Energize Nepal 2016-2019

Mid-term review and Appraisal of Upscaling Proposal

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Mid-term review and Appraisal of Upscaling Proposal

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Report

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EXECUTIVE SUMMARY

Energize Nepal is implemented since 2016 by a group of Norwegian and Nepali partners and consisting of two main components: 'Renewable Nepal phase II' and 'Hydropower component'. Total Norwegian funding to the five-year programme is NOK 25 million.

The assignment for *Review and Appraisal of Energize Nepal,* commissioned by Norad, called for an assessment of the progress of the Energize Nepal Programme (ENEP, the "Programme") and the added value of a proposal to extend the Programme (the "Proposal"). In addition, the assignment called for a brief assessment of previous Norwegian support to energy research in Nepal.

Research undertaken during completion of this assignment included:

- study of core Programme documentation;
- a field visit involving visits to the Project Office, Programme facilities, interviews with all main partners in the Programme and various other stakeholders and beneficiaries;
- research into secondary information available in the public domain; and
- additional documentation provided by the Programme Office and other stakeholders upon request.

The complexity of the Programme with its multitude of activities, partners and processes means that this review was not able to investigate all details related to each individual every Programme element. Nonetheless, the team for the Assignment (the "Team") gained substantial insight into the context of the Programme, the achievements of its "components" and progress toward meeting the Programme's objectives. The team is confident that these insights provide a sufficiently accurate empirical basis for answering the guiding questions for this Assignment, as provided in the Terms of Reference. The Team has also identified a number of internal and external risks factors for efficient and effective implementation and sustainability of the results.

Below we summarize the main findings of the assignment, and the Team's recommendations for the next phase of the Programme.

Previous support

40 years of energy sector cooperation between Norway and the Nepali including energy-related research, has left a significant and visible footprint in the Nepali energy sector. This support has made a major contribution to the country's research capacity in hydropower and other renewable energy sources, as well as improving capacity to provide consulting and technical services to the local hydropower industry. An important number of academics and hydropower industry leaders have been in Norway or by Norwegian-trained personnel and provide much needed man-power to drive development of new hydropower projects and regulations.

Still, there is a strong case for further strengthening Nepal's capacity to development this sector. There is also an opportunity to leverage existing relationships and continue to improve research cooperation in areas of mutual interest and benefit.

In this regard, it is noted that as of today there is little evidence of any scaling-up of Norwegian business engagements and investments. In fact, quite the opposite. One reason is that there are a wide range of factors that are yet to be favourable for sustained large-scale private investments in the Nepali energy sector. The institutional, policy and regulatory environment as well as the general investment climate are key. Those are long term political and economic challenges already attract significant donor attention. Meanwhile, ensuring appropriate research capacity and closing the local skills gap are also important but easily overlooked success factors. As such, Norwegian cooperation in research and academia has been complementary to other international support.

Energize Nepal 2016 – 2019

The Programme is relevant for Nepal, the hydropower sector, as well as for the priorities of the involved Norwegian institutions and Norwegian development assistance. The relationship between the organisations in the underlying Partnership Agreement – Kathmandu University, Hydro Lab, NTNU and Sintef - builds on a history of cooperation that extends back long before Energize Nepal.

Commitment to the Programme by the Norwegian partners appears strong and is becoming, to an increasing extent, entrenched within those institutions. In addition to Norwegian partners' support to academic activities and providing advice, collaboration on research activities provides value on both sides of the partnership.

The kind of technical know-how and research capacity fostered by ENEP underpins, to varying degree, academic research and technical services focused on development of Nepal's energy sector.

The Programme addresses an urgent need for local expertise needed to effectively exploit Nepal's significant renewable energy resources (in particular hydropower).

The Programme's objectives are likely to be substantially achieved. Delays in implementation of the Programme have posed some challenges toward achievement of the Programme's specific objectives. These delays are mainly due to factors beyond the direct control of the Programme management. Nevertheless, to the extent that the Programme continues to deliver progress and results, the Programme will deliver on the main objectives of establishing "capacity for research and education of relevance". Indeed, there is good progress toward most of the quantitative targets specified in the Programme's Results Framework and reported on actively by the Programme Management. However, it is noted that not all relevant progress indicators are included in Programme management reports.

Hydro Lab has shown that **there is scope for revenue generation through service provision** to the hydropower industry. As such, there is real progress towards the targeted exit strategy (improved self-sustainability).

The Turbine Testing Lab is also gradually building a foundation for revenue generation but has still a way to go to profitably exploit this opportunity. The response received from industry players clearly points to **challenges in mobilizing industry funding for joint research activities.**

Programme efficiency is aided by an appropriate Programme Governance structure, with the PAC representing the partners, the Project Selection Committee (PSC) as custodian of fair and transparent RENP selection procedures, and the Programme Office at Kathmandu University's School of Engineering managing the day-to-day operations.

The Programme's rate of spending suggests that **the budget for Norwegian funding may not be fully expended by year five** (Programme end date). Financial reporting also shows that contributions from other funding sources than RNE is lagging behind budgets.

Risk management is acceptable but could be strengthened to include risks related to programme implementation, transparency, and reputation. The review has identified some such risks that are not reflected in ENEP's risk management framework. The placement of the PO at Kathmandu University (KU) implies that particular effort to guarantee neutrality as programme and funds manager and ensure good communication and visibility of the Programme is necessary. KU has been the main beneficiary of all activities, including as participant in projects awarded through competitive processes. **More could be done to strengthen the procedures and transparency of the project selection processes**, and encourage involvement of external institutions and other potential beneficiaries and contributors.

The recommendations from the 2015 appraisal are to a large extent embodied in the Programme. This illustrates willingness and ability by the project promoters to adapt to the donor's priorities and funding limitations. One exception is related to the incubation support under the RENP II component. The information provided related to this area of support does not provide sufficient clarity. Other issues that deviate from the Appraisal recommendations are relatively minor with limited impact on the Programme.

The Programme has a **documented focus on women and social inclusion, including specific targets** and as one of the criteria in RENP project selection. Nevertheless, among the 94 Nepalese directly involved in project activities so far only 17, or 22%, are female. That said, the engineering sector is traditionally male dominated, and the representation would probably have been even lower without focus being given to the issue.

Lessons learned and Recommendations

This assessment shows that there is scope for improvement that should be kept in mind in the final phase of the current Grant Agreement and taken into consideration when planning an eventual extension of the Programme.

Some of these "lessons learned" relate to overall programme governance and management; others to specific subcomponents. They are presented below along with some specific recommendations for improvement.

Programme governance and management – lessons learned

Institutional cooperation requires long-term commitment. The individuals involved in ENEP have maintained the long-standing relationship between KU and NTNU/Sintef well. The relationship builds on a combination of personal relationships, strong commitment among the Norwegian partners to support their partner institution as well as Nepal's continued hydropower development. Through strengthening knowledge and research capacity on the Nepalese side, opportunities for joint research activities with benefits for both sides of the cooperation emerge. Recent reconfirmation of a MOU between NTNU and KU and the confirmation of intent to cooperate with TU, show that cooperation not only relies on personal relationships but is becoming institutionalized.

The stability of PAC and PSC representation has been a strength.

The bundling of several support projects into one large programme related to research cooperation in hydropower and RE has had both advantages and challenges. Concentrating Norwegian-supported activities has likely reduced the total burden of programme management, creating management efficiencies. On the other hand, it also increased the complexity of the programme. Management of multiple components and channels for funding places higher demand on good financial management as well as reporting routines. The Programme Office has handled this challenge quite well, but a few areas could be strengthened.

The integration or bundling of support projects has been successful in that **overlaps between components seem to have been largely avoided**. **On the other hand, integration into one programme appears to have created only limited synergies** between the components so far. Synergies are mainly achieved through use of the KU's facilities in RENP II, e.g. several projects involving TTL. This might have been possible even if the components were separate.

The hosting of the Programme Office by one of the main beneficiary institutions has created both advantages and challenges. KU's role as host for the programme has probably strengthened KU's ownership of the Programme. It was inherent in the Programme design that KU, with TTL and the activities related to development of centres of excellence, would be the main beneficiary together with Hydro Lab. However, it does create a risk for either perceived or real conflict of interest. Specifically, it was expected that the benefits or RENP II would be more evenly spread across more institutions. KU's participation in most of the projects poses a challenge to the reputation of the ENEP management as a neutral actor focused on providing equal opportunities to participate in and benefit from the Programme.

KU's decision to appoint its own staff member to replace the second (departed) Programme Manager also challenges the assumption of neutrality of the Programme management. On the other hand, KU's ability to provide a timely replacement was a strength in a challenging phase for the Programme.

In the light of these findings, we make the following recommendations (in no particular order):

1. Improve communication to ensure that other institutions involved in research, development and education in energy-related fields are made aware of the Programme, the opportunities for involvement and actively encouraged to participate;
2. Consider additional measures to strengthen other energy-sector institutions and industry participation in Programme activities;
3. Explicitly assess where new activities or elements to be supported in the Programme will be placed institutionally, such as Centres of Excellence;
4. Consider and implement measures to reduce staff turnover, discuss this in the PAC and document the outcomes;
5. With the recent changes in PAC, the PAC should consider an extraordinary PAC meeting to reconfirm working relationship and routines;
6. Continue to follow-up the institutional assessment to ensure that the improvements are implemented; and
7. Consider including in the risk management framework any unforeseen risks that have been experienced during implementation. Relevant risk to consider include but are not limited to staff retention, misperceptions of project eligibility etc.
8. Strengthen Programme reporting, by, for example:
    - Include budget and expenditure reporting that show i. total spending vs. total budget to date, ii. balance of funds per component and per partner. This could be a version of the table provided in the first progress report, which was not included in the year 2 report.

- Include progress indicators for the Centres of Excellence in the logframe and report on progress (i.e. of all elements, also those without progress in the reporting period).
- Reporting procurement-related issues, for example whether any single procurement has been over the threshold or whether procurements exceeding the threshold have been submitted to MFA for approval.
- Describe involvement of the Norwegian partners. Briefing notes following reporting of Norwegian institutions' funding and contributions could be included in an annex.
- Improve the risk management framework to include newly identified risk elements. Relevant risk may include but are not limited to staff retention and misperceptions of project eligibility.

RENP II – lessons learned

Documented procedures and routines to ensure fairness and transparency are important. The handbook developed for RENP I and the commitment to the established procedures by PSC is a strength for RENP II and has helped ensure quality projects and progress in periods of unstable programme management. The use of external evaluators in the procedure has also been a strength to ensure fair processes.

Conversely, there is a lack of written procedures and clear agreement on principles related to the strategic calls process. This has led to unclear procedures and inconsistent practices. In the interest of fairness, transparency and communication of equal opportunities, the PSC and PO should consider to:

1. Continue good practices implemented in the open calls process;
2. Continue practice with external evaluators;
3. Review and agree on strategic call process and update handbook;
4. Prioritize competitive procedures to the extent possible;
5. Make criteria and scoring/weighting principles applied known to the applicants; and
6. Review and assess the incubation support, and document the principles and procedures

Centres of Excellence – lessons learned

The task of strategy development and preparation of Centres of Excellence was placed in KU; but the PD did not explicitly identify KU as the future host for such Centres. It now appears that KU is automatically tasked as hosting solution without explicit assessment.

Whether or not KU continues as host for Centres of Excellence, such Centres also need to establish better links with relevant sector institutions to ensure relevance. This could allow research to play a stronger role in policymaking and regulation. A study into how research has played a role in informing Norwegian policy and regulation could be a useful reference in this regard.

To the extent Norwegian funds support further implementation of the planned centres – and if extended support is granted - the following could be considered:

1. Document the assessment and selection of host institution
2. Strengthen involvement of relevant sector actors and institutions (e.g. for CETRF, NEA/regulatory commission etc).
3. Consider relevant lessons from Norwegian experience?
4. Possible involvement of Norwegian partners and institutions and their contributions

Hydro lab and TTL – lessons learned

A good balance between commercial versus R&D orientation among centres and laboratories can have multiple benefits. A strong commercial approach improves financial self-sustainability through revenue generation and is proof of the relevance of research. Meanwhile, use of facilities in teaching activities and for research supports development of manpower and ensures that the centre or laboratory stays at the forefront of technological development. In ENEP, Hydro Lab has proven itself as valuable resource for the Nepali hydropower industry and is on the path towards commercial sustainability. In contrast, TTL has been useful for and strengthened by active use in various research projects.

To strengthen the balance between commercial and teaching/research use, the following could be considered

1. Promote a more commercial orientation/mandate for TTL;
2. Ensure that IEC standard procedure is verified in TTL;
3. Involve Hydro Lab more in academic and research activities; and
4. Consider relevant strategic topics that could be relevant for Hydro Lab and TTL respectively, e.g. applying the new equipment financed by the Programme.

Appraisal of Proposal for extension of Energize Nepal

The "Upscaling Proposal" document does not provide sufficient detail to properly assess the relevance and value-added of the different components. The team's insight from the current review of ENEP thus serves as the primary basis for the Team's assessments.

On general terms, **continuation of the main components in ENEP as well as IOE HYPER are relevant for the target group.** The additional activities for the ENEP components can be assumed to provide additional value toward achieving the specific objectives of ENEP, but lack of budget detail and justification of grant support makes it impossible to conclude with regard to **the efficiency of the support and thus the specific value added**.

The descriptions of a range of **new components do not provide sufficient detail to make relevance and value-added assessments.** This is true especially for the various centres of excellence proposed. The Proposal builds on the implementation of ENEP so far, but **makes limited explicit reference to any lessons learned through the implementation**.

An extension of both scope and budget as proposed will inherently **increase the complexity of the programme and the management burden** related to reporting lines and financial management. In view of this, there is a need to re-consider the Programme's governance structures. Specifically, the inclusion of IOE should be addressed, along with the challenges identified in the Review of ENEP (see above).

The Proposal should consider making improvements to stakeholder coordination. **In several components there should be scope for involvement and value-added by Norwegian partners**. There appears to be a **risk of overlaps between certain components**, such as three different components addressing elements within geotechnical fields. It is important to avoid overlaps and rather consider potential synergies through coordination and/or collaboration. For some components, involvement of other sector institutions will be important. Some further recommendations are provided.

Recommendations for a revised Proposal

The request is related to an extension to an existing agreement, with an established management and known partners, rather than a new programme. This implies somewhat less demanding requirements for programme documentation as a basis for decision-making by the Embassy on behalf of the Norwegian Government. At the same time, the requested **additional funding of 21 million NOK represents an 84% increase in the Norwegian funding** and the introduction of new elements to the Programme increases complexity.

Therefore, **it is a clear recommendation to request a revised Proposal** to enable a meaningful appraisal and appropriate recommendations to RNE in the view of concluding an Addendum to the Grant Agreement.

It is important to secure and document the "buy-in" of the request by all ENEP partners. The Norwegian partners are committed to the Programme and have confirmed that they stand ready to support revision of the Proposal to secure further support for the Programme.

Below we provide recommendations and aspects to consider in a revised proposal for extension of the scope, budget and time frame of Energize Nepal. The Review's recommendations for the final phase of the current Grant Agreement should also be considered.

Presentation of each Component/Sub-component

For each component, further background and data should be provided to support its rationale and the relevance of the targeted outcomes in relation to developing Nepal's Hydropower and/or Renewable Energy sector. This includes describing the links from to the ongoing programme and the experiences with the implementation to date, as well as assessment of synergies across components and involvement of partners and stakeholders. As guidance, information

in the Proposal should be sufficient to answer the following questions (not all will necessarily be relevant for all components)

1. How will the component/activity and outputs contribute to Nepal's development, either related to hydropower or other renewables?
2. What skills gaps will be filled?
3. What alternative sources of finance have been or could be considered? What will/could such contributions be? Is there scope for revenue generation through provision of services to the industry sector?
4. Are the activities already planned under ENEP? If that is the case, why will they not be achieved without additional budget?
5. Are the activities building on activities already completed (for example, CEPE/CETRF)?
6. Are any remaining funds from ENEP budget taken into consideration in estimating the funds required?
7. Does the implementation of ENEP so far provide relevant experience that has guided the formulation of this component/output/activity?
8. Who is the proposed host institution and why?
9. Are there any overlaps with any other activity, in particular within the programme? Is there a risk of duplication of activities?
10. Is there scope for collaboration and shared resources with other components?
11. Are there stakeholders in the sector that have particular interest in the component?
12. How will the component collaborate or coordinate with such stakeholders?
13. Are any contributions by Norwegian partners foreseen?
14. Are linkages with or collaboration with other international or national external parties considered?
15. Is it realistic to achieve the targets within the time frame?
16. Will the results last after completion of the Programme? (see "Exit Strategy" below)

Programme Governance and Management

The proposed extension will mean increased Programme complexity as well as a new key partner institution. To ensure that this added complexity is well-managed, the description of the overall Programme governance and management should be reconsidered to address issues such as:

1. The main governance elements (PAC, PSC, PO). What changes are required, if any?
2. How the additional/new elements will be managed, in particular the inclusion of a new institution (IOE)?
3. Reporting requirements and procedures for new elements. Component specific reporting should follow a consistent format or template, and include performance indicators. Such reports could be annexed (ref. hydro lab reports) to Programme reports.

Programme Risks

The extended scope and new partners create a need to reconsider the programme risks. The Proposal should present a revised risk management framework that:

1. Follows the same structure as the current risk management framework, preferably with the improvements recommended for ENEP.
2. Identifies additional risks, integrated into the Programme's risk management framework and to be monitored during implementation.

The Result Framework (RF)

Many elements for a results framework are presented for each sub-component. Presenting these in a structured form that matches the existing logframe will increase transparency with regard to new-versus-existing components/activities and the *additional* results that can be expected from new funding. This will also allow for easy consolidation into a full logframe for the extended programme.

In the process it is also recommended to review the proposed indicators to ensure that

1. Indicators are SMART;
2. targets are quantitative; and
3. baselines are provided if relevant (if other than zero)

The Budget

The budget should include detail sufficient to allow an assessment of realism of budgets estimates and efficiency, including

1. Item breakdown for each component, following the same or similar structure as the ENEP budget for easy integration into a consolidated budget for the extended programme.
2. Specification of other sources of funding

Exit strategy

The ENEP exit strategy as presented in the current PD indicated that the Programme would enable an increasing degree of funding mobilized through revenue generation and industry contributions to research.

It is recommended to include a revised exit strategy in the PD, considering:

1. The status of progress toward sustainable exit. This Review may be used as a reference point.
2. How the extended proposal will contribute to making the exit strategy more realistic
3. A realistic time frame to achieve the ambitious targets. The Proposal suggests 2.5 years. At present this would imply an extension of ENEP period on ½ year. This appears as a short time considering the complexity and the magnitude of the budgets including the remaining ENEP funding plus the additional budget.

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LIST OF ABBREVIATIONS

BPC	Butwal Power Company Ltd
HCEL	HydroConsult Engineering Limited
HL	Hydro Lab Pvt. Ltd
IOE	Institute of Engineering (TU)
IPPAN	Independent Power Producers' Association of Nepal
KU	Kathmandu University
KUBIC	Kathmandu Business Incubation Centre
MFA	Ministry of Foreign Affairs
NEA	Nepal Electricity Authority
NTNU	Norwegian University of Science and Technology
PM	Programme Manager
PO	Programme Office
RENP	Renewable Nepal
RfP	Requests for Proposals
RNE	Royal Norwegian Embassy
SOE	School of Engineering (KU)
TTL	Turbine Testing lab
TU	Tribhuvan University

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

Purpose of the Report

The purpose of this Report is to present the findings, conclusions and recommendations from the assignment *Review/Appraisal of Energize Nepal (NPL-12/0032).* This assignment was commissioned by Norad to Multiconsult Norge AS and was implemented in May-June 2019, including an 8-day field mission to Nepal for interviews, meetings and necessary investigations.

Purpose of the Assignment

The purpose of the assignment has been to assess the following:

a) previous support to energy research

b) progress of the ENEP program to date

c) added value of the "Upscaling Proposal"

The intention of the appraisal Team has been to ensure the usefulness of the report, not only for Norad and the Norwegian Embassy, but also for the Programme's management and project leaders. This implies ensuring that recommendations are as concrete and pragmatic as possible, in order to enable the Embassy and Programme management's follow up.

Appreciation

The Team would like to thank for all the support and cooperation that have been granted during the assignment. Particular thanks go to the Programme Office at Kathmandu University for excellent efforts to ensure logistics and practical arrangement allowing for an efficient field mission, and to Solveig Andresen and Sharad Karmacharya at the Royal Norwegian Embassy in Kathmandu. The people met during the field mission[1], as well as in interviews and meetings held in Norway before and after the mission, have without exception generously shared information related to the Nepali Energy sector and the programme activities, as well as reflections and opinions on how to ensure relevance, efficiency, effectiveness and sustainability of the Programme.

1.2 APPROACH AND METHODOLOGY

Consultant's team

The assignment has been implemented by a core Team consisting of Mari Sofie Furu, Multiconsult Norge AS[2], and Ujwol Phaiju, Hydro-Consult Engineering Ltd, Nepal[3], with support from backstopping staff at Multiconsult Norge AS.

Methodology

The Team has followed the approach shown in **Figure 1**. Before the field mission, the team reviewed the documentation provided and information about the Nepali energy sector to identify the environment in which the Programme operates and establish a preliminary understanding of the background for the Programme and progress to date. In parallel, the mission was planned and stakeholders contacted to request meetings during the field mission.

During the mission, the team sought to meet a wide representation of stakeholders – not only key partners, staff involved in Programme activities, and direct beneficiaries, but also representatives from sector institutions and the industry. Meetings were held with current and previous Programme Office staff, researchers and top management at Kathmandu University at Dhulikhel, with the Institute of Engineering of Tribhuvan University, Hydro Lab Ltd, with sector

[1] A list of people met is enclosed in ANNEX I
[2] www.multiconsult.no
[3] www.hcel.com.np

institutions and development partners at their own premises, and with industry representatives at various locations. A kick-off meeting at the start of the mission and a debrief at its end were held at the Embassy's premises in Kathmandu.

The field mission coincided with that of a 20-person strong delegation from NTNU headed by Rector Gunnar Bovim and featuring representatives from Leadership and administration, Hydropower/Geology, Health, Architecture/Design/Sustainability, and NTNU Alumni. The mission visited Kathmandu to review the university collaboration between Nepal and NTNU for capacity development, and officially launch the Nepal Norway Alumni Association (NNAA), and was a good opportunity to meet NTNU staff, several previous students to Norway and/or people that had been engaged in research projects and otherwise benefited through the long history of NTNU's engagement in Nepal.

The occasion of the celebration of the Norwegian Constitution Day on 17 May, also provided an excellent opportunity to discuss the Nepal-Norway cooperation in the Energy sector with a wide array of industry, academia and civil society representatives.

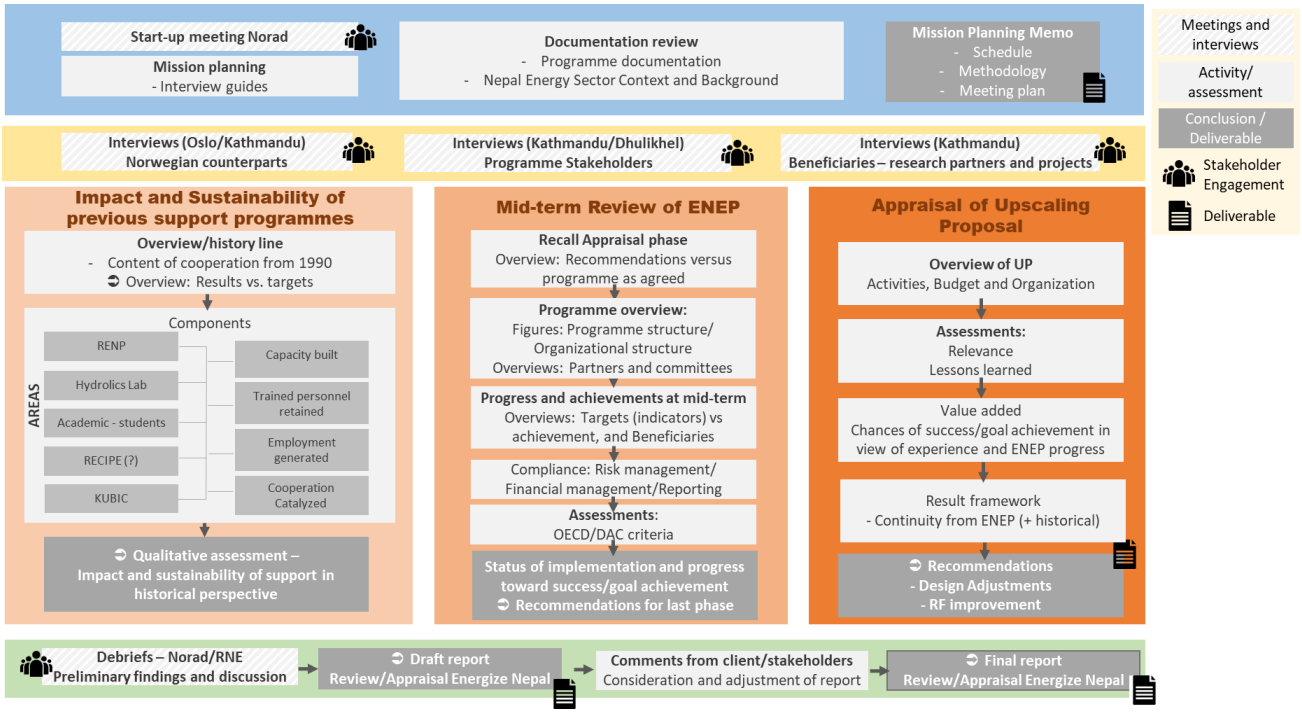


Figure 1 *Work Flow Chart*

Throughout the development of this report, the Team has aimed to address the key questions listed by Norad in the Terms of Reference for the assignment, while maintaining focus on establishing an understanding of whether,

- capacity of research and education required for Hydro power development has been, or is likely to be, enhanced, and;
- applied research capacity required for off grid renewable energy development has been, or is likely to be, developed.

The Team has further aimed at quantitative assessments or results achievement where possible, following the logic of the Logframe, and at providing recommendations that are as concrete and practically oriented as possible, in order to create a good basis for appropriate follow up by the different stakeholders as relevant.

Report structure

The structure of the report follows the outline that was presented to Norad in the Mission Planning Note. Chapter 2 establishes the background and context of the Programme. Since the relevance of the Programme and all the activities in the Upscaling Proposal are so closely linked to the energy sector at large, some space is dedicated to describing the status of development and the future outlook with regard to guiding sector targets and policies, the regulatory and

institutional framework for private investment, power generation, renewable energy development, supply and demand situation. The history of cooperation between Norway and Nepal is also briefly described.

Chapters 3, 4 and 5 presents the findings and recommendations pertaining to each of the main tasks: Impact and sustainability of previous cooperation; Mid-term Review of Energize Nepal – 2016-2019; and Assessment of Added Value of Upscaling Proposal. A summary of findings, conclusions and recommendations is provided in Chapter 6, and in the Executive Summary at the very beginning of the report.

2 BACKGROUND AND CONTEXT

2.1 Norway-Nepal cooperation

2.1.1 Bilateral cooperation

The first year of registered Norwegian bilateral assistance to Nepal dates from 1964, with 210 000 NOK. The bilateral cooperation picked up in earnest from around 1980. Since then, a total of 5 billion NOK has been allocated to assistance within various sectors such as Good governance, Education, Environment and energy, Health and social sector, Economic development and trade, and Emergency assistance.

Today, Nepal is one of Norway's main partner countries for long-term development. Current Norwegian support to Nepal aims to contribute to achieving the Sustainable Development Goals, with primary focus in the areas of Education, Clean energy and Governance. Funding is channelled through the government, multilateral organizations, and international and national non-government organizations.

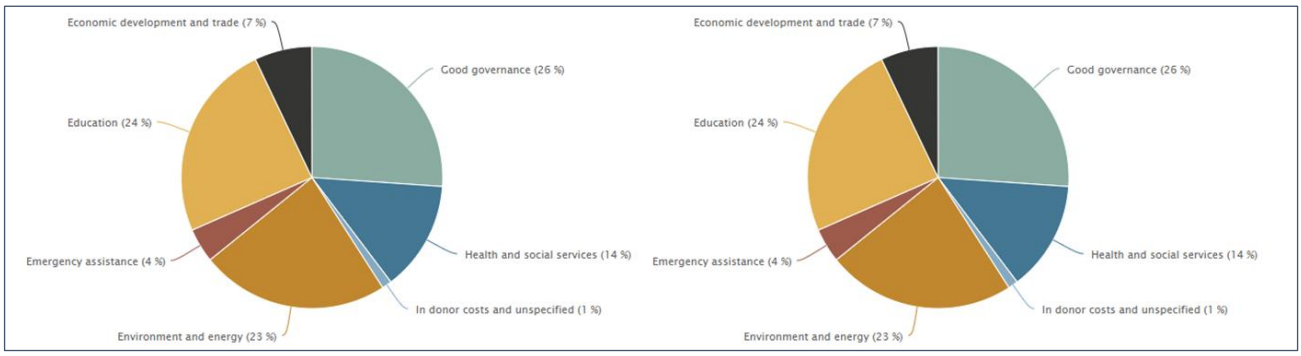


Figure 2 *Norwegian development cooperation by sector and channel from 1964*[6]

2.1.2 Energy sector

Norway's involvement in Nepal's energy sector goes back to 1965 when Butwal Technical Institute (BTI) was founded with assistance from the Norwegian Himalayan Mission (Himalpartner). Norway's support to Kathmandu University (KU) dates back to the early period of cooperation, with the support to establish the School of Engineering and its hydropower relevant laboratory infrastructure (the Turbine Testing Lab). Norway's early support in the sector also included the support to establishing the Hydro Lab Ltd. affiliated to Tribhuvan University. The cooperation between Norwegian University of Science and Technology (NTNU), Sintef Energy Research (Sintef) Himalpartner and the International Centre for Hydropower (ICH) on the Norwegian side and KU and HydroLab on the Nepali side has an equally long history. The rest of the bilateral development assistance has mainly been allocated to off-grid renewable energy, transmission and distribution projects, and institutional capacity building and cooperation. In addition to bilateral development assistance, Norwegian actors have been engaged in development of the hydropower resources, in particular the 75% ownership in Himal Power Limited, the company that owns and operates the 60 MW Khimti I Power Plant which completed in 2000. Building on this, Himal Power Ltd implemented a Norad supported neighbourhood and development project for grid electrification and community development project to ensure the standards and potential of people in the project area.

Bilateral assistance in the main sector 'Environment and Energy' to Nepal between 1999 and 2018 amounted to more than 1,1 billion Norwegian Kroner, of which around 600 million were allocated to sub-sectors 'Renewable Energy Production' and 'Energy policy' (Figure 3).

Currently there are two active agreements related to Energy sector support in addition to Energize Nepal; TF Advancing Hydropower Development in Nepal (IFC); Panel of Experts for Dudh Koshi Storage Hydroelectric[4] (Sweco Norge AS); HPL KREC mini grid (HimalPartner); National Rural and Renewable Energy Programme (Ministry of Finance); and SASEC Power System Expansion Project – Transmission Line Nepal (AsDB).

Between 2007 and 2015, according to the Clean Energy Initiative Results Report 2007-2015[5], Norwegian assistance benefited more than 6 million people, including electricity access through grid, mini-grid and stand-alone systems; and access to improved cooking solutions for over a million households. Around 700 km of transmission and distribution lines and more than 450 MW of hydropower was leveraged through the support.

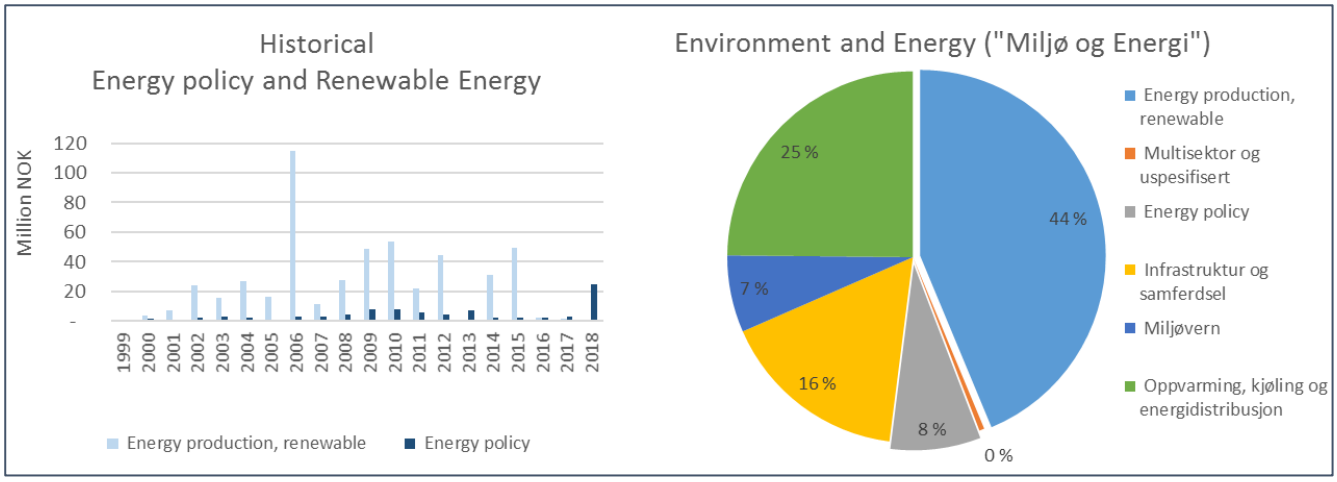


***Figure 3** Norwegian energy and environment related assistance from 1999*[6]

2.2 The Nepal Energy sector context

The starting point for the Norwegian-Nepali cooperation in energy is hydropower. Both countries have significant hydropower potential; however, while Norway to a significant degree has exploited this resource, most of Nepal's more than 8 GW potential is not yet exploited. Building on experience from more than a century of hydropower development is the basis for the cooperation, transfer of competence and knowledge from Norway can be a valuable contribution to Nepal's development.

