

Review of Technical Assistance Program, Phase I, 2014-2018, Between Norwegian Water Resources and Energy Directorate (NVE) and Ministry of Electricity And Energy (MOEE), of The Republic of the Union of Myanmar

SWECO

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FINAL REPORT

CASE NO. 1700063

**REVIEW OF TECHNICAL ASSISTANCE PROGRAM, PHASE I, 2014-2018,
BETWEEN NORWEGIAN WATER RESOURCES AND ENERGY
DIRECTORATE (NVE) AND MINISTRY OF ELECTRICITY AND ENERGY
(MOEE), OF THE REPUBLIC OF THE UNION OF MYANMAR**



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Table of content

List of acronyms	2
1 Executive Summary	3
1.1 Review Findings	3
1.2 Conclusion	4
1.3 Recommendations	6
2 Introduction	10
2.1 Objectives of the Review	10
2.2 Methodology	10
2.3 Structure of Report	10
2.4 Acknowledgements and Disclaimer	10
3 Review and analysis	11
3.1 Description of the Project	11
3.1.1 Goal	11
3.1.2 Purpose	11
3.1.3 Outputs and Activities	11
3.2 Assessment of Performance and Achievements	12
3.2.1 CA1 Hydropower Development	12
3.2.2 CA2 Technical Transfer, including English training course for MOEE professionals	16
3.2.3 CA3 Implementation Support – Electricity Law and Regulation	19
3.2.4 CA4 Hydropower Standards, including engineering services	23
3.2.5 CA5 Hydrometeorological Database	25
3.2.6 CA6 NVE Administration and Technical Support	27
4 Conclusions and recommendations	31
4.1 Efficiency	31
4.2 Effectiveness	33
4.3 Impact of the Program	35
4.4 Relevance	35
4.5 Sustainability	36
4.6 Risk management	37
4.7 Particular concerns to be investigated – specifically related to the Program	40
4.8 Audit	47
4.9 Financial management and anti-corruption measures	47
4.10 Proposed list of actions	48
5 Annexes	52

List of acronyms

CIA	Cumulative Impact Assessment
DACU	Development Assistance Coordination Unit
DEPP	Department of Electric Power Planning
DHPI	Department of Hydropower Implementation
DMH	Department of Meteorology and Hydrology (Ministry of Transportation)
ESM	Environmental & Social Management
ESMP	Environmental & Social Management Planning
ESMWG	Environmental & Social Management Working Group
HSE	Health, Safety & Environment
EPSWG	Electric Power Sector Working Group
ICH	International Centre for Hydropower
ICOLD	International Committee on Large Dams
IFC	International Finance Corporation
IHA	International Hydropower Association
MC	Multiconsult
MEC	Myanmar Earthquake Committee
MES	Myanmar Engineering Society
MFA	Norwegian Ministry of Foreign Affairs
MOALI	Ministry of Agriculture, Livestock and Irrigation
MOECAF	Ministry of Environmental Conservation and Forestry
MOEE	Ministry of Electricity and Energy
MNCOLD	Myanmar National Committee on Large Dam
MONREC	Ministry of Natural Resources and Environmental Conservation
MOT	Ministry of Transportation
NC	Norconsult
NORAD	The Norwegian Agency for Development Cooperation
NVE	Norwegian Water Resources and Energy Directorate
RNE	Royal Norwegian Embassy
THT	Tha Htay
UKT	Upper Keng Tawng

1 Executive Summary

Based on a request from Ministry of Electricity and Energy (MOEE) (previously named Ministry of Electric Power (MOEP)), to the Norwegian Ministry of Foreign Affairs (MFA) a Program of Technical Assistance was elaborated jointly between MOEP and the Norwegian Water Resources and Energy Directorate (NVE) with the support of the Norwegian Agency for Development Cooperation (Norad). The Program Agreement between the Norwegian Ministry of Foreign Affairs (MFA) represented by the Royal Norwegian Embassy in Yangon (RNE), and NVE was signed on 10/11 December 2014 by RNE/NVE, for phase 1 2014- 2018.

SWECO was assigned to review the phase 1 to:

- Assess the results of the existing and completed cooperation of initiatives under the program
- Suggest future support areas for the electricity sector in Myanmar, and possibilities for changes and expansions of the existing programs & projects and possible new areas of cooperation

1.1 Review Findings

The review has covered the period from the preparations of the existing Program, i.e. from 2013 and till today.

Overall, the program has fed into the development of the energy sector in Myanmar, and has been appreciated by MOEE up to top stakeholder level in the energy sector.

The project has reported outputs through a result framework establish at the start of the Program with break down into each CA and output indicators. The establishment of the new Component 3 in CA1 is the only major adjustment to the Program that has been treated thoroughly in the annual reports, as an Addendum to the Project Document. There is little information in annual reports considering deviations in plans and budgets, beyond reporting in shifts in budgets and to some extent in work content. Other, redistribution of funds and new areas, namely in-house consultancy assistance, establishment of environmental component and more support for regulatory issues, have been iteratively agreed among stakeholders.

The current reporting structure is considered static to be used as a management tool, and is proposed to be changed into annual target setting and follow-up to be better suited to reflect activities for each year, early identification of potential deviations and to address the value-add of a component related to the goals for that component and CA, and for the overall goals for the Project.

The TA Program has contributed to development of different standards for MOEE. This include Hydropower Standards, and environmental outputs such as Health, Safety and Environmental Policy and requirements for planning and construction of hydropower projects by DHPI, and a revised ESMS Policy and requirements to MOEE. The

The establishment of the different working groups (legal, grid code and environmental) has contributed to the development of the energy sector, but is not completed. The ESMWG, with members from different departments within MOEE, has contributed to a general increased attention to environmental and social issues in different departments of MOEE and is perceived as a success.

The Hydrological Database Forum, with members from three Ministries MOEE, MOT and MOALI, serves as a possible platform for an improved common use of hydrological data in Myanmar and thus a better knowledge of the water resources in general and hydropower potential in particular in Myanmar for future planning. The Program has increased the technical knowledge at the hydraulic laboratory, which will be important in future projects.

The technology transfer, both long-term and short-term, has included training within hydropower planning, design, operation and maintenance, hydrological methods, environmental and social issues, aspects related to regulator, grid code and legal issues, but also increased skills in English, which is of general importance in a future situation with more international activity and investments in the energy sector in Myanmar.

The on-the-job training by in-house consultants, within both technical design and hydrology, has also increased the level of knowledge.

1.2 Conclusion

In general, the program has fed into the development of the energy sector in Myanmar, and met the overall Program Goal of “development of a sustainable framework for hydropower development”.

As a general observation, however, the required efforts to reach the original targets of the program were originally significantly underestimated. This view is valid both for the required amount of training as well as the required time to accomplish necessary change. This has led to major shifts in budgets and the review team (RT) also recommends to extend the program.

The output indicators tell one part of the story. The actual impact of the delivery is less tangible. The overall assessment is that the capacity development component has had a significant impact regarding a general understanding of efficient and sustainable operations. The actual implementation of identified standards, rules and procedures will require additional support.

Compared with the Program Outputs for each CA, we have made the following remarks:

CA1: “MOEE has increased its know-how and capacity in developing hydropower projects according to international standards”

The Program has shown overall sufficient success and the component’s objectives have been fulfilled. All the output indicators have been respected even though the Result Framework in the Program Document does not quantify the indicators in all cases. It is also observed that the initial intension from RNE/NVE that “Sustainable Development” should mean a general focus on environment and socio-economic subjects. But instead the

technical assistance in Component 1 & 2 was shifted toward a higher focus on technical subjects. The new Component 3 with establishment of the Environmental and Social Management Working Group (ESMWG) within MOEE was an important change of the original program. The activities included in Component 4 resulting in a Pre-Feasibility Study for Bawgata HPP is finalized and closed. Local presence from sub-contractors have been less than anticipated, which should have been addressed by NVE.

CA2: “MOEE and collaborating agencies’ staff have developed their skills on relevant technical aspects related to management of electricity and water resource sector”

Through the Grid Code review and through the various short-term capacity building programs, MOEE as well as collaborating agencies have developed their skills within the electricity and water resource sector. It is obvious that this work is an absolute requirement to attain reasonable development of these sectors in Myanmar. The issue is if the development program could be performed in a more efficient manner, which is discussed further in the report.

CA3: “MOEE is enabled to implement electricity law and regulations”

The original task that MOEE would be enabled to implement electricity law and regulations was quite momentous. The recent amendments have however provided a more realistic and clear view as to what should be accomplished through the program. The current development of Grid Code, Distribution code and Wheeling Tariffs are good examples of concrete tasks that are required and where the input from professional advisors is central. An additional factor that will enable MOEE to implement electricity law and regulation is the work that currently is being performed by the legal group. This work will need to be further enhanced through assistance by an international legal advisor with significant experience in the sector. Passing the new electricity law will also require support. In summary, the performed efforts should enable the MOEE to implement electricity law and regulations. This will however require some quite significant assistance with the actual implementation.

CA4: “MOEE and collaborating agencies have accepted modern standards established for best-practice planning, implementation and operation of hydropower projects”

The development of the technical standards is completed. The Hydropower Standards is well-structured and the quality and relevance seems to be good and according to best practice. A high extent of the technical content seems to be based on already available documents but it implies that standards of this kind shall be similar on a world-wide perspective.

The output indicators per the Results Framework are not fulfilled, due to transfer of Component 2 & 3, a change included in the revised program. Even though the activities were transferred to CA 1 under the new Component 3, no guidelines and standards has yet been issued on these subjects.

A program on implementation support of the Technical standards needs to be included to fulfill the objective of “MOEE to have accepted modern standards”. Consider to translate

standards into Burmese for the more convenient use by MOEE staff and other nationals as part of this.

The cost for CA 4 has been kept within original budget, despite Components 2 and 3 being deleted.

CA5: “MOEE and Department of Meteorology and Hydrology (DMH) have more complete and reliable river flow- and discharge data”

The implementation of a hydrological database has been delayed, due to internet capacity problems within MOEE. NVE has actively worked with the Ministry to find a solution, and has reported that this issue should be solved during November 2017. Only two gauging stations have been upgraded, and plans for digitizing historical river flow data in the three Ministries, to be inserted into the database, are still not in place. It is unclear to what extent the new database will serve as a national hydrological database, containing all relevant hydrological data from DHPI, DMH and MOALI.

The Hydrological Database Forum, with members from the three Ministries MOEE, MOT and MOALI, serves as a possible platform for an improved common use of hydrological data in Myanmar and thus a better knowledge of the water resources in general and the hydropower potential as basis for future planning.

1.3 Recommendations

To enhance the overall Program Objective, it is of uttermost importance with presence in Myanmar, not only for the resident adviser, but as much as possible of training and technical support should be given in Myanmar. This should preferably be done as on-the-job training on specific projects and tasks. This requires close dialogue with MOEE on relevant tasks for on-the-job training, both within hydropower design, regulatory issues and hydrology. The resident advisor has a critical role in ensuring that this dialogue takes place.

A matrix with proposed actions and corresponding criticality is included in Annex E.

A possible new phase of the program is proposed to include the following issues for each CA, for further support:

CA1: Hydropower Development

- The remaining design for Upper Keng Tawng and Tha Htay HPP should be finalized during 2018, per information from MOEE at the review visit. The current status of the construction works are however unclear, but it is indicated that some progress is the case. If some crucial parts should still remain at the end of Phase I, the program for a Phase II should include technical support to secure completion of the Detail Design for these two projects. It is judged that the most critical areas that needs support in the power plant’s design, included under the responsibility of MOEE, are
 - o Underground works (pressurized tunnels)
 - o Slope stability
 - o Dam foundation and dam design.

- Besides this, it is recommended that the technical support to MOEE during Phase II should focus on transfer of know-how in design rather than direct support as design engineering services. In addition, support during supervision of the construction works for the above listed critical structures and areas is advised. This support should basically be performed locally as capacity strengthening heavily depend on local presence and thus the budget need to allow for this.
- Support on Bagwata HPP should continue, but should be structured in a separate program independent of technical assistance to MOEE. The support will facilitate the possibility for an independent project developer, such as Thoolei Company on behalf of the Karen Community, to develop a hydro power project in Myanmar that can serve as a role model and good example for other IPP's. The support so far to Thoolei Company has resulted in limited technology transfer to that company, with exception of given hydrology training. Future support should preferably be given as specific on-the-job training in Myanmar or via skype. Initially, this should include support in the performance of the Feasibility Study comprising also important transfer of technical knowledge and project development skills. The program for this support should be elaborated in cooperation with Thoolei and the beneficiary.
- Continued support to the ESMWG. Focus should be on establishing this group as a permanent unit within MOEE.

CA 2: Technical Transfer

- Continued support to master degree students, within relevant topics at international universities.
- Relevant seminars regarding hydropower development to be continued, ref. ICH seminars in the ongoing program. Important, however, that MOEE have more influence on the content and program for seminars in Myanmar, to ensure best possible relevance.
- English training should be continued, with possibly increase of number of students, by introducing one additional teacher, and possible cooperation with other Ministries.

CA3: Implementation support to electricity law and regulation

- Continue the work with implementation support to electricity law and regulation. If necessary, continue support to the grid code and legal working groups.
- Implementation support to wheeling charges and tariffs.
- Assess the need for an international legal adviser, to support the domestic legal adviser.

CA 4: Hydropower Standards

- This CA is finished, however a program on implementation support to MOEE of the technical standards should be included.

CA 5: Strengthening of hydrological database for hydropower development

- Any further upgrading of hydrological gauging stations must include extensive on-the-job training, to secure necessary experience in the different agencies for similar upgrading in the future.
- Further support to establishment of a hydrological database needs to be based on a thorough assessment of where to establish the database, both technical and hydrological capability. NVE has emphasized that the most natural department to be in charge of a national database is DMH under MOT. Furthermore, it should be investigated whether the planned Hydro Informatic Centre will cover a similar function as national database, and adjust the plans for Phase II in accordance.
- Continue support to the Hydrological Database Forum, which can act as a meeting place between MOEE, DMH and MOALI on issues related to future water resources management in Myanmar.
- If the technology transfer on hydrological methods and skills is to be continued, it is important that such training can be directly linked to specific projects and hydrology tasks in DHPI, DMH and MOALI. The content of such training should be decided in cooperation with the involved Ministries.

CA 6 NVE Administration & Technical Support

- Residential advisor needs to take an active role towards sub-contractors with respect to ToR and deliverables, particularly to improve local presence to ensure competence transfer through in-house consultants.
- Invoices from NVE to RNE, with review from MOEE need to be better detailed and linked to hourly booking on activities both for sub consultants and NVE internal staff.
- Early warning of potential deviations in budget to RNE/Norad must be improved. Internal project management of NVE resources, and respective budget should be disaggregated to involved resources, and status followed-up monthly per activity linked to hourly booking.
- Accommodation in Nay Pyi Taw should be at good international standard as local presence is critical for the program. This should however be clearly agreed with MOEE to avoid potential misunderstandings vs. Program Document. Also, the permanent location of the resident advisor in Yangon should be clearly agreed between MOEE and NVE/RNE, to avoid dissatisfaction concerning remuneration of costs between parties.
- The annual reporting should improve explanations on changes in budgets, the rationale for these and planned activities or potential deviations for next phase.
- The result framework seems not to have been used actively as a management tool and indicators are only reported for some of the CAs and components and the indicators should be more directed on reflecting the quality of a component and for the overall goals for the Project. Hence, the concept should continue, but be improved. This should be done by establishing annual targets at start-up of each program year, linked to the overall Program Objectives, but adapted to program plan and status for respective year.
- Risk management should be more dynamic. A risk matrix with acceptance criteria, should be established and updated annually. Cost risk assessment could also be introduced for technical studies of larger magnitude to estimate contingencies and to improve cost estimation and budget discipline.

Possible new areas to be included in an extension of the program:

Possible new areas to be included are assessed with regards to the status of the program.

