Turning on Myanmar's Lights

Integrated Energy Development Study: Phase Three Fieldwork Initiative

Presentation for UT-Chula Workshop

KWR International (Asia) Pte. Ltd.
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Preliminary Research

Beginning in 2012, initial research on Integrated Energy Development ("IED") was conducted by KWR International (Asia) Pte. Ltd. ("KWR") in cooperation with the University of Tokyo ("UT") and Economic Research Institute for ASEAN and East Asia ("ERIA").

This work, which served as the energy/electrification contribution for the Myanmar Comprehensive Development Vision ("MCDV"), published in 2013, included the identification of data gaps and further evaluation of the environment for IED in Myanmar.

A special emphasis was placed on evaluating prospects in different geographic areas around three themes:

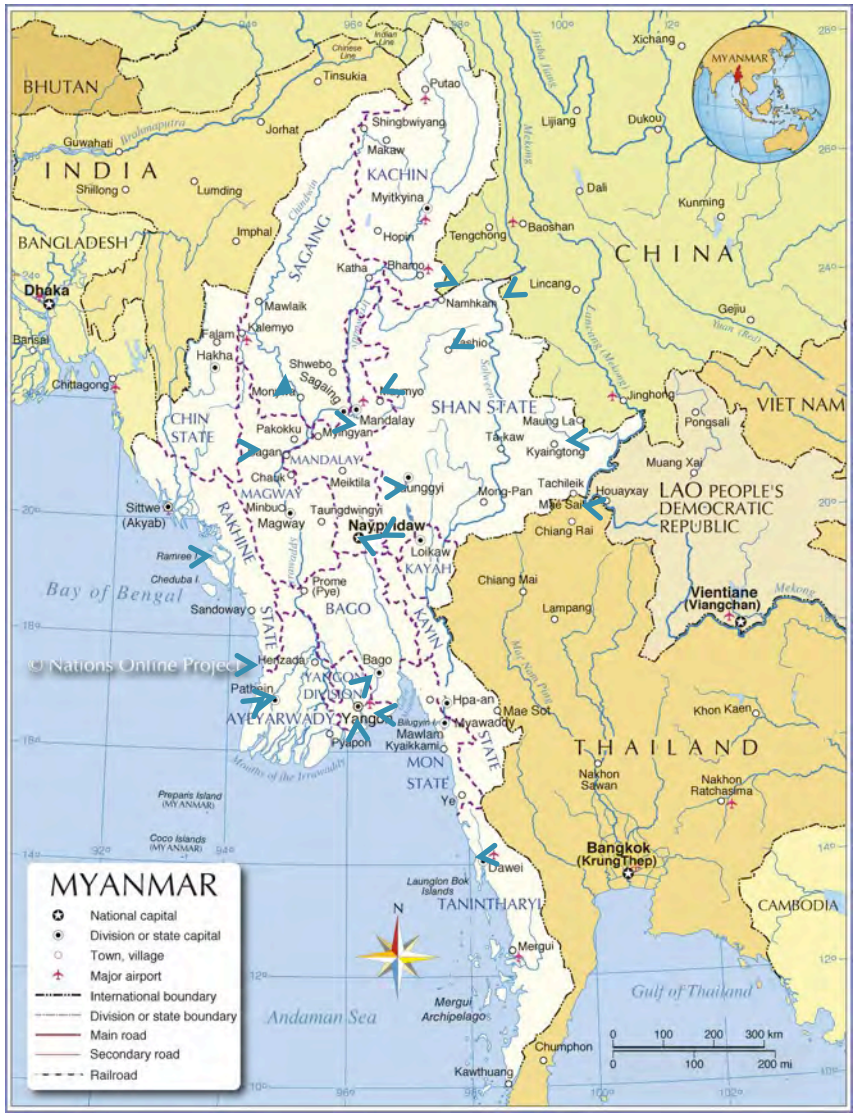
1) Grid Extension,

2) Regional Integration & International Cooperation, and

3) Off-Grid Development.