The government of Nepal's Energy Strategy of 2013 established a long-term target for hydropower is establishment of 10GW by 2020 and 25GW by 2030. The National Rural and Renewable Energy Program, initiated in 2012, also targeted 25MW mini and micro hydro and 600,000 solar home systems, along with goals for biogas, water pumps, solar cookers; aimed to reduce dependency on fossil fuels by 50%, and cut CO2 emissions by 14 million metric tons by 2020.

Of more recent date is the SE4ALL framework which targets universal access to electricity and sustainable cooking by 2030. Mid-term targets of 5000 MW hydropower by 2025 and 10000 MW by 2030; and 100 MW and 138 MW solar PV, are the currently referred targets in the country.

Since the establishment of Hydropower policy in 2001, Nepal has seen rapid rise in the development of Hydropower by Independent Power Producers (IPP). Today, IPPs equal NEA in terms of power produced from Hydroelectricity.

A total of ca. 91 Hydropower plants with combined capacity of 1038 MW are in place. Additionally, one (1) solar plant of 680 KW and two (2) thermal plants with 53.41 MW. NEA owns 562 MW and the private sector owns 511 MW. Compared to preceding year's figure of 1444.1 MW, the peak power demand of INPS registered to be 1508.16 MW with growth rate of 4.45% in the Year 2018. To meet current demand, Nepal imports up to 450 Mw of electricity from India.

[4] Norwegian Ministry of Foreign Affairs' Grant Portal
[5] The Clean Energy Initiative Results Report 2007-2015, Norad 2016
[6] Norwegian Aid Statistics, https://norad.no/om-bistand/norsk-bistand-i-tall

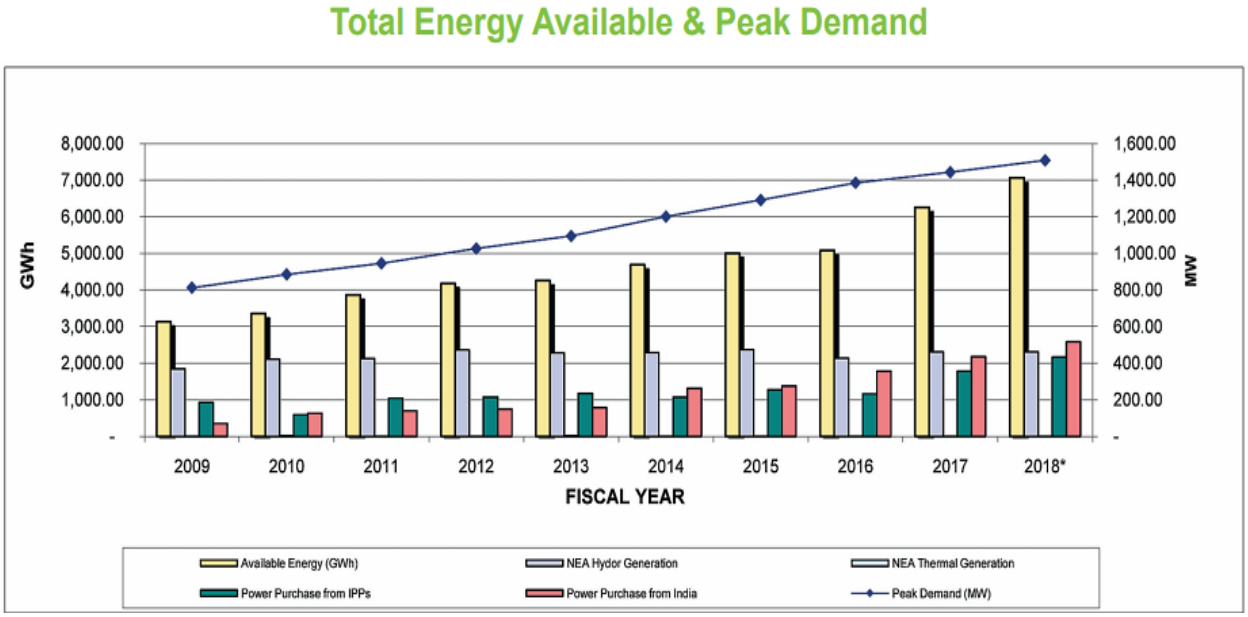


Figure 4 *Peak Demand versus Electricity Supply, 2009-2018*[7]

There are about 202 projects with 7727 MW capacity have received generation license for the construction of hydropower project and other 29 projects with capacity of 1548 MW has applied for Generation License in Department of Electricity development (DoED). Out of 7727 MW of the Generation license, approximately 3000 MW is under construction phase and rest are under study.

While the early targets were clearly over-ambitious – there is thus more recently significant positive progress and optimistic outlook of a significant amount of generation capacity currently under construction to come on-line over the next years.

This outlook creates a strong rationale for the need to strengthen Nepal's capacities within hydropower to manage the development. The hydropower is however not the only area that needs strengthening.

Nepal relies heavily on traditional biomass and imported petroleum to meet its energy needs, which constitute 80 percent and 12 percent of the energy consumption respectively. According to the Energy Progress Report 2019, published by World Bank, 95.5 % of Nepalese have access to electricity, out of which 99 % in the urban area is electrified and 95% in the rural areas. However, most households and businesses in Nepal do not have access to adequate and reliable electricity services. 70% of the Nepal's population have access to grid electricity while remaining rely on small, rural, off-grid systems.

While the grid is in constant expansion, small scale solutions for sustainable energy remain the solution for a significant minority. Several hundred micro-grids provide off-grid electricity in rural areas but supply capacity for sustainable solutions for heating and cooking energy must also be strengthened. Matching this, there is a good potential for various forms of bioenergy, such as biogas converters which also has gradually been introduced to several hundred thousand households.

3 Impact and sustainability of previous support to energy research

As requested in the Terms of Reference for the assignment and clarified with Norad during the start of the assignment, the following impact and sustainability assessment shall be brief and focussed (**Error! Reference source not found.**) and

[7] Source NEA Annual Report 2017/18

to a large extent qualitative, and is based on the Consultant's conclusions based on available documentation, web research, interviews and discussions during the mission.

IMPACT ASSESSMENT OF PREVIOUS SUPPORT TO ENERGY RESEARCH

In addition to an impact assessment of ENEP, the impact of previous cooperation with Hydro Lab and KU (RENP, TTL) shall be briefly assessed, among others, regarding:

1. *Capacity building of Nepali institutions/individuals*
2. *Retention of lecturers/academic staff at KU and other universities*
3. *Employment generation in the renewable energy sector*
4. *To what extent has Norway's support facilitated research cooperation beyond Norwegian institutions?*

Figure 5 *Terms of Reference, Scope of Work (3A)*

3.1 Historical support and cooperation

In accordance with the Terms of Reference for the assignment, this chapter focusses on two previous programmes, Renewable Nepal (RENP, 2009-2015), the Hydraulic Laboratory (Hydro Lab Phase II) and Turbine Testing Lab (TTL, 202009-2011). However, it is useful to see these programmes and their impact and sustainability in the light of other assistance to develop Nepal's energy related research and academic capacity. In particular, the support provided to ensuring access for Nepali undergraduate and graduate student to participation in various academic courses in the hydropower fields appear relevant. Some attention is therefore given also to this support.

Table 1 *Relevant cooperation activities prior to 2016*

Project/Programme (bilateral energy sector assistance)	Goals and objectives	Period	Budget
Turbine Testing Lab (TTL)	**GOAL**: Build applied research and development capacity at the University to serve the industry and the private sector. **OBJECTIVE**: Construct a turbine testing lab at Kathmandu University to build a competence centre for research and testing related to sand erosion and hydro turbines.	2009-2011	NOK 4.6 mill
Renewable Nepal (RENP)	**GOAL**: To enable Nepal to utilize its natural resources of energy to develop a renewable energy supply for social and economic development in an environmentally sustainable manner. **PURPOSE**: Build applied research capacity at Nepalese Universities and Research Institutions to serve Nepalese energy industry in developing high quality products and services directed at utilizing the country's renewable energy resources. **OUTCOME**: Relevant competence and capacity built at KU to design and implement research projects together with Nepalese energy industry.	2009-2015	NOK 8.43 mill

Hydro lab Phase II	**GOAL**: Contribute to sustainable development of water resources in Nepal for the benefit of the Nepalese people. **PURPOSE**: Support Hydro Lab so it will become a centre of excellence in water resources development in steep sediment-loaded rivers with focus on hydraulics and sediments.	2006-2013	NOK 6.5 mill
Academic cooperation	**Description**	**Period**	**Budget**
Faculty development	NTNU PhD students	2001-2018	
	Master programmes in Planning and operation of Energy Systems (MPPOES)	2011-2013 2014-2018	ENPE
	Establishment of Master Programme in Engineering in Energy and Petroleum Sector at Kathmandu University	2004-	
NOMA/NUFU	Several masters programmes	2002-2006	NUFU
		2007-2011	NUFU
		2006	NOMA
Other notable energy related cooperation agreements before/ as of 2016 (not exhaustive)		**Period**	**Budget**
Energy sector assistance Programme (ESAP) and National Rural Renewable Energy Programme (off-grid)		2007-2017	NOK 395 mill
Nepal Electricity Transmission Expansion and Supply Improvement Project		2012-2017	NOK 150 mill
South Asia Sub-Regional Economic Power System Expansion Project (SASEC)		2014-2021	NOK 180 mill
On-grid electrification with Himal Power Ltd. and Butwal Power Company		2007-2013	NOK 33 mill
Khimti Neighbourhood and Development Project (Himal Power Ltd)		2007-2010	NOK 19.6 mill
Small Hydropower Feasibility studies (NVE)		2004-2011	NOK 10 mill
Pro-poor hydropower (PEEDA)		2006-2010	NOK 6.5 mill
Rural electrification and Mitigation (Butwol Power Company)		2006-2013	NOK 12.8 mill
Institutional cooperation between NEA and Statnett on System Utilization		2011-2012	NOK 2.2 mill

3.2 Project summaries and goals achievements

A brief overview of the results from these previous support activities area is provided in the following. This is based on quick review of available documentation and interviews in Kathmandu during the field study and does not attempt to deep-dive into details.

Turbine Testing Lab project (TTL)

In 2009, an agreement was signed between KU and NORAD regarding financial support of 60% of the cost for construction of TTL, while KU and Nepalese industries contributed the rest. The lab was designed and implemented in cooperation with NTNU. The project successfully completed civil works, hydro-mechanical and electromechanical works, and tested and commissioned the lab as planned in 2011. The Final report informs that some cost overruns that were experienced would be covered within the agreed contingency budget. 29 Nepali staff, researchers and students

were involved in the implementation, contributing a total of around 4,000 man-days[8]. At least four of these remain in the 7-strong management group[9].

Already at completion of the project, the lab was in use for academic purpose, with PhD and master students working on turbine design, research for hydropower project development, student programmes as well involvement in RENP.

Currently, TTL operates within the academic environment of the university and collaborates with the industries and private sectors to address technical and societal aspects of hydropower development and turbine-related issues. It is equipped with the state-of-the-art technology, computers and office space for academic and commercial purpose and capable of testing turbines up to 300 kW. The lab can showcase a high activity level including close to 50 completed and 8 ongoing projects (of which four funded by RENPI/II) and more than one hundred academic publications (conference proceedings and journal papers) through its relatively short history.

TTL has a living website, which lists 20 staff (faculty, students, researchers/graduates, technicians) and provides overview of research work, projects. The manager of the lab is the first Nepalese PhD student to NTNU, and several of the staff have been participating at academic courses in Norway or the Master Programme in hydropower engineering which was established at KU in cooperation with NTNU and Norad. One NTNU professor is member of the management team.

The Objective, to construct a turbine testing lab at Kathmandu University to build a competence centre for research and testing related to sand erosion and hydro turbines, was achieved. Works were successfully completed, largely on time and budget, and the lab continues to provide value for academic and research purposes within Kathmandu University.

Renewable Nepal programme (RENP)

Renewable Nepal was conceptualized by a cooperation between KU and Sintef, starting in 2006 and approved for financing by Norad in 2009. Its aim was to stimulate applied research at Nepalese universities and research institutions through supporting research projects in developing prototypes of products and services of relevance to the development of Nepali Energy/Power Systems and making them available in the market. Through the projects, key expertise and capacity would be developed in the participating institutions and industries, enabling further development and innovation.

The project was originally planned until 2013, but was extended until 2015 on no-cost basis. The Final Report from the first phase indicates that an additional 8 projects would be supported in the extension period; however, the desk review from 2015 does not report any projects included in the portfolio after 2013; and the Team has not been able to track any documentation or institutional memory that indicates such additional projects. The total number of supported projects is thus considered to be 21, as reported in the desk review[10]. Projects that the partners intended to take to the next level had the opportunity to apply for additional financial support for research continuity and dissemination; 12 projects were granted such support.

Through the implementation of these research projects, 22 prototypes and 32 relevant services or technical competence were developed; with 245 researchers and 20 local and 2 international partners involved, and with participation from 22 different Nepalese companies. 11 products were considered to be relevant for further efforts toward market introduction. One interviewee emphasized the valuable knowledge development within the biomass area that had taken place – biomass and biogas related topics represented the biggest group of projects.

The team also met with representatives from four of the projects which had been taken to the next stage after the RENP project period. Some details and comments are provided in Box 1, and an overview of projects, involved parties and results is provided in ANNEX III.

[8] Final report Turbine Testing Lab, KU 2012

[9] Turbine Testing Lab (TTL), Kathmandu University http://ttl.ku.edu.np/

[10] Appraisal of Energize Nepal, Final Report, Multiconsult 2015.

The experiences from the projects were disseminated through 41 publications and a range of meetings, seminars and workshops organized by the programme as well as the individual projects, including international conference participation and south-south research institution networking.

RENP targeted industry contributions of 20% of the project costs; but achieved only 14.4% contribution[11]. Most of this was in terms of professional man-hours rather than cash contributions.

***Box 1** After-life of RENP projects*

AFTER-LIFE OF RENP PROJECTS

Four examples of projects taken to the next stage of development and marketing after RENP support

Solar and WLED based lighting (#327). The project designed a solar and lighting system and a new WLED Lamp in the lighting laboratory at KU. The company, Altitude Innovation, currently manufactures the WLED with average annual turnover of approximately 20 million NPR. Altitude Innovation at present supplies the street lights to the companies that have won tender to install street lights by the several municipalities The Lighting Laboratory at K.U has been supported by the European commission, and the upgraded lab is now used for testing services as well as academic purposes and practical applications.

Francis turbine design and prototype testing (#437). The project fabricated a 96 kW test prototype and a test rig; a Computer program for turbine design and analysis, and established prototyping and casting processes at the KU TTL. Through the project, capacity to design and manufacture this type of turbine locally was established. Before the turbine can be manufactured, there is need for design upgrades. TTL is in contact with the private partner, Chilime hydropower Company, but the continuation of the cooperation has not been concluded.

***Figure 6** Sailesh Chitakar was lead researcher for the Reversible pump turbine*

Electronic load controller (ELC) of pico-hydro (#488). Kathmandu Power and Energy Group (KAPEG) in cooperation with PEEDA carried out research for a 1 kW ELC, and later upgraded to 5 KW by KAPEG. In parallel, a Decentralized electric load controller (DELC) was developed. According to KAPEG, 2 components (1 kW and 3 kW) were installed in Okhaldunga in 2018. Up until today, approximately 10-15 ELCs have been sold and used. However, nothing is mentioned about the product in in the website of KAPEG and PEEDA about the project.

Small wind power system (#741). The second KAPEG project was implemented in cooperation with Practical Action Nepal and Risoe Center in Denmark, and also coordinated with Practical Action India. The project has successfully transferred knowledge of the research activity to India, with German funding support. KAPEG is still working on the same technology and have installed small wind turbine in Nagarkot in 2015, at Palpa in 2018, and further installation with 300 W to 1 kW capacity is currently carried out Karnali district**.**

It has not been possible to gain a complete and documented overview of the status of the products that were attempted commercialized. However, the Team gathered information to state with a high degree of certainty[12] that at least 3 products were basis for company establishment, and that at least two still exist. Additionally, some of the prototypes, or the knowledge and insight that was developed through the project, have been taken into the research arena for further development and application. While exact figures are unknown, various interviews indicate that a significant number of the researchers involved are still active in research and business.

The Purpose, to build applied research capacity at Nepalese Universities and Research Institutions to serve Nepalese energy industry in developing high quality products and services directed at utilizing the country's renewable energy

[11] Appraisal of Energize Nepal, Final Report, Multiconsult 2015.

[12] Interviews during the mission

resources, was partly achieved. The programme provided an important link between research and industry, which until then had been weak[13].

Hydro Lab Phase II

Harnessing the potential for power generation of the Himalayan steep rivers and ensuring sustainable water resources management is associated with complex issues and problems associated with hydraulics and sedimentation. Further, since these issues differ from one river to another, model studies are necessary to ensure safe and reliable design and operation of each projects. In the light of this recognition, Nepal felt the need to establish a research centre to study these issues. Initially affiliated to Butwol Power Company, the hydraulic laboratory was set up in 1988 as a 'River Research Laboratory' to carry out a physical hydraulic model studies of headworks for a hydropower project, in co-operation between NTNU and Institute of Engineering at Tribhuvan University. The facility was thereafter used to carry out similar study of the Khimti 1 Hydropower Project, in the mid-nineties. The River Research Laboratory was replaced by Hydro Lab Pvt. Ltd in 1998, with financial support from Norad through the People, Energy and Environment Development Association (PEEDA), technical/scientific support from NTNU, and management support by the International Centre for Hydropower (ICH). Norad also supported Hydro Lab from 2007-2013 to ensure continued support from NTNU and to enhance the capacity of Hydro Lab to serve the growing Nepalese hydropower sector. Hydro Lab is a private limited company with four institutional shareholders and is operating on a not-for profit basis.

Today, with expertise in hydro turbine efficiency measurement and sediment studies and capable of performing physical hydraulic model studies for water resources development projects, Hydro Lab is unique in Nepal. Hydro Lab features a Hydraulic Laboratory, a Sediment Laboratory, a recently equipped Geotechnical Laboratory, and equipment for field instrumentation and measurement, and can carry out Physical hydraulic model studies, numerical modelling, design reviews, field testing and measurements, and laboratory sediment analysis. The lab currently has 25 staff, of which 6 are women. 15 of the 25 were already involved in Hydro Lab at the time of the support project (2013).

According to the website, Hydro Lab has carried out significant number of different studies for hydropower (mainly) as well as drinking water projects, and a range of interviews during the field visit confirms a consistent view by various stakeholders in the sector that the Lab is highly relevant for the industry, and is also being actively used. There is still cooperation between NTNU, ICH and Hydro Lab; according to the Managing director, several Hydro Lab employees have attended MSc courses at NTNU, with the majority returning to the lab after studies. Hydro Lab also has active cooperation with a range of other institutions in Nepal and internationally, both in the region and elsewhere. On the other hand, there seems to be only limited use of the facilities in research and academic programmes; whether in cooperation with Tribhuvan University or other.

The Purpose, to support Hydro Lab to become a centre of excellence in water resources development in steep sediment-loaded rivers with focus on hydraulics and sediments, was partly achieved. More importantly, the fundament for the Hydro Lab to become such important national resource centre, was laid, and the centre continues to build on this fundament to become increasingly relevant and valuable for the hydropower sector.

SN.	Shareholders	Share %
1	People, Energy and Environment Development Association (PEEDA) (a NGO working on energy and environment)	50.08
2	Institute of Engineering (IoE), Tribhuvan University (an academic institution)	16.64
3	Nepal Electricity Authority (NEA) (a public utility corporation 100% owned by the Government of Nepal)	16.64
4	Butwal Power Company Limited (BPC) (a public limited company)	16.64
	TOTAL	100

Figure 7
Hydro Lab ownership structure as of 2019 (from Hydro Lab brochure, www.hydrolab.org)

[13] Desk review of RENP is provided in Annex A of Appraisal of Energize Nepal, Final Report, Multiconsult 2015

3.3 Sustainability

Sustainability assessments consider to what extent benefits or results of an intervention continues or is likely to continue after donor funding is withdrawn. In the case of Hydro Lab, TTL and RENP, the donor funding is not withdrawn, but carries on through the current Energize Nepal programme.

In this report, sustainability is rated based on the extent to which these early activities succeeded in building and retaining capacity; generating employment; and leveraging cooperation opportunities. The findings build on the information gathered through research and interviews as summarized in the preceding section.

SUSTAINABILITY:

"MEASURING WHETHER THE BENEFITS OF AN ACTIVITY ARE LIKELY TO CONTINUE AFTER DONOR FUNDING HAS BEEN WITHDRAWN. PROJECTS NEED TO BE ENVIRONMENTALLY AS WELL AS FINANCIALLY SUSTAINABLE"

OECD-DAC

Capacity Building of institutions and individuals

The financial support to establishment of TTL and Hydro Lab appears to have been instrumental in enabling these facilities to provide relevant services within research and for the hydropower sector. However, the cooperation with and contributions from highly skilled Norwegian academic personnel from NTNU and other institutions has had at least similar importance. While Nepal's hydropower sector faces a number of challenges that are different from Norway; the long history of Norwegian hydropower development has nevertheless been a reference for the development of the Nepali hydropower sector. The development of the hydropower resources was at an early phase at the time the cooperation with Norway was established, and the Norwegian knowledge base has been a strength in developing institutions to train skilled human resources and provide relevant services for the industry.

This contribution to developing human resources with relevant competence may be the most visible result of Norwegian cooperation in the energy sector. The staff involved in the concrete projects and programmes (TTL, HL, and RENP projects) only represent a part of this resource. The more than 60 MSc students and 8 PhD candidates in Norwegian programmes currently represent a significant strength for the Nepali hydropower industry[14].

The exact extent to which the capacity built among other (than KU) involved parties in RENP continues to be applied and prove value for the participating companies or organizations is not known, but a limited number of companies interviewed confirm continued activity in relevant fields.

Retaining staff

Of the 29 staff involved in the TTL project, at least four remain in the management group. The centre continues to be a resource for involvement of students and researchers, who after the TTL experience may go back to other research projects or the industry. TTL has also hosted several RENP projects, and as such provides a resource centre for applied research for development of new products and services.

Hydro Lab staff has been similarly stable, with 15 of the 25 staff remaining at the lab since the time of Norwegian support. Hydro Lab continues to bring opportunities to practical modelling training for students and graduates in the sector.

The staff from KU involved in RENP projects appears to a significant degree to continue affiliation to research.

[14] Several interviewees explicitly referred to the Nepalese Norway alumni as the 'driving force in the industry'.

Generating employment (in the hydropower sector)

As mentioned above, the Norwegian influence on the Nepali hydropower sector is above all visible through the development of skilled personnel for the sector. Availability of skilled personnel – while still in high demand – has enabled the growth of a significant number of local companies in the sector: IPPAN[15] currently has 125 licensed companies on their member list, in addition to a number of supply and associated companies and organizations.

With regard to contribution from TTL, Hydro Lab and RENP projects in actually generating employment *opportunities* in terms of new companies or expansions, the evidence is less clear. Hydro Lab does provide interesting opportunities for employment and is in expansion; however, the potential to create broad opportunities for employment is naturally limited.

As mentioned, the company establishment as result of RENP, while notable in itself, is hardly a driving force with regard to employment opportunities in the sector. Similarly, with the exception of the RENP projects in TTL, the Team has seen no concrete evidence of company establishment as spin-offs from TTL or Hydro Lab.

Leveraging cooperation opportunities, including the degree to which the Norwegian support has facilitated research cooperation beyond Norwegian institutions

RENP was the first programme that directly targeted industry-research cooperation in Nepal. Without claiming to initiate the first cooperation projects of this kind, as concept this was little known until 2009. Involvement of 8 other research institutions than KU and TU; both international and national, and 22 Nepalese companies, should in this sense be seen as an achievement. The challenges related to ensuring financial contributions from the industry may not be a surprise given the novelty of the concept; but may indicate that the chances of building industry-academia cooperation based on industry financing is not (yet) realistic.

Kathmandu University has cooperation with 7 Norwegian institutions, and its website features a long list of international collaborating institutions from 27 countries. This is however, for the whole university and not limited to the energy/engineering sector; and the direct influence of Norway's support in establishing these relationships is not clear. At the same time, the early collaboration with Norway since the early history of Kathmandu University, may have had a positive effect in ensuring experience with such international cooperation, showing its value, and inspired seeking cooperation with other institutions.

Hydro Lab has successfully established active collaboration with a range of international institutions, including Japanese, Korean, Indian and Canadian university and/or research institutions. The Norwegian contribution to ensuring that Hydro Lab is a competent institution with interesting activities is a positive factor to realizing such relationships.

The most concrete evidence of sustainability in regard to continued cooperation is that the capacity currently available at Kathmandu University and Hydro Lab creates opportunities for join research projects that are of interest and concrete value for Norwegian institutions. Nepalese students and faculty collaborate in NTNU's HydroCen, a research centre for environmentally friendly energy, and also participates in FranSed, which develops a Francis turbine for sediment laden waters, such as the Himalayan rivers.

Other relevant sustainability considerations

In addition to the concrete questions on sustainability factors addressed in the preceding paragraphs, the Team finds is useful to mention the following, potentially relevant lessons to be learned for the current and future cooperation programmes:

- **RENP: Transparent and fair project selection.** The RENP Programme management established a comprehensive and transparent process for selecting projects. This included engaging a Project Selection Committee and development of a handbook which documented the procedures to be followed in the calls for applications, review and selection of projects, contracting, and the scope for additional support. The selection involved both PSC assessments as wells as reviews by external experts in the relevant fields, and scoring according to predetermined criteria. The system appears to have been transparent and consistent, as noted by

[15] Independent Power Producers' Association of Nepal

both PSC members, beneficiaries and external reviewers. This is likely to have ensured the quality of the concept and partners as well as the relevance of the topics.

- Notwithstanding the above, placing the Programme office in KU inspired some complaints that KU might be given a particularly beneficial position to promote their own projects. 12 of 21 projects were promoted by KU. There is no evidence that KU actively exploited their position; the transparent selection procedures appear relatively robust. However, to the extent there is a *perception* in the market that applications are more likely to be successful if KU is involved, this is unfavourable.
- Not least, the selection of projects appears to have ensured that research topics and products are of relevance to Nepal. With the exception of hydropower, the renewable energy sector is in an early phase of development in Nepal but is nonetheless important. As an example, 57% of the RENP projects focused on bio-energy. Biogas is one of the sectors that have seen significant growth in Nepal, with several hundred thousand households currently using biogas generators as an alternative energy source for heating and cooking. Other biomass related products were also developed, including a stove prototype which was later introduced to Kenya and has been produced there. The use of biomass for cooking is still common in rural Nepal; and development of sustainable alternatives may positively contribute to environmental and social development.
- **Gender balance.** Quarter of research staff involved in RENP projects were women.
- **Long-term predictable support:** It appears that the sustainability builds not only on the activities in itself; the duration of the support seems to have a significant impact. As an example, industry involvement in research activities is a new concept and does not become the norm as a result of one programme of limited duration; or participation in a few projects. The value for the industry needs to be proven over time; making the benefits materialize and proving the potential competitive edge of businesses that invest in such long-term strategic activities.
- Similarly, the continuation of research cooperation between institutions in developed countries and those in developing countries becomes likely once sufficient research capacity is built in the developing country to be an interesting partner in joint research programmes, such as is seen in the NTNU-KU cooperation which is in the process of transferring from a contributor-recipient relationship to one which produces value for both sides.
- **Institutional ownership vs personal engagement.** The Nepali-Norwegian cooperation in the hydropower sector has been built on strong and consistent dedication by a handful of individuals. Relationships that build on personal engagement are by nature vulnerable. Meanwhile, the impact and continuity has been ensured through Norad and MFA funding, strengthened by involvement of other Norwegian institutions and companies in the hydropower development, and appears sustainable with the strong

***Box 2** Opinion by IPPAN's Vice President*

OPINIONS: Where is the continued Norwegian engagement in the Nepali Hydropower sector?

By Mr. Kumar Panday, Vice President, Independent Power Producers' Association Nepal

NORAD, the Norwegian government and not least Norwegian private companies have been involved in the hydro sector since several decades. This has created the industry leaders that drive the sector today.

However, more recently this engagement has been declining and these Norwegian actors no longer play an active role in the sector. Their current support programs do not engage directly with developers or companies involved in the hydro sector. IPPAN invites the Norwegian government to find ways to continue the engagement with the Nepali private sector and strengthen Norwegian involvement in the sector through engineering, contracting, procurement of Norwegian products etc. If such active engagement is not continued, this will be a missed opportunity for both Nepal as well as Norway, and Norway's great contributions will belong to historical.

presence of Norwegian alumni in the Nepali hydropower industry. Additionally, the cooperation between NTNU and several Nepali institutions on a broader basis than hydropower[16]

- **Industry engagement.** It might have been expected that Norwegian business could leverage strong ties between two countries and presence by Norwegian public and academia to explore opportunities for commercial activities. Norwegian capital was early established in Nepal, particularly Statkraft's ownership in Khimti Hydropower plant. However, this early strong position does not appear to have triggered further Norwegian business engagement and no new investment has taken place in the sector recently.

***Box 3** NTNU Alumni Nepal launched*

NTNU ALUMNI NEPAL

NTNU Alumni Nepal was officially launched during a reception on Tuesday 14 May on the occasion of the visit to Nepal by a delegation from NTNU, headed by Rector Gunnar Bovim.

More than a hundred of the total of close to five hundred previous students at NTNU were present at the event.

At the event, both sides confirmed their commitment to continue their strong cooperation to create knowledge for a better world.

Sources: https://www.ntnu.edu/alumni/nepal, https://www.facebook.com/pg/GunnarBovimNTNU/posts/

3.4 Findings - Previous support

40 years of energy sector cooperation between Norway and the Nepali including energy-related research, has left a significant and visible footprint in the Nepali energy sector. This support has made a major contribution to the country's research capacity in hydropower and other renewable energy sources, as well as improving capacity to provide consulting and technical services to the local hydropower industry. An important number of academics and hydropower industry leaders have been in Norway or by Norwegian-trained personnel and provide much needed man-power to drive development of new hydropower projects and regulations.

Still, there is a strong case for further strengthening Nepal's capacity to development this sector. There is also an opportunity to leverage existing relationships and continue to improve research cooperation in areas of mutual interest and benefit.

In this regard, it is noted that as of today there is little evidence of any scaling-up of Norwegian business engagements and investments. In fact, quite the opposite[17]. One reason is that there are a wide range of factors that are yet to be favourable for sustained large-scale private investments in the Nepali energy sector. The institutional, policy and regulatory environment as well as the general investment climate are key. Those are long term political and economic challenges already attract significant donor attention. Meanwhile, ensuring appropriate research capacity and closing

[16] NTNU cooperation in Nepal includes energy, health, architecture and sustainable development

[17] Withdrawal of Statkraft's engagement in Khimti triggered much attention internationally, for example, https://www.business-standard.com/article/pti-stories/norwegian-company-pulls-out-of-power-plant-project-in-nepal-116011201141_1.html

the local skills gap are also important but easily overlooked success factors. As such, Norwegian cooperation in research and academia has been complementary to other international support.

4 Mid-term review of Energize Nepal – 2016-2019

In the Mid-term review, the Team has aimed at establishing a good foundation to assess whether Energize Nepal is on a good way toward achieving its objectives within the scope of the Programme; and what measures could be taken to increase the chances of successful completion and sustainable impact.

In order to establish a good understanding of the Programme and status of progress, the first sections in this chapter are dedicated to a brief description of the programme, an assessment of the programme planning and design, an assessment of the compliance, control and quality of the Programme's operation and management. This is followed by an overview of achievements to date and challenges met (section 4.4).

These relatively detailed descriptions and findings create the basis for the assessment according to the OECD DAC criteria that follows (sections 4.5 onward), which attempts thus to provide answers as concrete as possible to the specific questions in the Terms of Reference.

Relevance

1. *How relevant is ENEP for Nepal's energy sector? What are the main capacity gaps addressed by ENEP?*
2. *How strong is the stakeholders' (KU, Hydro Lab, NTNU Sintef), ownership of ENEP?*

Effectiveness

3. *What have been the major factors influencing/hindering achievement of the objectives?*

Efficiency/Progress

4. *What are the main achievements so far (capacity building, peer reviewed publications, physical infrastructure, etc.)? Assess progress to date against overall goals of the program as reflected in the current Results Framework, and assess the reasons for deviations, if any.*
5. *Assess strengths and weaknesses of the current project implementation model (decision making, administrative costs, procurement, flexibility etc.).*
6. *Assess to what extent Tribuhvan University is involved in research activities.*
7. *Assess to what extent the hydropower industry (NEA, IPPs) is engaged with ENEP programme (NEA, IPPs). Also assess engagement of other renewable energy industries.*

Other issues

8. *To what extent has the 2015 appraisal recommendations related to a) Programme design and b) Organizational structure and management (re. Appendix) been incorporated?*
9. *To what extent has the Results Framework been used as a management tool for the agreement partners?*
10. *Identify the extent of transparency and possible conflicts of interest with regard to project award criteria. Suggest needs for improvements.*
11. *To what extent are the Norwegian institutions NTNU and Sintef Energy Research backing up the programme. Assess to what extent the involvement is institutionalized. What is the added value of NTNU and Sintef in the program?*

cont.

Sustainability and risks

12. *Assess the long-term sustainability and exit strategy for ENEP. To what extent is the hydropower industry now able/willing to a) fund research activities and to b) pay for the services offered by Hydro Lab and KU's Turbine Testing Laboratory? Identify sources of financing other than the Norwegian embassy to secure long-term sustainability of the programme. Make recommendations to improve the sustainability of such research programs in future, such as interventions from the government or contributions from key industries with also focus on possible policy interventions.*
13. *Assess ENEP's risk management (risk identification/mitigation measures, reporting on risks, etc.) and suggest improvements, if any.*

Cross-cutting issues

14. *Assess gender and social inclusion issues, such as recruitment of project staff, students involved and training programs among others. What efforts have been made to include women at all the different levels in this project?*
15. *Assess whether anti-corruption measures and conflict of interest issues are adequately managed and addressed.*

Figure 8 *Terms of Reference, Scope of Work (3B)*

4.1 Programme overview

Programme structure

ENEP consists of two main components:

RENP II: The second phase of the 2009-2015 Renewable Nepal programme, which facilitates cooperation between R&D institutions and industry with the view of developing prototype products and services of relevance to the renewable energy development in Nepal and the region; and train researchers/students. The RENP II budget also includes an allocation for 'business incubation support'.