- Hydro Power Master Plan (requires access to relevant hydrological information throughout the country). This will allow to assess the need for hydropower with respect to supply/demand in the country. Also, it will create a link to other initiatives within the energy sector in Myanmar and identify and prioritize projects to be supported.
- River Basin Management, including sediment transport and sediment volumes in existing reservoirs (need to check status on other ongoing or finished programs on water resources management in Myanmar). Essential competence to be developed within hydropower in Myanmar, and an area where Norway has developed high expertise (NTNU, investments through SNP/Statkraft etc) which can be utilized.
- Dam Safety Guidelines and dam break analysis. Critical areas with high possibility for competence transfer from Norway.
- Contracting and contract strategy, including international standards (incl. introduction to FIDIC). Very relevant topic for coming project phases both within the program and in general.

2 Introduction

2.1 Objectives of the Review

The objective of this review is to:

- Assess the results of the existing and completed cooperation of initiatives under the program
- Suggest future support areas for the electricity sector in Myanmar, and possibilities for changes and expansions of the existing programs & projects and possible new areas of cooperation.

2.2 Methodology

The review has covered the period from the preparations of the existing Program, i.e. from 2013 and till today. A start-up meeting with NVE was conducted. Documents included in Annex B were made available by NVE. Key participants in the program who have participated in the various CA's were identified with assistance from NVE. Questionnaires to be handed out to participants of CA1 and CA5 were prepared to support the interviews.

The mission preparation report and field visit plan were submitted to Norad. The interviews with personnel in Myanmar and at the Norwegian Embassy was performed, interviews with NVE program management for CA6 and for subcontractors (DNV GL, Norconsult and, Multiconsult). A list of contacted people is included in Annex C.

A presentation of preliminary findings was discussed in wrap-up meetings with the RNE and MOEE prior to departure from Myanmar, and presented in a wrap-up report.

2.3 Structure of Report

The report is structured with an overall review of each CA in chapter 3 "Review and analysis", with focus on assessing the results of the existing and completed cooperation initiatives for each CA under the program.

The specific evaluation criteria from the ToR (Annex A) are included in chapter 4, with assessment of all CAs together. Conclusion made for the program and summarized is included in the executive summary.

2.4 Acknowledgements and Disclaimer

The review is based on documents made available by NVE (Annex B) and additional information through meetings in Myanmar during field visit, with consultants and Program Management in NVE (Annex C). Nonetheless, the findings and recommendations in this report are solely those of the review team.

Sweco is grateful for the support from NVE to provide information for the review and facilitate the field visit, and to Norad for good dialogue throughout the project and for have been given the opportunity to conduct this interesting study.

3 Review and analysis

3.1 Description of the Project

3.1.1 Goal

The overall program goal for the project is to review Technical Assistance Program, phase I, 2014-2018, between Norwegian Water Resources and Energy Directorate (NVE) and Ministry of Electricity and Energy MOEE, (former Ministry of Electric Power, MOEP) of the Government of the Republic of the Union of Myanmar. The review will ensure that the program has reached its overall goal, i.e.: Development of a sustainable framework for hydropower development in Myanmar, and the stated efforts in the Program Agreement (PA), namely:

- MOEE has increased its know-how and capacity in developing hydropower projects according to international standards
- MOEE and collaborating agencies' staff have developed their skills on relevant technical aspects related to management of electricity and water resource sector
- MOEE is enabled to implement electricity law and regulations
- MOEE and collaborating agencies have accepted modern standards established for best-practice planning, implementation and operation of hydropower projects
- MOEE and Department of Meteorology and Hydrology (DMH) have more complete and reliable river flow- and discharge data.

3.1.2 Purpose

According to the ToR (Annex A) the purpose of this review is to:

- Assess the results of the existing & completed cooperation of initiatives under the program
- Suggest future support areas for the electricity sector in Myanmar, and possibilities for changes and expansions of the existing programs & projects and possible new areas of cooperation.

3.1.3 Outputs and Activities

The review has been conducted with the following steps:

- i. Contract signing and start-up meeting with Norad, start-up meeting with NVE with collection of information
- ii. Review of information and submission of a mission preparation note
- iii. Field visit to Myanmar with interviews of local stakeholders and participants of the program. A seminar in Nay Pyi Taw where preliminary findings and interpretations were presented to stakeholders and discussed. A wrap-up report submitted to Norad, MOEE, NVE and the Royal Norwegian Embassy in Yangon (RNE).

- iv. Interviews with NVE Program Management and with Norconsult, Multiconsult, DNV GL, ICH and Thoolei Company, as subcontractors to NVE
- v. Submission of draft final review report
- vi. Comments from Norad, RNE, NVE and MOEE to the draft report.
- vii. Incorporation of comments and submission of final report

3.2 Assessment of Performance and Achievements

3.2.1 CA1 Hydropower Development

Cooperation Area 1 (CA1) has been focused on technical matters related to the civil works design of two ongoing hydropower facilities that were used as objects for the technology transfer. The technical support to MOEE/DHPI were performed as on-job-training and In-house Consultancy Services.

The overall goal for CA1 is as follows: *“MOEE has increased its know-how and capacity in developing hydropower projects according to international standards either internally or through Public Private Partnerships”*

The Program Document dated 27 October 2014 list the following four components:

1. Design and Engineering Services (In-house Consultancy)
2. Construction Management Services (In-house Consultancy)
3. Feasibility Studies including EIA/SIA (In-house Consultancy)
4. Other Hydropower Studies (technical support to non-Union Government groups).

The outputs for CA1 are common for all four components. They are as follows:

- Training of MOEE counterpart is facilitated through consultancy services.
- Quality assurance of draft report carried out by NVE & MOEE per agreed schedule.
- NVE/MOEE carry out project management in efficient and professional manner.

During the procurement process of In-house Consultancy Services it was agreed to merge Component 1 and 2 comprising In-house Consulting Services for Upper Keng Tawng and Tha Htay Hydropower Projects. The In-House Consultancy Services are executed by Norconsult and Multiconsult (MC/NC) in association.

Component 3, Feasibility Studies including EIA/SIA, were originally included in the above contract with MC/NC but were deleted in January 2016 since the projects initially identified were transferred to private project developers, one of those being Bawgata HPP - see Component 4 below. The allocated budget for Component 3 was distributed to other activities within the Program.

Component 4 comprise a Pre-Feasibility Study for Bawgata HPP for the benefit of the Karen Community where Thoolei Company Ltd. was the local consultant. The Consultancy Contract was awarded to Norconsult who in fact performed the full study.

In September 2016, a new Component 3 was agreed that is described in the Addendum to the Program Document. The new Component 3 is covering basically Environmental aspects of a hydro power development.

Component 1 & 2

The Civil Work Design for the Upper Keng Tawng and Tha Htay Hydropower Projects is managed by two different teams within DHPI. The Technical Assistance (TA) performed by the In-house Consultant (MC/NC) has been related to different design aspects, mainly of the dams and spillways.

It is obvious that DHPI had/has a great need of support in design assistance of hydro power plants with limitation in resources even though the basic skills are present. The TA was performed by MC/NC in the format of seminars and work-shops but also as On-the-job training. But from the review, it also became clear that a high degree of input was made from MC/NC home office by performing design analyses etc. that was delivered in report format (in some cases follow-up by a seminar or work-shop). A total of 69 technical memos and 47 technical reports have been produced by MC/NC up to 2017Q2, basically from the home office. None of the reports or memos has however been reviewed as this was not part of the MTR, thus the quality and rationale is not evaluated. For the same reason, it has not been possible to evaluate within this scope of review how all the subjects for analyses reported in the technical memos and reports has been prioritized and selected and how critical all these has been to secure a safe design for the two hydro power plants. It is definitely correct that a number of these are very important and critical for the safe and secure design, but it cannot be precluded that a more restrictive approach would have resulted in a better cost effectiveness.

17 seminars and work-shops have been arranged attended by a total of 40 DHPI staff (group size between 3 – 14). It is also noted that no training of DHPI staff was performed in MC/NC home office in Norway though it was included in the ToR. The reason for this not happening is, according to MC/NC, budget constraints.

From the questionnaires that was circulated and filled in by DHPI's staff it is clear that the Technical Assistance provided by MC/NC has been appreciated and useful (22 submitted questionnaires, 12 males 10 females, scoring Good to Excellent). However, a general comment is that the level of depth and detail could have been better as many of the seminars and works-shops was presented in a general level only thus giving limited additional know-how. More practical exercises with software was also asked for. To keep in mind in this context is that DHPI has very limited budget and possibilities to acquire licensed software.

It should be highlighted that the technical assistance has resulted in design improvement for both Upper Keng Tawng and Tha Htay Hydropower Projects. The dam design has been revised resulting in improved dam stability and foundation and thus improved dam safety. At the same time, it has been possible to decrease the volume of construction materials and construction time. Also, the design of the spillways has been modified for better

function and decreased concrete structures. All this together will have a high positive economic impact on the construction costs, even though the real cost saving figure is not possible to estimate from available information. At the time of the MTR, the site construction activities are in an early phase and no major work with structures related to the design supported by MC/NC has been started as this will be commence only when the Detailed Design is completed and approved.

The original budget in the Program Document from October 2014 for Component 1 & 2 was 60 MM with a total budget of 16,5 MNOK. Due to the deletion of Component 3 its budget was distributed to other activities within the Program. In addition, a few other reallocations of budget were made in the course of the program. It is noted that the accumulated cost for Component 1 & 2 up to 2017Q2 became 153,8 MM and 37,6 MNOK, i.e. the resulting cost is **228 %** of the original budget. From the submitted reports, it is difficult to follow the decision chain approving this cost increase. It is however interpreted that this cost increase is a result from additional requests from DHPI in technical support and design input for the two projects and that this was not anticipated when setting up the original budget. In addition, there is a remaining budget up to 2018Q4 that summarize the total cost for Component 1 & 2 to 39,3 MNOK, i.e. **238 % of the original budget.**

From the progress reports submitted by MC/NC it can be interpreted that about 45 % of the man-month was spent in Myanmar performing mainly on-the-job training, seminars and work-shops but also technical assistance during the spillway model test. The available reports have however limited information and an exact figure is difficult to calculate, but it is expected to be in this order.

Out of the 55 % of the man-months input working at MC/NC home office it can be estimated that about 20 % is related to administration. A simple calculation results then in about 100 hours input in average per technical memo and report, and this can be considered as reasonable.

Considering the initial intention of the Program giving “Technical Assistance” to MOEE/DHPI for the design and development of the two HPP in question it can be concluded that the role of the In-house Consultant MC/NC is more of a Design Engineer. The need for a “Design Engineer” from DHPI is however obvious and the set-up is also in line with previous engagements from NEWJEC from Japan. But it became clear from the resulting accumulated cost that this fact being the case was not fully understood when elaborating the Program Document and the allocated budget for Component 1 & 2 resulting in the actual cost over-run.

Even though a great effort in assisting DHPI in the design activities has been given by MC/NC it remains a high need for continuously support in finalizing the design for the two HPP during 2018 (and probably beyond) as in-house Consultancy Services. The remaining budget for Component 1 & 2 up to program end is however very limited to support this. It is worth mention that the completion and approval of the Detail Design during 2018 is crucial for keeping the project implementation schedule. Other possible obstacles for the successful and timely project implementation such as budget constraints, local public resistance could happen, but it is not part of the MTR to analysis these risks.

Component 3

The original Component 3 - Feasibility Studies including EIA/SIA were included in the In-house Consultancy Contract with MC/NC. The component was however cancelled already in January 2016. Only limited activities were performed within this component regarding a Pre-Feasibility Study before cancellation.

New Component 3 The MOEE-NVE Environmental and Social Management

This component was defined in an addendum to the Project Document which was approved in the Annual Meeting in October 2016. The Environmental and Social Management Working Group (ESMWG) was established with 7 members, from different departments in MOEE.

The budget in the addendum to the Project Document for 2017 and 2018 was 16.9 million NOK. In the Annual report for 2017 this is reduced to 7.5 million NOK, without a clear explanation to this reduction of the budget.

A lot of activity has taken place during the first year of operation of the ESMWG, including preparation of a Health, Safety and Environmental Policy and requirements for planning and construction of hydropower projects by DHPI, and a revised ESMS Policy and requirements to MOEE. In addition, a lot of training for the members of the ESMWG, as well as other government institutions, such as MONREC.

In August 2017 two of the members started on Master studies in Bangkok. Planned activities for 2018 include an ESMP and a HSE plan for Tha-Htay HPP, and continued support and training in ESIA and ESMP management and reviewing.

The number one priority for the ESMWG, according to the members of the group, is to have the ESMWG established as a permanent unit within MOEE. This would “ensure continuity in staffing, separate budget and a formal contact in the Ministry for environmental issues”, as it was written in the addendum to the Project Document from 2016.

From interviews and questionnaires prepared for this review, the general impression was that the members of the working group were very satisfied with the different training so far in 2016/2017, and in particular with the support from the environmental adviser from NVE. They felt they had very good contact with the environmental adviser by email, in the periods the adviser has not been present in Nay Pyi Taw. For a possible next phase of the TA Program, the members of the group suggested to include Cumulative Impact Assessments and ESIA for Transboundary Projects in the training.

The MOEE-NVE Environmental and Social Management component, with the establishment of the ESMWG with members from different departments of MOEE, seems to be a success and continued support and training is highly recommended. It is recommended that the TA Program (NVE) continues to support establishment of the ESMWG as some sort of a permanent unit within MOEE. This is also one of the major outputs for this component, as formulated in the addendum to the Project Document.

Component 4

The Pre-Feasibility Study for Bawgata HPP was finalized in 2017Q2. Bawgata is a project driven by the Norwegian Embassy, RNE, as a peace and initiative, to support cooperation between the Government and the Karen Community. This is by RNE reported to be unique in its composition of stakeholders.

Thoolei Company acted mainly as a bridge between Norconsult and the Karen Community and were not actively involved in the technical parts of the study. The activities within Component 4 was performed more or less isolated from other components within CA 1. The Pre-FS includes both technical and ESIA aspects of the project.

The Pre-Feasibility Study will serve as a basis for the full Feasibility Study that is planned for 2018 as a co-financing from Norway and New Zealand and a smaller part own capital from the Karen Community.

From the questionnaire circulated among Thoolei staff, Norconsult was considered well skilled and provided relevant expertise. It is also clear that Thoolei staff was little involved in the performance of the technical parts of the study, thus the technology transfer must be considered to be rather limited. It is however a general interest in gaining more knowhow regarding hydropower development among Thoolei staff.

The original budget for Component 4 in the Program Document was 4 MNOK. The total actual cost became 5,9 MNOK, i.e. a budget overrun of 47 %. The reason for this overrun is in general terms described in 2017 Annual Report as need for “more time and resources” as well as “extensive stakeholder consultations” as well as “unpredictable access to the project area” as compared to the assumptions in the Program Document.

The overall budget for CA 1 in the Program Document was close to 49 MNOK. Up to 2017Q2 a total cost of about 51 MNOK was accumulated and the remaining budget is 3,3 MNOK. The prognosis for the total cost for CA 1 then become about 54 MNOK, i.e. a cost increase of about 11 %.

3.2.2 CA2 Technical Transfer, including English training course for MOEE professionals

This Cooperation Area has four components:

Component 1: Short-term Capacity Building and Development of Hydropower Training Centre & Laboratory Implementation support

This sub-component has primarily been performed by Norconsult through several hands-on training opportunities at the Paunglaung Hydraulic Laboratory. Training has included both development and understanding of physical models and support during testing, as well as CFD (Computational Fluid Dynamics) simulation. The support also included installation of a new ultrasonic flow meter device. The training has also involved Hydrological analysis and database management. This is described in further detail under Cooperation Area 5 (CA5).

The English Language Proficiency training currently involves the training of three classes with approximately 40 individuals at the Elementary, Pre-Intermediate and Intermediate

levels. Each of the English classes has three 3-hour lessons a week. Through these classes significant progress is made which is also verified through English tests that have been performed as part of the English training program. Training started 4Q 2016. A total of 36 students completed the English Training. In general, the students improved their English Skills by 24%.

