Green Power Corporation (DGPC), Bhutan Power Corporation (BPC) and Bhutan Electricity Authority (BEA)
- Written procedures and guidelines
- Revision of Grid Code
- New Hydro-Meteorological stations in operation

2.4.2 Activities

To produce the outputs, the following activities were defined in the Project Document:

Activity 1 – Human Resources Development, payment of local costs for other activities

This activity covers the human resource development activities, i.e. training, for the professional staff of the DOE, BEA, BPC and the DGPC. For practical reasons the local costs associated with the other activities are also included under this activity and are paid directly by DOE.

Activity 2 – Support for Electricity Regulation to meet the challenges of Accelerated Hydropower Development

Addition of additional hydropower capacity through bilateral assistance only will not be possible. This requires that Bhutan explore other models of joint ventures and private sector participation for raising the necessary finance. For the additional capacities, at least another 10-12 projects need to be developed within the next twenty years, mainly through Joint Ventures and private sector participation through Build Operate Transfer (BOT) models as per the provision of the Electricity Act. In this, regulatory assistance is required.

Activity 3 – Support to Hydromet Services Division for Sustainable Data Provision to Accelerated Hydropower Development

This activity will provide important support to the capacity and capability of the Hydromet Services Division of DOE in order to help it face the challenges and demands on reliable hydro-meteorological data placed on it by the thrust of the increased focus from the accelerated hydropower development program. The activity will include establishment of new hydro-meteorological and sediment sampling stations to fill in key gaps in the network at strategic locations for hydropower development, improving the analysis capacity of the Division, and the assessment of the impacts of climate change on the flow regimes of the rivers in Bhutan in order to give a more reliable database for hydropower development.

One of the keys to the success of work under this activity will be coordination and collaboration with the Department of Geology and Mines (DGM) who have much activity and expertise in the

monitoring of glaciers in Bhutan. Regular contact between DOE and DGM will therefore be an integral part of the activity.

Activity 4 – Coordination and backstopping by NVE

This activity includes the daily coordination and communication between the NVE coordinator and DOE's and NVE's project personnel, as well as preparation of progress reports, assistance to DOE in preparing reports for the RNE, participation in Annual Meetings, project accounting, cost control and invoicing, plus an allocation for review and comments to the DOE training plan and various backstopping activities unforeseen at the time of preparation of the Project Document.

2.5 Assessment of Performance and Achievements

2.5.1 General Findings

- Training appears to have resulted in positive outcomes: enhanced skills and knowledge.
- Many participants have experienced training as an eye opener, widening the perspective, and as enabling to contribute more. In quantitative terms, 171 candidates of DOE and BEA have spent 2,185 days on training, i.e. somewhat more than ten days on average, if travel time is deducted. In addition, BPC and DGPC have received approximately NOK 130,000 per year each for short term training. In relation to large staff numbers these resources are spread very thin.
- Higher education (a total of eight master degrees, and one post graduate course) has enabled staff to take on important positions in management and as specialists.
- The process of identifying training needs, selecting candidates, training subjects and appropriate training institutions, appears to provide the participating institutions an optimal mix for capacity building on all hierarchical levels.
- The training component of the programme is perceived as making a real difference to the oversight function of DOE, and it has a visible outcome and impact in terms of individual competence. In the words of one of the training participants:

Some years ago, we watched what the external consultants were doing, but we were not able to ask meaningful questions. Now, the situation is reversed: We are able to specify what we need, and we can determine whether it is being delivered, and at what level of quality. This process improves the solutions that Bhutan needs.

- The programme component Cooperation with NVE is in general highly appreciated by Bhutanese stakeholders. In turn, NVE personnel are impressed by the dedication of Bhutanese officials and staff, the ability and willingness to learn and the friendliness of the people. Noteworthy attributes of the cooperation are: Continuity, flexibility, thematic breath of available knowledge and willingness to share, collegiality and openness.

2.5.2 Efficiency

In the context of efficiency, the TOR for the review specifies the following tasks and questions:

- *Assess programme designs, planning processes, participation of relevant stakeholders and programme organization, monitoring and reporting.*
- *Assess progress and efficiency of activities carried out. Measure how economically resources and inputs; funds, expertise, time etc., are converted to outputs.*

- *Compliance with agreements and programme documents. To what extent have the partners in Norway and Bhutan complied with obligations as stated in the agreements and programme documents?*
- *Assess the quality of the results reporting. To what extent can reported results be verified?*
- *To what extent are disaggregated data included in the reporting with regard to men and women?*

The programme design of Phase III builds on the previous phases and it aims to meet the requirements of the future strategy which focuses on accelerated hydropower development. As can be seen from section 0 (and also briefly discussed in paragraph 1.3.1) there is a challenge in identifying the results chain. While in some cases it is obvious which major activity is supposed to produce a specific output, it is obscure in other cases.

Meticulous planning is done on a quarterly basis for the interaction with personnel of NVE and stakeholders at different levels of the DOE in the divisions of Planning and Coordination (PCD), the Hydro-met Services division (HMSD) and in the BEA. In the context of domestic electricity tariff fixation, DGPC and BPC have also been consulted. It is documented in detail that a participative and inclusive process has been conducted.

The efficiency of spending programme funds is not possible to assess in a rigorous manner, as there is no basis for comparison. It appears that with regard to long-term training, cost-efficiency is not the priority. It is considered more important to identify the best suitable course and training venue. On the other hand, DOE has managed to identify cost-efficient short-term training opportunities, among these in the Philippines, with the Electricity Generating Authority of Thailand (EGAT) and a North-Delhi utility.

The use of personnel from NVE and other Norwegian consultants is expensive, but decisions to use it are based on thematic requirements rather than on cost-efficiency criteria. Bhutanese stakeholders perceive the value-for-money as high, and in fact do not wish to sacrifice broad interaction with Norwegian specialists to cost-efficiency.

Reporting of NVE on programme activities is on a quarterly basis to DOE which reports semi-annually to the Norwegian embassy (RNE). This procedure as well as related financial reporting is in accordance with the bilateral agreement. Annual Meetings have been called by the DOE and have taken place as planned. Agreed Minutes have been produced, all according to the agreement.

Budgeting is detailed on a quarterly basis. Financial reporting (by DOE) is detailed for all training activities, but it is less detailed for the NVE component, raising the question whether this is in full conformance with agreement requirements. Accounts have been audited, as required (refer to section 0).

Reporting is of good quality on activities, in the format agreed. As a consequence of a weak results-based project design, there is no clear distinction between activities, outputs and outcomes in reporting. According to the bilateral agreement, reporting should include an assessment of the achievement of the purpose. In other words, it should include reporting on outcomes. This is mostly missing, not in the least due to a lack of useful indicators, or the lack of its use. The text box below gives an example; it is rather typical and applies to reporting in general.

An example of incomplete reporting

The indicator, defined in the Project Document is: *“Increase in hydro-meteorological network with improved and up-to-date equipment”*. It is not used in reporting. By how many stations has the network been increased? How many stations have now automated equipment? What is the

general status of the hydro-meteorological network? To these outcome-questions reporting should ideally provide the answers. Reporting stops after stating the completion of procuring and installing the equipment (activities).

Further, reporting should extend to the impact level: How is data quality affected by the intervention? Are time series more complete? Is overall coverage better? etc. If it is too early to provide such answers, reporting should at least state what can realistically be expected.

The quality of results reporting leaves room for improvements. Results can be verified at the level of outputs, but it is more difficult to do this when it comes to outcomes and impacts. The reason for this is twofold: a) In the first place, indicators at the outcome and impact level have not been defined in a manner that would make measuring possible, and in other cases are not used; b) in several contexts, more time is needed for outcomes to become visible.

Reporting does not provide disaggregated data about men and women involved in the activities, except for the Annual Report of 2009, in which the training of nine female staff in office management is specifically mentioned. It is overall plausible from interviews that gender equality is taken seriously, and in general is not a problem in Bhutan. The number of women employed in the various organisations and benefitting from training is increasing over time. However, the number of eligible candidates is limited, as basically, best available qualifications is the selection criteria in recruitment.

2.5.3 Effectiveness

The following questions are addressed:

- *Achievement of objectives:*
 - *To what extent will the overall objectives be reached? The performance of the programme in relation to set goals and indicators (the results chain).*
 - *To what extent have inputs, outputs and activities contributed to the overall objectives of the programme.*
- *Deviations:*
 - *What deviations of plans and budgets have occurred and what are the causing factors. Have adequate measures for avoiding reiteration of deviations been implemented.*
- *The roles and responsibilities among and between the implementing institutions.*
 - *Donor coordination?*

The overall objectives of the programme encompass the Goal and the Purpose that have been defined initially. The goal is accelerated hydropower development, and the programme purpose that is to contribute to this is the availability of local expertise for planning and development of hydropower resources, and strengthening of the regulatory capacity. It is obvious that an absolute answer to the achievement question is not possible. But the regulatory authority BEA has become autonomous in September 2010, and its capacity is definitely strengthened, evidenced by the fact that a first round of domestic tariff setting, led by BEA, has been completed, and tariffs introduced. Two types of inputs have contributed. On one hand exposure, short-term and long-term training of BEA personnel, and on the other hand, advice and cooperation of NVE specialists in producing outputs such as a tariff review and related discussion paper, draft guidelines on fines and penalties and licensing guidelines.

The review identified the following results chain³ in the regulatory area, and it is possible to conclude that a positive impact can be expected in due course:

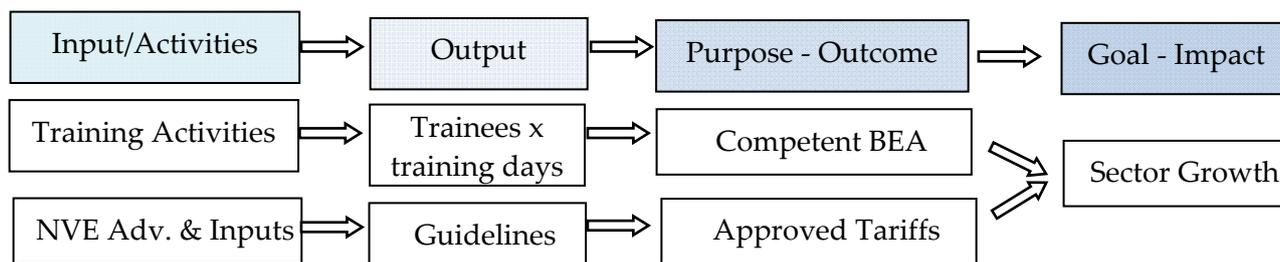


Fig. 2: Results chain in the Regulatory Area

Other results are less discernible, such as improved hydrological data. As discussed above, reporting is incomplete, but nonetheless, the results-chain is identified.

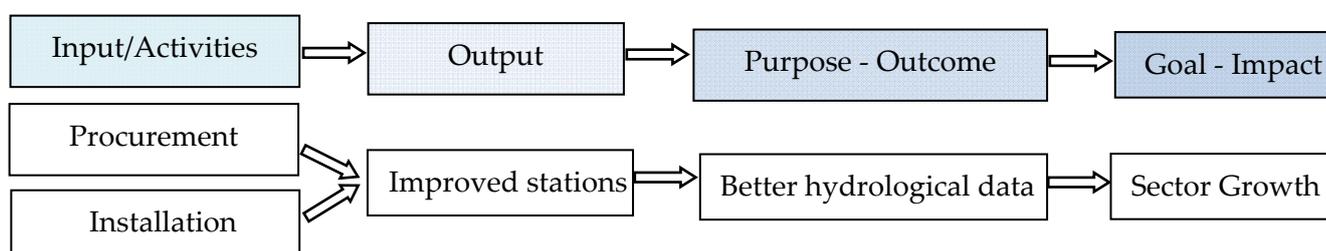


Fig. 3: Results Chain for the Hydromet Services Division

Deviations: It is found that the start of the programme was slow. Activities got on the way in the last quarter of 2008 and there was not much to report by the end of the year in terms of achieved training results. Another deviation was that the planned Training Needs Assessment (TNA) was not carried out. This was so decided to avoid overlap with Asian Development Bank (ADB) technical assistance (TA), which included such TNA. Meanwhile, the TNA of ADB TA has been made available to the programme, and it is found that within the programme there is definitely no need for a TNA.

Roles and responsibilities: Annual reports make it amply transparent which other donors are participating in the sector, and roles of donors as well as the Bhutanese institutions are clarified. It appears that there is no overlap or duplication in the various initiatives. In cases of doubt, programme management is fully aware of critical areas, and is experienced in coordinating various interventions side by side.

