

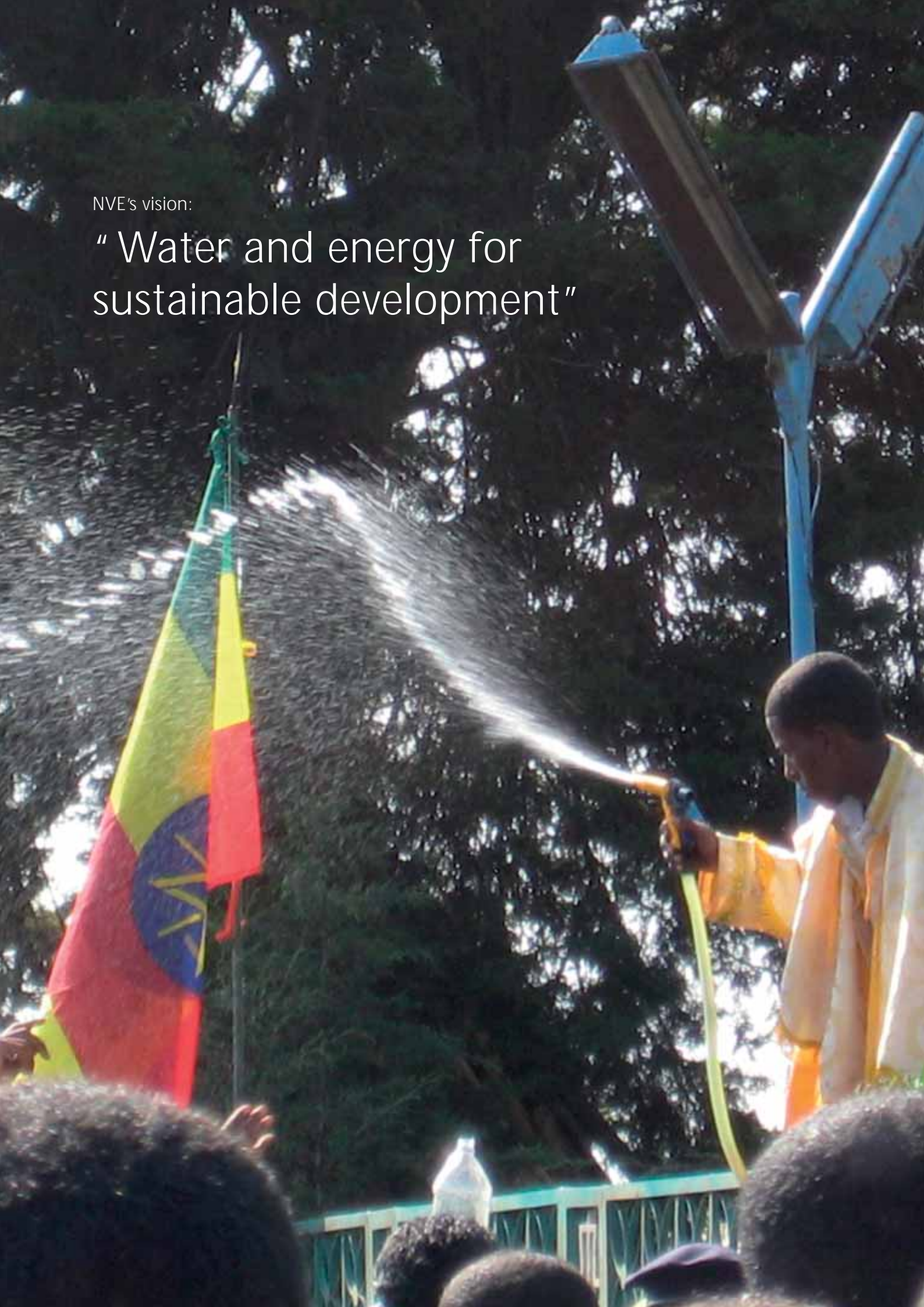


ANNUAL REPORT 2011

The cooperation between the Norwegian Agency for Development Cooperation (Norad), the Ministry of Foreign Affairs (MFA) and the Norwegian Water Resources and Energy Directorate (NVE)

NVE's vision:

" Water and energy for sustainable development "





Content

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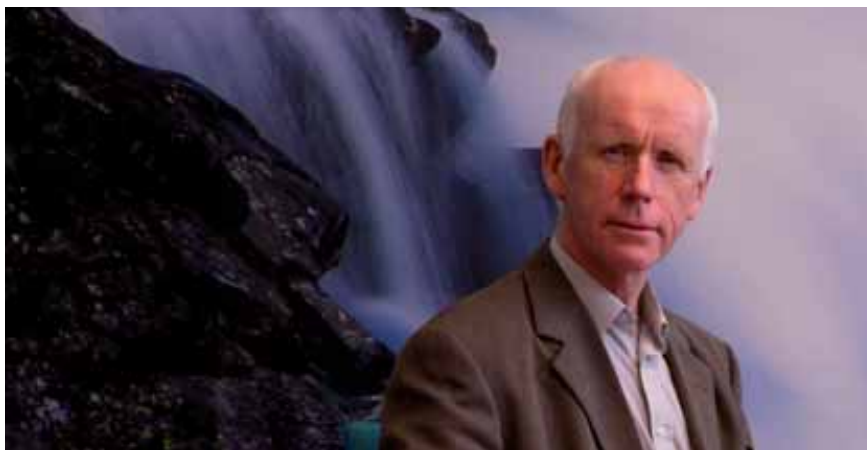
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Preface



Today 80% of world energy use is based on fossil energy sources. The use of fossil energy entails large greenhouse gas emissions. To mitigate climate change as a result of the enhanced greenhouse effect, the world's dependence on fossil energy must be reduced.

Norway has developed cutting-edge international expertise and industries in a number of relevant fields: management of energy resources, development and operation of hydropower installations, development and use of other clean energy sources, transmission and distribution of electricity, regional cooperation in the power sector and research and higher education in the energy sector. NVE in particular has expertise both on integrated plan-

ning of the use and protection of water resources and on the links between energy and environment. There is also a growing international interest in Norwegian experience and expertise in the field of natural resource management. NVE can make use of many years' of experience of international cooperation in the energy sector to offer comprehensive support in the field of clean energy and sustainable management of natural resources, adapted to the specific needs of each partner country.

NVE contributes to fulfil the current Government vision for Norway to be a driving force for environmentally-friendly energy production through capacity building and institutional

strengthening with selected partner countries with focus on renewable energy and sustainable management of natural resources. NVE's key priority programme for capacity building is the Initiative for Clean Energy in Development Cooperation, which is led by the Ministry of Foreign Affairs and Norad. The initiative promotes sustainable environmental, economic and social development by contributing towards meeting the huge need for renewable energy in developing countries, and will help boost international efforts at lowering greenhouse emissions.

Most of NVE's institutional partners are in countries defined by the UN as Least Developed Countries (LDCs).

NVE is also fully supporting and assisting the Ministry of Foreign Affairs in its contribution to reducing economic and social disparities in the European Economic Area and to the strengthening of bilateral relations with Central and Southern Europe and the former Soviet republics.

A handwritten signature in blue ink, appearing to read 'Per Sanderud'.

Per Sanderud
Director General of the Norwegian Water Resources and Energy Directorate (NVE)

The Annual Report 2011 presents an overview and brief assessment of the international activities carried out under the auspices of the Norwegian Water Resources and Energy Directorate (NVE) during 2011. In the past such activities, as reported on in the previous Annual Reports, have been coordinated and managed by NVE's International Section (IN). The present document serves to report on progress and achievements on the respective international projects and activities, - both to NVE's donors and

to the relevant other financing agencies, as well as to the respective arms of NVE which have participated in the work.

A new feature this year is the reporting on international projects carried out by various departments of NVE, notably the Hydrology Department; - an internal decision has been taken that the IN shall have the overall coordinating responsibility for all international project activities carried out by or in the name of NVE. An exception is research projects which

are normally reported on separately. IN is organized with management and secretariat functions to negotiate and formulate projects, facilitate their execution and to monitor technical/ financial performance. Furthermore, IN has a core staff of professionals who is assigned to implementation of specific projects, - often working in teams with other NVE staff, Norwegian and foreign consultants and of course the staff of national partner organisations in the project country.



Organisation of NVE

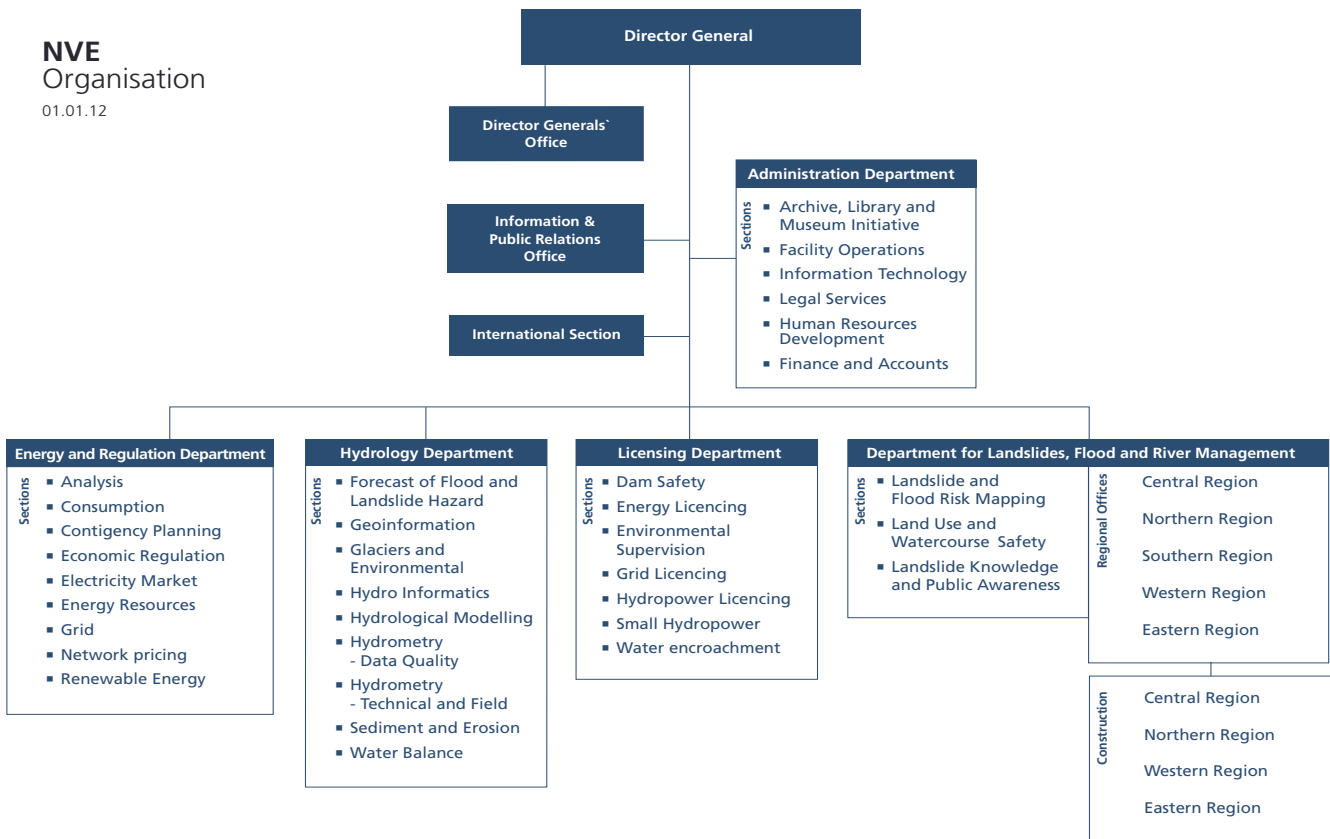
Established in 1921, the Norwegian Water Resources and Energy Directorate (NVE) is a directorate under the Ministry of Petroleum and Energy (OED) with the responsibility for overall management of Norway's water and energy resources. In short, NVE's mandate is to ensure an integrated and environmentally sound management of the country's water resources, promote efficient energy markets and cost-effective energy systems, and contribute to the economic utiliza-

tion of energy. NVE is Norway's national centre of expertise for hydrology and plays a central part in national flood contingency planning. The overall responsibility for maintaining national power supplies is also vested with NVE.

The mandate and functions of NVE have to be understood in the context of Norway's legal and executive system; - authority is substantially delegated to semi-autonomous directorates like NVE, and as a regulatory authority NVE is no

longer directly responsible for the commercial and production related interests - neither private nor state owned - in the water and electricity sectors.

NVE is based in the capital city of Oslo, has five regional offices in Norway and a total of about 550 employees. NVE's role and competence in a historical context is further described in the chapter "NVE's role, competence and experience".



The depicted organization of NVE shows IN as a staff function reporting directly to the office of the Director General of NVE. This provides for effective links to the respective substantive NVE departments concerned with:

Energy and regulation; Hydrology; Licensing; Landslides, Floods and River Management.

Typically, the first is dealing with analyses and regulation related to energy (mostly electricity), while the third is tasked to deal with the licensing mandates of NVE: Energy in general, hydropower, grid/ main distribution and dams (safety, construction standards and operations). The Hydrology Department

is a provider of fundamental information to all other departments, carrying out measurements, research, statistical analyses, modelling and forecasts with regards to water flows and sediment transport. The fourth department is addressing the consequences of flow variations as well as the required mitigation measures.

More about the evolving water and energy resources management practises, including the up-dated legal framework in Norway, is explained in the chapter on "NVE's Role, Competence and Experiences". There it is also explained briefly how learning - systematic application of collected and analysed data, lessons

learned and the strategic directions given to NVE have been put into practise. The experiences of this long term development is posing a challenge with regards to the international work NVE is undertaking, and is begging a systematic agenda to be set for IN's contribution to a similar learning from its projects, - combining Norway's and the partner countries' experiences and lessons learned. NVE has a well developed framework with procedures for achieving exactly this in an effective manner; - the potential for added value also for the partner countries is substantial.

Contacts in International Section

With the above organisational set-up in mind, IN's own organisation is presented in more detail here. It is a flat organisational structure with the Section Head being responsible to the Director General and to clients, partners, donors and financiers for the section's activities. He is also carrying out project work himself, and he is therefore assisted by the Project Secretary on continuous basis and by deputies, depending on who is available at HQs.

As of end 2011, IN has 3 permanent resident staff in Liberia, while other institutional agreements are supported by the provision of required and necessary backstopping from IN/ Headquarters.