The Program Document also includes the Secondment of selected staff to the In-House Consultants home office in Norway, which has not yet taken place.

Component 2: Long Term Capacity Building

The results of this component have today materialized in a MSc in electrical engineering at NTNU University in Trondheim.

Component 3: Seminars by International Centre for Hydropower (ICH)

The International Centre for Hydropower (ICH) has carried out approximately 10 workshops in Nay Pyi Taw with more than 300 attendees for MOEE staff and officials since the program commenced. The assessment has been carried out through interviews with individuals that have taken part in one or several of these seminars.

Component 4: Minister visit to Norway

This has not yet been planned for

The overall assessment of CA2 has been based on a number of interviews with the MOEE working groups. The following examples provide an indication of the complexity to deliver training and advice in a meaningful way;

- The issue of on-the-job-training has been raised several times. Most of the MOEE staff find desk-based training most efficient. The most efficient training takes place when concrete tasks have been assigned that require new skills and where the trainer is accessible in a small setting. This is of course an expensive type of training. The reason that it is considered to be efficient is largely due to the fact that many individuals are insecure in larger groups. One reason for this insecurity is lack of English skills. Occasionally, the absence of management is considered to have a positive impact in this regard.
- The English Language Proficiency training has several positive aspects. One is that it provides younger individuals with relevant skills for the future as an increasing share of foreign communication will be conducted in English. From a long-term perspective, it is vital for the development of the electricity sector. Another important topic is that the course actually gives MOEE-staff a broader understanding of other countries and cultures. This is also vital in order to continue successful development in the country. Since training is performed in a professional way by a teacher who is permanently based in Nay Pyi Taw and has lessons 5 days a week, this training element is efficient.

- The English Language Proficiency training was not particularly focused on developing technically relevant language abilities. The rationale is to establish a common platform without an orientation on technical topics. It should be said that English skills in general are quite low. From this perspective, the ambition to start with the basics should be the right way forward.
- As a general comment, both for the English Proficiency training as well as the legal group is the genuine appreciation to participate in these classes. This was largely by curiosity and dedication.
- With regard to Long Term Capacity Building only one individual has completed a MSc degree at the NTNU University in Trondheim. A significant reason is the relatively high English language skills that are required to gain admittance. From this perspective, the English Language Proficiency training is an important tool in this regard. It should be mentioned that the possibility to gain access to an international university is one key motivator for the individuals that take part in the English training courses.
- The work that has been performed by the International Centre for Hydropower (ICH) has been highly appreciated. Several of the topics have been very relevant for the conditions of Myanmar. To increase overall efficiency these courses can be further tailored to the specific conditions of the country. There is a significant interest to obtain best possible value from the seminars and training courses. Comments have been made about the contents level of the seminars. In some cases, the scope has been too broad and has not reflected the actual situation in Myanmar to the extent possible. On the other hand, a number of interviewed staff members have confirmed that they have had immediate use of the seminars in their daily work. A general conclusion is that the scope and contents should be discussed with MOEE well in advance of the actual training sessions. Then it would be possible to improve specific topics of interest.

In general terms both management and staff are enthusiastic about the Technology transfer that is taking place. Some observations include:

- The method of training has been discussed. The staff often emphasizes the importance of hands-on training in smaller groups and classes. It is in these settings that the learning potential is most significant.
- Implementation
There is a quite significant demand for advice related to the actual implementation efforts, i.e. how to go about the actual implementation efforts that are required in order to successfully implement codes, rules and standards.
- The role of NVE
In several interviews the important role of NVE has been commented. A primary observation is that NVE has a significant responsibility to cooperate with the various consultants, trainers and educators as well as the MOEE to ensure that the various parts of the Sustainable Hydropower development program are coordinated and the best possible use of resources is obtained. The importance of the resident expert

cannot be overemphasized. If this person can master the specific circumstances on the ground, significant additional efficiencies can be accomplished.

3.2.3 CA3 Implementation Support – Electricity Law and Regulation

The overall goal of CA3 is “MOEE are enabled to implement electricity law and regulations.”

From the onset of the program a revision of the Electricity Law including the preparation of regulations had been carried out by MOEP with assistance from ADB. The ADB consultancy had three main tasks:

1. Identification of Content and Deficiencies of Draft of New Electricity Law.
2. Preparation of Regulations to Establish Electricity Regulatory Authority and Effective Power Sector Regulatory Framework.
3. Drafting of Rural Electrification Law and its Implementing Regulations.

The original intention was for NVE to provide comments to the draft law and assist MOEP and the regulator (when established) with the implementation of the new Electricity Law and corresponding regulations.

Since the onset of the program this quite ambitious approach has been reduced and further clarified. In the annual report of 2015-16, the total allocated program budget for this activity was increased after a budget relocation from 3.806 to 8.806 MNOK. The scope of the Cooperation Area was further detailed in the annual report of 2017 through the addition of (Grid Code and Distribution Code) in the component description below.

Based on these changes Cooperation Area 3 has the following two components:

- Component 1: Implementation support - Electricity Law (Grid Code and Distribution Code)
- Component 2: Implementation Support - Regulations & Regulator

Component 1 Implementation support – Electricity Law (Grid Code and Distribution Code)

Component 1 was contracted to DNV-GL in Sept. 2016. Since then, DNV-GL has performed 16 three to four day missions to Myanmar where the current draft Grid Code has been scrutinized and amended. All parts for the Grid Code work have been concluded except, part 1 for the General Code, where it has been agreed between NVE and DNV-GL that NVE will continue to work on the finalization of this component through the remaining period of 2017 with the objective to provide advice on approval and implementation during 2018.

The original idea was to simply run through the existing code with the working group. It was however quickly determined that this was not a suitable solution. The existing (ADB

19(52)

financed) code was very much similar (copy) to the Saudi Arabia Grid Code and was not at all tailored for the needs of Myanmar or for the legal setting (largely similar to India) of Myanmar. It was therefore determined that a quite extensive development project was required.

The set-up of this work has mainly been that the consultants (one or most often two at a time) have arrived to the Ministry and met with the grid code working group, usually 7-10 individuals. The current code has been projected on a screen so that the whole group could work with the consultant, one paragraph at a time. Normally, this exercise has taken place over a full working day. Each part of the Grid code has thus required two or three missions by the consultant.

After each mission the consultant has reviewed and improved the wording regarding the comments that were provided in the working group sessions. The draft code was sent by e-mail to the working group for further comments. Normally, no further comments were made. In summary, no tangible progress was made between the consultant missions.

It has also been agreed with MOEE that the topic of Wheeling Charges should be covered as a part of the program. This work has only started and NVE has performed two workshops covering fundamental parameters of the Wheeling Charges. For this task, a special Wheeling Charges Working Group has been established and besides the two seminars NVE has also provided complementary meeting notes and other documents.

There is no doubt that the Grid Code development and Wheeling Tariffs are extremely important prerequisite for a successful development of the power sector. There are however some obstacles that seem to be under estimated. One is the complexity of the required institutional development. Secondly, the limited language skills in English and thirdly, the lack of implementation experience. The overall efficiency is strongly reduced if these fundamentals are not taken into account. The following examples provide an indication of the complexity to deliver training and advice in a meaningful way.

- As for the development of Grid Codes, local skills in the areas are not likely to be found. This is in other words an area that requires assistance from international consultants. Although this approach has been appreciated by the Grid Code working group, it should be questioned if there are not more efficient ways to perform this quite demanding task. This is further discussed below.
- Significant efforts have been made to develop the grid codes. The current set-up involves many quite short (3-4 days) missions by various professional teams. In very simplistic terms, these teams arrive to Myanmar, with basic preparations, perform their tasks and fly out. It is obvious that this set-up could be improved and more efficient.
- A concern that has been raised is if the consultants are prepared enough when they arrive to Myanmar. There is an awareness that more efficient training can take place if certain topics are developed ahead of the missions. Such preparations would lead to a more exact understanding of the actual needs and the knowledge level of the working groups.

- One specific concern was that the development of the “Data and Information Exchange Code” went too fast. There should have been a realisation that this was a difficult topic that required some quite significant time to resolve.
- Another complaint has been limited time to discuss the actual implementation of the codes. This will likely require additional time.
- Finally, CA3 initially included the development of Distribution Codes as well. This work has not yet started. It is however essential to finalise also the Distribution Codes as these form an entity with the Grid Code. However, before this works starts it is the consultants view that alternative training approaches should be considered such as the alternative below.
- Based on the above there should be a quite significant potential for improving overall training efficiency. This is especially the case regarding the development/implantation of Electricity Law (Grid Code and Distribution Code). This can be achieved by performing some of the sessions that require input be international specialists through video interaction. This would significantly reduce travel time and travel expenses without compromising input from experienced consultants. A couple of topics have to be specifically addresses if this will work:
 - 1) The program should be long enough for all parties to become familiar with the concept. There is a need for familiarization just to reap the full benefit.
 - 2) The concept requires solid presence by a core team or at least a technically driven resident expert. The role of the expert is not only to ensure that the video - connection and equipment is functional. It is equally important that necessary preparations have been made. This aspect has been addressed in previous sections. Proper preparations are however even more important when video-conferencing since insufficient preparations are so evident.
 - 3) A reliable and sufficiently fast internet connection is an absolute requirement. Given the specific conditions in Nay Pyi Taw, this requirement should be possible to arrange for. It is important to have suitable equipment including a projector or TV screen, a dedicated computer and video-conference speakers/microphones. These expenses would roughly amount to the costs of the first two trips.
 - 4) The internet-based video-conferences would be set up in a similar way as has been practiced within the program to date. The training sessions have been carried out as lectures with slide presentations that have been presented with video-projectors. The main difference would be that the lecturer instead of being present in person would lead the presentation from the lecturer’s home office.

Admittedly, there are few examples of such approaches in developing countries. It has been said that technical difficulties will create a reluctance to go through the initial obstacles. Since there are resident experts on site and since the required infrastructure is sufficient. The program also has a sufficient duration to allow for this approach.

Component 2: Implementation Support - Regulations & Regulator

The scope of this component has changed quite significantly over the duration of the program. The general conclusion is that the work of setting up a regulatory authority is more demanding and time-consuming compared to the original plan. Significant emphasis has however been directed towards some vital parts of a successful regulatory set-up.

In June 2017, the DEPP legal team consisting of 6 staff with formal legal education was set up. It was agreed that a local legal consultant would provide training to the DEPP legal team on various legal topics as well as through on the job training. The training is ongoing including reviews and translation of relevant contracts and laws. The topic therefore stresses language as well as practical legal considerations. The group has also reviewed the current Communication Regulatory Commission Draft Law in parallel with Myanmar's Electricity Law Amendment and Yangon Electricity Supply Corporation draft law from the perspective of implementing an electricity sector regulator.

The electricity law and the set-up of a regulatory authority are extremely important prerequisite for a successful development of the power sector. Also in this regard, some significant obstacles have been identified.

- The issue of on-the-job-training has been raised several times. A significant share of MOEE staff find desk-based training based on real life examples most efficient. The members of the legal group were enthusiastic about the benefits of their ongoing tasks. They were especially satisfied with the practical approach that is applied when reviewing and translating contracts that are in the finalization process. Since the legal education process is performed by a local lawyer, the overall efficiency is high.
- An important message is that the MOEE does not have the required legal capacity nor the required contacts to successfully enter into fruitful discussions with the parliamentary assembly. It seems as if there is a disconnect between the Ministry and the Parliament in this regard. An efficient way to handle this situation would likely be to add a legal international advisor to the legal working group in an effort to be able to present a reworked draft of the new draft law to the legislative assembly.
- As for the Electricity Law, a general observation by Sweco is that the required work to finalise the law and to pass it through the legal system is significantly underestimated. This work will likely require international legal assistance in addition to the domestic legal advisor that already has been connected to the project. A prerequisite for a successful approval is that appointed Energy Minister is in favour of such change. This may very well be the case. It is the consultant's view that an international legal advisor should be involved with the finalization and approval of the Electricity law. It is however important to bear in mind that the law of Myanmar has a good share in common with the law in India. These resemblances should be taken into account when involving an international legal advisor.

- There has been a request for international literature. It is extremely difficult to order and receive any kind of literature, e.g. legal literature for the legal group. Ways to mitigate this obstacle should be identified. It is Sweco's view that this is a practical and extremely inexpensive request that should be arranged for in an expeditions manner.

3.2.4 CA4 Hydropower Standards, including engineering services

The objective of Cooperation Area 4 (CA 4) is to ensure high quality studies for hydropower projects to further attract investors and ensure acceptable consequences to affected local population.

The overall goal for CA 4 is as follows: *"MOEP and collaborating agencies' have adopted modern standards established for best-practice planning, implementation and operation of hydro power projects."*

The Program Document dated 27 October 2014 list the following three components:

1. Technical Standards for Hydropower Projects
2. Environmental and Social Safeguard Standard for Hydropower Projects
3. Establishment of Compliance Monitoring System for Hydropower Developments

The outputs for CA 4 are common for all three components. They are as follows:

- MOEE drafted hydropower technical and environmental standards.
- Environmental and social safeguards standards drafted and consulted with relevant stakeholders
- Guidelines prepared for monitoring of hydropower projects

The related activities with CA 4 was contracted to Norconsult in September 2015 due to lack of internal resources in NVE. The target is to elaborate and establish a set of Myanmar National Hydropower Standards to be used in the development of hydropower facilities. The activities are performed in cooperation with national Committee of Hydropower Standards (COMHS).

During the Program, Component 2 and 3 were deleted and the subjects partly transferred to the new Component 3 under CA 1. It is noted cost for CA 4 has been kept within original budget. But it is noted that this is even though the Components 2 and 3 was deleted.

Component 1

Component 1 has been completed with the preparation and submission of the National Hydropower Technical Standards divided in eight volumes. The standards are mainly based on existing international standards, hand-books and guidelines but customized for Myanmar conditions. The standards shall be mandatory for all parties that wish to develop hydropower in Myanmar, including private companies. It is understood that the Standards are at present prepared in English language only. A translation into Burmese should be considered for the more convenient use by MOEE staff and other nationals.

In progress now is to distribute the Standards to relevant departments within MOEE and to implement the requirements. This will be a learning process and it is likely that this will take some time before they are fully into action and being practiced on real projects. Also, for ongoing projects like Upper Keng Tawng and Tha Htay Hydropower Projects it will be difficult to use the standards as the conditions are already set.

Even though the content in the Standards is basically up to international level it is foreseen that support to MOEE will be needed to begin with in interpreting the requirements in discussions and negotiations with project developers and contractors/suppliers.

Within the scope of the Mid Term Review it has not been included to review in detail the full content of the eight volumes, thus this has been made on a general level only. An observation is that the Standards gives the impression of a hand-books and guidelines rather than a formal standard (i.e. as IEEE, EN, ISO and similar). But the importance is that the Standards in this case fills the purpose and needs of MOEE.

The Hydropower Standards is well-structured and the quality and relevance seems to be good and according to best practice, as can be seen from a general overview. Adaptation to local conditions and relevant national regulation seems to be in place. A high extent of the technical content seems to be based on already available documents but it implies that standards of this kind shall be similar on a world-wide perspective.

A final remark is that the front page of the Standards mentions NVE and Norconsult. A national standard of this kind should not have this on the front page and this may reduce the legacy interpretation of the Standards by third parties.

The available progress reports do not include any information on time spent on the preparation of the Standards. But a simple estimate gives that the consumed budget represents a total input of about 16 man-months, i.e. 2 man-months per volume of the standard. Given that a high degree of the texts in the standards are taken from existing documents, the consumed budget is judged to be on the very high end.

Component 2 & 3

The omission of Environmental and Social Safeguard Standard and Compliance Monitoring System should be remedied in the short term as these documents will be very important when it comes to financing from international investing institutions.

3.2.5 CA5 Hydrometeorological Database

The overall goal for CA5 is “MOEP (today MOEE) and DMH have more completed and reliable river flow- and discharge data”. Cooperation Area 5 has three components.