2.5.4 Impact

Specific questions in the context of programme impact are the following:

- *What are the main outcomes, and if possible to measure, impacts of the programme*
- *To what extent do the intended target groups benefit from the programme?*
- *To what extent do women and socially excluded benefit from the programme?*
- *Do the programme's activities target gender equality and social inclusion issues?*
- *Environmental consequences: Are there any outcomes, and if possible to measure, impacts of the programme?*

³ It was noted in comments received from Norad's department for quality assurance, that results frameworks are genuinely country-led processes. In this context, the results chains shown here are illustrative examples.

The main impacts of the programme is an energy sector that is already restructured to an extent, and that is ready to be restructured further. The energy sector institutions appear as fully functional, with clear mandates. The impacts are considered a result of all three phases of Norwegian assistance and other efforts of the RGOB and other donors.

The Bhutan Electricity Authority (BEA) has become autonomous. It employs at present 24 staff, and it has created 51 positions. It is engaged in tariff setting and overseeing the sector in terms of electrical safety standards, and is getting ready for licensing of HPP.

The Druk Green Power Corporation (DGPC) is firmly established. It is well managed and is developing. In addition to having taken over the ownership, operation and maintenance of the large/mega schemes of Chukha and Tala and the smaller schemes Basochhu and Kurichhu, totalling almost 1,500 MW of capacity, DGPC is now engaged in HPP development activities on its own (study of Nikachhu 210 MW), implementation of Dagachhu 114 MW, the first CDM project, with support from Austria, and in studies (Rotphasong and Komatchhu) in collaboration with the Norwegian assistance. DGPC is at present employing more than 1,400 staff. Operational HPP are overstaffed consciously in order to prepare for new schemes coming into operation by 2017.

The Bhutan Power Corporation (BPC) has become the national transmission and distribution agency. It has been considerably strengthened with trained staff. A total of 59 staff, including two M.Sc. have over time been trained with Norwegian funding, and today BPC feels confident to achieve full electrification of Bhutan by 2013. There are 1,945 employees at present. The corporation is using performance indicators such as SAIFI and SAIDI⁴, which are reported to have improved over time.

DOE is fully staffed, and eight master's degree holders are in mid-level management or other responsible positions. It has a total of 257 employees. It has been proposed to expand the divisions of DOE into departments⁵, which will mean that another approximately 60 staff may be employed.

Training at the level of a master's degree has been made available to one candidate in the environmental field. There are no discernible outcomes on environmental matters, as a direct result of programme activities. The programme document of April 2008 for phase III actually states that hydropower development as such has a positive impact on the environment, and that it provides an alternative to electricity generated from coal in India. Unfortunately, this is a somewhat distorted and one-sided perspective. In terms of scale and total potential volume, electricity from Bhutanese hydropower can only contribute modestly to replacing coal power in India due to the sheer scale of the latter (refer also to section 1.1). A more pertinent question is what hydropower can potentially do to Bhutan's pristine nature. The threat is significant and much will need to be done to keep it under control.

The programme has contributed to integrating environmental considerations in the work on licensing. Environmental topics have also been included in lectures of NVE personnel. Otherwise, concrete environmental studies are a part of the Accelerated Hydropower development programme, but the related main activity is deferred to the extension phase.

⁴ SAIFI = System average interruption frequency index and SAIDI = System average interruption duration index for power utilities

⁵ Proposed departments are: Department of Hydropower & Power Systems, Department of New and Renewable Energy, and Department of Hydro-Meteorological Services. New and Renewable Energy is to include hydropower < 25MW.

In terms of end-user benefits, i.e. the people of Bhutan, an indicator is the cost of electricity. Of interest with regard to poverty alleviation is the tariff for the “social category”. The table below shows the entire tariff regime in force. The social tariff is probably the lowest in existence. Compared with the equivalent category in India, it is only 40%, and the tariff in the comparable category in Nepal is higher by a factor of 2.9.

Customer Category	1st August 2010 to 30th June 2011	1st July 2011 to 30th June 2012	1st July 2012 to 30th June 2013
Wheeling (Nu./kWh)	0.111	0.111	0.111
LV	0-100 kWh (Nu./kWh)	0.85	0.85
	101-300kWh (Nu./kWh)	1.47	1.54
	300+ kWh (Nu./kWh)	1.94	2.04
	LV bulk (Nu./kWh)	1.94	2.04
MV	Energy charge (Nu./kWh)	1.63	1.71
	Demand charge (Nu./kW/month)	95	105
HV	Energy charge (Nu./kWh)	1.51	1.54
	Demand charge (Nu./kW/month)	85	105

Source: <http://www.bpc.bt/utilities/electricity-tariffs>

Table 3: Electricity Tariffs of BPC

2.5.5 Relevance

Requirement according to the TOR: *In general assess the extent to which the objectives of the programme are consistent with the intended beneficiaries' requirements and country needs.*

The perception of Bhutanese stakeholders is that the relevance of Norwegian assistance is high. The combination of a formal training component and the cooperation with NVE personnel, which includes on-the-job training and significant professional exchange, increases the relevance beyond what each component alone could achieve.

There is a consensus among Bhutanese stakeholders, that future close cooperation with Norway will be even more relevant because of the challenges lying ahead.

High relevance is accorded to a number of characteristics in the cooperation. An attempt at ranking shows the following:

Rank	Characteristic	Attribute
1	Broad experience of experts	Highest relevance
2	Willingness to share knowledge	Highest relevance
3	Flexibility and openness	High relevance
4	Untied funds for training	Medium relevance

Table 4: Ranking of Relevance Characteristics

2.5.6 Sustainability

Finally, the terms of reference pose the following questions in the context of sustainability:

- *To what extent have the activities undertaken contributed to strengthening the institutional capacity of the relevant Bhutanese institutions and to make the institutions more sustainable?*
- *Capacity/competence building: The need for training/capacity building should be identified.*
- *Social-cultural/gender equality and sustainability? Assess the involvement of women in the programme, including planning and decision-making. Have, and will the programmes affect men*

and women differently? Have the programmes incorporated specific activities and mechanisms to ensure equal participation of women and men? What are the barriers to women's and men's participation? Have means and resources been distributed equitably between women and men?

- *Environmental sustainability: Have adequate mechanisms for monitoring and mitigating environmental impacts been integrated? Is it possible to follow up and monitor the results?*

The review assesses the sustainability of the energy sector institutions as follows:

- The energy sector has developed into the main and driving economic force in Bhutan. All efforts are being made to further build on strong institutions and to assure their sustainability. It is today plausible that sustainability of all institutions in the sector is high. It is perhaps in order to reiterate Bhutanese sentiments by citing the Minister of the Ministry of Economic Affairs, Lyonpo Khandu Wangchuk, who is quoted to have said in a recent speech:

The Energy Sector is in safe hands!

There is no doubt that the programme and Norwegian assistance has contributed to this assessment, but the challenges lying ahead should be taken seriously.

- Leaders in the energy sector emphasise that employment in the energy sector will need to reach about 6,000 staff by 2020. Based on hydropower generating capacity planned to reach roughly 11,500 MW by that date. The key performance indicator MW/staff would then number about 1.9, a change from about 0.4 MW/staff at present. This represents an increase of personnel efficiency by a factor of close to 5, and an efficiency gain fosters sustainability.
- However, the growth of staff numbers, and the increased envisaged staff efficiency will only be feasible if further human resource development, i.e. training and education in a significant number of key areas, and for large numbers of staff at all levels, is emphasised more than ever before. Further Norwegian assistance in this area will be a key contribution to sustainability, and will therefore be highly needed and appreciated by the RGOB.

3 Review of Support to the Accelerated Hydropower Development

3.1 Description of the Programme

Norway provides funding of up to NOK 14.982 million for the programme, which is implemented by the DOE. NVE of Norway is the designated collaborating partner. Funding is used for the implementation of defined field activities, in particular studies carried out by the engineering consultant Norplan, who was awarded the contract upon international tendering carried out by NVE. Inclusion in the study of local stakeholders to the extent feasible, in particular staff of DOE and DGPC, is envisaged in order to provide relevant field experience. The foreign consultant is instructed to use and build capacity within Bhutanese consultants.

According to the Project Document of April 2008, the programme was to include institutional capacity strengthening in project finance, power sales agreements, and associated activities with a major focus on the needs of independent power producers, as major activities. This was envisaged as crucial to DOE's ability of developing the hydropower resources of Bhutan in an accelerated tempo and speed.

The programme was also to contain support to preparatory activities for invitation of investors, reconnaissance studies of all remaining un-investigated sites under the Power System Master Plan, preparation for and carrying out of pre-feasibility studies for selected priority hydropower projects, and preparation for and carrying out of a Detailed Feasibility Study (including a Clean Development Mechanism preparatory Study) for one selected priority project.

With respect to the project studies, emphasis was to be placed on developing the capacity of DOE such that its staff could assume more and more of the responsibility and finally carry out all study activities themselves.

The duration of the project is five years, starting from July 2008 through 2012, matching the period of the 10th Five Year Plan for Bhutan⁶. It was understood that funding after the first three years would be subject to review.

3.2 Goal

The main purpose of the programme on the national scale is the accelerated development of the hydropower resources of the country, and for attracting investors for implementation of hydropower projects, thereby leading to socio-economic development and poverty alleviation /reduction⁷.

3.3 Purpose

The immediate objective of the programme is to accelerate the hydropower development in Bhutan in the form of programme finance and power sales agreements, reconnaissance surveys for the remaining listed sites under the Power System Master Plan, pre-feasibility studies of project sites and a Detailed Project Report of one site including environmental studies.

⁶ The end of the 10th Plan falls on 30 June 2013.

⁷ Reference is made to the Project Document of April 2008, which however, uses different terminology for both Goal and Purpose

3.4 Outputs and Activities

3.4.1 Planned Outputs

The Project Document of April 2008 listed the following target outputs:

- Reconnaissance report of all the remaining projects listed in the Power System Master Plan
- Power sale agreement formats
- Pre-feasibility reports of project sites
- Detailed Project Report of one Project, including an Environmental Report

Note: The programme was conceived before Bhutan's bilateral agreement with India to prioritise the construction of 10'000 MW of HPP.

3.4.2 Activities

Activity 1 - Project finance and power sales agreements

Support by a small group of specialists to manage and carry out the process of preparations to invite investors. This would need to be tailored to the results of the ADB TA, but would include considerable preparation work, resulting in the packaging of project information (including pre-feasibility studies, study of the export market, financing opportunities, risk assessment, CDM opportunities).

Activity 2 - Reconnaissance Surveys for unvisited sites under the PSMP

Under this activity, reconnaissance surveys were carried out for remaining unvisited projects listed in the power system master plan (PSMP). The survey works were to include verification of the physical head availability, site identification of major infrastructure like dam site, head race alignment, power house, switchyard, and transmission alignment. Emphasis was to be on capacity building of DOE personnel to enable them to handle the studies themselves.

Activity 3 - Prefeasibility Studies of project sites incl. environmental Studies

Prefeasibility studies to be conducted for 4 projects sites, later reduced to two sites, with optimization of design by Norwegian hydropower experts where opportunities are provided for the DOE and other national counterpart staff also to be trained on-the-job for effective skills and technology transfer. Great emphasis to be placed on capacity building of DOE experts. The rationale for carrying out the studies is based on a package of studies in which the first project studied has intensive input from Norwegian experts, the next project has reduced Norwegian expert input and increased DOE and Bhutanese staff involvement, and so on.

Activity 4 - Detailed Project Report (DPR) of 1 site incl. environmental Study

A Detailed Project Report will be prepared for at least one project site. Project development models through potential models like bilateral financing, joint venture, IPP and also through Norwegian assistance and joint venture partnership will be addressed in the study. The activity is also to include a Clean Development Mechanism Preparatory Study and an Environmental Study.

3.5 Assessment of Performance and Achievements

Due to the priority on implementing 10,000 MW bilaterally with India, it was agreed in the Annual Meeting of 6 May 2009, that no activity is expected on Activities 1 and 4 during the first three years of the project. The budget that was assigned to Activity 1 was reallocated to Activities 2 and 3. The review therefore contains no assessment of activities 1 and 4.

