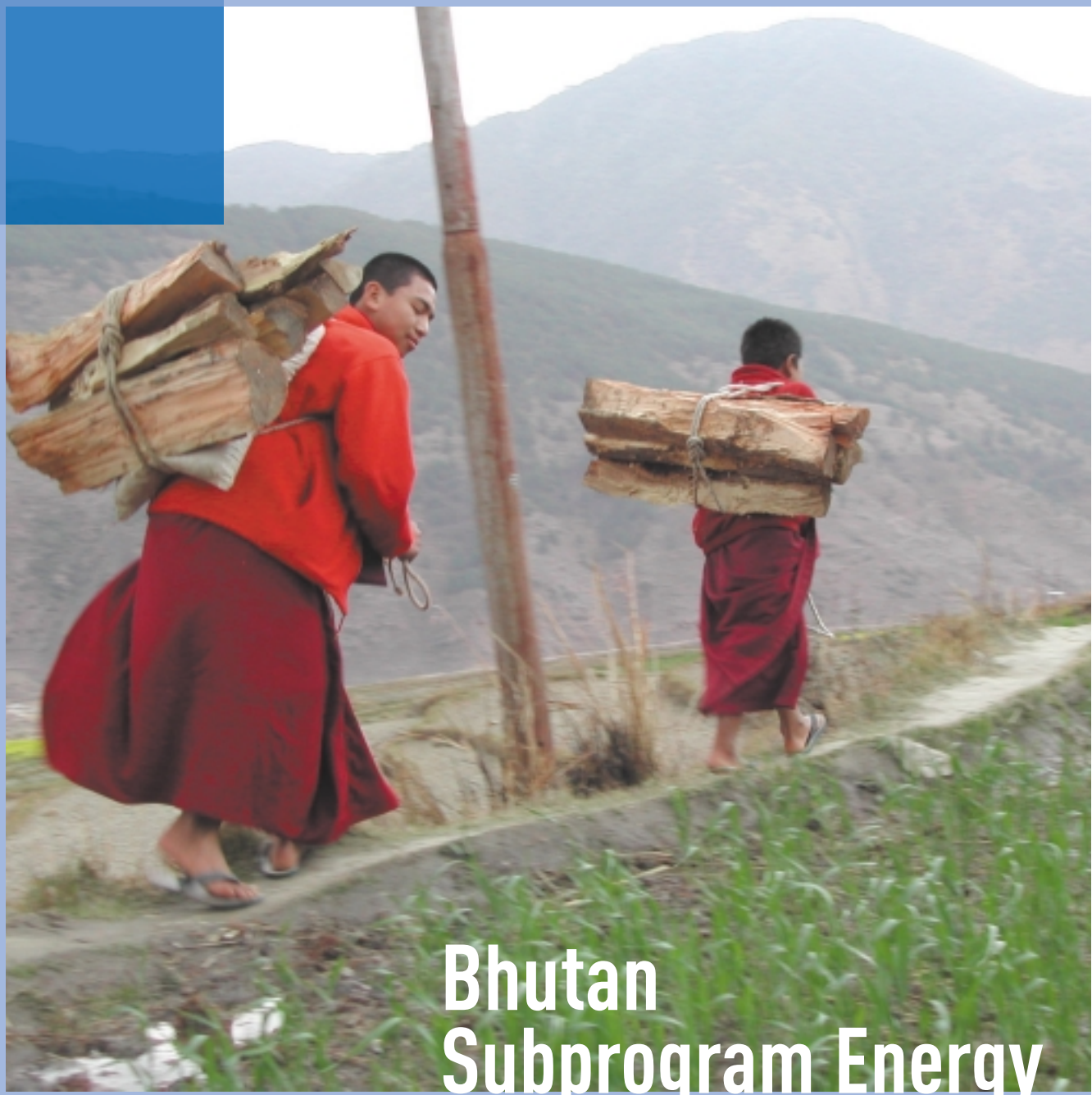
ENERGY



Bhutan Subprogram Energy 2005–2007

Support of Rural Energy, Hydropower Generation and Capacity Building

Austrian Development Cooperation

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Picture on cover: Firewood collection near Wangdi Phodrang, by W. Steinmetz

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1 EXECUTIVE SUMMARY

The Royal Government of Bhutan follows the development philosophy of Gross National Happiness (GNH), introduced by His Majesty the King as a holistic approach that encompasses economic growth, material progress, emotional security and the spiritual progress of the individual. The concept of GNH is attempting to balance economic progress with the maintenance of Bhutanese cultural and spiritual values, the improvement of social well-being, the preservation of the environment, and the promotion of good governance.

Guided by this development philosophy, the Royal Government of Bhutan (RGoB) puts high emphasis on providing electricity to all residents by 2020 and on financing social programs through revenues from electricity exports to India.

The 9th Five Year Plan (9FYP) gives priority to hydropower development for public income generation and sets a very challenging target for rural electrification to reduce fuelwood consumption and ameliorate rural life. Active participation of the local population is an essential precondition for the implementation of infrastructure projects in order to achieve true ownership. Therefore great emphasis is put on the decision making process at Geog level. Development activities are only carried out if they are a prime objective of the local population and if there is commitment to cooperate and facilitate.

Bhutan is gifted with a huge hydropower potential of all sizes and types. Besides the major hydro projects the power policy describes the preferences for electrification via grid extension. Where such extension is not economically viable, priority is given to micro or mini hydropower plants and local grids. Only very remote households or institutions shall be electrified by solar energy.

Fuelwood still accounts for about 77% of the total energy consumption and virtually all non-commercial energy consumption, of which the household sector takes up 95%. These figures underline the relevance of measures to reduce the use of fuelwood. Recent evaluations have shown that electrification reduces the fuelwood consumption by 25 to 35%.

This midterm program intends to assist the RGoB in their efforts to improve the living conditions in rural areas, focusing on:

- Hydropower,
- Rural Energy and
- Training and Capacity Building.

In the past, sector activities concentrated on hydropower development using an engineering approach. The present midterm program

- puts special emphasis on the sustainability of the investments in hydropower infrastructure so far,
- assists to finance rural electrification,
- targets on methods to increase energy efficiency, especially in fuelwood consumption, and
- continues to strengthen Human Resources Development (HRD) in the energy sector of Bhutan.

The present 2nd Sector Program covers the period 2005 – 2007.

2 BACKGROUND OF THE SECTOR PROGRAM

The discussion on an Energy Sector Program was started in 1998/1999, but no final agreement was reached. The first Energy Sector Program (2002-2004) was concluded in 2002. The main focus of this program has been in the construction and Operation & Maintenance (O & M) of modern hydropower plants and on rural energy supply in order to reduce poverty in the rural areas and to contribute to the preservation of the environment and job creation. About one third of the country allocation has been earmarked for these activities.

This 2nd Sector Energy Programme (2005-2007) will follow the guidelines of 9FYP of the RGoB (2002-2007). The focus will continue to be on the operation and maintenance of Hydropower Plants, Rural Energy and Capacity building.

3 THE ENERGY SECTOR

Access to energy is essential to sustain human life and to achieve the interrelated economic, social and environmental aims of human development. Everybody needs to prepare food, keep his house warm and have light after dusk. However, affordable, modern energy supplies like gaseous and liquid fuels, electricity, and more efficient end-use technologies are not accessible to about two billion people world wide. They have to rely on burning wood, crop residues and animal dung for their energy needs. Although there seems to be no physical limits to the world's energy supply for at least the next 50 years, today's energy system is unsustainable because of equity issues as well as environmental, economic, and geopolitical concerns. The current energy system is not sufficiently reliable or affordable to support widespread economic growth in most LDCs. In addition, negative environmental impacts of energy services at all levels threaten the health and well-being of present and future generations.

3.1 Features of the Sector

The development of Bhutan's energy sector is of crucial importance to the country, and in recent years high priority has been given to this sector. In the past the major source of energy was fuel-wood which, together with kerosene and LPG, is still widely used for domestic purposes, followed by diesel and petrol, predominantly used for transport. Now, hydroelectric power is assuming the leading role in the consumption pattern of energy.

The country is endowed with a large hydropower generation potential, the total capacity estimated at over 30 000 MW. The Power System Master Plan, worked out between 1990 and 1993, identified 91 potential hydropower sites with a capacity of more than 10 000 MW. Taking into account the sustainable use of water resources as well, an update in 2002-03 showed a feasible capacity for exploitation of more than 23 000 MW. While the installed hydropower capacity as of 8FYP was about 428 MW, in the 9FYP, 40 MW has been already commissioned and another 1 020 MW is under construction. Therefore by the end of 9FYP, about 1 490 MW of installed capacity will be available, and 2 800 MW under feasibility study. While 12 MW per year over the 9th Five Year Plan period is considered to be the annual increase of local consumption, the rest

shall be exported to India. RGoB has programmed similar expansion for rural electrification.

Based on the policy to provide electricity for lighting for all by the year 2020 the 9FYP sets the ambitious goal of electrifying 15 000 households within the period from 2002 to 2007. The third ADB loan for Rural Electrification (RE III) covers more than 8000 households, the Netherlands funded 3 150 households and the ACO funded more than 1 000 households. Apart from construction of additional power capacity RGoB also plans extension and strengthening of the power transmission and distribution network to answer the local demand as well as to enable the programmed exports to India.

Also in Bhutan the energy sector encompasses more than solely the generation of electric power. Up to now Bhutanese people consumed about 1 200 kg of fuelwood per capita per year, one of the highest specific consumption levels worldwide (twice as high as in Nepal). Fuelwood accounts for about 77% of the total energy consumption and virtually all non-commercial energy consumption, of which the household sector accounts for 95%. A typical household consumes about 14 m^3 wood, of which 7 to 9 m^3 is used for cooking and the rest for space heating. Recent evaluations have shown that electrification reduces the fuelwood consumption by 25 to 35%. Except for urban and periurban centers, most fuelwood consumed in the domestic as well as non-domestic sectors is procured from free supply sources, either by self collection or by using hired labour. Even the larger users such as institutions, establishments, agencies or monasteries rely heavily on public forests as free resources of fuelwood. Other forms of biomass like sawdust are also used for cooking and heating but on a very small scale.

3.2 Problems and Potentials

The energy sector in Bhutan underwent serious reforms in the last couple of years and will continue to do so in the years to come. With the change of the erstwhile Department of Power into the Department of Energy within the Ministry for Trade and Industry the RGoB had integrated various aspects and activities concerning the energy sector for the first time in one department.

In the power sector, a core sector of Austro – Bhutanese cooperation so far, the RGoB - assisted by ADB - created a totally new set-up. On the one hand, this sector has to play an even stronger role for the country's public income during 9FYP; on the other hand the ongoing restructuring (unbundling) process creates a completely new structural environment in the field of governmental and para-statal agencies. RGoB puts a lot of emphasis on the restructuring process, which also encompasses many challenges and risks.

Hydropower as the major export product of Bhutan is currently only sold to neighbouring India. The development of big hydropower projects is highly capital intensive and might lead to major changes in the financial position of Bhutan. So far the country did not enter into major loan agreements for investments on the international market as most other countries do because India has been the main financing partner granting special concessions to Bhutan. If some of the large hydropower projects become effective, Bhutan will certainly be increasing the

revenue of the major marketable natural resource but would also face increased loan repayments and the risk of depending even more on one single buyer.