Component 1: Upgrading and modernization of selected stations of the river gauging network

Two automatic hydrometric water level stations, Namtu (DHPI) and Hsipaw (DMH), have been established. The stations are located near each other in the same river system.

Access for NVE-personnel has been a challenge, due to security issues, and it has not been possible for NVE to go to the stations for maintenance. Both stations have been out of operation for a period, and necessary maintenance has only been undertaken by DHPI at Namtu. Lack of budget within DMH has, so far, made it impossible to do necessary repair at Hsipaw gauging station. DMH has a limited budget for visits to their gauging stations, which makes it difficult to organize the needed work at Hsipaw without additional financial support.

DHPI has identified a new gauging station they want upgraded within the TA Program (Shwe Li 3). This station is located far from Nay Pyi Taw, which makes it expensive for NVE to take part in establishing new equipment at the gauging station, and in addition it is said to be a security issue at this location, as well. NVE has said that the remaining budget for CA5 will not allow any upgrading of another gauging station in 2018.

There is an uncertainty connected to the ability in DMH and DPPI to establish new gauging stations themselves in the future, without additional technical assistance from NVE. This was the feedback given in interviews in Nay Pyi Taw. This seems to be the situation, despite the training that was part of the establishment of the two gauging stations in 2016. Another important issue is the question whether DMH and DHPI are technically and financially capable of operating such gauging stations, gaps in observation records due to lack of maintenance is not supporting the overall goal to have more completed and reliable data.

Under CA5 NVE has also supported the pre-feasibility study for Bawgata HPP with the establishment of a river gauge, and different training related to hydrology for staff in Thoolei Company. This activity has obviously increased the knowledge within Thoolei, as also was the feedback from the company, since they had very little knowledge in hydropower planning before they started with the Bawgata study.

Component 2: Modernization and integration of hydrological and meteorological databases

The Hydrology Database Forum, originally consisting of DHPI and DMH, has been expanded to also include Hydrology Branch, MOALI. The result is a meeting point for the three most important governmental agencies operating hydrological gauging stations in Myanmar. The forum has had several meetings. The meetings have been held in Nay Pyi Taw, and Hydrology Branch in MOALI is based in Yangon, but hopefully MOALI finds an opportunity to participate in the coming meetings in November 2017 and during 2018.

The database has so far not been implemented in DHPI, but remain with NVE. Due to internet capacity problems within DHPI the implementation and necessary training have not been possible. However, NVE expects this situation to be solved relatively soon. A data compilation work shop is planned as soon as the internet situation is solved, hopefully in November 2017.

Under CA5 DHPI, DMH and MOALI have received necessary software to operate the database. Each institution has one license installed on one lap top.

NVE expresses serious uncertainty regarding the planned installation of the database in MOEE/DHPI. DMH has far more experience with operating a network of hydrology gauging stations in the country, and their responsibility as a national meteorological and hydrological agency makes it more naturel to install the database in DMH. Still the database should be accessible for DHPI and MOALI, in addition to DMH. It is, however, not obvious that this solution is possible within the existing TA NVE-MOEE Program.

One major success factor is the future content of the database. If the database is to be a national database, it is a need for data records available in the database from several gauging stations in the different river systems in Myanmar. So far, it is very unclear whether DMH plan to digitize their historical data and put them into the database. To become a national database, it is of uttermost importance that all institutions with relevant hydrological data are willing to insert such data records into the database.

In a meeting with MOALI, we were informed that there is a Hydro Informatic Centre to be established in Yangon. This Centre is supposed to collect data from all agencies in Myanmar. MOALI considered it to be more relevant for them to insert their hydrological data records in that database than in the database to be established in the TA Program.

Component 3: Improvements to hydrological methods and skills

In addition to training directly connected to modernization of hydrological gauging stations, NVE has prepared a course program with 4 sessions, consecutively building on each other. Session 1 contains Basic Hydrology, and in sessions 2-4 more advanced hydrological methods are introduced. Each session is planned to last 5-10 working days. In the period between November 2015 and March 2017 a total of 76 persons (21 women and 55 men) from DHPI/DMH/MOALI have participated in 6 different course sessions. In addition, three training sessions have been undertaken for the Bawgata project, but no information was available on the number of persons attending that training.

More training is planned in November 2017 and in two sessions in 2018. At the beginning of the TA Program the hydrology skills and experience varied a lot both between and within the agencies involved. It is the opinion of NVE that the general hydrological knowledge in DHPI, DMH and MOALI has reached a level sufficient for more project directed training. However, this requires that DHPI/DMH/MOALI come up with relevant specific topics for the training. Such training could be more like on-the-job training with different hydrological methods connected to real work situations within the agencies.

The feedback from participants in the training, both in interviews and in responses to a questionnaire, is a general satisfaction with both the content of the different course sessions and the NVE experts who has given the training.

For the coming period, and for a possible next phase, the interviews in Myanmar revealed some requests for the continued content of CA5:

- On-the-job training, with upgrading of gauging stations and use of different hydrological analysis tools
- Calculations of PMP and PMF (dam safety in a changing climate)
- Calculations and analyses in ungauged catchments
- Purchase of an ADCP to DHPI, to improve discharge measurements at gauging stations

Further training should be connected to both implementation of the database and on-the-job training for the hydrology staff, to improve methods and skills directly linked to their daily work tasks.

The original budget for CA 5 was 8.4 million NOK. Total invoiced by the end of 2016 was 5.6 million NOK. The proposed budget for 2017 and 2018 is 5.255 million NOK. The work undertaken connected to Bawgata HPP, both hydrology training and establishing a new river gauge, was not part of the original plans, and thus not included in the original budget, for this CA.

Component 2 Hydrological database has been delayed, mainly due to internal internet capacity problems within MOEE. According to NVE this is expected to be solved during November this year, followed by planned training. The work on Component 3 is following the plans for this component. The planned number of gauging stations to be upgraded in Component 1 was not given in the Project Document, however, the RT finds that the cost for this component seems to be high with two upgraded stations only.

3.2.6 CA6 NVE Administration and Technical Support

Cooperation Area 6 is an administrative and technical support activity and is therefore not included in the results framework in the reporting. The items included are nonetheless vital to the operation and implementation of the program of technical assistance, and are measured through results during each year and potential deviations.

The Cooperation Area has six components mentioned in the Program Document;

- Component 1: Annual Report Assistance
- Component 2: Annual Meeting
- Component 3: Quarterly Reports
- Component 4: Accounts/Invoicing
- Component 5: Short-term Technical Experts

- Component 6: NVE Resident Adviser

Component 1: Annual Report Assistance

The annual reports are established in cooperation between NVE and MOEE. NVE establish the structure and first draft for annual report and circulate to MOEE for comments and contributions. This is coordinated by U Min Khaing, as NVE's main contact in NVE. He further collects input from MOEE, and circulate to NVE. The final draft annual report is presented at the Annual Meeting, and possible comments and revisions will be included before final approval. The process is perceived as constructive with good dialogue between NVE and MOEE.

It could be argued that NVE's main contact person in MOEE should be at a higher management level (e.g. L2 management below Director General in department of hydropower implementation), to secure tighter involvement from top level stakeholders and a more balanced input between the different CA's which today is reported to be dominated by technical design issues.

An important part of the annual report has been to complete the Result Framework where the objective is to report achievements compared with plans. There has however not been revision of the parameters since the start-up of the program, and changes have been agreed iteratively between stakeholders (on email) and there is lack of trackability in rationale for shifts and deviations.

Component 2: Annual Meeting

The formal role of NVE is to support MOEE to prepare and conduct the annual meeting. NVE's work is practically also related to pre-meetings with Norad/RNE to be coordinated within the Norwegian stakeholders, and detail discussion with MOEE and NVE internally within each CA for technical issues and planning.

The meeting is normally represented at high-level from both Myanmar and Norwegian side, with among others Deputy Minister (MOEE), Director General from DHI and the Norwegian Ambassador present.

MOEE takes responsibility to organize the actual meetings. NVE will normally present the administrative issues including results framework, budget, amendments etc., and MOEE the technical reports and progress from the CA with assistance from the in-house consultants. The content of the annual meetings is perceived to be at right level, related to the major achievements, plans and objectives. MOEE is typically interested in activities for technical progress in projects, with involvement of in-house consultants, with RNE being more reluctant to this. Here, NVE's role is to balance the requests with MOEE in its interests upfront annual meetings (here; of technical in-house support) and intentions and goals in the PD with Norad/RNE.

Component 3: Quarterly reports

The quarterly reports have been produced from Q1 2015; till date. The reports summarize activities from last quartile and plan and adjust activities for coming month. Progress on CAs have been reported. Cooperation between technical areas have been a challenge, which is linked to language barriers, and remaining need to improve English competence, as well of strong focus on CA1 from MOEE.

Component 4: Accounts/Invoicing

Most of the deliverables from sub-consultants have been linked tasks in CA1, for design support. In addition, secondments and in-house support have been provided MOEE on demand and invoiced per hour. NVE have been invoiced monthly for this work.

The cost reporting has been summarized in excel, and included in quarterly and annual reports. At the start of the project, the costs were allocated quarterly to the CA's based on work performed. This has been changed and is now directly linked to respective CA when hours are accrued (i.e. in hour booking system), which gives a more direct control of costs. Still, however, the invoicing should be improved.

Fixed expends such as office and house rental in Myanmar are invoiced directly to NVE in Norway. Contingencies and local disbursement are covered by NVE residential managers, and reimbursed as travel cost. The practice is efficient to control local costs, and to reduce local administrative burden and associated risk.

It has been raised concern that the invoices from NVE are not sufficiently detailed. Invoicing should be improved, linked to hourly booking on activities (also for NVE internal staff) and include:

- Budget per program activity, disaggregated to resources involved
- Hourly booking for NVE resources, linked program activities
- Monthly follow-up of cost per activity to ensure early warning of potential deviations
- Up-front approval of potential shifts in budget by to RNE/Norad (not after costs have incurred)

Shifts in costs between CA's are approved by RNE within the annual budget. The merit has mainly been email correspondence and rationale for these are not transparent in quarterly and annual reports. On the other hand, RNE's approval of next year's budget has been late (e.g. in April for 2017), which gives a going concern on budgetary issues for NVE during the first quartile of the year.

In the current Program Document chapter 3.5 it is stated that accommodation for NVEs and its Consultants' expatriates working in Nay Pyi Taw shall be provided to NVE and its Consultant by MOEE free of charge. In practice accommodation, has been in hotels and covered by the program when working from Nay Pyi Taw. This is supported by RT, to be aligned with normal international standards and as local presence is critical for the program, but should be clearly agreed with MOEE to avoid potential misunderstandings.

Component 5: Short-term technical advisors

Short-term technical advisors from NVE have been used to provide support to the Ministry. Technical areas have been provided as per needs, and involvement of internal experts from NVE considered to be good for areas such as hydrology and technical design. It has been most challenging to provide internal staff on regulatory support under CA3. In practice the Program Director and residential advisor under CA 6 have also been heavily involved in technical issues, particularly for technical design and hydrology.

Component 6: Residential Advisor

The role of the residential advisor has been instrumental for the program. The person has established structure for communication with the Ministry and taken care of practical issues related to sub-contracting, contact with RNE, visits from Norway and daily needs.

The residential advisor has been present since February 2015. During the hand over-period between the two residential advisors from NVE (March to July 2017) the environmental advisor also acted in this role.

The role is critical and the RT suggest that the role takes an even more active role towards following up sub-contracts with respect to ToR and deliverables, particularly for local presence to ensure effect of in-house consultancy.

The location of the resident advisor should be clearly agreed between MOEE and NVE/Norad, to avoid dissatisfaction concerning remuneration of costs between the parties. Currently she is in Yangon, and commutes to Nay Pyi Taw (Monday to Thursday)

4 Conclusions and recommendations

The review is summarized in accordance with the formal evaluation criteria specified in ToR.

4.1 Efficiency

To what extent does the result framework(s) and budget(s) enable cost-efficiency assessments?

Observation:

- The concept of the result framework with break down into each CA and output indicators and reporting of the results is initially good. In practice, however, the current structure is too static to enhance the value add in the project. It is difficult to assess the success of the program based on these result indicators.
- There have been attempts to adjust the result framework to changes in the program, e.g. a result matrix for the new Environmental Component and additional reporting in annual report of results.
- The budget is summarized in annual reports and provides information about use of funds and budgetary status. This does however not enable assessment of cost-efficiency alone.
- There have been several shifts and increase in budget. These are summarized in the reporting, but the rationale and merit of the changes are not transparent.

Proposal:

The concept of the result framework should continue, but adapted to annual status and project development. This should be done through establishing annual targets (or Key Performance indicators (KPI's)) at start-up of each program year. These should be linked to the overall Program Objectives, but adapted to CA and components, and the status for respective year.

The cost of reaching the target should linked to budget, and percentage progress (i.e. reaching defined milestones during the year) vs. budget use for that year, should evaluated in quarterly reports. The objective of this will be to establish "earned value", i.e. if the cost is justified by the underlying progress of the activity.

The follow-up of the targets should be included in the quarterly reports. The progress should be linked to reaching planned milestones during the year and progress assess.

The targets should be followed up quarterly, the deviations flagged (e.g. red/yellow/green) and corrective measures agreed. Progress towards planned budget (i.e. actual progress vs. cost in budget) should be assessed to consider cost-efficiency in work.

Example of annual target setting process and quarterly follow up:

	CA	Target	Progress (%)			
			Q1	Q2	Q3	Q4
Goal in Program Agreement	Cooperation Area (CA) component xx	Target for year 20xx – Plan	X%	X%	X%	100%
		Target for year 20xx – Actual	X%	X%	X%	X%
	Cooperation Area (CA) component xx	Target for year 20xx – Plan	X%	X%	X%	100%
		Target for year 20xx – Actual	X%	X%	X%	X%

Assess Program design, planning processes, participation of relevant stakeholders and program organization, monitoring and reporting.

- The issues covered by the project is relevant for the status of the energy sector in Myanmar. This is supported by the final Annual report 2017, which states that the ongoing MOEE-NVE TA Programme and the respective cooperation areas is in line with and supports implementation of the prevailing MOEE energy policies. It also draws on Norwegian core competence within hydropower and energy management, where possibilities for competence transfer are good.
- The initial project design is relevant and has been revised based on realities on the ground during the program. The reporting is a summarization of changes, whereas actual rational for these are less transparent.
- Much of the program is very focused on technical design in CA1, and involvement of MOEE key stakeholders with expertise in this is over-represented
- Consider to elevate MOEE contact person at a higher level to cover broader areas and ensure top anchoring of program.
- Results framework is not adapted to annual development, and changes in program difficult to trace in quarterly reports/annual report based on deviation of changes from planned progress.

Assess progress and efficiency of activities carried out. Measure how economically resources and input, funds, expertise, time etc. are converted to outputs.

- Overall, the cost of the program is on the very high-end, compared with the concrete output per cooperation areas. The support to the project expressed in stakeholder and participant interviews does however indicate the capacity building has been significant beyond the concrete deliverables alone, which is also the overall Goal of the Program.
- There is very positive feedback on activities within many areas such as hydraulic modelling, English training and the work of the ESMWG.
- It can be questioned if design support from home-office, which has mostly been the case in 2017 for CA1, contributes to the program objective. Design support should be in-house with MOEE and/or practice where MOEE sits with the sub-contractor in Norway (here; Norconsult and Multiconsult).
- NVE, with residential advisor should improve the follow-up of the contract with consultants to implement requirement of local presence and/or practice in Norway

Compliance with agreements and Program documents, and to additional requirements from the Norwegian Embassy in Yangon. To what extent have the partners in Norway and Myanmar complied with obligations as stated in the agreements and Program documents, and in other formal requirements regarding additional new activities to the Program?