3.5.1 General Findings

- The tasks of activities 2 and 3 were tendered, and a tender evaluation team with two members from DOE as well as two members from NVE selected the winning bid: Norplan of Norway. The contract was awarded on 15 April 2009.
- Ten counterparts from DOE and DGPC were assigned to the programme to work with the consultant in a first phase. Each participant was assigned specific tasks and activities, and a supervisor from the consultant's team. This concept was found a successful approach and counterparts were engaged with enthusiasm and diligence.
- It was found from interviews that formal training (under the Strengthening of Capacity programme) and on-the-job training in the presently reviewed programme is complementary and considered particularly useful by participants.
- Initial field work was hindered by the lack of quality maps. These had to be produced from satellite images. Additional costs were covered by using contingencies that had been set aside.
- With the experiences that counterparts have made, the wish is nurtured in DOE and DGPC to take on more responsibility in future work and also to expand the scope of study: Be responsible for the planned comprehensive detailed design study, engage more in project design optimisation studies in general, and include river-basin development approaches with the purpose of optimised systematic development of potentials. Also, engage in comprehensive study of the need and scope of seasonal storage projects, with a view to improve power supply security, while minimising environmental impacts.
- The review's main contention is that environmental concerns should be addressed at a strategic and overall level, rather than at the project level only. It is basically about Strategic Environmental Assessment (SEA), versus project-based Environmental Impact Assessment (EIA), as a matter of policy, simply for the fact that the ongoing development programme and future plans are massive and will have an impact on the national level, beyond the impact of individual projects. Brief assessment of what has been done so far in terms of environmental management in the various programme activities is a further motivation for a recommendation in this context.

3.5.2 Efficiency

In the context of efficiency, the TOR for the review specifies the following tasks and questions:

- *Assess programme designs, planning processes, participation of relevant stakeholders and programme organization, monitoring and reporting.*
- *Assess progress and efficiency of activities carried out. Measure how economically resources and inputs; funds, expertise, time etc., are converted to outputs.*
- *Compliance with agreements and programme documents. To what extent have the partners in Norway and Bhutan complied with obligations as stated in the agreements and programme document?*
- *Assess the quality of the results reporting. To what extent can reported results be verified?*
- *To what extent are disaggregated data included in the reporting with regard to men and women?*

The programme design is assessed as very ambitious. This has resulted in corrections and deferral of activities to a later stage. New RGOB priorities in bilateral hydropower development have played a role in this, but there have also been budget issues. Considerable time was spent at the beginning of programme implementation to align available budgets with the volume of

work. The programme has been designed for participation by DOE and DGPC personnel. In particular, staff of the hydro-met services division have been challenged with responsible tasks, as hydrological data interpretation is critical for good project design, but at the same time, it is very difficult due to constrained availability of reliable data.

In the area of social and environmental study, processes have been adequately participative by consulting with local communities and authorities. It appears that no opposition formed against potential hydropower development. At the locations in question, it is reported that communities do not extract water from the rivers for their own consumptive use. Hence, water sharing is not an issue, but people expect to benefit from getting access to a road when a HPP is being constructed.

It not possible to assess efficiency in terms of cost-saving implementation. The implementation had to deal with a number of issues such as a lack of accurate maps and geotechnical issues with breakdown of drilling equipment. This has raised the cost, and in addition a big landslide has not allowed field visits at an early stage, so another trip had to be undertaken. Despite these cost-inflating events, the programme was implemented within budget, and some savings were even achieved overall. This reflects well on efficiency. In another area however, it came to light that duplication of efforts in sediment sampling and analysis by DOE and DGPC in parallel threatened to reduce cost efficiency. This is further discussed in the following paragraph.

As far as can be ascertained, the agreement partners fully concur to obligations entered into. It so happened that the review could verify the results of the activities, as the draft reconnaissance reports for 14 sites, and pre-feasibility study reports for two sites had been submitted the previous week, in accordance with plans, and despite considerable problems encountered in sample drilling. There may be a point of non-compliance to the required extent of environmental study however (refer to 0, end of paragraph).

Reporting for the programme is on a quarterly basis from NVE to DOE, and semi-annually from DOE to the RNE, the same mode that is being followed in the Phase III programme. In addition, Norplan as the contractor for the field studies reports quarterly on progress of the studies to DOE. Reporting on activities is of high information content and is submitted in a timely manner. It is in the nature of the task that results in the form of produced project reports will be available at the very end of the contract.

Reporting identifies the personnel involved. Hence, it is transparent to what extent women are involved: Four women out of ten counterparts, but somewhat variable, and two women in the consultants' team of twelve, and later four out of fifteen.

3.5.3 Effectiveness

The following questions are addressed:

- *Achievement of objectives:*
 - *To what extent will the overall objectives be reached? The performance of the programme in relation to set goals and indicators (the results chain).*
 - *To what extent have inputs, outputs and activities contributed to the overall objectives of the programme.*
- *Deviations:*
 - *What deviations of plans and budgets have occurred and what are the causing factors. Have adequate measures for avoiding reiteration of deviations been implemented.*
- *The roles and responsibilities among and between the implementing institutions.*
 - *Donor coordination?*

For various reasons, the programme has been reduced to a less ambitious level. This indicates that the original objectives have not been achieved. The main reason for this is that priorities for Bhutan have changed. Accelerated hydropower development is now primarily following the bilateral approach, rather than the private sector and direct foreign investment approach. There is less urgency for the latter, and this implies that more time is available to “set the stage” for it. The programme has adapted early to this new reality. One may argue with the benefit of hindsight that the budget provided would not have been adequate for the full scope of activities in the first place.

Deviations: It was decided to carry out two pre-feasibility studies instead of four. The reason for this has been the budgetary constraint. Overall, It would have been appropriate to re-formulate the programme goal and purpose, as postponing half the activities or more made it far from realistic to achieve the original objectives. Nonetheless, what has been agreed to be carried out in terms of field studies and on-the-job training, has been achieved most effectively.

The roles and responsibilities between the implementing institutions are relatively clear. This may have been a bit different at the outset of the programme. DGPC had just become operative and its mandate was limited to operation and maintenance of HPP at the beginning. It was later extended to include project implementation, and this made it a candidate to also engage in project study, in parallel to DOE. This may have given rise to duplication of efforts on sediment sampling and research at an early stage. The problem was recognised however, and the consultant has made a proposal how it may be solved by upgrading the DGPC sediment lab in Kurichhu. This has now been agreed. DOE and DGPC discuss at present how this facility is to be managed, and equipment required is in the process of being procured, with delivery expected in the last quarter of the programme period.

Donor coordination: The study of hydropower potential through creation of the PSMP (master plan) has been the domain of Norwegian-Bhutanese cooperation for many years and it has continued to remain so in the present programme. Bilateral hydropower development with India does not duplicate this work, but uses results of studies for project implementation. The cooperation of Austria with Bhutan is on construction of HPP and CDM implementation, and other donors on other subjects, rather than prospective study. Hence there is no overlap, and no need for coordination.

3.5.4 Impact

Specific questions in the context of programme impact are the following:

- *What are the main outcomes, and if possible to measure, impacts of the programme?*
- *To what extent do the intended target groups benefit from the programme?*
- *To what extent do women and socially excluded benefit from the programme?*
- *Do the programme’s activities target gender equality and social inclusion issue?*
- *Environmental consequences: Are there any outcomes, and if possible to measure, impacts of the programme?*

Given the limited scope of the actual work, it is not surprising that it is not possible to measure outcomes beyond the produced outputs. Intended target groups, the people of Bhutan, can be expected to benefit only at a much later stage. The same is true for women and the socially excluded in general. On the other hand, women who have been involved in the programme as counterparts benefit in the same manner as male staff. Otherwise, the programme is of a technical nature, and none of the activities target gender equality and social inclusion issues.

There are, so far, no impacts in terms of environmental consequences. Within the tasks of preparing pre-feasibility studies for Rotpashong and Khomachhu HPP, Initial Environmental Assessment (IEA) has been carried out, but Environmental and Social Impact Assessment (ESIA)-pre-feasibility is actually required. IEA is limited largely to social and environmental data collection. Expected impact is described rather superficially in the main report, and no environmental measures are proposed, except that “environmental costs” are estimated at USD two million, representing 0.12% of the total estimated cost of USD 1,665 million. It is common, and considered current practice, that detailed environmental measures are not elaborated at this level of study, but then it is not clear, how a cost item for environmental measures can be estimated with any degree of relevance. Overall, adequate mechanisms for monitoring and mitigating environmental impacts are not in place at this stage, not even conceptually. This appears not as is required by the terms of reference for the consultant, which states: “...the ESIA pre-feasibility will determine... compensation and mitigation measures according to international standard.”

3.5.5 Relevance

Requirement according to the TOR: *In general assess the extent to which the objectives of the programme are consistent with the intended beneficiaries’ requirements and country needs.*

The perception of Bhutanese stakeholders is that the relevance of Norwegian assistance is high.

The accelerated hydropower development programme is complementary to the institutional cooperation programme. In terms of capacity building, it provides indispensable practical experience to participating counterparts. In addition, the programme also provided formal training. In the context of on-the-job training of counterparts at Norplan’s offices in Norway, several staff had the opportunity to attend a course at the International Centre for Hydropower (ICH) in Trondheim.

In terms of relevance to the sector development programme, preparation of reconnaissance and pre-feasibility studies is a highly relevant logical step. It may in fact be relevant for all future development approaches, including the presently prioritised bilateral approach, which requires additional feasible projects. Relevance is also true for the detailed feasibility study planned for an extension phase. It is required and relevant with a view beyond 2020, when strategic national plans envisage entering into a HPP development approach beyond bilateral implementation.

3.5.6 Sustainability

Finally, the terms of reference pose the following questions in the context of sustainability:

- *To what extent have the activities undertaken contributed to strengthening the institutional capacity of the relevant Bhutanese institutions and to make the institutions more sustainable?*
- *Capacity/competence building: The need for training/capacity building should be identified.*
- *Social-cultural/gender equality and sustainability? Assess the involvement of women in the programme, including planning and decision-making. Have, and will the programme affect men and women differently? Has the programme incorporated specific activities and mechanisms to ensure equal participation of women and men? What are the barriers to women’s and men’s participation? Have means and resources been distributed equitably between women and men?*
- *Environmental sustainability: Have adequate mechanisms for monitoring and mitigating environmental impacts been integrated? Is it possible to follow up and monitor the results?*

The review assesses the sustainability of the accelerated hydropower development programme as follows:

- Competence of staff in handling field studies has been significantly strengthened by the programme. To the extent that DOE and DGPC wish to take a more responsible role in further studies under the programme, in particular the task of carrying out a detailed feasibility study of one project which has been envisaged in an extension phase.
- Social-cultural/gender equality and sustainability are not specifically addressed by the programme. Women have equal chances in being engaged in tasks and positions as men, but they have to meet qualification criteria. Apparently, such criteria are being met increasingly, resulting in a number of women on the counterpart team.
- Environmental sustainability: So far, the level of study (reconnaissance and pre-feasibility) is not sufficiently deep to assess monitoring of environmental mitigation measures. It is too early for an assessment at this stage. Nonetheless, the review shares the concern of several senior Bhutanese officials that the environment is at great risk of being compromised in the course of accelerated hydropower development, on the basis of the observations made in the previous paragraph. It is found that achieving and maintaining environmental sustainability will require emphasised attention to environmental management approaches in an extension phase.

4 Review of Management of Risks caused by Natural Hazards for New Infrastructure Development

4.1 Description of the Programme

The programme is a continuation of the previous institutional cooperation programme “Capacity Building and Technology Transfer to Obtain Higher Degree of Regularities on Bhutan’s Major Roads”. The Department of Geology and Mines (DGM) is the responsible Bhutanese entity that cooperates with the Norwegian Geotechnical Institute (NGI).

To assist Bhutan in coping with the challenges related to existing roads, Norway has supported capacity building projects at DGM in two phases. The first was completed in 2004 and the second phase in 2007. While both phases were related to improvements and mitigation of risk for existing road systems, the present Phase III addresses the challenges related to managing the risks from Natural Hazards in connection with the planned development projects in the country.

Risk management includes elements such as hazard identification, risk assessment and risk reduction, measures for land use practice, use of building codes and regulations, possible use of structural mitigation measures, early warning systems and awareness and preparedness efforts. In addition to DGM, important stakeholders of the project include the Department of Urban Development and Engineering Services (DUDES), the Department of Roads (DOR) and the Thimphu and Phuentsholing township authorities.

The programme has a budget of NOK 6 million for a period of three years. Start was in July 2008, and it has been decided in the Annual Meeting of 2010 to extend the programme till the end of 2011. A two year extension is being considered.

Note: The design elements shown below are drawn from the Project Document of April 2008 and are listed under the appropriate sub-title. Categorisation has been attempted by the review as clear structuring has not been done in the PD. The review has also made an attempt to construct the results chain at least partially, which had not been shown using appropriate terminology, and in a logical manner.

4.2 Goal

The main goal of the programme is to mitigate natural hazards associated with infrastructure development in Bhutan through technology transfer and build up of capacity at DGM and other stakeholders. The ultimate goal is to prevent the negative effects on Bhutan's economy through sustainable development.

4.3 Purpose

The purpose of the programme is implementation of proper planning and risk management in connection with new infrastructure development, so that threats from natural hazards do not contribute to loss of lives and damage to critical structures.