Three Phases of Fieldwork included 200+ interviews during visits to:

- Muse
- Monywa
- Mandalay
- Bagan/Nyaung-Oo
- Taunggyi
- Kyaukphyu
- Gwa
- Pathein
- Chaungthar
- Bago
- Yangon



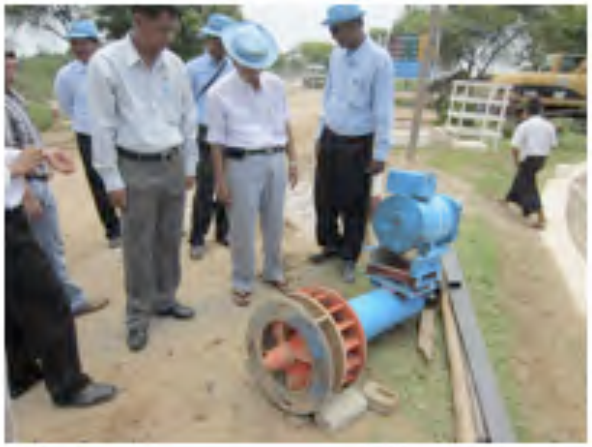
- Laukkai
- Lashio
- Pyin Oo Lwin
- Naypyidaw
- Kengtung
- Tachileik
- Dawei

Over 100+ additional meetings and interviews in **Bangkok, Singapore, Tokyo, US** and other locations

Phase I:
Exploratory fieldwork

Objectives

- Comparison of on-the-ground realities with background data and research compiled in 2012 and 2013 for MCDV report
- Further evaluation of current environment for integrated energy development in Myanmar
- Familiarization with, and exposure to, Myanmar's rural environment and refinement of methodology and approaches to conducting fieldwork in Myanmar



Phase 2: Looking in Depth to Facilitate Rural Electrification

Objective: *To develop a more comprehensive understanding of potential rural electrification strategies and technologies in Myanmar through fieldwork visits designed to provide quantitative/qualitative insight into geographical differences, comparative costs and trends, including:*

- Required Generation: providing insight into estimated demand through data generated from targeted villages and regions.
- Cost Estimates: evaluating comparative costs of different electrification strategies within targeted villages and regions through integration of location-specific data and estimated national assumptions.
- Village Data: generating village data to evaluate cost and other potential indicators that can be refined/developed through additional research.
- Summary Reports: construction of model/methodology that can generate/ analyze fieldwork data to support evaluation of potential rural electrification strategies and policy approaches to promote integrated energy development in Myanmar.

Phase 3: Fieldwork

Objective

To better understand the dynamics, best practices and potential risks of rural electrification, and to develop a greater understanding of cross-border power arrangements and potential policy responses, additional site visits and research were undertaken with emphasis on Myanmar-China energy relations. Activities undertaken between July-December 2014 include:

- Field visits to Muse and Kokang SAR and other areas near China-Myanmar border, as well as other areas in Shan State, including Lashio, that are heavily influenced by trade with, and investment and immigration from, China
- Meeting with Chief Minister in Taunggyi, capital of Shan State, who controls areas of great interest to China and Thailand for their hydro electricity potential and which are essential for regional energy integration
- Initial research concerning non-governmental organizations and other entities about potential social impact and other "costs" of ongoing and proposed energy projects, including large hydro projects on Thanlwin/Salween River
- Continued engagement with stakeholders and peer review of research and findings
- Participation in meetings on electrification hosted by World Bank and Asian Development Bank
- Training, meetings and workshops on energy issues for Myanmar officials, parliamentarians and practitioners