Hydropower Component: Incorporating several sub-components relevant for the Hydropower industry in Nepal and the region. The sub-components target enhancing infrastructure, human resource and R&D capacity in Hydraulics and sedimentation at the Hydro Lab and in design, operation & maintenance at the Turbine Testing Lab; and development and establishment of centres of excellence within Power engineering and Electricity trade research and facilitation.

The Logframe presented in the Programme Document ensures a relatively high detail level, and includes qualitative indicators.

The Grant Agreement does not provide an Agreed Project Summary. The summary presented in Table 2 presents the Programme's core elements.

Table 2 *ENEP Programme Summary*

Targeted impact[18]:
Improve the capacity of research and education required for development of the renewable energy sector in Nepal and the region
Targeted outcomes[18]:

[18] Grant agreement between MFA and KU dated 27/7-2016

Capacity enhancement of research and education capacity to support hydropower development in Nepal and region; and: **Develop applied research and education capacity required for renewable energy development in Nepal and the region.**
Targeted outputs:
The four outputs below follow the Grant Agreement (described in more detail in the Programme Document under each component than in the Grant Agreement): **Enhanced capacity and quality of service of hydraulic laboratory for physical model studies;** **Availability of Numerical hydraulic and sediment modelling facilities** **New products and services developed through research** **National and international private sector industries and research institutions involved in research and its commercialization**
Key KPIs

KPI	Target
New products/information/services	10
Institutions involved	20
Trained human resource in R&D/commercialization	20
Installation of piping network	01
Numerical hydraulic model study	01
Turbine testing lab installed	01
Model Francis turbine runner fabricated and tested	01

Implementation strategy

The strategies to achieve the targeted outputs include

- financing, procurement and installation of equipment to be used in R&D and service provision to the industry;
- facilitating partnerships between industry and academia
- build competence and knowledge base of relevance,
- develop products and services of relevance to the renewable energy development in Nepal.
- cooperation among Nepali, Norwegian and other institutions
- support and advisory from Norwegian institutions with good knowledge of and experience in the Nepali Hydropower sector through the Project Selection Committee and Project Advisory Committee*.

Programme governance

The highest representation and decision-making body of the Programme is the **Program Advisory Committee**, chaired by the Dean of the School of Engineering and representing each of the four main Partners: KU, Hydro Lab, Sintef and NTNU. The partners' relationship and the responsibilities of the PAC are governed in a Partner Agreement[19]. The Royal Norwegian Embassy represents the Norwegian Government as observers in the PAC.

The Programme is managed by a **Programme Office** which is located at the School of Engineering at Kathmandu University and takes care of the day-to-day management of the Programme; including coordinating of the various components and partners, and managing the RENP II. Meanwhile, the Hydropower Component is run by project

[19] Partnership Agreement regarding cooperation in and the execution of Energize Nepal Project between Kathmandu University (KU), Nepal; Hydro Lab Pvt. Ltd, Nepal; SiNTEF Energi AS, Norway and Norwegian University of Science and Technology (NTNU, Norway), dated August 2016.

management established within each of the sub-components. As planned, the Programme Office should be staffed by a programme management team of four persons:

- Programme Manager
- Admin/Finance Officer
- Assistant Manager Monitoring and Evaluation
- IT, Communication and Public Relations Officer

The **Project Selection Committee** is established as an independent committee to ensure impartial and fair selection and award of projects under the RENP II component. The PSC receives advisory input from the PAC, and is supported also by external evaluations. The three PSC members represent the Norwegian institutions in the Partnership Agreement together with one industry representative.

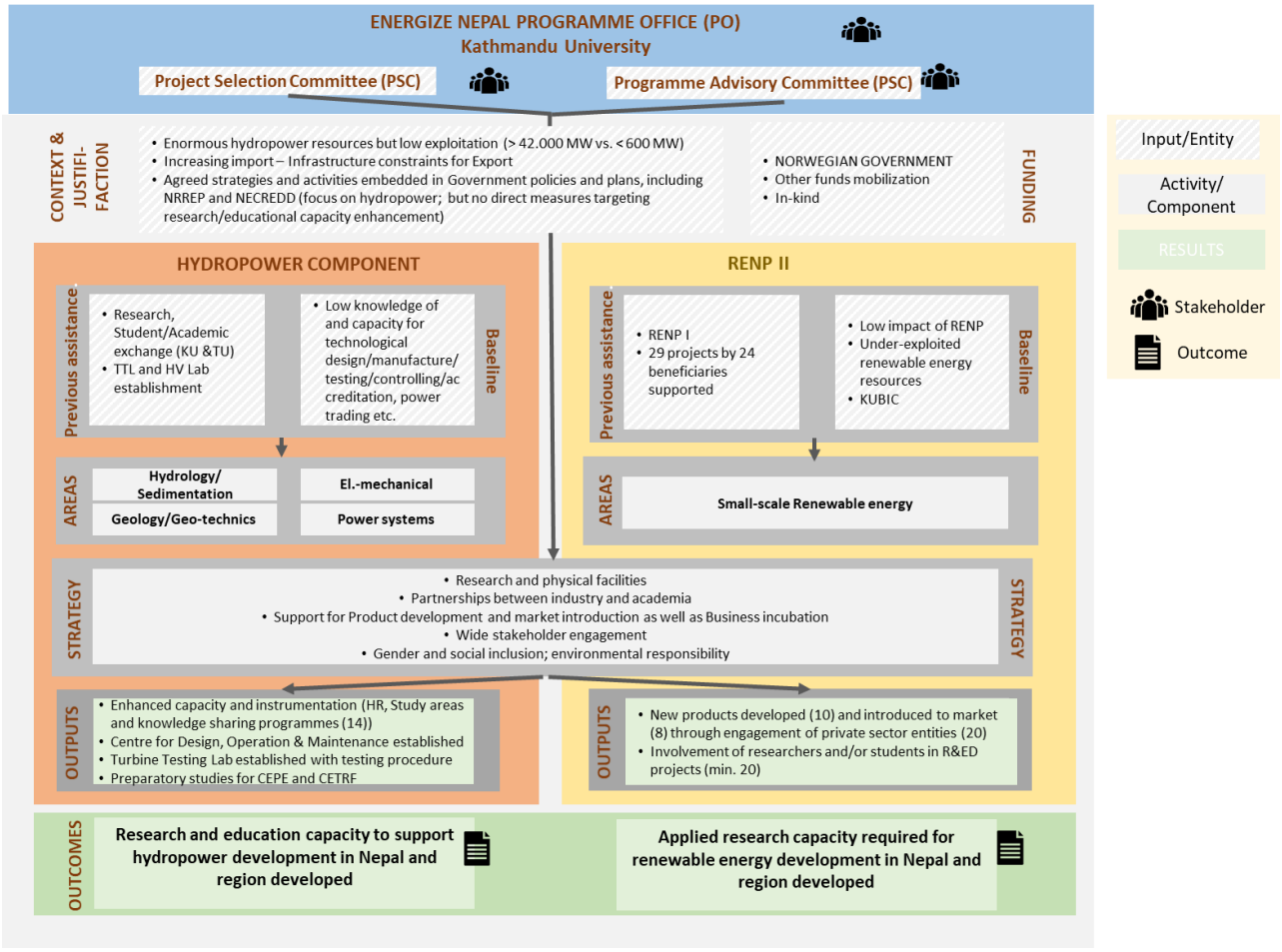


Figure 9 *Visual presentation of Energize Nepal*

Budget

The total budget as agreed in the Grant Agreement is just below NOK 35 million, of which NOK 24 million is foreseen to be as the Norwegian grant contribution. Other funding come from a variety of sources, including internal man-hours and resources by the Programme partners, private (industry) contributions, and contributions by other partners. Provision of the 'Other' part of the budget is not set as a conditionality in the Agreement.

Figure 10shows the overall budget breakdown over components/sub-components, as well as the relative share of the budget per component.

ENEP Approved budget	TOTAL	RNE	Other
A. PM	3,140	3,140	
B. Hydropower	17,266	13,730	3,536
Hydro Lab	9,082	7,500	1,582
TTL	6,487	4,690	1,797
CEPE/CETRF	1,697	1,540	157
C. RENP II	14,130	8,130	6,000
TOTAL	34,536	25,000	9,536

All figures in NOK 1000

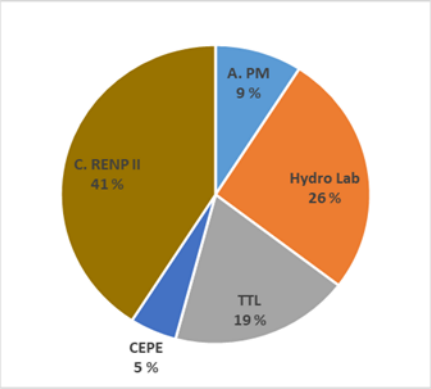


Figure 10 *ENEP Total budget and relative share of budget per component*

Box 4 *Kathmandu University*

KATHMANDU UNIVERSITY

KU is an autonomous governmental, public institution. It is the third oldest university in Nepal, and has consistently been ranked as Nepal's #1 University. It is well known for its engineering branches and is the topmost engineering college in Nepal. It is located in Dhulikhel, Kavrepalanchok District, about 30 km east of Kathmandu, on the grounds of the previous Kathmandu Valley Campus founded in 1985. KU was established by an Act of Parliament on 11 December 1991 with the motto "Quality Education for Leadership". This university operates through its seven schools and from premises in Dhulikhel, Lalitpur and Bhaktapur. The university provides undergraduate and postgraduate programs in a variety of fields.

Prof. Dr. Subodh Sharma was appointed as registrar of the university in 2018.

The fourth convocation of KU, held on 17 September 1998, was addressed by the prominent scholar and ex-vice chancellor of Norwegian Institute of Technology, Norway. For the first time in Nepal, Kathmandu University convocated a batch of environmental, mechanical, electrical, electronics and computer science and engineering graduates.

Source: https://en.wikipedia.org/wiki/Kathmandu_University

4.2 Quality of programme planning and design

In the 2015 appraisal of ENEP, a number of recommendations were given with regard to programme design, organizational structure and management, the budget, and financial management and reporting.

Notably, the appraisal team had been informed that while the proposed Programme requested NOK 40 mill in grant support, this budget should be reduced to around NOK 25 mill due to an assumed limited availability of funds. The recommendations with regard to the Programme design thus necessarily aimed at aligning the Programme accordingly.

The revised PD to a significant extent reflects that the recommendations have been followed. Most exceptions are related to details that have limited impact on the results. Some parts should be commended upon:

- The proposed Programme included a Geotechnics component. This was, due to limited funding, one component that the appraisal recommended to give lower priority. In the Programme as implemented,

Geotechnics is taken out as a separate component; however, the Hydro Lab activities include a geotechnics sub-component (equipping the geo-technics laboratory at the facilities). The current assessment is that this element appears to be relevant, and relevant for Hydro Lab's operation.

- The Business Incubation Centre that was included proposed Programme was given low priority. There is nevertheless some budget under the RENP II component for incubation services (ref. PD Section 3.2.: *"ENEP will also provide business support services for commercialization of innovative products and services through RENP II component in cooperation with Kathmandu University Business Incubation Centre"*. The strategy for this incubation activities is, however, subject to some concern and it may be appropriate to address this in a PAC meeting. The eligibility for incubation activities is unclear. While the PD Annex 5 states: *"The RENP II Component aims to support the successful development of entrepreneurial start-up companies that market the innovative renewable energy related products and services resulting from the research and development activities supported by the* component*.",* the Acting Programme Manager's explanation of the same component gives the understanding that,
  - projects don't need to be RENP II projects to be eligible; and
  - ii. Eligibility is linked to affiliation to Kathmandu University.
- In particular the second criterion is incompatible with the Programme's aim to be equally accessible for researchers affiliated to other institutions than KU.
- The appraisal recommended to strengthen the Programme Office by one representative from Hydro Lab. This has not been followed. In retrospect, the representation by Hydro Lab in the PAC, combined with the internal management at Hydro Lab for the sub-component appears to have been appropriate; and there is no evidence that the Hydro Lab component has suffered due to lack of representation in PO. On the other hand, in retrospect the placement of the Programme office at KU, which is also represents one of several beneficiaries could have deserved further assessment. While the recruitment of PO staff through external recruitment strengthens the neutrality, the localization at KU has inspired some concern from external parties regarding KU's impartiality in allocating resources. There is no evidence that this has actually happened; however, it may be harmful for the Programme reputation that KU is involved in 6 of 7 RENP II projects; and that the location of new the centres of excellence under development does not appear to have been considered carefully.
- The appraisal recommended to replace the representative from Norwegian industry by (a) representative(s) from AEPC and/or NEA. In retrospect, the non-compliance with this recommendation does not appear to be having a negative impact:
  - The continuity from the PSC from RENP I to RENP II that the Norwegian industry representative ensured, may have been a significant benefit for the Programme.
  - As a Nepali national and citizen, the representative in question is currently considered a representative of the Nepali industry rather than the Norwegian industry.
  - The selection process has involved external reviewers that to a large extent cover the role that a PSC member from e.g. AEPC and/NEA would have represented.
- The appraisal recommended that the final PD should confirm that the recommendations from the financial Management System assessment were implemented. This was not explicitly mentioned. The issue is subject to regular follow up by the Norwegian Embassy. Nevertheless, some of the recommendations are still not implemented.

In conclusion, the recommendations were followed to a large extent and with the exception of the incubation strategy, those not followed were mostly related to relatively minor issues with limited impact on the Programme.

An overview of the recommendations with comments relative to the final Programme is provided in the following table.

Table 3 *Recommendations to Programme design, Operational structure and management*

Area / Recommendation	Compliance	Remark (relevance/impact of non-compliance, other)
Programme design		
Change the outcome "Capacity enhancement of research and educational required for hydropower development in Nepal and the region" to "Capacity of research and education required for hydropower development in Nepal and the region enhanced".	✗	Low impact
Develop RECIPE outside the ENEP framework.	✓	RECIPE was not realized
Do not prioritize of the "GeoLab"	–	A separate Geo-lab component replaced in the final Programme by a Geological/ Geo-Technical facility at Hydro Lab for numerical modelling and elasticity modulus test. Geo-technical studies are relevant due to particular Himalayan geology
Do not prioritize the Business Incubation Centre	–	BIC as a separate component was taken out, but incubation services was integrated in the RENP II component; where the KUBIC services would be leveraged Business incubation services as implemented are not necessarily tied to RENP II; but requires affiliation to KU.
Document the demand for the reservoir-studies of HydroLab	–	Reservoir studies not included in ENEP
Reduce the administrative cost of element B3 (centre for design, operation and maintenance)	–	Low impact: Budget was to some extent reduced (from 282 to 232 KNOK); Norwegian funding part is a small portion of the budget.
Change the profile of RENP II by increasing the focus on research and development more relevant for the integrated power system, and make it more demand-driven.	✓	Possibility to steer support toward topics deemed particularly relevant ensured through "Strategic calls" window
Update the LFA-matrix to reflect the content of the Programme after considering and adjusting the scope.	✓	
Include indicators on the outcome-level to show how the Programme activities contribute to the development of the energy sector.	✓	
Organizational structure and management		
Develop and implement RECIPE outside ENEP, while keeping the Hydropower development and RENP II components within one Programme organization.	✓	
Simplify the organizational structure by removing the PSC.	✓	RENP II steering committee changed to 'Project Selection Committee'

Strengthen the Programme Office to include at least one more staff from HydroLab.	✗	Low impact. Hydro Lab is represented in the Advisory Committee, which appears appropriate PO changed from 6 to 4 staff; this is appropriate due to lower complexity of programme.
Replace the representative from Norwegian Industry in the SC of RENP II with AEPC and NEA (one seat each).	✗	SN Power's representative has remained the PSC member together with two Norwegians. This has probably had a significant impact on the PSC. However, external project reviewers providing independent assessments has been engaged; which to a large extent covers the intention of this requirement; and may in fact be better (The use of external reviewers is not clearly documented, but is confirmed by the PO and PSC members)
As a part of the mid-term review of the Programme, perform an impact and sustainability review of RENP I.	✓	
Financial management, budget and reporting		
Design the reporting framework to allow for reporting consistent with the frequency of internal Programme-reporting and follow-up.	✓	
Confirm that the recommendations from the Financial management system assessment are implemented.	–	PD does not explicitly address this; other than mentioning this as a risk. Financial management continues to be an element that requires close follow up by RNE
Review and update the budget to reflect final scope, with updated exchange rates and measures taken within cost effectiveness. Include a financing plan that contains financial and in-kind contributions from the Programme-partners and other contributors.	✓	
Align the budget included in the Grant Agreement with the itemized structure in the adjusted budget.	✓	
For financial external reporting, adhere to the itemized structure in the final budget agreed with the RNE and included in the grant agreement. The Embassy may consider the level of detail required.	✓	The Grant Agreement only contains the summarized budget; not detailed budget. Detailed budgets are provided in PD annexes.
For financial internal reporting, include more detailed reports by each institution, following the detailed budget structure.	✓	Hydro Lab provides detailed reports. It should be expected that IoE, CEPE and CETRF once included do the same
Consider higher frequency for internal reporting, e.g. on quarterly basis.	✗	RENP II projects and sub-components report semi-annually. Appears to be sufficient and

appropriate to avoid excessive reporting burdening with limited added value.

4.3 Compliance and Management quality

As described in 4.1 above, and in more detail in the Programme Document, the Programme Office (PO) takes care of day to day management, supported by the Programme Advisory Committee (PAC) and, for RENP II, the Programme Selection Committee (PSC).

Programme management and governance

The governance setup is appropriate with PAC overseeing the Programme, the Project Selection Committee ensuring transparent and consistent RENP project selection procedures, and the PO managing the Programme from day-to-day, monitoring progress and managing funds and budgets. PAC ensures cooperation and communication within the group of Partners, and PSC represents a sound carry-over of routines, procedures and lessons from the first RENP project. That said, the PSC does not appear to have been able to establish clear procedures with regard to the Strategic calls.

As noted in section 0, the placement of the PO at KU has been subject to some concern, and staff retention and continuity has been weak with significant impact on some sub-components.

First, while there is no reason to believe that KU intentionally has created barriers for institutions, their strong position within the Programme may to some extent have influenced the involvement of other institutions. With the calls for applications in RENP open for all research institutions, stronger presence by Tribhuvan University, Nepal's biggest academic institution by far could have been expected. TU was involved in three RENP I projects, but is not involved in any of the current projects. Their only involvement is thus through their ownership in Hydro Lab but there is little active use of Hydro Lab in academic programmes or joint research where TU is involved. While KU's strong position may have influenced TU's interest in participating in RENP, it may have been more determining that TU until recently did not offer energy specific engineering programmes, and that involving faculty and students in such research projects therefore has been less relevant. The recent introduction of a Master Programme in Energy Engineering at the Institute of Engineering opens opportunities for this to change.

Other sector institutions have been involved in ENEP mainly through the use of Hydro Lab by the industry. Nepal Electricity Authority (NEA) has not been directly involved, but through their ownership in Butwal Power Company, they are among Hydro Lab's clients. A spin-off of NEA, NEA Engineering Consulting, has applied for one research project in the third RENP call for applications. Otherwise two NGO's are involved in RENP projects.

The placement of centres of excellence in power engineering and trade research and facilitation was planned from the outset of the Programme, and it was not considered that the localisation of these centres once the plans were in place should be subject to either competition or explicit consideration of alternatives outside KU. KU has the capacity and staff available to ensure effective initiation of the centres' activities, and requiring a reconsideration of the localisation does not appear to be an effective means. However, as for Strategic calls under RENP II, any possible new centres considered should make explicit assessment of suitable host institutions and consider procedures to call for proposals.

Second, **the Programme Office operation has faced significant challenges since the start of the Programme, mainly related to the staffing and continuity of PO staff.** Retaining recruited staff has been particularly challenging; through the 2 years and 9 months of operation to date, there have been three different Programme Managers; two Assistant PMs, three IT and Communications Officers, and three Administration and Finance Officers. There have been extended periods before new staff could replace officers that had left, with the result that the PO has never been fully staffed. At the time of the review, the Programme had been without a Programme Manager for two months, and was in the process of recruiting a new PM; while the other three staff were in place and the Assistant PM was acting as PM. Naturally, these staffing issues has negatively impacted quality of management and implementation efficiency.

It should also be mentioned that the last Programme Manager was not recruited externally, but appointed internally by KU management. This could point to a weakness in the governance of the programme; there is no evidence in signed meeting minutes or other records of this decision. It is therefore not clear that the PAC were given the opportunity to influence this recruitment.

Despite these challenges, the PO has managed to maintain its key operational responsibilities; while reporting has been delayed at occasions it has been delivered; and RENP II RfPs have been implemented and awarded. Further, the separate components Hydro Lab and the Turbine Testing Lab have, in accordance with the PD, internal project management that appears to have been able to ensure continuity and good management and limit the impact of the PO challenges.

The most significant impact that the PO challenges have had, are considered to be the following:

- Overall programme management – notable impact
  - Some reporting delays
  - Capacity to ensure proactive work to ensure visibility of the Programme. This could be related to external communication, i.e. the opportunities within RENP II for institutions that are not affiliated with KU in particular and access to project. Proactive engagement by the PO to communicate for example events implemented by RENP II or Programme sub-components might further have a positive effect.
  - Capacity to ensure good and continuous communication with the PAC and PSC.
  - Follow up of financial management improvement measures as agreed in the Financial management assessment report
- RENP II – some impact
  - Reduced capacity to monitor the RENP II portfolio. While regular project monitoring has taken place and is documented; it would be recommended to establish a portfolio overview and 'tracker' in order to ensure compliance with deadlines and monitor progress of project implementation.
  - Current delay of the award process for RENP II RfP 3.
  - Ensuring documentation of strategy and consistency in selection process, in particular with regard to Strategic Calls.
- Development of centres of excellence – notable impact
  - The detailed planning for the two specified Centres of Excellence has been significantly delayed. It is not certain what impact lack of continuity at PO level has had; but the ability to follow up and ensure progress has clearly not been in place.
  - The Programme Document does not map out specific timelines and as such does not provide a basis for formal reporting requirements on this sub-component; however, it should be noted that the *deviation analysis* in the Progress Reports does not address the delay or the non-use of budget.
  - That said, there is more recently good progress on both centres. Detailed proposals with plans for the establishment and operation of both have been developed and submitted, and KU has approved their initiation and initial staffing. The initiation of activities within the centres is included in the proposal for extended support (see Chapter 5).
- Hydro Lab – A separate project management group within the Hydro Lab itself manages this sub-component. There seems to have been limited direct negative impact of the challenges in the PO.
- Turbine Testing Lab – A separate project management group within the Hydro Lab itself manages this sub-component. There seems to have been limited direct negative impact of the challenges in the PO.

Meanwhile, the Programme Advisory Committee as well as the Project Selection Committee have been remarkably stable. The PSC was continued with the same members as the Programme Steering Committee for the previous RENP I, and until May 2018, no member changes happened. More recently (May 2019), the KU representative in the PAC has been changed. This stability has been a clear strength, ensured the transfer of good practices and lessons learned from RENP I, and likely limited the impact of the lack of continuity of the PO staffing. With the recent change, however, it will be important to reconfirm the good working relationship and communication among the PAC and between the PAC and the Programme Office.

It could be mentioned that there was no tender involved with regard to the Norwegian collaboration institutions involved in the programme. The institutions were involved through direct negotiations. The direct selection of the institutions was duly and appropriately addressed and justified in the Decision Document[20].

The quality of a number of specific Programme management related responsibilities is briefly addressed in the following.

[20] Decision Document, MFA, June 2016

RENP II management

The planned portfolio management of the projects awarded and implemented under the RENP II component includes calls for proposals, selection and award procedures, guidelines for support from the Programme side, and monitoring, and is relatively well described in an Annex to the PD. These procedures build on those established and tested out during RENP I, and also described in the mid-term review of that programme[21]. The procedures include project reviews by both the PSC members and external experts on call-basis, and appear appropriate to ensure transparent and fair project award.

Different from RENP I, RENP II established two windows for calls: 'Open calls' and 'Strategic calls'. While the 'Open calls' follow the above-mentioned procedures, **the procedures followed for the 'Strategic calls' are less documented, transparent, and consistent.** According to the Acting PM (APM), potential topics for strategic projects are defined through stakeholder consultations and confirmed in the Project Selection Committee/PAC. The two Strategic projects awarded through 'Strategic call' so far have either been competitive through calls for proposals on specific, predetermined topics, or directly awarded. It is however not documented any agreement in neither PAC nor PSC that Strategic calls projects can be awarded without competitive procedure. Even more concerning is the fact that several PSC members appeared surprised and concerned to hear about the direct award procedure. The PSC members did however confirm that they had been part of the discussions to select the topics.

It should be mentioned that KU is represented in a larger proportion of the RENP II projects than they were in RENP I. While this may be well justified, it could also strengthen the concern related to KU's position as both funds manager and beneficiary.

In the previous phase, the Programme Office offered to projects the opportunity of 'buying' a small number of hours to support with financial reporting. This helped the small projects, in particular those from outside KU, to overcome the reporting burden which has been reported to be significant. There is no evidence that this strategy is carried over to the current Programme Management.

The RENP II project includes a sub-component related to 'business incubation', to be implemented in coordination with KUBIC (Kathmandu Business Incubation Centre). The inclusion of this element was presumably based on positive experience from RENP I, where those projects that were considered to have market potential could apply for post-implementation support to pursue the project toward commercialization. The eligibility criteria and procedure for award are however not documented. This could lead to a number of challenges in the award process, i.e.

- According to the APM, affiliation to KU is a criterion for KUBIC support. This is in conflict with the RENP II principle of equitable access to support independent of institution affiliation.
- KUBIC is 'naturally' open for application from non-RENP II projects. While this is not a problem per se, it should be confirmed that funds from the Programme are uniquely channelled to projects that have gone through the transparent project selection procedure established for RENP II.

Since no project has been completed yet, and incubation for any project thus has not been an issue, it is assumed that this has not had any impact.

The RENP II award procedures should thus be discussed in the PSC committee and reconfirmed with PAC, with regard to both the Strategic calls procedures and the incubation/post-project support possibility.

Risk Management

The PD includes a relatively comprehensive risk management framework, which addresses internal and external risk elements, ranks them in terms of Probability and Impact, and lists mitigation measures. The progress reporting uses the framework consistently to document the Programme Management's risk monitoring. It appears that the PO's following up of the identified risks represents a certain value for the management of the programme.

[21] Renewable Nepal, Phase I, Kathmandu University/Sintef, 2015.

The risk management could be strengthened by making the framework flexible to add newly identified risk. This would allow the Programme management to add any unforeseen risk that may be experienced through the implementation. As a few examples of unforeseen risks that have occurred the following can be mentioned:

- Lack of balance in participants in RENP II. The Programme has been subject to criticism by non-KU parties claiming KU affiliation gives project applications an unfair advantage. Whether justified or not, such claims represent reputational risks for the Programme, and may have the unfortunate effect that potentially strong project candidates are not submitted. If justified, it is clear that favouritism would negatively impacts the effectiveness of the Programme by unduly rejecting good projects. **That said, it is emphasized that the Team has not found any evidence of active favouritism for KU projects.**
- Inability to retain staff. While risks related to retaining research and academic staff, mobilizing supervisors for research etc. were identified, the same risk was not addressed with regard to the Programme Office staff. As mentioned above this is something which has affected the Programme since the start. Mitigation measures were thus not identified; and the challenges may have been given less attention than it should.
- While delays in installation of equipment (for Hydro Lab and TTL) were considered, the delays experienced that are either due to challenging procurement framework or supply ability of suppliers were not foreseen.
- As mentioned above the participation in PAC and PSC, including the key personalities from the Norwegian institutions, has been very stable. Nevertheless, the risks related to eventual retirement, change of staff internally or other event which may take any of these persons away from the programme is a relevant risk to consider. Mitigation measures should be considered through e.g. institutionalizing the relationships, involving other persons from the institutions in question etc.

Inclusion of such experienced challenges could improve the information value of the Progress Reports.

Financial management and budget control

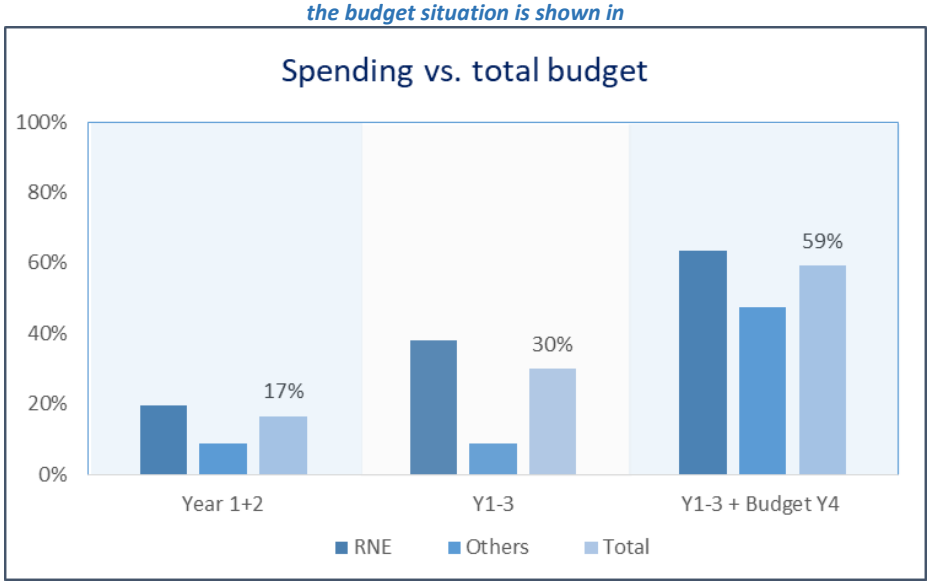
The Programme is subject to external audit annually, as well as regular assessment of financial management quality and follow up of Institutional Assessment of Kathmandu University[22]. In-depth assessment of financial reporting quality and routines are therefore not a part of this Assignment. Nevertheless, a few comments to the financial management of the Programme are provided in the following. In particular, budget planning procedure and status of spending are not considered neither in the institutional assessment nor the audit and is given some attention.

- RNE's close follow up on the audit results and the follow up of the Institutional Assessment in the Programme Annual Meetings is commended and should continue.
- The failure to comply with the specific recommendation in the mentioned assessment regarding establishment of separate account within KU for the Programme, and ensuring than interest is monitored and reported, means that these issues will continue to be important issues for follow up. The Acting PM informed that a specific request to KU management will be made. Further, the PO has confirmed that in the lack of a separate account the interest will be calculated manually and reported from year 3.
- The financial reporting in the Progress Report is acceptable; reporting on expenditure versus budget, as well as expenditures per partner and per component. The reports also provide useful description/justification of deviation from plans and budgets. With the details from the Audit Report available for more detailed information, this seems appropriate.
- Nevertheless, to make Progress Reports more easily readable, and provide a better overview of balance of funds and deviations from work plans, it would be useful to show expenditure both versus total budget and versus disbursements received e.g. by way of graphs, such as those presented in the Annual Meeting 2019[23].
- The programme office now has a full-time financial management officer in place and can be expected to have better capacity to establish and/or follow up good management routines
- The financial reporting in the Annual Report includes i. Total Programme budget overview per component and per partner; ii. Budget for the year per component and per partner; iii. Expenditure versus budget for the year per component and per partner. One element which could be added to ensure full overview would be a table to show total spending versus total budget to date, and balance of funds per component and per partner. This could be a version of the table provided in the first progress report, but removed in the year 2 report.

[22] Contract between Kuber & Co and RNE dated 28.04.2016
[23] Presentation in Annual Meeting, Nawaraj, May 16 2019

- The PO additionally maintains a relatively simple excel based set-up enabling regular monitoring and overview of receipt of funds and expenditures for each sub-component and each user, in NPR and NOK using a fixed exchange rate established at the start of the programme. While this is a useful tool, the reporting of expenditure for the Norwegian partners is not consistent with the budget setup and makes analysis of spending challenging.
- The PM has correctly taken balance of funds into account before disbursement requests, and while low spending has resulted in significant build-up of balance of funds, there appears to be a better balance achieved in the second half of Year 3. While CEPE and CETRF spending has remained low, the improvement is apparently due to delayed procurements in TTL and Hydro Lab, which recently have shown progress. The balance of funds as at request for instalment for first six months of year 4 is thus acceptable.

There is underspending compared with the original, total budget. With the total spending to date plus disbursement requests for year 4, 64% of the RNE budget will have been spent (59% of the total budget). This implies that the Programme would need to consume more than 40% of funds within the last one year of implementation. An overview of the budget situation is shown in



- **Figure 17** Use of funds versus total Programme budget.
- The Grant Agreement lists a number of specific requirements, in particular with regard procurements. Specifically, Article 10 requires the Grant Recipient to confirm in writing that the procurement provisions have been adhered to, and that for any contract exceeding NOK 500 000, shortlist of suppliers, award criteria and weighing and draft contract shall be submitted to MFA for approval requirements[24]. While the adherence to the respective institutions' procurement guidelines has been confirmed, the PO has not been able to explicitly confirm whether any contracts above 500.000 have been entered into. From the Audit report, it appears that only TTL has purchased equipment worth more than the threshold, but it is not clear whether any single procurement has been above the threshold. It is worth taking into the Progress Reports a confirmation of i. whether any single procurement has been over the threshold; and ii. if any single procurement has exceeded the threshold it has been submitted to MFA for approval.