4.4 Outputs and Activities

4.4.1 Planned Outputs

- Reduced disaster risks by minimizing vulnerabilities.
- Strengthened capacity and skills of DGM in management of risks caused by natural hazards.

- Early warning systems to lessen the impacts of natural and related environmental hazards e.g. due to glacial lake outburst floods (GLOF).
- Preparedness plans for people to become aware of the threat of natural hazards.
- Hazard and risk maps for better land use planning to settle populations in safer areas.
- Professional competence in DGM and other departments will also be enhanced as they will become aware of hazards, risks and vulnerabilities from natural disasters.

4.4.2 *Activities*

- On-the-job training on sub-surface soil and rock investigations and publication of results report and mapping of slope instabilities, as well as characterisation of rock mass using Q-system, for tunnelling purposes.
- Landslide mapping using light detection and ranging (LIDAR) technology
- Dissemination of knowledge to other Departments
- Attendance of one student in master's course at Oslo university
- Training and exposure on early warning systems, e.g. on rock slides in Norway.
- Procurement of equipment and software for geological investigations and analysis.
- Preparation of tunnel pre-feasibility study & plans for modern construction technology.
- Demonstration of work pertaining to practical slope stabilization measures along the existing road communication routes will be demonstrated to DGM and DOR personnel.
- Training of personnel to obtain a hands-on experience on various aspects of tunnelling.
- Exchange of knowledge and experience at the regional level.
- Preparation of hazard and risk zonation maps, including a concept of a Glacial Lake Outburst Flood (GLOF) early warning system, and procurement of related equipment.
- On the job training in Norway and Bhutan. Training material related to practical disaster mitigation measures for mass movements such as rock falls and landslides and seismic events caused by earthquakes will be developed for practising engineers for awareness and preparedness.
- Guidelines for land use planning and application to the management of natural hazards. Based on the damage potential from natural hazards guidelines will be prepared for e.g. building earthquake resilient infrastructures.

4.5 Assessment of Performance and Achievements

4.5.1 *General Findings*

- Stakeholders perceive the impact of on-the-job practical training as the key achievement of the programme.
- The programme is thematically very broad. On one hand this is an expression of significant dedication of all involved. On the other hand, some observers, including the review, find that the breadth of engagement is stretching the resources too thin, and is at the cost of a clear focus.
- While there have only been indirect links of the programme to the energy sector, Phase III tends now to move towards geotechnical study that is also directly relevant to hydro-power infrastructure construction. This is regarded as a positive development, as synergies appear attainable.

- At the same time, including new proposals in the area of seismological study and monitoring would again divert from a strengthened focus.
- From the perspective of the DOR, tunnelling has now become a Government priority. Early further progress is hoped for.
- It is noted that contact between DGM/NGI and DGPC has been established and both sides are very interested in taking up cooperation. In annual meetings, such closer cooperation between the energy sector and the geotechnical area has been explicitly encouraged. Of immediate interest is the investigation of some problems in the Tala cavern powerhouse. In the future, direct synergies could develop in tunnelling activities for roads and HPP.
- The review finds close linkage between the present programmes with energy sector infrastructure implementation a rational reason for a redirection of the programme, This would also provide a sharper overall focus of Norwegian cooperation. The rationale is threefold.
 1. Work on tunnelling is synergetic between roads and HPP, and may lead to useful exchange of experience.
 2. Road tunnels benefit remote HPP directly by making transport more economic during construction and operation, and
 3. The impact of natural hazard risk management for new infrastructures is most important and potentially beneficial due to the national scale of hydropower development.

4.5.2 Efficiency

In the context of efficiency, the TOR for the review specifies the following tasks and questions:

- *Assess programme design, planning process, participation of relevant stakeholders and programme organization, monitoring and reporting.*
- *Assess progress and efficiency of activities carried out. Measure how economically resources and inputs, funds, expertise, time etc., are converted to outputs.*
- *Compliance with agreements and programme documents. To what extent have the partners in Norway and Bhutan complied with obligations as stated in the agreement and programme document?*
- *Assess the quality of the results reporting. To what extent can reported results be verified?*
- *To what extent are disaggregated data included in the reporting with regard to men and women?*

The programme design is assessed as elaborate but somewhat lacking a coherent objectives hierarchy. It is a disadvantage for reporting that the structure has not been set up in line with the Development Cooperation Manual of Norad, Annex II. As a consequence, planning and reporting lack focus and performance indicators are not used.

Despite shortcomings in reporting, the review assesses progress as adequate and in line with resources expended. Overall, the programme shows under-spending of the budget and this is identified as a result of personnel limitations at DGM, which it appears has now been overcome by employing two additional geologists, which, notably, are women.

Efficiency of carrying out activities cannot be assessed. Firstly, no basis for comparison can be established and secondly, even if it did exist, expenditure reporting is not detailed enough to allow for meaningful assessment.

It is found that stakeholders concur with agreements by and large. It is noted however, that expenditure accounting is not provided against detailed budgets in the annual report, but merely in a summary manner.

4.5.3 Effectiveness

The following questions are addressed:

- *Achievement of objectives:*
 - *To what extent will the overall objectives be reached? The performance of the programs in relation to set goals and indicators (the results chain).*
 - *To what extent have inputs, outputs and activities contributed to the overall objectives of the programs.*
- *Deviations:*
 - *What deviations of plans and budgets have occurred and what are the causing factors. Have adequate measures for avoiding reiteration of deviations been implemented.*
- *The roles and responsibilities among and between the implementing institutions.*
 - *Donor coordination?*

Achievement of the overall objectives is a challenge because the formulation of goal and purpose is at a high, rather abstract level. On the other hand, the financial inputs have been put to good use in carrying out the various activities. Participating staff have experienced this as valuable practical training and it is perceived that it has improved the capacity of involved institutions. Further, equipment to implement new technologies and related training have widened the scope of skills in DGM.

An attempt is made to show a results chain as an illustrative example (see Fig. 4), but it is noted that the result cannot be quantified by the review because the required data has not been provided.

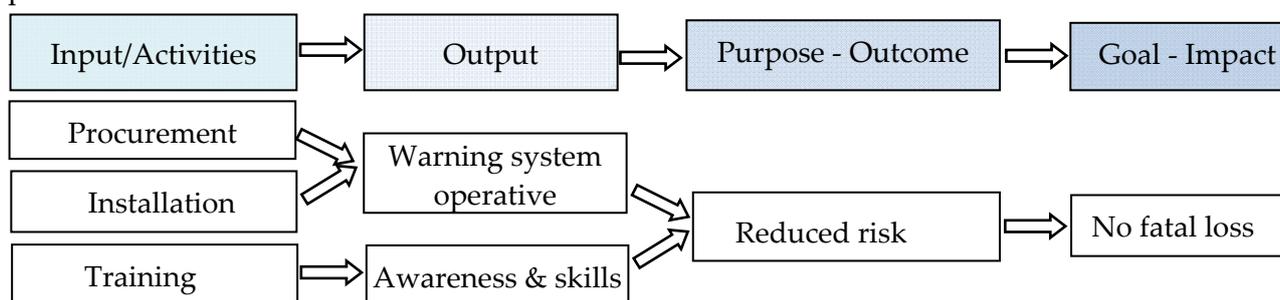


Fig. 4: Hypothetical Results Chain with regard to "Early Warning System" but data is lacking

Deviations: It is stated that there has been considerable delay in completing some of the activities. This implies deviations from plans, and the reason given is the constrained personnel capacity of DGM. From the perspective of the review it may also be the case that too many activities had been planned.

Donor coordination may be an issue in relation to GLOF study and action. The DGM is already engaged in the issue with UNDP and GEF and the hydro-met division of the DOE has some related activity also. There is a need to make sure that there is no overlap or duplication.

4.5.4 Impact

Specific questions in the context of programme impact are the following:

- *What are the main outcomes, and if possible to measure, impacts of the programme?*
- *To what extent do the intended target groups benefit from the programme?*
- *To what extent do women and socially excluded benefit from the programme?*
- *Do the programme activities target gender equality and social inclusion issues?*
- *Environmental consequences: Outcomes, and if possible to measure, impacts of the programme?*

An attempt is made to illustrate the outcomes using the result chain approach.

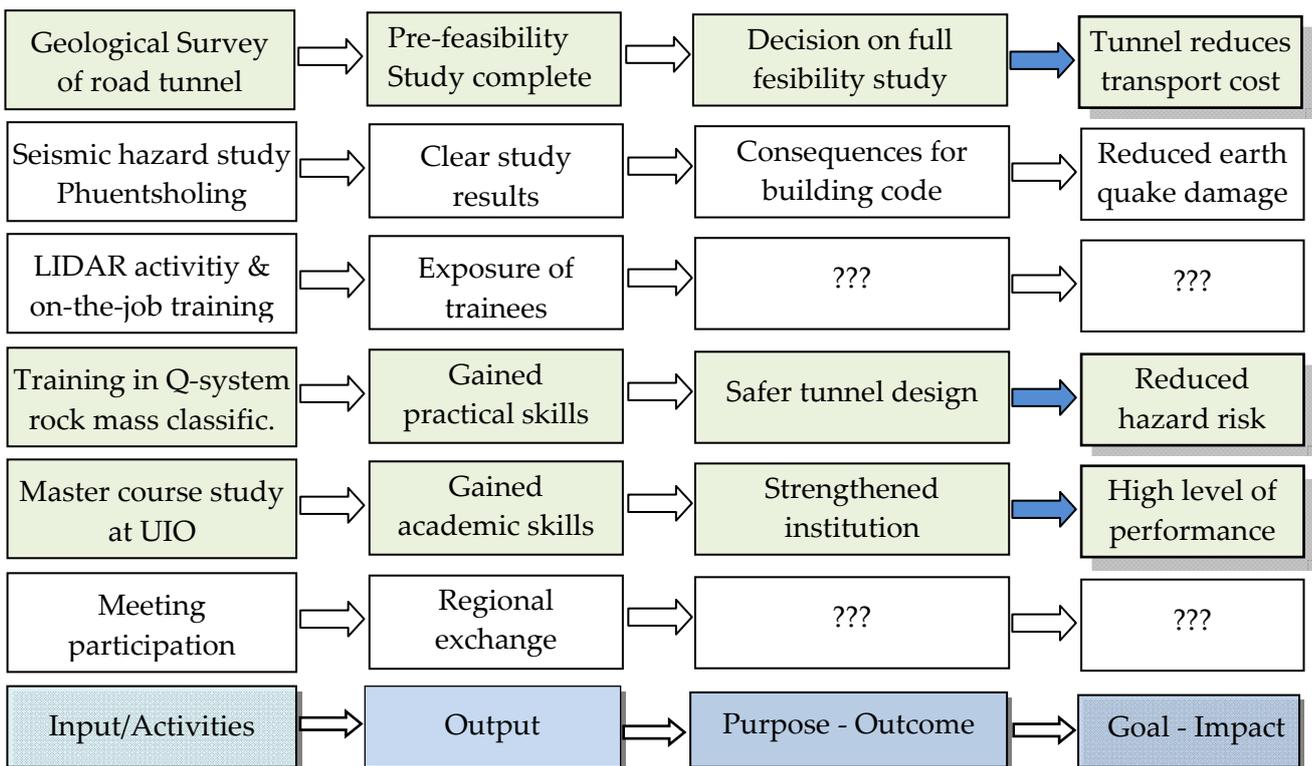


Fig. 5: Programme Activity Results Chains

It is visible that activities generally achieve an output, but that outcomes have not yet followed, and impacts can be expected only in a relatively distant future. In some cases, it is difficult to identify a desirable outcome and a potential impact, or such impact is uncertain. On the other hand, tunnelling investigation technology and risk management, as well as formal education, show a strong causality in the results chain, and impacts appear the most significant for Bhutan and the most rational for the programme.

The potential benefit to target groups – the people of Bhutan – is significant, probably the most important is achieved when road tunnels are realised, as this will save time and money for all users, and make traffic safer. Early warning systems will have the same impacts, if implemented. The benefit to the general public is probably less direct if geotechnical investigation and new technology is used in hydropower construction. Nevertheless, it will contribute to the nation’s most economically relevant development effort.

Women will benefit in the same way as men. The programme is of a technical nature and gender equality is not a meaningful criterion in this context.

Road construction is most likely the prime contributor to human-induced landslides. Road tunnelling has the potential to reduce the scale and frequency of landslides due to road construction. At the same time, it may be possible to circumvent areas prone to natural landslides with road tunnels. Hence, the programme can definitely make a positive contribution to offset environmental impact due to infrastructures.