The power sector in Bhutan represents the major source of income for RGoB and not a burden for the national budget like in most Less and Least Developed countries (LDC and LLDC). Their usual solutions to reform the power sector are therefore inadequate.

Since rural electrification reduces fuel wood consumption by 25-35% only, the midterm program embarks on further reduction of biomass via more efficient use of available resources. Past experience from other projects showed little sustainable success in this field. Therefore, the program foresees an orientation phase and a step by step approach to facilitate the conception of sustainable projects. This approach has to work on grassroots level, which requires respective implementation capacity.

The heat market is still dominated by the utilisation of fuel wood. The efficiency of such energy use is very low on the generation side (open fireplaces, cheap iron stoves without heat retention or heat exchangers) as well as on the utilisation side (non-existent heat insulation of resident and public buildings). The RGoB's policy of conserving the forest environment has resulted in the drive to substitute fuel wood by imported electrical heaters. While the intent is understandable, it is not justifiable from the thermodynamic point of view to convert electricity, a high form of convertible energy, into low-temperature heat, the lowest form of energy. Furthermore, from the economic point of view, diverting valuable (electric) energy resources to the consumer heat market implies increased imports of appliances and missed opportunities for providing greater value added to the productive economic cycle. Additionally, the problem of high subsidies for the system of fire wood acquisition by private consumers has been a concern as wasteful usage puts undue pressure on forests. A study initiated by the World Bank on the price reform for wood revealed that the fiscal cost of subsidizing concessionary wood in rural areas is substantial.

3.3 Government Sector Policy and Plans

3.3.1 General

The RGoB follows a development philosophy of Gross National Happiness (GNH), a holistic approach that encompasses economic growth, material progress, emotional security and the spiritual progress of the individual. This concept tries to balance economic progress with the maintenance of Bhutanese cultural and spiritual values, the improvement of social well-being, the preservation of the environment, and the promotion of good governance. Resources have been used judiciously and fairly, and even though poverty is being recognised, it is not associated with the abject wretchedness and human suffering so often found elsewhere. In order to support this development philosophy, the RGoB puts high emphasis on providing electricity to all residents by 2020 and on financing social programs from revenues generated by hydropower electricity exports to India.

3.3.2 Energy

Under the 9FYP, which will end in June 2007, the RGoB aims to accelerate growth and improve living standards, while ensuring the preservation of the country's environment and cultural heritage. The plan also focuses on revenue generation through hydropower development and industrialisation, human resource development, agriculture, and social services. This should mainly be achieved through expansion, consolidation, and improvement of the existing facilities. The share of electricity in GDP will be maintained at above 12% during the entire Plan period. To achieve this, the Government has already commissioned Basochhu and Kurichhu HPPs and is constructing Tala HPP.

The 9FYP, currently under implementation, strengthens the electrification part in presenting power development as the engine of socio-economic growth in Bhutan. Apart from the major hydro power projects, the power policy describes clearly the preferences to electrification via grid extension. If such extension is not economically feasible, priority is given to micro or mini hydropower in local grids. Only totally remote households or institutions shall be electrified by solar energy.

Major restructuring in the electricity industry was carried out through TA from ADB. The Electricity Act was passed in 2001, thus providing the legal framework. The Bhutan Electricity Authority is the custodian of the Electricity Act. The restructuring of DoP in July 2002 resulted in the formation of the Department of Energy, Bhutan Electricity Authority and the Bhutan Power Corporation. The generating companies, like Chukha, Kurichhu, and Basochu exist solely for generation purposes and the industry is expected to transform into a horizontally integrated system.

The revenues from the Chukha HPP have enabled RGoB to expand their programs in the social sectors including education and health. Further development of the power sector is crucial to allow RGoB to generate revenues required for operation and maintenance of the sector, for future expansion of social programs and for sustained overall economic growth. During the 7FYP the power sector accounted for some 25% of Government revenue, at the end of the 8FYP it has already increased to 45%. In the 9th Plan, revenue from energy sector is expected to be around 38% of the total Government revenues. This does not include revenues from Tala Hydroelectric project since it will only be completed at the end of the 9FYP and the related tariff negotiation with India is still ongoing.

3.4 Relevant National Sector Institutions

Department of Energy (DoE)

The Department of Energy (DoE) is responsible for formulation of policies, plans, programmes and guidelines related to Hydropower development, efficient utilization and management of Energy and Hydromet Services in the kingdom. DoE also serve as the Central Coordination Agency and the Focal point of the Royal Government on all matters related to Energy and Hydromet Services. Since Hydropower is the main resource of the kingdom of Bhutan, it is the responsibility of the Department of Energy to develop plans and policies for

sustainable development of Hydropower Projects mainly for export with a view to enhance National Revenue. DoE provides technical advice and related support services to the Royal Government on various issues, options, strategies and prospects related to Energy and Hydromet services, and, oversee, monitor and evaluate the implementation of plans, programmes and schedules and provide feedback for improvement. DoE also provides techno-economic and budgetary clearance on all major projects and programmes related to electricity sector before implementation. Since its change from Department of Power to Department of Energy, DoE is also focussing on other forms of energy other than electricity with a view to embark upon an integrated approach to energy development.

Bhutan Electricity Authority (BEA)

BEA is responsible for regulatory functions related to energy sector issues, for development of Standards and Codes, formulation and approval of Tariff, and their Regulations. BEA is also responsible for Licensing and Monitoring functions as well as Dispute Resolutions related to Power Sector. It currently functions as a division within the DoE and full autonomy is expected once the regulations are ready and the Electricity Act comes into effect.

Bhutan Power Corporation (BPC)

Upon restructuring of erstwhile DoP, Bhutan Power Corporation was launched as a public utility on the 1st of July 2002 with the mandate of distributing and supply of electricity throughout the Country and also providing transmission access for generating stations for domestic supply as well as export. BPC is governed by a Board of seven directors with the Minister of Trade and Industry as the chair and is headed by a Managing Director.

Department of Planning, Ministry of Finance

The Department of Planning oversees the macro-economic planning, program monitoring, and evaluation for the entire country. While it helps to co-ordinate the planning for the energy sector as a whole, most of the actual detailed policy studies and planning of the energy sector is done by DoE.

Large Hydro Power Plants (Generating Companies)

The large HPP like Chhukha, Tala, Kurichhu and Basochhu are established as autonomous generating companies under the companies Act 2000 and function as independent agencies under a Board of Directors.

Department of Forestry Services, Ministry of Agriculture

The Department of Forestry Services, Ministry of Agriculture, is responsible for the sustainable management of forest and protected areas. With relevance to the energy sector, it regulates the fuel wood supply, which constitutes approximately 75% of the country's total energy consumption.

Department of Trade, Ministry of Trade and Industry

The Department of Trade of the Ministry of Trade and Industry is the agency responsible for regulating the price and supply of the fossil fuels. Three private

companies, namely Bhutan Oil Distributors, Druk Petroleum Company and Damchen Distributors supply petroleum fuel products.

Royal Civil Service Commission

The Commission is in charge of planning, coordinating and executing HRD programs for the civil service. The Private and Corporate Sectors' HRD programs are directly dealt by the Department of Employment under the Ministry of Labour and Human Resources.

3.5 Beneficiaries and other stakeholders

Since energy is needed to sustain life, all people living in the area of intervention are affected in one way or another. Given the development concept of the RGoB in financing socio-economic projects from power sales to India and reducing fuelwood consumption by rural electrification, the resident rural population represents the majority of beneficiaries. Electrification also provides power for local trade and industry, which makes the private sector benefit considerably.

Local and foreign NGO's that are relating their work to the state of the environment in Bhutan could be important stakeholders however little is being done in especially addressing energy issues at the moment. There is quite a vacuum on the side of the civil society, academia, research and other private sector institutions.

Because of the known negative impacts of deforestation on the flood situation in the lowlands such as Bangladesh and West Bengal, Bhutan is taking special care of its environment by watershed management and protected woodland. In this respect the downstream regions can also be called stakeholders in the prudent Bhutanese policy of conserving forest cover and watershed management. As per the National Assembly (Bhutan's Parliament) resolution, the Kingdom will retain 60% forest cover for all years to come. Presently Bhutan has 72% forest covered area.

The Government of India (GoI) is also a major stakeholder and plays a significant role in the energy sector of Bhutan. The GoI via the PTC is the single buyer of electricity from Bhutan which represents more than 38% of RGoB's income. The Ministry of Power in India has declared that it would need to add 100,000 MW by 2012 representing an opportunity for Bhutan to develop its hydropower resources to supply power of Indian power demand.

The construction of new big hydropower plants in Bhutan is of mutual benefit to both India and Bhutan as the need for power is there in India and Bhutan is interested to enhance its revenues.

4 PAST AND ONGOING COOPERATION

4.1 Austrian Cooperation

Bhutan is one of the eight priority countries of the Austrian Development Cooperation, the only Asian country enjoying this status. From the very beginning

of the co-operation in the late 80s RGoB requested Austria to concentrate on sectors where it could offer special know how:

- energy, especially hydropower,
- tourism
- preservation of cultural heritage. and
- forestry and mountain ecology.

The Energy sector absorbed the major share of the funds committed for Bhutan. Up to June 2004 an amount of € 43.305 millions has been contributed mostly on grant and part on soft loan basis. The Austrian assistance has been concentrated in the area of power generation and rural energy supply with some accompanying measures in technical studies, human resource development and technical assistance (for details see Annex 5).

Rangjung HPP

The Rangjung hydropower plant (2.2 MW) in Eastern Bhutan designed and constructed with Austrian support was commissioned in 1996. Some rehabilitation works due to landslides in 1997 and heavy abrasion at the turbine runners in 2001 were supported. Bhutan Power Corporation (BPC), the responsible agency supported by Austrian assistance has started overhaul and updating of plant elements in 2004. The BPC will procure the required equipment and spare parts. Once the necessary spare parts/equipment are procured, the Austrian assistance will be provided for on the job training for the operation and maintenance staff of Rangjung HPP.

Basochhu HPP

The Basochhu hydropower scheme has been designed for a total capacity of 64 MW. To allow for better project feasibility the site was developed in two stages.

- Upper Stage, 24 MW

The project was inaugurated in January 2002. It is the largest joint project; in effect the largest project of Austrian Development Cooperation to date. The Plant has an installed capacity of 24 MW. The Austrian Development Cooperation provided a grant of Euro 13 078 331 and an interest free loan of Euro 17 150 789 for the construction of the Hydropower Plant. The Royal Government of Bhutan contributed an amount of Euro 4 796 407.
The plant is fully managed by the Bhutanese engineers and is operating without any problems. From commissioning in 2001, the plant has successfully operated on the national grid and generated 380.9 million kWh of electricity (as of 30 December 2004).