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Liberia
 Liberia
 Liberia

From May 2011
 From March 2011
 From February 2011

Until March 2013
 Until March 2013
 Until February 2013



Project work in Liberia

Overview of Activities and Time Consumption

The International Section with its 7 employees manages and coordinates the programmes together with partner institutions and carry out cost and quality control of projects and programmes during implementation. The major part of the professional/technical work is normally carried out by staff from the various departments and sections within NVE. During 2011 a total of 60 officers from NVE were involved in the international cooperation activities, compared

to 56 in the previous year. The volume of activities in 2011 was recorded at 13,5 person-years (one person-year being 1400 effective working hours), compared to 13 person-years in 2010. The international work draws on key expertise in NVE. It is important to find a balance in the organisation as a whole between national and international responsibilities. The current international volume is considered to be a good balance for NVE and this activity level should be pursued given that

the high activity level is requested from our partners.

Private consultants and professionals from other directorates and research institutions are sub-contracted to assist NVE in cases when NVE either lacks competence or temporarily is short of capacity.

An increase in activities is foreseen in Nepal, South Sudan, Tanzania and Angola.

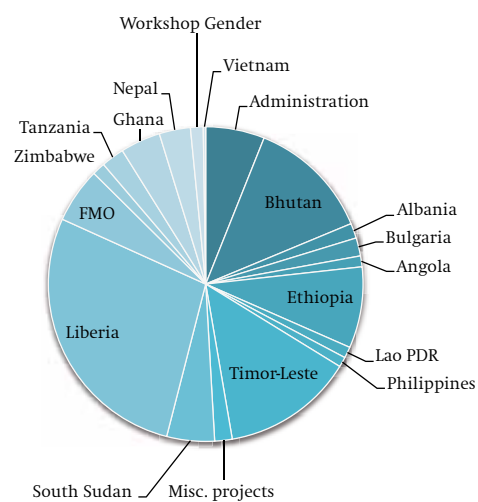
Institutional Cooperation financed through Development Assistance from MFA and Norad

| Country | Client | Project title | Contract Duration |
|-----------------|--|---|-------------------|
| Bhutan | Department of Hydropower & Power Systems | Strengthening of the Energy Sector, Phase III and Support to Projects of the Accelerated Hydropower Development Programme | 2008-2011 |
| Ethiopia | Ministry of Water and Energy | Feasibility Studies of Mandaya & Beko-Abo Multipurpose Projects | 2010-2012 |
| Ghana | Water Resources Commission of Ghana | Establishment of National Dam Safety Unit | 2010-2013 |
| Liberia | Ministry of Lands, Mines and Energy | Strengthening of the Water Resources and Power Sectors | 2010-2015 |
| Nepal | Department of Electricity Development | Technical Assistance Feasibility Studies of Small and Medium Size Hydropower Projects | 2004-2012 |
| The Philippines | Provincial Government of Oriental Mindoro | Flood Control Master Plan for Bucayao and Mag-asawang Tubig Rivers | 2007-2012 |
| The Philippines | Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration | Flood Forecasting and Warning System for Magat Dam and Downstream Communities | 2010-2014 |
| Tanzania | Tanzania Electricity Supply Company, LTD | Capacity Building and Emergency Repair of Existing Hydro Power Plants in Tanzania | 2011-2013 |
| Timor-Leste | Ministry of Infrastructure | Institutional Strengthening of the Water Resources and Power Sectors | 2009-2014 |
| Vietnam | Ministry of Natural Resources and Environment | Hydropower Licensing Project | 2006-2012 |

NVE around the world



Time Consumption





Assignments for Norad and Ministry

The Norwegian Agency for Development Cooperation (Norad) is Norway's principal government agency for international development cooperation. Being organized as a directorate under the Ministry of Foreign Affairs (MFA), its main tasks are to provide advisory services to the Ministry, to embassies in developing countries and to multilateral development organizations. Norad is occasionally carrying responsibility, delegated by MFA, for organizing the implementation of projects and programmes. This is carried out through agreements with

foreign governments and in some cases combined with contractual services by institutions like NVE. According to its strategy, Norad aims at maximizing the effectiveness of its work by placing a focus on quality and results.

NVE has, through a framework agreement, assisted Norad's engagements in the fields of water resources management and energy development. The specific tasks have varied from project identification, appraisals of projects and evaluation of reports, to planning and preparatory work for new projects, and

to monitoring or comprehensive management of water resources. Such assistance, however, is now more frequently organized directly between NVE and the various embassies.

In addition, NVE is assisting MFA – EEA/Norway Grants under a separate contract with Financial Mechanisms Office in Brussels in the implementation and coordination of the programme for specific countries.

It was decided this year to report on all projects and programmes under one heading, in alphabetical order, independ-



Akosombo Hydropower Plant, Ghana

of Foreign Affairs

ent of the status, whether being a long term institutional cooperation or an assignment of shorter duration.

The extent of the various country and project reports will vary, according to the size and scope, and in which phase the project is. Projects which have been going on for some time seldom have clear and defined indicators on which to report, and proper baseline studies are often lacking, compared to more recent developed projects, where immediate, short and long term outcome is better defined. Reporting on outcome therefore

is often a big challenge, and in particular in institutional cooperation where the main focus most often is on competence and capacity building, and where the outcome only can be seen after several years. During the last few years there has been an increased focus on result based monitoring, however, which based upon proper baseline studies and proposed indicators should simplify the reporting on outcome and monitoring of the progress in the projects.

Compared to earlier years there is also an increased focus on gender, and

how the gender perspective is included as a cross-cutting issue in all project activities. This is reflected in the various project descriptions, depending on how "old" the projects are. The gender focus will also vary from one country to another, depending on cultural differences.

This should be kept in mind when reading this report.



BHUTAN

Strengthening of the Energy Sector – Phase III, and Support to Projects of the Accelerated Hydropower Development Programme



Capital: Thimphu
GDP (10⁹ USD): \$\$1.83 (2011 est.)
GDP per capita (PPP): \$6,000 (2011 est.), country comparison to the world: 136
Population: 716,896
Total installed capacity: 1500 MW

Main Energy Sector Authorities:
Department of Hydropower and Power Systems.
Bhutan Electricity Authority.
Bhutan Power Corporation.
Druk Green Power Corporation.

Overall Project Data

Client: Department of Hydropower & Power Systems (DHPS), Bhutan

NVE Mandate: Institutional cooperation with DHPS and support/ technical advice to accelerated hydropower program.

Contract Value/ Duration: Split into two contracts of 15 MNOK each; entered into in May/ July 2008, with duration till December 2011 (after minor extension). Financed by Royal Norwegian Embassy in India.

Type of Activities: Institutional strengthening and human resources development for electricity sector; Studies on effect of climate change on hydropower flows; Reconnaissance and pre-feasibility studies of hydropower potentials.



Background:

The Goal of Bhutan's Advanced Hydropower Programme is to accelerate development of the hydro based energy resources by improving both knowledge and managerial capacity, and thereby attracting investors for implementation of hydropower projects. Moreover, the Government of Bhutan has realized that improved regulatory capacity is a prerequisite for an orderly and cost-effective growth of the energy sector. In this way, the sector programme will better support the accelerated hydropower development strategy set out in the 10th Five Year Plan for Bhutan.

The specific purpose of the Norwegian supported Programme component is to ensure availability of local expertise for planning the development of hydropower resources and strengthening of regulatory capacity in the energy sector. Phase III of the energy sector study work supported by Norway is covered by the bilateral agreement signed in May 2008. Immediately afterwards, a contract was entered into between DoE and NVE, in July 2008, for continued institutional cooperation. This contract covers the period July 2008 - June 2011 with a provision for a 2 years extension, subject to a positive outcome of Norad's planned project review and results assessment.

Activities and Outputs:

The activities conducted and brought to completion during 2011, in accordance with the contracts, comprised:

- Formal training (MSc) of Bhutanese civil servants.
- A number of initiatives aimed at institutional strengthening for development of energy sector.
- Modelling of effects of climate change.
- Management development in key areas, incl. hydrological data collection and analysis.

- Further development of the capacity of regulator Bhutan Electricity Authority (BEA).
- Reconnaissance studies of 17 hydropower projects and prefeasibility studies of 2 hydropower projects, as well as on-the-job technical training carried out by consultants.
- The programs were completed during 2011, under a no-cost extension to 31.12.11 with all activities and expected outputs accomplished within budget.
- Due to the strengths of the bonded partnerships the cooperation has borne fruits for Bhutan beyond what could be expected with the given levels of input. NVE shared its broad experiences, having a comparative advantage based on the extensive Nordic power market operations, other international power market developments, and the "Norwegian model" of managing natural resources (notably hydro power and natural oil/gas) to the benefit of the country as a whole.

Outcome:

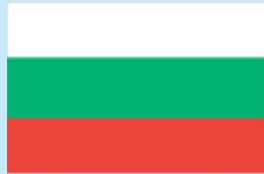
The outcome, in addition to specific studies which have also helped taking Bhutan's hydropower sector forward, can be summarized as follows:

- The programs, institutional cooperation in particular, have helped the country reach its current position as a major exporter of electricity to India (more than 1500 MW, with plans to increase this by 10 000 MW by 2020). Without continuing support through the long-standing cooperation with NVE, this would not have been possible.

Contact: David A. Wright daw@nve.no

BULGARIA

Energy Efficiency and Renewable Energy



Capital: Sofia
GDP (10⁹ USD): \$54.3 (2011 est.)
GDP per capita (PPP): \$13,500 (2011 est.)
Country comparison to the world: 89
Population: 7.037 million (2012 est.)
Total installed capacity: 11.169 MW (2006)
Main Energy Sector Authorities: Ministry of Economy, Energy and Tourism

Overall Project Data

Client: Financial Mechanism Office (FMO) of EFTA. FMO controls the EEA Grants funds on behalf of the Ministry of Foreign Affairs, Norway. The Ministry of Energy, Economy and Tourism (MEET) is client for a predefined project under the program.

NVE Mandate: NVE is Donor Program Partner (DPP) to the Program Operator (PO) in Bulgaria; MEET. NVE is also Project Partner (PP) to the Project promotor on a predefined project under the program.

Contract Value/ Duration: Program budget of Euro 13,260,000, at the disposal of the PO. NVE's expenditures as DPP are covered by separate contract with FMO. For the predefined project NVE's expenditures are covered by the project budget. 2011 – 2015.

Type of Activities: Advisory services in support of program and project developments.



Visit from Bulgaria to Hafslund's district heating systems at Gardermoen Airport.



Background:

The so-called EEA Grants are funded by the EEA countries Norway, Iceland and Lichtenstein as a contribution to reducing economic and social disparities in the European Economic Area and to strengthening of bilateral relations. As a result of negotiations, it was decided that funds would be distributed to 15 EU countries in Eastern and Southern Europe, - to be spent on 32 different program areas. In the Memorandums of Understanding (MoU) with the individual countries the actual allocation is determined, including which among the 32 areas will benefit. In the MoU it is also determined which Norwegian authorities will be the DPP for the countries' respective programs.

In Bulgaria NVE is the DPP for a program covering renewable energy and energy efficiency. In addition, NVE is also the project partner in a related, so-called pre-defined project. This will deal further with the establishment of a well functioning electricity market within the framework of EU regulations; - a follow up to a work earlier undertaken by MEET and NVE.

Activities and Outputs:

The work in 2011 was mostly related to preparatory activities in connection with negotiations and programme development. After signing of the MoU and the FMO/NVE agreement, work commenced between the Program Operator (MEET, Bulgaria) and NVE. Preparation of a draft program for the energy efficiency and renewable energy initiative progressed well and helped building a good working relationship between MEET and NVE. The draft program was nearly completed during 2011 and is due for presentation to FMO early in 2012.

In the present draft it is proposed to spend the funds on 4 areas: a) Small hydro power plants in water supply systems; b) Measures for energy efficiency in public buildings; c) Biomass

plants producing wooden chips and pellets, and; d) Competence building for state and local officials regarding energy efficiency and renewable energy (modest part of budget). The project phase is planned to start in the fourth quarter of 2012, subject to final approval of the program plan by FMO.

The pre-defined project on electricity market design will build on phase I of the project financed by grants from the former EEA financial mechanism (ref. project description in the 2010 Annual Report). The recommendations from this project were aimed at initiating a project to establish a national Day Ahead Market for electric power sales in Bulgaria. It has been planned to hold a first work shop in Bulgaria by mid February, 2012. The concluded phase 1 and subsequent discussions identified that establishing a power exchange based on the Day Ahead Market concept would benefit greatly from a market coupling with Romania.

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BULGARIA

Information System for Water Permits and Monitoring Management



Overall Project Data

Client: Bulgarian Ministry of Environment and Water (MoEW)

NVE mandate: Assistance to MoEW in setting up a data base system related to water uses and licensing.

Contract Value/ Duration: 1,386,080 (grant of 1.177.535 from Innovation Norway within the Norwegian Cooperation Program with Bulgaria, and 208,545 co-financed by MoEW). Project started officially 1 December, 2009, and was planned to end by 30 April, 2011. An extension has been granted until April, 2012 due to delays.

Type of Activities: Study visits, preparation of documents, procurement, advisory services, data base systems development (both software and hardware), and training workshops.

Background:

As a part of support to several new EU countries, the Norwegian Ministry of Foreign Affairs has agreed to assist Bulgaria in adapting to EU rules and regulations in selected sectors with funds channelled through Innovation Norway.

MoEW had started to develop a project for Information System (IS); - registration, monitoring and control of water bodies, especially to control discharge points and to provide online information to the public on the status of the permits (licenses). In addition to obvious advantages for Bulgaria's sector management, the aim is also to fulfill the EU Water Framework Directive. In 2008 the MoEW, in cooperation with NVE, prepared an application for funds based on clear objectives, proposed activities and outputs, with envisaged results (or outcomes). In addition to conventional IS, a component in support of enhanced public awareness was also included. Approval was subsequently received from Innovation Norway in early 2009.

Activities and Outputs:

A study visit to Norway for the project's Steering Committee (StC) members was organized in May, 2011; - local communities and a waste treatment plant in Drammen were visited. Tenders for deliveries of the software licenses and hardware supply were launched and finalized successfully in September, 2011. The software application analysis and final systems design were completed shortly after installation. All users of the system were trained. Final roll-out of the system was completed before by end of 2011. Work on a publicity plan to inform various users and the public of the new systems features and possibilities was launched during 2011 and will be finalized before closure of the project.