- Overall the project is compliant with the program document (including amendment 1) and components under cooperation areas met for most of the activities
- Very positive reports on the English training, achievements within ESMWG, and cooperation between local (Thoolai) and Norwegian consultancy (Norconsult) on the Bawgata pre-feasibility study.
- The legal working group has low traceable progress and local requests are related to specific support on contracting rather than regulatory issues as stated in the Program Document. The general observation by RT is that the required work to finalize the law and to pass it through the legal system is significantly underestimated. This work will likely require international legal assistance in addition to the domestic legal advisor that already has been connected to the project.
- The hydropower standards are completed but the implementation and use of these are not clear.
- The design support under CA1 is not yet completed and remaining work needs to be clearly specified with scope, schedule and resources.

Assess the quality of the results reporting. To what extent can reported results be verified?

- The result reporting has been completed without any revealed miss-reporting as such. The challenge is related to the format which is not suited to assess actual value add of the program throughout the period, as outlined under 4.1.
- Reporting needs to better reflect rationale for shifts in budgets and CA content

To what extent are disaggregated data on gender included in the reporting?

- Annual report 2017 reports participant lists and gender in courses conducted for the reporting year. Overall the balance is 63% men and 37% women within 12 conducted training sessions during the year. Both genders are represented in all areas, however technical items are over-represented by men and English training courses by women.
- Observation of participants list and interviews locally does however not indicate any issues related to gender biase, including at management level.

4.2 Effectiveness

To what extent does the result framework(s) including indicators facilitate assessment of whether the overall objectives will be reached?

- The result framework is not suited to indicate whether the overall objectives will be reached.
- The format should be changed to be more dynamic towards development in project, and better suited to assess value-add. This is further explained under 4.1 and include annual target setting and follow-up of milestones during the year, linked to budget releases.

To what extent can it be expected that the overall objectives will be reached? The performance of the Program in relation to set goals and indicators (the results chain).

- The overall Program Goal with Program Outputs are very ambitious, and state significant contribution to sector reforms and competence development in MOEE. Particularly for CA3, the original components are not considered realistic within the Program horizon of 4 years.
- The project has progress on concrete technical deliverables more than the overall program goal. The MOEE capacity development as part of these varies. Technical design support has highest priority for MOEE; whereas the tailored training sessions on energy sector development less.
- The best capacity development is on-the-job training with support from NVE/Sub-contractors. This needs however to be more in-house training in MOEE offices, and not as design support from Norway. If not, the real competence transfer will be limited and not aligned to reach the overall Program Output, even for an extension of the program.

To what extent have inputs, outputs and activities contributed to the overall objectives of the Program.

- The design studies are not completed, despite cost-overruns. Also, the technical support is not compliant with ToR of contracts with regards to local presence, and it can be raised question if it has become more of a sponsored technical design study, than capacity development
- The work on electricity law and regulation and the concrete output on Hydrometeorological Database are lower than expected.
- Several areas have been considered successful such as hydraulic model testing and dam design support. The establishment and work of ESMWG has contributed with concrete specifications for environmental, health and safety standards. Also, the English training course has been successful with high local participation.

What deviations of plans and budgets have occurred and what were the causing factors? Have adequate measures for avoiding reiteration of deviations been implemented?

- The formal reporting is not transparent with regards to shifts in budgets and work content, and rationale for these. It is hence difficult to assess causing factors and potential measures to avoid reiteration.
- NVE states in interviews and formal comments to draft report that “the stakeholders relevant to the program represented by RNE, MOEE and NVE have had an active dialogue on the direction and content of the program”

The roles and responsibilities among and between the implementing institutions, NVE, MOEE and the Norwegian Embassy in Yangon.

- Based on the document review and local interviews, there are likely to be misaligned expectations to the program;
 - o MOEE is requesting hands-on design support and help on practical matters related to concrete projects. They also want direct involvement in invoicing for such assistance. MOEE also expressed better involvement in the scoping of the training sessions.
 - o NVE/RNE have direct control of training content which often has a broader content than technical support alone. Expectations and content of program and training should be clearly aligned with MOEE, based on experience from first program period

4.3 Impact of the Program

What are the main outcomes, and if possible to measure impacts of the Program

- Concrete output related to hydraulic modelling, and how to adapt such models for civil design.
- Progress on master student work and good results from English training course.
- Difficult to assess measures of technical design program. In house consultancy is reported to have positive effect, but need to be continued over longer period and to take place locally (not home office support).

Have the relevant institutions and agencies been involved in the TA-activities?

- To RT information, the relevant institutions in Myanmar have been involved. Coordination with other programs in Myanmar should be assessed by RNE.
- The involvement of short term NVE staff is reported of being too short and consultants have had too high share of home-office work to secure capacity training locally, particularly for 2017.

To what extent do the intended target groups benefit?

- The involvement of target groups within the CAs are good. For hydrological database, it needs to be assessed where to establish the database, based on both technical and hydrological capability. NVE has emphasized that the most natural department to oversee a national database is DMH under MOT.

Environmental and social consequences: Are there any outcomes, and if possible to measure, any impacts of the Program?

- ESMWG is a success with result achievements and high-level participation within MOEE. The work has focused particularly on concept of ethnic nationalities, and outcome of the work is now included in the ESMS Policies for MOEE projects.

4.4 Relevance

Assess the extent to which the objectives of the Program are consistent with the intended beneficiaries' requirements and country needs.

- The overall objectives of the Program are consistent with the country needs, though overly ambitious for a 4-year program
- The intended beneficiaries' requirements are more related to technical assistance from consultants and related to concrete tasks.

Does the Program address (immediate & long term) needs in the electricity sector of Myanmar?

- The Program and outputs do address the immediate and long term needs in the electricity sector.

Discuss and assess the added value of the Norwegian Program and projects in perspective of other donor initiatives in Myanmar within the energy domain

- The support to electricity law and regulation has been coordinated with ADB/IFC initiative on the same, to ensure that Norwegian sponsored support is utilized here, and not duplicated.

- RT has not been able to make a complete assessment of all donor initiatives in Myanmar within the energy sector within this project. The Norwegian Program is however within the key area where Norway can add value with regards to sector competence. It is highlighted by MOEE in annual report 2017, that it is “considerably effective for the Ministry”. A coordination of activities within this program compared with other local initiatives should be assessed by RNE.

4.5 Sustainability

To what extent have the activities undertaken contributed to strengthening the institutional capacity of the relevant Myanmar institutions and to make the institutions more sustainable?

- Overall, the program has supported practical activities within MOEE, related to technical development of hydropower. This is core institutional area for Myanmar and has high relevance.
- The institutional strengthening of capacity varies between the areas. Much of this is more related to the limited time it has been in operation rather than the program design itself. Very positive contributions for capacity building on e.g. English training course, ESMWG and competence transfer within hydraulic studies/modelling
- Regulatory issues need to have a long-term focus to be sustainable (i.e. have actual impact) as development of sector reforms and implementation of these takes much longer time than the time span of the program
- Technical design need to implement more in-house and on the job training. This should be followed up more closely by resident advisor to ensure compliance with ToR.

Capacity/competence building: The needs for training/capacity building should be considered.

- MOEE has expressed need to have more influence on the content of the training sessions. I.e. training/capacity building should be developed in close cooperation with them
- The largest benefit of strengthening capacity is on-the-job training. I.e. activities with in-house consultancy and local presence should be prioritized for NVE and subcontractors in the budget.

How are issues of social-cultural/gender equality addressed in the Program?

- During the field visit it is not perceived to be strong gender-biases within the CAs. This is also supported by disaggregated gender data in annual report 2017
- The pre-feasibility study for the Bawgata, is part of the RNE's work on peace and cooperation between social-cultural groups in Myanmar, and involves the Karen people.

- NVE states that concept of ethnic nationalities has been given thorough focus in the EMSWG working group and included in the ESMS Policy and new ESIA requirements for hydropower in DHPI projects

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

- The program has been amended to increase focus on social and environmental work and integrate this in the Technical Assistance Program.
- Requirements for Safety and Environment Policy and Environmental and Social Management System Policy for planning and construction of hydropower projects have been established and local training conducted.

Review the enabling environment for sustainable capacity building, taking competency profile, salary level, staff turnover etc. into account

- Staff turnover is reported to be an issue. I.e. staff being trained in technical competencies are moving out of site jobs as part of career steps,
- The technical competence level has in general been reported to be lower than anticipated. This has resulted in a low starting point for training and implementation. One reported exception is geotechnical areas, where the local competency is reported to be on a good level.
- The salary level is low, but as there are few private sector alternatives turn-over based on this is not considered to be a big threat to the competence building program.

4.6 Risk management

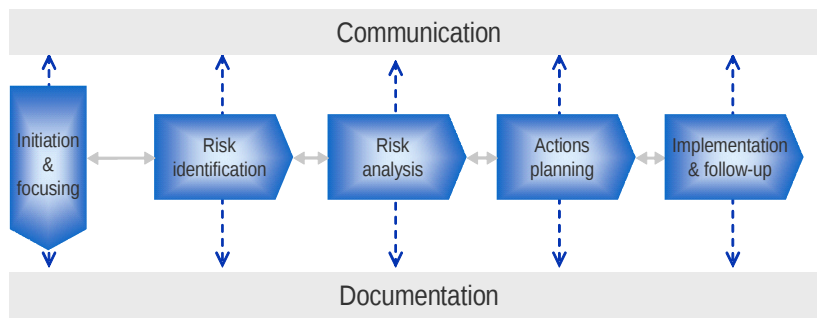
Assess the major risks experienced during the implementation of the Program, and to what extent the Program have addressed and mitigated these risks. Identify possible future risk factors and present recommendations for how to handle these.

- Risk and Mitigation Matrix for the Identified Program Areas was established as part of the Program Document. This has been followed up with reporting of status in the annual reports.
- One of the overarching risks for the program has been lack of support to development of hydropower resources of the country, based on social and environmental consequences. The program has adapted to this with the establishment of the EMSWG, to improve requirements for environmental and social areas in development of new projects through DHPI. A particular risk matrix for the Environmental Component of the program has also been developed, to ensure implementation. This work is considered to be essential also in the future.

- Availability of NVE experts to participate in the program has in general not been an issue. For regulatory issues in CA3, the progress has been slow and involvement of internal resources to contribute to meet the CA output lower.
- Safety issues on local sites has been limiting to the possibility to travel and follow up/refurbish hydrometeorological gauging stations, and the actual output from this CA is not completely as intended

Review of risk methodology:

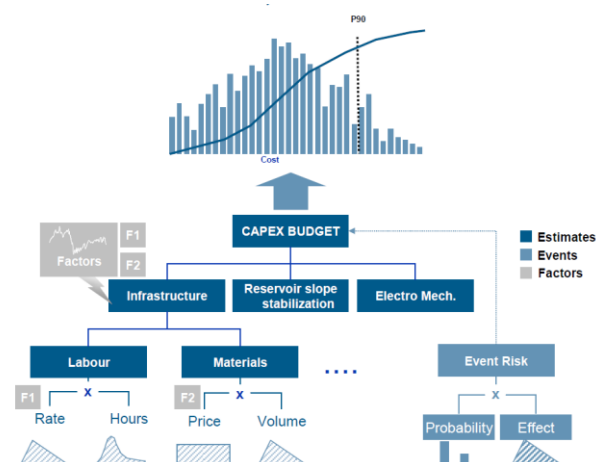
- Similar as for the result framework, the risk assessment should have been done more dynamically. This could be done by annual risk workshops to assess the key risks, and to identify mitigation means. Actions are addressed in quarterly reviews to track status. Example of risk process below:



- - Initiation: Definition of risk objectives, scope, roles and responsibilities, and planning of the risk management activities.
 - Risk identification: Identification of risks by looking at potential events or uncertainties and their causes in different areas in and across the value chain.
 - Risk analysis: Assessment of the risk’s consequence on the objectives. Ranking of risks per the resulting risk level.
 - Risk treatment: Identification of measures for risk treatment according to risk level. Implementation of action plan.
 - Monitoring and review: Monitoring and control activities according to established risk management plan. Review and improvement of the process.
- Acceptance criteria for risks (i.e. what level is assessed to be critical) should be defined for the project. The project should not process with unmitigated “red risks”, and “yellow/green” risks should also be monitored and potentially mitigated. Example of acceptance criteria defined for risk management in a project given below.

Frequency	Likelihood						
Once pr. year or more often	> 70 %	<i>Very high</i>					
Once every 1-3 years	30-70 %	<i>High</i>					
Once every 3-10 years	10-30 %	<i>Medium</i>					
Once every 10-100 years	1-10 %	<i>Low</i>					
Once every > 100 years	< 1 %	<i>Very low</i>					
		Consequence	<i>Very low</i>	<i>Low</i>	<i>Medium</i>	<i>High</i>	<i>Very high</i>
		<i>Financial loss (CD/unit)</i>	< 2,5 % of total project budget	2,5-5 % of total project budget	5-10 % of total project budget	10-20 % of total project budget	>20% of total project budget
		<i>Health & safety</i>	First-aid injury	Medical treatment injury	Lost-time injury. Burn-out > 3 months	Permanent disability. Burn-out > 1 year	Fatality
		<i>External environment</i>	No damage and environmental impact. Breach of law, regulation or concession.	Minor damage and/or environmental impact. Restitution time < 1 month and/or breach of law, regulation or concession.	Moderate damage and environmental impact. Restitution time 1-12 months and/or breach of law, regulation or concession.	Serious damage and environmental impact. Restitution time 1-10 years and/or breach of law, regulation or concession.	Permanent damage and environmental impact. Restitution time >10 years and/or breach of law, regulation or concession.
		<i>Reputation, external</i>	Persistent negative coverage in local/regional media.	Loss of trust from local/regional stakeholders.	Loss of trust from national/international stakeholders, and/or persistent negative coverage in national/international media.	Loss of trust from national authorities.	Loss of trust from national and international authorities.

- The cost involved in the technical part of the project (i.e. technical studies such as feasibility studies and detailed engineering or construction) could undergo a quantitative risk assessment. This assessment will estimate likelihood of cost overrun and needed contingencies. Normally cost beyond P50 (i.e. simulated cost within 50% probability level) will not be given to the project, without the owner's pre-acceptance (here; RNE/Norad).
- The process is described in the model and steps below. The example is taken for a project in construction phase, but sub tasks can in other phases (e.g. feasibility studies) can also be defined as components. The result is used to estimate a budget with associated contingencies, and involve the following steps.
 - i. Develop Triple (Base, Best, Worst) estimates for the project cost (including sub tasks)
 - ii. Possible: assess correlation between cost items
 - iii. Possible if schedule risk is included: Estimate cost of delay per month
 - iv. Assess Event Risks and costs associated with these
 - v. Run statistical model (i.e. Monte Carlo simulation on steps above).
 - vi. Establish P50 scenario for costs and needed contingencies



What are the critical issues at organizational, institutional and on program/project level?

- In general, one of the overarching risk issues is constitutional changes that may affect the set-up and relevance of the program. The key-mitigation from NVE is to have continuous local presence (which has been the case) and dialogue with MOEE.
- There is traditionally low level of cooperation between ministries and institutions. This has been influential for the cooperation in CA5 where the database and hydromet stations are allocated within different ministries.

Assess whether the corruption risks are managed properly (by considering the fund flow mechanisms and control procedures).

- There is a high risk of some level of corruption by operating in Myanmar. NVE does not have a bank account, local admin employees in Myanmar and reimbursements are done directly from Norway which is reducing the exposure.
- MOEE wants more direct control of reimbursements and release of funds. The current set-up with invoicing from NVE to RNE, with insight/comments from MOEE, does however reduce the corruption risk and supports corruption management of the Program.

4.7 Particular concerns to be investigated – specifically related to the Program

Consider the merit of the approved changes and adjustments in the Program made in annual meetings and in-between meetings.

- There is little information in annual reports considering deviations in plans and budgets, beyond reporting in shifts in budgets and to some extent in work content.
- The establishment of the new Component 3 in CA1 is the only major adjustment to the Program that has treated thoroughly in the annual reports, as an Addendum to

the Project Document. Other redistribution of funds and new areas, namely in-house consultancy assistance, establishment of environmental component and more support for regulatory issues, have been iteratively agreed among stakeholders.