Reporting and formal meetings requirements

Progress reporting has overall followed the Grant Agreement requirements, albeit with some delay reported by RNE. Table 4 provides an overview of requirements and compliance. As shown, the Programme Management has generally complied with the formal requirements, while a few recommendations as to strengthening the quality further are given above.

[24] Also specified in GRANT MANAGEMENT REGIME I AND II, PART IIII: GENERAL CONDITIONS APPLICABLE TO GRANTS FROM THE NORWEGIAN MINISTRY OF FOREIGN AFFAIRS

In addition to the formal requirements below, as per the Programme Document, component specific reports are available in the Programme office:

- Hydro Lab Annual reports providing overview of completed activities and progress assessment
- Results from monitoring of RENP II projects.

In addition to the formal Annual Meeting, RNE reports to have attended PAC meetings in November each year, which implies that there have been biannual meeting points. This improves the possibility for early detection of any issues, which is a strength considering the almost 10-month long intervals from reporting period end until Annual Meeting.

Table 4 *Reporting requirements compliance*

Requirement	Interval	Compliance
Progress report*	Annual, by 31. Dec	Annual Progress Reports submitted for 2016/17 and 2017/18. Submission date not given. Contents according to requirements
Financial report*	Annual, by 31. Dec	Overview included in both Progress Reports. Combined with Audit reports complying to requirement
Audit report	Annual, by 31. Dec	Submitted January both years
Implementation plan and budget	Annual, by 1st April and at least 2 weeks before Annual meeting	Submitted for 2017/18, 2018/19 and 2019/20 Submission date not given.
Final report*	4 months after end of Support period	N/A
Annual meeting	Annual, in May (tent.)	Three Annual Meetings held; in July; June; and May, respectively
Minutes from Annual Meeting*	Max 22 weeks after meeting	Completed and signed by all parties for AM 2017 and 2018
*** specific requirements as per PART II of contract**		

The quality of the progress reports is satisfactory; with significant improvements from year 1 to year 2 report which should be maintained in future reporting. A small discrepancy on performance indicators is noted.

The detailed logframe monitoring table that was included in Progress report for year 2, refers to the targeted outputs according to the PD logframe. Slight deviations in the report texts from the logframe with regard to indicators and targets are considered as minor, and should be possible to avoid through appropriate QA of the reports before submission.

The monitoring table also refers to annual milestones for each indicator, as planned in the detailed component descriptions in the PD (Annexes 4 and 5). When reporting on achievement, it could be considered to measure achievements against milestones for the reporting year, rather than the end targets. This would better represent performance in terms of progress *toward* achieving the targets, and clear indications where action is required to improve performance.

The Progress Reports do not explicitly report on activities by and engagements of the Norwegian institutions, other than their use of funds. Norwegian counterparts' contributions are not included as outputs or activities in the logframe, but some reports as to how they have contributed would be useful for assessing the value of the cooperation.

As noted above, the budget updates have not been fully consistent over the two Progress reports delivered to date. With the complexity of the programme with several sources of funding and multiple components funds are channelled to, it is important to maintain consistency. Some improvements were done from year 1 to 2; however, the table provided

showing disbursements and use of funds per component and per user that was provided in year 1 could be useful to follow from year to year. While these weaknesses exist, the provision of annual audit reports and external assessment of these ensures appropriate record-keeping and transparent financial management.

4.4 Programme progress to date

The Progress Reports provided by the Programme Management overall comply with the requirements as specified for the Grant Management Regime General Conditions Part II[25], however focusses on progress toward output level targets rather than Outcome level indicators.

The performance indicators are a good indicator and monitoring tool; however, does not provide a complete understanding of the actual progress and status. A qualitative assessment of the two main technical component is therefore considered relevant and follows. (A. Programme Office and Management is considered addressed above). A summary of expenditure until the most recent Progress Report; to date; and foreseen for years 1 until 4, is provided for each sub-component. Note that these do not include NTNU's part of the budget, which implies that for each component where NTNU have been receiving funds, the budget updates are

The OECD DAC criteria based assessments in sections 4.5 to 0 build on these more detailed descriptions to arrive at rather short, concrete conclusions, aiming at answering the concrete questions posed in the terms of reference.

B. Hydropower Component

B1. Capacity building of existing Hydraulic laboratory (Hydro Lab)

The progress of the support to the Hydro Lab is satisfactory. The first years have focused on procurement of various equipment to the different laboratories, with delay on some of these procurements. These delays were the reason for much of the underspending on this sub-component; but is reported to be back on schedule currently.

The installation of equipment to the geotechnical lab is in process, and this laboratory has not yet taken up activities. One of two targeted PhD students are engaged, along with one of five targeted MSc students.

Figure 11 *Hydro Lab Pvt. Ltd., Kathmandu*

The services of the lab are considered relevant for the industry and is in high demand, and the activity level is high. There have been less activities related to cooperation with academic institutions and programmes, or involvement in research projects. This may be due to two main factors: partly that the demand from industry is high enough to keep the resources in the lab busy and engaged; and partly that Tribhuvan University (TU) to which the Lab is affiliated and which is part owner of the lab, until last year did not have academic programmes in engineering specifically focussed on hydropower development. With TU's new Masters Programme (Ref. Chapter 0 below) there may be a scope for increased activity in this regard.

Hydro Lab appears as the element in the Programme which has the highest chance of realizing the exit strategy. Hydro Lab offers services for which there is willingness to pay among both private and state-owned companies in the industry, and may achieve a high degree of financial sustainability through sales of services.

[25] GRANT MANAGEMENT REGIME I AND II, PART II: GENERAL CONDITIONS APPLICABLE TO GRANTS FROM THE NORWEGIAN MINISTRY OF FOREIGN AFFAIRS, 2017

35% of the total budget has been spent[26] to date. Including spending to date and foreseen expenditure in year 4, 48% will be spent. There is thus a significant amount left for the last year.

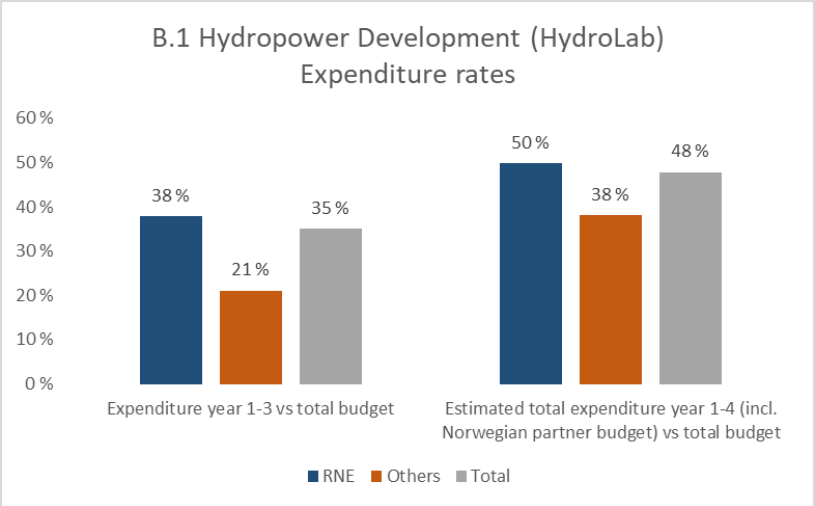


***Figure 12** B1. Hydro lab expenditures against budgets and against disbursed amounts. Expenditure year 1-3 excludes Norwegian partner funding, which is separately accounted for in POs files.*

B2. Establishment of centre for design, operation and maintenance of mechanical equipment of hydropower plants

The activities related to the centre is implemented within the **Turbine Testing Lab (TTL)** at Kathmandu University and the component is also referred to as that. The progress within this component is satisfactory. Similar to the Hydro lab, some delays in equipment procurement has led to delay in implementation of some activities as well as underspending versus budgets in the first two years; however, most of the delayed procurements have been completed in the course of Year 3. TTL is engaged in two RENP II projects and have one PhD student and two MSc students associated with ENEP.

Where Hydro Lab has successfully engaged with industry but has no reaped potential benefits in academic and research activities, the opposite seems to be the case for TTL. According to the people involved, little active outreach to the industry has been done. Meanwhile, the lab has already contributed some services to support the up-growing of the micro-grids sub-sector in Nepal, and testing facilities for relatively small-scale equipment should remain relevant in the view of the required maintenance and replacement of such installations that may be expected going forward.

To achieve this, whoever, the centre needs to engage with the industry. The recently installed equipment (IEC standard turbine test rig) will take the lab to an international standard level, which could be a strength in winning assignments which also could be provided by international facilities. Once installed, TTL will have the possibility to have this verified by a third party (NTNU could ensure this by observing a test and documenting that fulfils the IEC defined standards; alternatively, a test implemented for or in cooperation with a manufacturer could provide similar verification). This would ensure that the TTL can document experience with this level; a potential strength when aiming for research projects or service provision for the industry.

TTL's expenditure rates are roughly corresponding to the budget and can be expected to be fully expended by the end of the Programme.

[26] Analysis of figures provided by PO, "Annual Budget for Year 4 and disbursement required for July 2019 - Dec 2019"

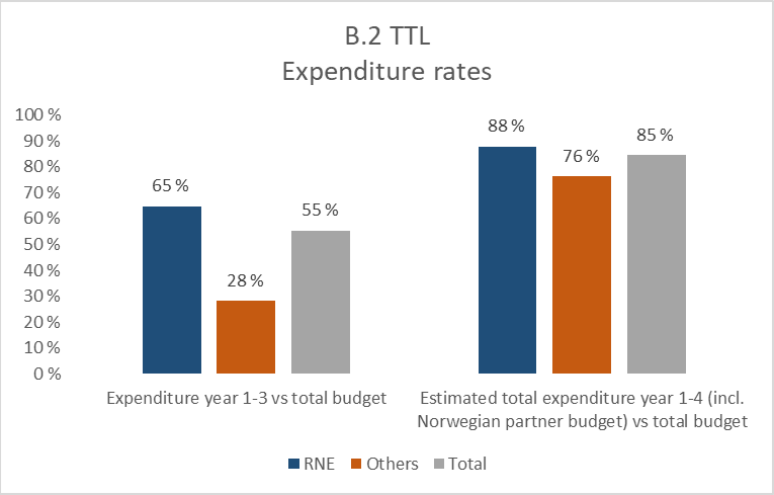


Figure 13 *B2. Centre for design, operation and maintenance of mechanical equipment of hydropower plants - expenditures against budgets and against disbursed amounts.*

B3. Preparatory studies for two centres of excellence: CEPE and CETRF

Figure 14 *new turbine under installation at the Turbine Testing Lab at Kathmandu University*

The **Centre for Electric Power Engineering (CEPE)** and **Centre for Electricity Trade Research and Facilitation (CETRF)** were indicated in the Programme Document. However, the only output *and* outcome indicators related to these centres was that detailed work plan and budget estimates would be available. The timeline specified in Annex IV to the PD indicates completion by year 1 of both studies.

In the Progress reports, these centres are not mentioned. During the review mission, it became clear that the reason was lack of progress in years 1 and 2. During year 3, resources have been engaged to establish the plans and budgets and these are made available for the team. The further plan indicates that KU will ensure staffing for the further work to establish the centres and initiate activities. Some staff is already identified, including one PhD student who will work with the trading field. The available budget is sufficient to ensure these early activities; however, the continued support to implement research activities will depend on additional budget made available (Ref. Chapter 0 below).

It is noted that the detailed description in Annex IV to the PD, it is indicated that coordination with other sources of funding for implementation of the centres would be ensured. There is however no evidence of such activity; and the required additional budget for the extended proposal suggests that this ambition has been down-tuned.

It can therefore be concluded that progress on this subcomponent has been slow and behind schedule; but, has now achieved the targeted output.

Table 5 *Centres of Excellence CEPE and CETRF – expenditures against budgets and against disbursed amounts*

Component	B.3 CEPE & CETRF		
Source (all NOK 1000)	RNE	Others	Total
Budget for component	1 540 000	157 000	1 697 000
Total expenditure year 1-2	-	-	-
Total expenditure year 1-3	32 167	-	32 167
Estimated total expenditure year 1-4	873 932	320 818	1 194 750

C. Renewable Nepal II

The Programme Office has managed three RfP rounds so far (Requests for Proposals). In rounds 1 and 2, a total of 7 projects have been awarded, including 5 under 'open call' and 2 as 'strategic calls' projects. The Team's concern related to the procedures followed for the 'Strategic calls' is noted above (section 4.3) and not further addressed here.

Both first calls were implemented timely and all 7 projects are under implementation. The third round has not yet been concluded; apparently awaiting the new Programme Manager to take office. Participation in all rounds has been significant and was according to the PSC members of sufficient quality to conclude that with more funding available, more project with potential value could have been awarded.

The projects engage a total of 17 institutions, companies and organizations, and cover the following topics:

- Turbine technology (two projects)
- Biomass fuel product development
- Bioenergy and fertilizer from food waste
- Energy efficient buildings
- Community electrification (strategic call 1)
- Technology for hydropower tunnelling works (strategic call 2).

KU is engaged in all but one of the seven projects. As mentioned above some stakeholders have voiced concern related to KU's dominance in the programme and the real or perceived lack of opportunity for non-KU entities to be successful in the RfPs. Tribhuvan University is not represented. With the exception of private companies and international partners, the Nepali institutions involved are two NGOs.

With the successful completion of RfP 3, the Programme Management should have no major challenges in achieving the targeted 10 projects; further, the interest is sufficient for more projects to be awarded. Care should, however, be made with regard to the communication and dissemination of the opportunities, and the neutrality of the selection criteria with regard to eligible research institutions. In particular since the competition for these projects is keen, any perception of disadvantage for non-KU institutions could discourage participation in the calls.

Since no projects have reached completion, it too early to judge the projects' degree of success in the form of successfully developing relevant products or services; making their market introduction; and their subsequent eventual market uptake. However, based on the information from the PO's project monitoring and interviews with project managers, the projects appear to be on schedule and making progress.

No incubation support has been awarded to date. This will be relevant once any of the projects come to completion and conclude their intention to pursue the development and marketization of the product or service developed.

An overview of projects and direct beneficiaries (cooperation entities) is provided in the following table.

Table 6 *RENP II - projects and direct beneficiaries*

Open call	Partners
1. Further R&D, optimization and prototype development of Turgo turbine technology for rural Nepal by enabling environment for technology dissemination and commercial development	PEEDA Kathmandu University Bristol University Nepal Yantrashala Energy
2. Integrated system for sustainable production of algal fuel pellet in Nepal	Kathmandu University Shubham Biotech Nepal Pvt Ltd. NTNU

3. Energy efficient building design for Nepal	Kathmandu University Innovative Createers Lund University (non-confirmed)
4. A pilot study to produce bioenergy and fertilizer from Kathmandu University's food waste	Kathmandu University Soil, Water and Air Testing Laboratory Pvt. Ltd University of South-Eastern Norway Kingdom Bioenergy Pvt. Ptd, UK
5. Capacity and competence development for introducing Francis turbine in Nepalese micro hydropower projects	Kathmandu University (TTL) Thapa Engineering Pvt. Ltd Nepal KOU/MNU Korea Shimban Precision Co, Ltd, Korea
Strategic call	**Partners**
6. Enhancing energy management of community electrification through technology and policy research	Nepal Energy Foundation South Lalitpur Rural Electric Cooperative
7. Technical investigation of tunnel support technology in hydropower projects located in the Himalayan region of Nepal	Kathmandu University Hydro Tunnelling & Research Ltd. NTNU

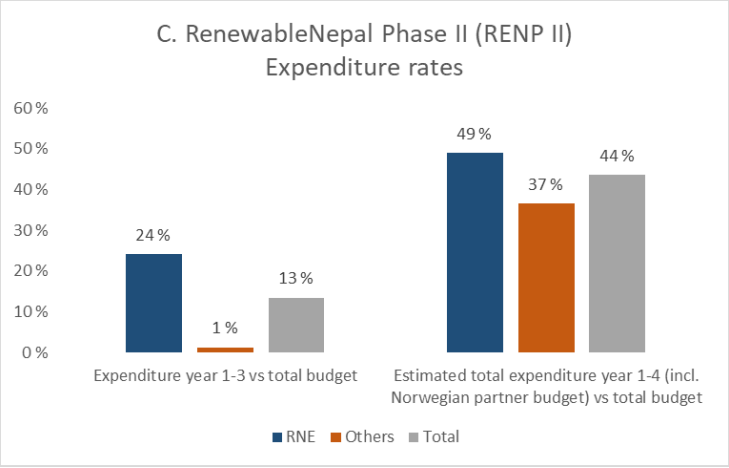


Figure 15 *RENP II Expenditure rates. The low expenditure rate to date is explained by the disbursement schedules for the supported projects.*

4.5 Relevance

Development cooperation programmes should be relevant with respect to Norwegian policies and priorities; Nepali policies, strategies, priorities; and the specific sector context and needs of the final beneficiaries.

Following the overall consideration of relevance of the Programme objectives versus national priorities, an assessment of each main component as well as the ownership of the main partners is provided.

RELEVANCE:

"THE EXTENT TO WHICH THE AID ACTIVITY IS SUITED TO THE PRIORITIES AND POLICIES OF THE TARGET GROUP, RECIPIENT AND DONOR"

OECD-DAC

Norwegian policies

The elements of Climate change, Renewable energy, and Environment, are combined as one topical area in Norwegian policies related to international cooperation and development assistance. The 2018 allocation of a total of 5.7 billion Norwegian Kroner (NOK) shows that this area accounts for approximately 16% of the total budget for international cooperation and development assistance. Nepal is a focus country for the Norwegian Renewable Energy for Development initiative.

In Nepal specifically, Norway aims to achieve inclusive and sustainable economic growth through development of clean energy and climate cooperation.

The objectives of Energize Nepal, to develop capacity in research to benefit development of hydropower and renewable energy, is well within all these ambitions, and fits into the broader development cooperation portfolio within Clean Energy, Environment and Economic Development (ref. Section 2.1.1).

Nepali policies and strategies

The government of Nepal's Energy Strategy of 2013, the National Rural and Renewable Energy Program, initiated in 2012, the Energy Strategy, and the SE4ALL framework, set the ambitions for power generation, renewable energy development, and access to sustainable energy and are the currently referred targets in the country (see section 2.2 for details).

Lack of skilled manpower is one of key issues mentioned in the Energy strategy as a key obstacle to achieving the targets. Lack of knowledge to alternative sources of energy for cooking and heating is another key issue.

In general, Energize Nepal's focus on hydropower and renewables is relevant with respect to Nepal's ambitions in the sector and address some specific gaps with regard to manpower and technical knowledge.

Component specific relevance

Hydropower component

Both the Turbine Testing Lab and Hydro Lab focuses on the impact of sedimentation on physical installations and equipment. Sedimentation represents particular challenges for hydropower development in the high Himalayan rivers. Similar testing and modelling facilities are not available elsewhere in Nepal. While turbine testing is usually done by the suppliers outside Nepal, river-specific modelling is only available at Hydro Lab. Knowledge in this field, and ability to provide services to industry to improve quality and appropriateness of installations, is considered highly relevant by both public and private industry actors. Through research activities and applied work with the hydropower industry, these facilities can contribute to educate human and develop

The turbine testing facility at TTL has so far mainly tested small-scale equipment. Recent years have seen an important growth of micro-hydro connected to small local grids. While the growth potential for this sector may be limited as the national grid continues to expend, maintenance and replacement of micro-turbines will likely continue to be relevant.

The facility is so far less used by the large-scale industry. Going forward, the verification of international testing capacities at TTL may be a positive factor in gaining foothold among the industry. However, TTL would need to work strategically if the ambition is to work for the industry and be used by turbine suppliers.

Hydro Lab, on the other hand, has a high activity level toward industry, but appears to not fully exploit the potential for academia and research engagement.

RENP II

According to the Energy Strategy (2013), research and development programmes on renewable energy were inadequate to achieve the country's ambitions in the sector.

3 of 7 projects awarded in the first and second call for applications for RENP are related to the hydropower sector; two turbine related projects and one in hydropower tunnelling technology. Two projects are within bio-energy, which as mentioned above, is relevant to address specific one in community electrification and one related energy efficient buildings. All these topics appear relevant for Nepal's needs, and may provide relevant products or knowledge for practical application. However, with regard to the focus of hydropower and renewable energy, energy efficient buildings represents a somewhat different theme.

Hydropower industry participation and contributions

In the mid-term review of RENP I, it was noted that the Programme's relevance to the Nepali Hydropower industry was limited. RENP mainly attracted small projects, of relevance to promote renewable energy in general; but in recognition that the hydropower industry represents a significant part of the very limited number of national actors that may have the financial capacity to fund research in Nepal, thus contributing to financial sustainability of industry-relevant research, it was important to make Norwegian support relevant for the hydropower industry specifically. This was among the main considerations behind the decision to merge RENP with the activities that were more directly oriented toward the hydropower industry.

To consider the relevance specifically for the Hydropower industry, an analysis of the research activities of the different components in the programme reveals the following:

In Renewable Nepal, 29% of projects (6 projects) were related to hydropower research; and in RENP II, three of seven projects awarded so far are related to hydropower. However, with the exception of the tunnelling and rocks strategic project, the RENP projects are related to pico-and micro-hydro; hardly the part of the industry with the highest financial strength and capacity to contribute to funding research. This is reflected in the share of industry contributions of total project costs. In RENP I, the average industry contribution of the hydropower related projects (weighted average) amounted to ca. 22% (admittedly higher than the all-RENP I average of less than 15%). In RENP II, the company involved in the tunnelling and rocks project is expected to contribute more than 40% of the total budget; as opposed to 23% and 11% for the two other projects, respectively. In addition to the monetary and time contribution, the industry partner's participation in the research project could potentially ensure major contributions to the industry in the form of improved Nepalese tunnel design[27]. While one project is not enough to prove a trend, this *might* be an indication that the strategic projects, offering a larger total budget frame, is better able to attract larger companies in the hydropower industry. However, the real effect remains to be seen after the completion of this and other strategic projects.

With regard to Hydro Lab, the annual reports reveal that 27 companies have been involved in the research projects undertaken and reported under ENEP between fiscal years 2016-2018. The budgets for these research activities is not reported; however as noted above the lab's activities are largely industry/client financed.

Neither the programme reports nor the TTL website reveal sufficient information to establish the extent to which companies have been involved in research with TTL, beyond the 9 RENP I/II projects in the turbine industry which has engaged TTL.

An overview of the companies identified as involved in research activities through RENP and Hydro Lab is included in Annex VI.

Ownership

The level of ownership to the intervention is an important factor to ensure continuity of the engagement by various partners, and avoiding conflict between the different spheres of interest of the involved institutions. The following focuses on the main partners in the Partnership Agreement between Kathmandu University, Hydro Lab, Sintef and NTNU.

[27] Opinion. HydroConsult Engineering.

The ownership to the programme by Kathmandu University has been strong. Energize Nepal features as one of the key research programmes on the KU website. The opportunities to access funding for strengthening the University's research capacity, at the TTL, through establishment of the centres of excellence, and through cooperation with industry through participation in RENP projects contribute to building capacity at the university. These opportunities enable KU to provide interesting and rewarding opportunities for graduates who thereby may remain affiliated to the university longer. The level of ownership to the programme appears cemented by the involvement of persons with long-standing relationship with Norway and with the representatives from the Norwegian institutions in the Programme. KU's representation in the PAC has been stable until recently; and shifted with the change of KU Registrar as KU deemed the PAC seat to follow that position.

Figure 16 *Norwegian footprints, School of Engineering, KU*

On the Norwegian side, all main involved representatives have long relationships with Nepal and KU, and partly build on relationships established already in the nineties. One of the members in both PAC and PSC is the son of Inge Johansen, professor who worked with the establishment of KU, and after whom the Engineering Block is named. NTNU's representative in the PAC previously spent a sabbatical year and was instrumental in building up the Turbine Testing Lab. Also, the NTNU representative who has been working mainly with Hydro Lab has been involved for many years and continues to be committed to the cooperation. NTNU's recent high-level visit to Nepal, officially launching the NTNU Alumni group and eye-witnessing several cooperation programmes, is a positive factor to solidify the institutional ownership beyond that of the individuals involved.

The Managing Director of Hydro Lab finished his PhD in Norway and worked for Norwegian engagements in Nepal before being engaged in Hydro Lab in 2001. For Hydro Lab, continued engagement in ENEP is an obvious opportunity to fund both expansion of the facilities, thereby strengthening their capacity to provide services, as well as continuing the positive cooperation with Norwegian institutions with relevant knowledge. For Hydro Lab, the foreseen involvement of the Institute of Engineering at TU would create opportunities for closer cooperation with that institution.

Summary and recommendations

Summary and recommendations
The programme on the overall is relevant for Norwegian priorities in Clean energy, Environment and Climate cooperation and for the Renewable Energy Initiative. Nepal has high ambitions in hydropower development. Skilled man-power and technical expertise is mentioned in various analyses of Nepal's energy sector as one of the key barriers to exploiting the generous resources available in Nepal for large and small-scale hydro power as well as renewable energy and other solutions for provision of sustainable energy solutions. Research and development programme on renewable energy is inadequate. Nepal is further in an early stage of exploitation of other renewable energy resources, and also still faces challenges in the transition to sustainable cooking and heating energy sources. The capacity developed through ENEP's different components provides, in various degrees, research or technical services that benefit various parts of Nepal's energy sector. This includes medium-large scale Hydropower (e.g. Hydro Lab, CEPE); small-micro scale Hydropower (e.g. TTL; RENP II); other renewable energy (e.g. RENP II; CEPE; as well as development of the sector at large (CETRF; CEPE; RENP II). The programme's relevance for the hydropower sector has improved compared to Renewable Nepal; mainly thanks to the integration of the hydropower specific component in the Programme. The hydropower industry is represented in most of Hydro Lab's activities. RENP II also appears relatively but not exclusively relevant for the industry, representing three of seven RENP II projects. The strengthening of the Turbine Testing Lab and the Hydro Lab increases the potential of research-based institutions to provide relevant services to the hydro power sector. It provides opportunities to develop much needed expertise for the hydro power sector, an opportunity that is leveraged in particular at TTL. Ownership by all parties to the Partnership Agreement seems solid.

4.6 Program Efficiency

EFFICIENCY:

"A MEASURE OF THE OUTPUTS – QUALITATIVE AND QUANTITATIVE – IN RELATION TO THE INPUTS. AN ECONOMIC TERM SIGNIFYING THAT THE AID USES THE LEAST COSTLY RESOURCES POSSIBLE IN ORDER TO ACHIEVE THE DESIRED RESULTS. THIS GENERALLY REQUIRES COMPARING ALTERNATIVE APPROACHES TO ACHEIVEING THE SAME OUTPUTS, TO SEE WHETHER THE MOST EFFICIENT PROCESS HAS BEEN ADOPTED"

OECD-DAC

The following summarizes the findings with regard to efficiency as degree of achievement of specific targets (indicators), the implementation modality, and the use of financial and other resources.

Section 4.4 above describes progress within each sub-component. **Table 7** summarizes the achievements vs the specific targets (indicators) established for each Outcome, or objective statement.

It should be noted that this overview does not exactly correspond to the LFA. For the hydropower component, the Progress Reports include both Outcome and Output indicators. As a compromise, the table includes the main 'Outcomes' from the LFA as well as the 'Programme Key Targets' as listed in the Progress Reports. Additionally, two indicators related to the establishment of Centres of Excellence, which appear to be relevant, are added for this assessment.

The column on the right indicates the Team's assessment of the likeliness that the targets will be achieved, based on the progress so far.

The overview provides an indication of whether the Programme is on good track, and potentially to identify challenges that need to be addressed.

Table 7 *Performance indicators on Outcome level and progress toward targets*

Hydropower component	KPI	Target	Chances of success

OUTCOME: **Capacity enhancement of research and education capacity to support hydropower development in Nepal and region**	Institutions involved	4	Achieved
	Innovative products and knowledge developed through research	2	It is unclear what specific products will be are counted.
	Academic graduates (PhD/MSc)	11	Good. See below
	Installation of piping network *	01	High (UP?)
	Numerical hydraulic model study *	01	High
	Turbine testing lab installed *	01	High. IEC standard equipment installed in May 2019; pending IEC calibrated equipment, testing and verification.
	Model Francis turbine runner fabricated and tested *	01	High. Good progress.
	Masters graduates supported *	07	Good. 3 supported by end Year 2
	PhD graduates supported *	04	Good. 2 supported by end Year 2
	Peer-reviewed articles published *	06	Possible. Only 1 so far; likely to pick up in later phases.
	Plan and strategy for Centre of Excellence in Power Engineering **	01	Achieved
	Plan and strategy for Centre of Excellence in Trade Research and Facilitation **	01	Achieved
RENP II component	**KPI**	**Target**	**Chances of success**
OUTCOME: **Develop applied research and education capacity required for renewable energy development in Nepal and the region**	Projects benefited	10	High. 7 supported so far potential of more projects with more budget.
	New products developed	20 (?)	Target it presumably wrong, as only 10 projects are supported. Progress Report refers to 10 as target; Annual meeting presentation 8.
	New products in market	10	Low chance of success. The target is unrealistic and should be revised.
	Institutions involved	20	High. 17 involved in current 7 projects.
	Trained HR in R&D and commercialization	20	With 10 projects supported this should not represent challenges. Target may be set too low? RENP reported 245 research staff involved.

Note: Outcome indicators in the PD Logframe per main Component.

The additional other, Output related, "Programme Key Targets" that are highlighted in Progress Reports are marked with *.
Two indicators marked ** are added by the Consultant, as they appear to be missing in performance ratings.

It appears that the programme is on a good track to achieve the targeted outputs and key performance indicators.

The delays that have been seen so far are mainly related to procurement of equipment in Hydro Lab and TTL; but this appears to be solved more recently.

As noted in the table, there is inconsistent references made to the targeted number of products introduced to market. While 20 appears to be an error in the logframe, even 10 appears unrealistically high. In the presentation by PO for the Annual Meeting 2019, the target is referred to as 8 marketed projects.

Building on experience from RENP I, where 11 of 21 projects concluded with marketable projects, it is unlikely that RENP II will have a 100% or even 80% success rate in producing marketable products. The target should be reconsidered.

Budget management and use of funds.

As noted above and shown in Table 8, the programme has so far spent less funds than originally budgeted for.

Table 8 *Programme spending vs. budgets, year 1 to date*

SN	Programme Components	RNE	Others	Total	Of budget
A	Operation and Management of Programme Office	**18 195 541**	**-**	**18 195 541**	**62 %**
B	**Hydropower Development Component**	**72 324 510**	**9 668 475**	**81 992 985**	
B.1	Capacity building of existing Hydraulic Laboratory	36 303 178	4 255 574	40 558 752	35 %
B.2	Establishment of centre for design, operation and maintenance of mechanical equipment for hydropower plants	35 611 198	5 412 901	41 024 099	55 %
B.3.1	Center for Electrical Engineering (CEPE)	128 028	-	128 028	10 %
B.3.2	Center for Electricity Trade Research and Facilitation (CETRF)	282 106	-	282 106	
C	**RENP II Component**	**21 072 377**	**971 240**	**22 043 617**	**13 %**
	Plus spending across all components, Norwegian partner budget	9 197 582	-	9 197 582	0 %
	TOTAL	**120 790 011**	**10 639 715**	**131 429 726**	**30 %**
	*BUDGET**	*318 750 000*	*121 584 000*	*440 334 000*	

The underspending from the first two years has to some extent been rectified in year three. The budgets for year 4 indicate an expected high level of activity, which hopefully will be achieved. However, even with full use of the budget for year 4, there is a high chance that the funds will not be fully spent by the end of the fifth year. **Figure 17** shows the use of funds to date. This indicates that 1/3 or the RNE budget will be left for the last year. Further, less than half of the planned 'other' contributions has been mobilized.

As a result, it would be recommended that while planning the budget for the last year of implementation, Programme Management should consider the gap in spending.

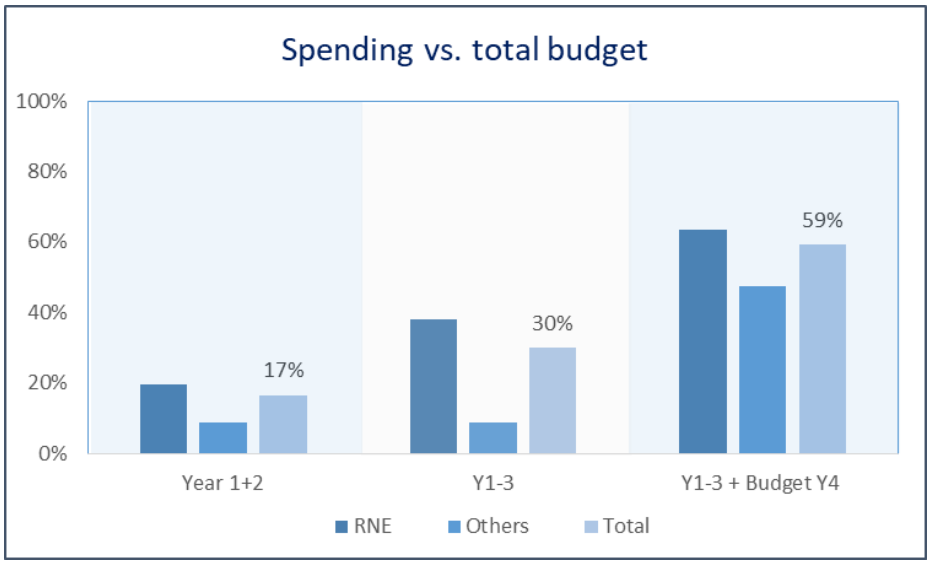


Figure 17 *Use of funds versus total Programme budget, accumulated after year 2, 3 and 4 (est.)*

Programme management and governance

As noted above, the stability of the PAC and the PSC has been a strength of the programme and reduced the impact of the challenges related to the Programme Office at Kathmandu University that manages the day-to-day Programme operations. The PAC appears to ensure the cooperation and communication within the group of Partners, and the Project Selection Committee ensures transparent and consistent RENP project selection procedures. That said, the PSC does not appear to have been able to establish clear procedures with regard to the Strategic calls.