More specifically, the outputs included:

- StC meetings held in Sofia, Bulgaria, in February and July, 2011, and at NVE, Oslo, in May 2011. Topics discussed included project progress and possibility for new/ extended project (scope and potential partners). A meeting also held in Oslo with representatives of Innovation Norway. Minutes of meeting prepared and circulated.
- A study visit for the StC members to Drammen (municipal authority) was organized and reported on.
- 2 Interim project reports prepared and approved during 2011.
- Contracts for delivery of hardware and software licenses prepared and made effective in September, 2011. Contractual obligations fulfilled by the suppliers during 2011.
- Software and hardware fully developed, installed and tested at the premises of MoEW. More than 36,000 clean records of data linked to permits were eventually consolidated for all 4 River Basin Directorates in the new IS.
- Initial training of all system users conducted in two stages; stage 1 with the consultants, stage 2 both with consultants and at MoEW; - comprehensive documentation for the system created.
- Final roll-out of the system was completed and system officially launched before end 2011, with all necessary documentation completed.

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ETHIOPIA

Feasibility Studies of Mandaya & Beko-Abo Multipurpose Projects



Checking hydrometric equipment

Overall Project Data

Client: Ministry of Water and Energy (MoWE), Ethiopia

NVE Mandate: Advisory services and capacity building of executing agency MoWE in: i) Implementation of two feasibility and EIA/SIA studies, and; ii) Capacity Building of MoWE in project management, as well as in procurement and hydrological services.

Contract Value/ Duration: MNOK 17.463 from the Norwegian Ministry of Foreign Affairs, with duration from June, 2010 until end of 2012.

Type of Activities: Advice on and development of project management capabilities; support to hydrological services; training for related capacity building.



Capital: Addis Ababa
GDP (10⁹ USD): \$30.5 (2011 est.)
GDP per capita (PPP): \$1,100 (2011 est.)
Country comparison to the world: 207
Population: 93.815 million
Total installed capacity: 1962 MW
Main Energy Sector Authorities:
Ethiopian Ministry of Water & Energy (MOWR).
Ethiopian Electric Power Corporation (EEPCO).



Hydrometric measurement at Kessie bridge, Abay River

Background:

Norway has provided assistance to Ethiopia for studies of two multipurpose projects on the Abay River (the Blue Nile within Ethiopia, the largest tributary to the Nile River), namely the Mandaya and Beko-Abo Multipurpose projects. Being the responsible authority for study of hydropower in Ethiopia, MoWE is Executing Agency for the feasibility studies. The Ministry is in need of capacity strengthening to help it fulfil its obligations under the projects, and Ethiopia therefore requested additional assistance from Norway towards institutional strengthening and capacity building with the dual purpose of being able to manage the feasibility studies and enhancing the institutional capacity to manage similar tasks in the future.

Activities and Outputs:

The activities during 2011 have comprised: a) Project management: Completed Review of technical and environmental consultants' reports; design of institutional cooperation programmes; establishment of procurement routines; procurement of IT systems and other equipment. b) Hydrological services: Design of institutional cooperation programmes; training within hydrological data collection and analysis, site visits, hydrological systems planning and flow measurements; c) Training for capacity development: Training needs assessments, related to project management and hydrological services; training within project management and procurement; advising on staff training and stakeholder workshops; participation in stakeholder workshops and meetings.

The current status on 2011 outputs is:

- Reports prepared by the technical consultants were reviewed by MoWE with assistance from NVE, and a stakeholder workshop on the Beko-Abo draft prefeasibility report was held in Addis Ababa in 2011. Workshop report prepared.
- Training needs assessment reports and draft plans for institutional cooperation (project management and hydrological services, training) prepared and issued. Training carried out with hydrological services.

Outcome:

Combined with the Institutional cooperation programme with focus on management development, hydrological services and capacity building/ staff training, the involved parts of MoWE has established and put to use improved routines and processes both for comprehensive planning and for dialogue with stakeholders.

Contact: David A. Wright daw@nve.no

GHANA

Establishment of National Dam Safety Unit (NDSU)



Inspection of a small irrigation dam in the Ashanti Region



Capital: Accra
GDP (10⁹ USD): \$38.6 (2011 est.)
GDP per capita (PPP): \$3,100 (2011 est.)
country comparison to the world: 168
Population: 25.241 million
Total installed capacity: 1 490MW
Main Energy Sector Authorities:
Ministry of Water Resources, Works and Housing.

Overall Project Data

Client: Water Resources Commission of Ghana (WRC).

NVE mandate: NVE to assist the WRC developing key steps and inputs towards the planned National Dam Safety Unit (NDSU).

Contract Value/ Duration: MNOK 6.7 for the project from Norad, with an additional MNOK 0.53 as a national input from Ghana. Project started in 2010, expected completion April 2013.

Type of Activities: Preparation of legal provisions and regulations, with technical and operational guidelines, data management, capacity building, and long term financing strategy as required for the functioning of NDSU.

Background:

Dams impose a serious threat as dam breakage can cause damage to life, property and the environment. In Ghana there is no single authority responsible for the safety of dams. The need for a centralised body to ensure that dam safety procedures are in place is therefore apparent. The 3 owners of major dams (i.e. of significant height and/or reservoir volume) in Ghana - the Volta River Authority (VRA), the Ghana Water Company Ltd (GWCL), and the Ghana Irrigation Development Authority (GIDA) - administer some 30 dams in total. An additional 1,500 smaller dams built for local water supply or irrigation purposes are owned by local authorities.



Dam in the Western Region of Ghana

NVE was engaged by Norad (2008) to assist the WRC formulate a Project Document (PD) for the establishment of a dam safety authority in Ghana. After this PD was accepted in 2010, Norad continued to fund NVE's inputs through a special funding. A Dam Safety Working Group (DSWG) was established as a consultative forum to enable coordination and execution of various specialized tasks. By the end of the Project - after 3 years - it is expected that an independent NDSU has been established and is fully operational in Ghana.

Activities and Outputs:

A series of workshops was organized in Ghana for the three Technical Committees in February, July, October and November, 2011. The following activities were initiated and concluded through these workshops:

- Plans for the various activities and capacity building measures related to the respective Technical Committees on dams, legal issues and financial matters, with concerned actors.
- Development of guideline regulations, including proposals for Legislative Instruments (LIs), for dam safety management.
- Work description and qualification of dam personnel defined, based on assigned responsibility for dam safety between owner and operator.
- Certification of the engineer and training of dam safety personnel.
- Data gathering for 200 dams in Ghana, and establishment of the National data base.
- Financial foundation and a formula to cover annual fees for monitoring and supervision.
- Procurement of necessary hard- and software for the functioning of the NDSU
- Purchase of one Project vehicle

The specific outputs during 2011 included:

- 4 Progress Reports prepared and published.
- 6 Technical Committee workshop and 2 DSWG meetings held; - all documented in proceedings/ minutes.
- 4 guidelines developed and published for review.
- Number of staff needed to run NDSU defined, and 6 dam safety personnel trained.
- Data base system on dam safety established and tested, ready for operation.

Other programme tasks initiated and still in progress at the end of 2011 include:

- Development of Legislative Instruments (LI) for regulation concerning dams and their safety.
- Development of training material required to for courses in support of a functioning NDSU.
- Training of NDSU staff and other dam safety personnel.

Outcome:

The following outcomes were achieved:

- Effective project coordination and management executed, providing benefits to the entire water resources sector, both in substance and as a positive case.
- Timely delivery of planned outputs has contributed towards a good standard for similar work.
- Effective spending of programme budget in accordance with activity plans has demonstrated the value of proper project management and discipline by involved parties.

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LIBERIA

Strengthening of the Water Resources and Power Sectors



Rebuilding the hydrometric network.



Capital: Monrovia
GDP (10⁹ USD): \$ 1.2 (2011 est.)
GDP per capita (PPP): \$400 (2011 est.)
country comparison to the world: 223
Population: 3.887 (2012 est.)
Total installed capacity: 188 MW*
Main Energy Sector Authorities: Ministry of Lands, Mines and Energy (MLME)

Overall Project Data

Client: Ministry of Lands, Mines and Energy (MLME), Liberia

NVE Mandate: Assistance to MLME and the related agencies Rural and Renewable Energy Agency (RREA) and Liberian Hydrological Services (LHS); - development of monitoring and management systems for water and electricity resources in Liberia, with associated institutional support.

Contract Value/ Duration: MNOK 51.42, covering period November, 2010 – end of 2015. The estimated cost of NVE's services MNOK 32.428 (including 3 long-term NVE advisers and the South African consulting company NetGroup).

Type of Activities: Institutional development/ capacity building (e.g. legal framework, rural and renewable energy). Water resources management (e.g. hydrology services, monitoring systems). Promotion of gender aspects and women's empowerment.

Background:

Fifteen years of civil war seriously affected the country's physical and human capital, also leaving institutional capacities severely curtailed. The new Government of Liberia (GOL), established in 2006, faced serious challenges which have subsequently been addressed in a systematic fashion. The GOL has prepared and endorsed programs in support of the recovery process.

The electricity supply was among the adversely affected sectors; - the country's main generating plant (Mount Coffee Hydro-power Plant) was damaged and out of operation. Since 2006,



Above left: Gender workshop.

On-the-job-training

the GOL has provided diesel generators to supply emergency power for essential public services in Monrovia. The rest of the country is however virtually without electricity supply.

In April 2007 Norway entered into an agreement with Liberia with the aim of increasing electricity production in Monrovia, and NVE has conducted several visits to Liberia since January 2008 funded by Norad. The contacts established between NVE and the various energy and water resource sector authorities have enabled NVE to become familiar with Liberia's development agenda and with the sector specific issues in particular.

Liberia requested that the cooperation with Norway within the power sector be extended, and a positive response was given. A Project Document was finalized in 2010 at the request of MLME, outlining the various activities to be included in a 5-year institutional cooperation programme between NVE and the Ministry (representing Liberia's water and energy/ electricity sector stakeholders). Thereafter an Institutional Agreement between MLME and NVE was signed later during 2010. The focus is on assistance to the development of monitoring and management of the water and energy resources, with special attention to institutional strengthening.

Activities and Outputs:

The programme activities in Liberia during 2011 comprised:

- The Inception Period was completed after consultations between MLME and NVE, as well as discussions with and among other sector stakeholders. The Inception Report sets out a detailed framework for the institutional cooperation between NVE and MLME, including outlines of activities to be carried out during the 5-year period.
- A workshop was held in Monrovia in February 2011, assisted by Norconsult, as an introduction to economic/financial analysis of power projects and options for legal structures.

- Analyses were conducted with the assistance of Norconsult on how to install further thermal power generation to meet the increased electricity demand in the short term.
- The recruitment process for long term advisors was undertaken and completed in 2011; - the positions cover hydrological services, the energy sector, and the gender challenges.
- Important preparatory work was carried out for the restoration of hydrological services.
- Gender mainstreaming has been defined, elaborated and finally established as a key issue on the development agenda governing the MLME – NVE cooperation. This is a key principle in programme execution.

The specific outputs during 2011 included:

- The programme Inception Report was submitted and approved in June, 2011.
- Specifications prepared by Norconsult for the Mount Coffee project were issued, covering both organization of the rehabilitation project and terms of reference for an Owner's Engineer.
- Reports of the various studies (by Norconsult) and meetings/ consultations conducted under the programme were prepared and issued.

Outcome:

At this early stage of the cooperation, with mostly short term ad hoc activities, few results can be reported. However, the overall recovery and development framework provided by GOL, combined with the NVE assisted analysis of the water/ energy sector issues, has enhanced the Liberian authorities' understanding of measures to be taken. The quality of and commitment towards outline sector plans have been notably improved since the first contacts in early 2008.

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NEPAL

Technical Assistance on Feasibility Studies of Small and Medium Size Hydropower Projects



Stakeholder meeting with Village Renewable Committee Leader, villagers and planners



Capital: Kathmandu
GDP (10⁹ USD): \$18.3 (2011 est.)
GDP per capita (PPP): \$1,300 (2011 est.)
Country comparison to the world: 201
Population: 29.890 million (2012 est.)

Total installed capacity: 557 MW
Main Energy Sector Authorities:
Department of Electricity Development
Nepal Electricity Authority

Overall Project Data

Client: Department of Electricity Development (DoED), under Ministry of Energy (MoEN).

NVE Mandate: Technical Assistance on Feasibility Studies.

Contract Value/ Duration: MNOK 3.17 (included in DoED's total budget for the studies), 2004 – 2012.

Type of Activities: Hydropower Feasibility Studies; Programme management and preparation of a next project phase; Training workshops.

Background:

DoED is responsible for executing the MoEN's mandate, within overall government policies, as it relates to the power/electricity sector. Among the tasks, DoED has a major responsibility for ensuring transparency of the regulatory framework, and to accommodate, promote and facilitate the private sector's participation in the power sector. The purpose of the feasibility study projects, related to DoED's role, is to encourage investors to engage in implementation of small and medium sized hydro-power projects.

A contract covering institutional cooperation between DoED and NVE was signed in December 2004 for Feasibility Studies and Environmental Impact Assessments (EIAs) of small and medium sized hydropower projects in Nepal. As a precondition the studies shall be undertaken by Nepalese consulting companies based on competitive bidding with DoED as the Client. NVE's role is to provide technical assistance and other advisory services to DoED.



Photos: Satish Tripathi

Study of maps and projects in the Sun Koshi Basin

The programme of 8 projects was split into three lots, with 3, 3 and 2 projects respectively. Completion of all projects was made subject to available budget resources as the programme progressed. It was for this reason that projects in the 3rd lot were cancelled, and it was decided to reallocate the remaining funds. DoED requested that the funds thus made available should be used for short-term assistance on activities within its line of work. These activities include Panel of Experts for Large Storage (Dam) Projects, as well as management/ cooperation tasks and general training activities for DoED officials

Activities and Outputs:

The status as of end 2011 is as follows:

- Consultants continued working on projects in the 2nd lot, with most of the required reports already presented and approved (before entire study documentation can be compiled).
- Draft Final Report for the last project in the 2nd lot has been delivered for review.
- DoED and NVE carried out a field trip to the Sun Koshi 2 and 3 project sites and prepared a draft Terms of Reference (TOR) for Feasibility Studies to be carried out by international consultants; Final ToR to be finalized during 2012.
- DoED and NVE arranged a 2 days Result Based Management (RBM) workshop in Kathmandu to indentify key outputs and indicators for the new proposed Institutional Cooperation to commence in 2012.
- As a part of the training programme ICH - International Centre for Hydropower - arranged a one week workshop on "Hydropower Concession Agreements" in Kathmandu. 30 persons from relevant government institutions participated in the workshop and gained increased knowledge on critical aspects related to negotiations with private investors.
- Work on the draft Programme Document (PD) for 2012-2015 was carried out using reallocated funds from cancelled projects.

