Task 5 – Sustainability Arrangements

Detailed Feasibility Studies: Transmission Projects in Nepal

Volume 5 (Report)

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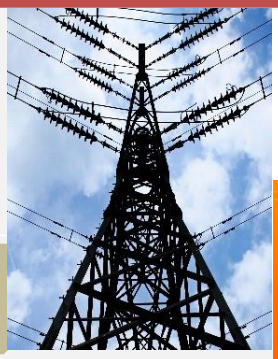

TETRA TECH

Detailed Feasibility Studies: Transmission Projects in Nepal

Volume 5 (Report)
Task 5: Sustainability Arrangements

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Acronyms

ADB	Asian Development Bank
CIF	Compact implementation funding
CP	Condition precedent
DCP	Development Credit Policy
DFS	Detailed feasibility study
DLECPCC	District Level Energy Crisis Prevention Coordination Committees
D-M	Dhalkebar-Muzaffar
EIA	Environmental Impact Assessment
ESCAP	Energy Sector Crisis Action Plan
Genco	Generating Company
GIS	Gas-insulated switchgear
GoN	Government of Nepal
HPP	Hydropower project
IBN	Investment Bank of Nepal
IEE	Initial Environmental Examination
IFC	International Finance Corporation
IPP	Independent power producer
KfW	German-owned development bank
M&E	Monitoring and evaluation
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MOE	Ministry of Energy
NEA	Nepal Electricity Authority
NERC	National Electricity Regulatory Commission
NHDP	National Hydro Power Development Project of USAID
NPTC	Power Trading Corporation in Nepal
OMCN	Office of Millennium Challenge Nepal
PPA	Power purchase agreement
PMU	Project management unit
PTC	Power Trading Corporation
RAP	Resettlement Action Plan
ROW	Right of way
RPGCo	Rastriya Prasaran Grid Company
RUM	Risk and Uncertainty Management
TL	Transmission line
TOR	Terms of reference
TSMP	Transmission System Master Plan
USAID	US Agency for International Development
USD	United States dollars
VDC	Village development committee
WB	World Bank

Executive Summary

This task addresses the sustainability of MCC's investment in reducing poverty and increasing economic benefits through its contributions to improving electricity sector operations and its effectiveness in developing and delivering power. This goal guides the proposed compact between the GoN and US Government. This task included an analysis of program and project risks and uncertainties that could affect the completion of the compact and/or sustainability of the project, suggested mitigation measures, and the development of an outline of an overarching risk and uncertainty mitigation plan.

The tight time limitations associated with MCC investments magnify the challenges. Likewise, the complexity and number of the electricity policy and sector reforms underway simultaneously add another layer of risk and uncertainty within which the project must succeed. All this makes it imperative to identify risks and uncertainties, develop proposed solutions, and implement them during the project design, implementation and operations phases. Adequate and effective monitoring and course corrections will be essential during each phase.

The MCC/GoN compact and project are being launched in an uncertain environment where a lot is going on. The proposed project itself is complicated: eight separate projects, each with multiple components such as transmission line additions, reinforcements, extensions and upgrades, along with 14 associated substations. These projects complement and link to the GoN and donor actions to address the deficiencies in the electricity sector that are resulting in inadequate power supply, daily power interruptions in the dry season, and a proportion of the population that is unserved by either grid-based or off-grid power.

The proposed risk management plan consolidates the numerous and varied potential risks to and uncertainties affecting MCC's investment that have been identified across its various components (i.e., technical design, environment and social accommodations, financial/economic analyses, implementation arrangements, and M&E function). A Sustainability Risk Register is provided in Annex A where all the risks and solutions are summarized in table form.[1] Risks are also categorized according to MCC's typology which is summarized in the report. The main risks encountered are:

- **Time/Completion Risk:** Risk that an activity is not completed due to cost or time overruns, insufficient government support, or legal disputes.
- **Cost/Financial Risk:** Risk that activity costs run over budgeted amount, requiring adjustments to that or other activities to accommodate the cost increases.
- **Results Risk** (including sustainability): Risk that the activity does not achieve the intended outcomes or impacts, or that results are unsustainable.
- **Political and Policy Risk** (including reputational): Risk that political environment necessary for successful compact deteriorates or that country cannot complete necessary policy reforms.

[1] The Risk Register uses an abbreviated format of that used by MCC in its QPR Risk Monitoring Framework provided to TT for this purpose. Risks are also categorized according to MCC's typology.

- **Capacity/Management Risk:** Risk that MCA does not have the capacity in technical expertise or management skills to deliver high quality projects on time and at the projected budget.
- **Opportunity Cost Risks:** Risk that MCC compacts do not achieve full potential in terms of quality and results due to missed opportunities.

The Risk Register extracts 45 project and sustainability risks from the DFS and links then with proposed solutions and mitigation measures already developed or being recommended for application to proposed MCC transmission line projects to improve the likelihood of sustainability over the short and long terms. Risks are ranked according to their likelihood (probability) and degree to which they jeopardize a project's sustainability and thus the urgency of their mitigation. Strategic and contingent risks are the main priority, while non-strategic risks are noted in the other DFS reports but not elevated to the sustainability issue that is the focus of this task.

Data and information that support the risks and mitigation measures are drawn from the MCC due diligence phase, the analyses presented in this DFS, and discussions with the OMCN, NEA, and key development partners involved in generation, transmission, and distribution. Another key source of information is the electricity sector crisis action plan that GoN and development partners compiled covering reforms, policies, and practices that will be priorities for sector reform. Progress is being made in implementing the action plan; so a major effort was made to determine its implementation status. Risks are divided between project risks (which include design, implementation through the completion of construction, and preparations for smooth project operation) and those associated with the long-term financial health and economic benefits resulting from the investments after they become operational.

Project Risks. As the timing of completion and costs are the overriding primary risks to the sustainability of the MCC investment, the major project risk is completing the project within the nominal five-year timeframe (i.e., hand-over to the institution designated to house the investment – which MCC expects to be the new Rastriya Prasaran Grid Company (RPGCo) or NEA). Another primary project risk is whether the investment package being developed is deemed financially and economically viable according to MCC's requirements. The main contributors to investment risk at the project level involve the resolution of environmental and social issues (including resettlement) associated with the routing of transmission lines and the siting of substations without requiring too much time and money, or causing disruptions or delays in construction. These are summarized with proposed solutions in the Risk Register (Annex A).

Sustainability Risks. The main short term sustainability risks include the following[2]:

- **Financial impacts of Indian/Nepali arrangements on power trading benefits:** Ensuring that there is a viable Indian/Nepali financial arrangement on power trading that will meet the

[2] Note that the risk mitigation related to ensuring the capacity, capability and availability personnel to operate and maintain the projects once completed is now covered under Technical Risks in the Project and Sustainability Risk Register.

compact investment's financial and economic hurdle requirements).[3] The severity of this risk has been dampened due to technical requirements of Indian power system to export hydro power from Nepal to balance the grid with about 30% of the generation coming from renewable energy sources in 2022. Pricing and institutional arrangements still require substantial effort on both sides to be ready for the enhanced power exchange envisioned for the Project.

- **Blockage and slowdown of reforms due to labor dissatisfaction:** Reducing the risk that labor dissatisfaction does not hold up sector reform or slow down/stop coordination on next stages of project development is underway.
- **Tariff reform fails to provide wheeling charges:** Mitigation requires making sure that tariff reform happens according to plan and that wheeling charges attributable to the new Transco are adequate to cover its operation and maintenance costs and allow for re-investment as needed to keep the transmission system in top shape and to allow it to finance expansions as needed in the future. Work on this risk is underway but needs to continue apace.
- **Distribution and sub-transmission system readiness to evacuate power from new transmission projects and distribute it to customers:** Improving the probability that the distribution system is ready to evacuate power and deliver it to its intended destinations when new transmission projects become operational.
- **Sufficiency of power injection to MCC transmission projects:** Ensuring adequate injection of hydropower into the transmission system involves identifying and removing barriers to making new hydropower capacity available to meet required domestic supply and in periods of excess allow export of power to improve economic benefits to Nepal while meeting the base needs of Nepal.
- **Readiness of necessary transmission projects sponsored by others and important to MCC project's system integration.** MCC's investments are only part of the transmission improvement efforts needed in Nepal to improve power flow and adequacy of delivery. Ensuring that other necessary pieces of the transmission system are progressing apace is also high priority and can be accomplished by improved coordination and exchange of information on the part of market actors and development partners.

All of these hinge on timely completion of the reforms that GoN and its development partners have set out to accomplish in the next several years. Failure to implement structural reforms in time to maximize the benefits of MCC projects could create opportunity costs to the project, reduce return on investment, and erode its sustained operation. The efficiency, effectiveness and timeliness of carrying out reforms are of utmost importance to sustainability of the MCC investment. Unflinching, timely and effective GoN support for the reforms is key to mitigating this risk. The full set of sustainability risks are located in the Risk Register in Annex A-6.

[3] Longer-term need for a separate Nepali Power Trading Company is a separate issue. This issue is urgent enough and tricky enough due to its cross border nature and intricacies that is needs to be separated and pushed to short-term urgency status.

Risk and Uncertainty Management Plan. The last section presents recommendations for a risk and uncertainty mitigation plan presented here focus heavily on timelines, identifying pinch points and critical paths to reduce time loss, and the development of appropriate monitoring tools and mechanisms. The MCC QPR Risk Monitoring and Management Tool appears highly adequate for its purposes for monitoring the risks identified in this Task and others that arise. The need for a shared reform monitoring system needs to be addressed. The recommendation would be "dashboard" type tools that could be tailored to the specific activities and sectoral actors' needs. Also stressed are risk management capacity building within the key institutions, and reinforcement of key personnel needs during the transition to the new sectoral entities, particularly the RPGCo, NERC (Nepal's independent energy regulator), and the Power Trading Corporation, while not forgetting that the NEA as a distribution company will need substantial support to coalesce and augment its efficiency and effectiveness on the distribution side. Obviously, MCC/MCA cannot do this alone, so continued concerted coordination efforts by the development partners is essential.

1. Introduction

1.1 Objective and Scope

This report provides recommendations to support and improve the sustainability of MCC's proposed transmission-related investment in Nepal. There are numerous sources of risks and uncertainties that could jeopardize this investment along the development and implementation path of the investment project. The report focuses on those risks and uncertainties that remain to be solved during the scoping, design and implementation of the project after its delivery to MCC in January 2017.

Despite the rigorous efforts of the detailed feasibility study (DFS) team, multiple uncertainties remain, e.g., those relating to transmission line route determination and rights of way, land acquisition for substations, related resettlement activities, and environmental and social impact mitigation. Each of these uncertainties, in turn, affects the financial return on investment and the economic benefits that will ultimately result from the MCC investment. The main project risks are consolidated in this report in order to prepare for an all-encompassing risk and uncertainty mitigation and management plan.

The DFS's financial and economic report has determined the financial return and economic benefits of the project under a range of scenarios. The iterative and interactive nature of the separate DFS tasks posed numerous difficulties in completing the risk and uncertainty assessment. Now resolved, it is much clearer which risks have become overarching in terms of likely project completion in the compact timeframe in a financially and economically positive outcome. These remaining risks and uncertainties, and the proposed solutions and mitigation measures are now the major focus of this report with its Risk and Uncertainty Management Plan (RUM Plan) for the DFS. Likewise, Volume 6 of the DFS specifies monitoring and evaluation measures that will support not only project oversight and management but also the progress of risk mitigation measures.

In addition to the risks and uncertainties associated with project implementation, there are risks and associated with the environment in which the projects will be operated. Most of these arise due to the now initiated reforms in the electricity sector. The reforms are captured in Ministry of Energy's "Concept Paper on National Energy Crisis Prevention and Electricity Development Decade," published by GoN in January/February 2016.[4] It was dubbed the Energy Sector Crisis Action Plan, and this report will refer to it as either ESCAP or the Action Plan. It lists many electricity sector reforms agreed by development partners with the GoN. The results of some of the actions implemented will have direct bearing on, *inter alia*, what type of entity will own, operate and maintain the completed projects. Few of these uncertainties will be resolved at the DFS stage, but the report's analysis "stretches" beyond the vision of the DFS by providing updates to the progress already made in implementing the Action Plan and insights into current recommendations for solutions affecting project completion and sustainability risks.