- Lower Stage, 40 MW

The project commenced in 2002 and the contractual final completion date is March 2005. The installed capacity of the plant is 40 MW. The project is carried out on a turnkey basis by a General Contractor (Austrian Hydropower Consortium Basochhu - AHCB), formed by four Austrian companies (VA Tech Hydro, Alstom Power, Verbundplan and Alpine Mayreder) and Bhutan Engineering Company being subcontracted for assistance in civil works. The RGoB has established the Basochhu Project Authority (BPA) at site as an

autonomous body with the capacity of owners representative and project management.

The commercial operation commenced on September 8, 2004 utilising the released water from Upper Stage. The Plant will be completed and inaugurated in last week of March 2005. This project represents the first Bhutanese major infrastructure project which has been completed within the originally planned time schedule and budget.

Project finance of Euro 31.25 millions has been based on a commercial loan on favourable terms under the Official Austrian Export Promotion Scheme (OAEPS) and Euro 16.5 millions from RGoB budget sources (for transmission lines, switchyard and project management). In addition to that, Austrian Technical Assistance for capacity building in the supervision of large turnkey contracts has been provided during construction and erection of the plant.

Dagachhu HPP

A Letter of Understanding on the preparation of a Feasibility Study was concluded between the Department of Development Cooperation, FMFA, Austria and the DADM, Ministry of Finance, RGoB on November 30, 2004, for an amount of Euro 600 000. The Project Design Document will be prepared in the year 2005.

Training and Technical Assistance (from 2000 onwards)

- Two scholarships for Master Degrees in the USA 1999 – 2001 (HRD Energy);
- Asian Institute of Technology (AIT): two slots are earmarked for the Department of Energy every year for Masters Courses. So far 9 candidates have availed the courses and the slots have been fully utilised;
- Training in Operation and Maintenance for HPP personnel in Basochhu (2001 – 2003). Since, Basochhu HPP, Upper Stage with its high technological standards is the first major hydropower plant in Bhutan that is fully operated by Bhutanese Technicians the entire operation and maintenance staff of BHPC had received on the job training on Mechanical and Electrical Engineering. In addition to that, an Austrian advisor to the plant manager had provided technical assistance (2001 - mid2004) and has trained the operation and maintenance team specifically on the operational and maintenance routines of the plant. The staffs working at the control room have been examined to become certified operators.
- Technical Assistance for the construction of Basochhu Lower Stage was contracted in the year 2002. Under this TA, Austrian Experts are providing assistance to the BPA in site management, contractual issues, quality and financial control. The contract will come to end after finalising the construction contract by mid 2005.
- Training in Operation and Maintenance for HPP personnel (Basochhu as a scheme of two dependent stages) has started in 2004. The training has been contracted to M/S Verbundplan over a period of two years. The main objective of the training is to assure that the modern equipment installed in the Basochhu Hydropower project will be operated and maintained by the Bhutanese team in a sustainable way in order to warrant a long life comparable with hydropower stations in Europe.

- Under the Capacity Development Pool: This facility has been made available since the year 2001. Since then Austria provided funds for the Bhutanese participation in the Annual GFSE Workshops as well as the training of a certified inspector in welding and ultrasonic tests for Basochhu Lower Stage. Monthly topping up for the DoE Master Degree candidates in AIT is also met out of the Capacity Development Pool.

Program Development Pool (Energy):

Since 2002 Austria provided funds for the development of programs/projects in the Energy Sector. Until end 2004 the fund has been utilised for studies namely the first phase of an impact assessment of Rural Electrification, the study of a rural stoves programme and the evaluation study for Solar Water Heaters in Bhutan. This Program Development Facility has been very useful and shall, also in the future be utilised for fielding experts to develop new programs/projects in the Energy Sector.

Clean Development Mechanism (CDM)

The basis for a CDM project is formed by the International regulations of the Kyoto Protocol and the Marrakech Accords, and is supplemented by additional Austrian criteria. Upon Expression of Interest by the DoE, M/S Verbundplan prepared a Project Idea Note for a Hydroelectric Project in Bhutan. The Expression of Interest submitted by the DoE, has been accepted by the Kommunal Kredit Public Consulting (KPC). To allow the RGoB to follow-up the integration of CDM mechanisms into their energy policy, a Letter of Understanding on Capacity Development for DoE was concluded between the Department of Development Cooperation, Ministry of Foreign Affairs, Austria and the DADM, Ministry of Finance, RGoB on November 30, 2004, for an amount of Euro 200 000. The TA in Capacity Development should result in the preparation and submission for validation of a Project Design Document by the DoE.

Rural Energy (RE)

National Program for Rural Electrification

In the current 9FYP, about 15 000 households shall be connected to the Bhutanese grid. In the concerted effort of many donors, Austria is also putting in its share. The RGoB appreciates Austria's targeted approach, which allows clusters of houses in remote areas, to be taken up, that would otherwise be left aside of the large scale planning. The yearly contracts are flexible and easily manageable.

The first project has been finalised, two more are under implementation and the forth has been signed between the ACO and the DADM recently. With this, a total of 1 285 households will be electrified until the end of 2005. This program is certainly the one, with the most direct and visible impact on poverty reduction that would otherwise not be financed from the RGoB, given the pattern of isolated settlement prevailing in Bhutan and the very high cost of household connections. It is understood by Austria to continue this program only at a pace which is manageable for DoE from tendering to final accounting.

Rural Electrification Projects

Project I

228 rural households have been electrified in Trashigang, Wangdue Phodrang, Thimphu and Mongar Districts. The project has been completed in October 2004. ACO received and endorsed the Audit Report for the completed activities of 199 households. For the remaining additional 29 households final audited accounts are awaited.

Project II

The project covers originally the electrification of 262 households in rural areas of Zhemgang, Samtse, Trashigang and Pemagatshel districts. According to progress report received from DoE, all the rural electrification tasks have been completed and 252 rural households have been connected to the BPC grid. The balance of funds will be utilised under RE III.

Project III

The project covers the electrification of 384 households, namely 289 households in Trashiyangtse, 46 households in Thimphu and 49 households in Haa district. The tendering procedures have been completed. The erection of the poles for the grid extensions are in progress.

Project IV

An Agreement was signed between the DADM and the ACO on December 2, 2004 covering an amount of Euro 553 940. A total of 421 households (Trongsa 204 households and Bumthang 217 households) will be connected to the grid by the end of 2005 and /or early 2006.

4.2 Other Donors

The development of hydropower is crucial for attaining the Bhutanese goal of self reliance. Therefore, in the past the bulk of foreign assistance has been invested in analysing the hydropower potential and in constructing large HPP, mostly for export purposes. The main donor in this area is India. In parallel, the distribution of clean, environmentally friendly energy to the rural areas is pursued as one of the major thrusts of creating an enabling environment for economic growth. In line with the ambitious target of RGoB especially the Netherlands, Japan and the ADB are supporting rural electrification.

The following overview covers the major donor interventions, for details see Annex 6.

Hydropower Plants and Feasibility Studies

India:

The Government of India is the main donor having funded and constructed Chukha and Kurichu, and is currently financing the Tala Hydropower Project. The financing of these projects is 60:40, where 60% of the cost is covered by grants and 40% by loans. Tala HPP is expected to be commissioned by early 2006.
Currently, the DPR (Detailed Project Report) study for the Punatshangchu HPP, Phase 1 is also funded by GOI and scheduled for completion by 2006. An agreement for a DPR of Punatshangchu II and Mangedchu HPP has also been concluded between India and Bhutan in January 2005.

The Government of India is also funding a study" Integrated Energy Management Master Plan". The study is being carried out by The Energy and Research Institute (TERI) based in New Delhi. The objective of the study is to develop an Energy Framework that would give a holistic overview of the demand and the supply scenario and to develop future strategies (up to 2020) for the sustainable supply of energy required for the socio-economic development of the Kingdom.

Japan:

With technical assistance from JICA, M/S Nippon Koei is carrying out a Rural Electrification Master Plan study. The objective of the study is to prepare a roadmap for future RE projects under the 10FYP to 12FYP in order to meet the national goal of universal electrification by 2020. The study is scheduled for completion by end of 2005.

Norway:

The evaluation of the hydropower potential was originally carried out in 1993 by Norconsult leading to the Power System Masterplan. This Power System Master Plan was updated in 2002 -2003.
The feasibility study of the Mangdechhu Hydroelectric Project (360 MW) was successfully completed in 2000.

UNDP/GEF:

Under the UNDP/GEF funding, a proposal for the implementation of a 100 kW pilot community based project at Sengor, in Mongar Dzongkhag has been committed for financing by UNDP, while answer from GEF is still awaited. The survey and design works are already completed.

e7:

The RGoB and e7 Fund for Sustainable Energy Development has signed a Memorandum of Understanding in 2002 for the development of a 70 kW Micro Hydro Project eligible for the Clean Development Mechanism (CDM) to provide electricity to the village of Chendebji in Tongsa Dzongkhag. The Project is being implemented by a local contractor and scheduled to be completed by 2006. Besides the energy goals, the project is to test the principles of CDM (in particular, the small scale CDM) under Kyoto Protocol of the United Nations Framework Convention on Climate Change, to which Bhutan is a party

Transmission and Distribution

India:

The Government of India has committed USD 6.7 millions for the Tintibi-Trongsa-Bumthang Transmission grid extension project. The objective is to provide reliable and adequate grid power supply from Kurichhu HPP for socio-economic/industrial development activities in Bumthang and Trongsa as well as to provide construction power to the proposed Mangdechhu Hydropower Project.

Asian Development Bank:

ADB is the leading multilateral financing institution in Bhutan and has played a pioneering role in the development of the power sector since 1993.

Rural Electrification Project I & II, USD 17.5 millions, 1995 to 2003, close to 11 000 households around the country have been connected;
Rural Electrification Project III, USD 9.4 millions, 2004 to 2007, over 8 000 households, including many schools and hospitals in 8 districts will be provided with new electricity connections.

Netherlands:

The Royal Government of the Netherlands under the SDA Program finances rural electrification of 514 households and solar electrification of remote public institutions in 8th Plan. The total cost of the project financed by the SDA Program is USD 2.5 millions. The project was completed in 2003.
In addition to that, the Sustainable Development Secretariat (SDS – funded by the Netherlands) is contributing Nu. 301 millions to electrify 3 150 households under Sustainable Rural Electrification Phase II Project in Trashiyangtse, Samdrupjongkhar, Paro, Gasa, parts of Punakha, Wangdue, and Zhemgang. The project has been initiated and scheduled for completion by end of 2006.

Institutional Development

Asian Development Bank:

ADB is the lead agency providing technical assistance (TA) for institutional development. The purpose is to assist the RGoB's ongoing efforts to reform the power sector and induce necessary institutional restructuring aimed at achieving efficiency, reducing subsidy and ensuring sustainability:

- Capacity Building of Bhutan Electricity Authority (USD 0.4 millions)
- Establishment of Druk Hydro Power Corporation (USD 0.5 millions)

Norway:

Under NORAD funding to strengthen the institutional capacity of the energy and water resources sector in planning, policy formulation, and development of regulatory framework including feasibility studies of major hydro projects, the study to update an integrated part of the Water Resources Management Plan was completed. The study also incorporated the Water Resource Management Plan that will form the basis for future updating of the plan in order to incorporate future changes in the national priorities, contribution to the restructuring of the hydropower sector (legal system, power pricing etc) through independent professional advice, an extended and improved hydro-meteorological network, an improved level of professional competence through systematic training and relevant professional literature supplied to a functioning library.
In order to assist further Institutional Strengthening of the Energy Sector and Water Resources Management Planning, the second phase of this project has started in January 2004. As per the Country Agreement and the Institutional Cooperation Contract with the Norwegian Water Resources and the Energy Directorate (NVE), Kingdom of Norway the activities cover Human Resource Development, Development of the Electricity Regulator, Regulations for water structure safety standards and licensing according to the Water Resources Act, Geographic Information System for the Energy Sector, Management Information System for the Energy Sector, Further development of Hydro-meteorological network and Coordination and backstopping by NVE.