4.5.5 Relevance

Requirement according to the TOR: *In general assess the extent to which the objectives of the programme are consistent with the intended beneficiaries’ requirements and country needs.*

The perception of Bhutanese stakeholders is that the relevance of the programme is high. At a general level, all activities are relevant, but this assessment is not very useful for priority setting. Hence, an attempt is made to differentiate and tentatively provide a ranking of different activities, in relation to a potential contribution to goal achievement.

Rank	Activity	Attribute
1	On-the-job training and experience	Highest relevance
2	Q-System technology training to inform tunnel design	Highest relevance
3	Landslide study, monitoring and early warning	High relevance
4	GLOF early warning	Medium relevance
5	Seismic zonation mapping	Low relevance

Table 5: Ranking of Activity Relevance

4.5.6 Sustainability

Finally, the terms of reference pose the following questions in the context of sustainability:

- *To what extent have the activities undertaken contributed to strengthening the institutional capacity of the relevant Bhutanese institutions and to make the institutions more sustainable?*
- *Capacity/competence building: The need for training/capacity building should be identified.*
- *Social-cultural/gender equality and sustainability? Assess the involvement of women in the programme, including planning and decision-making. Has, and will the programme affect men and women differently? Has the programme incorporated specific activities and mechanisms to ensure equal participation of women and men? What are the barriers to women's and men's participation? Have means and resources been distributed equitably between women and men?*
- *Environmental sustainability: Have adequate mechanisms for monitoring and mitigating environmental impacts been integrated? Is it possible to follow up and monitor the results?*

The review assesses the sustainability of DGM/NGI activities as follows:

- Institutional capacity has been enhanced, without doubt. However, given the wide range of duties that DGM is mandated to cover, raises the question of sufficient personnel resources. Information was provided to the review that one very senior staff is planning to move to a responsible position elsewhere. Even though this experts' knowledge is not lost to Bhutan, it will be lost to DGM, and it will put in question institutional sustainability of the affected division.
- From the above observation results a need for future training and additional capacity building in general. A sharpened focus in the programme activities, as discussed earlier, will also be conducive to attaining sustainability. Further training on the key subjects identified will be needed in the extension phase. As far as activities in the road sector are concerned, it appears necessary, and is explicitly requested from that side, to include staff of the DOR in training activities; on-the-job as well as formal.
- Social-cultural/gender equality and sustainability are not specifically addressed by the programme. Women have equal chances in being engaged in tasks and positions as men. DGM has been able to employ two women geologists recently.
- With a view to environmental sustainability, it appears that activities can contribute, in particular by moving ahead on support to tunnelling and on landslide study and prevention. Environmental monitoring within programme activities itself is not required.

5 Common Aspects

The projects reviewed have some aspects in common, as the methods and practices of work in the two involved partner institutions DOE and DGM are identical, and both are supervised by the same “parent”, the Ministry of Economic Affairs. Therefore, in order to avoid repetition, the assessment applies to all three programmes, but it is differentiated where necessary.

5.1 Risk management

- *Assess the major risks experienced during the implementation of the programmes, and to what extent the programmes have addressed and mitigated these risks. Identify possible future risk factors and present recommendations for how to handle these.*
- *What are the critical issues at organisational and institutional as well as programme level?*

The main risks encountered in field investigations of the accelerated hydropower development programme have been of a geotechnical nature and regarding the facilities to investigate sediments needed to be assessed. Drilling equipment available has not been good enough for the type of drilling required in the studies carried out. Norplan’s sub-contractor has not been able to assess the risk related to its drilling equipment beforehand, resulting in time delay. This was absorbed by extending the final field study period, and the issue is now solved.

No problems or risks have been encountered while carrying out Phase III of the programme of institutional cooperation on strengthening of energy sector institutions. In the wider context of the sector however, it has been recognised that climate change constitutes a serious risk. Under the programme, and in collaboration with UNESCO, a training course was designed and carried out with a view to provide knowledge to the participants on related hydro hazards such as drought and flood, and how to analyse these extremes. The course has been considered a great success and useful in creating awareness of the risks identified.

In the cooperation between DGM and NGI, there is a risk of a lack of focus. Too many needs within the DGM have been identified, and it is understandable that attempts are being made to include as much as possible. However, as has been reiterated in Annual Meetings, complementarity of the different programmes, rather than diversity appears as a logical direction in order to maximise the overall impact. Keeping this in mind eliminates the risk, and it appears as the logical course of action. Concentrating on fewer key activities under the programme will also alleviate the risk of a lack of sustainable staff resources, which tend to be spread too thin.

At an overall level, the review finds that potentially, there is a risk of environmental damage simply due to the scale of ongoing HPP implementation. To an extent, this is already in evidence, for example at the Tala dam which has fatally disrupted the river ecology, and has a negative impact on biodiversity, and at the construction site of Punatsangchhu I, where the spoils from tunnelling are dumped for kilometres along the steep river valley. It is unclear what environmental management plan is being followed, and whether this is appropriate, in both cases. However, it is quite plain that the risk of environmental degradation, including issues of biodiversity is a serious concern that must be taken seriously. According to information received, the National Environment Commission (NEC) is weak, both in terms of its mandate and its staff numbers. It is outside the scope of the present review to assess this. The review makes recommendations on how to address environmental issues from a thematic point of view (refer to page 34), but a more assertive role of NEC is required. It is not possible to estimate the cost and effort required to implement the recommendations at this stage. Also, the review points out that tunnelling in road construction in itself is an environmental damage mitigation measure.

5.2 Audit

→ *Assess the accounting and audits that have been carried out for the programmes.*

Accounting for the programmes is being carried out in a distributed manner, in principle by the entity incurring the expenses. For example, DOE does the accounting for the Capacity Building component of the institutional cooperation programme, while NVE carries out the accounting for its own expenditure, and delivers such accounts to DOE as the overall responsible entity.

For expenditure accounted for in Bhutan, the Royal Audit Authority is responsible for auditing of the accounts on an annual basis. The same routines are followed for each programme. Citation from one of the audit reports may therefore suffice. The Royal Audit Authority reports that:

- The funds were released by Norway to the project through the Department of Public Accounts (DPA)
- The Project Account has been maintained with the LC Account No. 206.01/21 of the Department under FIC No. 2325;
- The project disbursements were valid and supported by adequate documentations;
- The disbursements had been made in accordance with the project document, financial rules and regulations, practices and procedures of the RGOB;
- The project management had maintained an appropriate financial management structure, internal controls and record keeping systems;

In general therefore, the accounts are approved by the auditor. In the event of irregularities, this is being taken up by the auditor, and requires a project management response. For example, it has been noted that some personnel had not settled travel advances by the end of the financial year. This had to be rectified and project management had to provide the proof of settlement, which the auditor has acknowledged.

5.3 Financial Management and Anti-corruption Measures

- *Do the financial management systems and capabilities prove themselves sufficient?*
- *Is the expenditure so far justifiable when compared to plans, progress and outputs?*
- *To what extent are the programmes designed to fight corruption – are measures implemented to avoid and detect corruption functioning satisfactory?*

Financial management systems are in place and in general these are adequate. At the aggregated level, accounting for expenditure is done against respective budget positions.

Accounting is assessed as perhaps not detailed enough in all regards. The review finds that full transparency can be provided if all items procured are listed in the accounts, with full costs. This would also allow for proper asset accounting and management at the Bhutanese institutions concerned.

Expenditures are fully in line with plans, progress and outputs achieved, except for a natural delay in invoicing. This results in some instances in accounting for the expenditure in the following period, but this is unavoidable and has no adverse consequences.

The programmes are designed to fight corruption in so far as all procurement from third parties is subject to either Bhutanese or Norwegian regulations, and observance of such regulations is being monitored and reported on.

For direct expenditure from the programmes, the perception of the review is that there is room for improvement. Full transparency is an effective anti-corruption measure. In terms of

accounting, two steps are required for full accounting transparency: The first step is to prepare detail budgets at the item level, consistently using unit rate and quantity calculations. The second step is to set up the chart of accounts according to such detailed budgets, and to do the accounting accordingly. If such information is then provided in annual reports annexes, an effective anti-corruption measure is in place. So far, this has not been done at the level of itemised detail.

5.4 Gender Assessment

Among the persons contacted by the review, less than 20% were women. This indicates that female stakeholders are a minority in the context of the programmes reviewed. Informants state that the number of women employed in the various organisations, and benefitting from training is increasing over time. Human resources development and employment in government service is regulated by the Royal Civil Services Commission (RCSC). Gender development and equity is stated as an objective, but there is no documented policy or practice of affirmative action. Recruitment and selection of personnel is purely on the basis of merit of the candidates. Agencies have the delegated authority to recruit and employ personnel at all levels. However, the rule of merit-based selection applies, and this limits affirmative action at this level, not only in employment but also in selection for further training and education. The number of eligible female candidates is limited. Especially in technical disciplines, eligible male candidates by far outnumber females. As a result, many more men than women are employed. There is anecdotal evidence that when both female and male candidates for employment or promotion to a specific position have equal qualifications, the female will be chosen. In terms of statistics however, there are no gender disaggregated data.

5.5 Particular Concerns to be looked into

The terms of reference ask of the review to assess three specific questions with regard to the ongoing programmes. This is complied with by giving an independent outside view in an attempt to provide rational arguments.

5.5.1 Programme Extension?

→ *An option of two years programme extension has been foreseen originally. However, there is a concern that two years may not be sufficient time to complete planned activities, and therefore it may be opportune to extend by three years.*

Stakeholders have unanimously expressed a preference for a three years extension of all programmes. It is felt that two years is a period that is very short. In particular, it is not possible to complete 24 months master's courses within a two years period as the start date of a course is not likely to coincide with the beginning of the programme extension, and preparations, such as candidate selection, choice of course subject and training venue, will take a few months in each case.

Also, as there is a strong wish and a perceived need to expand and partially re-direct the programmes (see 0). For the inclusion of new themes and directions, again, two years is a very short period.

The review finds that the approach of the three programmes leaves room for improving linkages and synergies, with a view to compound the relevance and overall impact of all activities. To integrate such improvements, a programme planning exercise is suggested as a preparatory measure. Such planning is more efficient if it is done for a three year period, rather than for two years only.

While alignment with Bhutan's Five Year Plan periods would be desirable, it appears that extending the assistance period beyond the 10th Plan period is not a problem. Whatever is beyond the 10th Plan can conveniently be carried over into the 11th Plan by including it in the planning for the latter.

5.5.2 Programme Expansion?

→ *The question has been put to the review to assess the possibility of adding certain components or activities to the programme.*

There is a wish and rationale to include project design optimisation, a river-basin optimisation approach, the study of large storage projects, geotechnical capacity building with regard to hydropower tunnelling, and execution of road tunnelling feasibility studies. The review also sees the need for the introduction of systematic Strategic Environmental Assessment. A detailed "wish list" of future activities to be included in an expanded programme has been provided to the review. However, assessment of what has been proposed is outside the scope of the review. Rather, a coordinated joint process is required, preferably in the form of a planning workshop, so that priorities can be set and agreed among the stakeholders, as it is unlikely that everything could be included.

5.5.3 Inclusion of Seismic Hazard Initiatives?

As a general rule, Bhutan follows the construction standards with regard to earthquake risks of zone 5, which is adopted in neighbouring Northern India. As a result, some stakeholders feel structures are over-designed, implying higher costs than strictly necessary.

Bhutan has requested support for earthquake monitoring with a proposal dated May 2009, i.e. the establishment of the Bhutan National Earthquake Observatory, and national capacity building. Later, support was requested for National Seismic Hazard Mapping.

Seismic zonation may eventually result in adopting different standards in some areas, which ultimately may reduce costs of construction. However, an overall economic advantage is doubtful and there is no strong evidence that seismic zonation efforts should be prioritised in Bhutan. On the contrary, the seismic hazard study carried out in the Phuentsholing area has not come up with a recommendation that is different from what has already been the standard.

More importantly, the link to hydropower development and other national infrastructure construction appears weak. The review therefore finds seismic zonation efforts dispensable, in the interest of a sharpened focus of Norwegian assistance.

The review notes that the initiative to establish a national earthquake sensing network (observatory) has proved by Norway. For similar reasons to the above, the review finds no need to reconsider it.

DGM has established a seismology division recently, and is seeking donor support. With regard to donor's comparative advantages, the review does not find Norway to be the best possible choice. If Bhutan needs assistance in seismology and related areas there may be better suited donors, e.g. India (IIT Roorkee), Japan, Germany.

6 Summary, Conclusions and Recommendations

6.1 Summary of the Programmes

All three programmes are being implemented with great effort and dedication. Relevance is high, and results are appreciable. While the two programmes in the energy sector are complementary, the programme on geotechnical hazards has been conceived originally with its own unrelated agenda. During the phase under review, however, it is visible that complementarities have been identified and pursued. In all three programmes, there is room for improved results reporting. Table 5 shows the main features of the programmes. For all, an extension up to mid 2014 is recommended. During the extension period, major challenges need to be addressed. In this context, Norad's quality assurance department wishes to emphasise the possibility of reconsidering the phrasing of goal and purpose statements, the need for baselines and suitable qualitative as well as quantitative indicators at all results levels, as well as the identification of the sources of such information.