As noted in section 0 Quality of Planning and 4.3 Compliance and Management, the placement of the PO at KU has been subject to some concern, and staff retention and continuity has been weak with significant impact on some sub-components.

While KU's strong position may indirectly and unintentionally have influenced involvement of other institutions such as TU, the PO placement at KU undoubtedly represents significant benefits. With the long history of cooperation with Norwegian institution in hydropower research and academic programmes as well as their role as recipient of Norwegian support and manager of the RENP programme, ensured a well-known and trusted counterpart as manager of a relatively complex programme with significant funding, and facilitated continued cooperation between KU and NTNU/Sintef. In addition to the ownership to the Programme, the localization of the PO also provided office facilities and the benefit of established financial management and administrative systems, procurement procedures. While this implies some bureaucratic procedures, it is likely to have reduced costs and secured appropriate practices in financial management and procurement.

It is unlikely that the staff retention would have been better if the PO was placed outside KU. Based on various interviews, there is no evidence that this problem stems from internal conflicts. Rather, several interviewees point to the salary levels as too low to recruit and maintain relevant candidates. The appointment of KU faculty as the last Programme Manager by KU management and the lack of documentation of PAC involvement in this process should be noted in this regard. While the appointment may not have been fully in line with Programme governance principles, the ability of KU to provide this solution limited the period the Programme operated without Programme Manager.

The sum of the above provides no clear evidence that a localization on more 'neutral ground' outside KU would have been a better solution for the Programme Office. To ensure continued efficiency, special emphasis should be made on reinstating efficient communication between PO and the PAC once the new Programme Manager is in place. Additionally, stronger communication and visibility for the Programme and the opportunities for other institutions would be an advantage.

Summary and recommendations

The programme shows good progress toward the specific quantitative targets in the established Logframe.

Spending of funds has been lower than budgeted for, but has increased in the third year due to unlocking of some procurement related challenges.

There is nevertheless a significant chance that funds will still remain after year five. Meanwhile the ability of the Programme to mobilize external funding has not been sufficient to ensure the planned contributions by other parties than the Embassy. Without sharp increase in contributions by other parties, the planned balance between RNE funds and other contributions will not be achieved.

The Programme Governance structure is appropriate, with the PAC representing the partners, the PSC as custodian of the RENP selection procedures, and the PO managing the day-to-day operations.

The placement of the PO at Kathmandu University implies a dual role of funds manager as well as beneficiary of research projects. The benefits of this arrangement are however also significant. Care should be made to ensure neutrality, improve communication and visibility of the Programme, and strengthen the involvement of external institutions and other potential beneficiaries and contributors.

The interest from industry to participate in RENP II has been adequate and ensured competitiveness in project selection. Some weaknesses with regard to selection procedures are nevertheless concerning and should be addressed.

4.7 Effectiveness

EFFECTIVENESS:

"A MEASURE OF THE EXTENT TO WHICH AN AID ACTIVITY ATTAINS ITS OBJECTIVES"

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Effectiveness assessment focus on whether the objective of an intervention is achieved, or is likely to be achieved.

The overall objective of ENEP is to improve capacity of research and education required for development of the renewable energy sector in Nepal and the region. This statement is very similar to the objective statements for each component, which only differ in that the hydropower component exclusively targets hydropower.

At the Mid-term stage, it is appropriate to assess whether the objectives are likely to be achieved. As shown in the table in the previous section, there is good progress toward achieving the Component specific objectives indicators.

This indicates that it is likely that the Programme will effectively produce results in enhancing capacity for research and education within power and renewables. This is strengthened by the findings gathered and reported throughout this report. Further, the research and services are relevant and likely to be providing actual value for the development of the industry.

It is nevertheless appropriate to mention that the indicators to measure progress against the overall objective are simply the sum of the indicators for the Component specific objectives (albeit with some inconsistent targets values), and **will not actually measure the impact of the achieved results of the programme.** Specifically, neither involvement of institutions in Programme activities, development of human resources through training, practical experience and education, or availability of products is a good measure of whether the capacity developed is employed, relevant for the country's development ambitions, and provides value for the community. While more challenging to measure, a real impact evaluation should rather look to the wider effects of the results. This implies that any later evaluations will have to assess impact without pre-defined impact evaluators.

Summary and recommendations

The programme shows good progress toward the indicators set for the Overall and Component specific Programme Objectives.

The actual establishment of capacity for research and education or relevance for the sector is likely.

The overall objective indictors are not useful for later evaluations of the impact of the Programme and its outcomes.

4.8 Sustainability and risk

The durability of results (capacity for research and education) is here considered in terms of financial sustainability, i.e. to what extent industry is ready to finance research activities and/or pay for the services provided by Hydro Lab and TTL, and KU's ability to secure long-term financing other than from RNE.

SUSTAINABILITY:

"MEASURING WHETHER THE BENEFITS OF AN ACTIVITY ARE LIKELY TO CONTINUE AFTER DONOR FUNDING HAS BEEN WITHDRAWN. PROJECTS NEED TO BE ENVIRONMENTALLY AS WELL AS FINANCIALLY SUSTAINABLE"

OECD-DAC

Kathmandu University is established as an 'independent' research institution, in that is relies not only on government funding but also mobilizes financing from the business community, the general public and its students in the form of donations, external assistance, tuitions and fees. Norway is one of KU's main financial supporters, joined by Japanese, Danish, Indian, Swiss and Nepali governments and foundations.

It is natural to assume that an academic institution cannot operate solely on student tuitions and fees, but that government and external support will continue to be necessary. This is true for most academic institutions throughout the world.

That said, the ability of KU to mobilize funding from the business community will enable a broader field of research activities and provide stronger contributions to community through development of relevant expertise and skilled human resources. RENP is a direct invitation to industry to participate in research while funding only a fraction of the real costs. While interest from industry to participate in funded projects has been good, in fact highly competitive, the willingness to provide funding, in particular cash contributions, has been difficult to mobilize. It should however be considered that RENP may have been the first explicit attempt to establish such links between industry and academia through research, and that **the potential also for financial contributions may slowly pick up as the cooperation proves valuable. Full industry funding for research appears however unlikely.**

Meanwhile, payment for specific services of relevance for investment projects, as provided by Hydro Lab and TTL, is more realistic. **Hydro Lab already operates to a significant degree based on revenue from clients in the Hydropower industry**. This should prove the long-term sustainability of the support. That said, further collaboration on research projects should be encouraged. This will ensure that the lab's services remain relevant and at the forefront of the development, and provide opportunities for training of skilled man power that is needed in the sector.

TTL has not reached quite the same ability to exploit the revenue potential represented by the industry. It has been able to mobilize funding for research through RENP and other programmes. It lists several companies on its list of contributors, but according to most of interviewees, the lab's focus is on research and use in academic programmes rather than selling services to industry. According to the NTNU PAC member, however, given the verification of international standard turbine testing capacity, the relevance for industry should be easier to sell. **TTL thus has a potential for at least partial financial sustainability.**

In perspective of the strong emphasis on the relevance for the Nepali hydropower industry specifically, and the contribution of the programme to enhance financial sustainability of hydropower research activities, it is noted that the Results Framework could have been better designed to measure these factors. As an example, a disaggregation of Hydropower industry engagement versus other that of other industries would facilitate specific reporting on whether the programme effectively reaches that industry; and help maintain focus on industry contributions in management of all components of the Programme. This may be considered in the eventual revision of the logframe in relation to the Upscaling Proposal.

Risk management

As noted above, the PO monitors and reports on the risk matrix established in the PD. However, this risk matrix mainly reflects external risk, and not risk internal to the programme, such as staff retention, or fair and transparent procedures to select projects to benefit from funding and staff for management or research positions.

Making the risk matrix more flexible and include experienced, not foreseen risk, of both external and internal nature, could improve the risk management and overall Programme quality.

Summary and recommendations - Sustainability and Risk

KU as a 'non-governmental' academic institution naturally relies on a variety of funding sources, and is likely to continue to be partly dependent on donor financing.

It is likely that RENP II contributes to engaging the Industry in research activities, with some effect also on the potential for financial contributions to research by industry. However, the potential is so far not sufficient for future research activities to rely on industry funding, in particular in the relatively young renewable energy field.

Hydro Lab has potential for at least partial self-sustainability as a relevant service provider to industry with services that are in high demand. Continued research to remain relevant and up-to date is still relevant and may not be fully internally funded.

TTL has some potential to be partly industry funded, but appears to have a way to go before exploiting this potential. Emphasis should be given to this element in the last phase of the Programme, including the verification of international standard turbine testing capacity.

4.9 Cross-cutting issues and other issues

Gender and social inclusion

Gender and social inclusion have been given attention in the planning of the Programme as well as in the implementation. The PD states that two of 11 higher academic grade students (PhD/MSc level) supported by the Programme shall be women; that gender balance will be considered in recruitment of staff and participants for trainings; and that gender and social inclusion will be incorporated in RENP criteria.

"Projects that encourages participation of women in research" is explicitly highlights mentioned as one criterion for eligibility in the RENP call for applications documents, and incorporated as selection criteria. According to the PO, out of a total of 68 persons involved in the 7 awarded RENP II projects, 12 are women. One of the RENP Strategic call projects is engaged with community electrification; an initiative that explicitly targets vulnerable or poor, rural populations, and shows that also selection of topics for strategic calls maintains the focus on such issues. Additionally, one researcher involved in CETRF is a woman.

Hydro Lab staff engages 6 women among their 25 staff; including three of the engineers. These three are among the six Hydro lab staff that are directly supported by ENEP. Hydro Lab additionally informed that they promote one female PhD student and one Master student.

TTL does not engage any female engineers; there is only one intern who works with accounting and finance. The Financial officer at the ENEP Programme Office is woman. There is also one woman involved in the turbine technology related project[28] under RENP II.

The programme has so far not been successful in recruiting women PhD candidates; this is reported to have held back the recruitment of candidates for the Programme supported PhD position.

It is evident that it is challenging to recruit women, particularly for higher grades and positions in research. This is however not unique to Nepal or even developing countries. Establishing explicit targets, repeating the message in communication related to calls for applications or invitations for participation in research and training activities, and maintaining the focus on the issue is necessary. The topic should remain as an item on the agenda for all formal meetings in the programme.

Reporting on the Results Framework

As mentioned in section 4.3, the Programme Management actively uses the Logframe indicators to report on progress. While there are some minor deviations from the PD logframe, and some potential for improvement in the reporting approach, this enables to follow progress from year to year. The use of the table in future progress reporting is encouraged, and appears to facilitate the management's continued focus on the established targets and progress toward achieving these.

[28] ENEP-RENP-II-17-01, "Turgo turbine technology for rural Nepal"

In order for the Results Framework (RF) to be a useful management tool, however, the PO should be encouraged to actively consider the assumptions in the logframe, and to what extent the deviations from plans may be explained by any assumptions that do not hold. Combined with the risk reporting – which, as noted above, is well followed up – this could make the reporting process more useful for the management to maintain focus on critical risk factors.

Hydro Lab reports on risk and deviations as well as quantitative activities and outputs; but does not appear to be explicitly referring to the risk management framework, the assumptions noted in the logframe; nor the outcome level (i.e. keeping an eye on whether the activities and outputs produce the targeted outcomes).

There is no clear evidence that the Norwegian partners actively consider the results framework as a management and guidance tool.

Anti-corruption and conflicts of interest

As noted in section 4.3, the use of KU's administrative systems for accounting, audit, and procurement as well as the external audits create a high credibility that appropriate safeguards are in place and reduces risk of corrupt practices. The potential conflict represented by KU as manager of funding allocated for academic and research activities both at KU itself and in other institutions, needs to be monitored by the PAC and/or PSC (for RENP activities) and safeguarded through well established and transparent routines. This appears to be well in place and appropriately managed when it comes to Open calls, however, the routines for selecting topics and implementers of Strategic calls under RENP need revision.

NTNU and Sintef value added and ownership

As noted under Sustainability above, the engagement and activities by representatives from the Norwegian partner institutions is given very little attention in Progress Reports as well as the PO Annual Meeting presentation. The interviews with both Nepalese and Norwegians involved in the Programme and the field mission observations, give clear indications of the involvement.

Sintef's main engagement has been as member in the PSC, as well as guidance of students, PhD and development of curriculum. Their contribution in ensuring consistency in procedures has been valuable; however as mentioned above, the routines and/or communication between the Programme management and the PSC appears weaker in RENP II than the previous experience. In particular the approach for Strategic calls has not been closely followed. Sintef has been a dialogue partner for, among others, the KU PAC member and TTL manager throughout the cooperation.

NTNU's engagement is strong and is being solidified on institutional level. NTNU's representatives have been actively engaged as advisors for the activities in both TTL and Hydro Lab, and also advised on curriculum development, student guidance and engaged in student exchanges and visits outside the direct support of the Programme. A number of joint research projects are under implementation, involving both Norwegian and Nepali students.

While the main hydropower components as well as RENP to a large extent have proven their sustainability as institutions (programme) which will continue to operate without direct Norwegian involvement, the value that their involvement represents is a clear strength for the programme. The relationships and experience further appear solid and positive enough to make future, continued cooperation likely. Such cooperation will, one or the other, still require some funding mobilized by either or both involved institutions.

The participation in development of Centres of Excellence by Norwegian partners is less evident. While both Sintef and NTNU provided input during the concept stage, they do not appear to have been much involved in the development of the detailed plans and start-up initiation, and no involvement is mentioned in the plans.

Summary and recommendations – Other issues
ENEP maintains appropriate focus on gender balance and social inclusion. Projects promoting social inclusion, benefiting vulnerable population groups, and involving female researchers and experts, are prioritized in open and strategic calls selection process. Recruitment of women for higher academic studies is challenging and poses a risk for achieving the Programme target for students in PhD/MSc programmes. The Result Framework is actively used in Progress reporting, there is some potential to improve the approach to provide better clarity with regard to progress against milestones as well as against than final results. Anti-corruption practices and routines are in place and follow up by the Embassy through external audits and audit reviews further reduces risk. KU's neutrality as funds manager should be monitored, explicitly addressed in formal meetings, and communicated externally to avoid any discouragement of other institutions to approach the Programme and its activities. There is a significant value added provided by the Norwegian institutions, through active engagement in the PAC as well as in Programme activities, as well as in development of curriculum, mentoring and student exchange which do not necessarily fall under the Programme but solidifies the overall relationship. The ownership by NTNU appears to be well institutionalized. While the main components appear to be sustainable enough to continue, there is scope for further value provided through joint research programmes, student exchange and other joint activities.

4.10 Findings

The findings related to the key review questions in the TOR are summarized as follows,

The Programme is relevant for Nepal, the hydropower sector, as well as for the priorities of the involved Norwegian institutions and Norwegian development assistance. The relationship between the organisations in the underlying Partnership Agreement – Kathmandu University, Hydro Lab, NTNU and Sintef - builds on a history of cooperation that extends back long before Energize Nepal.

Commitment to the Programme by the Norwegian partners appears strong and is becoming, to an increasing extent, entrenched within those institutions. In addition to Norwegian partners' support to academic activities and providing advice, collaboration on research activities provides value on both sides of the partnership.

The kind of technical know-how and research capacity fostered by ENEP underpins, to varying degree, academic research and technical services focused on development of Nepal's energy sector.

The Programme addresses an urgent need for local expertise needed to effectively exploit Nepal's significant renewable energy resources (in particular hydropower).

The Programme's objectives are likely to be substantially achieved. Delays in implementation of the Programme have posed some challenges toward achievement of the Programme's specific objectives. These delays are mainly due to factors beyond the direct control of the Programme management. Nevertheless, to the extent that the Programme continues to deliver progress and results, the Programme will deliver on the main objectives of establishing "capacity for research and education of relevance". Indeed, there is good progress toward most of the quantitative targets specified in the Programme's Results Framework and reported on actively by the Programme Management. However, it is noted that not all relevant progress indicators are included in Programme management reports.

Hydro Lab has shown that **there is scope for revenue generation through service provision** to the hydropower industry. As such, there is real progress towards the targeted exit strategy (improved self-sustainability).

The Turbine Testing Lab is also gradually building a foundation for revenue generation but has still a way to go to profitably exploit this opportunity. The response received from industry players clearly points to **challenges in mobilizing industry funding for joint research activities.**

Programme efficiency is aided by an appropriate Programme Governance structure, with the PAC representing the partners, the Project Selection Committee (PSC) as custodian of fair and transparent RENP selection procedures, and the Programme Office at Kathmandu University's School of Engineering managing the day-to-day operations.

The Programme's rate of spending suggests that **the budget for Norwegian funding may not be fully expended by year five** (Programme end date). Financial reporting also shows that contributions from other funding sources than RNE is lagging behind budgets.

Risk management is acceptable but could be strengthened to include risks related to programme implementation, transparency, and reputation. The review has identified some such risks that are not reflected in ENEP's risk management framework. The placement of the PO at Kathmandu University (KU) implies that particular effort to guarantee neutrality as programme and funds manager and ensure good communication and visibility of the Programme is necessary. KU has been the main beneficiary of all activities, including as participant in projects awarded through competitive processes. **More could be done to strengthen the procedures and transparency of the project selection processes**, and encourage involvement of external institutions and other potential beneficiaries and contributors.

The recommendations from the 2015 appraisal are to a large extent embodied in the Programme. This illustrates willingness and ability by the project promoters to adapt to the donor's priorities and funding limitations. One exception is related to the incubation support under the RENP II component. The information provided related to this area of support does not provide sufficient clarity. Other issues that deviate from the Appraisal recommendations are relatively minor with limited impact on the Programme.

The Programme has a **documented focus on women and social inclusion, including specific targets** and as one of the criteria in RENP project selection. Nevertheless, among the 94 Nepalese directly involved in project activities so far only 17, or 22%, are female. That said, the engineering sector is traditionally male dominated, and the representation would probably have been even lower without focus being given to the issue.

4.11 Lessons learned and Recommendations

The experience with implementation of ENEP so far provides a number of 'lessons learned' which should be kept in mind in the final phase of the current Grant Agreement, as well as taken into consideration in planning an eventual extension of the Programme.

Some of these "lessons learned" relate to overall programme governance and management; others to specific subcomponents. They are presented below along with some specific recommendations for improvement.

Programme governance and management – lessons learned

Institutional cooperation requires long-term commitment. The individuals involved in ENEP have maintained the long-standing relationship between KU and NTNU/Sintef well. The relationship builds on a combination of personal relationships, strong commitment among the Norwegian partners to support their partner institution as well as Nepal's continued hydropower development. Through strengthening knowledge and research capacity on the Nepalese side, opportunities for joint research activities with benefits for both sides of the cooperation emerge. Recent reconfirmation of a MOU between NTNU and KU and the confirmation of intent to cooperate with TU, show that cooperation not only relies on personal relationships but is becoming institutionalized.

The stability of PAC and PSC representation has been a strength.

The bundling of several support projects into one large programme related to research cooperation in hydropower and RE has had both advantages and challenges. Concentrating Norwegian-supported activities has likely reduced the total burden of programme management, creating management efficiencies. On the other hand, it also increased the complexity of the programme. Management of multiple components and channels for funding places higher demand on good financial management as well as reporting routines. The Programme Office has handled this challenge quite well, but a few areas could be strengthened.

The integration or bundling of support projects has been successful in that **overlaps between components seem to have been largely avoided**. **On the other hand, integration into one programme appears to have created only limited synergies** between the components so far. Synergies are mainly achieved through use of the KU's facilities in RENP II, e.g. several projects involving TTL. This might have been possible even if the components were separate.

The hosting of the Programme Office by one of the main beneficiary institutions has created both advantages and challenges. KU's role as host for the programme has probably strengthened KU's ownership of the Programme. It was inherent in the Programme design that KU, with TTL and the activities related to development of centres of excellence, would be the main beneficiary together with Hydro Lab. However, it does create a risk for either perceived or real conflict of interest. Specifically, it was expected that the benefits or RENP II would be more evenly spread across more institutions. KU's participation in most of the projects poses a challenge to the reputation of the ENEP management as a neutral actor focused on providing equal opportunities to participate in and benefit from the Programme.

KU's decision to appoint its own staff member to replace the second (departed) Programme Manager also challenges the assumption of neutrality of the Programme management. On the other hand, KU's ability to provide a timely replacement was a strength in a challenging phase for the Programme.

In the light of these findings, we make the following recommendations (in no particular order):

9. Improve communication to ensure that other institutions involved in research, development and education in energy-related fields are made aware of the Programme, the opportunities for involvement and actively encouraged to participate;
10. Consider additional measures to strengthen other energy-sector institutions and industry participation in Programme activities;
11. Explicitly assess where new activities or elements to be supported in the Programme will be placed institutionally, such as Centres of Excellence;
12. Consider and implement measures to reduce staff turnover, discuss this in the PAC and document the outcomes;
13. With the recent changes in PAC, the PAC should consider an extraordinary PAC meeting to reconfirm working relationship and routines;
14. Continue to follow-up the institutional assessment to ensure that the improvements are implemented; and
15. Consider including in the risk management framework any unforeseen risks that have been experienced during implementation. Relevant risk to consider include but are not limited to staff retention, misperceptions of project eligibility etc.
16. Strengthen Programme reporting, by, for example:
    - Include budget and expenditure reporting that show i. total spending vs. total budget to date, ii. balance of funds per component and per partner. This could be a version of the table provided in the first progress report, which was not included in the year 2 report.
    - Include progress indicators for the Centres of Excellence in the logframe and report on progress (i.e. of all elements, also those without progress in the reporting period).
    - Reporting procurement-related issues, for example whether any single procurement has been over the threshold or whether procurements exceeding the threshold have been submitted to MFA for approval.
    - Describe involvement of the Norwegian partners. Briefing notes following reporting of Norwegian institutions' funding and contributions could be included in an annex.
    - Improve the risk management framework to include newly identified risk elements. Relevant risk may include but are not limited to staff retention and misperceptions of project eligibility.

RENP II – lessons learned

Documented procedures and routines to ensure fairness and transparency are important. The handbook developed for RENP I and the commitment to the established procedures by PSC is a strength for RENP II and has helped ensure quality projects and progress in periods of unstable programme management. The use of external evaluators in the procedure has also been a strength to ensure fair processes.

Conversely, there is a lack of written procedures and clear agreement on principles related to the strategic calls process. This has led to unclear procedures and inconsistent practices. In the interest of fairness, transparency and communication of equal opportunities, the PSC and PO should consider to:

7. Continue good practices implemented in the open calls process;
8. Continue practice with external evaluators;
9. Review and agree on strategic call process and update handbook;
10. Prioritize competitive procedures to the extent possible;
11. Make criteria and scoring/weighting principles applied known to the applicants; and
12. Review and assess the incubation support, and document the principles and procedures

Centres of Excellence – lessons learned

The task of strategy development and preparation of Centres of Excellence was placed in KU; but the PD did not explicitly identify KU as the future host for such Centres. It now appears that KU is automatically tasked as hosting solution without explicit assessment.

Whether or not KU continues as host for Centres of Excellence, such Centres also need to establish better links with relevant sector institutions to ensure relevance. This could allow research to play a stronger role in policymaking and regulation. A study into how research has played a role in informing Norwegian policy and regulation could be a useful reference in this regard.

To the extent Norwegian funds support further implementation of the planned centres – and if extended support is granted - the following could be considered:

5. Document the assessment and selection of host institution
6. Strengthen involvement of relevant sector actors and institutions (e.g. for CETRF, NEA/regulatory commission etc).
7. Consider relevant lessons from Norwegian experience?
8. Possible involvement of Norwegian partners and institutions and their contributions

Hydro lab and TTL – lessons learned

A good balance between commercial versus R&D orientation among centres and laboratories can have multiple benefits. A strong commercial approach improves financial self-sustainability through revenue generation and is proof of the relevance of research. Meanwhile, use of facilities in teaching activities and for research supports development of manpower and ensures that the centre or laboratory stays at the forefront of technological development. In ENEP, Hydro Lab has proven itself as valuable resource for the Nepali hydropower industry and is on the path towards commercial sustainability. In contrast, TTL has been useful for and strengthened by active use in various research projects.

To strengthen the balance between commercial and teaching/research use, the following could be considered

5. Promote a more commercial orientation/mandate for TTL;
6. Ensure that IEC standard procedure is verified in TTL;
7. Involve Hydro Lab more in academic and research activities; and
8. Consider relevant strategic topics that could be relevant for Hydro Lab and TTL respectively, e.g. applying the new equipment financed by the Programme.

5 Appraisal of Upscaling Proposal

The Appraisal of the Upscaling Proposal is based on a relatively short document submitted to RNE in October 2018. It is understood that RNE is positive to increasing the ENEP budget. The appraisal intended to provide an assessment of the relevance of the activities proposed and their contribution toward achieving ENEP's goals; the use of lessons learned from the previous projects and ENEP; and the Result Framework for the new activities.

Relevance

1. *Assess whether the activities under the Upscaling Proposal (UP) are relevant to the target group of ENEP program. What is the added value of UP for ENEP?*
2. *Assess whether the extra funding makes it more likely that ENEP achieves its goals?*

Use of lessons learned

3. *How has lessons learned from the previous projects and ENEP been incorporated in the UP? Make recommendations on a) coordination issues with other stakeholders, b) reporting obligation, and c) Any other business.*

Results Framework (RF)

4. *Assess UPs RF with reference to ENEP's RF. Assess baseline values, indicators and targets for new activities and assess their added value.*

Other issues

5. *Make up to five recommendations for the design/implementation of UP, also taking the findings in the review part into account.*

Figure 18 *Terms of Reference, Scope of Work (3C)*

In the debrief meetings after the mission, both at RNE in Kathmandu and at Norad in Oslo, the Team informed that the documentation available was not sufficient for an appraisal as foreseen. It was agreed that as a result, the Appraisal part of this assignment would focus on recommendations for improving the proposal, in addition to responding, to the extent possible, on an overall level to the specific questions in the TOR. The aim of this Appraisal is therefore to provide recommendations that will enable a revision of the proposal that ensures sufficient information available for a smooth decision-making process.

The contents of document provided is presented in Section 5.1, including high-level considerations of components, budget and the results framework. This is followed by brief assessments of each component/sub-component. Where possible, the team's views related to relevance, possible value added, proposed budget are presented. For each sub-component where outputs, activities and indicators are presented, a tabular presentation following the same logframe structure as the ENEP Programme Document is provided.

5.1 The Proposal

The document that the TOR refer to as **'Upscaling Proposal' is a request for a cost extension of the current Energize Nepal Programme** (entitled 'Extended Proposal' by the authors; hereafter referred to as 'the Proposal'). It has the same objective statements as current programme; and the same main components, with the important exception that it introduces a component related to 'Hydro Power Engineering Research' in the Institute of Engineering at Tribhuvan University (IOE-HYPER).

The rationale of the Proposal appears to be mainly the fact that ENEP was originally proposed with a significantly higher budget that what was finally agreed. In the Grant Agreement, the Norwegian contribution is approximately 1/3 less than the requested funds. At the same it is noted that the difference of the total budget in the approved PD versus the original proposal much more significant; the approved PD's total budget is only 21% of the original proposal. The difference lies in the estimated contribution from other funders; 9.5 million NOK in the approved PD versus 123 million NOK in the original proposal.

Although the Proposal refers to the downscaling of the budget from the original plan, the activities proposed in the Proposal do not correspond to the parts that were taken out from the original proposal. The majority of the extended budget is allocated to existing sub-components, but some elements are introduced for the first time. The rationale for an additional budget for ENEP thus does not fully lie in the difference between the originally proposed programme and the funding that was made available through the Grant Agreement.

Table 9 shows the elements that were originally proposed but not included in ENEP; those in the Proposal that build on the current components, and those that are introduced for the first time in the Proposal

Table 9 *Components and sub-components in original ENEP proposal; Grant Agreement; and Upscaling Proposal*

# (in UP)	Component/Sub-component	Original PD	Grant Agreement	Upscaling Proposal	Note
A.	**Programme Management**	✕	✕	✕	Additional budget
B.	**Hydropower**				
B1.	Hydro Lab	✕	✕	✕	Additional budget
B2.	Centre for design, manufacturing etc. (TTL)	✕	✕	✕	Additional budget
-	Geotechnical	✕			
B3.	CEPE		✕	✕	Additional budget
B3.	CETRF		✕	✕	Additional budget
-	Business Incubation	✕			(Partly included in C.)
B4.	Centre for R&D of Tunnelling and Rock engineering			✕	New
B5.	Hydropower Development Centre			✕	New
C.	**RENP II**	✕	✕	✕	Additional budget
D.	**IOE-HYPER**			✕	New
-	**RECIPE**	✕			NOT in ENEP

Budget

The Proposal does not present details other than the totals per component, divided by RNE and 'Others'. Assessments of the appropriateness of budgeting, item cost assumptions, and potential savings, are therefore not possible.

The total funding requested from RNE for the proposed activities is NOK 21 million. This represents an increase of 84% of the Norwegian funding as compared to the current Grant Agreement for ENEP. The total of the amount agreed as per the Grant Agreement plus the additional requested funding will be 46 million, as compared to the 40 million originally indicated in the first proposed Programme document (2015).

In addition to the Norwegian funding, a contribution of 17% of the proposed budget is proposed to be sought from other sources. No information with regard to foreseen contributors is provided, and the Proposal does not address the strategy to approach potential contributors or the realism of the budgeted contributions.

The proposed amounts per component/sub-component and funding category are presented in Table 10. The table also shows the relative increase compared to the Grant Agreement that the proposed amounts represent, and relative shares of the budget for RNE and 'Others'.

Table 10 Upscaling Proposal – Requested budget per component and sub-component

Upscaling proposal Proposed budget and Percentages increase from ENEP All in NOK 1000	TOTAL BUDGET		RNE		Other contributions	
	Budget	% incr.	Budget	% incr.	Budget	% incr.
A. Programme Management	**500**	*16 %*	**500**	*16 %*		
B. Hydropower	**11 654**	*67 %*	**9 500**	*69 %*	**2 154**	*61 %*
B1. Hydro Lab	5 254	*58 %*	4 500	*60 %*	754	*48 %*
B2. Centre for design, manufacturing and operation and maintenance of mechanical equipment for hydropower plants (Turbine Testing Lab)	1 300	*20 %*	1 000	*21 %*	300	*17 %*
B3. CEPE/CETRF	1 300	*77 %*	1 000	*65 %*	300	*191 %*
B4. Centre for R&D of Tunnelling and rock engineering	2 500	*New*	2 000	*New*	500	*New*
B5. Hydropower Development Centre	1 300	*New*	1 000	*New*	300	*New*
C. RENP II	**5 776**	*41 %*	**5 000**	*62 %*	**776**	*13 %*
D. IOE-HYPER	**7 500**		**6 000**		**1 500**	
TOTAL	**25 430**	*74 %*	**21 000**	*84 %*	**4 430**	*46 %*
Percentage of total		*100%*		*83 %*		*17 %*

The proposed division between the different components is shown in **Error! Reference source not found.**. Due to the lack of detail, in-depth assessments are not possible. The assessments in section 5.2 include some considerations related to each component.

A few high-level observations are made:

- A significant part of the proposed funding, close to 30%, will go to the IOE-HYPER component. As a new component which has not previously received support, this appears natural.
- Other than IOE, RENP and Hydro Lab remain the largest components.
- The proposed budget for Programme Management is only 2 % of the proposed budget. This may seem low, considering the added complexity of the Programme.
- Budgets allocated to the Norwegian partners' involvement are not specified
- Alternative sources of funding are not named or otherwise described.

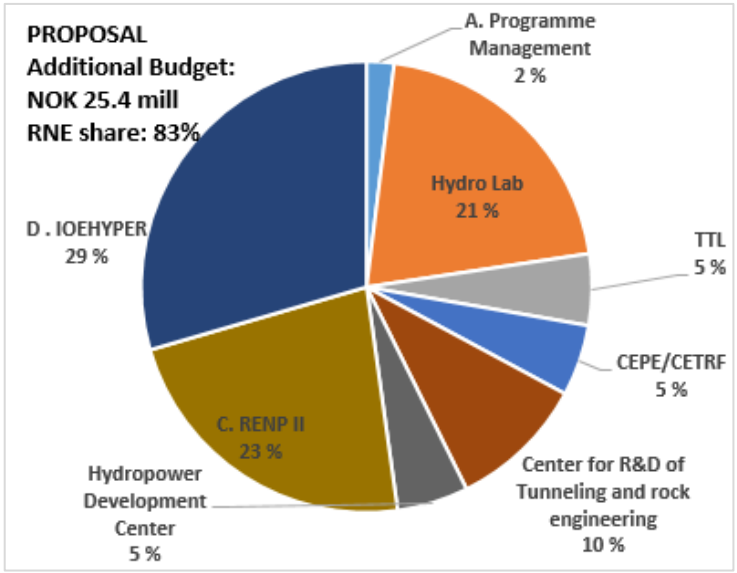

Figure 19 Upscaling Proposal - Components proposed for funding

Figure 20 shows the changes from ENEP as per the Grant Agreement, to the extended ENEP given the budget increase and the additional components.