Outcome:

The major outcomes of the ongoing programme, beyond just completed Feasibility Studies, include:

- The Programme Document for new institutional cooperation includes a number of new working areas which are reflecting the close relationship and mutual confidence developed between DoED and NVE (provided the request is accepted by the Norwegian Embassy).
- Training in the area of Concession Agreements was considered highly relevant and DoED has requested a follow up course as this form of management/ contracting is seen as a potential option for future.
- Feasibility studies of sufficient required for small and medium size hydropower projects will be available for private investors.
- Increased technical and administrative competence and experience in preparation of feasibility studies (consultant companies and DoED).
- Nepalese consultant companies hold international standard, with increased ability to undertake relevant assignments for international power companies and investors both in Nepal and abroad.

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THE PHILIPPINES

Flood Control Master Plan for Bucayao and Mag-asawang Tubig Rivers



High mountain precipitation creates floods in the lowland



Capital: Manila
GDP (10⁹ USD): \$216.1 (2011 est.)
GDP per capita (PPP): \$4,100 (2011 est.)
country comparison to the world: 156

Population: 103,775 million (2012 est.)
Total installed capacity: 15 610 MW

Overall Project Data

Client: Provincial Government of Oriental Mindoro (PGOM).

NVE Mandate: Coordination and responsibility for overall execution of the Norwegian supported project.

Contract value/Duration: MNOK 4.291; - started in 2007 and will be completed in 2012.

Type of activities: Baseline studies and data collection/management for real time hydrometric network and a flood warning system.



Background:

Parts of the Philippines have repeatedly been exposed to severe flood damages. On this background a dialogue between PGMO and Norad on these issues commenced: In 2003 the PGOM asked Norad for assistance to develop a “Flood Control Master Plan for Bucayao and Mag-asawang Tubig Rivers”. Norad requested NVE to assist in the preparation of the Terms of Reference for the project and to facilitate the tendering process. As a result of open competitive bidding, the contract for preparation of the flood control Master Plan was awarded to SWECO Grøner AS (later SWECO NORGE) with its partners in the Philippines. The study work started in late 2007.

On the other hand, however, the hydraulic model in combination with the digital elevation model is an important tool to predict possible impact even from minor construction work like embankments or dredging in the rivers.

The conscious effort to involve women and to observe gender issues in this project has given good results, serving as a pilot for similar projects.

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Activities and Outputs:

During 2011 there has mainly been a wrap-up of the project, including preparation of the final report of the project. This report was submitted to Norad in December, 2011

Outcome:

If the various proposals are implemented, the Provincial Government will be in possession of new tools for reducing flood damage and also be able to warn people of coming floods. If not implemented, the outcome of the project will be minor, except for the training and capacity building carried out by the consultant.

Even if implemented in accordance with plans, complementary measures have to be taken in order to achieve the benefits: Information and public awareness campaigns along with evacuation plans are required to avoid severely reduced effects of the flood forecasting system once disaster strikes.

THE PHILIPPINES

Flood Forecasting and Warning System for Magat Dam and Downstream Communities



The spillway of Magat Dam

Overall Project Data

Client: Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).

NVE Mandate: To assist and advice PAGASA with implementation of the flood forecasting and warning system project.

Contract value/Duration: MNOK 10.700; - started in November 2010 and will end in 2014.

Type of activities: Rehabilitation of hydrometric network; development of procedures for use of data for flood forecast/warning systems; associated training.

Background:

The Cagayan river basin is the largest in the Philippines, encompassing the provinces of Nueva Viscaya, Isabela and Cagayan. The basin is affected by recurring floods due to tropical cyclones and the northeast monsoon. To mitigate adverse effects of flooding in the basin, the Philippine Government established the Cagayan Flood Forecasting and Warning System (FFWS) in 1982. The FFWS was upgraded in 1992 with the inclusion of a warning system for operation of the Magat Dam; -multipurpose dam for irrigation of 102,000 hectares and for power production. The system has encountered further problems since its upgrading, including breakdown of the telemetry system and some of the monitoring stations. The ability to warn people downstream and to operate the spillways of the Magat Dam satisfactorily at times of floods has therefore been reduced.

In June 2008 Norad asked NVE to assist PAGASA preparing a proposal for the rehabilitation and upgrading of the system. A field visit including an assessment of the station network was conducted by NVE officials in November 2008. As an agreed follow-up, NVE prepared a proposal in close cooperation with PAGASA on how to structure potential Norwegian support for the rehabilitation and upgrading of the Cagayan FFWS. Upon submission, the proposal was approved by the Norwegian Embassy in Manila; - the agreement between the Embassy and the Department of Science and Technology was signed in late December, 2009, while the Institutional Agreement between PAGASA and NVE was signed in November, 2010.



Activities and Outputs:

During the first project meeting in late April 2011 it was found that the premises for the project had changed. The hydrometric network had deteriorated further, and the prioritizing of necessary activities as well as selection of hydrometric equipment had to meet stricter criteria. A field report was prepared and submitted to PAGASA in late September, 2011, with approval of the report given in October. This caused a delay of the full project start, with completion expected only in 2014.

A visit to the Philippines was planned in December, but had to be postponed until 2012 because preparatory work for the visit was delayed.

Outcome

It is too early to look for tangible outcomes of the project. The findings of field visits and lessons from the past deterioration of both structures and institutional capacity have however clarified the challenges ahead. It is clear that a sharp focus has to be put on sustainability whatever measures are planned or implemented. Also during 2011 the Philippines have been hard hit by heavy rains with subsequent flood damages, emphasizing the need for such projects.

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ROMANIA

Enhancement of Water Resources Management in Mures River Basin



Capital: Bucharest

GDP (10⁹ USD): 185,3 \$

GDP per capita (PPP): 12,300 \$

country comparison to the world: 97

Population: 21.848 million

Overall Project Data

Client: National Institute of Hydrology and Water Management (NIHWM), Bucharest, Romania, on behalf of the Mures Water Basin Administration (MWD).

NVE Mandate: Providing assistance to NIHWM and MWD on the improvement of existing monitoring system, including data collection and processing. NVE has the Danish Hydraulic Institute (DHI-Norway) as international partner for specific aspects of work.

Contract Value/ Duration: NOK 890,000 for Work package 1-Project Management, Work package 6 – Monitoring and instrumentation and Work package 8 – Results dissemination, covering the period April 2009 – April 2011.

Type of Activities: Project management/ coordination, consulting services for water resources modelling, upgrading of selected hydro-meteorological network station components, capacity building for sustainable development and operation of enhanced system.

Background:

Through the European Economic Area Financial Mechanism (EEA Grants), the Romanian NIHWM, with partner organizations MWD, NVE and DHI-Norway, obtained funding for implementation of the project "Enhancement of Water Resources Management in Mures River Basin". The total budget is Euro 1,476,000, out of which the grant amounts to 80%, Ministry of Environment and Forests, Romania, provides 15%, and the rest (5%) is ensured through in-kind contribution by the Norwegian partners.

The overall goal of the project is to strengthen the institutional capacity of local and central water management authorities. The objective is to ensure protection of the environment through sustainable use of the water resources in Mures River Basin. This would according to the project plan be achieved through the realization of a decision-making tool for river basin water management. The tool is based on an integrated mathematical model capable of determining the surface- and groundwater resources balance, based on certain predefined characteristics and parameters, within likely scenarios. These are specific to problems encountered in the water resources management in the basin. The model will be designed for the sub-basin Tarnava Mica River basin. DHI-Norway is the main partner for the model development, the first goal of the project.

For future operation of the decision-making tool and calibration of the model, a second goal is concerned with improvement of the integrated monitoring system of the hydrological and meteorological conditions in the river basin. NVE is the main partner for achievement of this goal.

Activities and Outputs:

During 2011 the following activities were carried out at the general management level:

- Steering Committee meetings were conducted with NVE in attendance.
- Project coordination and management tasks related to procurement, installation and calibration of systems was led by NIHWM in consultation with MWD and assisted by NVE/ DHI when required.

The same division of responsibility applied to capacity building aimed at ensuring adequate functioning of the project outputs.

Activity 1 – Improving the existing monitoring system; - including data collection and processing. This comprised the following activities, performed by the local partners and NVE in cooperation.

- 3 meteorological and 2 hydrological stations established. 18 hydrological and meteorological stations rehabilitated and equipped with automatic registration and transmission systems.
- Staff training on discharge measurements with Streampro and River Surveyor in Romania
- Study visit to Norway incl. visits to stations covering surface- and groundwater, snow and precipitation, urban conditions, and demonstration of discharge measurements with Doppler instruments

The key outputs in the course of 2011 were:

- Hydrological and meteorological stations in the surveillance network - new and rehabilitated – became fully operational.
- Enhanced competence and capacity was created through study visits to Norway with presentation of the data collection and quality control systems of NVE.
- Well performing data collection was promoted successfully by a workshop on data collection/ processing, and local level training of staff in discharge measurements.

Activity 2 – Installation of a water basin model; - The activity has been performed by DHI-Norway in cooperation with local partners:

- Development of water resources management model designed and calibrated.
- Training in support of model application and operation was carried out for MWD/ Mures Water Basin.

The key outputs during 2011 were:

- Functioning water basin models with required documentation.
- Trained staff available to operate the new system.

Activity 3 – Elaboration of scenarios and recommendations; the activities have been performed by DHI and local partners. Additional work performed by DHI-Norway and local partners to include installation of a water basin model adapted to the Tarnava Mica River basin, with relevant training courses, elaboration and simulation of scenarios, and result analysis.

The key outputs during 2011 include:

- Technical/ scientific reports and articles issued; - for dissemination of results and introduction of innovative river basin modelling.
- Project management's focus on ensuring adequate dissemination and publicity regarding this system will enable replication elsewhere.

Activity 4 – Project management and publicity; The activity has been performed mainly by NIHWM during 2011, supported by NVE and DHI-Norway with specialist inputs.

The key output is a series of presentations and discussions which are feeding into new surveillance initiatives and into strategy preparation for enhanced fact-based management of river basins in Romania.

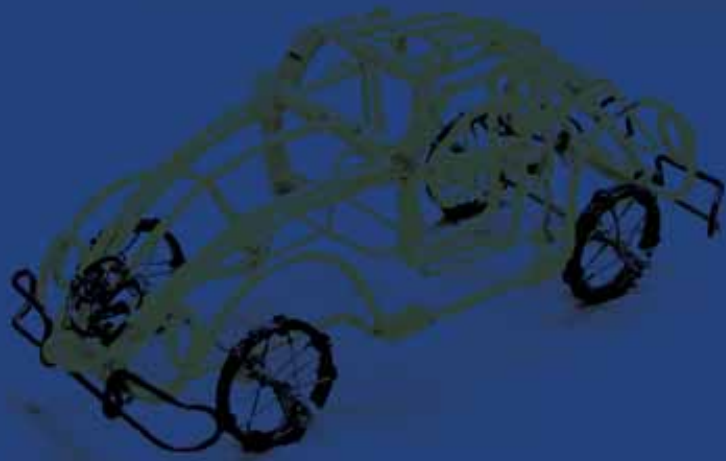
Outcome:

Through the improved monitoring network and the water balance model a decision support system for integrated water management is realized. This enables preparation of strategies for sustainable management of the water resources under changing weather conditions, both in a short- and long-term climatic perspective. The idea is that the equilibrium between the availability and demands of water can be identified, which is indeed compatible with the motto of the project; "Balance for Life".

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SERBIA

Improvement and Development of Flood Forecasting Services in Serbia



Capital: Belgrad
GDP (10⁹ USD): 46.11\$
GDP per capita (PPP): 10.7 \$
country comparison to the world: 105
Population: 7.276 million

Overall Project Data

Client: The Republic Hydro-meteorological Service of Serbia (RHMS).

NVE Mandate: Assist RHMS on improvement of existing flood forecasting systems for small/ medium sized catchments, and to evaluate effects of climate change on hydrology in Serbia.

Contract Value/ Duration: NOK 2,965,000 for the period October 2011 – September 2013.

Type of Activities: Project management/coordination; hydrological modelling, data processing with flood forecasts, etc.; upgrading of selected hydro-meteorological network station components; studies on impacts of climate change on water resources and flood regimes; capacity building thro' formal training and participatory methods like workshops.

Background:

The project aims at supporting RHMS in its efforts to improve and develop further the modelling capability and real time flood warning/forecasting services in the country. In this way, the decision making process concerning flood risks and water resources management in Serbia's flood prone areas will become more reliable. Timely and accurate hydrological forecasts together with adequate flood warning products - modernized with application of state-of-the-art tools - are expected as tangible outcomes of this project.



The current project builds on outputs of several preceding projects supported by the Norwegian Government, in particular the recently introduced systems for data management (WISKI 7) and hydrological modelling and flood forecasting (HBV). It is focussed on further improvement of hydrological services and development of procedures, tools and routines based on web-technology; - for issuing of flood forecasting bulletins and other user-oriented products in support of decision-making and damage prevention related to Serbia's water courses. The aim is to enable the responsible water authorities to move a step further in modernising its hydrological services with regards to efficient water and flood risk management, operation of reservoirs, and maintenance of the existing flood protection system in the country. Lastly, the effect of climate change on water resources will be tested in selected catchments by using WISKI 7, HBV and the most plausible climate change scenarios for the Balkan region.

The project will be jointly implemented by RHMSS and NVE, thus continuing the excellent cooperation established between the two organisations during previous years. Major technical input and know-how will be provided by the Hydrology Department of NVE, whilst the RHMSS will provide suitably qualified national staff, as well as all the necessary data, facilities and logistical support during project execution.

Activities and Outputs:

The project became effective only in October 2011 due to some delays in release of funds, and it was formally launched during the Steering Committee meeting in November. The following activities (with outputs mentioned where appropriate) were carried out:

- 21 -23 November, Belgrade: Start-up Steering Committee meeting. Achievements of the two former projects (2008-2010) were summarized; implementation schedule was revised based on new commencement date. Activities to be completed during first project year were defined and a detailed action plan was finalized; plan includes training activities, meetings, modelling and climate change studies. The Steering Committee meeting was documented in approved minutes of the meeting.

Other activities during 2011:

- Installation and testing of module for automatic HBV-model forecasts;
- Training of RHMSS staff in use of the module;
- Detailed outline of requirements with regard to training related to the KISTERS WISKI 7 Hydrological information system;
- Outline/ selected details with respect to the planned training related to the HBV-model operation.

Outcome:

The HBV-model is now running daily for 10 catchments. Introducing new systems and routines always requires an adjustment of priorities with respect to time and funds for the purpose; - some extra efforts are needed during this start-up stage to ensure that full advantage is taken of the enhanced hydrological information system and of outputs from the improved hydrological model. After two more project years, a flood forecasting system for small and medium sized catchments in Serbia is expected to be fully operational.