Programme	Goal	Purpose	Funding (NOK)	Focus	Future challenges
Institutional strengthening of energy sector	Accelerated HPP development by capacity building	Local expertise available for planning & regulation	15 million	- Training & education, - Hydrology study & data improvement - Regulatory work	- Staff training to keep pace with HPP implementation - Focus & priority setting - Results-based management
Accelerated HPP development	Accelerated HPP development by project study	Studies on financing by private sector and technical design & environmental impact	14.98 mill	- Technical study - On-the-job training	- Optimised HPP design - River basin development approach - Environmental study & management in particular for storage projects
Management of natural hazard risks	Mitigated natural hazards in infrastructure development	Proper planning and risk management	6.0 million	- Tunnelling & landslide control, - Seismic zoning for urban construction	- Increased alignment of geotechnical action with key infrastructure development: Focus on HPP, roads (tunnelling) - Results-based management

Table 5: Summary of Reviewed Programmes

6.2 Conclusions

The energy sector of Bhutan is developing at a fast pace. A number of large and mega hydropower projects under construction, totalling some 4'000 MW provide the evidence. Plans are being prepared to expand the DOE and affiliated institutions. In the view of stakeholders, this will require further and intensified capacity building strengthening in future.

It is found that the ongoing projects build on previous collaboration in the energy sector and on geotechnical subjects, respectively. Capacity building on a practical level appears as the key strength of all programmes.

Formal training at Master's level is another key measure. Those that have undergone such training share the perception that this has been invaluable in widening their professional perspective, and fosters individual careers. Leaders at a high level firmly believe that higher

education contributes to quality in institution building, and that it is indispensable, also in future.

While support in the energy sector and assistance to geotechnical capacity building were programmes without explicit links to each other in previous phases, this is perceived to have changed in the ongoing phase: DGM and its Norwegian partner NGI pursue activities that have more concrete links and relevance to energy sector development. This is seen as a relevant positive development that can be further strengthened in future, with a view to maximise synergies and to sharpen the overall focus.

Reporting on progress is detailed at the activity level in all programmes. Following the results chain is not a conceptual practice, and it is therefore a challenge to identify the causality between activities on one hand and outcomes and ultimate impacts on the other hand. This is unfortunate, as results-based management is not only useful for comprehensive reporting but is also a management tool that informs management of progress and the need for corrective action when progress is elusive. The review finds that the situation could be greatly improved by conducting a joint planning exercise which would produce a results- and objectives framework (refer to Annex D for explanatory diagrams). According to feedback received, Norad's department for quality assurance also supports this notion.

Overall, the three programmes make a difference – individually and amplified in combination – to institution building in the Ministry of Economic Affairs, and in particular the sub-ordinate departments DOE and DGM, and affiliated institutions. Commensurate with the economic importance of the energy sector, further growth and associated capacity building is indispensable. Further Norwegian cooperation is considered more important than ever, as significant challenges loom ahead. These need to be addressed in good time with further opening of the sector. The objective will be to increase national benefits while effectively mitigating and managing environmental and social impacts, as indicated in Gross National Happiness criteria.

The review shares the concern of several senior Bhutanese officials that the environment is at great risk of being compromised in the course of accelerated hydropower development. The concern is founded on what is already visible, for example at the Tala dam and the Punatsangchhu site, as well as the modest scope of environmental study and education that is being undertaken under the assistance programmes. Moreover, as has been mentioned earlier, NEC is weak.

From an overall perspective, Norwegian assistance supports the most important development programme of the Bhutanese national economy. Hydropower has become the no. 1 income generating sector of the country. It is obvious that this fact increases the already high dependence from India. The Norwegian assistance for capacity building, institutional support, technical assistance and training of qualified staff is of great significance in countering such dependence.

The Norwegian assistance programmes in the field of energy development and in geotechnical cooperation are conceptually well adapted and carried out in a spirit of genuine partnership by the concerned institutions of Bhutan and Norway. Bhutan sincerely wishes the extension and prolongation of the programmes for at least three years.

The Review Team is impressed by the high quality and dedication of the management and staff of all Bhutanese agencies and institutions collaborating with the Norwegian partners. This appears as a sound professional for future collaboration.

6.3 Recommendations

6.3.1 At the Programming Level

1. The review recommends to extend all programmes to complete by 30 June 2014, i.e. the programmes in the energy sector for a period of three years, and the programme on natural hazard management by 2.5 years, as the latter has already been agreed to be extended till the end of 2011. This will give enough time to complete further important work and master courses, as argued earlier.
2. It is recommended to further realign the programme on natural hazard management to contribute more meaningfully to infrastructure construction with major significance for Bhutan, i.e. hydropower plants and major roads.
3. It is recommended to revisit the formulation of the task “preparing the Detailed Project Report of one project”, with a view to assign the responsibility for the task to the Bhutanese partner institutions DOE and DGPC, and to define the consultant’s role as general support, specific special tasks, on-the-job training, backstopping and DPR review in the endeavour.
4. The review also recommends to conduct a planning exercise for all three programmes combined, in preparation for the extension phase, with a view to align and coordinate, and perhaps rephrase programme Goals and Purpose, and in particular to put in place an appropriate structure and system for results-based management and reporting based on measurable indicators. Ideally, key personnel of all involved institutions should participate. In the experience of the review, good results are achievable if sufficient time (two days or more) and external workshop facilitation are made available.
5. It is recommended to establish baselines for the extension phase in the semi-annual reports per the end of June 2011, i.e. establish what has been achieved so far, quantitatively and qualitatively. This is a requirement for more results oriented monitoring and reporting in the extension phase.

6.3.2 At the Institutional Level

6. It is recommended to develop and introduce a staff performance monitoring system at the level of each organisational entity on an annual basis, and to use reporting internally as well as in the context of programme reporting in response to desirable measuring of capacity development. Stakeholder comments indicate that the RCSC has such a system in place. Hence, it is suggested that the starting point should be to look into the existing monitoring system, and to adapt it as appropriate.
7. The review recommends strengthening the collaboration between DGM/NGI and the DOR with regard to landslide mitigation and tunnelling in the road sector, as well as between DGM/NGI and DGPC on the subject of hydropower-related tunnelling and other geotechnical issues in the context of energy sector infrastructures.
8. Clarify and avoid possible overlap between DGM/NGI and DGM/UNDP/GEF as well as DOE/NVE regarding work on Glacial Lake Outflow Floods (GLOF).

6.3.3 At the Thematic Level

9. As the energy sector grows at a fast pace, the need for institutional development and growth is recognised. The review recommends that support to training efforts, short-term as well as long-term is intensified as per identified needs.

10. It is recommended to focus on tunnelling in the road sector and on HPP in the Natural Hazards Management programme, as this appears to be the most relevant work activity and creates synergies.
11. It is recommended to include the optimisation of HPP design as a study area, as well as optimal utilisation of basin potentials for hydropower development in the Accelerated Hydropower Development Programme.
12. As each large/mega HPP will have an environmental impact beyond the project itself, it is recommended to apply best-practice Strategic Environmental Assessment (SEA) as a tool, rather than only EIA. As stakeholders have commented, both the Power System Master Plan, and the Water Resources Master Plan have addressed cumulative effects of Plan implementation. Therefore, revisiting the relevant statements may be useful in the overall effort.
13. With large- and mega-scale, and in particular in river-basin oriented hydropower development approaches, river ecology is an issue. Large dams (existing Tala 92m high, 1020 MW, and planned Rotphasong dam, 67 m high, for example), disrupt the river ecology completely and fatally, by blocking fish migration and upstream reproduction. Fish ladders or similar technical measures do not function at this scale. One way to mitigate the problem is to breed local fish species, and once a year put them into the river (restocking) upstream and downstream of the dam. To follow up on this, the review recommends to establish contact with NTNU in Norway, Prof. Kjell Nilssen (at Institute of Biology), who is an expert on the subject.
14. The RGOB is at present seeking parliamentary approval of the draft Renewable Energy Policy. Hydropower development of projects smaller than 25 MW is an important part of it. This scale of projects represents an opportunity for unilateral and private sector approaches. It is recommended that the Accelerated Hydropower Development Programme include support to this scale of projects as and when opportunities arise.
15. In order to gain a sharpened focus across all programme activities, it is recommended not to include support to other Renewable Energy initiatives in DOE, or seismic mapping and related activities in DGM in the programme extension period.

Annexes

Annex A: Terms of Reference

Terms of Reference (20 October 2010) for

Joint review of the Norwegian assistance to Bhutan with regard to

- a) **Institutional cooperation for strengthening of the energy sector – phase III, and**
- b) **The accelerated hydropower development program, and**
- c) **Management of risks caused by natural hazards for new infrastructure development – phase III**

1 Background

In 2001 the Government of the Kingdom of Norway and the Royal Government of Bhutan signed phase I of the agreement for assistance to the “Institutional strengthening of the energy sector” and the “Water resources management and planning”. Phase II of assistance to the “Institutional strengthening of the energy sector” was signed in 2003.

In 2002 phase I of the agreement for “Preventive measures for landslide hazards in the Kingdom of Bhutan” was signed between the Government of the Kingdom of Norway and the Royal Government of Bhutan. Phase II of this program was signed in 2004.

An independent consultant, Norplan, was commissioned in 2007 to carry out a review of the Norwegian assistance to the above mentioned programs.

Based on the findings and recommendations in the review report, it was decided to start up phase III of the programs, and the agreements between Norway and Bhutan were signed in May 2008. The program period is July 2008 – June 2011 for all the three programs listed below. The programs may be extended for two year depending on the results of the planned review, as described in this TOR, and the priorities of the Government of the Kingdom of Norway and the Royal Government of Bhutan.

According to the article X in the respective agreements, a “review focusing on progress to date and effectiveness of the program, i.e. the extent to which the purpose is being/has been achieved, shall be carried out after two and a half years of implementation of the program. An assessment of the programs impact may also be included in the review.”

The last annual meetings between the Government of the Kingdom of Norway and the Royal Government of Bhutan were held in May 2010, and it was decided that a joint review of the programs should be carried out towards end of 2010. This is the general background for the assignment. A more detailed description of the different programs and purpose etc of the planned review is given below.

a) **Institutional cooperation for strengthening of the energy sector – phase III**

Under an agreement dated 21 May 2008 Norway has agreed to provide financial support for institutional strengthening of the energy sector and water resource management for planning – phase III. In accordance with the agreement, the Norwegian Water Resources and Energy Directorate (NVE) provide assistance to the Department of Energy (DoE) which is the implementing institution in Bhutan. The total financial grant from Norway is NOK 15 million.

Goal: Accelerated development of the hydropower resources of Bhutan, and for attracting investors for implementation of hydropower projects, thereby leading to socio-economic development and poverty reduction. Furthermore, to ensure the required regulatory capacity to allow the growth of the power sector in an orderly and cost effective manner, and in this way also support the accelerated hydropower development strategy of the 10th Five Year Plan for Bhutan.

Purpose: To ensure the availability of local expertise for planning the development of hydropower resources and strengthening of the regulator capacity.

b) The accelerated hydropower development program

Under an agreement dated 21 May 2008 Norway has agreed to provide financial support to the accelerated hydropower program of Bhutan. In accordance with the agreement, the Norwegian Water Resources and Energy Directorate (NVE) provide assistance to the Department of Energy (DoE) which is the implementing institution in Bhutan. The total financial grant from Norway is NOK 15 million.

Goal: Accelerated development of the hydropower resources of Bhutan, in the form of program finance and power sales agreements, reconnaissance surveys for remaining listed sites under the Power System Master Plan, pre-feasibility studies of project sites and a detailed program report of one site including environmental studies.

Purpose: Accelerated development of the hydropower resources of the country, and for attracting investors for implementation of hydropower projects, thereby leading to socio-economic development and poverty reduction

According to the 2009-report for this program, the annual meeting in 2009 agreed that no activity is expected on Activity 1 – project finance and power sales agreements – and Activity 4 – detailed project report (DPR) of one site including environmental study.

c) Management of risks caused by natural hazards for new infrastructure development – phase III

Under an agreement dated 21 May 2008 Norway has agreed to provide financial support for management of risks caused by natural hazards for new infrastructure development in Bhutan. In accordance with the agreement, the Norwegian Geotechnical Institute (NGI) provides assistance to the Department of Geology and Mines (DGM) which is the implementing institution in Bhutan. The total financial grant from Norway is NOK 6 million.