5 STRATEGY AND LOGIC OF AUSTRIAN COOPERATION

5.1 Austrian Energy Sector policy

The Austro-Bhutanese Energy Sector Program has been set up in concurrence with the policy statements of the Austrian Development Cooperation and the overall development goals such as poverty reduction, promotion of gender equality, protection of the natural environment and the promotion of peace and good governance. The proposed midterm program fits well into the given guidelines. Specific details compared to the goals are given in Chapter 7. While most of the intervention concentrates on capacity building for the power sector in Bhutan in a wider sense the program also includes support of investments and know-how transfer to improve the level and quality of energy services. Attention was given to sustainability, not only in the sense of sustainable energy projects but also to see energy as an instrument for sustainable human development.

The Austrian Development Cooperation is convinced that private sector development and participation can contribute substantially to the overall development of a country. In the energy sector of Bhutan the restructuring of the former Department of Power is an extremely important step into this direction. Further efforts to develop small scale enterprises e.g. in the field of maintenance of the energy supply for companies and households, are needed. Among others, skills development and training, as proposed under 5.7.3, are considered to be means contributing to the private sector development in Bhutan.

Geographical concentration on only some remote areas in Bhutan is another issue that will be taken up in future.

5.2 Consultations with Development Partner

The present 2nd Energy Sector Program represents an update of the 1st Program (2002 – 2004) but takes into consideration the rapid changes in the Bhutanese energy sector. It is also an appropriate time for the Austrian side to review the program since the major investment – namely Basochhu HPP - will be completed in early 2005.

In a series of meetings between ACO and representatives of the Department of Energy, partially assisted by the ADA Energy Adviser in October and November 2004, a review and update of the 1st ESP (2002 – 2004) could be formulated.

The final round of consultations with RGoB took place after the draft had been discussed at FMFA in February/March 2005.

5.3 Key factors and approach

- Concentration of Austrian programming efforts on the energy sector – even prior to the formulation of a Country Program - is justified since this is a key area of Bhutanese development policy and was the focus of Austrian cooperation since the beginning. This program will pave the way for a more comprehensive midterm planning on country level. In the absence of a Country Program it already takes some wider development aspects into account.

- Hydropower development will remain the core area and general theme of Austrian cooperation in the energy sector. Austria has a comparative advantage and a lot of experience in this field of technology. Past and ongoing evaluations of rural electrification have shown, that the introduction of electricity does not only have significant effects on rural development but also many inter-linkages with the economy at large (income and job creation), with the social service sectors (health and education) as well as with the environment (water catchment area, firewood substitution) and with gender balanced development.
- An important lesson of past experience and evaluation is also that activities in the energy sector must follow a comprehensive and holistic approach. Physical infrastructure deployment has to be complemented by skills development, institution and management capacity building measures. Efforts to enhance local participation and ownership have to be considered as well as measures to target off-grid rural areas and (alternative) energy development. Therefore the program combines the areas hydropower and rural energy development with training and capacity building measures.
- The scope of activities does not encompass policy advice and capacity building for structural reforms since this field is covered by other donors, especially ADB, and would be beyond the current Austrian technical and financial capacities.
- The timeframe of the program will be three years although the national planning cycle refers to a five year period. The three-year-period has been chosen because of the current and foreseeable dynamics in the sector. The Austrian interventions should be flexible and complement the activities of RGoB and other major donors.
- Geographically special consideration is given towards rural and remote areas. During the program period further specification of the geographic areas of cooperation is intended with a concentration on two remote Dzongkhags.
- In the field of training and capacity building the program will pay special attention not only to HPP staff and the rural population at large but in particular to the growing number of (job seeking) school leavers and unemployed with special consideration and promotion of women at project level.
- In operational terms the main instrument of the program will be Technical Assistance in the three areas as outlined above but it will also encompass support and accompanying measures of financial assistance and regional / international training programs. (ref. Annex 7: ODA statistics)
- The concept of National Execution (NEX) has been followed successfully in the past and therefore this form of implementation shall be continued in future. The RGoB has also taken up donor co-ordination whereby procedures of consultation and policy dialogue provide for the integration of donor assistance into a comprehensive national plan. In the past special forms of cooperation existed with the Dutch Government and ADB regarding rural electrification in the Rangjung area. For the midterm period of this program further specific fields of cooperation with other donors in the sector under the EUEI need to be identified.

- During the midterm period of this program the Austrian assistance for the energy sector of Bhutan will amount to about one third of the country envelope, which currently lies at around € 2.200.000,- per year. Additional financing can be provided through scholarship programs.

5.4 Development Objective

The objective of this program is to optimise the use of renewable, environmentally friendly and sustainable energy sources, like e.g. hydropower as well as to increase efficient use of energy resources in order to contribute to economic self-reliance and balanced development in Bhutan. Furthermore, the program aims at promoting CDM Projects in accordance with the International regulations of the Kyoto Protocol and the Marrakech Accords.

5.5 Objectives of the Energy Sector Program

Hydropower:

- To ensure sustainability, efficiency and impact of the investments in HPP (i.e. Rangjung, Basochhu);
- To ensure transfer of modern HPP technology;
- To enhance local capacities and thus improve self reliance;

Rural Energy:

- To improve access to modern forms of energy sources, especially in rural areas;
- To enhance sustainability and efficiency of investments in rural energy;
- To optimise the use of energy;

Training and Capacity building:

- To enhance qualifications on basic, vocational and higher education levels;
- To promote private sector development;
- To promote regional and international dialogue and exchange on sustainable use of energy;

5.6 Expected Results

(Quantifications and local specifications on project level only)

Hydropower:

- Sustainability, efficiency and impact of HPP (Rangjung, Basochhu) secured;

- Modern HPP technology transferred and staff qualified;
- Relevant studies conducted;

Rural Energy:

- Efficient and sustainable use of rural energy achieved;
- Reduction in use of firewood and other energy sources achieved;

Training and Capacity building:

- Higher qualifications on basic, vocational and higher education levels achieved;
- CDM Projects promoted;
- Employment and private business created;
- Use and maintenance of rural energy improved;
- Regional and international exchange on sustainable use of energy conducted;

5.7 Fields of Activities

5.7.1 Hydropower

Given the importance of the development of the hydropower potential for Bhutan's development objectives, the Austrian Development Cooperation (ADC) will no longer be engaged in the construction of large hydropower plants but reinforce the sustainability of the joint projects such as Rangjung and Basochhu by emphasising the improvement of operational and maintenance skills as well as establishing the organisational framework for effective maintenance and materials management in order to achieve the required level of plant availability and sustainability.

It is, however, common understanding that the responsibility for operation and maintenance of HPPs like Rangjung and Basochhu, lies with RGoB immediately after handing over.

If funds permit micro/mini hydropower construction will be taken up.
In the hydropower field the co-operation will concentrate on the transfer of technology through on-the-job training in Austrian hydropower stations for engineers and technicians (stage) and on-the-job training in Bhutan according to specific needs related to grid management and operation & maintenance of HPPs.

Although the Austrian Development Cooperation will not continue to finance the construction of HPPs, the experience of the past shows that Austrian technology might also be interesting for commercially financed HPP projects in Bhutan.

For special cases, studies such as the finalised “Pre-feasibility Study on a Turbine Runner Workshop” can be considered.

5.7.2 Rural Energy

The Rural Electrification Program (RE) will be supported to the extent of funds available on a yearly basis. Therefore no fixed commitment for a certain number of households can be given for this midterm sector program. The Austrian contribution can pick up villages or clusters of houses omitted for various reasons in the main RE program. Special attention will be given to Central and Southern Dzongkhags.

Since RE reduces the firewood consumption only by about 35%, different measures shall be studied and implemented to tackle the remaining 65%, like improved stoves, better insulation of houses, use of alternative sources of energy i.e. solar water heaters, etc.

Studies on the possible use of waste materials such as saw dust, vehicle oils, used cooking oils as energy solutions in Bhutan including the implementation of pilot installations for various use and technologies to heat institutions, like schools, clinics, tourist shelters, army camps etc. are considered.

5.7.3 Training and Capacity Building

Skills development to promote sustainability of investments and to provide a link to the private sector (job creation) for school leavers, both girls and boys, for activities in the areas of rural electrification (line men), electrical house wiring, maintenance management, maintenance of solar equipment, skilled village craftsmen etc.;

CDM Projects/Procedures in accordance with the International regulations of the Kyoto Protocol and the Marrakech Accords, and supplemented by additional Austrian criteria will be trained;
Technicians to be trained in formal vocational training in Bhutan (polytechnics);

Academic training at AIT, Bangkok for two Master courses per year;

Regional and international exchange of experts (ICIMOD, GFSE etc.)

5.8 Indicators

(Quantifications and local specification on project level only)

Hydropower:

- Rangjung and Basochhu HPP have lower operation and maintenance costs and shorter shut down periods than the national average.
- Construction and operation of Micro-/ Minihydels;
- Number of trainees and qualified staff;
- Studies conducted

Rural Energy:

- Number of rural households / institutions having access to modern forms of energy;
- Percentage of savings in firewood consumption in a certain area;
- Percentage of rural energy investments in a certain area in working condition;

Training and Capacity Building:

- Number of trainees on basic, vocational and higher education levels;
- Number / estimates on jobs and private business created;
- Number of exchanges / participants;

6 IMPLEMENTATION

The precise activities to be implemented during a calendar year will be agreed upon in the Annual Consultations held yearly between January - March. From the funds earmarked for Bhutan about 1/3 should go into the energy sector, this is currently corresponding to approximately EUR 733 000 annually. In addition to this amount scholarships will be funded from other sources of the Austrian Development Cooperation. A soft loan by the Austrian Kontrollbank for the construction of Basochhu, Lower Stage supplemented the portfolio.

DoE or its successor will be the main partner on the Bhutanese side. After a general agreement with DoE and DADM on the priority activities has been reached, areas of cooperation with other agencies on national or regional level will be identified.

The principle of National Execution, which stipulates that the lead role in planning, coordination of activities within RGoB and with other donors and the overall responsibility for the transparent use of funds lies with RGoB, will be observed. The Austrian side will monitor and evaluate the results of the various Austrian interventions.

6.1 Means and resources

The Austrian assistance will complement Bhutanese efforts and the interventions of other donors as far as appropriate. Double financing will by all means be avoided. The RGoB contribution to each contract will vary and be determined either in cash or in kind.