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SLOVAKIA

Adaptation to Climate Change



Flood retention dams



Capital: Bratislava
GDP (10⁹ USD): 126.9 \$ (2011 est.)
GDP per capita (PPP): 23,400 \$ (2011 est.)
Country comparison to the world: 57
5,483,088 (July 2012 est.)

Overall Project Data

Client: Financial Mechanism Office (FMO) of EFTA, Brussels. FMO controls the EEA Grants funds on behalf of the Ministry of Foreign Affairs, Norway.

NVE Mandate: NVE and the Directorate for Civil Protection and Emergency Planning (DSB) are Donor Program Partners (DPP) to the Program Operator (PO), the Governmental Office in Slovakia.

Contract Value/ Duration: Program budget of Euro 12,463,000, at the disposal of the PO. NVEs expenditure is covered by a separate contract with the FMO. The Memorandum of Understanding (MoU) was signed in June 2011. The program period will last until 2015.

Type of Activities: Advisory activities in climate change related programs/ projects within the framework of MoU.



Field-trips around the Slovakia. Representatives from the Governmental Office and local authorities in Slovakia and from DSB and NVE.

Background:

The so-called EEA Grants are funded by the EEA countries Norway, Iceland and Lichtenstein as a contribution to reducing economic and social disparities in the European Economic Area and to strengthening of bilateral relations. As a result of negotiations, it was decided that funds would be distributed to 15 EU countries in Eastern and Southern Europe, - to be spent on 32 different program areas. In MoUs with the individual countries the actual allocation is determined, including which among the 32 areas will benefit. In the MoU it is also determined which Norwegian authorities will be the DPP for the countries' respective programs.

In Slovakia NVE is the DPP (together with DSB) for a program that addresses the need for adaptation to climate change. Spending of the EEA Grants is based on a comprehensive National Climate Change Program. The program aims to reverse a negative trend with more drying of landscapes and larger floods. Structures made of stone and wood will be built in streams and rivers to retain and slow the water flows, to store flood water and to regulate the flows proposed into the major rivers. The specific EEA Grants funds are proposed allocated for the Zemplin and Upper Nitra regions, as well as separate measures in the cities of Kosice and Piestany, and the "Blue Schools project" all over the country.

Activities and Outputs:

DSB and NVE have conducted two site visits to already finished retaining structures of stone and wood in flood prone creeks and rivers. There have also been several meetings with representatives of the villages, regional authorities, etc. in order to become familiar with local issues.

In Slovakia a first draft program was made available at an early stage of the project. This was possible due to the referenced National Climate Change Program. The project proposal is scheduled to start during 4th quarter of 2012. Work on the next draft commenced already late 2011 and will, upon completion, be submitted to the DPP/ PO, and then be forwarded to FMO for approval early in 2012.

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SOUTH SUDAN

Capacity Building in the Ministry of Electricity and Dams, and Fula Rapids Hydropower Plant (Feasibility Study)



Capital: Juba
GDP (10⁹ USD): \$ 13,227 (2011 est.)
GDP per capita (PPP): \$ 1,546
Population: 8.260 million
Total installed capacity: 12 MW
Main Energy Sector Authorities: Ministry of Electricity and Dams, South Sudan Electricity Corporation

Overall Project Data

Client: Royal Norwegian Embassy, in conjunction with Ministry of Electricity and Dams (MED).

NVE Mandate: NVE to assist MED with the preparation of a Programme Document (PD) for capacity building in MED (see also Background).

Contract Value/ Duration: MNOK 2.0 for preparation of the PD during 2011, including Terms of Reference (TOR). The project proper is expected to start in the second quarter of 2012.

Type of Activities: Fact finding missions and discussions with stakeholders to identify the scope of the programme, including preparation of related documentation.



Old hydrometric station at the White Nile



Background:

Norway has a long record of cooperation on the humanitarian side with South Sudan, and Norway was one of the first countries to open an embassy in the newly formed Republic of South Sudan. The Government of South Sudan requested assistance in the energy sector, and Norway responded positively as this is a prime concern as regards sustainable economy, as well as a key issue in the development of infrastructure to serve the new State. Initially NVE was asked to assist MED with the preparation of a feasibility study for the Fula Rapids hydropower plant. However, Norfund took an interest in the project and assumed responsibility for this study. Hence NVE's mandate was changed to address the institutional and capacity related aspects of the energy/ electricity sector.

Activities and Outputs:

Two fact finding missions were carried out by NVE to the Fula Rapids hydro power site, and one workshop on Environmental and Social Impact Assessment (ESIA) methodology conducted. However, after Norfund had taken responsibility for study work, NVE's focus was directed towards the institutional support to MED. One further fact finding mission was carried out to that end, and discussions were subsequently held with MED in Oslo and Juba.

The PD is under preparation with expected submission to the Norwegian Embassy in Juba during first quarter of 2012. A draft version, developed as a joint effort on consensus basis between MED and NVE, has already been discussed with Norad and the Embassy.

Norad has agreed to finance some of the critical up-front capacity building activities in relation to the Fula Rapids hydropower project prior to formal start-up of the main programme. The final Project Document will hence be amended to reflect what activities have already been implemented.

Outcome:

The initial experiences bear witness of a climate for fruitful partnership. The dialogue with MED point at the potential for a considerable positive impact on South Sudan's energy sector with a focus on key strategic and capacity issues. The cooperation aiming to work on consensus basis has developed well. NVE is in this respect making reference to other long term institutional cooperation programmes where mutual trust has been a key to sound progress and success.

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TANZANIA

Capacity building and emergency repair of existing hydro power plants i Tanzania



Capital: Dar Es Salaam
GDP (10⁹ USD): \$23.2 (2011 est.)
GDP per capita (PPP): \$1,500 (2011 est.)
country comparison to the world: 201
Population: 43.601 million
Total installed capacity: 919 MW
Main Energy Sector Authorities: TANESCO

Overall Project Data

Client: Tanzania Electricity Supply Company Ltd (TANESCO)

NVE Mandate: Assist TANESCO in procurement, and management and rehabilitation of hydropower plants, and training of operation and maintenance personnel.

Contract Value/ Duration: MNOK 23. Agreement signed in November, 2011, and ending in 2013

Type of Activities: Procurement assistance and facilitation of training for plant maintenance

Background:

TANESCO's hydropower plants are in need of both emergency repair and a scheme of planned maintenance. The programme intends to address this through assisting TANESCO with funds and capacity to conduct the activities.

Activities and Outputs:

The earlier proposed Program Document and Institutional Cooperation Agreement for the cooperation project was rewritten, finalised and signed in November, 2011. TANESCO elaborated the procurement documents for a rehabilitation contractor which NVE commented by end of December, 2011.

Outcome:

At this early stage no tangible outcomes can be stated. Discussions in meetings and workshops, as well as written documentation prepared, have however contributed towards recognition and a realistic understanding of the situation.

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TANZANIA

Masigira HPP - Fact Finding Mission and Preparation of TOR for Feasibility Study



Site visit to Ruhu River Masigira

Overall Project Data

Client: Tanzania Electricity Supply Company Ltd. (TANESCO) and Norad/Royal Norwegian Embassy of Tanzania

NVE mandate: Provide technical advice to TANESCO and Norad regarding possible feasibility study – Masigira Hydropower Project (Masigira HPP).

Contract value/ Duration: 300.000/Short-term assignment, 2011.

Type of Activities: Fact finding mission (FFM)/ field visit, discussions and preparation of documentation (Terms of Reference – TOR)

Background:

The Rift Valley Holding (RVH) - a company 50% owned by the Norwegian Høegh Group - is involved in tea farming in Tanzania and other countries in the region. A tea farm and factory investment of USD 16 mill is under preparation in the Ruhuhu/Masigira River area. Water from the river is needed both for irrigation and power generation for the tea farm with its factory. Another larger hydropower project on the same river source is in the forward plans of TANESCO. Norad agreed to provide finance for an initial study to prepare for a more detailed study of a future project; - a fact finding mission (FFM) leading to the terms of reference (TOR) for a comprehensive feasibility study.

Activities and Outputs:

The purpose of the FFM was to identify whether the hydropower and irrigation development plans of RVH could potentially be in conflict with other planned projects. A greater 118 MW hydropower project on the same river (Ruhuhu) had been included in a prefeasibility study in 1997, and it is listed among future projects by TANESCO. Possible solutions to combine the projects, including prospects for joint hydropower development, were required of the FFM.

The FFM identified that the projects would compete for the same waterfall/ resource. The reservoir of the proposed 118 MW project may also conflict directly with the tea farming areas. The planned intake reservoir may need to be reduced to bring down the considerable dam costs and to avoid conflict with the tea farm.

The first output, the FFM Report, concluded that: a) The two projects can most likely be combined, and; b) some kind of joint venture between TANESCO, RVH and other companies should in that case be considered.

The second output was the TOR: Based on the FFM report, NVE assisted TANESCO preparing the first draft ToR for a feasibility study on the overall Masigira hydropower project. The TOR were finalized by TANESCO in August 2011

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TIMOR-LESTE

Institutional Strengthening of the Water Resources and Power Sectors



Elise Trondsen and Mr. Fransisco establishing a staff gauge in Comoro River



Capital: Dili
GDP (10⁹ USD): \$0.700 (2011 est.)
GDP per capita (GPP): \$3,100 (2011 est.)
country comparison to the world: 169
Population: 1,201 million
Total installed capacity: 26 MW
Main Energy Sector Authorities:
Ministry of Infrastructure
Electricidade de Timor-Leste

Overall Project Data

Client: Ministry of Infrastructure (MIS), also on behalf of the respective Secretaries of State for Electricity, Water and Urbanization, for Energy Policy, and for the Environment.

NVE Mandate: Assistance to Government of Timor-Leste towards institutional strengthening of the Water Resources and Power Sectors, as well as facilitating physical development and improved operation of selected hydropower projects.

Contract Value/ Duration: MNOK 50 for Phase 3 of the cooperation, covering the period September 2009 – September 2014.

Type of Activities: Advisory services, incl. coordination and management of consultants; institutional development and capacity building, incl. staff training and education programmes for institutions.

Background:

The cooperation with Timor-Leste started with a request from the then President Alkatiri in December 2001 for Norwegian assistance within the energy sector. The request was considered favourably by Norad, and Phase 1 of the institutional cooperation between ministries in Timor-Leste and NVE started early 2003. The bilateral cooperation has moved successfully into Phase 3 based on a consolidated mutual trust and adequate response to the tasks. For additional information on the history of the comprehensive cooperation, reference is made to International Section's earlier annual reports.



Towers of development. Bringing power to the people in Timor Leste

Activities and Outputs:

An overview of the activities carried out during 2011 is given below, theme by theme. The key outputs from the various programme activities are presented under the same thematic headings.

Water Resource Management

Legal Assistance: A final draft Water Resource Law (WRL) has been prepared during 2011 and includes public hearing in 4 districts and in Dili. The draft Law was translated into Portuguese and Tetum which ensured full involvement and ownership by the Timorese stakeholders. The WRL is ready to be presented in the Council of Ministers and Parliament

Hydrology and Database: In 2011 9 new rainfall and 8 new water level stations were established. The coverage of the network is now considered to be satisfactory for all of Timor-Leste, with new stations launched in both Ocussi and at Atauro during 2011. The hydrological report for 2010 was prepared in January 2011 and hydrological data are requested from many stakeholders. The National Directorate of Water Resources Management (NDWRM) is now handling all hydrological work after the Long Term Adviser left in June, 2011.

Hydropower Master Plan (HPM) for Timor Leste: A draft HPM was submitted in December 2011. The document provides a thorough overview of the hydropower potential in Timor-Leste, ranking the respective projects based on economic parameters. The key conclusion in the draft report reads: "15 projects have been found economically viable compared to HFO-based thermal generation and have an accumulated installed capacity of around 126 MW and an annual generation of around 536 GWh. The total investment costs for these projects are around USD 530 million."

The Strategic Development Plan for Timor Leste, launched in July 2011, states that by 2020 at least half of Timor-Leste's energy needs will be met from renewable energy sources. The HPM illustrates that hydropower will be one of the key energy options to achieve this goal.

Hydropower Development

Gariuai Mini HPP: Repair work was completed in September 2011, and the Wasserkraft contractor completed the re-commissioning test and the staff training. Gariuai MHPP has been up and running since end of October, providing electricity to the grid.

Atsabe and Maliana Feasibility Studies: Two full feasibility studies, including local consultations, were finalized and are now ready to be presented to national and international investors/donors. Investors have shown an interest to develop the Atsabe and Maliana projects. A Clean Development Mechanisms (CDM) desk study makes Atsabe and Maliana even more attractive to develop. No investment decision has been taken for any of the projects yet.

Capacity Building and Programme Management

Training: An environmental seminar was held in February 2011 together with the Norwegian Petroleum Programme. The focus was to increase competence among institutional partners about environmental aspects in relation to various energy sources.

Six scholarships candidates commenced their studies in 2011, while two more will start in 2012. The Human Capacity Working Group has ensured coordinated training activities through close contacts with involved institutions. English skills have been further improved among partner institution staff after courses arranged in Dili.

Various coordination and management tasks: Long Term Resident Adviser and Education & Training Coordinator continued their work until June 2011. Regular consultation meetings between NVE and partner institutions have been held, with minutes of meetings prepared.

Outcome:

The long-term cooperation on energy and water resources has had a profound positive impact on Timor-Leste's ability to manage and develop its resources in these fields. To-day NDWRM is the main agency in Timor-Leste responsible for hydrological measurements and data-collection.

NDWRM's strengthened position as a resource institution within this sector is demonstrated through their daily involvement with other authorities/ institutions and with donors requesting data, professional advice and cooperation in these areas.

NDWRM is responsible for developing the new Water Resource Law and present a final version to be discussed by the Council of Ministers and the Parliament; - further strengthening the role as a key institution within Water Resource Management. The law will be based on contemporary principles as regards legal provisions and responsibilities for its practical administration, notably with respect to separation of powers and management responsibilities.

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VIETNAM

Hydropower Licensing Project



Capital: Hanoi
*GDP (10⁹ USD): \$123.6 billion (2011 est.)
GDP per capita (PPP): \$3,300 (2011 est.)
country comparison to the world: 164
Population: 91.519 million (2012 est.)