At the annual meeting in May 2010 it was agreed to extend the cooperation to December 2011.

Goal: Mitigate natural hazards associated with infrastructure development through technology transfer and build up of capacity at DGM and stakeholders. The ultimate goal is to prevent the negative effects on Bhutan's economy through sustainable development.

Purpose: Implementation of proper planning and risk management in connection with new infrastructure development in Bhutan, so that threats from natural hazards do not contribute to loss of lives and damage to critical structures.

2 Purpose of the review

The overall purposes of the joint review of the three above listed programs are to **i)** assess the program performance against the planned inputs, activities, outputs, outcomes and, if possible to measure, impacts **ii)** give the foundation for decisions on possible corrective measures for the rest of the program periods and to **iii)** obtain information and advice with regard to the preparations of possible extensions of the existing programs after the completion in June 2011, as well as possibilities for changes and expansions of the existing programs and possible new areas of cooperation.

3 Expected outputs

The following are the expected outputs of the review:

1. A mission preparation note prior to the arrival to Bhutan.
2. A wrap-up report prior to the departure from Bhutan.

3. A final review report including the observations, analysis and conclusions of the Consultant. The final report shall also include a set of specific recommendations for possible improvements of the existing programs in the remaining program period, possible extension of the existing programs, and possible new programs/areas of cooperation (related to the existing programs).

Seismic hazard mapping has in particular been suggested as a possible new area of cooperation, and this could possibly be integrated in the energy- and hydropower programs. A project proposal has been worked out by NORSAR and the Geological Survey of Bhutan/Department of Geology and Mines. The review should assess the possibility to include this as a new area of cooperation.

4 Scope of work

The review shall cover the period from the preparations of the three existing phase III programs and to current date. In general the Consultant shall address all issues found to be pertinent to meet the planned results of the programs. Hereunder, but not necessarily limited to, the following issues:

Efficiency

- Assess program designs, planning processes, participation of relevant stakeholders and program organization, monitoring and reporting.
- Assess progress and efficiency of activities carried out. Measure how economically resources and inputs; funds, expertise, time etc., are converted to outputs.
- Compliance with agreements and program documents. To what extent have the partners in Norway and Bhutan complied with obligations as stated in the agreements and program documents?
- Assess the quality of the results reporting. To what extent can reported results be verified?
- To what extent are disaggregated data included in the reporting with regard to men and women?

Effectiveness

- Achievement of objectives:
 - To what extent will the overall objectives be reached? The performance of the programs in relation to set goals and indicators (the results chain).
 - To what extent have inputs, outputs and activities contributed to the overall objectives of the programs.
- Deviations:
 - What deviations of plans and budgets have occurred and what are the causing factors. Have adequate measures for avoiding reiteration of deviations been implemented.
 - The roles and responsibilities among and between the implementing institutions.
- Donor coordination?

Impact

- What are the main outcomes, and if possible to measure, impacts of the programs?
- To what extent do the intended target groups benefit from the programs?
- To what extent do women and socially excluded benefit from the programs?
- Does the program's activities target gender equality and social inclusion issues?
- Environmental consequences: Are there any outcomes, and if possible to measure, impacts of the programs?

Relevance

- In general assess the extent to which the objectives of the programs are consistent with the intended beneficiaries' requirements and country needs.

Sustainability

- To what extent have the activities undertaken contributed to strengthening the institutional capacity of the relevant Bhutanese institutions and to make the institutions more sustainable?
- Capacity/competence building: The need for training/capacity building should be identified.
- Social-cultural/gender equality and sustainability? Assess the involvement of women in the programs, including planning and decision-making. Have, and will the programs affect men and women differently? Have the programs incorporated specific activities and mechanisms to ensure equal participation of women and men? What are the barriers to women's and men's participation? Have means and resources been distributed equitably between women and men?
- Environmental sustainability: Have adequate mechanisms for monitoring and mitigating environmental impacts been integrated? Is it possible to follow up and monitor the results?

Risk management

- Assess the major risks experienced during the implementation of the programs, and to what extent the programs has addressed and mitigated these risks. Identify possible future risk factors and present recommendations for how to handle these.
- What are the critical issues at organisational and institutional as well as program level?

Particular concerns to be investigated

- The review shall consider whether a 3-year extension of the programs might be more suitable than a 2-years extension, to take into account the need to extend scholarships to existing students.
- Possible expansion of the existing programs/possible new activities related to the existing.
- Seismic hazard mapping has in particular been suggested as a possible new area of cooperation, and this could possibly be integrated in the energy- and hydropower programs. A project proposal has been worked out by NORSAR and the Geological Survey of Bhutan/Department of Geology and Mines. The review shall assess the possibility to include this as a new area of cooperation.

Audit

- Assess the accounting and audits that have been carried out for the programs.

Financial management and anti-corruption measures

- Do the financial management systems and capabilities prove themselves sufficient?
- Is the expenditure so far justifiable when compared to plans, progress and outputs?
- To what extent are the programs designed to fight corruption – are measures implemented to avoid and detect corruption functioning satisfactory?

5 Implementation and reporting

Sources of information and methodology to be employed

Documents: The members of the review team shall make themselves familiar with all relevant and available background information, such as project documents, appraisals, the agreements, addendums, the decision documents, work plans, progress reports, minutes from the annual meetings etc. The Consultant will have access to all relevant documents at the Norwegian Embassy and in Norad.

Interviews: In addition, the review will be done through interviews with key informants in Norway and Bhutan, and with personnel at the Norwegian Embassy in New Delhi. The team is expected to have extensive meetings with relevant partners, stakeholders and counterparts, women as well as men, providing input for the purpose of the review. Interviews of stakeholders in Norway may be arranged as meetings in person, by telephone and/or by video-conferences.

Field work: One field visit to Bhutan shall be carried out for a maximum period of two weeks. A detailed field visit plan shall be prepared prior to the arrival of the Consultant, and the Bhutanese coordinators of the programs will provide the necessary logistics and organize the field trips. The Norwegian Embassy in New Delhi and the Norwegian Agency for Development Cooperation (Norad) will also give assistance in the preparations of a meeting schedule.

Timetable for preparation, field work, reporting and indicative volume of assignment

Preparations: Upon signing of the contract, the Consultant will study relevant documents, and work out a mission preparation note.

Field work: The Consultant shall undertake a maximum 2-week fact-finding mission to Bhutan, tentatively in December 2010, to conduct interviews, review additional documents and visit field sites.

Reporting: The final review report shall be written in English and shall preferably not exceed 30 effective pages, plus an executive summary and attachments. The report shall be submitted on paper and electronically. The report format is shown in appendix 1. The preparation of the final review report shall be based on the following process:

- a) A mission preparation note shall be submitted to the Norwegian Embassy in New Delhi, Norad and the partners in Bhutan, prior to the arrival to Bhutan. The note should include the key issues identified, building upon a preliminary assessment of the programs, referring to the outlined scope of work in point 4 above.
- b) The Consultant shall submit a report with the major findings in wrap-up meetings with the parties prior to the departure from Bhutan.
- c) The report mentioned in b) above shall also be submitted to the Norwegian Embassy in New Delhi, and the Consultant shall present the report and interview relevant personnel at the Norwegian Embassy.
- d) The Consultant is expected to present a draft report to the parties, including summary of main findings, conclusions and recommendations, within 10 working days after the field work in Bhutan. The draft shall also be submitted to Norad.
- e) The final report is to be submitted within 2 weeks after the parties have delivered their comments to the draft report.

Indicative volume of the assignment

The following assumptions indicate the volume of the assignment. The final budget, together with a work plan with a time schedule, is however to be proposed by the Consultant.

- 2 international experts and 1 local expert.
- Preparations: two weeks á five working days.
- Bhutan mission: one to two weeks á five working days.
- Reporting: two to three weeks á five working days.

Approximately 9 – 12 working weeks in total for the team.

6 Qualifications of the Consultant

It is the decision of the tenderer, but it is envisaged that it is necessary to have a team of several persons to be able to successfully carry out the assignment. The tenderer is expected to put forward the best team composition, and this will be given special attention in the evaluation of

the tender. A gender-balanced team of qualified team members will in particular be assessed positively.

The team shall consist of a team leader who has the overall responsibility for the assignment. It is envisaged that the team leader will be assisted by one international expert and/or one local expert. The team should altogether cover the following disciplines and qualifications:

- A minimum of 5 years professional experience.
- International in-depth knowledge of and experience from the energy sector and management of risks caused by natural hazards.
- Familiarity with Bhutan, especially with regard to the energy sector and the natural hazards situation, will be a benefit.
- In-depth knowledge of and experience from program design, appraisal, management and implementation, especially with regard to infrastructure and institutional development.
- Experience from similar review assignments.
- Knowledge of and experience from financial management and auditing.
- Preferably a strong grasp of the modalities of development cooperation, preferably with references from donors or multilateral institutions.
- Strong critical analysis skills.

XXX

Annex B: Document List

- 01-PD Draft-Support Accelerated Hydropower Development - 9 April 20...
- 02-A-Annex II PD Phase III Budget and Planning Sheets.pdf
- 02-PD Strengthening Energy- 2008-DOE-NVE.pdf
- 03-PD Natural Hazard Risk 2008-dgm-ngi.pdf
- 04-Annual Report 2008 energy sector.pdf
- 05-Semi Annual Report 2009 energy sector.pdf
- 06-Annual Report 2009-energy sector-Final.pdf
- 07-Annual Report 2009-Hazard Risk-DGM-NGI Draft.pdf
- 08-ACCHydro_Annual Report 2009 Final.pdf
- 09-Norplan review energy+Hazard Risk.pdf
- 10-NORSAR proposal Bhutan_Hazard.pdf
- 11-NORSAR proposal Earthquake observatory.pdf
- 12-NORSAR note on proposal rejection.pdf
- 13- AD-Management of Risks caused by Natural Hazards.doc 807292_1_1...
- 14-AD-Accelerated Hydropower doc 805167_1_1.pdf
- 15-AD-Energy institutions III-0701104.pdf
- 17 Agreement NVE-Norplan Bhutan April 2009.pdf
- 18-Årlig møte Rapport fra Bhutan 09 endelig versjon doc 900644_1_1.pdf
- 19-Accelerated Progress Report 01 3Q2008 - Rev01 pdf 919896_1_0.pdf
- 20-Accelerated Progress report 02 4Q2008 - Rev01 pdf 919897_1_0.pdf
- 21-Accelerated Progress Report 03 1Q2009 - Rev00 pdf 919898_1_0.pdf
- 22-Accelerated Progress Report 04 2Q2009 - Rev00 pdf 919899_1_0.pdf
- 23-Accelerated Progress Report 05 3Q2009 - Rev00 pdf 919900_1_0 (2).pdf
- 24-Accelerated Progress Report 06 4Q2009 - Rev00 pdf 919901_1_0.pdf
- 25-Phase III Progress Report 01-3Q2008.pdf
- 26-Phase III Progress Report 02-4Q2008.pdf
- 27-PHASE III Progress Report 03-1Q2009.pdf
- 28-Phase III Progress Report 04 2Q2009.pdf

- 29-Phase III Progress Report 05 3Q2009.pdf
- 30-Phase III Progress Report 06 4Q2009.pdf
- 31-NORAD Phase III Expenditure and Planning Sheets xls 919905_1_0.xls
- 32-mandate I annual meeting May 2010.doc
- 33-mandate II annual meeting May 2010.doc
- 34-mandate III annual meeting May 2010.doc
- 35-mandate IV meeting with RUB May 2010.doc
- 36-Notes for Meetings in Bhutan May 2010.msg.pdf
- 37-2009 travel report annual meetings.pdf
- 37-2010 travel report annual meetings.pdf
- 38-Agreement Natural hazard risk NGI-DGM.pdf
- 39-Agreement on DOE-NVE Strengthening III.pdf
- 39-Agreement Support to Accelerated Hydropower Development Progra...
- 40-Bhutan jordskjelv risiko.msg 920206_1_1.pdf
- 41-DGPC-Bhutan-Basochhu.pdf 922351_1_0.pdf
- 42-APPRAISAL Natural hazard risk.RTF
- 43-2009 DGM-NGI agreed_minutes_6 May.pdf
- 44-2010 DGM-NGI agreed minutes annual meeting.pdf
- 45-2007 energy sector Agreed Minutes Annual Meeting.pdf
- 45-2010 Energy sector III-Agreed minutes annual meeting.pdf
- 46-Energy sector Phase III Expenditure and Planning Sheets.XLS
- 47-Seismic hazard-leter Norad.DOC
- 48-Appraisal DOE-NVE FASE III Strenghtening.doc
- 49-2007 Annual report Energy sector.pdf
- 50-Norplan-TERMS OF REFERENCE-Final.pdf
- 51-Norplan Q-Report 1 Nov 09.pdf
- 52-Norplan Q-Report 2 Jan 10.pdf
- 53-Norplan Combined Interim&Progr Rep no3-MainVol.pdf
- 54-Norplan Q-Report 4 Aug 2010.pdf