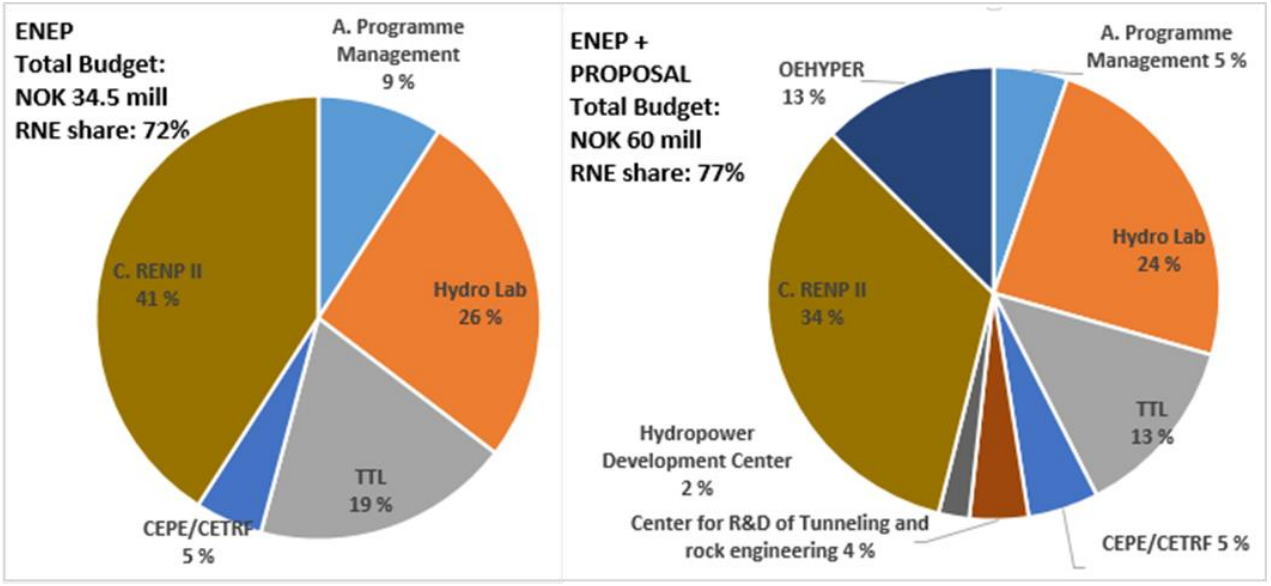

***Figure 20** Relative shares of budget per component; as per Grant Agreement (Left) and as proposed for extended budget (right)*

Results framework.

The presented elements in the Proposal should be established as a Results Framework. Ideally this should be integrated with the current logframe, to represent the full programme after the extension. The framework should show new or additional targets to highlight the added value of the additional budget. ANNEX V presents a structured set-up which corresponds to the current logframe.

Many elements of the results framework are in place. However, the indicators for some of the components are of poor quality and needs review to fulfil the criteria for 'SMART' indicators. This is commented upon for the relevant sub-component in the assessments in the next section.

***Box 5** SMART Indicators*

SMART INDICATORS

Well established M&E practice agrees that "SMART indicators" are necessary to enable meaningful results measurement.

There is some variation as to what the abbreviation stands for, but most theory identify SMART as follows:

- **S is for Specific.** This means that the indicator clearly and directly relates to what is being measured, is unambiguous, and all Parties have a common understanding of the indicator.
- **M for Measurable.** Agreement is also broad about the M: Measurable. A good indicator must be possible to count, observe, analyse, and test.
- **A is referred to as Achievable, Attainable, or Attributable**: The indicator's targeted value should be possible to achieve and should be achieved as a direct or indirect result of the intervention and the activities, and it should be possible.
- **The R means Relevant or Realistic:** There must be a relationship between what the indicator measures and what the programme provides (support, funding) to create the targeted results, and it must be realistic to achieve the target with the inputs and within the time frame for the intervention.
- **The T means that the indicator must be Timely and Time bound:** It must be possible to collect the data with an effort that corresponds to the value of the indicator as a measure of results, and data must be available at the time when monitoring will happen.

Many sources of information provide more details, e.g. https://eca.state.gov/files/bureau/a_good_start_with_smart.pdf

General comments to the Proposal.

The Proposal does not contain sufficient information for the Team to do the necessary assessments for a Programme and budget of this magnitude.

The main weaknesses observed are summarized below. Section 0 provides a set of specific recommendations to improve the basis for assessment of the Proposal, which should be communicated to the Programme Office and the partners.

The following issues are general across the document:

- Insufficient background and rationale
  - There is basically no reference to the ongoing ENEP, other than in a short 'Background' paragraph;
  - The components are not referred to as 'existing' or 'new', or whether originally proposed or not.
- No justification as to how the additional funding and activities will help achieve the Programme's objectives, contribute to sustainability, or ensure realization of the exit strategy.
- No reference to lessons learned – whether challenges and the management of these will be improved based on experience; or positive lessons that will be built upon and transferred to other elements.

  - Not least it is important to consider the experience with generating interest among and mobilizing participation and financial contributions from the industry, as this also influences the realism of the exit strategy and whether it should be revised.
- While various relevant results management elements are presented, no structured Logframe is presented
  - This makes the assessment of the contributions from additional funding versus the planned achievement challenging
  - Inconsistent numbering of the various elements through the Proposal
- The targets for several components appear unrealistic to achieve within the remaining period of ENEP. The proposed duration of the activities of 2.5 years should be a minimum; at this stage this will imply a time extension of at least 1.5 years.
- No assessment of potential overlaps or synergies between the various sub-components and stakeholders involved in the Programme.
  - For example, activities and competence strengthening within geotechnical fields are proposed under three components; Hydro Lab, Centre for R&D in Tunnelling and Rock Engineering, and IOE-HYPER, but the document makes no cross-references between these components.
  - There is a Centre for RET proposed as part of CEPE, as well as the CRES under RENP II. Renewable energy is also included in IOE's activities.
- No assessment of the Programme's governance. While the Proposal explicitly mentions that the Programme management 'is very effective', an assessment of how to integrate new elements and partners should be expected.
- No description of the cooperation with and contributions by Norwegian or other external partners to the Programme. Interviews with stakeholders, in particular Norwegian partners, indicate that while the partners are not familiar with the details of the Proposal, the topics and components have been discussed in the partner group.
- The budget presented is on a very high level and does not provide any details to enable a budget assessment
  - No breakdown of sub-components/activities; cost categories; or item cost estimates
  - There is no rationale or explanation behind the down-scaling of expected partner contributions, from 28% in ENEP to 17% in the Proposal; adding up to a weighted average of 23%[29]. It is likely to assume that this builds on the experiences and challenges met in mobilizing such partner and external funding; the Programme Management's view on this should be explicit.

With regard to the components/sub-components that already exist in the current Programme, there is

- No reference to achieved targets to date
- No description of how the additional budget will strengthen the elements that have already been achieved
- No rationale for new sub-components or activities within existing components
- Not referring to or building on any lessons learned through Programme implementation to date

With regard to the components/sub-components that are introduced for the first time in the Proposal, there is

- No background, context or rationale to justify inclusion of new elements (B4, B5 and D) to enable assessment of the relevance; effectiveness; and sustainability of these elements.

5.2 Assessment

Despite the weaknesses in the programme document, the insight gained through the review of the current Programme allows the Team to provide overall considerations related to the proposed components and sub-components related to relevance, potential value added, and the relevant lessons that can be drawn from the implementation to date.

While it is likely and natural to assume that the proposal builds on experience and lessons learned from the current implementation, there is no mention of this in the Proposal, neither in terms of an overall approach or with respect to specific components.

[29] Note also that the original proposal indicated 75% of total budget as contributions by partner/others.

The Team's brief assessments of the relevance of each component and sub-components, and possible relevant lessons to build on from the current implementation, are presented in the following.

A. Programme Management

With inclusion of more activities as well as a new ENEP partner (IOE), as well as in light of the experience so far, it is natural that the PO will needs an additional budget.

The Proposal claims that the Programme management is effective and will continue unchanged. For two reasons, this is considered insufficient:

- The weaknesses observed and reported thoroughly throughout Chapter 0 indicates a need to improve the overall governance and management of the Programme.
- The proposed inclusion of IOE. The Proposal should consider how IOE will be integrated in the governance structure. This includes reporting and communication routines.
- The increased complexity of the programme. It should be considered to what extent the burden of administration will be increased, and whether this would justify a strengthening of the Programme Office staff.

No details related to activities or outputs are provided.

No budget details are provided. Overall, the budget corresponds to only 2% of the proposed additional budget, which may seem low considering the added complexity of the Programme. Based on experience, the salary level for PM could be reconsidered.

The budget estimates should be provided; including showing whether funding for increased number of staff or salary increases are foreseen.

B. Hydropower

B1. Capacity building of existing Hydraulic Laboratory

The proposed elements as shown in

Table 11 **Hydro Lab - Outputs, activities and performance indicators** are considered relevant for the Nepalese context. To date, most hydropower plants have been Run-of-River (RoR). However, currently Peaking Run of River projects as well as projects requiring reservoirs are under development and study. The additional components will ensure that knowledge in this relatively new area – for Nepal – is available at the Laboratory. Such knowledge will add value to the sector in terms of capacity to manage the specific challenges related to sedimentation in Himalaya and ensure better operation and management of the new plants.

The strengthening of the newly equipped geo-technical laboratory is relevant due to the particular geological conditions in Himalaya, with frequent landslides and risk of damning. As noted below, the Proposal should take a holistic view on activities related to geotechnics, and explicitly address potential overlaps or synergies between the Hydro Lab facility and the ambitions of the proposed centre for tunnelling and rock R&D.

In light of the assessment above related to the potential benefits for the laboratory of strengthening academic and research orientation, improved capacity for accommodating internship candidates and research activities are also recommended. Opportunities for collaboration with IOE should be emphasized.

The budget proposed implies an increase of almost 60% from the approved ENEP budget, or a quarter of the additional funding. As a centre with an established commercial operation, an external contribution of only 14% as lower than what could be expected. A revised proposal should assess opportunities for other funding sources, and justify the need for continued Norwegian support.

__Table 11__ Hydro Lab - Outputs, activities and performance indicators

Outputs	Activities

		Performance indicators and targets
Enhanced power supply system, equipment and instrumentation of Hydraulic laboratory for physical model studies as well as field studies **(Current component 1.1.1)**	"1) Upgrade power supply system 2) Increase discharge capacity 3) Increase workshop equipment facilities 4) Increase laboratory instrumentation facilities 5) Increase field measurement facilities"	- Provision of four variable frequency drives in the pumps - One 200 lit/s pump installed at the laboratory - Added equipment and instrument facility at the laboratory - A set of bathymetric survey equipment and current meter available for field studies at the laboratory"
Development of competent manpower in the Hydro Lab's area of activities	"1) Contribute on education 1.1 Technical assistance and guidance to MSC thesis, interns and research students including laboratory facilities 1.2 Provide internship opportunity at the laboratory 2) Enhancing knowledge and skills of employees"	- Three higher studies/research works related to the company's field of interest supported of which one will be women/disadvantaged group as far as possible - Three young engineers provided with internship opportunity at the laboratory - Three employees undertake training related to their job nature within the country"
Knowledge shared among stakeholders	Publish research articles	- Publication of two research articles
Enhanced knowledge on hydraulics, sedimentation and ground engineering through research works	"1) Research on hydraulics and stability of boulder lined weir 2) Establishment of database for underground construction in Nepal "	- "Two knowledge product/information developed through research works: - Information on boulder lined weir design - Database for underground construction"

B2. Establishment of centre for design, operation and maintenance of mechanical equipment for hydropower plants

Local knowledge and capacity to assess erosion of turbines due to sedimentation is important. The testing procedures for the IEC standard equipment that has been installed will give the laboratory a valuable proof of competence in this area. The integration with the FranSed project which is implemented jointly with NTNU is also a positive element, and one of the few elements where Norwegian cooperation and contributions are mentioned.

As shown in Table 12, performance indicators are indicated. However, several of these are not specific and/or measurable and needs to be revised.

The proposed budget represents only around 20% increase of the ENEP budget for TTL. Nevertheless, it is noted that – with the exception of the explicit mentioning of the FranSed project – the planned activities (testing procedures as well as establishment of testing manuals) were already targeted in the ENEP PD. A revised proposal should present a thorough justification of additional budget to these activities.

Additionally, the share of funding from other contributors is lower than in the current budget. In light of the fact that the lab so far has been unable to mobilize the other contributions as foreseen in the PD, this seems to build on experience. However, as mentioned above, the lab should have the potential for a more commercial orientation of service provision. A revised version should address the potential for funds mobilization and explain why funding from other partners has been lower than planned.

Table 12 Establishment of centre for design, operation and maintenance of mechanical equipment for hydropower plants Outputs, activities and performance indicators

Outputs	Activities	Performance indicators and targets
IEC standard hydro turbine test rig installed and turbine performance testing procedure established at TTL	"1) Development of instrumentation and control system for model turbine testing 2) Procurement of computer software for model turbine analysis"	- Development of data acquisition systems for various types of measurements in testing - ANSYS and MATLAB simulation software will be available
Models of Francis Turbine runners are fabricated and tested in IEC standard test rig	"1) Development of design tools and programs and integrate it with CFD and CAD software for analysis and optimization of model turbines 2) Optimization and Numerical analysis of design 3) Manufacturing drawings of the new turbine 4) Development of fabrication procedure 5) Procurement and Installation in the IEC 60193 rig 6) Testing with IEC 60193 7) Develop compendium with guidelines for selection as well as design of Francis turbine for sediment erosion applications. 8) Develop assembly, installation and testing manuals."	- Development of design tools and programs - Optimized design and manufacturing drawing of model turbine - Model Francis turbine procured, installed and tested in the test rig - Fabrication and installation guidelines established"

B3. Centres of Excellence: Power Engineering (CEPE) and Trade Research and Facilitation (CETRF)

While the Proposal provides little detailed information, upon request the Programme Office provided the recently completed preliminary studies for these centres. This allows the Team to gain some more insight to the ambitions and plans for these centres than the sparse information in the Proposal document.

With regard to CEPE, the relevance of power engineering competence is confirmed through interviews with relevant sector institutions. The Institute of Electrical Engineering under KU School of Engineering, with the basic establishment of a HV lab already in place appears to be an appropriate host for CEPE. Meanwhile, an assessment of other potential host institutions would have strengthened the case.

CEPE will, not least, strengthen the competence are related to development of grid integration of renewable technologies other than small Hydropower. Nepal is at an early stage of development of this sub-sector, and there is a clear need to encourage capacity building. Potential overlaps and synergies between the proposed Centre for RET with the Centre for Renewable Energy Systems proposed under the RENP II component should be assessed and described in a revised proposal. On the overall, the activities proposed appear relevant for the proposed set-up and valuable in the Nepalese context.

The link with sector institutions, in particular NEA but also the new regulatory commission, should be considered and assessed in a revised proposal.

The Proposal includes Outputs, Activities and Performance indicators for CEPE. With the exception of 'laboratory equipment available', the indicators are for the most part reasonably specific and measurable.

The Proposal lacks any specific outputs, activities, and performance indicators for CETRF. According to the preliminary study, the ambition is to develop knowledge related to power trading. The ENEP PD provided some justification for the need of a centre related to power trade: Electricity trade is expected to play an important role in Nepal's economy, requiring experts in both technical fields and trading. Three years later, the prospects of electricity trade are no weaker. With Nepal's outlook to become a significant power supplier to the large Indian market within foreseeable future, this could prove highly valuable for Nepal.

It is not clear that KU is the obvious host for such centre. While the technical expertise related to load forecasting and demand modelling are relevant fields for KU, other elements of power trade and facilitation require involvement of other stakeholders with expertise and/or mandates related to regulation, power economics, and international relations. A revised proposal should address how such links will be ensured, and a justification for KU as host institution.

The budget presents one lump sum for both centres together. The ENEP PD only included funding for the preparatory phase of the centres, stating that other agencies would be approached for funding of the establishment and initiation of activities. The budget indicates an addition corresponding to 77% of the ENEP budget for CEPE and CETRF studies; but a large proportion of 'other' funding. A revised proposal should thoroughly account for the efforts done in this regard and justify the resort to Norway for additional funding.

Additionally, the ENEP budgeted funds for CEPE and CETRF are not fully expended, while the targeted outputs have been produced. A revised proposal should address the application/transfer of remaining funding to the actual establishment.

Table 13 *Establishment of Centre for Power Engineering - Outputs, activities and performance indicators*

Outputs	Activities	Performance indicators and targets
Experimental lab set-up for interconnecting solar PV into local grid at Department of Electrical and Electronics Engineering in Kathmandu University.	"1) Literature review on case studies of proven technology of grid penetration of intermittent RETs and energy storage concepts in similar countries. 2) Develop setup for grid interconnection of DG, analysing net metering and islanding concept of local grid interconnection. 3) Purchase of software for simulation. 4) Software modelling of grid interconnection of distributed generation into the Integrated Nepal Power System and validating with IEEE standards. 5) Economic analysis of grid interconnection of DG and design of Feed in Tariff."	- Software simulation result performed in Matlab-PSAT, HOMER will be made available. - DIgSilent Power Factory software will be available. - There will be at least one publication made.
Enhancing capacity of HV lab for testing.	"1) Upgrade existing HV laboratory set up. 2) Increase the existing testing facilities at HV laboratory. 3) Perform insulation break down test for insulators, cables. 4) Perform experimental set up applicable to Bachelor's and Master's students."	- At least one Bachelor's Project work and one Master's dissertation report will be supported. - At least one solid, liquid and gas dielectric strength insulation breakdown test will be performed and validated as per IEC standard

Establishment of RET laboratory set up at DoEEE.	"1) Purchase of smart grid trainer kit. 2) Purchase of interconnected hybrid energy trainer kit. 3) Purchase of PSCAD software. 4) Perform experimental set up applicable to Bachelor's and Master's students.	- At least one Bachelor's Project work and one Master's dissertation report will be supported. - Laboratory equipment will be available at the lab. - Labs performed will be verified as per IEEE standards. - PSCAD software will be available. - Simulation output will be made available

B4. Centre for R&D of Tunnelling and Rock engineering

The topic for this centre was identified in assessing relevant topics for Strategic calls, and one strategic RENP II project in this field has been initiated. The justification for selection of the topic, or for inclusion of the centre establishment in the Proposal, is not documented.

The Proposal does not specify where the centre will be established and how it will be staffed. While geotechnical studies and field work appears relevant for the Nepal Hydropower sector, it is noted that equipment of geotechnical studies and ground engineering is included in the Hydro Lab sub-component of ENEP, and Hydro Lab intends to carry forward strengthening of this facility in the extended programme. Additionally, competencies related to tunnelling and rock engineering are also considered for the IOE component. No assessment as to potential synergies or overlaps with these activities is provided.

A revised proposal should document an assessment of whether and how the Hydro Lab facilities could be leveraged through cooperation, the staffing strategy, and a justification of the proposed localisation of the centre, and whether cooperation with IOE is relevant.

The Proposal presents outputs, activities and performance indicators as shown below. The activities are not sufficiently specific to assess. The performance indicators are not specific and no quantitative targets are set.

Table 14 Centre for R&D of Tunnelling and Rock engineering - Outputs, activities and performance indicators

Outputs	Activities	Performance indicators and targets
Geotechnical investigations and analyses lab will be established	1) Program of field sampling, 2) Laboratory testing 3) Engineering analysis 4) Evaluation with the results	- Determination of the strength of an in situ rock mass by laboratory type testing - Development of empirical failure criterion for jointed rock masses - The existing rock mechanics lab and structural labs will be strengthened - Equipment: a) The equipment used shall be hand operated, power drilling, and driving equipment b) Equipment considered suitable for determination of the limits and conditions of the various soil strata, and for obtaining samples for examination, field classification, and laboratory analysis."
Design of the tunnel initial support, waterproofing, and final liner	1) Development of design tools and programs and integrate it with Flac3D, Phase II and CAD software for analysis of tunnel	- Development of design tools - Test for Racking and Ovaling deformation - Guidelines established"

	2) Numerical analysis of design 3) Model studies 4) Design and drawings of tunnel 5) Development of procedure to design of underground structures 6) Develop assembly, installation and testing manuals 7) Development of guidelines for selection as well as design of tunnel lining"

B5. Hydropower Development Centre

The documentation of this subcomponent is even scarcer than for the tunnelling centre. It appears that the strategy for CEPE/CETRF will be followed: specifying only the output in form of a preliminary study. However, it is highly uncertain what is meant by 'Hydropower Development', a relatively broad term. Even preliminary, a description should be expected, for example contents and objective of such centre, the services or research that it might host, the value it would represent, stakeholders involved and coordination with existing competence centres, and so forth.

Neither a relevance assessment of an assessment of the budget is possible. Generally, building on experience from ENEP, there appears to be a case to consider the sustainability of such centres, potential funding sources, host institution, possible research activities and services to be provided, the relevance and value for Nepal, as well as potential involvement of Norwegian or other partner institutions, in such a preliminary study. The description of the output of this activity should make these and other factors explicit.

C. RENP II

The competitiveness of the RENP II calls for applications has been very high; to the extent that some potentially interested projects have not been submitted due to low chances of award.

According to several PSC members, the quality of the received calls has been high, and some good candidates have been rejected due to the limited room for projects in the budget.

Based on this, the budget extension for RENP II is reasonable and recommended.

However, a condition for the extension should be that the procedures for selecting and awarding projects, both for Open and Strategic calls, are reconfirmed by the PSC and PAC. The PSC and PAC should also consider and preferably document an assessment of KU's neutrality and ability to appropriately manage their dual role without compromising transparency and fairness of the processes

The additional elements included under the extended RENP II component are difficult to assess, as no justification or background is provided. This is particularly true for the Centre for Renewable Energy Systems. As mentioned previously, there is limited knowledge in Nepal related to the potential value of RES in the integrated system and the technical and regulatory challenges increased exploitation of the potential implies. However, this should be properly assessed, including possible localization of such centre, relevant partners and potential sources of funding for its operation, and itemised budget estimates should be expected as a minimum.

Table 15 RENP II - Outputs, activities and performance indicators

Outputs	Activities	Performance indicators and targets

Four open call projects RNE funding	Four open call projects on RE and Hydro power sector will be awarded on competitive funding	- Research on 4 RE and/or Hydro power sector will be conducted - Collaboration with 8 institutions will be extended through research - Capacity building of at least 8 young researchers will be ensured through research
Two Strategic projects RNE funding	Two strategic RE and Hydro power sector will be awarded on non-competitive funding	- Research on 2 RE and/or Hydro power sector will be conducted - Collaboration with 4 institutions will be extended through applied research - Capacity building of at least 4 young researchers will be ensured through research
Establishment of Centre for Renewable Energy Systems (CRES)	A CRES under school of engineering will be established for dynamic research on RE systems.	- A CRES will be established - Research on optimization of energy systems will be conducted - Capacity building of at least 4 young researchers will be ensured through research - Collaboration with 4 institutions will be extended through applied research of the same field - Two journal articles will be published in the sector of energy systems"
Capacity building in RE and Hydro power sector	Series of capacity building trainings will be conducted in the sector of RE and Hydropower	- At least 10 trainings (at least of 5 variety) in the RE and hydropower sector will be conducted - Capacity building of at least 100 participants in the sector will be done Training manuals of each 5 variety of training will be developed.
Business incubation	Ongoing business incubation initiation will be enhanced through various support activities.	- At least 10 start-up business will be supported - At least 10 products will be developed and deployed in community - At least 5 previously supported start-up business will be supported to next level"
International network	International network of RENP II will be enhance through various training and project enhancement.	- At least 3 international networks will be established - At least 2 international trainings will be conducted either in Nepal or abroad"

D. IOE-HYPER

Involvement of the Institute of Engineering of Tribhuvan University was considered in the initial stages of preparation for ENEP, but did not materialize – “due to its own organizational structure” according to the Proposal.

The Proposal provides some quite general and overall information and rationale for the proposed expansion to include IOE in the Programme at this stage. It further informs that ‘IOE has sent letter of intent on 8th August 2018 to Energize Nepal to collaborate with the consortium partners.” This letter has not been provided, and the Team thus has no basis to consider its contents.

TU is Nepal’s largest academic institution, but has not offered energy or hydropower specific engineering education or research facilities. The recent establishment of a master programme in hydropower engineering is IOE’s main motivation for entering into the programme, with the view of strengthening curriculum and the competence base of the teacher force involved in the programme.

Table 16 *IOE-HYPER - Outputs, activities and performance indicators*

Outputs	Activities	Performance indicators and targets
MSPHE programme enhancement	1) Entrance Exam for Student selection 2) Student enrolment improvement 3) Student selection for mobility to NTNU for research 4) Lab equipment/software procurement 5) Research seminar conduction 6) Organizing Conference/workshop"	- Co-implemented education, research and development activities through student enrolment, lab Equipment setup, students mobility to NTNU, participation and organizing, conference/seminar/workshop, and number of publications
Enhanced institutional capacity at IOE	1) In-house faculty and fresh graduate selection for PhD enrolment 2) Post Doc program initiation 3) Knowledge sharing event between NTNU Resource person/ IOE Staff 4) Workshops and trainings"	- Increased number of mutually generated publications. - Increased number of interdisciplinary teamwork/ cooperation activities. - Co-organized and implemented workshops for academic staff Training of administrative personnel of IOE
Improved research repository network	1) System setup and network building 2) Digital content collection 3) Research theses integration onto system 4) Network handle/access /maintenance trainings"	- Monitoring access pattern and availability of materials, - Increased number of access - Increased number contents"
Greater collaboration with Hydro Lab	1) Physical Lab work at Hydro Lab 2) Joint research initiation 3) Practitioners training"	- More number of sessions for lab works - Number of collaborative research work and Publications Joint trainings for professionals"
Increased industry and professional interaction / bridging the skill gap	1) Organizing short-term training to industry / policy making (govt.) people and others 2) Getting feedback from others on Institute greater engagements"	- Increased number of MSHPE graduates to Industry/govt. - Positions - No. of trainings, no of interaction events"
Publication of research work and information disseminations	"1) Publish research work in National and international Journals 2) Research work presentations in National and international conferences 3) Organising institute level workshops for information decimations"	- Increased the number of research publications and conference proceedings

The Proposal states that the main objective of the IOE-HYPER program is **to support in establishing hydro power engineering program at IOE and then foster it with various activities to become as a national research centre from all of the aspects including human resource, knowledge repository and experimental labs so that the output of the program delivers the qualified manpower having high class research environment exposure on hydro power engineering.**

The Team in general terms finds inclusion of IOE in the Programme as a positive addition. Most stakeholders during the mission, including Norwegian partners, KU, and other stakeholders, confirms that this is a welcome proposal.

Based on the discussions held with both Institute representatives and Norwegian partners in the Programme, it appears that sufficient ownership to the programme and interest to collaborate can be established. The Proposal mentions Norwegian input in several activities, which is a positive element.

Meanwhile, the inclusion of such a large and important component at this advanced stage of implementation is not straight-forward.

Not least, for a contribution of NOK 7.5 million a more detailed programme document should be expected. While the outputs and activities proposed appear reasonable to support the objective, the general lack of detail and justification makes any detailed assessments of contents and value for money meaningless.

Even without such detailed insight, it is natural to assume several specific challenges. First, the remaining period is limited and the Proposal does not provide sufficient background to assess the realism of achieving the ambitions. Second, the proposal does not present any assessment as to how this new, main partner should be integrated in the Programme's governance structure and in the administration and management by the Programme Office to ensure sustainability and effective delivery of the targeted outputs. These issues must be addressed in a revised proposal.

Box 6 *Institute of Engineering at Tribhuvan University*

INSTITUTE OF ENGINEERING – TRIBHUVAN UNIVERSITY

Institute of Engineering is one of the top and oldest technical Institute of Nepal and was founded in 1930. It is located in Pulchowk Lalitpur. After the introduction of New Education System Plan in 1972 in the country, Institute of Engineering (IOE) was formed under Tribhuvan University and both the Nepal Engineering Institute and Technical Training Institute were brought under Institute of Engineering.

Institute of engineering begin bachelor courses in engineering from 1978, master courses from 1996 and doctoral program from 2003. By now, Bachelor's, Master's and doctoral programs are run in Pulchowk campus, Pulchowk. Master's and Bachelor's courses are run in the Thapathali campus, Purwanchal campus and Paschimanchal campus. IOE is now delivering its services from four constituent campuses and ten affiliated colleges.

Source: https://tribhuvan-university.edu.np/institutes/institute-of-engineering

5.3 Findings – Appraisal of ENEP

The "Upscaling Proposal" document does not provide sufficient detail to properly assess the relevance and value-added of the different components. The team's insight from the current review of ENEP thus serves as the primary basis for the Team's assessments.

On general terms, **continuation of the main components in ENEP as well as IOE HYPER are relevant for the target group.** The additional activities for the ENEP components can be assumed to provide additional value toward achieving the specific objectives of ENEP, but lack of budget detail and justification of grant support makes it impossible to conclude with regard to **the efficiency of the support and thus the specific value added**.

The descriptions of a range of **new components do not provide sufficient detail to make relevance and value-added assessments.** This is true especially for the various centres of excellence proposed. The Proposal builds on the implementation of ENEP so far, but **makes limited explicit reference to any lessons learned through the implementation**.

An extension of both scope and budget as proposed will inherently **increase the complexity of the programme and the management burden** related to reporting lines and financial management. In view of this, there is a need to re-consider the Programme's governance structures. Specifically, the inclusion of IOE should be addressed, along with the challenges identified in the Review of ENEP (see above).

The Proposal should consider making improvements to stakeholder coordination. **In several components there should be scope for involvement and value-added by Norwegian partners**. There appears to be a **risk of overlaps between certain components**, such as three different components addressing elements within geotechnical fields. It is important to avoid overlaps and rather consider potential synergies through coordination and/or collaboration. For some components, involvement of other sector institutions will be important. Some further recommendations are provided. (section 5.2).

5.1 Recommendations for a revised Proposal

The request is related to an extension to an existing agreement, with an established management and known partners, rather than a new programme. This implies somewhat less demanding requirements for programme documentation as a basis for decision-making by the Embassy on behalf of the Norwegian Government. At the same time, the requested **additional funding of 21 million NOK represents an 84% increase in the Norwegian funding** and the introduction of new elements to the Programme increases complexity.

Therefore, **it is a clear recommendation to request a revised Proposal** to enable a meaningful appraisal and appropriate recommendations to RNE in the view of concluding an Addendum to the Grant Agreement.

It is important to secure and document the "buy-in" of the request by all ENEP partners. The Norwegian partners are committed to the Programme and have confirmed that they stand ready to support revision of the Proposal to secure further support for the Programme.

Below we provide recommendations and aspects to consider in a revised proposal for extension of the scope, budget and time frame of Energize Nepal. The Review's recommendations for the final phase of the current Grant Agreement should also be considered.

Presentation of each Component/Sub-component

For each component, further background and data should be provided to support its rationale and the relevance of the targeted outcomes in relation to developing Nepal's Hydropower and/or Renewable Energy sector. This includes describing the links from to the ongoing programme and the experiences with the implementation to date, as well as assessment of synergies across components and involvement of partners and stakeholders. As guidance, information in the Proposal should be sufficient to answer the following questions (not all will necessarily be relevant for all components)

1. How will the component/activity and outputs contribute to Nepal's development, either related to hydropower or other renewables?
2. What skills gaps will be filled?
3. What alternative sources of finance have been or could be considered? What will/could such contributions be? Is there scope for revenue generation through provision of services to the industry sector?
4. Are the activities already planned under ENEP? If that is the case, why will they not be achieved without additional budget?
5. Are the activities building on activities already completed (for example, CEPE/CETRF)?
6. Are any remaining funds from ENEP budget taken into consideration in estimating the funds required?
7. Does the implementation of ENEP so far provide relevant experience that has guided the formulation of this component/output/activity?
8. Who is the proposed host institution and why?
9. Are there any overlaps with any other activity, in particular within the programme? Is there a risk of duplication of activities?
10. Is there scope for collaboration and shared resources with other components?

11. Are there stakeholders in the sector that have particular interest in the component?
12. How will the component collaborate or coordinate with such stakeholders?
13. Are any contributions by Norwegian partners foreseen?
14. Are linkages with or collaboration with other international or national external parties considered?
15. Is it realistic to achieve the targets within the time frame?
16. Will the results last after completion of the Programme? (see "Exit Strategy" below)

Programme Governance and Management

The proposed extension will mean increased Programme complexity as well as a new key partner institution. To ensure that this added complexity is well-managed, the description of the overall Programme governance and management should be reconsidered to address issues such as:

17. The main governance elements (PAC, PSC, PO). What changes are required, if any?
18. How the additional/new elements will be managed, in particular the inclusion of a new institution (IOE)?
19. Reporting requirements and procedures for new elements. Component specific reporting should follow a consistent format or template, and include performance indicators. Such reports could be annexed (ref. hydro lab reports) to Programme reports.

Programme Risks

The extended scope and new partners create a need to reconsider the programme risks. The Proposal should present a revised risk management framework that:

20. Follows the same structure as the current risk management framework, preferably with the improvements recommended for ENEP.
21. Identifies additional risks, integrated into the Programme's risk management framework and to be monitored during implementation.

The Result Framework (RF)

Many elements for a results framework are presented for each sub-component. Presenting these in a structured form that matches the existing logframe will increase transparency with regard to new-versus-existing components/activities and the additional results that can be expected from new funding. This will also allow for easy consolidation into a full logframe for the extended programme.

In the process, the stakeholders should consider their own need for management and monitoring of progress and results seen from their own interest. In revising the set of indicators and how each indicator is formulated, it is recommended to ensure that

22. Indicators are SMART;
23. targets are quantitative; and
24. baselines are provided if relevant (if other than zero)

As noted above, the hydropower industry is one of Nepal's most resourceful sectors and potential to contribute to economic development impact and sustainability, and the Norwegian Government explicitly emphasize the relevance of the programme for this sector. As such, indicators that specifically measure the impact on the hydropower industry and progress with regard to financial sustainability could be considered. This might include indicators addressing the following questions:

25. To what extent is the Programme able to attract companies in the hydropower industry (e.g. disaggregating hydropower versus other energy businesses)?;
26. To what extent does the Programme facilitate industry funding for research activities (e.g. including the target for minimum industry contribution in research).

The Budget

The budget should be sufficiently detailed to allow an assessment of realism of budgets estimates and efficiency, including

27. Item breakdown for each component, following the same or similar structure as the ENEP budget for easy integration into a consolidated budget for the extended programme.
28. Specification of other sources of funding

Exit strategy

The ENEP exit strategy as presented in the current PD indicated that the Programme would enable an increasing degree of funding mobilized through revenue generation and industry contributions to research.

It is recommended to include a revised exit strategy in the PD, considering:

29. The status of progress toward sustainable exit. This Review may be used as a reference point.
30. How the extended proposal will contribute to making the exit strategy more realistic
31. A realistic time frame to achieve the ambitious targets. The Proposal suggests 2.5 years. At present this would imply an extension of ENEP period on ½ year. This appears as a short time considering the complexity and the magnitude of the budgets including the remaining ENEP funding plus the additional budget.