Total installed capacity: 12 400 MW
Main Energy Sector Authorities: Electricity of Vietnam. Ministry of Natural Resources and Environment (MoNRE). Ministry of Industry and Commerce (MoI). Electricity Regulator Authority of Vietnam (ERAV). Ministry of Agriculture and Rural Development (MARD). Ministry of Planning and Investment (MPI)

Overall Project Data

Client: Department of Water Resources Management (DWRM), Vietnam, under the Ministry of Natural Resources and Environment (MONRE)

NVE mandate: Assist in formulation of processes and capacity building for licensing of water resources utilization, particularly for hydropower.

Contract Value/ Duration: MNOK 6.157; started in 2006 and will be completed in 2012.

Type of activities: Institutional cooperation and advisory services on regulatory mechanisms.

Background:

The project has been conceived within the overall objectives of water resources management in Vietnam: Sustainable, environmentally and socially sound management of the water resources used for development of hydropower projects in the country. The main specific goal is to establish licensing routines for hydropower projects which will involve various authorities and stakeholders. Training of involved staff in licensing and related skills is also an important activity within the project. A handbook for hydropower licensing will be developed. A standard framework for license conditions and rules of operation is an expected output according to the scope of work.

The Country Agreement between Vietnam and Norway was signed on 19 September 2006, and MONRE and NVE signed a contract on 20 October 2006.



Activities and Outputs:

A national consultant was initially contracted by MONRE to prepare the final version of the Hydropower licensing guidelines. MONRE decided to arrange an extra workshop to discuss the draft guidelines (without NVE's participation) and to formulate the requirements for continued work on the guidelines.

- The hydropower licensing database was completed early 2011 and seems to function well.
- A draft program for a final dissemination conference was developed by NVE in early 2011. However the conference cannot be held before all activities, including the guidelines, are fully completed.
- Hydropower licensing guidelines, standard license documents and hydropower licensing database.
- Various workshops, training courses, and study visits have been organized.
- NVE has provided advice on specific licensing cases.

Outcome:

The many workshops of the project have provided input to the hydropower licensing guidelines, and in the process given the Vietnamese participants enhanced competence regarding the licensing issues. A summary of outcomes is as follows:

- The capacity building has been achieved through a multitude of diverse training and exposure events, influencing MONRE and other agencies way of working.
- A methodology based on combining presentations both by national resource persons and by NVE - with subsequent group work, discussions, and field visits - has set a standard for work on similar tasks in the future.
- Improved skills, knowledge and understanding have been gained with regards to development of licensing routines and procedures. Likewise, the capability to evaluate license applications and to stipulate license conditions and envi-

ronmental flows related to hydropower development has been notably enhanced.

- The study tours and courses in Norway have increased participants' knowledge on water resources development and licensing aspects, including basic knowledge on hydropower development and associated environmental issues. In addition, the visits to Norway have cemented the mutual confidence and good working relationship between the parties.
- The approach of facilitating dialogue and open inter-ministerial discussions has enabled recommendations and contributions that have had a positive impact on all project outputs.
- The project has initiated contact and cooperation between ministries that will last beyond this project.
- The hydropower licensing database will provide licensing status and information regarding ongoing and past hydropower projects.

The above assessment of outcomes is based on specific feedback from individual participants and their respective institutions.

Issues and challenges:

Vietnam is probably one of the countries in the world with most hydropower currently under construction. Hydropower licensing involves several ministries and agencies in Vietnam, and the licensing process in Vietnam has not been well coordinated. The order and timing of licenses is not logical as construction work is often nearly finished before the application for a water license is processed. As this project will end in 2012, it is important for achievement of its objectives that MONRE and the other involved authorities are able to develop and maintain the guidelines, as well as acquire and maintain the related skills during the coming years.

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OTHER ASSIGNMENTS

This chapter summarizes briefly some short-term assignments which are completed or projects in a very early start-up phase.



Angola

NVE was requested by Norad in April to carry out a fact-finding mission to Angola. The purpose of the mission was to formulate an institutional cooperation between NVE and the Ministry of Energy and Water or other relevant partners in Angola, with the objective of improving the enabling environment for clean energy investments. The scope of work included identification of possible areas for institutional cooperation, including also an initial mapping of possible other areas of cooperation, specifically within higher education and vocational training that might support the development of the energy sector as a whole.

The mission was carried out in early May, and a number of meetings were held with potential stakeholders. As a result of the fact-finding mission a comprehensive travel report was prepared, concluding on the main cooperation areas as follows:

- Increased efficiency program for the electricity sector, reduction of commercial and technical losses
- Support in implementing clean energy projects
- Support to DNHR and the new National Institute for Water Resources Management
- NVE Coordination and Backstopping

Laos

In early January Norad requested NVE to carry out a review of two hydropower projects on the Xeset River in Laos earlier supported by Norad, in the light of a request from Laos for further support. The task also included an appraisal of the new request for funds. The review, including a mission to Laos, was carried out in February, after which a report covering observations, analyses, and conclusions and recommendations were prepared.

The main findings and recommendations were that the support to Electricite du Laos for the Owner's Engineer consulting services for Xeset 3 HPP and Houay Lamphan Gnai HPP would increase the sustainability of the hydropower plants constructed.

Zimbabwe

In late 2011 Norad requested NVE to lead a fact-finding mission to Zimbabwe to explore opportunities for possible future development cooperation in the energy sector together with participant from Norad Oslo and in collaboration with the Royal Norwegian Embassy in Harare.

The draft fact-finding mission report was issued at year-end and will be commented by stakeholders in Zimbabwe before finalization.

Albania

After severe flooding in the Shkoder region in 2010, Albania requested assistance from Norway. While not being in a position to offer immediate assistance, Norway instead offered to finance the establishment of a flood forecasting system, upon which MFA requested NVE to investigate the possibilities of cooperation with relevant Albanian institutions, in order to mitigate the flood problems. A pre-project was defined, aiming at identifying institutions and prepare a ToR and project document. A preliminary document was prepared and an Inception Workshop was carried out in June 2011, after which the project document was revised and presented to MFA. So far no decision has been made on further commitment from MFA.



An exciting completion of a successful seminar

Clean Energy and Gender Training Seminar - Norway

Overall Project Data

Client: Norad.

NVE Mandate: Increase the focus and knowledge in partner institutions on how to integrate gender related aspects in their work.

Contract Value: MNOK 0.6, for expenses under NVE responsibility.

Type of Activities: Seminar, including various interactive modules in workshop format.

Background:

It has been a concern for some time that gender imbalance has been observed in delegations from NVE partner institutions during training and missions abroad. Towards this end NVE organized a seminar addressing this particular issue: The Gender and Energy Training Seminar was conducted from 12 – 16 September, 2011, in Oslo, Norway. The seminar received support from Norad and was implemented in close collaboration with ETC/ENERGIA and Nord/Sør-konsulentene (i.e. the North/ South Consultants) consortium. This was the first seminar in Norway of its kind aimed at boosting gender awareness and gender mainstreaming capacity in partner institutions and staff.

Activities and Outputs:

The agenda was structured around two main substantive themes; Clean Energy Sector in Norway, and Gender Aspects of the Energy Sector in Developing Countries. The seminar had been broken down into 15 sessions. Giving examples of good practices and methods for gender mainstreaming in energy projects was adopted as the strategy for communication of key messages.

In delivering the respective sessions, several training tools and methods were employed. They consisted of:

- a. Introductory presentations by the trainers;

- b. Field trips;
- c. Case studies and interactive exercises conducted in smaller groups of participants;
- d. Feed-back presentations by from the participants' respective groups; and
- e. Open discussions in plenary sessions.

As part of the strategic planning for post training follow-up, participants worked in country-level groups using a gender SWOT (i.e. strengths, weaknesses, opportunities, threats) analysis. The purpose was to identify and assess internal and external factors that influence their institutions; - capacity and competence required to implement gender mainstreaming strategies.

Based on the SWOT analysis, the participants developed country level gender and energy action plans. These appear as the most important part of the conclusions presented in the seminar proceedings.

Outcome:

The NVE seminar on gender and energy in Oslo has led to increased gender awareness among participants and to specific action plans to be considered by the institutional partners.

Key results from the evaluation questionnaire showed that:

- All participants rated the overall design and facilitation of the seminar as “very good”;
- 92% of the participants felt that their learning expectations were met.

The participants pledged to follow up the gender actions plans with their respective institutions. This immediate outcome is likely to lead to a more robust outcome among many institutional partners; - adopting and internalizing more effective gender sensitive strategies, along with practical measures to implement them.

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NVE's Role, Competence and Experiences

"My colleague Ánund Kvambekk and I during mass balance measurements on Langfjord glacier in May. We do this in spring and late summer every year. The view from "the office" on these days is incredible. Of the glaciers measured by NVE, this one has shown the greatest retreat in the last 20 years"

*Ragnar Ekker, Senior Engineer at Section
for Glaciers and Environmental*



Photo: Ragnar Ekker/NVE

1

Water Resources and Energy Management in Norway



Inland waters – lakes and rivers – have since time immemorial been important for the location of settlements and their developments. The first simple “laws” and common rules on water rights date back about 1000 years. Gradually governance of water became legally linked to the economically important forestry, agriculture and transportation sectors – clearly evidenced already from the 17th century. The first Water Course Act dates from 1887, - in anticipation of extensive hydropower development. The revised Act, with provisions for Concessions (i.e. comprehensive Licenses) for hydropower, came into force in 1917. After several amendments, new acts and subsidiary regulations, the current Water Resources Act was adopted in 2003 as the modern legal instrument for governance of water in Norway.

The institutional framework has always reflected the primary “priorities of the time”, - starting from transportation (incl. floating of large quantities of timber) via grinding-/ saw-mills to hydropower and increasing focus on the environmental concerns. The present day’s NVE, which is now under the Ministry of Petroleum and Energy (MPE) has evolved from the first formal institution in charge of “water matters”, initially the Directorate of Canals and Harbours formed in 1804. The Norwegian Water Resources and Electricity Administration was established in 1927. This became the first “NVE” with a similar, although both wider and a less focused, mandate than at present.



During the most intensive period of hydropower development in Norway (1950s – 1970s), NVE was largely a huge “all-in-one” institution with internal directorates responsible for regulation/ licensing, development, and operation/ distribution in relation to electric power. The next major shift came as the Government decided to separate regulatory functions more clearly from the executive (and commercial type) functions in 1986; - the present NVE retained the key regulatory role, along with resource monitoring and inspectorate functions as shown in the organizational chart of NVE. There is now strong focus on independent, knowledge based decision support. The hydropower production and transmission functions were separated and transferred to new State owned enterprises with commercial objectives; - an important aspect of this new regime is extensive outsourcing and exposure to competition (or production targets passed by NVE/MPE).

Over the years, a set of complementary laws have been passed to cater for all aspects related to governance, development and management/ operation of water resources in Norway. To ensure checks and balances, responsibility for the various acts fall under different Ministries such as the Ministry of the Environment (e.g. pollution control and general spatial planning issues), the Ministry of Health (e.g. water quality) and the Ministry of Fisheries (e.g. inland aquaculture and fish farming), in addition to the portfolio of MPE. In addition, all of these water and energy governance issues entail important roles for local actors, notably the Local Authorities.



Low reservoir levels at Vasslivatn in Hemne, Sør-Trøndelag, Norway

2

NVE in the “ Knowledge Business” for Water and Energy



NVE has through the EU project WATCH investigated the effects of climate change on the inflow to the water reservoirs. The results indicate that if the present regulation procedures are maintained, the increased inflow to the reservoirs can not be utilized in the hydropower production. A group of researchers are investigating the drawdown zone of the Aursunden reservoir in the upper part of River Glomma

The evolving governance structure for water and energy in Norway provides good lessons for continued refinement and high quality of water resources management within NVE's mandate. These lessons are equally relevant for countries where the water resources/energy sector management is only now gaining momentum, or where highly centralized government structures without separation of the regulatory and executive functions hinder efficiency, transparency and accountability. In order to execute its mandate in Norway, NVE has to conduct continuous research and development, – both alone, in collaboration with other sector authorities, and by engaging research institutions. NVE is committed to be at the cutting edge on matters pertaining to water resources/catchments (basins), electric energy, concessions/ licensing for the sector, landslides where there are water related risk factors, electric power markets, as well as safety and security (energy supply, damage safeguards, environment)

The NVE mandate requires two different and equally important approaches with a view to conduct a legitimate and competent role in decision-making and promotion of reforms (e.g. the new laws/ regulations):

- Manage all relevant water resources and energy data; - collection, analyses, reporting and dissemination of findings; - setting agenda for continued and expanded routine work and/or research.



- Ensure transparent ways of doing the water/ energy business; - interface with partners, competing actors, central/ local level authorities, and society/ community; organize adequate and transparent hearing processes.

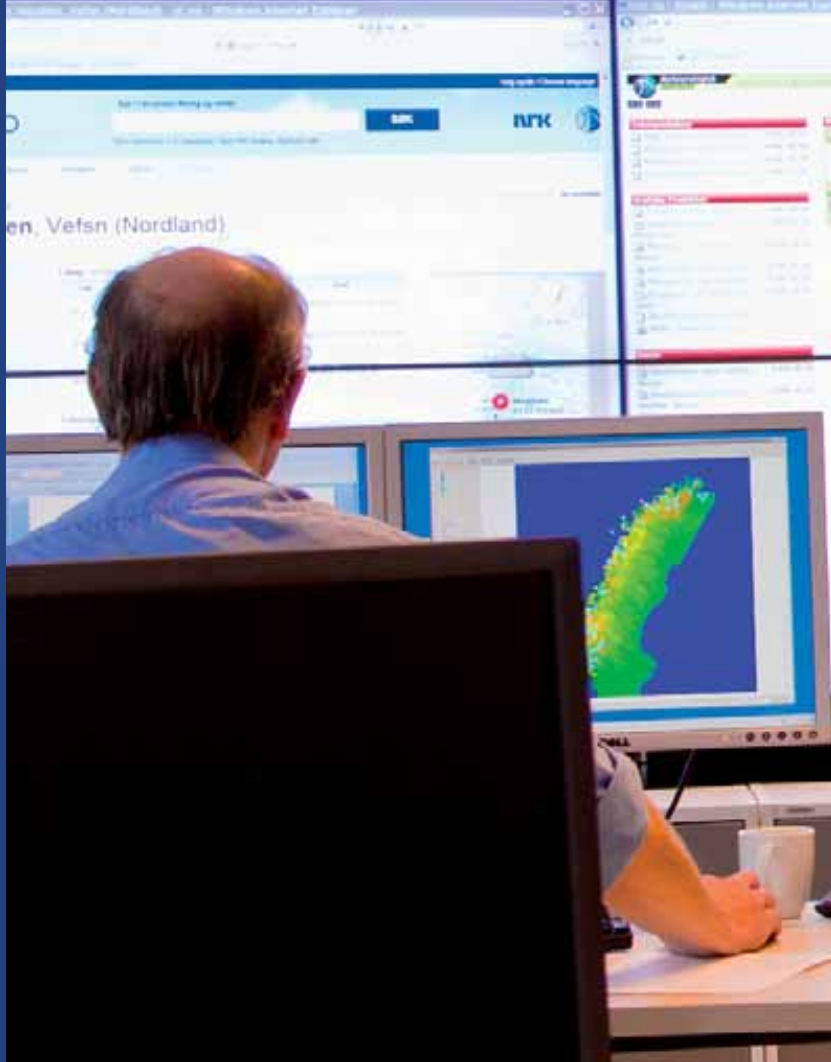
The readers are referred to NVE's web pages for more information. Go to home page: www.nve.no and click on "English" for access to English languages content. The page contains a lot of relevant and illustrative information, reflecting on the professional and scientific duties of NVE. Some links, e.g. "real time hydrological data", will take you to detailed information with text in Norwegian but there are simple vocabularies to help foreign readers. Annual Reports of the International Section are available from 2003 onwards on: www.nve.no/en/About-NVE/International-work

It is by drawing on the historical, as well as present day's tasks and challenges, that NVE's advice and management of activities in foreign countries can be made relevant and legitimate. In our organization high competence levels and analytical skills are at a premium, and we believe this to be our competitive advantage in our overseas endeavors.