- 56-ADB-DOE TNA Final .pdf
- 57-ADB DOE TNA Annexures Final.pdf
- 58-Energie_AU-Sektorprogramm_bhutan_2005_2007.pdf
- 59-GLOF risk punatsangchhu.docx
- 60-icimod-science_regarding_glacier_melt_re.pdf
- 61-Bhutan GLOF 1028 (1).ppt
- 62-Bhutan-Danida 201002Evaluationreport.pdf
- 63-Druk Holding & Investments.pdf
- 64-India Aid to Bhutan 2009.docx
- 65-India_2010-11 Budget outcome.pdf
- 66-#000-AidData_Bhutan.xls
- 66-Norplan Inception report with appendix JULY 2009.pdf
- 67-Bhutan Hydropower Policy.doc
- 68-Bhutan SEA FINAL DRAFT Basin-2.doc
- 69-Cumulative training breakdown III.xlsx
- 70-Low-Flow course Evaluation report NVE.pdf
- 71-NORAD PhaseIII_ISES_2010 Semi-annual Report -final.docx
- 72-NORAD PhaseIII_ACCHydro_2010 Semi-Annual Report final.doc
- 73-PR07NVE - ACC - 1Q2010 - Rev00.pdf
- 74-PR07NVE - PHASE3 - 1Q2010 - Rev00.pdf
- 75-PR08NVE - ACC - 2Q2010 - Rev00-Complete Report.pdf
- 76-PR08NVE - PHASE3 - 2Q2010 - Complete Report.pdf
- 77-PR09NVE - ACC - 3Q2010 - Rev00.pdf
- 78-PR09NVE - PHASE3 - 3Q2010 - Rev00.pdf
- 79-PR10NVE - PHASE3 - 4Q2010 - Rev00.pdf
- 80-Rotpashong Prefeasibility study Vol 1 Draft Report.pdf

Annex C: Persons Contacted

#	Name	Affiliation, position
Bhutan		
1	Mr. Mewang Gyeltshen	Renewable Energy Division DOE, Chief Engineer
2	Mr. Gem Tshering	BPC, Director
3	Mr. G. Karma Chhopel	National Environment Commission (NEC), Water Resources Coordinator
4	Mr. Tshering Tashi	NEC, Water Resources Officer
5	Mr. N.B. Dhital	Kalachakra Consultancy, Proprietor
6	Mr. Karma Dupchu	DOE, Hydro-met Services Division, Head Hydrology Section
7	Mr. Dorji T. Phuntshok	Druk Green DGPC), Head HR & Admin. Department
8	Mr. Suresh Nepal	BPC, General Manager Rural Electrification Department
9	Mr. Ugyen Tshewang	RCSC, HRD Division, Chief Human Resources Officer
10	Mr. Karma Tshering	BEA, Chief Executive Officer
11	Mr. Yeshi Wangdi	DOE, Director General
12	Mr. Christian Mazal	Austrian Coordination Office for Development Cooperation, Councillor, Head of Office
13	Mr. Ramesh Chhetri	Austrian Coordination Office for Development Cooperation, Programme & Project Officer
14	Mr. Ugyen Wangda	DGM, Head of Division Geological Survey of Bhutan
15	Dasho Chhewang Rinzin	DGPC (Druk Green), Managing Director
16	Mr. Rinchen Wangdi	GNHC, Development Cooperation Division, Chief Program Coordinator
17	Ms. Kuenzang L. Sangey	GNHC, Development Cooperation Division, Program Officer
18	Mr. Tashi Dorjee	DOE, Planning and Coordination Division, Chief Engineer
19	Mr. Jambay Lhundup	DOE, Planning and Coordination Division, Project Engineer
20	Mr. Hari Sharma	DOE, Planning and Coordination Division, Programme Coordinator
21	Mr. Sangey Tenzing	DOR, Director General
22	Ms. Tukten Wangmo	BEA, Monitoring Division
23	Ms. Sonam Wangmo	Norplan Project Secretary
24	Mr. Dechen Dorji	RCSC, HR Officer
25	Mr. Ugyen Tshering	DOE, Chief HR
26	Mr. Yeshi Dorjee	DGM, Specialist on Geology, Programme DGM-NGI coordinator
27	Ms. Pratigya Pradhan	DGPC, Projects Department, Manager
28	Mr. Sonam Tobgyel	DGPC, HRO
29	Mr. Pema Dorji	DGPC, Projects Department, Asst. Manager
30	Ms. Deki Choden	BEA, Acting Chief Tariff & Economic Division

#	Name	Affiliation, position
31	Mr. Pem Dorjee	BEA, Chief Monitoring Division
32	Mr. Dorji	BEA, Acting Chief Admin. & HR Finance Division (AFD)
33	Mr. Nima Tshering	BEA, Chief of Licensing and Technical Division
34	Mr. Kuenzang Penjor	BEA, AFD, Asst. Admin. Officer
35	Ms. Karma Choden	BEA, Personal Assistant to the CEO
36	Ms. Tshering Choden	BEA, Accounts Assistant AFD
37	Mr. Tshering Wangdi B.	Department of Roads (DOR), Chief Engineer
38	Mr. Sherub Phuntsho	DOR, Deputy Executive Engineer
39	Mr. Dilip Thapa	DOR, Geotechnical Engineer
40	Mr. Nir Kumar Giri	DOR, Geotechnical Engineer
41	Mr. Kunzang Wangdi	DOR, Specialist
43	Mr. Choten Duba	DOE, Engineer
44	Mr. Chhimi Dorji	DOE, Engineer
45	Ms. Tashi Pem	DOE, Engineer
46	Ms. Ngawang Choeda	DOE, (previous) Programme Manager
47	Ms. Wangmo	DOE, Assistant Engineer
48	Mr. Tilak Sunwar	DOE, Engineer
49	Mr. Passang	DOE, Engineer
50	Ms. Kuenga	DOE, Personal Assistant to DG
51	Mr. Kuenzang	DOE, Assistant Engineer
52	Ms. Dechen Wangmo	DOE, Assistant Engineer
53	Mr. Phurba	DOE, Met. Technician
54	Mr. Ranjit Tamang	DOE, Met. Technician
55	Ms. Budhi Maya Subha	DOE, Admin. Assistant
56	Mr. Taybha Budha Tamang	DOE, Engineer
57	Ms. Chhimi Wangmo	DOE, Office Asst.
58	Mr. Jigma Renzin	DOE, Junior Engineer
59	Mr. Thinley Wangchuk	DOE, Technician
60	Mr. Norbu Wangdi	DOE, Sr. Met. Technician
61	Mr. Karma P. Dorji	DOE, Executive Engineer
62	Mr. Satchi	DOE, Executive Engineer
63	Mr. Karma Tshewang	DOE, National Programme Manager
64	Mr. Kinzang Sonam	DOE, Head Meteorology
65	Mr. Gem Dorji	DOE, Principal Engineer
67	Mr. Dorji Tshering	BPC, Manager Corporate Planning
68	Mr. Garab Dorji	BPC, EDCD Senior Engineer

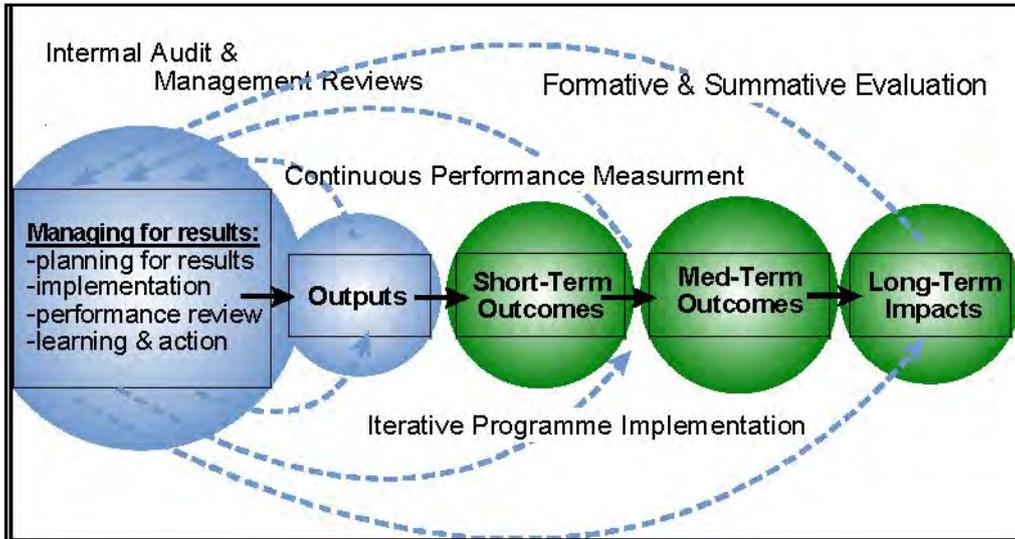
#	Name	Affiliation, position
69	Mr. Karma Tenzin	BPC, Transmission Maintenance Division Senitheka, Manager
70	Mr. Ghana Shyam Tamang	BPC, DCSD Thimphu, Engineer
71	Mr. Pema Tenzin	BPC, Transmission Division SMD Supervisor
72	Mr. Ugyen Dorji	BPC, Transmission Division SMD Supervisor
73	Mr. Dorji Tshewang	BPC, DCSD Engineer
74	Mr. Norbu Tshering	BPC, DCSD Senior Engineer
75	Mr. Yeshi Dorji	BPC, Planning & Coordination Cell, Corporate Planning Manager
76	Mr. Tashi Tshering	BPC, TLMSD Senta TMD Incharge
77	Mr. Duptho Wangdue	BPC, TCMSD, TMD Incharge
78	Mr. Tshering Namgye	BPC, TMD Manager
79	Mr. Yeshi Dorji	BPC, Simtoka Incharge
80	Mr. Sonam Dorji	BPC, TMD Sintokhu L/man.
81	Mr. Dowchu Dukpa	DGM, Geophysicist
82	Mr. Jamyang Chhopel	DGM, Geologist
83	Mr. Ugyen Wangda	DGM, Chief Geologist
84	Mr. Tashi Tshering	DGM, Geophysicist, M.Sc. Student UIO
85	Ms. Pema Deki	DGM, Geologist
86	Ms. Sonam Lhamo	DGM, Geologist
87	Mr. Rinchen Dorjee	DUDES, Director
88	Mr. Sonam Yangley	DGM Director General and officiating Secretary MoEA
Norway		
89	Mr. David Wright	NVE, Program coordinator of Energy Sector Programs
90	Mr. Martin Brittain	NVE, Legal Adviser
91	Mr. Tore Langset	NVE, Tariffs Specialist
92	Ms. Miriam Jackson	NVE, Glaciologist
93	Ms. Hege Hisdal	NVE, Head Hydrology
94	Mr. Stein Beldring	NVE, Hydrology Specialist
95	Mr. Jan Atle Roti	Norplan, Team Leader Hydropower studies
96	Mr. Jan Lindemark	Norplan, Consultant Chukha HPP Rehabilitation
97	Mr. Rajinder Kumar Bhasin	Norwegian Geotechnical Institute (NGI), Program coordinator
98	Mr. Oddvar Kjekstad	NGI, Senior Adviser
99	Dr. Kong	NGI, Specialist
100	Mr. Pawel Jankowski	NGI, Senior Specialist on Ground Penetrating Radar technology

#	Name	Affiliation, position
101	Mr. Roger Olsson	NGI, Rock Engineering
102	Mr. Arnstein Aarseth	NGI, LIDAR Specialist
Norwegian Embassy New Delhi		
103	H.E Ms. Ann Ollestad	Ambassador

Annex D: Logical Framework and Results-Based Management Approach



Facilitation of Planning Workshops based on Logical Framework Analysis (LFA) and integrating a Results Framework for results-based management. The process is suitable for stakeholder participation



The diagram above depicts the results chain, and how monitoring of results is used to inform project management

	Results Framework	Objectives Framework	Measuring Performance	Data / Info Sources	External Factors
↑ Results chain	Impact	Goal	Indicators	Means of Verification - MoV	Assumptions
	Outcome	Purpose	Indicators	MoV	Assumptions
	Outputs	Outputs	Indicators	MoV	Assumptions
	Inputs, Resources	Inputs, Res (Activities)	Inputs/ Budgets	MoV	Assumptions

The Logframe (LFA) against the results framework is shown above. In summary, LFA is used in programme design and planning, while the results framework is used for implementation monitoring, management and reporting