- The given output indicators are not suitable for measuring the merit of changes and adjustments in the Program.

To what extent is the results framework used as a management tool?

- The results framework seems not to have been used actively as a management tool, as outlined under chapter 4.1. Indicators are only reported for some of the CAs and components. The results framework and the indicators are more directed on tangible output, and do not necessarily reflect the quality of a component related to the goals for that component and CA, and for the overall goal for the Project.
- Improvements to the result framework is included under chapter 4.1. The essence is to establish clear targets per year, which are linked to the overall Program Goals and adjusted to project status. Milestones for reaching annual targets need to be linked to the budget cost. This will allow early initiation of actions if deviations are revealed.

Find out to what extent the annual and semi-annual reports reflect the planned activities, challenges, risks and achievements.

- The reports summarize activities from last period, and describes plans for coming period. However, very little on deviations or specific explanations even for those CAs where actual expenditures differ substantially from the budget, or the output has been less than expected but the expenditures are not correspondingly lower than the budget.
- Very little explanations to changes in budgets in annual reports, the rationale for the changes are not reflected in described changes in the planned activities or in deviations.

Discuss the role of NVE long-term resident advisor's vs short-term revolving advisors.

- The long-term resident adviser has an important role in keeping up the continuity in the Program, and in the communication and cooperation with MOEE. The resident adviser gives crucial practical support to the in-house consultants and short-term advisers. The success of the TA Program depends considerably on a permanent presence of a NVE adviser in Myanmar.
- The more the resident adviser can take an active part in the different CAs, the better outcome of the Program. This will of course depend on the actual expertise of the resident adviser. For the start-up of the ESMWG a resident environmental adviser was very important, and the good contact that was established has resulted in a continued good contact by email/skype after the adviser's return to Norway.

- Short-term revolving advisers are necessary, to cover different topics in the Program. However, it would be beneficial if the number of different short-term advisers could be limited to focus more on on-the-job training.
- Establishment of a good relationship between MOEE staff and NVE staff is essential to achieve the outcome of the Program, if this can lead to additional contact and supervision on email/skype between the visits by the short-term advisers. Short-term training without a possibility for additional technical support after the training session is finished will often be of limited value in a longer perspective.

Find out to which extent the work of the program has fed into the overall development of the energy sector in Myanmar.

- Most important, the TA Program has resulted in or contributed to development of different standards for MOEE. This include Hydropower Standards, and different environmental outputs such as Health, Safety and Environmental Policy and requirements for planning and construction of hydropower projects by DHPI, and a revised ESMS Policy and requirements to MOEE.
- Establishment of the different working groups (legal, grid code and environmental) has contributed to the development of the energy sector, but is not completed.
- The ESMWG, with members from different departments within MOEE, has contributed to a general increased attention to environmental and social issues in different departments of MOEE.
- The Hydrological Database Forum, with members from three Ministries MOEE, MOT and MOALI, serves as a possible platform for an improved common use of hydrological data in Myanmar and thus a better knowledge of the water resources in general and hydropower potential in particular in Myanmar for future planning.
- The Program has increased the technical knowledge at the hydraulic laboratory, which will be important in future projects.
- The technology transfer, both long-term and short-term, has included training within hydropower planning, design, operation and maintenance, hydrological methods, environmental and social issues, aspects related to regulator, grid code and legal issues, but also increased skills in English, which is of general importance in a future situation with more international activity and investments in the energy sector in Myanmar.
- The on-the-job training by in-house consultants, within both technical design and hydrology, has obviously increased the level of knowledge, in both MOEE, DMH and MOALI, as well as Thoolei Company (Bagwata HPP).

What are the main lessons learned, and how should these lessons inform a possible new phase of cooperation?

- It is of uttermost importance with presence in Myanmar, not only for the resident adviser. As much as possible of training and technical support should be given in

Myanmar, and preferably as on-the-job training on specific projects and tasks. This requires input from MOEE on relevant tasks for on-the-job training, both within hydropower design and hydrology.

- Design support given by the consultants from their home offices have less added value as technology transfer to MOEE staff, but hybrids with residential advisor facilitating short session locally on skype etc (outlined in chapter 3.2.3) could be tested.

Discuss the sustainability of the program by cooperation areas and identify the most important CA for further support by NVE.

In general, 4 years is not very long and it is expected that some of the quite ambitious goals for the different CAs cannot be reached completely within this Phase I. The sustainability for the CA across the program is good. It is relevant to current energy situation in the country and it is acclaimed at high stakeholder level in Myanmar. Also, MOEE states that the program is in-line with current energy policies.

RT has not identified *the most* important CA as all are relevant, but suggests the following changes in a potential extension of the program:

CA1

- The remaining design for Upper Keng Tawng and Tha Htay HPP should be finalized during 2018, per information from MOEE at the review visit. The current status of the construction works are however unclear, but it is indicated that some progress is the case.

If some crucial parts should still remain at the end of Phase I, the program for a Phase II should include technical support to secure completion of the Detail Design for these two projects. It is judged that the most critical areas that needs support in the power plant's design, included under the responsibility of MOEE, are underground works (pressurized tunnels), slope stability, dam foundation and dam design. Besides this, it is recommended that the technical support to MOEE during Phase II should focus on transfer of know-how in design rather than direct support as design engineering services. In addition, support during supervision of the construction works for the above listed critical structures and areas is advised.

- Support on Bawgata HPP should continue, but perhaps better in a separate program independent of technical assistance to MOEE. If MOEE will be given a more active role in a next phase for follow up the cost in the Program, consultants and invoices, this is probably even more important. The support so far to Thoolei Company has resulted in limited technology transfer to that company, maybe with the exception of the given hydrology training. Future support should preferably be given as specific on-the-job training in Myanmar or via skype.
- Continued support to ESMWG is essential and fits the overall goal well. Focus should be on establishment as a permanent unit within MOEE.

CA2

- Continued support to master degree students, within relevant topics at international universities.
- Relevant seminars regarding hydropower development to be continued (ref. ICH seminars in the ongoing program), including both seminars in Myanmar and in the other countries in the region, and participation on seminars in Norway. Important that MOEE have more influence on the content and program for seminars in Myanmar, to ensure best possible relevance.
- English training should be continued. Investigate a possibility to increase the number of students, by introducing one more teacher, and perhaps in cooperation with other Ministries. An extra teacher was highly recommended by the English Training Teacher, to improve the quality of the program.

CA3

- Continue the work with implementation support to electricity law and regulation. If necessary, continue support to the grid code and legal working groups.
- Implementation support to wheeling charges and tariffs.
- Assess the need for an international legal adviser, to support the national legal adviser.

CA4

- This CA is completed, but should include a program on implementation support to MOEE, and translation to Burmese considered.

CA5

- Any further upgrading of hydrological gauging stations must include extensive on-the-job training, to secure necessary experience in the different agencies for similar upgrading in the future.
- Further support to establishment of a hydrological database needs to be based on a thorough assessment of where to establish the database, based on both technical and hydrological capability. NVE has emphasized that the most natural department to be in charge of a national database is DMH under MOT. Furthermore, one should check whether the planned Hydro Informatic Centre will cover a similar function as national database, and adjust the plans for Phase II in accordance with that.
- Continue support to the Hydrological Database Forum, which can act as a meeting place between MOEE, DMH and MOALI on issues related to future water resources management in Myanmar.
- If the technology transfer on hydrological methods and skills is to be continued, it is important that such training can be directly linked to specific projects and hydrology tasks in DHPI, DMH and MOALI. The content of such training should be decided in cooperation with the involved Ministries.

CA6:

- The results framework should be developed into annual targets to be more dynamic towards changes in the program. Quarterly follow-up of targets should be included to improve assessment of measures and document rationale for these
- Residential advisor needs to take an active role towards sub-contractors with respect to ToR and deliverables
- Invoices from NVE to RNE with review from MOEE need to be better detailed and linked to hourly booking on activities both for sub consultants and NVE internal staff. Improve internal project management of budget status to allow early warning of RNE/Norad of potential deviations.
- Risk management should be more dynamic. A risk matrix with acceptance criteria, should be established and updated annually. Cost risk assessment could also be introduced for technical studies of larger magnitude to estimate contingencies and improve cost estimation and budget discipline.

Consider to which extent MOEE/NVE/RNE/MFA have made adjustments based on changing realities on the ground during the program, to make the program flexible and relevant.

The following major adjustments in the Program have been made during Phase I, and budgets have been reallocated within the Program. Smaller adjustments have also been taken in the different CAs, due to the actual situation each year. Such changes are not mentioned in the following.

- The Feasibility Study of the Middle Paunglaung HPP, originally component 3 under CA1, was suspended at the end of 2015 since an independent developer had entered into a MoU to develop that project. The unused budget was reallocated to other activities within the Program.
- New component 3 under CA1 introduced by the end of 2016, through establishment of the ESMWG.
- Component 2 (Environmental and Social Safeguard Standards for HPP) and Component 3 (Compliance Monitoring System) under CA4 were taken out from that CA. Component 2 was included in the new Component 3 under CA1. Component 3 was no longer relevant since MONREC is the responsible authority to do environmental compliance monitoring.
- Changes in training content based on actual technical skills and skills in English language.
- Reduced ambitions in Phase I on regulatory support.

Reflect on to which extent the Ministry of Foreign affairs, the Norwegian Embassy have succeeded in directing and follow-up during the program implementation.

- MFA and RNE have overall succeeded in directing and follow-up the program. Improvements should be made in earlier approval of annual budgets, implementation

of more dynamic (annual targets with quarterly follow-up) results framework and risk management system to be used as a management tool. Also, MOEE should be given a more active role in tailoring content in short-term training session with support from NVE.

The review shall consider the relevance of a possible next phase and duration (years) of the NVE/MOEE-Program.

- It seems very relevant to continue with a Phase II for another 4 years, to support the overall goal of the TA Program “development of a framework for sustainable hydropower development”, as well as the other stated efforts from the Program Document (see section 3.1.1 of this report). It is not realistic to limit the program period to 4 years only to reach the Program Goal.

Suggest possible expansion of the Program and possible new activities in addition to the existing, as well as possible areas for termination.

See above discussion on possible continuation of existing CAs.

In a Phase II focus should be on further strengthening of cooperation with other Ministries. If necessary, and if possible, formal agreements with other Ministries should be included.

Possible new areas to be included are assessed with regards to the status of the program.

- Hydro Power Master Plan (requires access to relevant hydrological information throughout the country). This will allow to assess the need for hydropower with respect to supply/demand in the country. Also, link to other initiatives within the energy sector and identification and prioritization of projects to be supported.
- River Basin Management, including sediment transport and sediment volumes in existing reservoirs (need to check status on other ongoing or finished programs on water resources management in Myanmar). Essential competence to be developed within hydropower in Myanmar, and an area where Norway has developed high expertise (NTNU, investments through SNP/Statkraft etc) which can be utilized.
- Dam Safety Guidelines and dam break analysis. Critical areas with high possibility for competence transfer.
- Contracting and contract strategy, including international standards (incl. introduction to FIDIC). Very relevant topic for coming project phases both within the program and in general

Identify needs of the electricity sector in Myanmar, with specific focus on prioritized topics, where NVE or other Norwegian stakeholders could add value if new initiatives are considered.

- Studies on grid (national and connections to neighbor countries), energy mix, future demand, power system master plan
- Transboundary rivers

The review team should address any additional issues they find relevant to this assignment.

Important for RNE to coordinate possible activities in Phase II with other programs in Myanmar, supported by Norway or others (e.g. ADB, IFC, WB, other country programs) to avoid that similar activities are covered in other studies and programs.

4.8 Audit

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

- There has not been a particular audit for the program. This will be as part of the National Audit Office (Riksrevisjonen) audit of NVE.

4.9 Financial management and anti-corruption measures

Do the financial management systems and capabilities prove themselves sufficient?

- The cost reporting is summarized in an excel sheet, and included in quarterly and annual reports. Linking of the costs were in the start of the project allocated on quarterly to the CA's based on work performed.
- At the start of the program the costs were quarterly allocated, which does not give sufficient accuracy of cost. This has been changed and is now directly linked to respective CA when hours are accrued (i.e. in hour booking system)

Is the expenditure so far justifiable when compared to plans, progress and outputs?

- The concrete output of the CA components is low compared with the overall cost, and would not have been justifiable if these alone was the purpose.
- As part of capacity transfer, it is however essential to have local presence, in-house support and on-the-job training. This will drive costs, and for 2017 budget not allowed for sufficient local training. To have a true capacity building, 4-year period is too short, and should be prolonged.

To what extent are the programs designed to fight corruption– are measures implemented to avoid and detect corruption functioning satisfactory?

- Costs related to office and house rental in Myanmar are invoiced directly to NVE in Norway. Contingencies and local disbursement has been covered by NVE residential managers, and reimbursed as travel cost. The practice is a simple but efficient approach to control local costs, and to minimize engaging local economic staff and to have direct control of the costs.

4.10 Proposed list of actions

Item	Issue	Action	Priority
CA1: Hydropower Development	Improve technology transfer in design support	<ul style="list-style-type: none"> - Finalize the remaining Detail Design for Upper Keng Tawng and Tha Htay HPP during 2018¹ - Support on Bagwata HPP should continue, but should be structured in a separate program independent of technical assistance to MOEE - Continued support to ESMWG, including establishment as a permanent unit within MOEE 	<p>High</p> <p>Medium</p> <p>High</p>
CA 2: Technical Transfer	MOEE involvement and influence on the content of the training program	<ul style="list-style-type: none"> - MOEE to have more influence on the content and program for seminars in Myanmar Seminars by ICH - Possibly increase number of students in English training, by introducing one additional teacher, and/or cooperation with other Ministries 	<p>Medium</p> <p>Medium</p>
CA3: Implementation support to	Improve progress on implementation support.	<ul style="list-style-type: none"> - Assess the need for an international legal adviser, to support 	<p>Medium</p>

¹ If some crucial parts should remain at the end of Phase I, the program for a Phase II should include technical support to secure completion of the Detail Design for these two projects. The most critical areas that needs support in the power plant's design, included under the responsibility of MOEE, are i) Underground works (pressurized tunnels) ii) Slope stability, iii) Dam foundation and dam design. The technical support to MOEE during Phase II should focus on transfer of know-how in design rather than direct support as design engineering services. In addition, support during supervision of the construction works for the above listed critical structures and areas is advised.

electricity law and regulation	Continue the work with	the domestic legal adviser	
CA 4: Hydropower Standards	Implementation of technical standards	<ul style="list-style-type: none"> - Tailored implementation support to MOEE of the technical standards in potential next phase 	Medium
CA 5: Strengthening of hydrological database for hydropower development	<p>Upgrading of hydrological gauging stations</p> <p>Hydrological database</p> <p>Database Forum</p>	<ul style="list-style-type: none"> - Any further upgrading of hydrological gauging stations must include and improve on-the-job training to make the staff in MOEE, MOT and MOALI competent to do such upgrading themselves in the future - Assess where to establish the database, based on both technical and hydrological capability (i.e. consider to relocate to DMH under MOT) - Assess the possibility for the database to become a national hydrological database, related to the new Hydro Informatic Centre to be established in Yangon - Continued support to the Hydrological Database Forum, an important forum for coordination between DHPI, DMH and MOALI. The forum also serves as a possible platform for an improved common 	<p>Medium</p> <p>High</p> <p>High</p> <p>High</p>

		use of hydrological data in Myanmar and thus secure a better knowledge of the water resources in general and the hydropower potential as basis for future planning	
CA 6 NVE Administration & Technical Support	NVE management (Residential advisor/Program Director) vs. subcontractors	- NVE management (Residential advisor/Program Director) to take a more active role towards sub-contractors. Improve competence transfer by ensuring presence from sub-contractors for all design support, through tight follow-up of contracts from NVE	High
	Improved detailing in invoicing from NVE	- Improve disaggregation and detailing with link to hourly booking on activities both for sub consultants and NVE internal staff. Budget status to be followed-up monthly per activity to improve early warning of deviations to RNE/Norad	High
	Result framework	Improve use of the result framework as a management tool, including: <ul style="list-style-type: none"> - Establish annual targets at start-up of each year - Link progress on milestones throughout the year to budget cost. Flag potential 	High

	Annual report	<p>deviation in progress vs. budget in quarterly reviews</p> <ul style="list-style-type: none"> - The annual reporting to improve explanations on changes in budgets/activities and the rationale for these 	Medium
	Risk management	<ul style="list-style-type: none"> - Conduct annual risk workshops to assess the key risks, and identify mitigation means. Addressed actions in quarterly reviews to track status - Consider to conduct quantitative risk assessment for cost involved in the technical part of the project (i.e. technical studies or construction) to assess budget uncertainties, contingencies and delegate authority for use of this 	<p>Medium</p> <p>Low</p>

5 Annexes

Annex A: Terns of Reference

Annex B: Document List

Annex C: Meetings and Persons Contacted

Annex D: Questionnaires used for evaluation

Terms of Reference

July 12th 2017

for

Review of

Technical Assistance Program, phase I, 2014-2018, between Norwegian Water Resources and Energy Directorate (NVE) and Ministry of Electricity and Energy MOEE, (former Ministry of Electric Power, MOEP) of the Government of the Republic of the Union of Myanmar

1. Introduction

[Technical Assistance Program, phase I, 2014-2018, between NVE and MOEE](#)

Background

In early 2014 NVE and MOEP (today MOEE) signed a Memorandum of Understanding (MoU) for Technical Assistance, with the overall goal “to contribute to sustainable development of hydropower with the involvement of national experts from both private and public sectors, in a cost-effective and transparent manner thereby leading to socio economic development and poverty reduction.” Prior to the MoU-completion, NVE during 2013 and 2014 completed a scoping mission to Myanmar and an inception phase, preparing for the technical assistance, funded by Norad with 3 MNOK.