6 Conclusion

The Assignment for Review and Appraisal of Energize Nepal called for an assessment of the ENEP programme to date and the added value of the 'Upscaling Proposal', and, additionally, a brief assessment of previous support to energy research.

The assignment included study of core programme documentation and interviews with the main partners in the Programme and a range of other direct and indirect stakeholders and beneficiaries, combined with research into secondary information available in the public domain and additional documentation provided by the Programme Office and other stakeholders upon request. Through this the Team for the Assignment has gained insight into the context of the Programme, the achievements to date for each of its components and progress toward its objectives, and also identified a number of internal and external risks factors for efficient and effective implementation and sustainability of the achievements.

While the complexity of the programme and multitude of activities, partners and processes imply that a limitation as to the depth of detail of the review and assessments, this insight is sufficient to provide relatively clear answers to the guiding questions provided in the TOR.

The previous cooperation with Hydro Lab and KU through RENP and TTL as well as other activities involving research and academic cooperation has created value for the main beneficiaries and left visible footprints in the Nepali Hydropower sector.

The different components of Energize Nepal have made significant progress toward the quantitative targets. Despite some delays in implementation it is likely that most outputs will be achieved either fully or to a good degree.

The management of the Programme has experienced challenges due to internal and external factors. Inability to retain Programme Office staff is one such factor that has resulted in inadequate staffing for extended period. This may mainly have impacted the implementation of preliminary studies for planned centres of excellence and caused delay in the third round of calls for applications for RENP II.

The Norwegian Embassy should request revision and resubmission of the "Upscaling Proposal" before processing the request for extended support. The Proposal as submitted does not allow an appropriate assessment of the justification and value added of the extension to ENEP. The insight from the review of ENEP and the interviews during the mission allows the Team to make overall assessments of the proposal and strengths and weaknesses of most the proposed components, but a more detailed appraisal and recommendations of support require improvements to the document to justify the request for additional funding and make a credible case of success and sustainability.

ANNEXES

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ANNEX IV. OVERVIEW OF FUNDING TO DATE – PER PROJECT, YEAR AND FUNDER CATEGORY

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ANNEX I PEOPLE AND ORGANIZATIONS MET

Review/Appraisal Energize Nepal

a. Programme related meetings

Institution/ Company	Name	Position/Role	Relevance/meeting
AEPC	Mr. Nawa Raj Dhakal	Director	Meeting with AEPC
AEPC, RERL	Satish Gautam	National Programme Manager, Renewable Energy for Rural Livelihood Programme (RERL)	Meeting at UNDP office re. RERL
GIZ	Dr. Narayan Prasad Chaulagain	Deputy Chief Technical Advisor	Meeting with Nepal Energy Efficiency Programme NEEP
Hydro Lab		Female researcher	Meeting regarding Hydro Lab, plus Annual Meeting
Hydro Lab	Dr. Meg Bahadur Bishwokarma	General manager	Meeting at Hydro Lab
Hydro Lab	Dr. Umesh Singh	Sr. Research Engineer	Meeting at Hydro Lab, plus Annual Meeting
IPPAN	Mr. Ananda Chaudhary@gmail.com	Treasurer	Meeting at IPPAN
IPPAN	Mr. Kumar Panday	Vice-president	Meeting at IPPAN
Kathmandu University	Dr. Biraj Singh Thapa	PI of project: ENEP-RENP-II-18-03	RENP II Project
Kathmandu University	**Dr. Daniel Tuladhar** **Dr. Prachand Man Pradhan** Dr. Damber Bahadur Nepali	**OMC members**	**OMC meeting**
Kathmandu University	Mr. Brajesh Mishra	PI of CETRF	Project Beneficiaries Meeting
Kathmandu University	Mr. Diwakar Bista	OMC member + PI of CEPE	Project Beneficiaries Meeting
Kathmandu University	Ms. Namrata Tusuju Shrestha	Researcher of CETRF	Project Beneficiaries Meeting
Kathmandu University	**Prof. Dipak Subedi**	**RDC**	**RDC director**
Kathmandu University	Prof. Dr. Ram Kantha Makaju Shrestha	Vice Chancellor	KU Management
Kathmandu University,	Prof. Subodh Sharma	Registrar	KU Management
Kathmandu University	Deepak Prasad Subedi, Professor, Dpt of Natural Sciences; School of Science	Director	Directorate of Research, Development and Consultancy (RDC)
Kathmandu University, SoE	Dr. Bhola Thapa	SoE	Norwegian cooperation, RENP, TTL
Kathmandu University, SoE	Brijesh Adhikary	Department of Electrical Engineering	Previous PM
Kathmandu University, SoE	Dr. Damber Bahadur Nepali	Dean	Chairman OMC member

Kathmandu University, SoE	Mr. Malesh Shah	Lecturer	RENP, Efficient buildings
Kathmandu University, SoE	Prof. Hari Prasad Neupane	Project Leader TTL Researcher of project:	TTL
NEA Engineering Company Ltd.	Mr. Hitendra Dev Shakya	Managing Director	Submitted RENP proposal; industry representative; interested in electric mobility, trade research and facilitation etc.
Nepal Electricity Authority	Mr. Prabal Adhikary	Spokesperson, NEA Chief of division for energy trading	Meeting at NEA
Nepal Electricity Authority	Ms. Mandira Adhikary	Engineer	Meeting at NEA
Nepal Electricity Authority	Ms. Shanti Laxmi Shakya	Deputy Managing Director	Meeting at NEA
Nepal Electricity Authority	Shiva Kumar Adhikary	Chief, Administration Division	Meeting at NEA
PEEDA	Mr. Biraj Gautam	PI, RENP	Project Beneficiaries Meeting
PEEDA	Ms. Topaz Maitalnd	RENP	Project Beneficiaries Meeting
PEEDA (Nepal Yantrashala)	De. Suman Shrestha	Industrial partner of RENP	Project Beneficiaries Meeting
Programme Advisory Committee	Ole Gunnar Dalhaug	PAC member, Professor NTNU	PAC, Norwegian involvement, TTL
Programme Advisory Committee	Petter Støa	PAC member, PSC member, Sintef	PAC, PSC, RENP I and II
Programme Office	Mr. Nikhil Raj Karki	IT and Communication Officer	communication and visibility strategy
Programme Office	Ms Sahana Shrestha	Financial officer	Programme financial management
Programme Office	Nawaraj Sanjel	Acting Programme Manager	Programme management and mission coordination
Project Selection Committee	Dr. Sandip Shah	PSC member, Managing Director Dolma Himalayan Energy	Meeting regarding role in PSC, RENP I and II.
RENP II Project	Dr. Shyam Sundar Khadka	ENEP-RENP-II-18-02	
RENP II Project	Dr. Suman Shrestha	ENEP-RENP-II-17-01	
RENP II Project	Dr. Sunil Lohani	ENEP-RENP-II-18-01	
RENP II Project	Mr. Biraj Gautam	ENEP-RENP-II-17-01	
RENP II Project	Mr. Paras Mani Timilsina	ENEP-RENP-II-17-03	
RENP II Project	Ms. Piyali Das	ENEP-RENP-II-17-03	
RENP II Project	Ms. Rojina Sharma	ENEP-RENP-II-17-02	
RENP II Project	Ms. Topaz Maitland	ENEP-RENP-II-17-01	
RENP II Project	Prof. Bivek Baral	ENEP-RENP-II-17-04	
RENP II project	Mr. Prem Krishna KC, Managing Director Hydro Tunneling / Research Pvt. Ltd	Researcher of project: Tunneling works	RENP, strategic

Tribhuvan University, Institute of Engineering (IoE)	Prof. Ramchandra Sapkota	Dean	IoE involvement in ENEP extension
Tribhuvan University, IoE	Bhola NS Ghimire	Director	IoE involvement in ENEP extension
Tribhuvan University, IoE	Dr. Shree Raj Shakya	Director	Centre for Energy Studies director (RENP I Project)

b. Other people met

Institution/ Company	Name	Position	Relevance/meeting
BPC	Mr. Pratik M.S Pradhan	Vice President, Business Development & Projects	HP Industry
Hydro-Consult Engineering	Mr. Manohar Shrestha	C.E.O	KU Industry cooperation
National Association of Community Electricity Users Nepal	Mr. Ram Bahadur Ghimire	Executive Officer	
Nepal Hydro & Electric Limited	Mr. Rajesh Agrawal	CEO	HP industry
Nepal Electricity Regulatory Commission	Dr. Ram Prasad Dhital	Member	Regulatory body in Energy Sector
Nepal Yantra Shala Energy	Dr. Suman Pradhan	Project Coordinator	
Nepal Engineers' Association	Dr. Tri Ratna Bajracharya	President	
Kathmandu University	Dr. Ramesh Kunar Maskey		
Tribhuvan University, IoE	Dr. Jagat Kunar Shrestha	Ass. Dean	Introduced by Dead/Director

ANNEX II LITERATURE LIST

a. Programme documentation (received from Norad)

Document title	Author/Source	Year	Content	Relevance
Technical Proposal ENEP Cost Extension- Amended	KU?	2019	Request for cost extention ENEP	Upscaling proposal
Final report-TTL April 2012	KU	2012 - APRIL 17	Final report Turbine Testing lab	Previous cooperation
IEEE Ethics - University cooperation 2014 01 29 Sharma - Thapa - Johansen - Dahlhaug - Stoa	Sharma - Thapa - Johansen - Dahlhaug - Stoa	2014	Research paper by KU/SINTEF/NTNU - University cooperation as a development tool in poor countries	Previous cooperation
Renewable Nepal RN-I-15-03-31-Final Report	KU?	2015 - MAR 31	RENP Phase I Final report	Previous cooperation
RenewableNepal - mid-term review - final report	Norplan	2011 - DEC	Final report Renewable Nepal programme	Previous cooperation
Agreement - signed 27072016	MFA	2016 - JULY 27	Grant agreement with KU - 25 MNOK	Key Programme documentation
Annual Partner and Project Advisory Committee meeting minutes 2017	KU	2017 - JULY 6	Minutes of meeting Annual partner meeting	Key Programme documentation
Annual Report HL 2016-2017	HydroLab	2017	Annual report by Hydrolab 2016-2017	Key Programme documentation
Annual report HL 2017-2018	HydroLab	2018	Annual report by Hydrolab 2017-2018	Key Programme documentation
ENEP Decision Document approved June 2016	Norad / RNE	2016 - JUNE 17	Decision document	Key Programme documentation
Final_appraisal report_ENEP_250915_Multiconsult 1466694_2_1	Multiconsult	2016 - SEPT 25	Appraisal of ENEP	Key Programme documentation
HydroLab-1-Annual PR-1st yr_ENEP_Aug2016-15July2017	Hydro Lab	2017	Annual Progress report #1 ENEP	Key Programme documentation
HydroLab-2-Annual PR-2nd yr_ENEP_16July2017-15July2018	Hydro Lab	2018	Annual Progress report #2 ENEP	Key Programme documentation
KCo Energize Nepal Assessment Report	Kuber & co	2018 MAY 27	Review of ENEP audit report	Key Programme documentation
Minute Annual Partner Meeting 05 June 2018	KU	2018 JUNE 5	Minutes of meeting Annual partner meeting	Key Programme documentation
Minute Followup on Institutional Assessment of KU 21 August 2018	KU	2018 AUG 21	Minutes of meeting discussion of institutional audit KU	Key Programme documentation
PD-Energize Nepal PD	KU?	2016 JUNE	Programme document ENEP	Key Programme documentation
Year 1 -Annual Report (Technical and Financial) - ENEP	KU	2017	Annual report by KU 2016-2017	Key Programme documentation
Year 2 -Annual Report - ENEP	KU	2018	Annual report by KU 2017-2018	Key Programme documentation

b. RENP II Application documents (received from Norad)

Document title		Year	Relevance
ENEP-RENP - II - 01-Sample-Letter Of Intent	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II - 01-ApplicationSummaryPage	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II- 01General Terms and Conditions	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II -01-Project Budget Calculation Sheet	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENPII Content for the Web 2017	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENPII Project Application Call-NewsPaper 2017	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENPII ProjectApplication Call Document 2017	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II-01-Format-CurriculumVitae	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II-01-Format-OrganizationProfile	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II-01-Format-Schedule	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP-II-01-MainApplication	Call for Proposals round 1	2017	RENP II Procedural documents
ENEP-RENP - II - 01-Sample-Letter Of Intent	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP-II - 01-ApplicationSummaryPage	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP-II- 01General Terms and Conditions	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP-II -01-Project Budget Calculation Sheet	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENPII Content for the Web 2017	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENPII Project Application Call-2018 - Janaksikshya Monthly	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENPII Project Application Call-NewsPaper 2017	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENPII ProjectApplication Call Document 2017	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP-II-01-Format-CurriculumVitae	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP-II-01-Format-OrganizationProfile	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP-II-01-Format-Schedule	Call for Proposals round 2	2018	RENP II Procedural documents

ENEP-RENP-II-01-MainApplication	Call for Proposals round 2	2018	RENP II Procedural documents
ENEP-RENP - II - 01-Sample-Letter Of Intent	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II - 01-ApplicationSummaryPage	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II- 01General Terms and Conditions	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II -01-Project Budget Calculation Sheet	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENPII Content for the Web 2017	Call for Proposals round 3	2019	RENP II Procedural documents
Application Call Document 2019	Call for Proposals round 3	2019	RENP II Procedural documents
Content for Newspaper	Call for Proposals round 3	2019	RENP II Procedural documents
Notice Call for proposal - Signed	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II-01-Format-CurriculumVitae	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II-01-Format-OrganizationProfile	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II-01-Format-Schedule	Call for Proposals round 3	2019	RENP II Procedural documents
ENEP-RENP-II-01-MainApplication	Call for Proposals round 3	2019	RENP II Procedural documents

c. Other documentation received from Programme Office

Document title	Author/Source	Year	Content	Relevance
Annual Plan for Year 4 July 2019-July 2020	Programme Office	2019	Work plan, budget and disbursement request base data	Additional programme information
EN-16-07-27-PD -Annex 4 - HDC -Hydropower Development Component	KU	2016	Detailed description of the Hydropower Component ENEP	Key Programme Documentation
EN-16-07-27-PD -Annex 4 - RENP II Component	KU	2016	Detailed description of the RENP II Component ENEP	Key Programme Documentation
ENEP Brochure			Programme information	Additional programme information
RENP II Monitoring template		2019	Template for quarterly monitoring of RENP II projects	Additional programme information
ENEP Partnership Agreement	KU,HL, NTNU, Sintef	2016	Agreement between ENEP partners	Key Programme Documentation
Annnual Meeting 16.05.2019 Presentation	Programme Office	2019	Presentation by Nawaraj Sanjel in annual meeting 2019	Additional programme information
Proposal CEPE	KU, CEPE project manager	2019	Detailed proposal for establishment of Centre of Excellence for Power Engineering	Additional programme information
Proposal CETRF	KU, CETRF project manager	2019	Detailed proposal for establishment of Centre of Excellence for Trade Research & Facilitation	Additional programme information
Overview of ENEP Project Members	Programme Office	2019	Overview of PSC and PAC members over time; Overview of PO staff over time	Additional programme information
Year 2 Audit Report - ENEP	R.T.&Associates, Chartered Accounta	2019	Audit report ENEP 2018	Key Programme Documentation

d. Various other documentation received from stakeholders and secondary information

Document title	Author/Source	Year	Content	Relevance
RENP 2009 Programme document	KU	2009	RENP 2009 Programme document	Key Programme Documentation
NTNU High Level Delegation Presentation	Bhola Thapa, KU	2019	Presentation at the high-level meeting in Kathmandu on 17.05.2019	Previous cooperation/outside ENEP
Clean Energy for Development annual report 2009	Norad	2010	Clean energy for development annual report	Bilateral cooperation
Clean Energy for Development annual report 2010	Norad	2011	Clean energy for development annual report	Bilateral cooperation
Clean Energy for Development annual report 2011	Norad	2012	Clean energy for development annual report	Bilateral cooperation
Clean Energy for Development annual report 2012	Norad	2013	Clean energy for development annual report	Bilateral cooperation
Clean Energy for Development annual report 2013	Norad	2014	Clean energy for development annual report	Bilateral cooperation
Clean Energy for Development annual report 2014	Norad	2015	Clean energy for development annual report	Bilateral cooperation
Clean Energy for Development annual report 2015	Norad	2016	Clean energy for development annual report	Bilateral cooperation
Greening of Embassy Portfolio 2007	Norad	2007	Report on climate change related topics in the embassy's development cooperation portfolio	Bilateral cooperation
NTNU-EP-KU presentation	NTNU	2019	Overview of historical and current areas of cooperation between NTNU and Nepal	Previous cooperation/outside ENEP
ADB Nepal-Energy Assessment Road map 2017		2017	Report on the state of the Nepali Energy sector	Sector background

ANNEX III RENP 2009-2015 OVERVIEW

a. Engagements

Engagements	
Institutional involvement	NEPAL • KU (12 of 21 projects) • TU (3 projects) • 3 other research institutions • Two foundations/NGOs International • 3 institutions
Industry involvement	22 companies/industry
Research staff	245 persons 84 “intensively involved”
Gender balance	3 female leaders Overall ca 25-30% engagement * 23 intensively involved researchers ** Exact figure not found*

b. Outcomes: products initiated to market

Products introduced to market
1. Briquetting machine
2. Briquette stoves
3. Portable and fixed type charring retorts
4. Fuel type customized gasifier power system
5. Jatropha oil stove
6. Optimized biogas plant for cattle or poultry waste
7. Isolated micro-organism for efficient fermentation
8. Mini grid components such as synchronizer
9. Pico hydro system
10. Custom design white led lamps and lighting system
11. Small wind power system

c. Project overview and current status *

ID	Main R&D Topic	Start Year	Duration Year	Objective	Partners			Result – project end	Current status
					R&d	Industry	Other		
172	Briquetting machine and briquette stoves	2010	3.5		Nepal Academy of Science and Technology (NAST)	Mhepi Briquette Industries (MBI)	Center for Energy and Environment Nepal (CEEN)	• Improved briquetting machines • Briquette stoves for domestic and institutional purpose	Additional support granted and two products introduced to market
242	Mini-grid components for micro-hydro	2010	3.5		Kathmandu University (E&E Dept & CEPTE)	Krishna Grill and Engineering Works	-	• Computer model and program for mini-grid component design and simulation • Induction generator controller, synchronizer, VAR compensator • Mini grid system in laboratory	Additional support granted and two products introduced to market Technology Transferred to Krishna Grill.
248	Gasifier based complete power system	2010	3.5	Success Story	Kathmandu University (K.U)	Sun Works		• Gasifier System 5 kW and 22 kW • Multi-fuel engine testing facility with data acquisition system. • Spin off company manufacturer	Additional support granted and product market introduction initiated. According to PSC member the product is still available by a company in Butwal area and a workshop for this type of technology has been established
327	Solar and WLED based lighting	2010	3.0	Success story	Kathmandu University (E&E Dept)	Altitude Innovation		• Lightning Laboratory at KU • WLED Lamp electrical design capacity • Solar and lighting system design and implementation capacity	Altitude innovation manufactures the WLED and has the turnover of approximately average 20 million NPR per year. At present, the street lights installed by Municipality is been supplied by Altitude Innovation. The Lighting Laboratory at K.U has been upgraded from the funding by European commission, and the lab is used for testing services, and academic/ practical purposes.
379	Biogas analysis of social impact	2010	3.0		K.U Natural science dept	Rapti Renewable Energy Services		• Computing laboratory at KU • Consumer Profile database of 400 households	Outcome proved the value of gasifiers in terms of wood fetching time saved (one year saved per gasifier).

								• Competence on use of statistical method for analysing and inferring database • Project was women-led (10 students involved in field work)	
437	Francis turbine design and prototype testing	2010	3.5	Success Story	• K.U Turbine testing lab • NTNU	• Nepal Hydro & Electric • Dynavec As		• 96 kW test prototype fabricated locally and test rig for it • Computer program for design/ analysis of turbine • Prototyping and casting processes	The project built the design capacity of the TTL and is ready to manufacture Francis turbine. The manufacturer are hesitant to manufacture the design as of today. Currently TTL is approaching NHE and other manufacturer and fabrication organization to manufacture the turbine designed by TTL (to encourage manufacturer TTL is ready to provide the turbine design for free). According to one PSC member the turbin was of high quality and could be marketed by means of a 3D printer. If manufactured it would be a 'tailormade' turbine for Nepalese sand-erosion exposed conditions.
488	Electronic load controller of pico-hydro	2010	1.5		People energy & Environment dev. Ass (PEEDA)	Kathmandu Power and Energy group (KAPEG)		• Improved ELC • ELEC Fabrication and supply records of various rating • Pic-power plant in community	The research was carried out for 1 kW and later upgraded to 5 KW by KAPEG and the parallel product was also invented as Decentralized electric load controller (DELC). In 2018, 2 of these component was installed in Okhaldunga of 1 kw and 3 kW. Up until today, approximately 10-15 nos of the ELC has be sold and used by the companies which was distributed by KAPEG. However, nothing is mentioned about the product in in the website of KAPEG and PEEDA about the project.
681	Charring and internal firing of brick with char	2011	2.5		CENTRAL Dept. of Environment Science (CDES, TU)	• MinErgy • Shree Satya Narayan Itta Bhatta		• Technology promoted by various agencies • Portable type charring retort • Optimized internal fuelling of brick using char • Fixed type improved charring retort (brick based)	Product showed high quality in terms of efficiency; applicable as building material. Additional support granted; portable and fixed type charring retorts introduced to market
741	Small wind power system	2011	2.5		Risoe Denmark Technical University	• Kathmandu Power and Energy Group • Practical Action in Nepal		• Wind power system designed fabricated, tested, installed in local site. • Installation of similar system in India • Data logging and monitoring system.	Practical Action Nepal coordinated with practical action India and transferred knowledge of the Research activity to Odisha, India with help of the German funding. KAPEG is further working on the same technology and have installed small wind turbine in Nagarkot in 2015, installed in 2018 at Palpa and further installation is being carried out Karnali district of Nepal with the capacity of 300 W to 1 kW.
761	Bio-ethanol from agro-waste	2011	2.5		K.U Biotech Dept	Everest Biodiesel Company		• Laboratory facility establishment • Isolated enzymes and xylose fermenting yeast • Pre-treatment technique • Isolated micro-organisms	

924	Biogas from wastewater	2012	1.5		K.U ME Dept	Universal Consultancy Services		• Laboratory facility for analysis of wastewater • Pump driven and gravity flow UASB reactors	
941	Microalgae culture and biodiesel production	2012	1.5		K.U Biotech Dept	High Himalayan Energy and Agro Ltd		• Lab setup for microalgae culture • Flat plate bio-reactor • Trans esterification reactor • Algae growth chamber • Flat plate bio reactor	
996	Pico propeller turbine design and installation	2012	1.5		PEEDA	Oshin Power Services		• Pico propeller turbine design manual • Marketing or business plan for 1 kW pico turbine • Community power plant near Butwal • Solid works based model for turbine	
1007	Civil design framework for small hydro	2013	1.0		K.U civil Engineering Dept.	Cross mountain Engineers Ltd		• Design framework and standardization chart for micro/mini hydropower project • Study report on the climate change considering historical rainfall and temp. data.	
1017	Bio-ethanol from cheese whey	2013	1.0		Research Institute for Bioscience and Biotechnology (RIBB) K. U biotech Dept	Aaran engineering ltd		• Isolated yeast strain for lactose fermentation • 25 litre capacity fermentation • Laboratory facility	
1049	Biogas from poultry waste	2013	1.0		K.U Environment Dept	• Prabhat Poultry • Deurali Gobargas Company Ltd.		• Isolated yeast strain for lactose fermentation • 25 litre capacity fermentation • Laboratory facility	Additional support granted. Optimized biogas plant for cattle or poultry waste introduced to market
1050	Metabolic/genetic engineering of yeast	2013	1.0		T.U Biotech Dept	Yashoda Sustainable Development Ltd		• Lignocellulosic biomass pre-treatment method • Fermenter • Competence in genetic engineering	Additional support granted, one product introduced to market
1080	Battery-super capacitor hybrid storage	2013	1.0		Stord/ Haugesund University College, Norway	• Nepal power engineering Society • Nepal Electric Vehicle Industries ltd.		• Hybrid Energy Storage system design method • Hybrid energy storage system prototype	
1083	Bio-ethanol based fuel cell	2013	1.0		T.U Biotech. Dept.	Crystal Bioenergy Nepal Ltd		• 12 yeast isolated and 2 found best • Optimized pre-treatment technique • Prototype ethanol fuel cell • Laboratory facility	
1087	Jatropha oil based cooking stoves	2013	1.0		• PEEDA • Energy Environment R&D Centre	Energy and Environment Pvt. Ltd		• Dual Tank kerosene + Jatropha oil pressure stove • Jatrophas oil wick stove • Community demo and feedback on stoves.	Additonal support granted and product introduced to market
1095	Reversible pump turbine design/prototyping	2013	1.0		TTL	Chilime hydropower		• Model Prototype • Prototype test rig • Test result of prototype • RPT design method	
All			41.5						

** Sources:*

- *Interviews with xx, xx, Petter Støa/Sintef, Bhola Thapa/KU*
- *RENP Phase I 2009-2013 Final report*

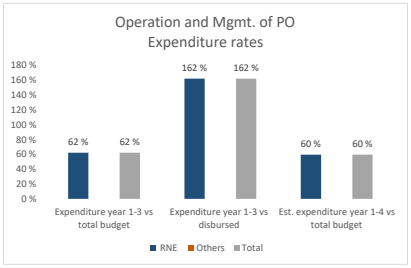
ANNEX IV PROGRAMME SPENDING

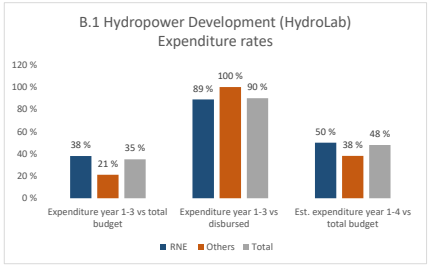
Analysis of data on funds received and expended informed by Programme Office

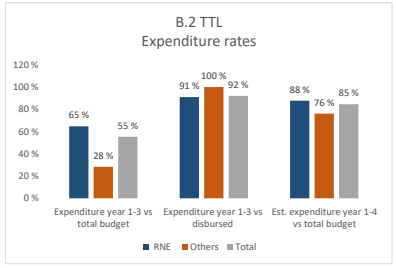
	Programme Office / O&M			B.1 HydroLab			B.2 TTL			B.3 CEPE			B.3 CETRF			C. RENP II			NTNU*			TOTAL		
	RNE	Others	Total	RNE	Others	Total	RNE	Others	Total	RNE	Others	Total	RNE	Others	Total	RNE	Others	Total	RNE	Others	Total	RNE	Others	Total
Fund Received Rs																								
1st Installment	392 256	-	392 256	889 277	36 129	925 406	542 902	-	542 902	-	-	-	-	-	-	-	-	-	232 000	-	232 000	2 056 435	36 129	2 092 565
2nd Installment	236 768	-	236 768	1 509 205	297 641	1 806 846	1 025 563	424 541	1 450 104	-	-	-	-	-	-	477 397	76 176	553 573	111 541	-	111 541	3 360 474	798 358	4 158 832
3rd Installment	250 545	-	250 545	804 472	-	804 472	1 500 842	-	1 500 842	167 857	-	167 857	167 857	-	167 857	1 410 842	-	1 410 842	377 838	-	377 838	4 680 254	-	4 680 254
Total Fund Received	**879 569**	**-**	**879 569**	**3 202 954**	**333 771**	**3 536 724**	**3 069 307**	**424 541**	**3 493 848**	**167 857**	**-**	**167 857**	**167 857**	**-**	**167 857**	**1 888 239**	**76 176**	**1 964 415**	**721 379**	**-**	**721 379**	**10 097 163**	**834 487**	**10 931 651**
Expenditure																						-	-	-
1st Installment	335 210	-	335 210	545 665	36 129	581 795	179 283	-	179 283	-	-	-	-	-	-	-	-	-	242 073	-	242 073	1 302 231	36 129	1 338 361
2nd Installment	510 587	-	510 587	694 496	297 641	992 137	1 553 920	424 541	1 978 462	-	-	-	-	-	-	500 480	76 176	576 655	309 390	-	309 390	3 568 872	798 358	4 367 230
3rd Installment	581 304	-	581 304	1 607 147	-	1 607 147	1 059 832	-	1 059 832	10 041	-	10 041	22 126	-	22 126	1 152 256	-	1 152 256	169 916	-	169 916	4 602 623	-	4 602 623
Total Expenditure	**1 427 101**	**-**	**1 427 101**	**2 847 308**	**333 771**	**3 181 079**	**2 793 035**	**424 541**	**3 217 576**	**10 041**	**-**	**10 041**	**22 126**	**-**	**22 126**	**1 652 735**	**76 176**	**1 728 911**	**721 379**	**-**	**721 379**	**9 473 726**	**834 487**	**10 308 214**
Balance of Fund	(547 532)	-	(547 532)	355 646	-	355 646	276 272	-	276 272	157 816	-	157 816	145 731	-	145 731	235 504	-	235 504	-	-	-	623 437	-	623 437
Year 4 Budget	444 071	-	444 071	897 560	269 268	1 166 828	1 325 101	944 558	2 269 659	592 885	129 966	722 851	248 879	190 852	439 731	2 326 306	2 114 259	4 440 565	582 102	50 196	632 298	6 416 904	3 699 099	10 116 003
July-Dec 2019 Budget	294 061	-	294 061	630 000	189 000	819 000	915 738	415 772	1 331 510	436 802	64 983	501 784	194 931	87 583	282 514	2 059 838	2 062 758	4 122 596	391 443	50 196	441 639	4 922 813	2 870 292	7 793 105
July-Dec 2019 Disbursement	**841 593**	**-**	**841 593**	**274 354**	**189 000**	**463 354**	**639 466**	**415 772**	**1 055 238**	**278 986**	**64 983**	**343 968**	**49 200**	**87 583**	**136 783**	**1 824 335**	**2 062 758**	**3 887 092**	**391 443**	**50 196**	**441 639**	**4 299 376**	**2 870 292**	**7 169 668**

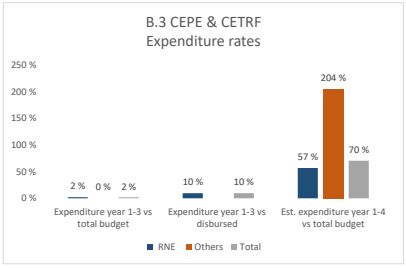
Component	**Programme Office / O&M**			**B.1 HydroLab**			**B.2 TTL**			**B.3 CEPE & CETRF**			**C. RENP II**			**NTNU***			**TOTAL**		
Source (all NOK 1000)	**RNE**	**Others**	**Total**	**RNE**	**Others**	**Total**	**RNE**	**Others**	**Total**	**RNE**	**Others**	**Total**	**RNE**	**Others**	**Total**	**RNE**	**Others**	**Total**	**RNE**	**Others**	**Total**
Budget for component	3 140 000	0	3 140 000	7 500 000	1 583 000	9 082 000	4 690 000	1 797 000	6 487 000	1 540 000	157 000	1 697 000	8 130 000	6 000 000	14 130 000	2 501 000	298 000	2 799 000	25 000 000	9 536 000	34 536 000
- Norwegian partner budget	(846 000)		(846 000)	-	-	-	(377 000)	(298 000)	(675 000)				(1 278 000)		(1 278 000)						
Total expenditure year 1-2 *	845 797	-	845 797	1 240 161	333 771	1 573 932	1 733 203	424 541	2 157 744	-	-	-	500 480	76 176	576 655	551 463	-	551 463	4 871 104	834 487	5 705 591
Total expenditure year 1-3 *	1 427 101	-	1 427 101	2 847 308	333 771	3 181 079	2 793 035	424 541	3 217 576	32 167	-	32 167	1 652 735	76 176	1 728 911	721 379	-	721 379	9 473 726	834 487	10 308 214
Including Norwegian partner budget)	1 871 172	-	1 871 172	3 744 868	603 039	4 347 907	4 118 136	1 369 099	5 487 235	873 932	320 818	1 194 750	3 979 041	2 190 435	6 169 476	1 303 481	50 196	1 353 677	15 890 630	4 533 587	20 424 217
Expenditure year 1-3 vs total budget	62 %		62 %	38 %	21 %	35 %	65 %	28 %	55 %	2 %	0 %	2 %	24 %	1 %	13 %	29 %	0 %	26 %	38 %	9 %	30 %
Expenditure year 1-3 vs disbursed	162 %		162 %	89 %	100 %	90 %	91 %	100 %	92 %	10 %		10 %	88 %	100 %	88 %	100 %		100 %	94 %	100 %	94 %
Est. expenditure year 1-4 vs total budget	60 %		60 %	50 %	38 %	48 %	88 %	76 %	85 %	57 %	204 %	70 %	49 %	37 %	44 %	52 %	17 %	48 %	64 %	48 %	59 %

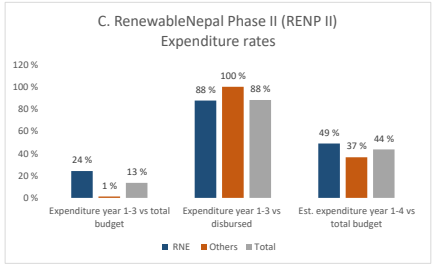
**excl. Norwegian partners for components B1,2,3 and C, due to separate report on combined funds use across all components by Norwegian partners. See separate columns*











ANNEX V - UPSCALING PROPOSAL - LOGFRAME ELEMENTS

Main Component	SN	Sub-component	Impact/Outcome/Outputs	Activities	Objectively verifiable indicators			Assumption	Comments
					Baseline	Performance indicators and targets	Means of verification		
									Impact statement
B. Hydropower Development Component									Outomce statement Outcome indicators and targets
	1.1.1	B.1. Capacity building of existing Hydraulic Laboratory	Enhanced power supply system, equipment and instrumentation of Hydraulic laboratory for physical model studies as well as field studies	1) Upgrade power supply system 2) Increase discharge capacity 3) Increase workshop equipment facilities 4) Increase laboratory instrumentation facilities 5) Increase field measument facilities		- Provision of four variable frequency drives in the pumps - One 200 lit/s pump installed at the laboratory - Added equipment and instrument facility at the laboratory - A set of bathymetric survey equipment and current meter available for field studies at the laboratory			Continuation of exisiting outputs in ENEP
	1.1.4		Development of competent manpower in the Hydro Lab's area of activities	1) Contribute on education 1.1 Technical assistance and guidance to MSC thesis, interns and research students including laboratory facilities 1.2 Provide internship opportunity at the laboratory 2) Enhancing knowledge and skills of employees		- Three higher studies/research works related to the company's field of interest supported of which one will be women/disadvantaged group as far as possible - Three young engineers provided with internship opportunity at the laboratory - Three employees undertake training related to their job nature within the country			
	1.1.5		Knowledge shared among stakeholders	Publish research articles		Publication of two research articles			
	1.1.6		Enhanced knowledge on hydraulics, sedimentation and ground engineering through research works	1) Research on hydraulics and stability of boulder lined weir 2) Establishment of database for underground construction in Nepal		Two knowledge product/information developed through research works: - Information on boulder lined weir design - Database for underground construction			
	1.1.7	B.2. Establishment of centre for design, operation and maintenance of mechanical equipment for hydropower plants	IEC standard hydro turbine test rig installed and turbine performance testing procedure established at TTL	1) Development of instrumentation and control system for model turbine testing 2) Procurement of computer software for model turbine analysis		- Development of data acquisition systems for various types of measurements in testing - ANSYS and MATLAB simulation software will be available			Duplication ENEP? Review some indicators - Measurable & Specific (quantitative targets)
	1.1.8		Models of Francis Turbine runners are fabricated and tested in IEC standard test rig	1) Development of design tools and programs and integrate it with CFD and CAD software for analysis and optimization of model turbines 2) Optimization and Numerical analysis of design 3) Manufacturing drawings of the new turbine 4) Development of fabrication procedure 5) Procurement and Installation in the IEC 60193 rig 6) Testing with IEC 60193 7) Develop compendium with guidelines for selection as well as design of Francis turbine for sediment erosion applications. 8) Develop assembly, installation and testing manuals.		- Development of design tools and programs - Optimized design and manufacturing drawing of model turbine - Model Francis turbine procured, installed and tested in the test rig - Fabrication and installation guidelines established			
	Output 1	B.3. Preparatory study for development of CEPE and CETRF	Experimental lab set-up for interconnecting solar PV into local grid at Department of Electrical and Electronics Engineering in Kathmandu University.	1) Literature review on case studies of proven technology of grid penetration of intermittent RETs and energy storage concepts in similar countries. 2) Develop setup for grid interconnection of DG, analyzing net metering and islanding concept of local grid interconnection. 3) Purchase of software for simulation. 4) Software modelling of grid interconnection of distributed generation into the Integrated Nepal Power System and validating with IEEE standards. 5) Economic analysis of grid interconnection of DG and design of Feed in Tariff.		- Software simulation result performed in Matlab-PSAT, HOMER will be made available. - DIgSilent Power Factory software will be available. - There will be at least one publications made.			Continuation of exisiting outputs in ENEP Review some indicators - Measurable & Specific (quantitative targets)
	Output 2		Enhancing capacity of HV lab for testing.	1) Upgrade existing HV laboratory set up. 2) Increase the existing testing facilities at HV laboratory. 3) Perform insulation break down test for insulators, cables. 4) Perform experimental set up applicable to Bachelor's and Master's students.		- At least one Bachelor's Project work and one Master's dissertation report will be supported. - At least one solid, liquid and gas dielectric strength insulation breakdown test will be performed and validated as per IEC standard.			
	Output 3		Establishment of RET laboratory set up at DoEEE.	1) Purchase of smart grid trainer kit. 2) Purchase of interconnected hybrid energy trainer kit. 3) Purchase of PSCAD software. 4) Perform experimental set up applicable to Bachelor's and Master's students.		- At least one Bachelor's Project work and one Master's dissertation report will be supported. - Laboratory equipment will be available at the lab. - Labs performed will be verified as per IEEE standards. - PSCAD software will be available. - Simulation output will be made available.			
	Output 1	B.4. Center for research and development of tunneling and rock engineering	Geotechnical investigations and analyses lab will be established	1) Program of field sampling, 2) Laboratory testing 3) Engineering analysis 4) Evaluation with the results		- Determination of the strength of an in situ rock mass by laboratory type testing - Development of empirical failure criterion for jointed rock masses - The existing rock mechanics lab and structural labs will be strengthen - Equipment: a) The equipment used shall be hand operated ,power drilling, and driving equipment b) Equipment considered suitable for determination of the limits and conditions of the various soil strata, and for obtaining samples for examination, field classification, and laboratory analysis.			New sub-component Review indicators - Measurable & Specific (quantitative targets)

	Output 2		Design of the tunnel initial support, waterproofing, and final liner	1) Development of design tools and programs and integrate it with Flac3D, Phase II and CAD software for analysis of tunnel 2) Numerical analysis of design 3) Model studies 4) Design and drawings of tunnel 5) Development of procedure to design of underground structures 6) Develop assembly, installation and testing manuals 7) Development of guidelines for selection as well as design of tunnel lining		- Development of design tools - Test for Racking and Ovaling deformation - Guidelines established			
	Output 1	B.5. IOE on enhancing hydro power engineering research	MSPHE programme enhancement	1) Entrance Exam for Student selection 2) Student enrolment improvement 3) Student selection for mobility to NTNU for research 4) Lab equipment/software procurement 5) Research seminar conduction 6) Organizing Conference/workshop		- Co-implemented education, research and development activities through student enrolment, lab Equipment setup, students mobility to NTNU, participation and organizing, conference/seminar/workshop, and number of publications			New sub-component Review indicators - Specific (quantitative targets)
	Output 2		Enhanced institutional capacity at IOE	1) In-house faculty and fresh graduate selection for PhD enrolment 2) Post Doc program initiation 3) Knowledge sharing event between NTNU Resource person / IOE Staff 4) Workshops and trainings		- Increased number of mutually generated publications. - Increased number of interdisciplinary teamwork/ cooperation activities. - Co-organized and implemented workshops for academic staff Training of administrative personnel of IOE.			
	Output 3		Improved research repository network	1) System setup and network building 2) Digital content collection 3) Research theses integration onto system 4) Network handle/access /maintenance trainings		- Monitoring access pattern and availability of materials, - Increased number of access - Increased number contents			
	Output 4		Greater collaboration with Hydro Lab	1) Physical Lab work at Hydro Lab 2) Joint research initiation 3) Practitioners training		- More number of sessions for lab works - Number of collaborative research work and - Publications - Joint trainings for professionals			
	Output 5		Increased industry and professional interaction / bridging the skill gap	1) Organizing short-term training to industry / policy making (govt.) people and others 2) Getting feedback from others on Institute greater engagements		- Increased number of MSHPE graduates to Industry/govt. Positions - No. of trainings, no of interaction events			
	Output 6		Publication of research work and information disseminations	1) Publish research work in National and international Journals 2) Research work presentations in National and international conferences 3) Organising institute level workshops for information decimations		- Increased the number of research publications and conference proceedings			
	Output 1	B.6. Hydropower development center	A preliminary study for establishment of hydropower development center will be carried out at KU.	N/A		N/A			New sub-component Outputs/indicators
C. RENP II									Outomce statement Outcome indicators and targets
			Four open call projects RNE funding	Four open call projects on RE and Hydro power sector will be awarded on competitive funding		- Research on 4 RE and/or Hydro power sector will be conducted - Collaboration with 8 institutions will be extended through research - Capacity building of at least 8 young researchers will be ensured through research			Continuation of ENEP Review indicators - Realism
			Two Strategic projects RNE funding	Two strategic RE and Hydro power sector will be awarded on non-competitive funding		- Research on 2 RE and/or Hydro power sector will be conducted - Collaboration with 4 institutions will be extended through applied research - Capacity building of at least 4 young researchers will be ensured through research			
			Establishment of Center for Renewable Energy Systems (CRES)	A CRES under school of engineering will be established for dynamic research on RE systems.		- A CRES will be established - Research on optimization of energy systems will be conducted - Capacity building of at least 4 young researchers will be ensured through research - Collaboration with 4 institutions will be extended through applied research of the same field - Two journal articles will be published in the sector of energy systems			
			Capacity building in RE and Hydro power sector	Series of capacity building trainings will be conducted in the sector of RE and Hydrpower		- At least 10 trainings (at least of 5 variety) in the RE and hydropower sector will be conducted - Capacity building of at least 100 participants in the sector will be done - Training manuals of each 5 variety of training will be developed.			
			Business incubation	Ongoing business incubation initiation will be enhanced through various support activities.		- At least 10 startup business will be supported - At least 10 products will be developed and deployed in community - At least 5 previously supported startup business will be supported to next level			
			International network	International network of RENP II will be enhance through various training and project enhancement.		- At least 3 international networks will be established - At least 2 international trainings will be conducted either in Nepal or abroad			

ANNEX VI Hydropower industry engagements

A. RENP II: industry partners and contributions

Project name	TOTAL BUDGET	Energize Nepal Funding	Own Contribution	Third Party Contribution	Nepalese Industry partner	ENEP %	Industry partner %	Industry partner NAME
R&D to establish a commercially viable locally-constructed Turgo turbine for low cost renewable electricity generation in Rural Nepal	7 016 521	4 744 301	2 272 220	0	1 630 000	68 %	23 %	Nepal Yantra Shala Energy (NYSE)
Capacity and competence development for introducing Francis Turbine in Nepalese Micro Hydropower Projects.	11 271 500	4 843 750	4 927 750	1 500 000	1 189 000	43 %	11 %	Thapa Engineering Pvt. Ltd
Technical Investigation of Tunnel Support Technology in Hydropower Project located in the Himalayan Region of Nepal	3 413 000	1 757 500	1 655 500	0	1 383 000	51 %	41 %	Hydro Tunneling and Research Pvt. Ltd., Kalikasthan Kathmandu
TOTAL	21 701 021	11 345 551	8 855 470	1 500 000	4 202 000	52 %	19 %	

ANNEX VI Hydropower industry engagements

B. Hydro Lab: names of involved companies and overview of research projects

HYDRO LAB

	Company
1	Ambeshwor Engineering Hydropower Pvt. Ltd.
2	Blue Energy Pvt. Ltd.
3	Butwal Power Company Ltd.
4	China International Water & Electric Corp.
5	Design and Development Pvt. Ltd
6	ELC-Electroconsult in association with NEW-JEC
7	GMR Upper Karnali Hydropower Limited
8	Gorakshya Hydropower Company Pvt. Ltd.
9	Himtal Hydropower Company Pvt. Ltd
10	IFC
11	Kabeli Energy Limited
12	Mandu Hydropower Limited
13	Mathillo Mailun Khola Jalvidhyut Ltd.
14	Multi Energy Development (P) Ltd.
15	Myagdi Hydropower Pvt. Ltd.
16	NEA, Engineering Service DirectoratE
17	NEA, Upper Modi Hydroelectric Project, Engineering Service Directorate
18	Nepal Electricity Authority
19	Pan Himalaya Energy Pvt. Ltd.
20	Peoples Energy Ltd.
21	Peoples Hydropower Company Pvt. Ltd.
22	Remit Hydro Ltd.
23	Sahash Urja Limited
24	Sanima Hydro Engineering Pvt. Ltd., TMS, Mountain Energy Ltd. and ELC of Italy
25	Sanima Jum Company (P) Ltd.
26	Shanghai Investigation Design & Research Institute Co. Ltd
27	TMS and Remit Hydro Ltd.

Contract Research activities performed during Fiscal Year 2074/75 (2017/18)

S. N.	Activity	Client	Remarks
1	Physical Hydraulic model study of the headworks of following hydropower projects		
i)	Solu Dudhkoshi (RoR)	Sahash Urja Limited	Completed
ii)	Khimti II (RoR)	Peoples Energy Ltd.	About 90 % completed. However, an addendum to the original contract signed with the Client for testing of the new design proposed by the EPCF contractor.
iii)	Likhu 1 (RoR)	Pan Himalaya Energy Pvt. Ltd.	Only about 20 % completed (delayed due to design change by the Client)
iv)	Supper Dordi Kha (RoR)	Peoples Hydro Pvt. Ltd.	About 60 % completed
v)	Supper Trishuli (PROR)	The World Bank Group	Agreement signed and preparatory works started.

vi)	Langtang Khola	Multi Energy Development Pvt. Ltd.	Agreement signed
2	Sediment sampling and laboratory analysis projects:		
	Aankhu	Gorakshya Hydropower Company Pvt. Ltd.	Completed
	Andhikhola Storage HPP	Engineering Service Directorate, NEA	Completed
	Bagmati Small Hydro	Mandu Hydropower Limited	Completed
	Chino Khola	Butwal Power Company Ltd.	Ongoing
	Dudh Koshi Storage HPP	ELC-Electroconsult in association with NEW-JEC	Completed
	Ghar Khola	Myagdi Hydropower Pvt. Ltd.	Completed
	Ghunsa Khola HPP	Remit Hydro Ltd.	Ongoing
	Jum Khola HEP	Sanima Jum Company (P) Ltd.	Completed
	Kabeli A	Kabeli Energy Limited	Ongoing
	Kali Gandaki Gorge	Shanghai Investigation Design & Research Institute Co. Ltd	Completed
	Kali Gandaki Tinau Multipurpose Project	Design and Development Pvt. Ltd	Completed
	Khimti II	Peoples Energy Ltd.	Completed
	Langtang Khola	Multi Energy Development (P) Ltd.	Completed
	Lower Manang Marsyangdi	Butwal Power Company Ltd.	Ongoing
	Mathillo Mailung Khola	Mathillo Mailun Khola Jalvidhyut Ltd.	Just started
	Super Aankhu	Gorakshya Hydropower Company Pvt. Ltd.	Completed
	Supper Dordi	Peoples Hydropower Company Pvt. Ltd.	Completed
	Sun Koshi 2 and 3 Storage HPP	Shanghai Investigation Design & Research Institute Co. Ltd.	Ongoing
	Upper Madi	China International Water & Electric Corp.	2017 completed and 2018 ongoing
	Upper Modi	Upper Modi Hydroelectric Project, Engineering Service Directorate, NEA	Completed
	Upper Karnali	GMR Upper Karnali Hydropower Limited	Ongoing
	Upper Marsyangdi	Himtal Hydropower Company Pvt. Ltd	Ongoing
3	Supper Trishuli HPP bathymetric survey of the model area of the river	Blue Energy Pvt. Ltd.	Agreement signed and work started
4	Study of sediment management in RoR hydropower projects in Nepal	Water and Energy Commission Secretariat (WECS), Ministry of Energy	Completed

5	Miscellaneous projects:		
i)	Sediment concentration, particle size distribution and mineral content analyses.	More than 5 hydropower projects in Nepal.	Completed
ii)	Data collection for cumulative impact assessment of Trishuli River basin	IFC	Completed
iii)	Discharge measurement in, Tamakoshi V, Ghunsa and Simbuwa HPPs	TMS and Remit Hydro Ltd.	Completed
5	Miscellaneous projects:		
i)	Sediment concentration, particle size distribution and mineral content analyses.	10 hydropower projects in Nepal.	Completed
ii)	Discharge measurement in Lower Marsyangdi, Tamakoshi V, Tadi and Dudhkoshi HPPs	Sanima Hydro Engineering Pvt. Ltd., TMS, Mountain Energy Ltd. and ELC of Italy	All completed except Tamakoshi V which is ongoing

ANNEX VII

Terms of reference

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Review/Appraisal
of
Energize Nepal
(NPL-12/0032)

1. BACKGROUND

Norway has supported the energy sector in Nepal since the 1960s, including hydropower research. In recent years, Norway has supported the hydraulic laboratory Hydro Lab (http://hydrolab.org/). At Kathmandu University (KU, http://www.ku.edu.np/), Norway has supported the construction of the Turbine Testing Laboratory (TTL) and the Renewable Nepal (RENP) projects. Since 2016, the previous research cooperation has been continued through one programme called Energize Nepal (ENEP). The program is managed by Kathmandu University in partnership with Hydro Lab Pvt. Ltd., and the Norwegian University of Science and Technology (NTNU) and the Norwegian energy research institute SINTEF Energi AS (Sintef). Norway provides financial support to the program through the Royal Norwegian Embassy in Nepal (Embassy).

The two main components in ENEP are

Hydropower Development Component, which aims to promote and support innovative research for generating new knowledge for solving common hydropower development problems. It focuses on research in the fields of hydraulics and sedimentation, geology and geo techniques, mechanical and electrical equipment and power systems.

Renewable Nepal phase II (RENP II) Component, which aims to increase Nepal's capacity to utilize its huge renewable energy resources by supporting applied research and development (R&D) projects implemented through partnership with the private sector companies, primarily within renewable energy. This includes biomass, solar, hydropower, wind, hydrogen and geothermal based systems.

The objective of ENEP Program is:

To improve capacity of research and education required for development of the renewable energy sector in Nepal and the region.

According to the 2016 agreement between the Norwegian Ministry of Foreign Affairs (embassy) and Kathmandu University, a mid-term review shall be carried out. A combined mid-term review and appraisal of an Upscaling Proposal (UP) will be conducted in May/June 2019.

2. PURPOSE OF ASSIGNMENT

The main purposes of this assignment are to assess the **a**) progress of the ENEP program to date and **b**) added value of the UP. In addition, a brief impact assessment of previous support to energy research shall be undertaken.

3. SCOPE OF WORK

The review shall be carried out by performing a desk study of project documentation and a field visit to Nepal for interviews with relevant stakeholders and site visits. The visit aims to coincide with the ENEP Annual Meeting scheduled for (tentative date) 16 May 2019.

Note that Norad will undertake a separate assessment of the interphase between ENEP and the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED / ENPE).

This assignment shall include the following three main tasks:

3.A. IMPACT ASSESSMENT OF PREVIOUS SUPPORT TO ENERGY RESEARCH

In addition to an impact assessment of ENEP, the impact of previous cooperation with Hydro Lab and KU (RENP, TTL) shall be briefly assessed, among others, regarding:

1. Capacity building of Nepali institutions/individuals
2. Retention of lecturers/academic staff at KU and other universities
3. Employment generation in the renewable energy sector
4. To what extent has Norway's support facilitated research cooperation beyond Norwegian institutions

3.B MID-TERM REVIEW OF ENERGIZE NEPAL

Relevance

1. How relevant[1] is ENEP for Nepal's energy sector? What are the main capacity gaps addressed by ENEP?
2. How strong is the stakeholders' (KU, Hydro Lab, NTNU Sintef), ownership of ENEP?

Effectiveness

3. What have been the major factors influencing/hindering achievement of the objectives?

Efficiency/Progress

4. What are the main achievements so far (capacity building, peer reviewed publications, physical infrastructure, etc.)? Assess progress to date against overall goals of the program as reflected in the current Results Framework, and assess the reasons for deviations, if any.
5. Assess strengths and weaknesses of the current project implementation model (decision making, administrative costs, procurement, flexibility etc.).
6. Assess to what extent Tribuhvan University is involved in research activities.
7. Assess to what extent the hydropower industry (NEA, IPPs) is engaged with ENEP programme (NEA, IPPs). Also assess engagement of other renewable energy industries.

[1] According to 2011 review of Renewable Energy Program, it lacked focus on large-scale hydropower, which is Nepal's priority and a potential large-scale industry.

Other issues

8. To what extent has the 2015 appraisal recommendations related to **a**) Programme design and **b**) Organizational structure and management (re. Appendix) been incorporated?
9. To what extent has the Results Framework been used as a management tool for the agreement partners
10. Identify the extent of transparency and possible conflicts of interest with regard to project award criteria. Suggest needs for improvements.
11. To what extent are the Norwegian institutions NTNU and Sintef Energy Research backing up the programme. Assess to what extent the involvement is institutionalized. What is the added value of NTNU and Sintef in the program?

Sustainability and risks

12. Assess the long-term sustainability and exit strategy for ENEP. To what extent is the hydropower industry now able/willing to **a**) fund research activities and to **b**) pay for the services offered by Hydro Lab and KU's Turbine Testing Laboratory? Identify sources of financing other than the Norwegian embassy to secure long-term sustainability of the programme. Make recommendations to improve the sustainability of such research programs in future, such as interventions from the government or contributions from key industries with also focus on possible policy interventions.
13. Assess ENEP's risk management (risk identification/mitigation measures, reporting on risks, etc.) and suggest improvements, if any.

Cross-cutting issues

14. Assess gender and social inclusion issues, such as recruitment of project staff, students involved and training programs among others. What efforts have been made to include women at all the different levels in this project?
15. Assess whether anti-corruption measures and conflict of interest issues are adequately managed and addressed.

3C. ASSESSMENT OF ADDED VALUE OF UPSCALING PROPOSAL

Relevance

1. Assess whether the activities under the Upscaling Proposal (UP) are relevant to the target group of ENEP program. What is the added value of UP for ENEP?
2. Assess whether the extra funding makes it more likely that ENEP achieves its goals?

Use of lessons learned

3. How has lessons learned from the previous projects and ENEP been incorporated in the UP? Make recommendations on a) coordination issues with other stakeholders, b) reporting obligation, and c) Any other business.

Results Framework (RF)

4. Assess UPs RF with reference to ENEP's RF. Assess baseline values, indicators and targets for new activities and assess their added value.

Other issues

5. Make up to five recommendations for the design/implementation of UP, also taking the findings in the review part into account.

4. Review Team and Qualifications

The Review Team will consist of a team leader assisted by one team member. At least one of the team members should be proficient in the Nepalese language:

Minimum criteria:

- Strong reporting skills (team leader)
- Proficiency in English (entire team)
- At least one person in the team must be proficient in the Nepali language

Award criteria / qualifications: Team leader

- Ability to professionally lead the review team
- Documented experience from similar assignments with references
- Experience from Norwegian hydropower or other energy related research programmes
- Preferably, work experience from hydropower projects
- Strong analytical and communication skills

Award criteria / qualifications: Team member(s)

- Experience from Nepal's hydropower sector
- Preferably familiar with Nepalese academic institutions
- Experience from similar assignments of projects funded by international donors in the region
- Master's degree in hydropower engineering or similar

Norad may participate as an **observer** in the review team.

5. Implementation and work modality

The assignment will include review of relevant background material and documentation (cf. Annex I), interviews with relevant stakeholders in Nepal and Norway (cf. Annex II), and a visit to Nepal. In addition to joint meetings with the ENEP management team, the Consultant should also have separate meetings with all main stakeholders. The Consultant should be available to initiate the work in May 2019 and complete the work by end of August 2019.

Norad foresees that the assignment will require between 8 and 10 working weeks.

The Consultant will be responsible for the following deliverables:

- Kick-off meeting via videoconference/Skype with the Embassy. Norad should also be invited to join
- Mission preparation note, and proposed report structure/outline to be delivered to Norad before field mission
- Conduct meetings/interviews with Norwegian counterparts

- Start-up meeting in Kathmandu with the Embassy before field work
- Undertake field work in Kathmandu including meetings with Kathmandu University, Hydro Lab and other relevant stakeholders in Nepal;
- Presentation of preliminary findings to the Embassy in Kathmandu at the end of field mission and to Norad in Oslo within two weeks after the field mission
- Draft report, 3 weeks after return from field mission
- Final report, 2 weeks after submission of Norad's comments to draft report. The final report shall address all assessments as described under Scope of Work. The final report shall be no longer than 30 pages (font 12) excluding an executive summary and annexes, and be delivered in .doc and .pdf format.

Annex I: List of reference documents

The Review Team shall conduct the review based on assessments of the program documentation, including (but not limited to):

Project Preparation phase

- Mid-Term Review of Renewable Nepal
- Appraisal of Energize Nepal
- ENEP Agreement, dated 27 July 2016
- Decision Document ENEP (Embassy)
- Proposal for cost extension (October 2018)

Progress Reports

- ENEP Progress reports (2016/17 and 2017/18)
- Annual Meeting Minutes (2017 and 2018)
- Year 2 - Audit Report - ENEP - Consolidated
- Minute Follow up on Institutional Assessment of KU 21 August 2018

Other documents

- RENP II documents
    - Call for proposals
    - Received proposals (round 1, 2 and 3)
    - Award of project proposals
- Final report Renewable Nepal
- Final report turbine testing laboratory project
- Hydro Lab annual reports
- The Norwegian State budget for 2019 (in Norwegian)
- Relevant Norwegian White Papers (in Norwegian)
- Energy, water resources and irrigation sector's current status and roadmap for future (White paper, May 2018)
- University cooperation as a development tool in poor countries (IEEE paper from 2014), prepared by Suresh Sharma (KU), Bhola Thapa (KU), (Kathmandu University), Inge Johansen (NTNU), Ole Gunnar Dahlhaug (NTNU) and Petter Støa (SINTEF Energy Research)

– Evaluation of Norwegian Power-related Assistance (200), Annex 3: Case studies Nepal (including Hydro Lab)

Annex II: Stakeholders

(It is expected that the Consultant interviews a representative sample of stakeholders.)

Relevant stakeholders are:

Oranizational and Project Beneficiaries (Stakeholders)				
SN	Name	Position / Organization	Email	Remarks
1	Prof. Ram Kantha Makaju Shrestha	VC, KU	vcoffice@ku.edu.np	
2	Prof. Subodh Sharma	Registrar, KU	registrar@ku.edu.np	
3	Prof. Bhola Thapa	PAC member (KU)	bhola@ku.edu.np	
4	Dr. Damber Bahadur Nepali	Dean, SoE Institutional Contact of ENEP	Damber.Nepali@gmail.com	
5	Mr. Brijesh Adhikary	Project Manager, ENEP	brijesh@ku.edu.np	
6	Prof. Hari Prasad Neopane	Project Leader TTL	hari@ku.edu.np	
7	Prof. Bivek Baral	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-17-04, KU	bivek@ku.edu.np	
8	Mr. Paras Mani Timilsina	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-17-03, KU	timipara@ku.edu.np	
9	Dr. Sunil Prasad Lohani	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-18-01, KU	splohani@ku.edu.np	
10	Dr. Shyam Sundar Khadka	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-18-02, KU	sskhadka@ku.edu.np	
11	Dr. Biraj Singh Thapa	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-18-03, KU	bst@ku.edu.np	
12	Dr. Meg Bahadur Bishwokarma	General Manager, Hydro Lab Pvt. Ltd	mbb.hydrolab@gmail.com	
13	Dr. Gyanendra Lal Shrestha	Project Manager, Hydro Lab component	gls@hydrolab.org	
14	Mr. Chiranjibi Sharma Poudel	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-17-02, Nepal Energy Foundation	cspaudel@gmail.com	
15	Mr. Devendra Adhikari	Project Administrator of RENP-II project receipt PID:ENEP-RENP-II-17-02, Nepal Energy Foundation	devendraaryal07@gmail.com	
16	Mr. Biraj Gautam	Principal Investigator of RENP-II project receipt PID:ENEP-RENP-II-17-01, PEEDA	biraj@peeda.net	
17	Mr. Diwakar Bista	Principal Investigator of CEPE PID:ENEP-CEPE-18-01, KU	diwakarbista@ku.edu.np	

18	Mr. Brajesh Mishra	Principal Investigator of CETRF PID:ENEP-CETRF-18-01, KU	brajesh@ku.edu.np	
		Others		
1	Mr. Subarna Prasad Kapali	Ajummery Bikas Foundation	spkapali@gmail.com	
2	Mr. Suman Basnet	Ajummery Bikas Foundation	basnes4@gmail.com	
3	Mr. Dinesh Kumar Ghimire	Secretary, Ministry of Energy, Water Resources and Irrigation	dkgmowr@hotmail.com	
4	Mr. Madhusudhan Adhikari	Executive Director, AEPC	madhusudhan.adhikari@yahoo.com	
5	Dr. Narayan Chaulagain	DCTA, GIZ/NEEP	narayanchaulagain@gmail.com	
6	Mr. Kumar Pandey	Vice-President - IPPAN	pandeykum@gmail.com	
7	Mr. Manohar Shrestha	CEO, Hydro-consult Engineering	manohar.shrestha@hcel.com.np	
8	Mr. Hitendra Dev Shakya	ED, NEA EC	hitendradev@hotmail.com	
Operation and Management Committee (OMC) members				
1	Dr. Damber Bahadur Nepali	Dean, SoE Institutional Contact of ENEP	Damber.Nepali@gmail.com	
2	Dr. Daniel Tuladhar	HoD, DoME	daniel@ku.edu.np	
3	Dr. Prachand Man Pradhan	HoD, DoCGE	prachand@ku.edu.np	
4	Mr. Diwakar Bista	HoD, DoEEE	diwakarbista@ku.edu.np	
5	Mr. Brijesh Adhikary	Project Manager, ENEP	brijesh@ku.edu.np	
Project Selection Committee (PSC) members				
1	Dr. Sandip Shah	PSC member	sandipshah.gm.2005@gmail.com	
2	Mr. Hans Otto Halland	PSC member	hohaaland@gmail.com	
3	Dr. Petter Stoa	PSC member	petter.stoa@sintef.no	
Project Advisory Committee (PAC) members				
1	Prof. Ole Gunnar Dahlhaug	NTNU	ole.g.dahlhaug@ntnu.no	
2	Prof. Bhola Thapa	KU	bhola@ku.edu.np	
3	Dr. Petter Stoa	Sintef Energi	petter.stoa@sintef.no	
4	Dr. Meg Bahadur Bishwokarma	Hydro Lab	mbb.hydrolab@gmail.com	
Institute of Engineering (IOE)				
1	Prof. Ramchandra Sapkota	Dean. IOE	rc.sapkota@ioe.edu.np	
2	Prof. Bhola Nath Ghimire	Prof. IOE	bholag@ioe.edu.np	
Female Engagements				
DoCGE				
1	Ms. Avidha Shah	Teaching Assistant	avidha.shah@ku.edu.np	
2	Ms. Reshma Shrestha	Asst. Professor	reshma@ku.edu.np	
3	Ms. Prachi Raj Khanal	Teaching Assistant	prachi.rk@ku.edu.np	
DoME				

1	Ms. Sirapa Shrestha	Teaching Assistant	sirapa.shrestha@ku.edu.np	
DoEEE				
1	Ms. Namrata Tusuju Shrestha	Lecturer	namrata.tusuju@ku.edu.np	
2	Ms. Kamala Gajurel	Teaching Assistant	kamala.gajurel@ku.edu.np	
ENEP Components				
RENP-II Projects				
	Name / Position in Project	**Project ID (PID)**	**Email**	**Remarks**
1	Ms. Topaz Maitland Part time researcher	ENEP-RENP-II-17-01	tm16030.2016@my.bristol.ac.uk	
2	Ms. Rojina Sharma Researcher	ENEP-RENP-II-17-02	rojina@npnef.org	
3	Ms. Pussma Thing (Tamang) Researcher		pussma073@gmail.com	
4	Ms. Shova Sanjel Research Assistant		shovasanjel5571@gmail.com	
5	Ms. Piyali Das Research Fellow	ENEP-RENP-II-17-03	daspia19@gmail.com	
6	Ms. Garima Baral Research Assistant		gareema.baral@gmail.com	Resigned
	N/A	ENEP-RENP-II-17-04	**N/A**	
7	Ms. Bipasyana Dhungana Research Assistant	ENEP-RENP-II-18-01	d.bipasyana@gmail.com	
8	Ms. Shristi Shakya Research Assistant		shakya.ss94@gmail.com	
9	Ms. Sushmita Regmi Research Assistant	ENEP-RENP-II-18-02	sushmita.regmi@ku.edu.np	Recently resigned
	N/A	ENEP-RENP-II-18-03	**N/A**	
CEPE				
	N/A		**N/A**	
CETRF				
1	Ms. Namrata Tusuju Shrestha	Researcher	namrata.tusuju@ku.edu.np	
Hydro Lab Pvt. Ltd.				
1	Ms. Usha Shrestha	Research Engineer	us@hydrolab.org	Recently resigned
2	Ms. Debika Aryal	Finance Officer	da@hydrolab.org	
3	Ms. Rojina Bhandary	Administrative Assistant	rb@hydrolab.org	
Turbine Testing Lab (TTL)				
1	Ms. Rakshita Sharma Bastola	Project Support Staff	sharma.rakshita07@gmail.com	
Project Management Unit (PMU)				
1	Ms. Sahana Shrestha	Admin and Finance Officer	shrestha.sahana@ku.edu.np	

ANNEX 3. RECOMMENDATIONS IN THE 2015 APPRAISAL

Recommendations related to **Programme design**:

a. Change the outcome "Capacity enhancement of research and educational required for hydropower development in Nepal and the region" to "Capacity of research and education required for hydropower development in Nepal and the region enhanced".
b. Develop RECIPE outside the ENEP framework.
c. Do not prioritize initiation of the GeoLab or the Business Incubation Centre.
d. Document the demand for the reservoir-studies of HydroLab
e. Reduce the administrative cost of element B3 (centre for design, operation and maintenance)
f. Change the profile of RENP II by increasing the focus on research and development more relevant for the integrated power system, and make it more demand-driven.
g. Update the LFA-matrix to reflect the content of the Programme after considering and adjusting the scope. Include indicators on the outcome-level to show how the Programme activities contribute to the development of the energy sector.

Recommendations related to **organizational structure and management**?

h. Develop and implement RECIPE outside ENEP, while keeping the Hydropower development and RENP II components within one Programme organization.
i. Simplify the organizational structure by removing the PSC.
j. Strengthen the Programme Office to include at least one more staff from HydroLab
k. Replace the representative from Norwegian Industry in the SC of RENP II with AEPC and NEA (one seat each)
l. As a part of the mid-term review of the Programme, perform an impact and sustainability review of RENP I.