3

Intensive Learning during Hydro-Met Year 2011



The hydro-meteorological year 2011 (i.e. actually from second half 2010 to early 2012) was unusual both in terms of measurements and related statistical description, as well as in terms of physical events such as high and low flows, rainfall pattern and hefty storms, resulting damages and the effects on electric energy prices. It is still being discussed to what extent the scenarios were within reasonably expected statistical variations or whether they truly reflected climatic changes. In any case, this year provided notable challenges for NVE and other institutions concerned with the “acts of God” and their consequences; - preparedness, forecasts, warning systems, damage prevention, emergency assistance and planning for future coping mechanisms both in the short and longer term.

NVE has decided to summarize some of the events and experiences, presenting them in charts for easy overview and communication to various stakeholders. These charts – presented on the following pages – cover the 12 months of 2011. Chart 1 includes a general overview, reflecting many aspects of the tasks, responsibilities and activities under the NVE mandate. Notably, some of the research and public information activities related to water and energy management are indicated. There is no particular focus on the climate aspects, flooding, effects on energy supply or damages resulting from excessive rainfall and storms. Chart 2 depicts the average water reservoir level variations throughout 2011, along with the specific events related to Norway’s “water situation” in the course of 2011.

It is important to know that the late part of 2010 set the scene for 2011, characterized by very dry months in most parts of the country, and an early onset of cold winter temperatures (both in Norway, the other Nordic countries and elsewhere in Northern Europe). Drought as such is rarely a serious problem in Norway, except for a few water supply schemes. However,



The flood forecasting at NVE is operational 24h/365days/year. A total of 69 forecasts covering 35 incidents were submitted during the last year

Low levels in the hydro-power stations' reservoirs may have serious effects on electricity production during the winter months November – April when precipitation is stored in the form of snow throughout the catchment areas. The effect was felt during 2011 with record high electricity prices charged to consumers during the cold winter months.

At the other end of the charts – moving into 2012 – there were relatively well filled reservoirs which coincided with modest winter temperatures; - the exactly opposite situation of one year earlier. Electric energy prices were forecasted to stay relatively low in spite of sharply increasing oil prices; - Norway could again become a reliable exporter of electric power through the extensive cable network linking into the North European grid.

The damages from floods and landslides have raised awareness regarding the need for better prevention and physical measures; - political willingness to provide budget resources resulted from the situation. The difficult energy supply conditions with unpredictable electricity prices also sparked a political debate regarding the liberalized power market, making Norway almost fully integrated into the European market. With Norway's high reliance on hydro-power based electricity, the conditions for profitable cooperation with nuclear, oil and coal fired power producers - supply for hydro power sources can easily be peaked to meet varying daily demands, contrasting the properties of most other technologies. Public voices have raised the question if Norway has gone too far in liberalizing indicating that the profits of the power production companies are more important than supply security. This may be controlled through adjustment of the license regime, introducing for example different thresholds in order to govern reserves to be held in reservoirs and criteria for the level of permissible exports.

NVE is a crucial actor in the analyses and evaluation of such situations as Norway experienced during 2011; - several studies have been carried out or are still in progress with a view to advise Government on how best to tackle these issues. As extreme scenarios have emerged, one challenge is that the past experiences do not hold all the answers, – although containing an indispensable fact base for making high quality conclusions, recommendations and action plans. Learning is an ongoing process for NVE as it has been for a couple of hundred years (counting also NVE's predecessors).

Chart 1 Review of the Year



January

- NVE's Sub-glacial lab won the award as the most claustrophobic laboratory.
- Power supply very tight due to low reservoir levels and high demand
- 22 millioner crowns allocated to surveillance of situation in Nordnesfjellet
- Recommended construction of power line between Mongstad and Kollsnes and out to the Troll A platform on the Continental Shelf.
- New edition of Watershed Handbook published

February

- Per Sanderud appointed new Director General of NVE
- Avalanche observers training
- NVE allots 60 million crowns to 66,000 customers of the 24 distribution companies with the country's highest net rental charges.

March

- NVE sends three long-term experts to Liberia
- ECO-design Regulations
- Guidelines issued for power supply emergency preparedness regulations
- Flood zone map for Sørkedalen delivered to Oslo municipality

April

- Agnar Aas retires the position of Director General of NVE
- New guidelines: Flood and Landslide Hazards in Area Planning
- New version of NVE Atlas
- Three NVE staff appointed to the government's energy planning committee.

September

- Official opening of rehabilitated NVE Headquarters
- Flood Zone map for Vansjø and Moss river handed over to municipalities of Moss, Rygge, Råde and Våler

October

- Norway's national "Energy Days" seminar
- Debate on renewables in Norwegian power supply
- Annual Report on Environmental Protection - 91 million crowns allocated to 80 protection measures

November

- Inspections and public hearings
- Final inspection of one of Norway's largest hydro-power projects
- NVE issues fines to five distribution companies for giving incorrect information of their plans for power rationing
- Glaciers continue to recede
- NVE researches receive highest accolades
- Quick clay map of Oslo municipality

December

- www.nve.no awarded 6 stars at Annual Quality Conference
- NVE advises distribution companies on measures for preventing bird deaths at wind plant.
- Electricity Certificates regulations made law
- Storm Dagmar - many power outages



May

- Norway's economic geothermal potential mapped
- 45 Quick Clay zones mapped in Alta municipality
- First High Court case under the Water Resources Directive – sentenced for construction in conflict with the concession conditions.
- New NVE publication: "More frequent thunderstorms can cause more power cuts"

June

- NVE moved back into rehabilitated headquarters
- Flooding in both Southeast and Northern Norway

July

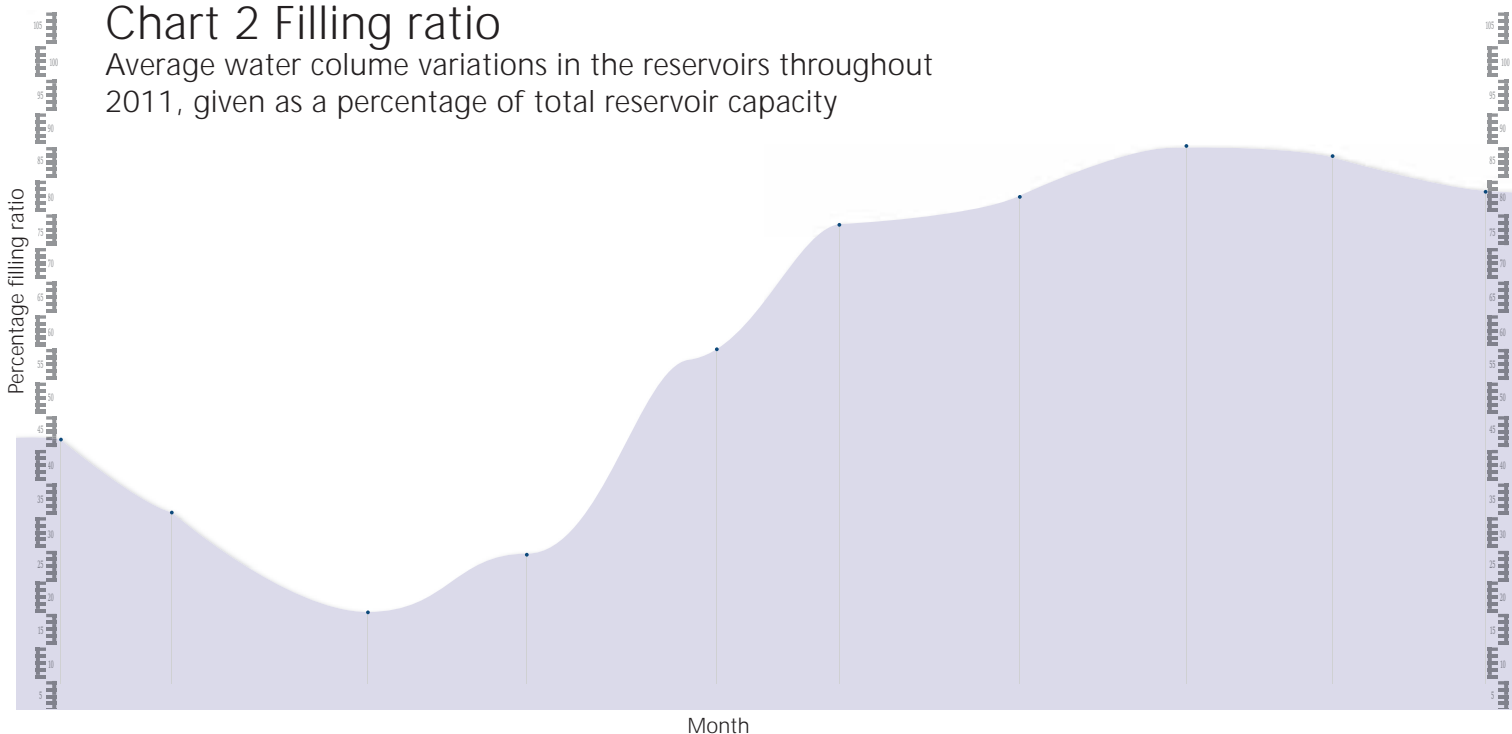
- White Paper on protective measures against landslides and floods – NVE in panel of experts
- Ministry of Petroleum and Energy moves into NVE's headquarters
- one year since energy certification arrangement came into effect. 100,000 energy certificates issued for households

August

- National landslide and avalanche mapping plan
- Flood in Trøndelag and Nordland
- Report: Effect of Climate Change on Floods in Norway

Chart 2 Filling ratio

Average water volume variations in the reservoirs throughout 2011, given as a percentage of total reservoir capacity



4

Learning from Experiences Abroad



Fula Rapids, White Nile, South Sudan

The foreign activities of NVE are always linked with the corresponding competencies required and used in Norway. While respecting each country's right to make its own policy/ strategy decisions – and indeed having a genuine ownership to them – the experiences and “best practices” gained by NVE can no doubt be brought to bear also in the different situations abroad.

It is more than 50 years since the first systematic collaboration with developing countries' water resources authorities began and over this period much experience has been gained. NVE started 2 years ago to systematize the lessons learned and wants to disseminate and share them with other partners. These can be in terms of positive or negative “anecdotes”, as well as in the form of sophisticated statistics, new draft legislation or practical guidelines.

Some lessons learned from recent year's, but also summarizing more generally some experiences from earlier years, institutional and project based cooperation with NVE partners in other countries include:

Observing the “tension” and “stress” making foreign/ Norwegian lessons and “best practices” hard to adopt: Any country will start out with a set of “givens”, - both facilitating and constraining factors. The Timor-Leste experience shows the importance of patience, responsiveness and mutual trust; - through a long term presence NVE has built good relations with the institutions, helped developing them and, in addition, adopting an on-the job-training approach. As a result, NVE is now assisting the sector authorities with legal issues such as the drafting of new water resources legislation and the negotiations concerning trans-boundary river issues.



Another aspect of this same issue has emerged when working with “new” governments, whether they have been reconstituted after major political conflicts or civil war, or if it simply a state with recent independent status. Timor-Lest was a case of this nature which was successfully tackled with patience and targeted capacity building. Similar issues are faced in Liberia and Southern Sudan where both governments have to face the challenge of establishing policies, strategies and government functions almost from scratch. While this poses difficult challenges, it also carries unique opportunities: The potential for positive impact on sector management is particularly high during this formative stage, provided the course is set right. The lessons learned from Bhutan and Timor-Leste will be very useful. There could perhaps be scope for some reciprocal exchange of experiences through study tours, - on a South-South basis rather than the conventional North-South approach.

Resolving project implementation issues: Some projects struggle with cumbersome procedures, rules, and resistance towards making decisions. The reasons might be incompatible procurement and accounting rules or over-cautious officials afraid of being accused of corruption or nepotism; - one option is to put in place a semi-autonomous implementation unit operating under tailor-made rules acceptable to both parties. Needless to say: Such “one-off” units do have advantages from efficiency point of view but the sustainability of implementation capacity thus utilized might be questionable.

Enabling the next steps in sector development: Sustainable and cost-effective sector development may often require that successfully reformed and equipped institutions are put in place before the development pace is increased. Such approaches are challenging for donors and recipient governments alike; - results need to be tangible and measurable but

many of the preparatory activities – the capacities to be in place – are often time consuming and their outputs are difficult to measure. This is a concern both at the overall sector level (good policy before accelerated construction of trunk infrastructure) and also at the “local” institutional level (as an example hydrological measurements and monitoring needing analytical capacity and confident/ competent staff, as well as up-to-date equipment and transportation facilities). This dilemma is reflected in nearly all project activity descriptions.

Need for consultation processes: In response to difficulties and shortfalls in the involvement of women in all aspects of project execution and management, NVE organized gender workshop with participants from several partner countries, with professional assistance from Norad and Energia. The outcome of the workshop included several specific actions and commitments (by individual officers) which could enable a more balanced gender representation in the various functions and stages of sector development. NVE similarly learnt more about how to ensure such balance and participation in effective ways.

Consultation processes have already become important in some projects. Good lessons have been learnt from such different countries as the Philippines, Timor Leste, Bulgaria and Liberia, - expressed through explicit feed-back from the partners. Consultations have many aspects, as also experienced by NVE: It will improve the fact base for decision-making; ownership and/ or acceptance can be solicited from concerned communities and user groups; women in management and project implementation positions ensure “permanent” presence of the competence and knowledge which can only come from women.

Understand national budget and priority practices: Recent experiences have emphasized the need to approach project design/ execution as a process which does not end until the “output” – hydropower scheme, data collection/ processing system, operation and maintenance plan, revised staffing organizational structure – is actually a normal and integrated part of the larger system. Sometimes a completed “output” does not proceed to its operational modus because the recurrent resources had not been provided for in budgets. The nature of these problems vary a lot: Technical units of the organization work according to different priorities compared to the administrative/ financial units; time horizons for introducing new budget items often exceed project implementation time; “urgency” and “priority” mean different things to different staff and organizational units, and sometimes transfer and release of funds are delayed as a result of specific legal requirements or conflicting priorities.

Appendix 1

| TOTAL INVOICED - INSTITUTIONAL COOPERATION 2011 | | | | | | | |
|---|---|-----------------|---------------------|---------------------|---------------------|---------------------|----------------------|
| Proj.no | Country/Client | NVE Hours | Fee Charged NOK | NVE-adviser NOK | NVE expenses NOK | Consultants NOK | Total NOK |
| 32543 | Nepal. Department of Electricity Development | 463,00 | 412 070,00 | | 116 598,17 | 155 668,91 | 684 337,08 |
| 32106 | Nepal. Department of Electricity Development. Prep for new inst. Agreement | 49,00 | 43 610,00 | | 179,00 | | 43 789,00 |
| 32550 | The Philippines. The Provincial Government of Oriental Mindoro | 45,00 | 40 050,00 | | | 20 895,00 | 60 945,00 |
| 32551 | Vietnam. Ministry of Natural Resources and Environment | 47,00 | 41 830,00 | | 37 737,95 | | 79 567,95 |
| 32555 | Bhutan. Department of Hydropower & Power Systems (Strengthening of the energy sector) | 1 026,00 | 913 140,00 | | 1 101 817,85 | 11 500,00 | 2 026 457,85 |
| 32556 | Bhutan. Department of Hydropower & Power Systems. (Accelerated Hydropower Development Programme) | 1 365,55 | 1 215 339,50 | | 748 319,34 | 4 604 901,00 | 6 568 559,84 |
| 32557 | Ghana. Water Resources Commission | 778,00 | 692 420,00 | | 1 555 805,08 | 188 349,88 | 2 436 574,96 |
| 32558 | Timor Leste. Ministry of Infrastructure. | 1 501,00 | 1 335 890,00 | 887 500,94 | 658 933,03 | 1 223 582,83 | 4 105 906,80 |
| 32559 | Liberia. Ministry of Lands, Mines and Energy | 2 476,15 | 2 203 773,50 | 2 185 924,52 | 2 749 018,04 | 3 009 067,00 | 10 147 783,06 |
| 32560 | Ethiopia. Ministry of Water and Energy | 1 573,40 | 1 400 326,00 | | 420 500,44 | | 1 820 826,44 |
| 32561 | Philippines. Department of Science and Technology, Philippine Atmospheric, Geophysical and Astronomical Services Administration | 150,50 | 133 945,00 | | 31 109,67 | | 165 054,67 |
| 32562 | Tanzania. Tanzania Electricity Supply Company Ltd | 66,75 | 59 407,50 | | | 47 033,54 | 106 441,04 |
| TOTAL | | 9 541,35 | 8 491 801,50 | 3 073 425,46 | 7 420 018,57 | 9 260 998,16 | 28 246 243,69 |

Appendix 2

| TOTAL INVOICED - 2011 Norad/MINISTRY OF FOREIGN AFFAIRS | | | | | | | |
|---|--|-----------------|---------------------|-------------------|---------------------|-------------------|---------------------|
| Proj.no | Activity | NVE Hours | Fee Charged NOK | NVE-adviser NOK | NVE expenses NOK | Consultants NOK | Total NOK |
| 32001 | General assistance | 1 142,00 | 1 016 380,00 | | 23 549,16 | | 1 039 929,16 |
| 32111 | NVE-trainees | | | | 1 458,00 | | 1 458,00 |
| 32076 | Energy Expert to SADC. Royal Norwegian Embassy, Mozambique | 15,00 | 12 900,00 | 347 368,50 | 276 719,27 | | 636 987,77 |
| 32091 | Ethiopia. Feasibility Studies of the Mandaya and Beko-Abo Multipurpose Hydro-power Projects | | | | 51 239,14 | | 51 239,14 |
| 32095 | Montenegro. Strategic Environmental Impact Assessment. Study at the Moraca River | 32,00 | 28 480,00 | | | 99 920,00 | 128 400,00 |
| 32104 | Tanzania. Routines for operation and maintenance | 124,50 | 110 805,00 | | 129,03 | | 110 934,03 |
| 32105 | Nepal. Energy Seminar (Licensing etc.) | 10,00 | 8 900,00 | | | 925,00 | 9 825,00 |
| 32108 | Nepal Energy Minister. Visit to Norway | 83,00 | 73 255,00 | | 103 468,28 | | 176 723,28 |
| 32109 | Tanzania. Monitoring Twinning Agreement Tanesco-Statnet | 28,00 | 24 920,00 | | | | 24 920,00 |
| 32114 | Studies on Opportunities and Barriers to Renewable Energy Investments in Mozambique and Nepal. | 7,00 | 6 230,00 | | | | -28 510,00 |
| 32115 | Albania. Flood forecasting system | 290,00 | 258 100,00 | | 38 018,01 | | 296 118,01 |
| 32116 | Workshop, Gender | 246,00 | 218 940,00 | | 322 523,24 | | 541 463,24 |
| 32117 | Lao PDR. Review hydropower projects, Xeset River | 216,75 | | | 35 128,78 | 17 793,16 | 245 829,44 |
| 32118 | Tanzania. Facting Finding Mission Masigira | 227,00 | 202 030,00 | | 83 005,35 | | 285 035,35 |
| 32119 | Southern Sudan. Feasibility Study Fula Rapid Hydropower Plant | 925,00 | 823 250,00 | | 198 709,92 | 107 167,90 | 1 129 127,82 |
| 32120 | Visit to Norway, Baron Tekna | 66,00 | 58 740,00 | | 31 570,00 | | 90 310,00 |
| 32121 | Angola. Prep of program document | 210,50 | 187 345,00 | | 85 323,11 | | 272 668,11 |
| 32122 | Zimbabwe. Fact-finding mission. Possible cooperation Energy Sector | 250,80 | 223 212,00 | | 62 191,06 | | 285 403,06 |
| TOTAL | | 3 873,55 | 3 253 487,00 | 347 368,50 | 1 313 032,35 | 225 806,06 | 5 297 861,41 |

Appendix 3

NVE's Participation in International Research and Cooperation with International Institutions

International Energy Agency (IEA) Wind Energy: Member of the Executive Committee for the Implementing Agreement for Cooperation in the Research, Development and Deployment of Wind Energy Systems. Participate in Annex for Integration of wind and hydropower systems and Annex for wind system integration.

IEA Hydropower Implementing Agreement Participates in the Executive Committee, the Small Scale Hydropower annex and in the preparation of an annex on valuation methodology for hydropower's systems balancing and ancillary services.

The Council of European Energy Regulators (CEER) The overall aim of the Council of European Energy Regulators (CEER) is to facilitate the creation of a single competitive, efficient and sustainable internal market for electricity and gas in Europe. NVE participates as member.

The European Regulators' Group for Electricity and Gas (ERGEG) ERGEG is an advisory group of independent national regulatory authorities established to assist the European Commission in consolidating the Internal Market for electricity and gas. ERGEG was abolished as of July 1st, 2011 and ERGEG's tasks has been taken over by ACER.

The Agency for the Cooperation of Energy Regulators (ACER) was established by a Regulation under the Third energy market Package as of March 1st, 2011. Implementation of the Third Package in Norway will set the principles for NVEs participation in ACER.

International Council on Large Electric Systems (CIGRÉ) CIGRE (International Council on Large Electric Systems) is one of the leading worldwide Organizations on Electric Power Systems, covering their technical, economic, environmental, organisational and regulatory aspects. NVE participates, inter alia, as a member of the Board in the Norwegian national committee and as a member of the study committee on System Environmental Performance.

European Committee for Electrotechnical Standardization (CENELEC) CENELEC's mission is to prepare voluntary electrotechnical standards that help develop the Single European Market/European Economic Area for electrical and electronic goods and services removing barriers to trade, creating new markets and cutting compliance costs. NVE has participated as representative for CEER, inter alia, in the technical committee 8X on System aspects for electrical energy supply, the working group 1 of TC8X on Physical Characteristics of electrical energy and related task forces.

International Electrotechnical Commission (IEC) IEC is the leading global organisation that publishes consensus-based International Standards and manages conformity assessment systems for electric and electronic products, systems and services,

collectively known as electrotechnology. NVE participates as member in PT2 on Power quality aspects from the energy supplier point of view under the technical committee 8 on System aspects for electrical energy supply.

The Union of the Electricity Industry (EURELECTRIC) Its mission is to contribute to the development and competitiveness of the electricity industry and to promote the role of electricity in the advancement of society.

CIREN – International Conference on Electricity Distribution CIREN works for the purpose of increasing the business relevant competencies, skills and knowledge of those who see themselves as a part of the electricity distribution community. CIREN is dedicated to the design, construction and operation of public distribution systems and of large installations using electrical energy in industry, services and transport. CIREN covers the whole field of Electricity Distribution Systems and associated services, including dispersed and embedded generation issues, the technical aspects of Electricity Supply and related aspects such as cost reduction, environment, regulation, organisation and related IT systems. NVE participates, inter alia, as member of the National Committee of CIREN.

The Nordic Energy Regulators (NordREG) NordREG is a cooperative organization for Nordic regulatory authorities in the energy field. Their mission is to actively promote legal and institutional framework and conditions necessary for developing the Nordic and European electricity markets.

Nordic Project on Distributed Energy for Remote Areas The objective of the project is to identify renewable technologies and new energy technologies suitable for remote areas in Finland, Sweden, Denmark, Norway, Iceland, and Greenland.

NATO; Industrial Planning Committee (IPC) Ad Hoc Working Group on the Protection of Energy-Related Critical Infrastructure (AHWG), subgroup electricity. The aim of the working group is to examine the electricity infrastructure and resulting vulnerabilities and discuss potential preventive and/or consequence management measures, and develop a catalogue of best practices for the protection of electricity-related critical infrastructure.

Nordisk Beredskapsforum (NordBER) The objective of the forum is to conduct a dialogue between the involved parties concerning contingency planning and crisis management in the power sector. NordBER deals with issues which are not managed by TSO cooperation through Nordel. The forum consists of the Nordic energy authorities, TSOs and other relevant parties from the Nordic countries.

The European Committee for Standardization (CEN) Has created a working group on "Protection and Security of the Citizen" as a monitoring and coordination platform for

stakeholders. Nine expert groups have identified needs, one of them is the expert group “Critical Infrastructure – Energy Supply”. The CENELEC Joint Expert Group Critical Infrastructure - Energy Supply has identified needs and possibilities for standardisation activities for security and emergency preparedness within energy supply.

NordVind Wind power working group appointed by the Government Officials Committee for Energy under the Nordic Council of Ministers. Collecting and communicating national experiences from practice and procedures as well as results from R&D projects to create a Nordic “best practice” for wind power development

International Commission on Large Dams (ICOLD) NVE has the secretary function for the national dam committee (NNCOLD). NVE also has representatives in the following ICOLD technical committees: Committee of Governance of Dam Projects; Committee on Dam Safety; European Working Group on Legislation.

European Governments Dam Safety Network Forum for sharing experience on issues relevant to dam safety between national authorities.

Swedish Meteorological and Hydrological Institute (SMHI), Sweden Harmonizing water related databases along the Swedish-Norwegian border.

Reference Information Specifications for Europe (RISE), Funded by the 6th Framework Programme Participants: SMHI, Swedish mapping Authorities, Norwegian mapping authorities, NVE. Developing guidelines for the creation of geospatial data implementation specifications, with focus on hydrography, elevation models and land-use data themes.

CHIN GIS Workgroup Participants: The Danish National Environmental Research Institute (DMU), SMHI, Finnish Environment Institute (SYKE), Icelandic National Energy Authority (OS) and NVE. Workshop in Silkeborg, DK focused on basic geographical information systems related to surface waters (rivers, lakes and catchments areas).

Cooperation with EU/EEA: Stakeholders Forum related to a European Flood Action Programme. Norway has one representative; from NVE. In 2007 the forum was replaced by a Working Group F (WG F), dealing with the theme Flood risk management as part of the working structure for the Common Implementation Strategy (CIS) for the Water Framework Directive (WFD).

The objectives of WG F are:

- support the implementation of the EU Floods Directive (adopted in 2007)
- ensure a platform for coordination with the WFD.
- ensure links with other CIS activities

- provide a platform for information exchange.

China: Bilateral cooperation in hydrology between Bureau of Hydrology (main office in Beijing), MWR (Ministry of Water Resources) and Hydrology Department, NVE.

Cooperation between NVE and Haihe Water Conservancy Commission concerning groundwater monitoring and water management practices

EU: Participation and Vice Chair in COST 731. Long term research cooperation dealing with uncertainty in meteorological- and hydrological forecasting. NVE contributes to the EU WATCH project together with partners from other Nordic and Baltic hydrological services (climate and energy related research).

UNESCO/IHP: Represent NE-FRIEND cooperation Long term professional cooperation in hydrology (comprising institutions from NL, UK, Poland, Czech Republic, Slovakia, Austria, France and more).

WMO: National representation in international forums under WMO on operational hydrology (Hydrology Department)

IAHS/ICSW: International cooperation in hydrology, 2007-2010

UK – Centre of Ecology and Hydrology: Long-term cooperation with CEH in hydrology.

Republic of Croatia Cooperation between Meteorological and Hydrological Service in Croatia and NVE.

Montenegro Hydrometeorological Institute, Podgorica: Preparation of masterplan for hydrological network and data acquisition in Montenegro.

The Republic of Serbia: Hydrological Flood Forecasting System for Small and Medium Sized Catchments in Serbia. Cooperation between Hydrometeorological Service of Serbia (RHMS) and NVE.

The Republic of Armenia: Hydrology in Armenia, cooperation between Armenian State Hydrometrological and Monitoring Service (ArmStatHydroMet) and NVE.



NVE's vision:

“ Water and energy for sustainable development ”



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