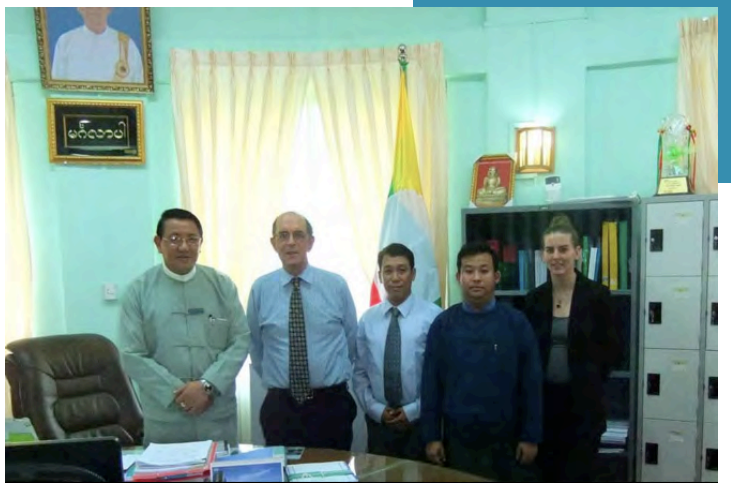
Phase 3: Fieldwork Locations

- Taunggyi
- Yay War
- Lashio
- Laukkai
- Mauhit
- Nan Pak Khar
- Muse
- Ho Saung

Phase 3: Fieldwork Locations

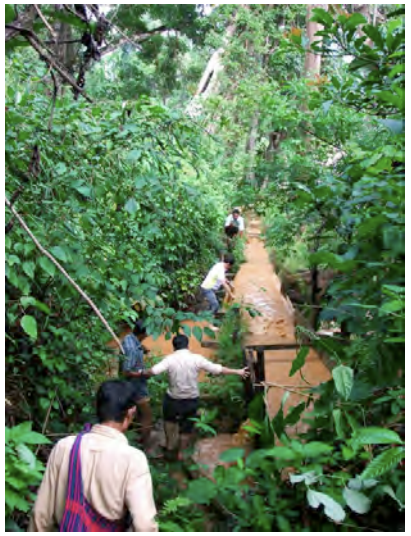
Taunggyi

- Capital of Shan State and one of Myanmar's largest cities
- Team met with Chief Minister and other key members of the regional government



Yay War

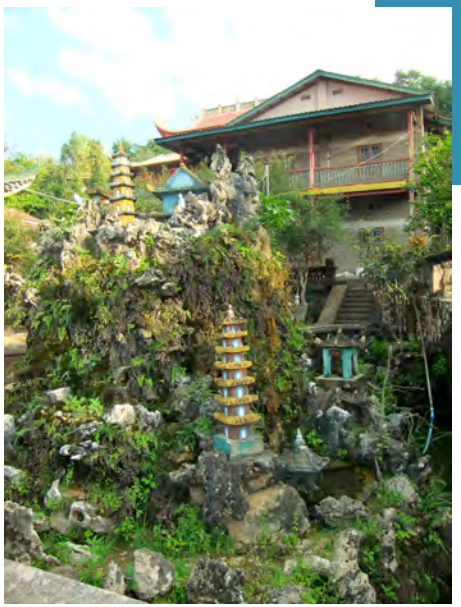
- Relatively poor, agricultural village
- Powered by several micro-hydro turbines run by households
- Aspires to grid connection or greater electrical capacity



Phase 3: Fieldwork Locations

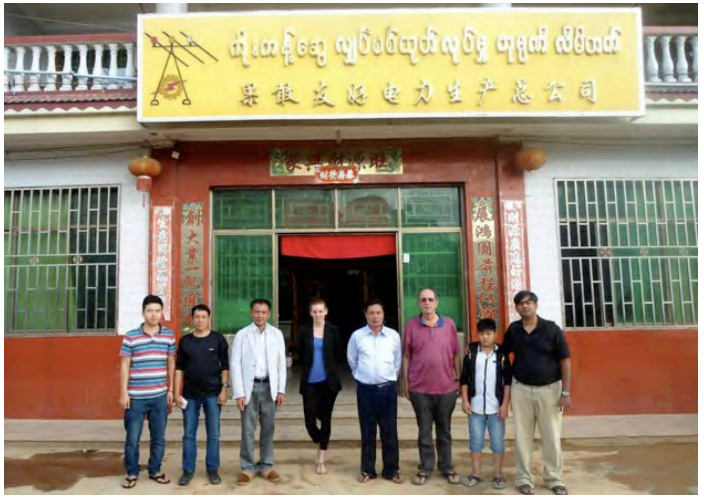
Lashio

- Shan State's largest town with rapidly growing population
- Significant influence from China trade and immigration



Laukkai

- Self-administered zone on Myanmar-China border
- Privatized power arrangements not subject to national guidelines
- Impacted by ethnic conflict in surrounding areas



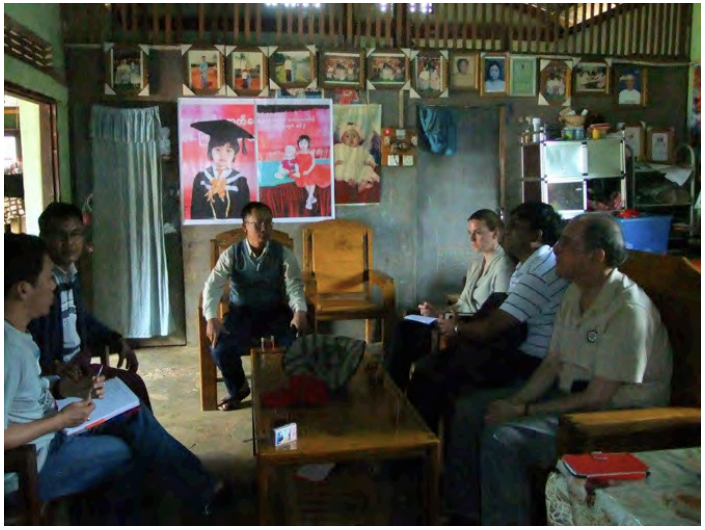
Phase 3: Fieldwork Locations

Mauhit

- Small, poor Kachin village located at the end of the national grid
- Electricity is available from church-owned generator and few solar panels
- Received support from World Food Programme

Nan Pak Khar

- Large agricultural village with small industry (car repair, welding, etc.)
- Formerly off-grid, most wards now receive electricity from China



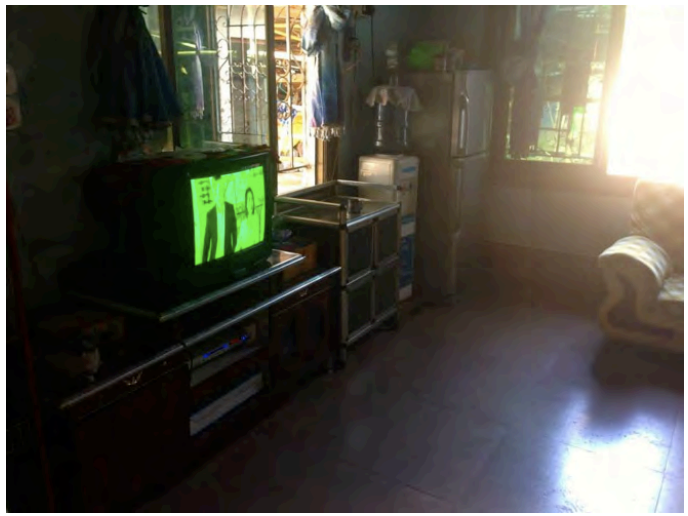
Phase 3: Fieldwork Locations

Muse

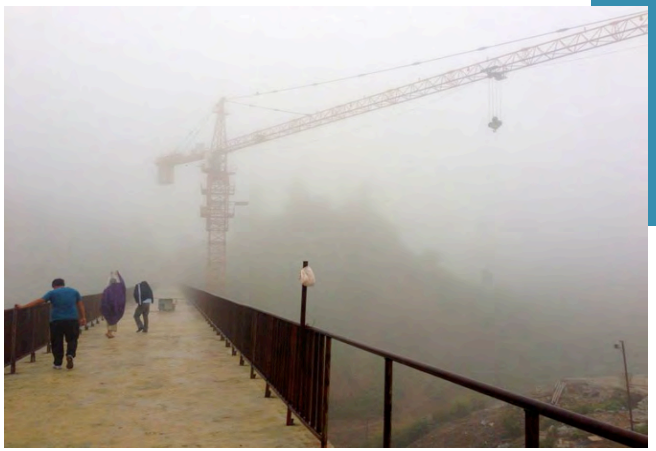
- Border town with growing trade and cross-border activity with China
- Site of large-scale luxury development and successful industry
- Benefits from PPP in electricity generation and distribution