A Program Agreement (PA) between the Norwegian Ministry of Foreign Affairs and NVE was formalized in late 2014, confirming funding of 87,3 MNOK to the Program phase I, 2014-2018 (hereafter referred to as the “Program”).

Overall Program Goal:

Development of a sustainable framework for hydropower development.

Program Outcomes:

- MOEE has increased its know-how and capacity in developing hydropower projects according to international standards
- MOEE and collaborating agencies’ staff have developed their skills on relevant technical aspects related to management of electricity and water resource sector
- MOEE is enabled to implement electricity law and regulations
- MOEE and collaborating agencies have accepted modern standards established for best-practice planning, implementation and operation of hydropower projects
- MOEE and Department of Meteorology and Hydrology (DMH) have more complete and reliable river flow- and discharge data.

A Program Document of October 2014 agreed on the following six Cooperation Areas (CA), as shown in the table below, with planned expenditures over the years. The overall program structure has remained unchanged since 2014, but with some modifications, re-distribution of funding between the CAs. An amendment for the agreement is considered to maintain high activity through 2018. In

the list below are mentioned the main sub-consultants performing work in addition to NVE on the various CAs.

- CA1 Hydropower Development, including extensive in-house MOEE engineering services, provided by Norconsult and Multiconsult.
- CA2 Technical Transfer, including English training course for MOEE professionals
- CA3 Implementation Support – Electricity Law and Regulation, including work on grid and distribution code, provided by DNV GL, and legal assistance provided by MN Associates Intellectual Property Law Firm
- CA4 Hydropower Standards, including engineering services, provided by Norconsult
- CA5 Hydrometeorological Database
- CA6 NVE Administration & Technical Support

Area No. Description	Time Schedule					Royal Norwegian Embassy/MFA					Total (NOK x 1000)
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	
1 Hydropower Development		-----				2 613	22 275	17 463	6 600	0	48 950
2 Technical Transfer		-----				165	2 321	2 431	2 101	1 358	8 377
3 Implementation Support - Electricity Law & Regulation		-----				0	1 375	1 045	880	506	3 806
4 Hydropower Standards		-----				110	1 815	1 705	0	0	3 630
5 Strengthening of Hydro-meteorological Database		-----				385	2 915	2 420	1 925	1 595	9 240
6 NVE Administration & Technical Support		-----				330	3 245	3 245	3 245	3 245	13 310
					Total	3 603	33 946	20 309	14 751	6 705	87 313

According to article X in the PA a mid-term review “focusing on progress to date and effectiveness of the Program, i.e. the extent to which the outcomes are being/have been achieved, shall be carried out by tentatively 2016. An assessment of the Program’s impact may also be included in the review.”

2 Review Purpose

The purpose of this review is to:

- Assess the results of the existing & completed cooperation of initiatives described in 1 above
- Suggest future support areas for the electricity sector in Myanmar, and possibilities for changes and expansions of the existing programs & projects and possible new areas of cooperation.

3 Expected Review Outputs

The following are the expected review outputs:

1. A mission preparation note prior to the field visit to Myanmar.
2. An interactive seminar in Yangon or Nay Pyi Taw where preliminary findings and interpretations are presented to stakeholders and discussed
3. A wrap-up report prior to the departure from Myanmar, to be presented to MOEE, NVE and the Royal Norwegian Embassy in Yangon (RNE).
4. A draft final review report
5. A final review report including the observations, analyses and conclusions of the Consultant. The final report shall also include recommendations for possible improvements of the existing Program in

the remaining program period, possible next phase, and possible new programs, projects or areas of cooperation. The final report shall also make recommendations on, if relevant, cooperation areas which should be terminated and not continued in a possible next phase of the cooperation.

4 Scope of work

The review shall cover the period from the preparations of the existing Program, i.e. from 2013 and till today. The consultant shall address all issues found to be pertinent to meet the planned results of the initiatives described in Chapter 1 above. Hereunder, but not limited to, the following issues:

Efficiency

- To what extent does the result framework(s) and budget(s) enable cost-efficiency assessments?
- Assess Program design, planning processes, participation of relevant stakeholders and program organization, monitoring and reporting.
- Assess progress and efficiency of activities carried out. Measure how economically resources and input, funds, expertise, time etc. are converted to outputs.
- Compliance with agreements and Program documents, and to additional requirements from the Norwegian Embassy in Yangon. To what extent have the partners in Norway and Myanmar complied with obligations as stated in the agreements and Program documents, and in other formal requirements regarding additional new activities to the Program?
- Assess the quality of the results reporting. To what extent can reported results be verified?
- To what extent are disaggregated data on gender included in the reporting?

Effectiveness

Achievement of objectives:

- To what extent does the result framework(s) including indicators facilitate assessment of whether the overall objectives will be reached?
- To what extent can it be expected that the overall objectives will be reached? The performance of the Program in relation to set goals and indicators (the results chain).
- To what extent have inputs, outputs and activities contributed to the overall objectives of the Program.

Deviations:

- What deviations of plans and budgets have occurred and what were the causing factors? Have adequate measures for avoiding reiteration of deviations been implemented?
- The roles and responsibilities among and between the implementing institutions, NVE, MOEE and the Norwegian Embassy in Yangon.

Impact of the Program

- What are the main outcomes, and if possible to measure impacts of the Program?
- Have the relevant institutions and agencies been involved in the TA-activities?
- To what extent do the intended target groups benefit?
- Environmental and social consequences: Are there any outcomes, and if possible to measure, any impacts of the Program?

Relevance

- Assess the extent to which the objectives of the Program are consistent with the intended beneficiaries' requirements and country needs.
- Does the Program address (immediate & long term) needs in the electricity sector of Myanmar?
- Discuss and assess the added value of the Norwegian Program and projects in perspective of other donor initiatives in Myanmar within the energy domain

Sustainability

- To what extent have the activities undertaken contributed to strengthening the institutional capacity of the relevant Myanmar institutions and to make the institutions more sustainable?
- Capacity/competence building: The needs for training/capacity building should be considered.
- How are issues of social-cultural/gender equality addressed in the Program?
- Environmental sustainability: Have adequate mechanisms for monitoring and mitigating environmental impacts been integrated? Is it possible to follow up and monitor the results?
- Review the enabling environment for sustainable capacity building, taking competency profile, salary level, staff turnover etc. into account

Risk management

- Assess the major risks experienced during the implementation of the Program, and to what extent the Program have addressed and mitigated these risks. Identify possible future risk factors and present recommendations for how to handle these.
- What are the critical issues at organizational, institutional and on program/project level?
- Assess whether the corruption risks are managed properly (by considering the fund flow mechanisms and control procedures).

Particular concerns to be investigated – specifically related to the Program

- Consider the merit of the approved changes and adjustments in the Program made in annual meetings and in-between meetings
- To what extent is the results framework used as a management tool?
- Find out to what extent the annual and semi-annual reports reflect the planned activities, challenges, risks and achievements
- Discuss the role of NVE long-term resident advisors vs short-term revolving advisors
- Find out to which extent the work of the program has fed into the overall development of the energy sector in Myanmar
- What are the main lessons learned, and how should these lessons inform a possible new phase of cooperation?
- Discuss the sustainability of the program by cooperation areas and identify the most important CA for further support by NVE.
- Consider to which extent MOEE/NVE/RNE/MFA have made adjustments based on changing realities on the ground during the program, to make the program flexible and relevant
- Reflect on to which extent the Ministry of Foreign affairs, the Norwegian Embassy have succeeded in directing and follow-up during the program implementation
- The review shall consider the relevance of a possible next phase and duration (years) of the NVE/MOEE-Program.
- Suggest possible expansion of the Program and possible new activities in addition to the existing, as well as possible areas for termination

- Identify needs of the electricity sector in Myanmar, with specific focus on prioritized topics, where NVE or other Norwegian stakeholders could add value if new initiatives are considered
- The review team should address any additional issues they find relevant to this assignment.

Audit

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

Financial management and anti-corruption measures

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

5 Implementation and reporting

Sources of information and methodology to be employed

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

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

Field work: One field visit to Myanmar shall be carried out for a period of up to 2 working weeks, including minimum two consultant team members. A detailed field visit plan shall be prepared prior to the arrival of the Consultant. The local RNE-coordinator of the program can provide suggestions regarding logistics and field trips, but the arrangement is the responsibility of the consultant, including obtaining visa. RNE and the Norwegian Agency for Development Cooperation (Norad) can give advice in the preparations of a meeting schedule. MOEE, including resident NVE advisers, are mainly working out of Nay Pyi Taw, hence most of the field visit will take place there. One representative from Norad may take part in the review as observer.

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

Indicative timeline for the review:

- Contract signed in August/the beginning of September
- Field work and draft report writing during October and November
- Final report after comments to be completed by end of November

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

Field work: The Consultant, represented by minimum to consultant team members, shall undertake a maximum 2- week fact-finding mission to Myanmar, tentatively in mid-October 2017, to conduct interviews, review documentation, and make field visits.

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

- a) A mission preparation note shall be submitted to Norad prior to field work in Myanmar. The note should include the key issues identified, building upon a preliminary assessment of the programs, referring to this ToR.
- b) The Consultant shall submit a report with the major findings in wrap-up meetings with the RNE and MOEE prior to departure from Myanmar.
- c) The Consultant shall present a draft report to the parties, embassy and Norad, including summary of main findings, conclusions and recommendations within 10 days after the field work in Myanmar. Deadline for comments to the draft report is 1 week.
- d) The final report has to be completed by the end of November 2017, within max. 2 weeks after the parties have delivered their comments to the draft report.

Indicative volume of the assignment

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

- The review team shall be minimum 2 experts
- Preparations: Up to two weeks á five working days.
- Myanmar mission: Up to two weeks á five working days.
- Reporting: Two to three weeks á five working days.

Approximately 12 – 13 working weeks in total for the team.

7 Documentation

Non-exhaustive listing of documents to be available for the review team:

- Program documents
- Official agreements and amendments
- Minutes from annual meetings
- Annual reports

- Semi-annual reports
- Financial reports
- Audit reports

Appendix

Report format

All reports to be delivered in English. The expected report structure is shown below. Any deviations or changes need prior approval by Norad.

1 Executive Summary

1.1 Review Findings

1.2 Conclusion

1.3 Recommendations

2 Introduction

2.1 Objectives of the Review

2.2 Methodology

2.3 Structure of Report

2.4 Acknowledgements and Disclaimer

3 Review and analysis

3.1 Description of the Project

3.1.1 Goal

3.1.2 Purpose

3.1.3 Outputs and Activities

3.2 Assessment of Performance and Achievements

3.2.1 Formal Criteria

3.2.2 Efficiency

3.2.3 Effectiveness

3.2.4 Impact

3.2.5 Relevance

3.2.6 Sustainability

3.2.7 Risk management

3.2.8 Particular concerns to be investigated

3.2.9 Audit

3.2.10 Financial management and anti-corruption measures

4. Conclusions and recommendations

Annexes

Annex A: Terms of Reference

Annex B: Document List

Annex C: Persons contacted

Annex B: Document List

- Annual reports for 2014/2015, 2015/2016 and 2016/2017
- Addendum to Program Document
 - MOEE – NVE, September 2016. Technical Assistance Programme, Environmental Work
 - [No author/date]. Annex CA 1 Environment Result Matrix and Budget 06.09.16
- Documents concerning environmental and social impact management of hydropower in Myanmar, including
 - [author not specified]: Concept note - strategy for improvement of environmental & social impact management of hydropower projects in MOEP
 - Office Order No.(048/2016) from Ministry of Electric Power (MOEP), Minister Office to Establishing Environmental and Social Management Working Group of MOEP
 - [author not specified]: DRAFT MANDATE FOR MOEP Environmental and Social Management Working Group (ESMWG)
 - ESMWG and NVE Resident Environmental Advisor in May 2017, Concept Note: Establishment of a Permanent Environmental and Social Unit in MOEE
 - Norwegian Water Resources and Energy Directorate, September 2017, Strategy for Environmental Assistance to MOEP Hydropower Projects
 - Morten Johnsen and Anette Ødegård, NVE: NVE recommendations for environmental assistance to MOEP hydropower projects
 - 27.09.2016-Department of Hydropower Implementation, MOEE; Approval of Health, Safety and Environment Policy and Requirements
 - [author not specified]: Health Safety and Environmental Policy for construction of hydropower projects by Department of Hydro Power Implementation
 - [author not specified], Occupational Health, Safety and Environmental Requirements for DHPI operations
 - Norconsult, 22.5.2017: Health, Safety and Environment Plan, Thantay hydropower Project
 - DHPI's Branches and Construction Units (undated), HSE plan for Thantay Hydropower Project
 - [author not specified]. Environmental and Social Management System Policy for planning and construction of hydropower projects by DHPI
 - [author not specified]. Detailed Requirements for the Environmental and Social Management System for Hydropower Project Implemented by DHPI
 - Comments from Departments/Enterprise under MOEE to Policy and Requirements for the Environmental and Social Management System for Hydropower Project Implemented by DHPI (undated)