[4] See GON 2016. This document provides a listing of the reforms envisioned for the electricity sector in the short to medium terms, and was published after much consultation within the government and with the major energy sector development partners. A "living" unpublished matrix to track all of the reforms has been prepared by the development partners' Energy Sector Coordination Committee, which meets periodically.

To anchor the resolution to complete the Action Plan reforms of most interest to the compact's transmission projects, MCC will be developing conditions precedent involving necessary reforms and completion times to be inserted into the Compact itself. MCC and OMCN, and ultimately MCA, will continue to work with development partners and other stakeholders on these items (some of which are also conditions precedent to other development partners' assistance to the GoN). Suggested Conditions Precedent to the Compact related to project and sustainability risk are indicated in the Risk Register (Annex A) with Yellow highlighting. As timing is paramount for the MCC investment's sustainability, MCC (and other US Government development agencies) are actively providing or planning for technical assistance to promote the highest-priority reforms. As just one example, the ESCAP calls for the development of wheeling charges. When such charges are effectuated, the RPGCo should have a consistent, reliable revenue stream with which to fund its operations as an independent entity (in theory). However, electricity sector non-payments are a common issue with unbundled power sectors in developing countries, especially where there are high losses and high customer non-payments. NEA suffers from both issues. Once unbundled, the result may be that intra-sector debt builds up as sector parties accrue non-payments. Being a transmission company with numerous suppliers but probably just one or two customers (NEA and India Power Trading Company), RPGridco could easily get squeezed as NEA could be strapped for cash (if sectoral reform of tariffs is not completed according to plan), and may be more likely to use scarce funds to pay generators that have greater leverage to turn out the lights. The market model used (whether single buyer or bilateral contracts) will influence the effect on RPGridco. But regardless, NEA is starting from a financially unhealthy situation. Multiple uncertainties cannot be allowed to hold back the MCC investments, so every effort to reduce uncertainty in sector reform will be important for their long-term sustainability.

1.2 Approach and Methodology

1.2.1 Approach

The Tetra Tech sustainability team worked with technical, environment and social, financial/economic, monitoring and evaluation, and project implementation teams to identify, compile and characterize their risks and uncertainties, and develop proposed solutions or mitigation measures, hereafter mostly referred to as "solutions". The main project risks and their solutions have been extracted from the other DFS volumes. The longer-term sustainability risks were assessed by the sustainability team after consultation with development partners and other stakeholders, and a literature review on the reform process leading up to and responding to the Action Plan. This extensive review allowed the team to form a better understanding of progress made to date and to take account of plans that will affect progress on the Action Plan in the next two years (again focusing mainly on those Action Plan items that are most important to the MCC transmission investment project).

1.2.2 Methodology

In cooperation with the financial/economic team, the sustainability team categorized risks and related uncertainties as to whether they fell into one or two categories of risk and uncertainty streams:

Project-related risks and uncertainties, i.e., project design, implementation, completion and timing risks. Specific uncertainties and risks at the detailed feasibility study level may remain unresolved, but most have suggested solutions that, if implemented, would greatly reduce the risk and resolve uncertainties. This could be a result of either uncertainties (e.g., pending GoN action items related to adequate and fair compensation for rights of way and required resettlement) or unresolved design issues relating to route line conditions, environmental and/or social issues, or implementation. These risks and uncertainties become prominent within the tight timeframe of MCC's investment schedule.

Sustainability risks and uncertainties, i.e., those that could affect sustainable and profitable operation of the project. National reforms underway and commitments made in ESCAP to improve Nepal's institutional structures are essential to solving Nepal's electricity crisis. Especially important are the distribution of responsibilities and authorities (e.g., completion of proposed sector restructuring) and ancillary rules and regulations, the establishment of wholesale and retail tariffs, and cross-border electricity agreements. The uncertainty is whether they will proceed in a timely fashion, and the risk is that they could be delayed or interfered with for political or other reasons, prolong the crisis and undermine the return on MCC's investments under the compact.

Political uncertainties and impacts continue to be an important uncontrollable risk especially as Nepal moves toward implementation of a federal state and local elections which could lead to future strikes, blockades, and other closures which often affect construction projects through lack of access or work stoppages. The events may be uncontrollable, but as far as possible mitigation has been inserted in specific tasks to anticipate delays due to political unrest. Projects located in areas greatly affected by the constitutional changes (changing some boundaries) would be most at risk.

As there are numerous risks associated with an investment of this size, for the feasibility stage, risks were also categorized as to their urgency and controllability with the following groupings:

Strategic. These are risks that absolutely must be controlled because it is possible to do so and the control of these risks is vital to the success of the project or enterprise. For the Final DFS, strategic risks are mostly cost risks (i.e., those that might increase project costs and thus jeopardize the financial and economic returns required by MCC) or time risks (those that might lead to a failure to complete the project within MCC's five-year time allotment). For virtually all of these risks, specific solutions have been posited to mitigate, avoid, circumvent or restructure the risks.

Contingent. These are risks that are destructive or would severely reduce the likelihood of project success; they are also difficult to control. Coping successfully with important but uncontrollable risks requires that the team posit solutions to avoid, mitigate, circumvent or restructure them but often within the context of the actions of other donors and stakeholders who need to be brought along to make the mitigation activity work. The most important example would be the formation of market structures and functions to modernize and streamline the transmission framework within which Nepal's electricity sector operates.

Non-Critical Path, e.g., non-strategic risks and uncertainties that are not important or difficult to control, but are generally are not worth much time or effort to resolve, and strategy refinement

where addressing these risks is not necessary to project success, although it could add value to the project. These risks can be attended to when time and resources permit.

To make the work of the sustainability team's assessment manageable and transferrable and reduce unnecessary burden on MCC/OMCN in reviewing the risks and uncertainties, the focus of this report is primarily on strategic and contingent risks. This means, for example, that uncontrollable but low likelihood political risks are not addressed even though they would be big "show-stoppers" if they did occur.[5] The team relied on the assumption that MCC's own process of assessing whether a compact can be developed with a specific country for certain sectors at a certain time would have filtered out (i.e., eliminated) any proposed projects that would fail due to uncontrollable political risks. However, where a political risk is still associated with some component of the project, e.g., political meddling in what should be market activities, these are identified and solutions suggested.

For ease in identifying the potential impact of the risks, they are further categorized according to MCC's own QPR risk typology. Table 1 below shows the risks types with a short explanation. The risk registers developed for the Feasibility Study (Annex A) have been further ranked by the probability of the risk occurring (low, medium or high), the relative impact (low, medium or high) and the combined risk rating (low, medium or high). The QPR methodology provides examples of how to rate the risk's probability and rank likely impacts. Other features of the QPR methodology were not adopted since they are designed for actual use during project implementation for risk tracking purposes.

Risk tracking and management tools have been considered for their application in subsequent phases of the project. However, given that the MCC QPR Risk Register approach is well designed and already being utilized in MCC infrastructure projects, the expectation is that the risk registers developed for the Feasibility Study can be transferred to the next phases of the project with confidence that they will be picked up during design and subsequent stages using the QPR methodology. This, plus the Task 1 Project Implementation Schedule with its Critical Path that ultimately should include tracking of progress on meeting specified compact conditions precedent should greatly enhance the likelihood that the implementation and M&E activities of OMCN/MCA will be successful in reducing project and sustainability risks to acceptable levels.

[5] Examples of such political risk might be large scale government interference, such as nationalization or expropriation of private assets. The likelihood of this is lower now in Nepal, given the move to greater democracy and transparency. As Nepal continues to move toward implementation of a federal state and local elections which could lead to future strikes, blockades, and other closures, construction projects might be affected by lack of access to a site or work stoppages. The events may be uncontrollable, but as far as possible mitigation has been inserted in specific tasks to anticipate delays due to political unrest. Projects located in areas greatly affected by the constitutional changes (changing some boundaries) would be most at risk. Planning for such projects is recommended to include some amount of slippage time.

Table 1: MCC Risk Typology (from QPR Risk Assessment Tool)

Time/Completion Risk: Risk that an activity is not completed due to cost or time overruns, insufficient government support, or legal disputes. **Cost/Financial Risk:** Risk that activity costs run over budgeted amount, requiring adjustments to that or other activities to accommodate the cost increases. **Quality Risk:** Risk that projects are implemented in a way that is not up to MCC construction or programmatic standards. **Results Risk** (including sustainability): Risk that the activity does not achieve the intended outcomes or impacts, or that results are unsustainable. **Political and Policy Risk** (including reputational): Risk that political environment necessary for successful compact deteriorates or that country cannot complete necessary policy reforms. **Fiduciary Risk** (including fraud and corruption): Risk that MCC funds go unaccounted for, are not used for the intended purposes and/or do not result in performance as specified in contracts. **Capacity/Management Risk:** Risk that MCA does not have the capacity in technical expertise or management skills to deliver high quality projects on time and at the projected budget. **Opportunity Cost Risks:** Risk that MCC compacts do not achieve full potential in terms of quality and results due to missed opportunities.

2. Risk and Uncertainty Assessment and Proposed Solutions

2.1 Sustainability Risks

This section describes the background of recent Nepali electricity sector reform efforts and provides an update on the status where there has been progress. This "history" of reform provides the context within which sustainability risks must be evaluated. Without these promised reforms and indications that the new government is actively carrying them out, it is doubtful that MCC would have recommended a compact with Nepal.

2.1.1 Sector Reform Studies Preceding the GoN's 2016 Electricity Sector Action Plan

Renewed efforts by the GoN and development partners to institute electricity sector reform over the last couple of years are finally taking off. The efforts are intended to undo the sluggish and inefficient performance of the vertically-integrated and politically-manipulated GoN electricity sector institutions and replace them with a more efficient and effective sectoral arrangement. This concerted effort comprised consulting assignments and resulting studies, coordination efforts on the part of development partners, and workshops to provide convincing arguments and ways forward to the GoN in the run-up to its recent adoption of the Action Plan.

The following consulting studies (more or less in chronological order) are just some of the most notable that documented Nepali electricity sector failures and proposed solutions in the run-up to adopting reforms:

As early as 2013, the Niti Foundation, a well-respected Nepali NGO, conducted an analysis of the political economy of power tariffs in Nepal.
The EdF Transmission Master Plan (2014) included an extensive study of technical and other deficiencies of the Nepali transmission system. It made extensive sector reform recommendations (on pricing/tariffs, open access market structure, and cross-border transmission, and proposed a roadmap for implementing reforms). This plan provides a large international government utility's perspective.
The Asian Development Bank study, Power Sector Issues and Envisioned Policy Conditions (Sept. 2015), provided a three-year timeline with three tranches of policy conditions. This comprehensive study provided the basis for the "donor vision" reports produced shortly thereafter. The unpublished "Donor Vision 2015" was followed by the World Bank's Nepal Energy Sector -- The Need of Changes 1st draft for Brainstorming among Development Partners and Preparation of Development Policy Financing (DPC), Sept. 2015, which laid out actions that development partners together felt would be required to fix the electricity sector's many deficiencies.
Niti Foundation's "Engaging in Reforming Policies in Nepal – January 2016" referring to the hydroelectric sector provided further advice on sector failures and made recommendations for increasing stakeholder acceptance of projects (a proven major risk for both transmission and hydro projects in Nepal).

These different perspectives and development partner pressure were pivotal in shaping the GoN Action Plan, which GoN adopted at the beginning of 2016.