Ho Saung

- Border village near Muse using Chinese power
- Aspires to connect to national grid



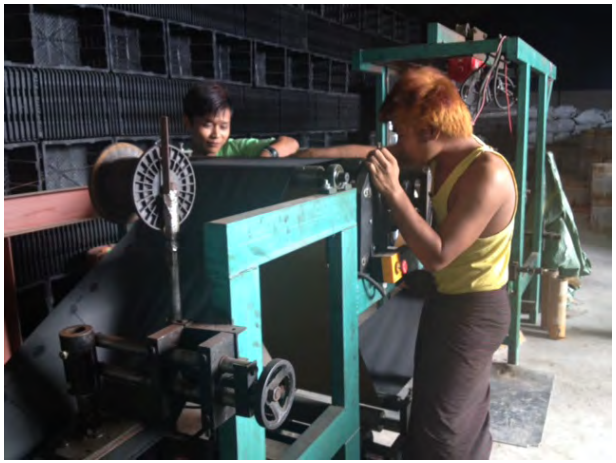
Phase 3: Conclusions



Regional Integration Requires Myanmar to Balance External with Domestic Concerns.
While discussion on regional energy integration focuses on Myanmar's role as exporter of oil and gas—Myanmar has much to gain from cross-border electricity trade. There will be difficulty building political support for regional plans that emphasize exports, but this overlooks myriad examples of power supply from China/Thailand that facilitate economic growth along periphery.

Regional Integration Must Balance Political and Economic Concerns.
Despite benefits of electricity supply from China, Myanmar government is moving to switch power supply to Myanmar national grid. This is a matter of politics as Myanmar would like to maintain and enhance its sovereignty by allowing it to maximize its control over areas that have been trouble by ethnic unrest and to ensure that electricity provision is not used to exert foreign influence over the country.

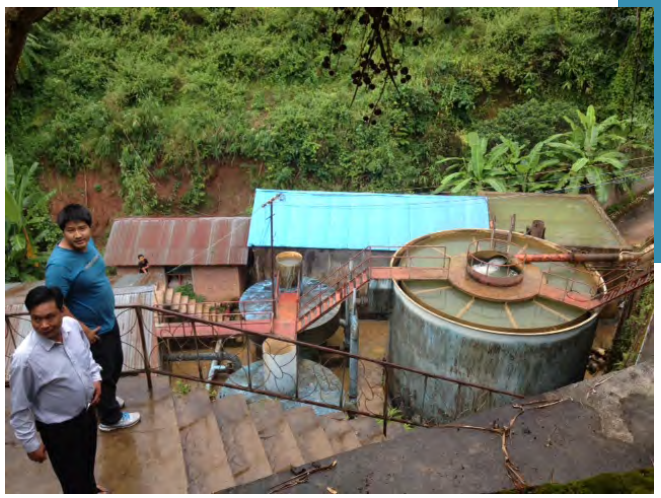
Phase 3: Conclusions



Myanmar Is Beneficiary As Well As Contributor to Regional Energy Integration.
In addition to benefits accrued from cross-border arrangements with China and Thailand, revenues from energy exports—which are generally seen as less desirable than domestic use given country's history of poor resource management—can, if handled properly, be used in a way that will contribute to rural development and electrification, or improvements to the national grid.

Regional Energy Integration Can Catalyze Myanmar's Growth and Development.
Development of Muse area, and CBD in particular, has relied on the availability of stable power from China which provides the capacity to handle high demand projections. This project likely would not have been able to access financing or make development plans without a guarantee of stable and sufficient power, which the Myanmar grid could not supply. The Team's visit to Tachileik along Myanmar-Thai border demonstrated similar outcomes: higher incomes, greater economic activity and population growth generally follow reliable, stable power supply.

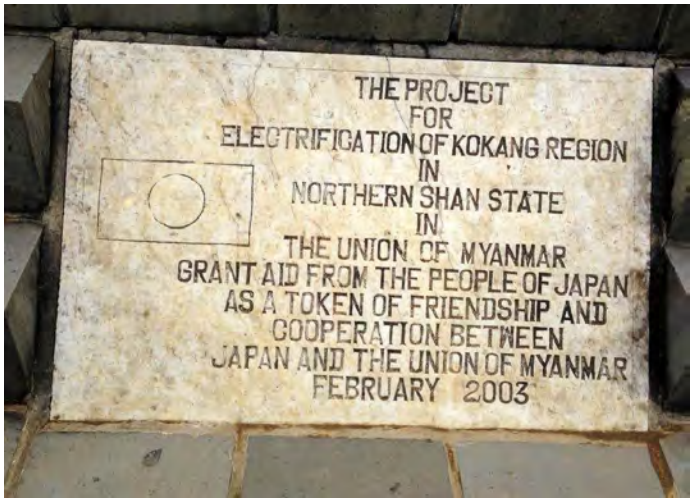
Phase 3: Conclusions



Social and Environmental As Well As Financial Concerns Must Be Addressed.
Potential negative social and environmental impact from Myanmar energy projects—ranging from pollution and carbon emissions to displacement of local communities and destruction of livelihoods—requires greater attention. This is particularly true for projects along Salween/ Thanlwin, where stakes are high both in terms of potential power output as well as political and economic backlash that would occur if a disaster were to occur. Financial considerations are also important and, in some cases, intersect with social/socioeconomic impact.

Myanmar Can Play a Key Role in Facilitating Regional Integration.
Myanmar can contribute to policies on regional energy integration, as well as economic integration, to facilitate regional connectivity AND promotes growth within Myanmar and region as a whole. Shan State and the direction taken with energy projects under development with Thai and Chinese investment, can play a critical role in shaping these policies.

Phase 3: Conclusions



Regional Energy Integration Can Take Many Forms.

Whereas Myanmar currently gains access to Chinese and Thai power, primarily through informal, independent lines, it is also possible that electricity supply can be provided through Myanmar national grid. While there are political and other implications that need to be resolved, and perhaps a trade-off made in respect to export sales of gas or hydro-power, this would provide for continuous connectivity during peak periods while eliminating the need for cross-border distribution lines with payments going directly to a foreign utility.

Myanmar would therefore provide for its citizens through its own national grid while maintaining sovereignty and control of power provision. If power from China and Thailand were shut off, Myanmar could continue to supply power through the national grid at reduced levels. This could position Chinese and Thai power as a substitute for the costly procurement of many individual generators, which is seen throughout Myanmar as a back-up to Myanmar's unreliable supply.

Looking Forward: Toward a Comprehensive Framework for Regional Energy Integration - 1

Fieldwork and analysis undertaken by the KWR/UT Team since 2012 has achieved a number of important accomplishments leading toward the development of a more comprehensive assessment of national electricity development and regional integration. These include:

- Development of comprehensive data and information to drive understanding of electrification, rural development and Myanmar's periphery as well as energy relations with its neighbors;
- Identification and examination of key drivers and dynamics of electrification on a village, regional and national level;
- Examination of commonly used technologies, comparative cost factors and regional differences; and
- Improvement in Public-Private dialogue concerning electrification issues.

Looking Forward: Toward a Comprehensive Framework for Regional Energy Integration - 2

Having completed Background Review and Phase 1-3 Fieldwork, further examination is needed to finalize research and prepare findings that:

- Identify and examine regulatory obstacles to universal electrification;
- Identify and examine social obstacles to universal electrification;
- Identify and examine special projects and cross-border electrification initiatives that do not necessarily follow national guidelines;
- Continue cultivation of contacts and formulation of stakeholder network and mechanism for peer review of research and policy discussion; and
- Discuss and examine policy approaches for Myanmar electrification and regional integration within final report.

Q&A/Next Steps?

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