Activity	Austrian input in EURO
Energy sector in the bilateral yearly budget o Hydropower (ref 5.7.1) o Rural energy (ref 5.7.2) o training and capacity building (ref 5.7.3)	733 000 40% 40% 20%
Academic Training o 2 Masters per year at AIT	43 604
Basochhu Lower Stage o Ongoing loan by OeKB	31 249 319

6.2 Procurement

In implementation of a contract signed by DADM and ACO the procurement of goods and services will either be carried out in Bhutan or in Austria, whichever is more appropriate and effective. In some cases the tendering can be done prior to the signing of the contract if agreement on the activity and the method of execution has already been reached.

For procurement by the Austrian authorities a procedure according to the Austrian Bundesvergabegesetz (Procurement Law) will be followed. The Bhutanese side will be informed on the bids received and the evaluation carried out by the Austrian side. Award of contract shall only be done in mutual agreement.

For procurement by the Bhutanese authorities the rules and regulations of the RGoB will prevail. The Austrian side will be informed before awarding of a contract and receive a copy of the contract.

6.3 Organisational structure

FMFA is responsible for the overall decision on the Austrian program for cooperation that is in particular, the choice of partner countries, the budget frame allocated for cooperation each year, the general guidelines on the development policy and the sector policies.

The country program for Bhutan is administered by Austrian Development Agency (ADA) desk officer at headquarters in Vienna and the ACO in Thimphu.

ACO is entrusted in general with all activities connected with Development Cooperation, especially:

- the preparation of projects/contracts after a decision has been taken at the level of country program, sector programs or at the Annual Consultations;
- the monitoring of progress and the judicious use of funds;
- the preparation of evaluations;
- the participation in donor coordination and coordination with RGoB.

6.4 National Execution

The strategy to implement projects following the principles of National Execution (NEX) has been formally adopted by Austria in 1997 and has been observed in all new contracts. NEX strongly increases ownership but it also demands a joint and very tight involvement in planning, monitoring and accounting. Cofinancing is sought partly to enlarge the financing capacity but mainly to strengthen ownership and ensure that interventions are of top priority to the RGoB.

6.5 Implementation Plan, Timetable and Procedures

Guided by the midterm energy sector program the individual contracts shall be agreed upon during the Annual Consultations and prepared subsequently by ACO/Bhutan, the desk at ADA and RGoB. Austrian financial regulations may require that the duration of a certain contract is limited to the period of one year though the activity is of a longer duration. In that case consecutive contracts will be concluded.

The Austrian regulations require half yearly reports and accounts to be submitted. The reporting shall be done in English, the reports have to be signed by the Bhutanese Implementing Agency and – as the case may be – countersigned by the international expert. The principle of mutual information and transparency in the use of funds shall be followed.

6.6 Preconditions and Accompanying Measures

This energy sector program is based on the assumption that the overall Bhutanese development strategy (9FYP) will be implemented according to plan and coordinated with other donors. Activities in the field of Rural Electrification or HRD are based on this precondition.

On a macroeconomic level the fact that part of the government revenue (e.g. from energy exports) is used to finance socio economic programs is an important precondition for further support of the energy sector in Bhutan by the Austrian Development Agency. This way of financing socio economic programs will help Bhutan to become more self reliant and self sustainable in her development commitment.

Some of the activities enumerated in the sector program require cooperation between various Bhutanese agencies and can only be carried out if the political will and commitment for such cooperation exists.

The existence and proper staffing of an Austrian Coordination Office in Thimphu as well as an energy consultant strengthening the country desk and ACO are also prerequisites.

6.7 Monitoring and Information

An assessment of the progress of implementation will be done during the Annual Consultations, looking back at targets and achievements in the qualitative and financial sense. Reporting and monitoring will be done at project level. A report on the progress of contracts/projects is given by ACO in the form of Quarterly Reports to the ADA.

6.8 Evaluation

Instead of the planned external evaluation of the sector program itself towards the end of 2004 the Austrian side started a long-term evaluation on the effects of rural electrification (taking the RE II project as example) on indicators such as poverty reduction, socio-economic changes, migration, trade and SME's and last but not least environment.

6.9 Public Relations

Bhutanese media, such as Kuensel, the bi-weekly newspaper, and the BBS are informed by ACO on special events that might be of public interest and they have in the past readily taken up the news.

All public relations activities in Austria will be coordinated between the Department of communications and information in the ADA, country desk and ACO.

7 ASSUMPTIONS

7.1 External factors

The projects are to be implemented in partnership with DoE and its utility company Bhutan Power Corporation (BPC). Moreover the projects are fully in line with the government's rural based development strategy under the 9FYP. Therefore political support is most likely. Basis for the presented Austrian midterm sector program is the published electricity policy with its target to sell surplus power to India, the fact that India is willing to pay fair prices for this electricity, the power sector in Bhutan works efficiently so as to generate at low cost and the RGoB continues to finance socio-economic development in rural areas from electricity export. If one of these elements fails the program would loose its poverty reduction aspect and requires to be reviewed.

7.2 Risk estimates and need for modifications

In the unlikely event of major changes in the general policy of the RGoB only little room remains for modifications. All projects will be agreed in detail by the NEX concept. The partners are governmental departments or newly created para-statals or companies with the RGoB as major shareholder and are not in a position to follow different policies than RGoB's. Since no partner outside RGoB will be involved the program has to be terminated in such a case.

It has to be noted that all indications give the contrary impression. The 9FYP of RGoB stresses the policy to finance socio-economic projects and rural development from revenues of electricity sales even more than the FYP before.

8 SUSTAINABILITY CONCERNS

8.1 Institutional and Policy Support

Given the crucial importance of the energy sector for the development of the country there is high priority accorded to it on all institutional and policy levels. Therefore the identified areas of Austrian cooperation can be considered as fully in line with national policies and plans.

Since less then 30% of households have access to electricity and only 20% of the power generated is consumed locally the population at large and public opinion also is in favour of extended access and wider local use of modern energy sources. A household survey conducted during the recent evaluation stated that electricity is of high importance to all of them. The survey revealed at the same time that electricity is not considered as important as basic needs such as food, water supply and social services. The potential of electricity to improve the delivery of such basic needs and services might not (yet) have been realised.

Whilst a widespread backing for the development concept of subsidised provision of energy is prevailing the awareness for a more cost efficient use still leaves much to desire.

Currently there is very limited potential and capacity in the private sector to play a major role in the energy sector. Therefore the planned restructuring and corporatisation exercise remains a public sector affair and depends widely on donor support mainly provided by ADB.

A cautious decentralisation drive on RGoB side regarding the setting of priorities is opening the way for more transparency and local participation in the sector.

8.2 Donor co-ordination

Without any doubt the most important instrument for the donor coordination is the approved 9FYP, which is in effect from July 2002 to June 2007. Guided by the plan, the Department of Aid and Debt Management (DADM) has the task of co-ordinating the donors and of ensuring that no duplication takes place. This is relatively easy given the size of the country and the many formal and informal contacts among the donors active in a sector.

In addition to the coordination carried out by the RGoB, contacts between the few major donors in a sector take place. In this respect, India has a special role due to its long-standing and close relationship with Bhutan and does not take part in coordination with other donors.

Since 2002, the UNDP Thimphu has started publishing annually a document on the “Joint Donor Database” which provides the details of the projects supported by the donors of Bhutan. It also provides details of the sectors along with the amounts, according to the Development Assistance Committee (DAC) Sector Codes. This has helped in the coordination of activities, supported by various donors and in checking the duplication of activities. Midterm programs are shared on a voluntary basis among the donors.

8.3 Appropriate technology and maintenance

In the context of Development Cooperation the term “appropriate technology” very often means simple and labor intensive technology. This is not the case when talking about Bhutan, one of the few LLDC, where labor is a rather scarce factor of economic production. Austria has been a key player in the introduction of modern HPP technology in Bhutan. The Austrian power generation infrastructure provides a much higher degree of mechanisation and automatisation. Therefore it requires less manpower, a fact which matches with the relative manpower shortage in Bhutan.

After some problems in the early stages of modern HPP technology interventions to cope with specific climate and geological conditions the technology is now better adapted to local circumstances.

Long term plant availability is a major concern of the Austrian Development Cooperation. It is the task of the RGoB to set targets in that respect and to develop and implement a standardised systematic approach in order to achieve the required level of availability over the expected lifecycle of equipment. Such an approach comprises procedures to ensure regular servicing and conservation of equipment in order to avoid early damage as well as unexpected breakdowns. It entails proper planning for major interventions, including safeguarding of spare part supply, as well as services from outside contractors. In the specific situation of Bhutan with very limited services offered by the private sector it will be the responsibility of the public sector to develop such services as well as a concept for timely and cost conscious spares provision through a budgeting mechanism.

For future plants the issue of plant maintainability shall be accorded high significance. The systematic approach towards maintenance shall not start during plant construction but be regarded as a major concern during specification and tendering. This comprises questions like proper documentation (routine maintenance, repairs, spare part identification, standardising of equipment and working material to be used, e.g. lubricants, etc), inspection techniques, supply of tools and proper skills development.

To ensure proper performance of maintenance a reporting system shall allow the administration unit responsible to regularly check maintenance efficiency through parameters such as availability of spares consumption or cost of maintenance.
The earlier focus on pure plant construction activities and so called hardware components has gradually shifted to a more comprehensive approach which takes human resource development and other factors of local participation and ownership into account.

Apart from equipment to be imported for the hydropower plants, the projects are to be implemented using locally available inputs and manpower. The projects have the character of optimally utilizing or enhancing the natural resources of the area.

8.4 Poverty reduction

The RGoB’s Department of Planning in its Poverty Analysis Report October 2004 defined the national poverty line, which represents the amount that a person should consume (in real terms) to be considered as non-poor has been

established at 740.36Nu. per month. Based on this poverty line, it was estimated that 31.7% of the population of the country is poor. Of this, only 4.2% of the urban population is poor against 38.3% of the rural population.

About 4% of the population is considered subsistence poor, in that they are not able to meet their basic food needs. The expected time for the very poor (or subsistence poor) to exit poverty is about 15 and half years. It has been estimated total population of Bhutan as of 2003 is 734,340 and based on this estimate, a total of Nu. 560 millions would be needed annually if the poverty situation needs to be eliminated.

“The fact that a significant portion of the population lives at subsistence level, with no savings possible, means that it is subject to changes not only beyond its control but perhaps even beyond its comprehension”. The concept has identified ten living standard dimensions with “access to electricity” being one of the essential physical facilities to contribute to the reduction of poverty and to the well being of the people.

To a large percentage the final beneficiaries of this program are households below the poverty line and live in subsistence economy with very small cash income from selling crop surplus. Some money also flows into the rural communities as remittances from family members working in town and from wage labor.

Access to energy is a key component of any poverty eradication and sustainable development strategy and critical to the achievement of the Millennium Development Goals. The availability of electricity is a stimulant to the extension and creation of rural craft, industry and trade. Agricultural processing in fact is the main direct productive use of electricity in rural areas – grain grinding, flour milling, rice husking, and production of seed oil. The productive use of electricity will increase employment opportunities and reduce rural to urban migration. Furthermore, the supply of electricity to lower income households is expected to enhance their income-earning potential.

Electricity supply to social services like schools and hospitals and to cultural institutions like monasteries and temples is also improving their standards and performance which has effects and impact on the living standard and well being of the population too.

The RGoB‘s policy of subsidised energy tariffs underlines the relevance of this sector not only as propellant for economic growth but also for poverty reduction. With effect from July 2002, a block tariff system was introduced by BPC. By the end of the year 2004 the tariffs were: Block 1, up to 80 kWh/month: Nu 0.6/kWh, Block 2, 81-200 kWh/month: Nu 0.95/kWh and Block 3, for consummation beyond 200 kWh/month: Nu 1.2 /kWh. The RGoB receives 2.0 Nu/kWh for exports from Chukha HPP and 1.75 Nu/kWh from Kurichhu HPP.

8.5 Environmental protection

Bhutan is a country rich in bio-diversity, with its natural forest cover largely intact. Many ecologists believe that Bhutan represents the last and best chance for conservation in the Eastern Himalayas, a region considered to be of critical importance to the global efforts to conserve biological diversity. The country is

well aware of this treasure, as the 8th FYP states: “Conservation is a central tenet of Buddhism. The importance of protecting nature in all its manifestations has permeated Bhutanese consciousness and has become integral to the Bhutanese way of life.”

Regarding environmental protection Bhutan faces many challenges in the years ahead with the process of modernisation creating new demands upon the country’s natural resources. Apart from electricity the country has little to sell to the outside world to pay for its numerous needs. The policies that preserve Bhutan’s rich natural beauty and bio-diversity restrict the commercial exploitation of the raw materials upon which most national development schemes are based. There are tight restrictions on commercial logging and severe regulations on exploitation of mineral resources.

While 79 % of the population earns their living from the land, only about 8.6% of the area is under cultivation with a high proportion of slopes that are too steep for cultivation without risk of erosion. Shifting cultivation is phased out on environmental grounds. Therefore the pressure on land and other renewable resources will inevitably grow as a result of the population increase which is now estimated at 2,5%.

The RGoB is addressing environmental concerns in its National Environmental Strategy and maintaining strict regulations to preserve a minimum 60% of forest covering the total land area. In view of the high reliance on fuelwood as a source of energy in households, the Government wishes to accrue benefits from the energy sector projects not only in terms of balanced development throughout the country but also in reduction of the pressure of deforestation in the long term. Firewood consumption in rural areas will be gradually replaced by electricity, which is indigenously and environmentally friendly generated from hydropower stations.

The household survey carried out during the evaluation of Rangjung HPP has shown that a reduction of firewood use of about 25% per year took place in electrified households.

8.6 Socio-cultural Factors

A specific cultural identity, pride and self esteem is typical for Bhutanese people. There is a common notion that they are not victims but masters of their own destiny and the development process in general. This is quite a difference to many other developing countries (and to a common donor perception also). Sources for this very special consciousness and the emphasis on the notion of self reliance might be the precarious cultural situation between two giant neighbours, India and China, but also historical factors. For instance that the Bhutanese people were never living in feudal circumstances like the medieval European peasantry. Furthermore Bhutan was never under colonial rule. Throughout ancient history the majority lived as free men and women on their own land with only a minority kept as serfs or slaves. In addition to the monastic system a centralised state authority developed as a rather thin layer and very late.

The Bhutanese development concept is designed to be people-centred and tries to maintain a delicate balance between modernisation and preservation of its

own cultural traditions. It stresses the aim of equitable and sustainable development through the full participation of the people. The philosophy of Gross National Happiness (GNH) attempts to harmonise economic progress with social, spiritual and emotional wellbeing. Therefore unhindered access to lamas (priests) for performing religious activities and enriching the spiritual aspects of a person's life is seen as equally important to a Bhutanese as housing, clothing and food.

Consequently in addition to direct enhancement of domestic household welfare, policy objectives of rural electrification emphasize also social impacts and overall benefits to the community. The use of electricity by community and social services has positive impact on higher living standards and well being. With the rising living conditions in rural areas a decrease of rural-urban migration is expected. Rural electricity will be used by schools and health clinics in rural areas, for street lighting and in public and cultural buildings.

Less tangible, electricity tends to provide rural communities with a psychological boost as it brings them into active contact with the outside world and other national and international perspectives (via radio, television, internet, etc.). Electric light has improved the reading and writing capacity of all social classes in Bhutan including monks obtaining non-formal education.

The above mentioned evaluation has shown that electrification projects do have a positive impact on rural development since electricity is linked in many aspects to modern life and it has thus the potential to change the attitudes of the rural population. It states: "In a country that jealously guards its cultural and religious heritage; some nervousness over the exposure to outside influence created by electricity is to be anticipated. Religious and cultural leaders express confidence and optimism about their ability to manage change, of which electrification is only a part, and to use electricity for their own purposes".

8.7 Gender

Traditionally with a matrilineal society background Bhutanese women enjoy equal status and opportunities with men and in fact predominant inheritance laws are favourable to women. Most household heads are women and the participation of women in decision-making forum on village level is as high as 70%.

The primary and secondary school enrolment rates are still lower for girls than for boys and the number of women holding senior management and civil service positions is comparatively small. This has mainly been due to lack of educational facilities and the distance that the girl student had to walk from home to school in the past, which resulted in low enrolment rates among girls. However with better access to educational facilities now the enrolment has improved in recent years.

With modernisation, the role of Bhutanese women is also changing, as the society transforms from a traditionally joint family to a nuclear family unit. As more people take up employment in the modern sector and dwell in the urban and peri-urban areas and with the growing trend towards nuclear family the safety net of the extended family is breaking away. This poses challenges not only for women but for the society as a whole.

Results of the above mentioned evaluation indicate that women benefit substantially from electrification, as they spend more time in the household and

use improved lighting and other household appliances. Electrification in flourmills and other grain and food processing facilities also reduce women's workload. Furthermore, it is also stated that electrification of health clinics and schools benefited them and their children significantly.

Fuel wood collection is mostly women's and children's work in domestic households, therefore women benefit from firewood substitution by electrification. Furthermore, using firewood for cooking and heating causes respiratory diseases among women and children as they usually stay in their houses longer than men do.

In order to promote gender balance and women's participation in all areas of co-operation an assessment of their situation regarding capacity building and decision making should also take place on project level in order to identify steps and measures to improve their situation.

8.8 Institution and capacity building

Decentralisation is one of the pillars of the Bhutanese development concept of GNH. „One aspect of human happiness is the ability to make choices for oneself, and the closer the decision-making process is brought to the community and the individuals in it, the more operational becomes the concept of GNH" (RGoB's Poverty assessment).

In the 9th Five Year Planning period of RGoB a large portion of the responsibility of planning and implementation will move to lower levels of Local Government, i.e. from the Dzongkhag to the Geog level. Such increase in people's participation in decision making obviously requires capabilities and responsibilities of the local administration.

This task refers also to the field of Rural Electrification and Rural Energy development where the local authorities have a vital role to play in the implementation of plans and projects according to the setting of priorities by their constituency. The relevant capacity building aspect has to be considered and elaborated as one of the main components of the Austrian sector policy.

8.9 Economic and financial viability

8.9.1 Hydropower

As described above, the RGoB develops hydropower on economic terms for export earnings, which are used further on to finance social programs from revenues. Since RGoB took grants and loans on concessional interest rates only, the Bhutanese program on development is financially sustainable so far. In the long run the RGoB consumer price for grid-fed electricity will be brought gradually closer to economic levels, at least for more affluent strata of clients.

The Austrian program targets to improve the overall project and program viability by transferring modern hydropower technology and by expanding the lifespan of investments and equipment.

8.9.2 Rural Energy

According to the vision of RGoB, future replacement investments will be met from the increased revenues resulting from its long-term development policies of which rural electrification forms an integral element. The major part of economic and financial viability is related to positive environmental and socio-economic effects, such as decreasing pressure on woodlands and emission of greenhouse gases, improving rural income and health. All activities in rural areas have active participation of the population concerned as a prerequisite.

8.9.3 Training and Capacity Building

The economic value of training and capacity building is to be seen on long-term basis and is well published in relevant literature. Since further development of hydropower is essential for RGoB and other investors the DoE will have to finance relevant HRD more and more out of revenues of the hydropower projects on a project related basis.

8.10 Adequate timeframe

The duration of the sector program will be three years given the rapid changes in the sector. It does not coincide with the 9th FYP but takes fully into account the guidelines, thrust and objectives of the Plan. The Austrian interventions can complement the main players and give some flexibility to assist for example in Rural Electrification taking care of some villages or clusters of houses left out for various reasons from the main stream. The three year cycle is also more appropriate to the Austrian budgetary guidelines.

9 ANNEXES

1. Abbreviations / sources used
2. Bhutan: development strategy, facts and figures
3. Overview of Hydropower Sector (map)
4. Organogram DoE and BPC
5. Austrian Contracts up to June 2004
6. External Assistance to Power Sector
7. ODA statistics Austria/Bhutan
8. Logical Framework

ANNEX 1:

ABBREVIATIONS

ACO	Austrian Coordinaton Office
ADA	Austrian Development Agency
ADB	Asian Development Bank
AIT	Asian Institute of Technology (Bangkok)
BPC	Bhutanese Power Corporation
DAC	Development Assistance Committee
DADM	Department of Aid and Debt Management
DoE	Department of Energy
EUR	Euro
FMFA	Federal Ministry for Foreign Affairs (Austria)
FYP	Five Year Plan
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEOG	Blocks (group of villages), similar to community
GFSE	Global Forum on Sustainable Energy
GNH	Gross National Happiness
GOI	Government of India
HPP	Hydro Power Plant
HRD	Human Resource Development
ICIMOD	International Centre for Integrated Mountain Development
LDC	Less Developed Countries
LLDC	Least Developed Countries
MW	Mega Watt
NEX	National Execution
NGO	Non Governmental Organization
Nu	Ngultrum (approx. 58 NGU = 1 Euro)
NWAB	National Women's Association of Bhutan
ODA	Official Development Assistance
RE	Rural Electrification
RGoB	Royal Government of Bhutan
TA	Technical Assistance
UNDP	United Nations Development Program

Sources Used:

1. Bhutan Vision 2020
2. IXth Five Year Plan Document (2005-2007)
3. Statistical Year Book of Bhutan 2002
4. DoP Sustainable Rural Electrification by Grid Extension and Photovoltaic supply, October 2000
5. Gender Pilot Study Report Bhutan June 2001
6. RMA Selected Economic Indicators March 2004
7. Three Year Program 2001-2003 of the Austrian Development Cooperation, Vienna 2000

Annex 2: Bhutan, Development Strategy

The Bhutanese concept of Gross National Happiness, which was declared by His Majesty the present King in the late 1980s, is the unifying and guiding principle for all development efforts in Bhutan. It is spelled out in the document “Bhutan 2020 a vision for Peace, Prosperity and Happiness” published 1999 and put into action in Five-Year-Plans, which are closely monitored and taken very seriously by the Government.

Bhutan recognized and pronounced very early that development has more dimensions than those associated with the growth of the Gross National Product, that the individual has material, spiritual and emotional needs.

Five thematic headings or objectives serve as a powerful tool for steering the process of change:

- Human development, culture and heritage, balanced and equitable development, governance and environmental conservation.

Main achievements:

- Only in 1960 Bhutan abandoned her policy of isolation and actively sought contact with the neighbors in the South and the outside world. India was the most prominent partner during this phase.
- The most important result of the first three Five-Year Plans was a road network that connected Bhutan with India (N-S highway from Thimphu to Phuentsholing) and the main East-West Highway connecting the major towns in Bhutan. Prior to that all distances had to be covered on foot, only mule tracks existed, everything had to be carried by men or animals.
- In the Fourth Five Year Plan (1976-81) more weight was put on education, health and forestry; industrial development was introduced as a new area.
- The Fifth Plan (1981-87) emphasized economic self reliance, putting priority on the development of hydropower, mining and industry. It is generally regarded as a crucial phase in Bhutan’s socio-economic development. Chhukha HPP took up production in 1987/88 supplying the entire Western Bhutan with power and still exporting 90% of the production to India. Hydropower started to be the single largest source of income for the country.
- The next plans had as a target to make Bhutan more independent from foreign capital and labor, putting great emphasis on human resource development, health services, development of agriculture, hydropower and the private sector. The underlying principle is always sustainable economic development with due consideration to environmental conservation and the protection of the traditional values and the cultural identity.
- Bhutan has so far followed a very prudent financial policy. Current expenditures are met by domestic revenue, while capital/development investments are covered by donor aid or concessional loans. The revenue from hydro power puts the government in a position to finance social sectors and grant subsidized rates for

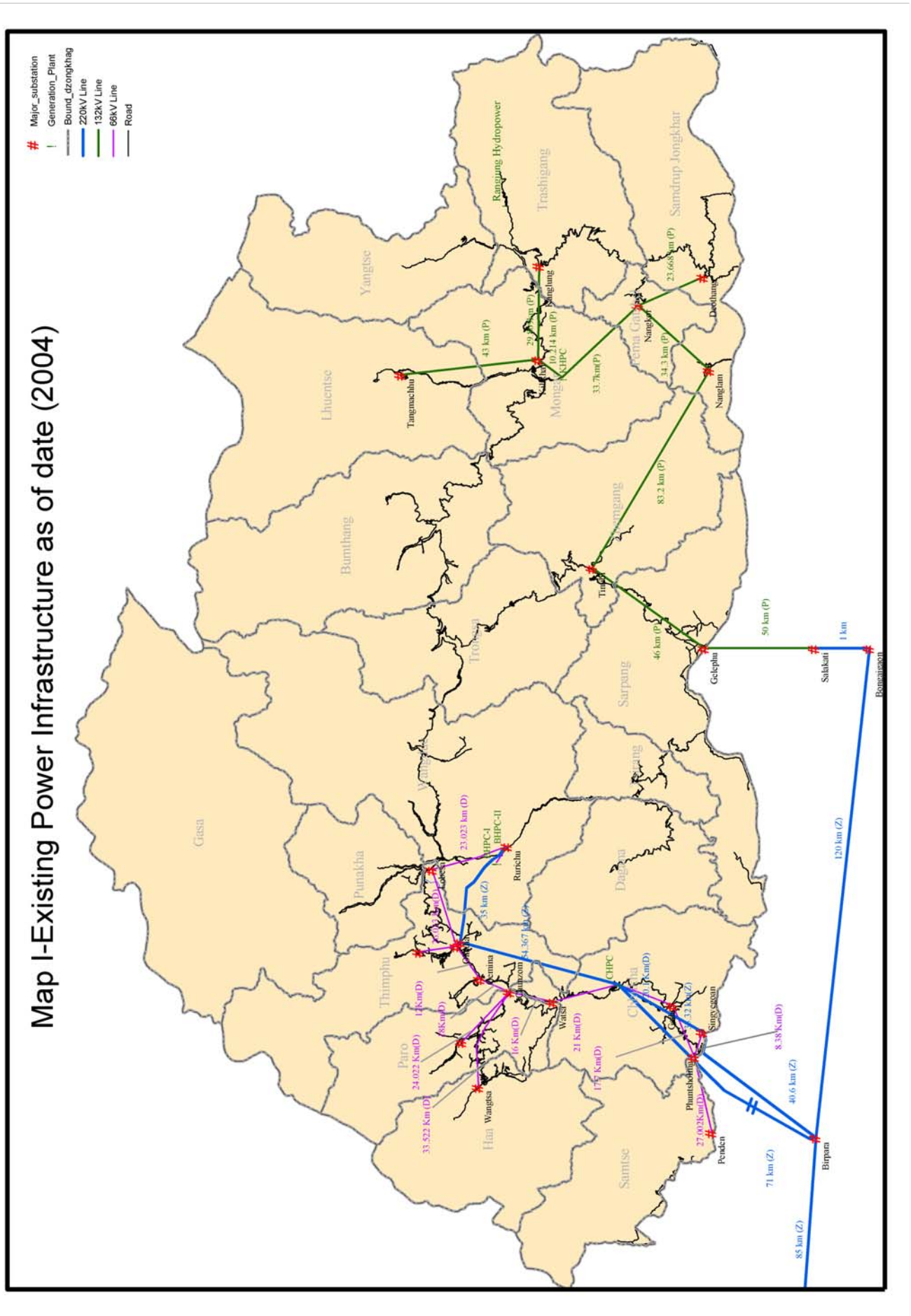
domestic tariffs. Revenue from hydropower in 2004/2005 is expected at 38%, while expenditure for the power sector is calculated with 4% (excluding mega projects), the bulk of expenditure going to health and education with 27%. Medical and educational services are free to Bhutanese.

Bhutan, facts and figures

Land area	38,394 square km
Land under agricultural cultivation	7.7%
Forest cover	72.5%
Protected areas	26.2%
Population (2002)	716,424 (official figure used by donors resident in Thimphu; some UN agencies still use an estimate of up to 1.8 million)
Population growth rate (2002)	2.5%
Life expectancy (2002)	66 years
Basic social services	
Access to safe drinking water (2002)	77.8%
Persons per hospital bed (2002)	833
Adult literacy rate (2004)	54%
Gross enrollment ratio (2004)	89%
Economy	
Per capita GDP income (2004)	US$ 834
Inflation (CPI September 2004 -CSO)	2.87%
Economic growth rate from 1980 on	6 % average
Foreign exchange reserves 2004 (March)	US$ 397 million, covers imports of 24 months
External debt (2004 March)	US$ 196.9 million; Indian Rupees equivalent of US $ 286.4 million
Taxes: rural people (nearly 80% of population)	Less than 1% of taxes

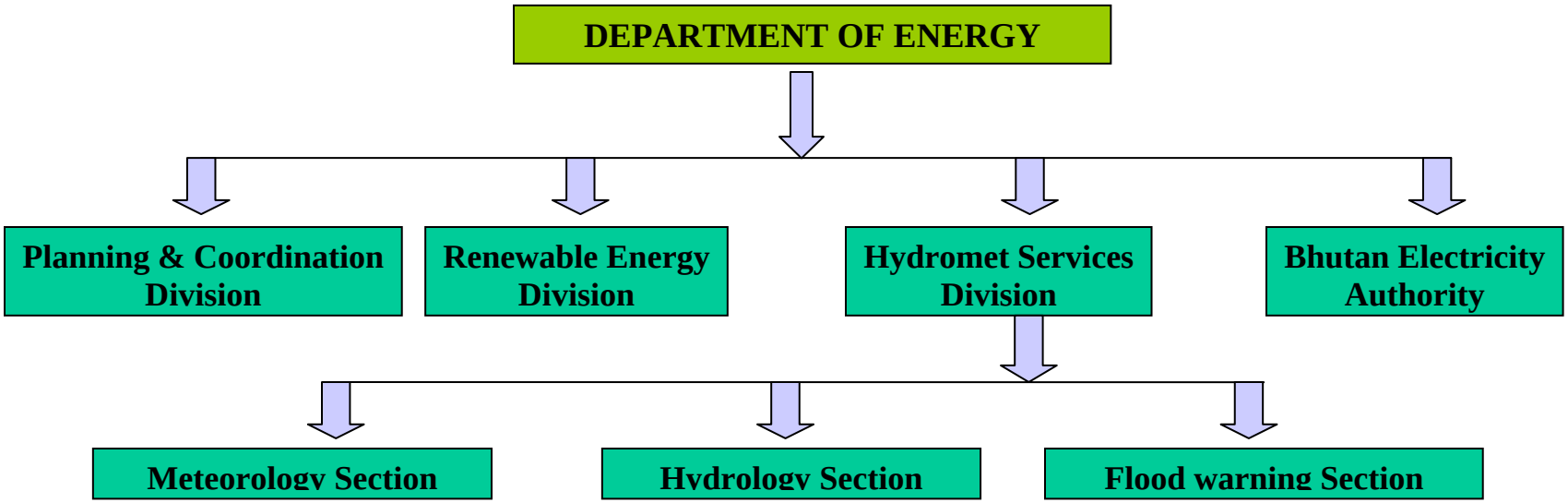
Sources:
Central Statistical Organization, Planning Commission, 2002
UNDP Country Report 2002;
Selected Economic Indicators, Royal Monetary Authority, March 2004

ANNEX 3


Map I-Existing Power Infrastructure as of date (2004)
Major_substation
Generation_Plant
Bound_dzongkhag
220kV Line
132kV Line
66kV Line
Road
Gasa
Punakha
Thimphu
Paro
Ha
Wangtsi
Bumthang
Lhuentse
Yangtse
Trashigang
Trashiyangtse
Samdrup Jongkhar
Samtse
Chukha
Dagana
Tsirang
Sarpang
Wangdue
Trongsa
Zemina
Tangmachhu
Rangjung Hydropower
Nanglang
Mongar CHPC
Nangkor
Daothang
Nanglam
Tingtibi
Gelephu
Salakati
Bongaigaon
Basochu
Chukha
Kurichu
Watsi
Singyegaon
Phuentsholing
Penden
Birpara
50 km (P)
1 km
120 km (Z)
83.2 km (P)
46 km (P)
43 km (P)
33.7km(P)
34.3 km (P)
23.668 km (P)
40.6 km (Z)
71 km (Z)
85 km (Z)
8.38Km(D)
21 Km(D)
16 Km(D)
17 Km(D)
12Km(D)
68Km(D)
24.022 Km(D)
33.522 Km (D)
27.0025Km(D)
32 Km(Z)
35 km (Z)
23.023 km (D)
54.367 km (Z)

ANNEX 4 - A

DOE's Organogram



ANNEX 4 - B

BPC Organogram

ANNEX 5: Austrian assistance to Energy Sector up to 30-06-2004 Figures in Euro

Project/Contract No.	Titles	Commitment	Total
Basochhu I HPP			
1113-00/1990	Basochhu HPP Feasibility Study	218.019	
1113-00/1992	Basochhu HPP construction (ERP Grant)	13.081.110	
1113-01/1992	Basochhu HPP construction (ERP Soft Loan)	17.150.789	
1113-01/1993	Basochhu HPP Detailed Planning	1.199.101	
1113-02/1994	Basochhu HPP Access Road and TA	724.422	
1113-02/1996	Basochhu HPP Access Road and TA	108.410	
1113-05/1997	Basochhu HPP Monitoring Consultant Extension	290.691	
1113-02/1999	Basochhu HPP System Study	37.106	
1113-03/1999	Basochhu HPP Intake Modeling (ERP)	108.464	
Basochhu II HPP			
1113-01/1999	Basochhu HPP II - Tender preparation	380.824	
	Stage II investment of Euro 31.25 million (soft Loan – export credit)		
	Sub Total Basochhu from Development Funds (grants and loans)		**33.298.936**
Rangjung HPP			
1360	Rangjung HPP Project costs before 1996	5.238.310	
1360-02/1996	Rangjung HPP local costs	241.855	
1360-03/1996	Rangjung HPP landslides protection	161.680	
1360-01/1999	Rangjung HPP II - Spare Runner (ERP)	60.318	
1360-02/1999	Rangjung HPP II - New Runners (ERP)	123.500	
1360-04/2000	Rangjung HPP II - monitoring consultant	201.372	
1360-03/2000	Rangjung HPP II - Construction new desilter	289.078	
2145-00-2002	Rangjung Analysis (Subcontract 7)	12.000	
	Sub Total Rangjung HPP		**6.328.113**
Rural Energy			
2116-00-2001	Rural Electrification (RE) I	329.117	
2116-00-2002	Rural Electrification (RE) II	462.777	
2116-00-2003	Rural Electrification (RE) III	442.335	
2145-00-2002	Baseline study RE (Subcontract 4)	63.000	
2145-00-2004	Solar Warm Water (Subcontract 1)	35.400	
	Sub Total Rural Energy		**1.332.629**

Training and TA			
1113-01/1993	Masters training Programme USA	54.505	
1531-00/1993	Training of four DoP Technicians, Austria	315.882	
2043-00/1999	Masters training Programme, USA (2 DoE)	190.766	
1109-00/1999/	2 per year Masters AIT, funded from other Austrian sources	xxxxxxxx	
2102-00-2001	Basochhu, Adviser to Plant Manager	130.811	
2102-01-2001	Basochhu I, Trg operational and maintenance staff	300.000	
2122-00/2002	Basochhu II -Consultancy	960.000	
2070-00/2000	Energy consultant , Verbundplan	70.129	
2102-01-2004	Basochhu II, Trg operational and maintenance staff	270.000	
2104-00-2002	Training of one official from BPA (Subcontract 3)	4.461	
2104-00-2001	GFSE Workshop (Subcontract 7)	6.247	
2104-00-2001	Topping AIT Masters (Subcontract 1)	16.580	
2104-00-2002	GFSE Workshop (Subcontract 6)	5.000	
2104-00-2002	Topping up AIT Masters (Subcontract 1)	21.024	
	Sub Total Training and TA		**2.345.405**
	Grand Total		**43.305.083**

ANNEX 6 : External assistance to the power sector since 1997

Sl.#	Project Title	In Million US $		Remarks
1	**ASIAN DEVELOPMENT BANK (ADB)**	**Grant**	**Loan**	
i	Rural Electrification -1 TA 1375-BHU (SF)		7,500	A PPTA grant approved in December 1993.Loan approved on 19 September 1995 and loan Agreement signed on 17 November 1995. Project completed in December 1999.
ii	Rura Electrification -II TA 2912-BHU	0,600		Prior to completion of RE-I, a followup RE II project was approved in November 1997. Loan Agreement signed on 12 January 2000
iii	TA 3112-BHU-Policy and Legal Framework for Power Sector Development	0,500		Approved on 8 December 1998.
iv	TA 3307-BHU- Coporatization of DOP	0,600		TA approved on 25 November 1999
v	RE-TA 5894-Faciliting capacity building & participatory activities.	0,400		Approved 28 December 1999.
vi	TA No. 3825-BHU- RE & Network Expansion.	0,700		Work started in 2002 and ended in 2003
vii	Loan 1712 BHU (SF) -SREP		10,000	Loan approved on 25 November 1999. Loan agreement signed on 12 January 2000.
viii	Loan 2009 BHU (SF) -RE & Network Expansion project		9,400	Loan approved on 30 September 2003.
ix	TA 4188 BHU-Capacity building of Bhutan Electricity Authority	0,400		Agreement signed on 7 November 2003. TA 4189 started in April 2004 and was completed in November 2004.
x	TA 4189 BHU -Establishment of DHPC	0,500		
2	**GOVERNMENT OF NETHERLANDS (SDA)**			
i	Rural Electrification -1552 households	1,373		Project started in 1995 and was completed in 1999
ii	Solar lighting	0,472		Project started in 1995 and was completed in 1999
iii	Rural electrification of 521 households	1,471		Project started in 2001and was completed in 2003
iv	Solar lighting	0,785		Project started in 2001and was completed in 2003
v	Sustainable Rural Electrification of 3150 households	6,100		Project started in 2003and will be completed in 2007
3	**AUSTRIAN COOPERATION BUREAU (ACB)**			
i	Rural Electrification ACB-I	0,260		RE of 199 HH, Project starteded in 2001 and completed in 2003
ii	Rural Electrification ACB-II	0,460		RE of 262 HH,Project started in 2003 and completed in 2004
iii	Rural Electrification ACB-III	0,460		RE of 384 HH, project commenced in 2004 and to be complted by 2005.
3	**GOVERNMENT OF INDIA**			
i	Rural Electrification	0,814		Project started in 1993 and completed in 1999
ii	Rural Electrification Transmission Lines	1,031		Project started in 1998 and completed in 2002
4	**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**			
i	Integrated RE-Master Plan	1,500		(in kind) RE Master plan study commenced from Decmber 2003 and scheduled to be completed by end of 2005.

ACB, 01-Sep-04

Annex 7 : ODA Statistics Austria/Bhutan

Figures in 1000 US $

Calendar Year	Sectors	Grant	Loan	Total
2000	Energy	4.764	1.337	
	RNR and Environment	524		
	Culture and Religion	34		
Source:	Tourism	23		
ODA-Statistics DAC -	Others	274		
	Total	**5.619**	**1.337**	**6.956**
2001	Energy	1.364	2.398	
	RNR and Environment	177		
	Culture and Religion	409		
Source:	Tourism	8		
ODA-Statistics DAC -	Others	526		
	Total	**2.484**	**2.398**	**4.882**
2002	Energy	871	1.402	
	RNR and Environment	188		
	Culture and Religion	473		
Source:	Tourism	168		
ODA-Statistics DAC -	Others	274		
	Total	**1.974**	**1.402**	**3.376**

ODA - Official Development Assistance
DAC - Development Assistance Committee

Note : The high amounts included in HPP Basochhu distort the regular bilateral programme because disbursements cannot be planned but follow the implementation of the construction site. For better overview they are given seperately below:

Figures in 1000 US $

Calendar Year	Sectors	Grant	Loan	Total
2000	Basochhu HPP	4.156	1.337	
	Total	**4.156**	**1.337**	**5.493**
2001	Basochhu HPP	638	2.398	
	Total	**638**	**2.398**	**3.036**
2002	Basochhu HPP	NIL	1.402	
	Total	**-**	**1.402**	**1.402**

Note : Median Exchange rates for 1Euro to US$

Year	2000	2001	2002
Rate	0,920	0,895	0,9358

ANNEX 8: LOGICAL FRAMEWORK OF ENERGY SECTOR PROGRAM (ESP), BHUTAN

Logic of intervention	Indicators	Sources of Verification	Assumptions
Development Objective: The objective of this program is to optimise the use of renewable, environmentally friendly and sustainable energy sources, like e.g. hydropower as well as to increase efficient use of energy resources in order to contribute to economic self-reliance and balanced development in Bhutan.	Bhutan has significantly improved access to renewable, environmentally friendly and sustainable energy and the capacity to manage and maintain these energy resources.	Figures/ data according 9th FYP midterm review of Plan	Continuing commitment towards renewable, environmentally friendly and sustainable energy resources; RGoB implements 9th FYP; further commitment for Rural Electrification; revenues from power exports will be ploughed back into social development;
SP Objectives: **Hydro Power**: • To ensure sustainability, efficiency and impact of the investments in HPP (i.e. Rangjung, Basochhu); • To ensure transfer of modern HPP technology; • To enhance local capacities and thus improve self reliance;	Low maintenance costs / short shut down periods Number of qualified and capable staff	Logbooks / reports Reports	Hydro Power continues to be in line with RGoB's priorities;
Rural Energy: • To improve access to modern forms of energy sources, especially in rural areas; • To enhance sustainability and efficiency of investments in rural energy; • To optimise the use of energy;	Grid extension, Off grid and alternate energy sources in place; RE investments working;	DoP data + Reports DoP data + Reports	RE defined as priority by population through decentralized planning Coordination of activities by RGoB; Donor co-ordination working and interventions complementary; Local participation and commitment;

Training & Capacity Building: • To enhance qualifications on basic, vocational and higher education levels; • To promote private sector development; • To promote regional and international dialogue and exchange on sustainable use of energy;	Trained staff; Employment + business opp. Number of exchanges;	Project reports Monitoring Project reports Regional initiatives/programmes/ activities	Trainees have suitable school education on which to build upon; RGoB promotes actively private sector development; BH Partners are willing to cooperate; Willingness of RGoB to cooperate on a regional level;
<u>Results</u>: **Hydro Power**: • Sustainability, efficiency and impact of HPP (Rangjung, Basochhu) secured; • Modern HPP technology transferred and staff qualified; • Relevant studies conducted;	See above (objectives)	See above (objectives)	See above (objectives) Studies relevant for RGoB;
Rural Energy: • Rural households and institutions in rural areas electrified; • Efficient and sustainable use of rural energy achieved; • Reduction in use of firewood and other energy sources achieved;	Firewood/household See above (objectives)	Local survey See above (objectives)	Reduced RGoB subsidies See above (objectives)
Training & Capacity Building: • Higher qualifications on basic, vocational and higher education levels achieved; • CDM Projects promoted; • Employment and private business created; • Use and maintenance of rural energy improved; • Regional and international exchange on sustainable use of energy conducted;	See above (objectives)	See above (objectives)	See above (objectives)

Activities: **Hydro Power**: • improvement of HPP operational and maintenance skills; • micro/mini hydro power construction (funds permitting); • studies on hydro power plants;	Work plans on project level Number of hydels	Reports on project level Reports	 Funds permitting
Rural Energy: • electrification of rural households/ institutions. • exploration of energy saving measures and alternate sources of energy (i.e. improved stoves, insulation, etc.); • studies on possible use of waste materials;	Number of households Work plans on project level Acceptance of population and institutions Waste materials utilized	DoP data + reports Reports New initiatives	Local contribution; priority at Geog planning level Local participation Priority for DoE
Training & Capacity Building: • skills development • professional training • academic training AIT • reg./ int. exchange of experts	Skilled and trained professional staff emerges from courses; training plans Number of exchanges	Grades and certificates On the job assessments Reports	Suitable background knowledge to build upon Willingness to cooperate on regional level