2.1.2 The GoN's 2016 Action Plan for Reform of the Nepal Electricity Sector

The "Concept Paper on National Energy Crisis Prevention and Electricity Development Decade" was published by the GoN in January/February 2016. It was in full agreement with the thrust that development partners had been making in the run-up to 2016. The ninety-nine actions proposed in the Action Plan were organized by type of action needed (e.g., policy change, new legislation, and unbundling of NEA). This section reorganizes them into sectoral groups (e.g., transmission, generation, and distribution) which represent the future of the electricity sector) and focuses on those most critical to the proposed MCC/GoN transmission investments. Where actions have been advanced since the Plan's adoption, the advances will be noted in a later section.[6]

Coordination and Oversight of the Action Plan. This set of actions will improve sector coordination and oversight. They involve supervision of the crisis management plan by a "Central Energy Crisis Prevention Coordination Committee" and District Level Energy Crisis Prevention Coordination Committees (DLECPCC) for effective implementation of the Action Plan. These committees will help facilitate actions needed by MCC/GoN projects through inter-agency coordination for the development of electricity projects at the Joint Secretary level. The DLECPCCs are expected to promote understanding and acceptance of electricity sector infrastructure projects in the districts (a key issue for infrastructure like transmission that takes land and must resettle populations). A Facilitation Committee chaired by the Chief Secretary and consisting of secretaries of the related ministries has also been included. Reforms are also proposed for the Ministry of Energy (MOE) and Department of Energy Development to obtain more efficient oversight and planning of the sector.

Establishment of Transmission Grid Company and Prioritization of Transmission Projects: The most important actions include RPGCo's[7] formation and operationalization**.** The company will own the public transmission assets and will carry out all functions pertaining to extension, operation and control of the national transmission grid**.** There will be reallocation of related human resources, structures and property of Nepal Electricity Authority into the RPGCo. The Action Plan gives priority to some needed transmission infrastructure upgrades.[8] Several of them are projects included in the DFS. These are:

- Completion the construction of high priority transmission extensions, which will facilitate the import of electricity through Dhalkebar-Muzaffar (D-M) transnational transmission line to reduce load-shedding
- In the third phase of the D-M import facilitation transmission and substation projects, the Hetauda-Naubise 400 kV electricity transmission line (including substation)

[6] Action groups that do not pertain directly to the MCC/GoN compact's transmission projects are not included here because they are not likely to change risks and uncertainties faced by the MCC investment. For example, other action items concern the designation of national priority projects, national energy security policy, and rural electrification.

[7] Rastriya Prasaran Grid Company. See Annex B for a full list of its proposed functions.

[8] The Action Plan is a bit vague on what "priority" will mean in real terms, but appears to guarantee that such projects are basically pre-approved at the highest level.

- Substations at the 400 kV level at Hetauda and Inaruwa.

In addition the Action Plan calls for the development and implementation of a procedure in such a way as to allow the transmission line and substation to be constructed under the Build-Transfer Model by forming a consortium of related promoters to carry out power evacuation by initiating the construction of transmission line in a speedy manner. This action will help to increase the power that can reach the grid and ultimately to Nepalis and India alike**.**

Establishment of a Generation Company (Genco) and Enabling Conditions. Significant actions include 1) the establishment of a Genco that will own the NEA generation facilities and 2) improving and providing enabling conditions for hydropower and other renewable energy projects (e.g., in licensing, taxation and allowing Build-Transfer model to be used by developers, and the River Basin Master Plan) including providing "open access" for generators to the national transmission system. This entails immediately carrying out the study and construction of medium- and large-scale hydroelectric projects in such a way as to supply the mid-term and long-term electricity demand of the country by the government. This is a key ingredient for the transmission project's success (without generation to evacuate, some of the MCC/GoN transmission project components would be underutilized.)

Establishment of Power Trading Company. The Action Plan calls for GoN to form a National Power Trading Company to carry out the activities relating to electricity trade in the country and abroad. This will be another function carved out from NEA which currently has a limited power trading function.

Establishment of Independent Energy Regulator (NERC). Among a range of sector improvements expected from the establishment of the NERC would be bringing tariffs in line with cost-recovery for the transmission and distribution functions and the development of wheeling tariffs.

Distribution Improvements. Action items related to distribution include revisions to the law on electricity theft, distribution system technical improvements, tariff modifications such as peak load or time-of-day pricing, smart metering, development of an electricity distribution master plan and loss reduction plan, and upgrade of distribution substations. Various demand-side (efficiency and demand reduction) actions are called for, including diesel generation encouragement. Load forecasting will be based on actual (not load-limited) demand. NEA will provide distribution service to industrial areas, prioritize upgrades in areas of high demand and carry out integrated road and transmission line construction in urban areas including Kathmandu along with "obstruction removal." By removing generation, power trading and transmission from the vertically integrated NEA, the result is that NEA would become the national distribution company, sometimes referred to as NEA-D short for NEA Distribution.

Policies Relating to Environment and Social Impacts of Construction Projects. The most important of these relating to generation and transmission projects include land acquisition issues, environmental impact assessments, and social benefits.

- **Land compensation, enforcement of land decisions.** The solution proposed to avoid the delays in acquisition of rights of way (ROWs) is to provide additional annual compensation

(rental) for the lands falling in ROWs in addition to the current policy of 10% value compensation.[9]

- **Environmental Impact of Electricity-Related Construction Projects.** The Action Plan proposes to simplify the provisions relating to Environmental Impact Assessments (EIA) and Initial Environmental Examinations (IEEs) necessary while making application to NEA for power sale/purchase agreements by eliminating the approval of related terms of reference (TORs) by the Village Development Committees (VDCs). There is also a range of proposals to simplify and speed up approvals for projects that involve forest clearing.
- **Social Development**. Proposal for a funding mechanism for social development (benefits) associated with project areas with funds coming from the developer (differentiated by size of project with breakpoint being 100 MW.)[10]

2.1.3 Progress Made Since the GON Action Plan

Development partners have been quite active in deepening awareness of the options available to the GoN for implementation of the Action Plan and providing specific technical assistance to the GoN entities that are most implicated in implementing it. The main development partners involved are World Bank, ADB, MCC, USAID, US State Department, DfID, KfW, and JICA. Several studies sponsored by them have provided deeper insights on different options for implementing the committed actions, inter alia, the following that seem quite relevant to sustainability:

- Adam Smith International, as due diligence consultants to MCC on the power sector in Nepal, provided two reports on the Nepali power sector.[11] Some relevant highlights are presented below.
- The so-called Yaki Yeti Workshop (March 2016) focused on options for certain reform actions. The World Bank's presentation on Sustainable Power Sector Development provided a consolidated development partner vision and way forward with a concise and cogent layout of the steps for sector reform and suggested a comprehensive time-bound power sector reform plan agreed by all stakeholders that would focus first on tariff study and reform (retail and wheeling) and formation of key institutions, including NERC, Transco, Genco, and Disco.[12]
- Economic Consulting Associates at a September 2016 workshop on electricity market reform in Nepal provided additional rationale and options for the formation of a separate system operator and a power trading company, and recommendations on open access to transmission, market rules for power trading, and single buyer issues.

[9] This formula is one of several examined in Volume 3. The need for workable solutions is called out in the Risk Register since land compensation is such a major risk to the project.
[10] No examples of the funding mechanism were given in the Action Plan, but the Final DFS has some suggestions in Volume 2.
[11] Final reports January 2016 and February 2016. Situation Assessment and Reform Roadmap (2 separate documents).
[12] The priorities expressed here are oriented toward an orderly progression of reforms. In the light of the urgency for MCC and GoN to enter into the Compact, Tetra Tech is suggesting a more transmission-focused set of priorities.

The studies and workshops demonstrate a fairly cohesive (i.e., not conflicting) and comprehensive set of implementation actions and advice that could or should be undertaken. As the details get worked out on different aspects of reform going forward, such suggestions should be brought forward. The following are just a few notable examples for later consideration.

The EdF Transmission Master Plan (EDF, 2014) made specific recommendations on transmission including: the adoption of average cost pricing (rather than marginal cost pricing as the latter would be too complicated and eventually lead to deficits), wheeling charges that would be a "mix" of energy and demand MW (capacity) and cost-plus regulation, and that 100% of the charges should be based on demand not MWh or a combination.

The Niti Foundation (Niti, January 2016) recommended promoting citizens' investments (shares) in hydro projects to increase stakeholder acceptance of the projects, citing two projects where this had been successfully implemented (Tamakoshi and Barun Hydropower). The report also discussed the Build-Transfer model which to date had not been adopted/allowed in Nepal (p. 21).

The Adam Smith studies made notable recommendations for:

- Transitional governmental arrangements to ensure that the existing operations and assets are transferred without disrupting the safe, reliable and secure delivery of power to the ultimate consumers. These transitional steps should not be bypassed in a rush to establish the new entities without adequate arrangements for all the steps necessary to fully transition to them.
- Elimination of load shedding within 24 to 36 months as a strategy to get acceptance of the changes needed for sector reform.[13]
- A recommendation policy for NEA to replace existing take-or-pay contract components over time with ones with less onerous effects on NEA cash flow and eventually moving away from this contract type to take-or-pay power purchase agreements (PPAs).

In April 2016, the main development partners working in the energy sector named earlier reaffirmed their commitment to develop coordinated action plans for their interventions in the power sector. They started and are still keeping a combined matrix of such activities. ADB/World Bank (WB) recently released an updated time schedule for "prior actions" (or what MCC calls "conditions precedent") necessary for GoN to receive a series of three tranches of funding in support of sector reform embedded in the Development Credit Policy (combined project efforts of ADB and WB). Table 2 extracts the most relevant prior actions for the MCC/GoN transmission projects' sustainability. The table is laid out with the "time-bound" conditions that need to be met and time periods (three separate tranches) in which to meet them in order to receive the promised funding. *Note that tariff reform, operationalization of NERC, RPGCo, and the NPTC, and reform of NEA's remaining functions of generation and distribution are all high on the WB/ADB list of actions, which makes them ideal partners with MCC/MCA to support the progress of needed reforms*. Given that the experience with newly formed regulators in some developing countries is that they remain unable to overcome political resistance to tariff hikes, WB/ADB vigilance and prior action leverage is comforting.

[13] Indeed, with just a change in upper management at NEA and strong and continued pressure from the Ministry of Energy (MoE), this has been accomplished just within the short contract period of the DFS.

Table 2: Time Bound Conditions of WB/ADB

Development Policy Credit's Sector Reform Schedule

Transmission Relevant Prior Actions Needed in Phase	Phase 1 (By March 2017)	Phase 2 (By December 2018)												Phase 3 (By June 2020)																	
	2017												2018												2019												2020					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Tariff Reform																																									
Approval of new tariff by ETFC																																									
Adjustment in line with the New Tariff regime by NEA in July with goal FY21 5% above cost of service							*																								*										*
NERC Act																																									
Endorsement of NERC Act and submission to Parliament by Cabinet																																									
Enaction of a New NERC Act by Parliament																																									
Operationalization of NERC																																									
GoN to Set-Up NERC																																									
Appointment of Commissioners of NERC,Issue of Rules of Power Sector Regulation by NERC																																									
Operationalization of RPGCo																																									
Appointment of CEO																																									
Issue Rules of RPGCo																																									
Ownership and Operation of New Assets by RPGCo																																									
Transfer of Existing NEA Transmission Assets RPGCo																																									
Operationalization of PTC																																									
Establishment and Registration of a New PTC by GON																																									
Appointment of MD and Board of Directors of PTC																																									
Issue of Rules and Regulation of PTC																																									
Restructuring of NEA (GenCo & Disco)																																									
Establishment/Registration of GenCo & Appointment of MD/Board of Directors by GON																																									
Establishment/Registration of DisCo & Appointment of MD/Board of Directors by GON																																									
New TL RoW Policy																																									
Cabinet endorsement																																									
Prepare Guidelines for Sustainable HPP Development: ESIA approval, Resettlement and Benefit sharing																																									

As noted, in this sustainability risk mitigation analysis, we have selected those reforms that are most crucial for the success of the transmission projects that MCC and OMCN are studying for feasibility before being included in the MCC/GoN Compact. The table shows that there is significant risk mitigation pressure already embedded in the components and timeline of the WB/ADB's DPC.

MCC's due diligence consultants opined on possible conditions precedent (CPs) to the compact in the run up to the DFS. They include the following:

- Complete functional unbundling at NEA[14] *
- Transfer the NEA Load Dispatch Center to the RPGCo
- RPGCo becoming the Independent System Operator
- All new (non-private) transmission assets and investments would be housed in the RPGCo*
- Legacy assets would be transferred on an agreed time schedule from GoN to the RPGCo*
- Establishing a Power Trading Corporation in Nepal (NPTC)*
- Establishing a new electricity regulator in Nepal*
- Adopting and enforcing an open access transmission regime.

MCC conditions precedent (CPs) marked with * above are the same as the time-bound conditions already set by ADB/WB. If ADB/WB time schedule holds, the marked CPs could be completed prior to the MCC compact entry in force. Including all of these CPs in the compact might seem repetitive and redundant, but at the same time it would show solidarity with other donors and hence put more

[14]"Functional" unbundling within the NEA structure involves an initial separation process in which employees would first be identified and sorted out into the three major functions of NEA: generation, transmission and distribution as a prerequisite to the physical separation of the functions once these entities are established.

pressure on the GoN to implement the agreed actions if they have lagged (as the compact signing for the transmission projects would not go forward without agreement to these precedents). Additional CPs will be forthcoming as more in-depth engagement by MCC with GoN ensues in the run-up to Compact signing. For this reason, we suggest CPs that relate to risk reduction for high importance Project and Sustainability risks identified in this Volume's risk registers (Annex A). Meanwhile, MCC continues to work with OMCN on and plans to produce a final set of conditions precedent. In the Risk Register (Annex A) the suggested additional CPs that are considered risk mitigation measures are highlighted in yellow for MCC's consideration.

Table 3 brings the progress made on the Action Plan up to date with the status of key reforms as of the completion of the DFS.

Table 3: Status of Key Actions Important to Proposed MCC/GoN Transmission Projects

Action Plan Grouping	Status
Coordination	The Central Committee has been endorsed by Cabinet and is operational. Invitation letters to the District Level Committees went out in November 2016.
Transmission Company (Transco or RPGCo)	RPGCo has been created and registered with a broad mandate covering the functions stated above. A CEO has been recruited and hired. See Annex B for RPGCo functions and organizational set-up. US Government (MCC) is providing analysis of NEA's operations and assets that will be needed for creating and standing up the organization.[15] Initial studies will be conducted to specify the steps and capacity building needed to be provided to proposed RPGCo.[16]
Transmission Infrastructure Upgrades	MCC/OMCN and GoN are actively moving forward on preparation for signing of the Compact that includes these projects.
Power Trading Company	Company has been registered. A description in Nepali of functions of the company exists.
NERC	A draft Act to Establish the Nepal Electricity Regulatory Commission has been prepared by NHDP and submitted to MoE (August 2016) and MoE has forwarded it for comment to MoL and MoF. Through the same preparatory study referenced under RPGCo above, US Government (MCC) is providing technical support that will be a useful basis for creating and standing up the organization. Initial studies will be conducted to specify the steps and capacity building needed to be provided to proposed NERC. World Bank has tariff study underway.
Generation Company	Company has been registered as Vidhyut Utpadan Company Limited (VUCL) in Nepali. Board members and CEO have been appointed. CEO is Mr. Mohan Raj Panth who was directly appointed by MOE board of directors. The company has a website www.vucl.org. Capitalization amounts and share proportions have been decided. Genco status and functions are elaborated in Annex C.

[15] MCC's "Nepal Preparatory Studies for Power Sector Reform Projects" began in December 2016, overlapping with the DFS workshop.
[16] Based on progress on creating the RPGCo, we assume that this capacity will be lodged at RPGCo and not at NEA.

Action Plan Grouping	Status
Distribution Company	The Distribution Company will be the last to be set up. However, distribution sufficiency and readiness are important for getting the power wheeled from hydropower generation sites through the transmission line to customers. The MCC project includes several SS serving industrial areas and overloaded SS in the KTM basin. Section 2.3.3 on distribution readiness and sufficiency.
RAPs: Land compensation, enforcement of land decisions.	Consensus achieved among GoN and development partners that ROW compensation policy must be changed given past experience. A methodology and guidelines for compensation determination to justify the appropriate amount of rent in specific cases is being developed under WB/ADB DCP conditionality and is expected to be completed by March 2017. The implications this added compensation would have on the costs of electricity vs. the reduction in time for completing acquisition are being modeled in the MCC-sponsored DFS (See Volumes 2 and 3).

2.2 Sustainability Risks and Mitigation Measures

2.2.1 Readiness Risks: Short-term Risks and Uncertainties, and Priorities for Urgent Action

For the purposes of identifying those risks most relevant to the long-term technical, financial/economic viability (sustainability) of the MCC/GoN investment, sustainability risks and proposed mitigation measures are arranged and discussed in order of their priority relating to the short- and medium-term investment climate and relative importance to the projects. We believe that the short-term priorities merit immediate attention. If not addressed, as a worst case scenario, there could be endless delays to "building a bridge to nowhere" and once built having disappointing "traffic input" and reduced capacity to discharge that traffic to its intended destination with insufficient revenues to keep operating and maintaining that bridge.

Short-term urgent sustainability priorities include:[17]

- **Financial impacts of Indian/Nepali arrangements on power trading benefits:** Ensuring that there is a viable Indian/Nepali financial arrangement on power trading that will meet the compact investment's financial and economic hurdle requirements).[18]
- **Blockage and slowdown of reforms due to labor dissatisfaction:** Reducing the risk that labor dissatisfaction does not hold up sector reform or slow down/stop coordination on next stages of project development.
- **Tariff reform fails to provide wheeling charges**

[17] Note that the risk mitigation related to ensuring the capacity, capability and availability personnel to operate and maintain the projects once completed is now covered under Technical Risks in the Project and Sustainability Risk Register.

[18] Longer-term need for a separate Nepali Power Trading Company is a separate issue. This issue is urgent enough and tricky enough due to its cross-border nature and intricacies that is needs to be separated and pushed to short-term urgency status.

- **Distribution system readiness to evacuate power from new transmission projects and distribute it to customers:** Distribution system readiness to evacuate power and deliver it to its intended destination when new transmission projects become operational.
- **Sufficiency of power injection to MCC transmission projects:** Injection sufficiency (hydropower capacity available to meet expected supply)
- **Readiness of necessary transmission projects sponsored by others and important to MCC project's system integration**
- **Failure to implement reforms in time to maximize the benefits of MCC projects.**

These seven risks and uncertainties rose to the top during review of sector reform activities and discussion of priorities with MCC/OMCN and development partners. We see these as "readiness" risks (although MCC's risk characterization that best suits them is "results risks"). In other words, without adequate supply and capacity to evacuate power from the transmission projects and inject the power to the distribution system and receive a cost recover, they could become stranded assets (meaning that they might operate, but with reduced inputs and outputs, they will not live up to their full potential).

These are elaborated in the following subsections and summarized in the Sustainability Risk Register which is part of the overall Risk Register in Annex A.

2.2.2 Indian/Nepali Arrangements on Power Trading.[19,20]

Ensuring that there are viable Indian/Nepali financial and institutional arrangements on power trading is paramount. The viability of the compact's transmission investment is largely dependent on the revenues from sales of surplus power to India and the reduction of load shedding afforded by the two-way cross-border trading component of the project. There are significant issues to be resolved regarding: getting the best prices for Nepal for both export and import of power and institutional trading agreements and arrangements including open access for IPPs. Fortunately, the India-Nepal power exchange is important for both countries (for different reasons), and that is why both are actively participating in getting the connection upgraded and built.

For Nepal to achieve faster economic growth, it needs a stable and least-cost supply of electricity in dry times and could make use of its high potential (40 GW) of hydro power in wet times to generate income from India. The seasonality of supply availability will require large exports to India in order for IPPs to be bankable (and/or imports to eliminate load-shedding), especially in the medium and long run.

At the beginning 2017 demand within the Indian power was "soft" due to lower economic growth in India. Under such conditions, Nepal could be buying power at a higher cost than it could sell excess power to India in the times of surplus generation in Nepal, undermining its financial returns without significant tariff increases. The India power demand outlook for 2023 and beyond, on the other

[19] See Risk Register Technical Risk 1; Financial and Economic Risks 1, 2, 5, and 6; and Sustainability Risks 3 and 10.

[20] Longer-term need for a separate Nepali Power Trading Company is a separate issue. This issue is urgent enough and tricky enough due to its cross-border nature and intricacies that is needs to be separated and pushed to short-term urgency status.

hand, might be quite different. Bilateral institutional agreements and pricing formulas must take such factors into account.

Another angle worth pursuing emerged when Tetra Tech and MCC met in December 2016 with Indian authorities (i.e., the Ministry of Energy, PGCIL and POSOCO). They corroborated their interest in a high-renewable-energy injection (possibly 20 to 30 GW over time) of Nepali hydropower to balance India's grid as a technical requirement for running their power system smoothly.
India is hoping to inject 175 GW of renewable energy-sourced generation into its existing grid of about 315 GW by 2022. Due to operational uncertainties associated with such generation, India's grid requires a high level of reserves. Having a generation mix suitably balanced with natural gas and internal hydropower and other renewable energy generation would be optimal. However, gas generation is high cost, and India's hydro potential is low in part due to opposition by a strong environmental lobby. India is counting on importation of available Nepali (and Bhutan et al.) hydro potential for the needed balancing. If the prices negotiated for Nepali hydropower injection were to be more favorable than current market prices, this could be a good outcome.

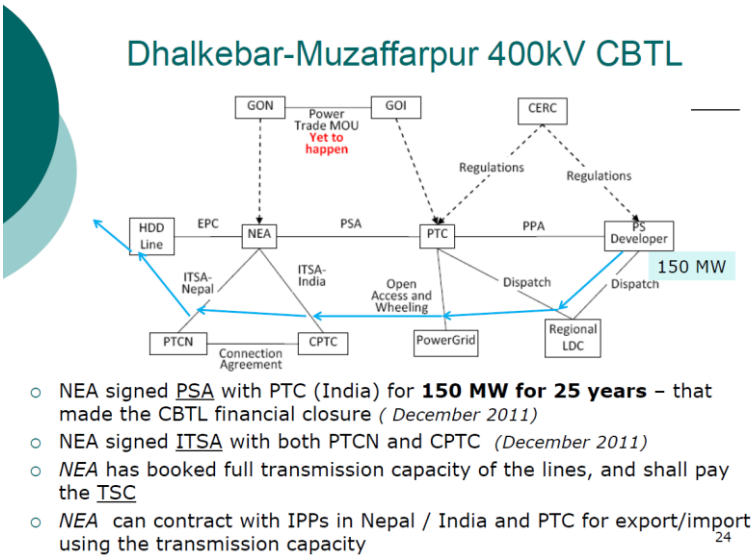
Pricing under these circumstances becomes more complicated. Import prices for power purchases in times of shortage in Nepal are already established under agreements between NEA and India for purchases up to 150 MW. The following questions need to be addressed to reduce uncertainty in the evaluation of cross-border trading.

- Will these agreements be superseded by new ones?
- Is this something that would be beneficial for Nepal?
- Will import and export prices be linked (as a form of banking) based on benefits to both sides?

Prices would likely be negotiated between India and Nepal at the government level, especially if considerations such as environmental benefits are taken into account. Negotiations might not yield the best results for both sides unless the GoN is well prepared. Such negotiations will most likely take place in advance of the completion the cross-border transmission line. It would behoove GoN, MCC/OMCN, and other donors to have the power trading function (PTCo) well established and capacitated to contribute substantively to the negotiations. It will be important to include consideration of the institutional arrangements for power trading that are agreed with India. Institutional arrangements and agreements are being sought and institutional arrangement are being made in the near term that may affect the long-term conditions and terms that might be set for power exchange between the two countries. There are immediate concerns about the economic viability related to the structure, nature, and cost differentials of cross-border tariffs and import quantity restrictions.

Hydropower production in Nepal destined for export by the time that the cross-border transmission line is upgraded to be able to handle the quantities expected will be a mixture of NEA- and IPP-owned. IPPs comprise those with private sector Indian owners and others owned by private investors from other countries, etc. Those IPPs nearing completion in Nepal that are dedicated to supplying India (except for an agreed set-aside for Nepal) are depending on adequate trading arrangements as well as favorable prices.

Note that there is already significant joint venture ownership of extant D-M transmission lines (PTCN on Nepali side and CPTC on the India side) and more institutional arrangements on the way.[21] NEA is handling cross-border power exchange and is a signatory to many of the necessary transactions and agreements required for the upgraded D-M transmission line and substations to be built and function. The transfer of these authorities from NEA to the Transco should be included in the unbundling process.



Power trading occurs within the rules set for power markets (long and short- term, spot, etc.), government regulations, power exchange agreements, etc. The Indian market is on the more sophisticated end, rivaling "first world" markets.

Inequality of negotiation skill levels and clout between India and Nepal is a significant issue. NEA has a limited power trading function but lacks experience in two-way cross-border trading. As electricity markets become more sophisticated when regional trading becomes possible, the complexity of such trading will only increase.

In mid-December India clarified and issued its new guidelines on cross-border trade of energy. They prioritize generation projects with majority equity investment of Indian public or private entities. Government-owned companies of neighboring countries (in this case, Nepal) also get a "simplified process." A one-time approval from India will be needed from the Indian designated authority (the Central Electricity Authority). Detailed processes and procedures will be issued in regulation by the Indian Central Electricity Regulatory Commission. Other IPPs are not barred from cross-border trade but will be dealt with on a case-by-case basis, raising concerns especially for those attempting to reach financial closure. Open access to transmission may be undermined if these processes are too burdensome.

The establishment of the Nepal PTC is indicated in the Action Plan, and a timetable has been established by ADB/World Bank for it to receive support from their joint Development Policy Credit.

[21] See Status of Cross-border Interconnection with India and Expected Benefits, slide 24, Hitendra Shakya, Colombo, Sri Lanka, ~2013.

According to the DPC's plan, the NPTC should be up and running by the end of 2018, leaving a gap when power trading agreements will be under development.

MCC/OMCN and other donors should consider how best to shore up expertise in power exchange and trading. The interim effort might be led by IBN with the addition of power trading expertise since they are already working together closely on getting hydropower projects ready for financial closure and understand what is needed from the private IPP side. The advice of highly experienced power trading specialist(s) could help to sort out the issues and start the negotiation process because such agreements are complicated and take time. This decision to strengthen present power exchange and trading capabilities within the GoN could be considered as a hedge to deal with anticipated changes in the market nearer to the time when the investment will be coming on line and before PTC is fully capacitated. Some issues to consider in association with the narrative above and the findings of the DFS' financial and economic findings could be:

- Is the present agreement for power exchange adequate for future purposes (two way exchange, etc.)?
- What are the financial risks related to exporting IPP hydropower projects? Will India's new guidelines leave IPPs to fend for themselves, weaken their cases for financial viability, etc.?
- Are multi-year trading agreements with India more beneficial than one year agreements? Will India agree to them?
- Will there be penalties if promised power from Nepal is delayed or less than contracted?
- Will agreements allow for wheeling charges to be imposed in each direction to support the Transco's operations?
- What will the policy be for exporting to a third country (i.e., Transmission pricing, points of connection, or nodal pricing)?
- Would substituting Nepali power in coordinated way with coal plant shut downs for maintenance on the Indian side be more beneficial to Nepal (and how would they be coordinated)? At a contracted fixed negotiated price?
- Can exposure to fuel price fluctuations be avoided by fixed price contracts and/or weighted variable cost pricing formulas in the longer term?

In parallel, GoN and its partners backing the cross-border interconnection projects should regularly monitor the political risk of heightened trade protectionism from India or the increased sensitivity regarding energy dependence in Nepal while communication and engagement of stakeholders on both sides of the border should be a continuous activity until project completion and well into operation.

2.2.3 Blockage and Slowdown Due to Labor Dissatisfaction[22]

Reducing the risk that labor dissatisfaction could hold up sector reform or slow down/stop coordination on next stages of project development is paramount. Labor unions are generally opposed to unbundling of a vertically integrated company. They feel that trade union strength will be diminished by distribution to separate entities and the resulting likely reduction in the number of employees. Unions have become comfortable with their present arrangements and are organized in such a way that they do not represent trades or levels (management vs. line staff, for example).

[22] Also Covered in Annex A Risk Register: Sustainability Risk 4

There are a half dozen unions in Nepal and all except for one in NEA are linked to political parties. Thus, they also carry the clout of their party along with their numbers and negotiation skills within the company. They fear the loss of the status quo which might mean that they will have to work harder, compete for and/or accept different positions post reform. They also fear that they might be treated more like an employee of a private company (e.g., performance oriented). They have demonstrated their power to stop reforms or changes that they oppose and are backed by their affiliated political party in return for their support during elections and protests. They feel that they can rely on the GoN to support them since GoN (not NEA) as the actual owner of NEA is their true employer. Their pressure on MOE and GoN almost always results in the union getting their way.

MCC/OMCN is participating in the efforts of the development partners to study the political economy of Nepal's electricity sector. Their intention is to develop an informed approach to dealing with the labor issues that are certain to arise is the very near term (i.e., there are already signs that labor has major concerns). MCC/OMCN will be able to build on the results of the study to develop a labor and management engagement plan for building acceptance to the changes and incorporating incentives into repositioned employees' jobs plus separation packages for those let go. Training packages for new skills would be a natural component of this plan.

2.3.4 Tariff Reform Could Fail to Provide Adequate Wheeling Charges for Transco[23]

Another reform that could significantly affect the sustainable operation of the completed project is the creation of the National Electricity Regulatory Commission (NERC). The GoN has proposed the creation of this independent regulatory authority. Legislation currently under preparation by the GoN will create NERC. The new regulator would then assume responsibilities from ETFC for economic regulation while taking on additional regulatory authorities to improve transparency and accountability in the power sector. Proposed responsibilities of the NERC include establishing an independent and transparent regulatory regime that would be able to improve the sector's financial sustainability. Specifically cited as its functions would be, inter alia, regulating transmission, developing and implementing wholesale and retail tariff adjustment processes, promoting service improvements, and facilitating open access to Nepal's power system.[24]

Currently, the GoN through MoE are the *de facto* regulators overseeing the sector while the ETFC is a quasi-independent body in charge of fixing tariffs. This puts the GoN in a position of conflict of interest and ETFC subject to political pressures. The establishment of NERC as the independent regulator and building its capacity will allow it to oversee the newly established independent entities, particularly RPGCo, NEA-Disco and the GenCo and to promulgate cost-recovery tariffs for each of them. Each of them needs a dependable revenue stream based on its costs, e.g., for RPGCo to operate the transmission system. NERC is expected to develop those tariffs for the unbundled entities. This entails a process of asset separation, valuation, and migration from the vertically integrated NEA to RPGCo.

[23] These risks and possible solutions are covered in the Risk Register under Finance and Economic Risks 3 and Sustainability Risks 9 and 10.

[24] Generation planning and contracting will move to the new GenCo while survey licensing would be overseen by NERC (possibly with co-authority with the River Basin authority). It is not clear from documentation obtained whether GenCo will develop and maintain a master generation database or whether this will be under MoE. This needs to be further clarified.

The ADB/WB Prior Actions requirements indicate that developing and implementing a new tariff structure will take place within 2017. However, the status of the wheeling charges for transmission services is not clearly called out. Such a structure might break out separate ancillary services provided by the transmission company (to suppliers, distributors and users of power transmitted) to ensure the Transco's financial viability. The ADB noted that the establishment of NERC in the project's timeframe is a reasonable expectation, but that it would probably be too ambitious to expect that NERC would be able to establish wholesale power prices and wheeling charges within the MCC timeframe.

NERC's replacement of the EFTC could be highly political, which raises red flags on the "risk-o-meter." Its establishment depends significantly on the adoption of a revised Electricity Law and/or the passing of separate legislation creating the entity. For this reason, there may be significant delays in the creation and operationalization of NERC and watering down of its powers and functions.

If it becomes obvious that such delays or dilution will occur, wheeling charges could be fixed by MoE until NERC cost-recovery tariff for wheeling (which would form part of the retail and wholesale tariffs) could be developed and approved. This could draw on the World Bank tariff study. Wheeling charges will need to be part of cost recovery presumably passed on to consumers but possibly partially shared by hydropower plants through "injection charges." There has been analysis of this option in the literature and studies leading up to sector reform.

2.2.5 Distribution System Readiness to Evacuate Power from New Transmission Projects and Distribute it to Customers[25]

The readiness and sufficiency of the distribution substations and system to evacuate power from MCC transmission projects and deliver it to customers is important for the same reason that the transmission lines and substations are designed for different capacities of injection than were formerly supplying some of the areas that will receive power from the new transmission system improvements. Without adequate capacity in the substation to receive the injection, the operation will be less efficient (and the customers that should be receiving the power will not be able to). ADB is helping NEA to prepare many of the existing distribution system substations that MCC/MCA projects will affect. Unfortunately, the NEA distribution master plan is not available at this time. So we can only guess at this point whether the upgrading of the capacity of the distribution system is adequate to serve the distribution load that will be extant when the transmission Projects are able to inject power to each substation.

The distribution system's readiness is being prepared for, but the information provided shows some uncertainty (and was difficult to assemble due to the differing stages that each project is in), as shown in the Table 4.

[25] The risks and proposed solutions associated are laid out in the Risk Register under Sustainability Risk # 9.

Table 4: Strengthening of Distribution System Required to Handle MCC Project Sub-station Additions by MCC/GoN Compact Projects

Sub-Station	MCC Sub-Station Upgrade or New	Description of MCC Activity	Total capacity in MW to be collected from IPPs/GoN up to 2023	Distribution Strengthening Required by NEA	Status
Hetauda	Upgrade	From 220 kV to 400kV	1112.4	There is alredy sound distribution system since long time due to City and Industrial area.	Ready
Dhalkebar	Upgrade	From 220 kV to 400kV	Receiving from Hetauda and Kimti	A.Load center should increase/ Voltage Level 33/11 kV, Sub-Station of 12.5 MVA. B. Conductor Replacement by SASEC/ADB Project, L=10 KM	DCS/NEA prepared proposal but not approved. NEA is seeking fund from AIIB
Inerwa	Upgrade	One 132 bay extension	153	Load center should increase/Voltage Level 33/11 kV,Sub-Station of 12.5 MVA.	,,
Balanch	Upgrade	One 132 bay extension	920	Load center should increase/Voltage Level 33/11 kV,Sub-Station of 3 MVA and Conductor Replacement by SASEC/ADB Project	,,
Attariya	Upgrade	One 132 bay extension	83	Load center should increase/Voltage Level 33/11 kV,Sub-Station of 3 MVA and Conductor Replacement by SASEC/ADB Project	,,
New Khimti	Upgrade	Two 220 bay extension	763	Load center should increase/Voltage Level 33/11 kV,Sub-Station of 3 MVA	,,
Kusma	Upgrade	Two 220 bay extension	320	Load center should increase/Voltage Level 33/11 kV,Sub-Station of 8 MVA	,,
Ilam	Upgrade	Two 132 bay extension	153	Cover Conductor PSC is to be replaced by SASEC/ADB Project	Planning Stage
New Butwal	New	400 kV	Receiving from New Damauli	Chauraha 33/11 D/C was constructed	Done
Naubise	New	400 kV	986.4	132 kV, 2*8 MVA already exists for distribution system	Ready
New Damauli	New	400 kV	1126.4	6/8 MVA Kharenitar & at Seti 8 MVA SS will be built	Planning Stage
Lapsiphedi	New	400 kV	387.16	Land purchase underway; detailed engineering next step	NEA Planning Stage
Likhu	New	132 kV	307	Fully within MCC's Project scope	Detailed Feasibility Stage
Tadekhani/Durba	New	220 kV	163	33/11kV, 3 MVA will be constructed	Planning Stage
Lamki	Upgrade	from 132kV to 400 kV	946	6/8 MVA Sub-Station under construction at Hasuliya & Rajapur	Construction Stage

Note:
1. AIIB: Asian Infrastructure Investment Bank
2. SASEC: South Asia Subregional Economic Cooperation Power System Expansion Project by ADB
3. DCS: District Consumer Services

NEA/GoN appear to have done the planning for those substation improvements needed to evacuate and distribute the power from six project substations (Kusma, New Khimti, Attariya, Balanch, Inerwa, and Dhalkebar) and have submitted funding requests to AIIB, which is said to have agreed to finance (or provide grant for?) these six projects. Other substations are in different stages. NEA says that Hetauda and Naubise already have substations and distribution systems with sufficient capacity and need no upgrades. For New Butwal at Chauraha the needed 33/11 D/C line has already been

constructed. Lapsiphedi is in the planning stages and land has been at least partially acquired. Likhu is said to be completely within MCC Project's purview (and therefore would be at the Detailed Feasibility Stage. For New Damauli and Tadekhani/Durbang needed improvements have been identified and planning is underway. No source of funding is cited. Lamki substation is under construction. These distribution assets will remain with NEA after unbundling except for Likhu, the status of which needs to be determined, but presumably it would pass to the Transco if it handles solely transmission infrastructure.

Until all distribution projects' status is known, MCC/OMCN should keep a close watch on the status of NEA planning.

- When the distribution master plan becomes available, it should be used by OMCN to verify and update the information on substation and distribution system readiness to evacuate power from new transmission projects and distribute it to customers. This will remove an uncertainty regarding the readiness of the distribution system to evacuate power in adequate quantities.
- Once the capacity and upgrades are determined to be adequate, the main tracking indicators should be finance availability, construction completion.

2.2.6 Sufficiency of Power Injection to MCC Transmission Projects [26]

2.2.6.1 HPP Readiness

Hydropower project (HPP) injection readiness and sufficiency is a concern because the transmission Project requires a certain minimum level of injection to operate efficiently. Thus we are concerned about the availability of hydropower capacity to meet expected injection when the projects are ready to receive them.

As described in Volume 4 Financial and Economic Analysis, TetraTech examined data available on HPP to understand how much of the total generation coming on line in the time period from 2017 through 2030 starting with the baseline of 2016. Projects were divided into those projects that would be operational by 2023 and those that would be operating by 2030.[27] With this information TetraTech team sought to determine whether and when MCC/GoN investments' transmission capacity might be adequately utilized and the expected financial and economic benefits would ensue as a result. The team found that there were large discrepancies between different estimates of HPP generation in Nepal in the Project period. This is largely due to a seeming anomaly stemming from NEA's database that designates a large proportion (on the order of 1/3) of hydropower potential to "unknown" developers with unknown status. The amounts estimated to be available in any given year varied significantly as analysts tried to quantify the output of important additions to the generation supply that had very little information and possibly inaccurate completion dates associated with them. This discordance came to a head during the MCC DFS when results of

[26] The risks and proposed solutions associated are laid out in the Risk Register under Sustainability Risks # 9 & 10 and Financial and Economic Risks # 3.
[27] The sources of information were the same for Volume 4 and Volume 5, basically project lists maintained by NEA and MoE. Digging into their status was done by TetraTech Nepali Consultants Dr. Surendra Uprety, Mr. Himanta Joshi and Mr. Suresh Yadav.

financial and economic analysis proved to be highly sensitive to categorizing the "unknown" generation potential.

The capacity of HPPs that are under construction as of 2016 remains doggedly low and the estimated time of completion in many cases has been frustratingly long. In some cases, projects managed by NEA have stretched over a decade and are still not finished. These are large, complicated projects, but they reflect the issue of leaving it to NEA to manage such projects (even with caveats about the delays due to earthquakes, strikes, blockades, and notoriously difficult resettlement problems). Indeed, this slow progress appears to be one major reason why IBN was set up: precisely to manage the process from investment to operation of projects over 500 MW (of which there are only a few). IBN appears to be making good progress with the projects it's managing (with the help of Deloitte provided through USAID's NHDP). Most HPP projects are well under the IBN's threshold.

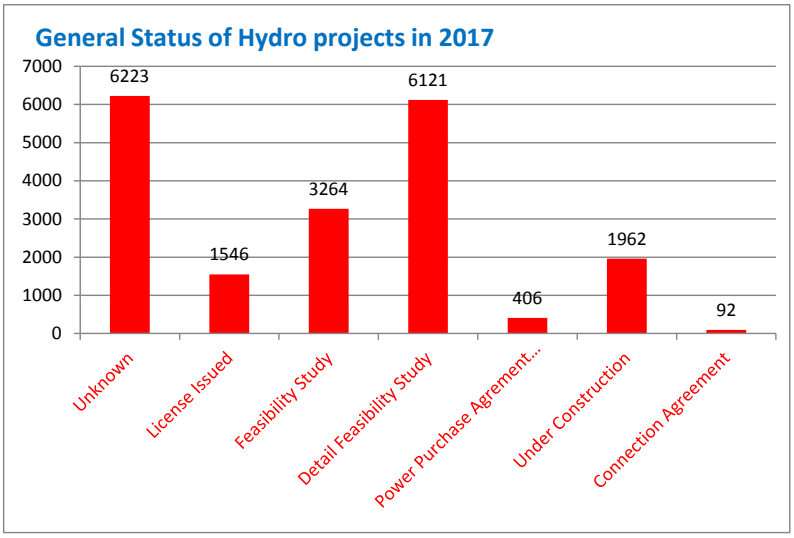


Figure 1: General Status of Planned Hydro Projects over 10 MW under Development as of 2016 (19614 MW)[28]

What is known is that the capacity of hydropower generation over 10 MW in Nepal in 2016 was only 865 MW of which roughly 1/3 is IPP developments and the remainder is government owned and operated. Pitted against the hydropower potential in Nepal which variously is pegged at 20,000 to 40,000 MW by several fairly reliable estimates to back up these numbers, Nepal has barely dipped its toe into the water. The main thesis of the Project is that more hydropower will support Nepali economic growth through better, more reliable electricity supply and sales of excess hydropower outside Nepal (largely India for the short term). The pace of hydropower development has been frustratingly slow, and many of the reform actions aim to reduce the barriers to getting projects from concept to production.

In the forecast used for financial and economic analysis in the DFS (aggregated in Chart 1), even with high production in the dry season (basically best dry season case) in year 2023, demand is

[28] These MW estimates are, as noted, subject to the interpretation of project status by TetraTech analysts and may vary somewhat from other interpretations of the same data, but the relative importance of the Unknown status is very clear.

underserved by national generation capacity by approximately 50%. Alternatively in wet season high production in 2023, demand is almost fully met (but only 50% met if low production scenario is used) and only a very small portion of production might be exportable. There is enough risk of significant undersupply that it is fairly certain that there will be a need for power import (or load shedding) in the dry period of 2023 (about when the MCC transmission line will come on line).

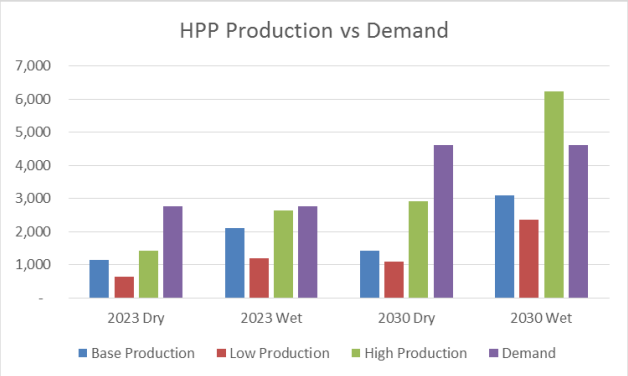


Figure 2: Forecast Scenarios used for Financial and Economic Analysis[29]

Things look a lot better in the forecast for 2030 where wet season high production exceeds demand by roughly 1/3 although dry season high production underserves demand by about 1/3. Because the transmission investment is designed to at least meet demand in the wet season but not in the dry season and because of the uncertainty of obtaining high production goals, cross-border trading to supplement supply will be an absolute necessity to bring the economic and financial benefits that merits the project investment.

So, a key issue remains how to be sure that hydropower development continues at the hoped for pace for these benefits to accrue and to reduce the risk that hydropower development continues to falter. While these hydro projects are not part of the MCC investment, the sustainability of that investment could be jeopardized by insufficient power supply depending on how the projects progress between 2016 and the two test periods. Shortfalls in generation capacity therefore may be a concern. Slow progress in developing hydropower projects and the difficulties that they experience once they are operational (on-time completion and subsequent poor O&M) is a significant concern for reducing load shedding and providing the electricity supply that the Projects are anticipating.

Basically "Unknown" in the Figure means that the projects are known by NEA or MOE as either national or international IPPs but that their status at this point is unclear. It is hard to know how many of these projects will materialize in the planned timeframe due to a number of factors. These include:

[29] This chart was developed in December 2016 but the estimates may have been modified to some degree for the January 2017 final report. For the figures used in the financial and economic analysis, see Volume 4 of the Final DFS.

- A deposit requirement (sort of earnest money) that is significant enough that many IPPs did not pay it but are still on the books as a potential project with no advances being made.
- Some found that the lack of a transmission network close to their project site made the economics to pricey to ever give return on investment.
- Access roads were too pricey to install.
- Social problems (resistance to the project) and resettlement requirements
- Financial closure difficulties due to equity requirements by financiers or as a result of the move to a change in PPAs that instituted take or pay clauses limiting the payments from NEA.

How fast they move into an active phase depends on concerted effort to remove barriers and provide incentives.

The TetraTech team conducted a number meetings on the projection of commercial operation dates with key stakeholders, including the Joint Secretaries of the Ministry of Energy (MoE), officials of the Department of Electricity Development (DoED), Nepal Electricity Authority (NEA), some representatives of Independent Power Producers Association of Nepal, and experts. The consensus of the consultations is that the most of the projects with unknown status at present are expected to be completed by 2030.

One of the reasons for a positive outlook with regard to future generation is the institutional restructuring of the state-owned Nepal Electricity Authority as noted in the previous section on the status of the sector reform efforts. The government recently set up *Vidhuyt Utpadan Company* (Electricity Generation Company Nepal) to accelerate investment in the generation of electricity, *Rastrya Prasharan Grid Company* (National Transmission Grid Company), Power Trade Company and Engineering Company. These entities have more focused missions than the predecessor organization, NEA, with regard to their respective industry segments.

The government has set a target of 20,000 MW of generating capacity by 2027, roughly the level forecast by TT in its Baseline 2030 generation projection. The formation of a generation company, which includes output from NEA and other independent power producer, appears to have improved the government's focus on the Generation segment, which may enable a more aggressive investment program. Signs of progress include higher activity tempo by DoED, NEA, and other IPPs in detailed engineering studies, feasibility studies, including desk studies of these projects as per the government commitment. The government has recently sought to accelerate investment in generation by issuing a notice to the prospective generators that they must file their application for license especially for government reserved projects.

Readiness of Necessary Transmission Projects Sponsored by Others

Sufficiency of power injected into MCC projects due to failure of the transmission projects sponsored by others is another concern. There is a lot going on in transmission planning and construction in Nepal in addition to the MCC/GoN projects. Many of these lines are connecting hydropower projects to trunk line transmission. Figure 3 shows the aggregated status of non-MCC Transmission line projects in Nepal and a detailed listing of the individual projects is contained in Annexure D to Task 5. These other network projects might not completed on a timely basis, reducing trade with

India and/or energy delivery to domestic customers upon which the benefits of the project depend. Not all, but some of them, will connect with MCC substations at transmission hubs which have been designed with sufficient capacity for their injection. The PSSE studies that were carried out in Task 1 were based on the power flow Scenario-F (2025) provided by the due diligence team. They included the projects sponsored by other donors as well. The transmission and generation projects associated with the scenario have been provided in the Appendices A and B of the due diligence report. The only modifications were the transmission projects being considered by MCC. No sensitivities were analyzed for these projects funded by other donors."

In addition, Technical Risk 9 proposes solutions to delays due to mismatch between the designs of new MCA substations and those of NEA or other donors' transmission lines which will be connecting to these substations and Technical Risk 10 proposes solutions to lack of information about the design of existing or new substations. Both assign these solutions to the proposed MCA Engineer (discussed in Volume 7, Implementation). Financial and Economic Risk 5 points out that such failure to complete other network projects on a timely basis could reduce trade with India and/or energy delivery to domestic customers upon which the benefits of the project depend. It is recommended that OMCN/MCA: coordinate rigorously with other donors to avoid this risk. An agreement with India for wheeling through Indian Tx system may be useful mitigation measure if other projects do not materialize in time.[30]

Status of New Transmission Line Projects			
Status	**#**	**KM**	**Avg**
Under Construction	20	2642	132
Planned & Proposed	27	4340	161
Total	47	6982	293

Figure 3: The Status of non-MCC Transmission Line Projects in Nepal (Source: Suresh Yadav)

2.2.7 Readiness of RPGCo (Transco) to Take Over Transmission

The RPGCos' operationalization is one of the most important Action Plan commitments that could affect the MCC investment because if RPGCo is formed, then ultimately the MCC-funded assets may

[30] The agreement would be between NEA/Transco and the Uttar Pradesh SEB that permits the NEA to wheel power through the Indian NW-SE Tx line that runs roughly parallel to the border. In the absence of a completed 400 kV line inside Nepal from NW to SE, various border crossing points could wheel power through India for use within Nepal - e.g., from, say, T8/NR4 region to the KTM region, re-crossing at XB1. It should be noted that this would require an operating agreement between the SEB and NEA that gives operational control to the SEB.

be delivered to it. ESCAP specifically calls for the operationalization of NTGC, the proposed new transmission company, which currently has only an executive director.

It is possible that the proposed independent transmission system owner and operator would be ready to operate independently with adequate compensation for its services when the MCC investments are completed and operational. To date the GoN has registered a new, independent transmission company that will assume responsibility for the ownership and operation of Nepal's transmission system. There are ongoing discussions about how the NTGC will be operationalized as it currently lacks staff, organizational structure, assets, etc. A management committee has been formed to develop a plan to operationalize this organization, but there are delays in moving this forward. An ADB energy sector specialist expressed doubt that this could be accomplished within the MCC timeline. He instead recommended working within NEA's present structure to get the TLs built and operating efficiently.

The Ministry of Energy recently announced that, in response to GoN decisions at the Prime Minister's Office, four actions would be taken to overcome an acute energy crisis in the upcoming dry season. The actions included operationalizing the RPGCo at the beginning of the next fiscal year.[31]

Subsequently adopting the statutes for RPGCo and managing the separation of the assets and staffing up from vertically integrated NEA to the RPGCo, and setting cost-reflective tariffs are all necessary actions. There may be enough support among the development partners to force GoN to get this done, and time required is, in principle, sufficient. As noted above, institutional reform is underway, with clear, agreed time schedules with intermediate steps for the way forward with responsibilities delineated. So the risk becomes one of keeping to the commitments on next steps and time schedules. This requires monitoring progress and immediately following up with mitigation measures if back-sliding occurs.

As of November 2016 RPGCo had already been formally established (registered in the Company Register and endowed with an equity contribution from GoN). The functions of RPGCo have been specified. An acting CEO had been appointed to oversee the solicitation for the CEO which should occur in the first quarter of 2017. The acting CEO (from DOE) is continuing to advance the development of RPGCo. Post-CEO selection and appointment, the operationalization of RPGCo will require asset assessment and transfer (starting with the dispatch center), transfer and recruitment of additional personnel, capacity building on O&M of existing and new, higher-voltage equipment, new investment management, etc.). What happens to the transmission infrastructure being planned and under construction (approximately 47 projects with a total of almost 7,000 km) is an open question: should they be assigned to the RPGCo when they are operationalized or be assigned to NEA, only to be transferred when the physical separation occurs? Financial viability requires an adequate financial management system and adequate wheeling charge revenues to support the company's operations.

[31] *Himalayan Times*, "MoE told to reduce power cuts in winter" October 21, 2014, p. 2. Other significant actions mentioned include: budget allocations for the 400 kV D-K-H TL and the 400 kV H-D_I TL project, establishment of the National Hydroelectricity Generation Company and the NTGC within the current fiscal year and that that GoN promises to set up a trading company by end of this fiscal year and have the NTGC operational by end of the next fiscal year.

RPGCo will take "ownership" of the transmission master plan. Transmission planning and tracking will be its responsibility. There are some risk reduction advantages built into the responsibilities of the RPGCo. In the past, lack of a single entity having "ownership" of the Transmission System Master Plan (TSMP) led to asset inventory inaccuracies and significant inefficiencies. As just one example, the building out of parts of the 220 kV system had been done but not updated in the TSMP. It has now been clarified that RPGCo will own the TSMP as soon as it is operationalized. At that time it will be important to provide assistance in updating the plan going forward, including following best practice on how and when and how often it will updated, and how it will be accessed and used by regulators and/or other sector actors to plan expansion to meet needs. Allowing access to view certain parts of the document/database on the RPGCo website is a good way to accomplish this. Regular updates via reports to the NERC and MoE would also become part of the RPGCo functions and efforts to foster transparency.

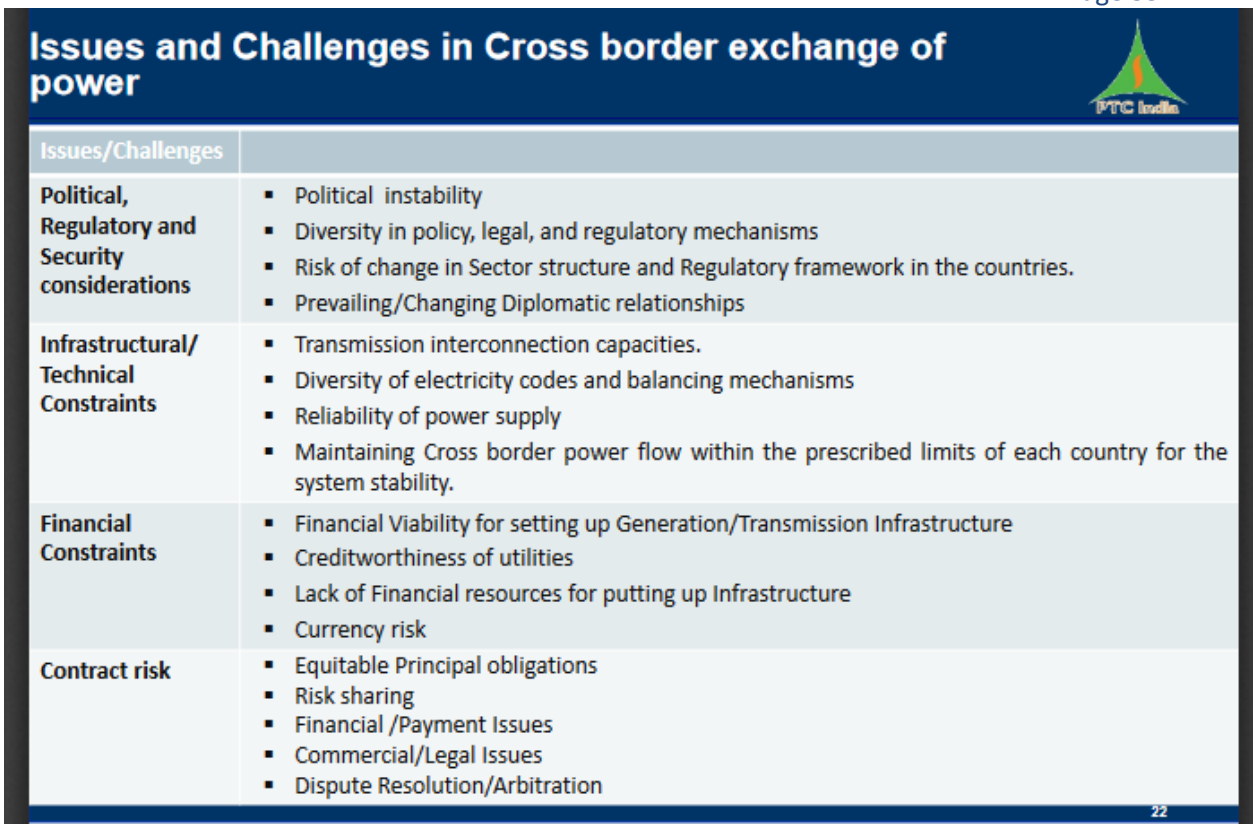
2.2.8 Establishment of the Power Trading Company

Bulk transfers of power are already occurring between India and Nepal, but mostly from India to Nepal. Increased capacity for more exchanges will be realized when the 400 kV D-M transmission line is completed and power can flow both ways to Nepal's advantage in the rainy season. PTC India is pursuing opportunities for short- and long-term trade in electricity between India and Nepal to increase the mutual benefits of cross-border trade.

PTC India is proposing to facilitate transmission interconnections between the two countries as well as generate new investment capital in Nepal's transmission capacity related to interchange. PTC India is already supplying power to Nepal during winters when the country experiences shortfalls in generation. The amount supplied is capped at 150 MW capacity, adjusted annually.

The company is also proposing to facilitate the formation of a Nepalese power trading company in partnership with Nepal for accelerating hydropower plant development. In a presentation at the South Asia Regional Workshop on Competitive Electricity Markets, in Colombo, Sri Lanka, March 18-20, 2014 Haran Saran Executive Director of PTC India cited numerous issues and challenges to be addressed in accomplishing its goal (summarized in Figure 4).

These differences are not out of the ordinary when power trading commences across borders. They appear to be resolvable with concerted effort and political will. Concerns such as financial constraints may be addressed by donors (e.g., the World Bank's Development Policy Credit). Lack of political stability affects the ability to finance investments and can only be resolved by a continuing stable government environment that is able to keep the peace. Given the importance to the financial success of MCC investments in cross-border interconnection and to the financial stability of the Nepalese electricity sector, addressing all challenges and issues associated with cross-border trade is a high priority.



Issues and Challenges in Cross border exchange of power

Issues/Challenges	
Political, Regulatory and Security considerations	▪ Political instability ▪ Diversity in policy, legal, and regulatory mechanisms ▪ Risk of change in Sector structure and Regulatory framework in the countries. ▪ Prevailing/Changing Diplomatic relationships
Infrastructural/ Technical Constraints	▪ Transmission interconnection capacities. ▪ Diversity of electricity codes and balancing mechanisms ▪ Reliability of power supply ▪ Maintaining Cross border power flow within the prescribed limits of each country for the system stability.
Financial Constraints	▪ Financial Viability for setting up Generation/Transmission Infrastructure ▪ Creditworthiness of utilities ▪ Lack of Financial resources for putting up Infrastructure ▪ Currency risk
Contract risk	▪ Equitable Principal obligations ▪ Risk sharing ▪ Financial /Payment Issues ▪ Commercial/Legal Issues ▪ Dispute Resolution/Arbitration

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Figure 4: Issues and Challenges in Cross-Border Exchange of Power

Source: South Asia Regional Workshop on Competitive Electricity Markets, in Colombo, Sri Lanka, March 18-20, 2014 Haran Saran Executive Director of PTC India

PTC's establishment and operationalization should include improving the cross-border trading mechanism (revision and repricing, and development of new agreements once PTC is separated from NEA). This will naturally include a review of the existing agreement with the India Cross-Border Trading Company. Staffing will have to include a mix of new and staff transferred from NEA to achieve the right capabilities. Capacity building will be needed to bring all to the same level of competency in the company's functions, particularly the analytical capacity to develop trading agreements. Key questions that need to be answered soon include: what will be role of this company? Is it a single buyer? Or just a market maker? Does it do dispatch?

2.2.9 Coordination and Timing Risks Related to Overall Sector Coordination.

The ESCAP is a donor-driven process working with the GoN. There is uncertainty about whether the portions of ESCAP relating to transmission services regulation and the operationalization and facilitation of cross-border trading by setting up a Nepalese Power Trading Company (NPTC) will be implemented within the MCC timeframe. If the GoN expedites ESCAP's adoption, many action items specified in ESCAP could greatly reduce the MCC investment's long-term sustainability risks (e.g., regarding Resettlement Action Plans, forest removal and replantation). Three actions that are particularly important for the long-term sustainability of MCC investments are the formation of the NTGC and the NPTC, and the development of appropriate wheeling charges.

Policy and institutional risk and uncertainty were noted by MCC and OMCN as a threat to sustainability.[32] Along with other development partners, MCC ranks this risk as very high. Internal MCC/OMCN documents on the Nepal power sector investment identify and prioritize the creation and operationalization of three key institutions: a GridCo (now established as RPGCo), an independent regulator (to be called NERC), and a power trading company (referred to as NPTC). It would be most beneficial to stabilize MCC's investment if these entities were established and operationalized well before the transmission projects are completed. Their primary concern is that the GoN may not manage to make timely decisions or take concrete actions to implement policy and institutional reform decisions within the development partners' differing timeframes, thus causing operational delays or uncertainties.

Each of the high-priority institutions is at a different stages of initiation and the impediments to their operationalization differ somewhat in the details.

2.3 Project Design and Implementation Risks and Mitigation Measures

The primary risks associated with project design, implementation and completion have been identified in each respective volume by the DFS technical, environmental and social, financial/economic, and project implementation teams. See Section: 1.2 Approach and Methodology for risk typology and definitions. See Risk Register: Annex A for full set of risks and solutions associated with each of the project Tasks identified and discussed in detail in their respective Volumes. These are summarized below.

- **Technical.** For the technical assessment of network requirements, the greatest overall risk going forward is the aggressive time schedule of the project and the cost of project components. Delays confronted in route determination and the voluminous amount of data needed for it mean that additional verification and adjustments (such as bore holes, walking lines, etc.) will need to be overcome in subsequent phases of the project. In order to mitigate this risk as much as possible, work on obtaining these essential data is scheduled as much as possible for the compact implementation funding (CIF) stage and procurements have been packaged into large bundles, using the FIDIC yellow book (design-build). A concern that O&M had not been included in project design has been taken care of through specification and costing of the capacity and material needs for handing over a project to the transmission operator.

- **Environment and Social.**
    - The environment and social assessment risks for the projects under consideration are not out of the ordinary for similar past projects in Nepal. So, progress has been made in solutions that the team hopes can be applied (in part based on other donors past experience in Nepal and from lessons learned in other MCC projects in other countries). For example, from past experience with transmission projects requiring forest clearing and crossing sensitive areas in Nepal, it is well known that there are significant risks of missing deadlines and overrunning costs due to the provision of environmental mitigation and social benefits necessary to convince

[32] MCC NPL_PPAM and OMCN.

affected persons and NGOs to support the project in each area. Fortunately, similar development partners' transmission line projects have recently made advances in reducing the time required for certain pinch points (e.g., forest clearing and replacement). These are analyzed and solutions presented for MCC's consideration. ESA Risks 1 & 2 proposes summarizes the proposed Stakeholder Engagement Framework and Benefits Sharing Program which is based on such past experience.

- Significant uncertainties that require the reworking of route alignments could add costs in redesign (and possibly the need to re-do environmental assessments, etc.). Streamlining this practice and methods for eliminating the most egregious causes of time delays are suggested for MCC/OMCN consideration. Advances in project management approaches to contracting are recommended for reducing environmental and social impact re-assessments. These are summarized in the E&S Risk Registers and elaborated in Volume 2. A social benefits program framework based on field work done in the DFS stage is provided for further elaboration in the Design Stage in Volume 2.

- Resolving the interaction between national and international standards on environmental and social impacts is suggested as a condition precedent for the compact.

- **Resettlement.**
  - Compensation issues dominate the significant risks regarding ROW compensation. Several solutions are suggested and involve making sure that compensation is adequate, tracked and neither premature nor delayed. Former problems with lack of transparency in the process will be overridden by extensive stakeholder engagement and consultation.

  - Delays in finalizing project designs by the technical team can inhibit the start of RAP work, thereby delaying construction. Early intervention is suggested to resolve as many of the designs as possible to reduce time loss in approaching affected persons. M&E indictors should help monitor issues of demonstrating resettlement outcomes. See in particular Risk Register Resettlement Risk # 2. Other solutions involve improving capacity of district offices in completing surveys and title transfers, avoiding premature compensation (i.e., in error) by closer monitoring of the link between proof of eligibility and payment of compensation.

  - For the resettlement policy, there is some uncertainty about the extent to which the project will be subject to Nepal's environmental regulations for EIA in accordance with NEA/ESSD guidelines, timelines and suspense periods, and the risks and possible delays involved with having to serve two "masters." The last recommendation in E&S Risk Register applies equally to the resettlement related impacts and solutions.

- **Financial and Economic Feasibility.** The results of the economic analysis indicate the range of results over the entire package and each of its projects meet MCC's hurdle rate of 10% economic rate of and financial return. Without referring to the specifics of these packages, a

number of overriding risk are called out that need to be addressed in all of the scenarios analyzed. Measures and solutions proposed include:

- Actions to reduce risks to market actors from hard currency exchanges and fuel price differentials (mainly for avoiding load shedding or private back up with diesel generators)
- Leveling the playing field of cross-border trade with a market actor with much greater market power (e.g., focus on agreement types and payment options most advantageous to Nepal)
- Reducing the risks of stranded assets that might be within the control of GoN and donor partners in Nepal.
- Proposed agreements advantageous to both sides in cross-border trading (e.g., banking power exchange credit to even out differences in power prices in crucial supply periods such as when baseload plants are out of service but supply is available in the other) and in the situation that India finds itself where it needs to balance its renewable and non-renewable power sources for system stability purposes.

- **Monitoring and Evaluation.** M&E key indicators have been developed to track the progress and results of implementing the MCC investment. Certain key indicators will focus on progress made in avoiding key risks to project completion and sustainability. After review by MCC and OMCN the additional M&E sustainability risk measure recommended in Task 5 may be added to the key M&E indictors in Volume 6.

- **Project Implementation.** The risk register (see Annex A) for project Implementation (Volume 7) identifies a number of risks associated with implementation and suggests possible solutions. The most salient of these include, inter alia:

  - Given the introduction of a variation on the project management approach that incorporates MCC's project management model (i.e., using MCA for project management and implementation oversight) and the complexity of the MCC project, Tetra Tech proposed a tailored management scheme to tightly control project activities and developed packages of projects to be awarded under separate EPA contractors under one managing project engineer. This scheme also allows for reassigning an EPA contract if one of the contractors fails to deliver.

  - A project implementation schedule has been proposed in which lengthy processes such as EIA and land acquisition activities are advanced as far as allowed under MCC rules to be completed before EIF.

  - The MCA's PMU will oversee the M&E activity as well as the risk monitoring and management activity as outlined in this volume.

  - To avoid delays caused by inadequate coordination and cooperation between ministries necessary for permits and approvals, OMCN/MCA will make special effort to form relationships with essential partners and explains its modus operandi for

them.

- To avoid delays due to work stoppages and social disruptions and in transportation of materials in difficult terrain, the PMU's management scheme and implementation schedule will take terrain and weather conditions into account, and construction contracts will emphasize the need to incorporate difficult terrain and distance from good roads in offers. The project implementation schedule takes into account these delays.

- Given the number of projects being implemented in parallel with the MCC project, there is also a concern that there could be a lack of skilled specialists in the disciplines needed for project oversight, management and implementation (including managing the risks identified within the foregoing tasks). Early wide-scale recruitment and capacity building by MCA for promising young professionals, and adequate market rate compensation will help alleviate the challenge of obtaining skilled specialists for the project.

3. Approach to Risk and Uncertainty Management in a Changing Environment

Given the beneficial "upheaval" occurring in Nepal's electricity sector now and in the upcoming years, risk and uncertainty are major factors for all market actors to consider. This uncertainty even affects the sort of risk and uncertainty management that might be developed with the primary aim of protecting the MCC investment.

For advancing the project in a timely and budget-wise manner through the implementation phase to completion and handover, the proposed project's implementation and M&E plans already include both project and sustainability risk and uncertainty mitigation measures for ensuring that project milestones are being met on time and on budget. The proposed TORs for the staff of OMCN/MCA needed to manage the project, and contractors hired to construct the project have explicit risk mitigation requirements, measures and reporting at all levels. MCA staff meetings will undoubtedly explicitly review progress and judge the status vis-à-vis completion, timing and readiness measures. MCA will also include risk and uncertainty management in every TOR with performance targets (e.g., key performance indicators to manage risks successfully), including MCA management up to the highest level. The project risk matrices provided in this report can help to pinpoint where assignments of risk management and mitigation should be placed.

For the management of longer-term sustainability risks and uncertainties, especially those with the greatest likelihood of risk to the project's viability, other tools will be needed to keep track of and, if necessary, intervene in a timely manner regarding decisions being taken by other stakeholders. As noted, monitoring and evaluation of the management of sustainability risks and the adopted solutions will be housed within the MCA M&E Unit. This Unit will also be responsible for tracking, managing and reporting on the final full-fledged MCC QPR Risk Register for the project. As MCC already has an established procedure for this, no more will be elaborated here.

Risk management starts with the conditions precedent in the compact. Many of those will probably overlap with the sustainability risks identified in this volume. Once the final conditions precedent related to risk management are known, risk management measures can be fine-tuned or added. They could well include the following:

1) Cross-border trading and institutional arrangements and agreements, and the Power Trading Company
2) Tariff reform (wheeling charges)
3) RPGCo (Transco) readiness
4) HPP injection sufficiency
5) Ancillary transmission projects by others
6) Sub-transmission and distribution system readiness
7) Labor unrest disruption to reform progress.

Each of these may need additional M&E tracking efforts. The Annex A's Risk Register is a good place to start. Section 4 adds another dimension to risk management: cross-agency coordination of risk monitoring and management a MCC/MCA-sponsored dashboard that would have the capability to

provide a consolidated view of the status of a large number of projects and activities, who is responsible, etc. The new GENCo and Transco could collaborate with NEA and MCA (and other donors) to keep the dashboard up to date on projects and issues relating to generation sufficiency and transmission project developments. MCA, donors sponsoring the distribution system master plan, and NEA could collaborate on updating distribution progress and issues.

A reform monitoring dashboard would need to be created. The Deloitte/NHDP team is developing such a dashboard for IBN to monitor its hydroelectric projects. The MCC/MCA dashboard would have the capability provide a consolidated view of a large number of projects and activities. These would be updated and managed at the individual level but also used to view progress on a group of projects for a quick view of the status of the disparate processes underway (as noted, many under the purview of other entities) to implement the Action Plan. Selected actions most related to the transmission system viability could be developed first.

But in order to develop such a tool, the information needed to populate it would need to be available, up to date, and accurate. A system of sorts already exists. It is an effort lead by the Joint Secretary of MOE and the "Central Energy Crisis Prevention Coordination Committee" in coordination with development partners and other GoN stakeholders. As it stands now, the process could be characterized as a piecemeal and word-of-mouth affair with development partners making attempts to keep a matrix of the status of actions to keep things straight within the donor community.

MOE should be proactively providing comprehensive up-to-date sector-related information to all stakeholders. The Ministry could help stakeholders, such as MCC, to develop, maintain and update information so that all market participants can adjust and plan better based on current information on the Nepali situation (regulatory framework, new legislation, rules and regulations, environment and social requirements). A consolidated set of the latest, constantly updated information in an easily accessible location, e.g., a portal for stakeholders and a web page for general public, could be created. IBN does this for the "over-500 MW" projects, but such information should be available on a much more inclusive basis and for other aspects of the reform. Then each entity could use the information to their own purposes.

A couple of examples could illustrate how the MOE information source could be utilized by sector entities, including MCA, to identify risks and uncertainties and take mitigating actions. Each new entity, e.g., RPGCo and Genco, should be helped to create similar dashboards to inform their individual risk and uncertainty management. As a start, risk management courses should be provided to employees of all new entities.

For RPGCo this could include the development or acquisition of a risk and uncertainty management system specifically adapted to transmission forecasting, operation and maintenance. It is likely that this will be covered by technical assistance provided by one or more of the developing partners. Such assistance should be provided early on in the establishment of the new entities. As RPGCo is more advanced in its establishment, a consultancy in first half of 2017 and cooperative activities with other development partners could be initiated. This system would be in addition to (and could be linked to) the development of financial, human resource, and asset management systems for the new company.

For the NPTC, when the modern trading function that it requires is being built, robust policy and institutional risk assessment tools should be included to allow monitoring and reporting of the factors that create risk and uncertainty in the company's trading operations. It is likely that these systems are already available and can be adapted to the present and future conditions within which the company will be operating.

Likewise, the Genco will need to deal with the uncertainties that are created by the large quantity and ever changing data needed for generation system planning. The sooner that a consistent and accurate database of assets, project applications, etc. is compiled, so much the better for risk reduction. The dashboard that NHDP is developing with IBN could easily be shared with the Genco.

For Information/Clarifications

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