- ESMWG and NVE Resident Advisor 17.03.17. Draft Concept Note: MOEE – NVE, Communication Policy and Activities.
- Minutes of Discussion for Courtesy Call with U Htein Lwin, Permanent Secretary of Ministry of Electricity and Energy by Mr. Morten Johnsen, Norwegian Water Resources and Energy Directorate on February 16, 2017
- Minutes of Meeting for Courtesy Call with Permanent Secretary U Htein Lwin of Ministry of Electricity and Energy and Mr. Morten Berthelsen Johnsen, Environmental Advisor of Environmental and Social Management Working Group of MOEE, on May 29, 2017
- Department of Hydropower Implementation (DHPI) Ministry of Electricity and Energy (MOEE), April 2017. Draft Stakeholder Engagement Plan (SEP) for Preparation of Environmental and Social Management Plan (ESMP) for Tha-Htay Hydropower Project
- DHPI – Department of Hydropower Implementation in MOEE, Norwegian Water Resources and Energy Directorate (NVE), February 2016. Terms of Reference for Tha Htay Hydropower Project, Myanmar, Environmental- and socio-economic surveys for the Environmental and Social Management Plan (ESMP)
- Department of Hydropower Implementation, Ministry of Electric Power, 03.02.2017. Tender document for Consultancy Services for Environmental and Social Baseline surveys and Environmental Management Plans for the Tha-Htay Hydropower Project
- [author not specified]. Household Questionnaire for Socio-Economic Survey for Tha Htay HPP
- [author not specified]. Village Questionnaire for Tha-Htay Hydropower Project, ESMP Study
- NVE Environmental Advisor Mr. Morten Johnsen 29.05.17. Summary for EIA review training for MOEE staff - March/April 2017
- Morten Johnsen, NVE, 18.07.2016. Final Training Needs Assessment for Environmental and Social Management Working Group (ESMWG) Ministry of Electricity and Energy (MOEE)
- Morten Johnsen, NVE, 30.06.17, Training Efficiency and Needs Assessment July 2016 – June 2017 for Environmental and Social Management Working Group (ESMWG), Ministry of Electricity and Energy (MOEE)
- NVE Environmental Advisor Mr. Morten Johnsen. 14th and 15th September 2016, Summary for Compensation and Environmental and Social Management Planning Seminar
- ESMWG and NVE Resident Environmental Advisor in May 2017. Early Draft Concept Note: Establishment of a Permanent Environmental and Social Unit in MOEE
- MINISTRY OF ELECTRICITY AND ENERGY, DEPARTMENT OF HYDROPOWER IMPLEMENTATION. April, 2017. Information for Master Program at AIT

- NVE Environmental Advisor Mr. Morten Johnsen 23.11.16. Summary for the ESMWG Study Visit to Lao PDR
- [No author/date]. Establishing of Working Committees under HSEQ Management Committee of Ministry of Electricity and Energy
- Guidance documents for ESMWG
 - [No author/date]. Concept Note, Strategy for the Improvement of Environmental & Social management of hydropower projects in Myanmar.
 - [No author/date]. DRAFT MANDATE FOR MOEP Environmental and Social Management Working Group (ESMWG)
 - NVE Resident Environmental Advisor in May 2017, Concept Note: Establishment of a Permanent Environmental and Social Unit in MOEE
 - Norwegian Water Resources and Energy Directorate, September 2017. Strategy for Environmental Assistance to MOEP Hydropower Projects
- MoU
 - Signed MoU by Thaung Han, DG of DHI and Per Sanderud, DG of NVE
 - Addendum to MoU of 3/7/15 signed by Aye Sann, DG DHI and David Wright, Program Director NVE.
- NVE and MOEE, July 2013, Scoping report
- Program Agreement
 - 11th December 2014, Program Agreement between the Norwegian Ministry of Foreign Affairs and the Norwegian Water Resources and Energy Directorate regarding technical assistance to the Myanmar Ministry of Electric Power 2014 – 2018 (development of sustainable framework for Hydropower Development
 - RNE 11.6.2016. 2nd amendment of Program Agreement
- Program Document
 - NVE and MoEP, 27/10/2014, Program Document for Technical Assistance Development of a Sustainable Framework for Hydropower Development
- Quarterly Progress reports
 - 2015 Jan- April
 - 2015 April – July
 - 2015 July – September
 - 2015 September – December
 - 2016 Jan- April
 - 2016 April – July
 - 2016 July – September

- 2016 September – December
- 2017 Jan- April
- 2017 April – July
- Signed minutes from annual meeting 29th of April 2015, concerning the Annual Report for 2014. Presentations from meeting included in archive;
 - Introductory remarks from Ambassador Ann Ollestad, RNE
 - Presentation of annual report in meeting
 - Presentation for Norconsult and Multiconsult for Upper Keng Tawng HPP and Tha-Htay HPP
 - Presentation for Norconsult and Multiconsult for Environmental & Social Support Services and ESIA Feasibility Studies for Department of Hydropower Implementation, Ministry of Electric Power, Nay Pyi Taw, Myanmar
- Terms of Reference for subcontractors
 - 03/04/2016, Terms of Reference - Consultant with Technical expertise to assist working group for finalization of Myanmar Grid Code and Distribution Code
 - 09/02/2017. Terms of reference for a legal consultant to MOEE
 - 03/10/2014 [submission date]. Tender documents Consultancy Services for In-House Engineering Services and Feasibility Studies for Department of Hydropower Implementation, Ministry of Electric Power, Nay Pyi Taw, Myanmar

Annex C: Meetings and Persons contacted

Date: 28.09.2017

Topic: Contract signing and start-up meeting with Norad

Location: Norad, Oslo

- Ørnulf Strøm, Norad
- Harald Birkeland, Norad
- Børre Helgesen, Sweco
- Jan-Petter Magnell, Sweco

Date: 07.09.2017

Topic: Documentation for the review from NVE

Location: NVE, Oslo

- Gunn Oland, NVE
- Jan-Petter Magnell, Sweco

Date: 19.09.2017

Topic: Start-up meeting with NVE

Location: NVE, Oslo

- Gunn Oland, NVE
- Morten Johnsen, NVE
- Jan-Petter Magnell, Sweco

Date: 10.10.2017

Topic: Introduction meeting NVE

Location: MOEE Office No 27, Nay Pyi Taw

- Thea Schøyen, Resident Energy Adviser, NVE
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Date: 11.10.2017

Topic: Introduction meeting DEPP

Location: MOEE Office No 6, Nay Pyi Taw

- Daw Mi Mi Khaing, Director General
- U Myint Oo, Deputy Director General
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Introduction meeting DHPI

Location: MOEE Office No 27, Nay Pyi Taw

- U San Wai, Deputy Director General
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Meeting DHPI

Location: MOEE Office No 27, Nay Pyi Taw

- Daw Mya Kyae Mone, Deputy Director Design Branch
- U Aye Chan Myint Thein, Assistant Director Design Branch
- Daw Aung Tin See Tun, Staff Officer, Design Branch
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Introduction meeting DMH

Location: Ministry of Transport, Nay Pyi Taw

- Dr. Kyaw Moe Oo, Acting Director General
- Daw Htay Htay Than, Director
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Meeting with hydrologists at DMH

Location: Ministry of Transport, Nay Pyi Taw

- Daw Myo Myat Tnu, Deputy Staff Officer
- U Wanna Swe Oo, Senior Observer
- U Kyaw Min Hlaing, Deputy Staff Officer
- U Tin Tin Naing, Senior Observer
- Daw War War Khaing, Senior Observer
- Daw Yin Yin San, Deputy Staff Officer
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Date: 12.10.2017

Topic: Visit to Paunglaung Hydrolab

- U Aye Chan Myint Thein, Assistant Director Design Branch
- Daw Nan Hmin Thida Shwe, Deputy Director, DHPI
- U Aung Zay Yar Myint, Assistant Director, Quality Control Office, DHPI
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Meeting Construction Unit No 5

Location: MOEE Office No 27, Nay Pyi Taw

- U Aye Chan Myint Thein, Assistant Director Design Branch
- U Kyaw Thu Win, Deputy Director, Upper Keng Tawng HPP
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Meeting Construction Unit No 4

Location: MOEE Office No 27, Nay Pyi Taw

- U Tun Min Thein, Assistant Director, Tha-Htay HPP
- U Aung Myo Htet Chit, Assistant Director Design Branch
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Meeting member ESMWG

Location: MOEE Office No 27

- Daw Khin Seint Wint, Deputy Director, Policy and Legal Procedure Scrutinization and Work Inspection Branch, Permanent Secretary Office
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Date: 13.10.2017

Topic: Meeting with Master Student NTNU

Location: MOEE Office No 27, Nay Pyi Taw

- U Zaw Win Htun, Staff Officer EPGE, Keng Tawng HPP
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco
- Len Börjeson, Sweco

Topic: Meeting with responsible English Training

Location: MOEE Office No 27

- Matthew Spencer, English Training Teacher
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco
- Len Börjeson, Sweco

Topic: Meeting with 6 English Students

Location: MOEE Office No 27, Nay Pyi Taw

- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco
- Len Börjeson, Sweco

Topic: Meeting with ESMWG

Location: MOEE Office No 27, Nay Pyi Taw

- U Ye Myint Htun, Director (civil), Investigation Branch, leader ESMWG
- Daw Way Way Hlaing, Assistant Director DHPI
- Daw Yu Khine Tin, Staff Officer DEPP
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco
- Len Börjeson, Sweco

Topic: Meeting with legal working group

Location: MOEE Office No 6, Nay Pyi Taw

- U Min Tayza Nyunt Tin (local legal advisor)
- 4 members of the DEPP legal team
- Bo Pettersson, Sweco
- Len Börjeson, Sweco

Topic: Meeting with DNV-GL

Location: MOEE Office No 27, Nay Pyi Taw

- Dr. Jinlong MA
- Jan-Petter Magnell, Sweco

Date: 16.10.2017

Topic: Meeting on CA5

Location: MOEE Office No 27, Nay Pyi Taw

- Daw Kay Thi Aye, Deputy Director, Investigation Branch, DHPI
- U Myint Naing, Assistant Director, Hydrology Branch, DHPI
- Jan-Petter Magnell, Sweco

Topic: Meeting with the Technical Working Group of MOEE (Grid Code and Wheeling Tariff working groups)

Location: MOEE Office No 27, Nay Pyi Taw

- U Myint Oo, Deputy General Director, DEPP
- U Tint Soe Win, Deputy Director
- U Nay Zar Win, Assistant Director

- U Saw Sithu Hlaing, Director
- 3- 4 additional Directors plus approximately 15 professional staff from DEPP
- Len Börjesson, Sweco

Topic: Meeting with Program Main Contact

Location: MOEE Office No 27, Nay Pyi Taw

- U Min Khaing, Director, Design Branch, DPPI
- Daw Mya Kyae Mone, Deputy Director Design Branch
- Daw NN, Deputy Director, Design Branch
- Jan-Petter Magnell, Sweco
- Bo Pettersson, Sweco

Topic: Meeting ICH

Location: Park Royal Hotel, Nay Pyi Taw

- Tom Solberg, Project Director
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco
- Len Börjesson, Sweco

Topic: Meeting NVE

Location: NVE's office, Middelthuns gate 29

- Gunn Oland, Program Director, NVE
- Morten Johnsen, Head of section, NVE
- Yngve Trædal, SWECO

Date: 17.10.2017

Topic: Meeting Thoolei Company Ltd

Location: Hilton Hotel, Nay Pyi Taw

- U Chit Oo, General Manager, Thoolei Co.
- Daw Hsit Hsar, Director, Thoolei Co.
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco

Topic: Seminar at MOEE

Location: MOEE Office No 27, Nay Pyi Taw

- 20 participants from DHPI, DEPP, DMH, NVE and Sweco, including U San Wai, Deputy Director General, DHPI, and U Min Khaing, Director, Design Branch, DHPI

Date: 18.10.2017

Topic: Meeting with the Royal Norwegian Embassy

Location: Royal Norwegian Embassy, Yangon

- Harald Walter Mathisen, Counsellor Development
- Bo Pettersson, Sweco
- Jan-Petter Magnell, Sweco
- Len Börjesson, Sweco

Date: 19.10.2017

Topic: Meeting Hydrology Branch, MOALI

Location: MOALI, Yangon

- Daw Khon Ra, Director, Hydrology Branch
- U Thet Wai Htun, Staff Officer, Hydrology Branch

- Daw Phyu Hnin Su, Special Sub. Assistant Engineer, Hydrology Branch
- Daw Shuse Pyi Tan, Sub. Assistant Engineer, Hydrology Branch
- Jan-Petter Magnell, Sweco

Date: 25.10.2017

Topic: Review of Norconsult and Multiconsult work in CA1

Location: Skype

- Ola Erling Kjærstad, Norconsult
- Robin Wood, Multiconsult
- Yngve Trædal, Sweco
- Bo Pettersson, Sweco

Date: 26.10.2017

Topic: Review of NVE work in CA5

Location: NVE, Oslo

- Sverre Husebye, NVE
- Péter Borsányi, NVE
- Jan-Petter Magnell, Sweco

Date: 27.10.2017

Topic: Review of DNV GL work in CA3

Location: Skype

- Lars Messing, DNV GL
- Len Börjeson, Sweco

Annex D: Questionnaires used for evaluation

Questionnaire

NVE-MOEE Technical Assistance Programme

Cooperation Area 1: Hydropower Development

Component 1 & 2 – In-house Consulting Services

Name: _____ Gender: Male

Female

Position: _____ Age: _____

Education: _____ Years of relevant experience: _____

Did you attend English Proficiency Course: Yes No

In what subject were you involved in the Technical assistance Programme?

Tha Htay Hydro Power Project

Upper Keng Tawng Hydro Power Project

Other: _____

How did you find the relevance of the Technical Assistance to your work?

None Low High Excellent

To what extent do you foresee that the Technical Assistance will be beneficial to your future work?

None Some Large Very large

How do you find the level of expertise of the In-house Consultant?

Bad Low High Excellent

To what extent did you feel involved in the In-house Consultants work?

None (seldom) Low (monthly) Large (weekly) Very Large (daily)

In what way are you performing your engineering different after the programme:

Suggestions for improvements and comments to the Technical Assistance:

Questionnaire

NVE-MOEE Technical Assistance Programme

Cooperation Area 1: Hydropower Development

Component 3 – Environmental and Social Management Work

Name: _____ Gender: Male

Female

Position: _____ Age: _____

Education: _____ Years of relevant experience: _____

Did you attend English Proficiency Course: Yes No

In what subjects were you involved in the Technical assistance Programme?

Health, Safety and Environmental (HSE)

Public Involvement

Environmental and Social Management Planning

EIA guidelines

Other: _____

How did you find the relevance of the Technical Assistance to your work?

None Low High Excellent

To what extent do you expect that the Technical Assistance will be beneficial to your future work?

None Some Large Very large

How do you find the level of expertise of the In-house Consultant?

Bad Low High Excellent

To what extent did you feel involved in the In-house Consultants work?

None (seldom) Low (monthly) Large (weekly) Very Large (daily)

In what way are you performing your engineering different after the programme:

Suggestions for improvements and comments to the Technical Assistance:

Questionnaire

NVE-MOEE Technical Assistance Programme

Cooperation Area 1: Hydropower Development

Component 4 – Other Hydropower Studies

Name: _____ Gender: Male

Female

Position: _____ Age: _____

Education: _____ Years of relevant experience: _____

Did you attend English Proficiency Course: Yes No

In what subject were you involved in the Technical assistance Programme?

Bagwata Hydro Power Project Pre-Feasibility Study

Other: _____

How did you find the relevance of the Technical Assistance to your work?

None Low High Excellent

To what extent do you expect that the Technical Assistance will be beneficial to your future work?

None Some Large Very large

How do you find the level of expertise of the In-house Consultant?

Bad Low High Excellent

To what extent did you feel involved in the In-house Consultants work?

None (seldom) Low (monthly) Large (weekly) Very Large (daily)

In what way are you performing your engineering different after the programme:

Suggestions for improvements and comments to the Technical Assistance:

Questionnaire

NVE-MOEE Technical Assistance Program

Cooperation Area 5: Hydrometeorological Database

Name: _____ Gender: Male
Female

Position: _____ Age: _____

Education: _____ Years of relevant experience: _____

Did you attend English Proficiency Course: Yes No

In what subject were you involved in the Technical Assistance Program?

- Upgrading and modernization of selected stations
 Modernization and integration of hydrological and meteorological databases
 Improvements to hydrological methods and skills
 Other: _____

How did you find the relevance of the Technical Assistance to your work?

- None Low High Excellent

To what extent do you foresee that the Technical Assistance will be beneficial to your future work?

- None Some Large Very large

How do you find the level of expertise of the In-house Consultant?

- Bad Low High Excellent

To what extent did you feel involved in the In-house Consultants work?

- None (seldom) Low (monthly) Large (weekly) Very
Large (daily)

In what way are you performing your engineering different after the program:

Suggestions for improvements and comments to the Technical Assistance:
