



# Completion Report

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Project Number: 47128-001  
Technical Assistance Number: 8657  
June 2018

## Myanmar: Off-Grid Renewable Energy Demonstration Project

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TA No., Country and Name			Amount Approved: \$2,000,000	
TA 8657-MYA: Off-Grid Renewable Energy Demonstration Project			Revised Amount: Not Applicable	
Executing Agency: Ministry of Agriculture, Livestock, and Irrigation (MOALI)		Source of Funding: Japan Fund for Poverty Reduction (JFPR)	Amount Undisbursed: \$473,388.25	Amount Utilized: \$1,526,611.75
TA Approval Date:	TA Signing Date:	Fielding of First Consultant:	TA Completion Date Original: 30 June 2017	Actual: 31 December 2017
23 May 2014	23 July 2014	16 February 2015	Account Closing Date Original: 30 June 2017	Actual: 20 March 2018

**Description:** Energy access in Myanmar is one of the key challenges facing the country as it continues to emerge from economic isolation. The national electrification rate of Myanmar was only 30% in 2013, one of the lowest rates in the region and well below its neighboring countries'. There were more than 44,000 unelectrified villages out of 64,000 villages in the country. Expanding access to viable, efficient, and sustainable sources of energy is a central goal for the Government of Myanmar. In September 2014, the government approved the National Electrification Plan (NEP) which proposes an aggressive grid electrification roll-out program and an ambitious off-grid program.

The NEP is targeting 100% electrification by 2030. The Ministry of Electricity and Energy (MOEE) is the main agency involved with the extension of the power grid. The Ministry of Agriculture, Livestock and Irrigation (MOALI), the executing agency of the TA and formerly the Ministry of Livestock, Fisheries, and Rural Development, is responsible for the off-grid rural electrification program. As of 2016, about 40,000 villages were still unelectrified, and the government's challenge for the NEP was to electrify all unelectrified villages through grid extension and off-grid electrification over the next 14 years. The off-grid rural electrification program has been implemented by the Department of Rural Development (DRD) within MOALI, which was the implementing agency of the TA.

ADB provided a capacity development TA to support the scale-up of sustainable off-grid solutions for renewable energy systems to provide energy access in Mandalay, Sagaing, and Magway regions in Myanmar. The TA was designed to install pilot solar photovoltaic (PV) mini-grid systems at villages to establish a business model for community-based electrification and to provide capacity building for the government officials. Also, the TA created several knowledge products, which include an investment plan for off-grid renewable energy projects, a geospatial web-mapping tool to support project developers in identifying potential project sites for off-grid renewable energy projects, a financial model with financial viability analysis of solar PV mini-grid systems, and a guidebook titled "Developing Renewable Energy Mini-Grids in Myanmar."

**Expected Impact, Outcome, and Outputs**

The impact would be increased access to energy in rural Myanmar from renewable energy sources. The expected outcome would be improved capacity and commitment within MOALI and the government of selected regions and states to design and manage rural energy access programs using renewable energy resources. The TA outputs were: (i) renewable energy systems designed and installed in 25 villages to power community infrastructure and households; these are primarily solar PV systems, targeting the central dry zone (Mandalay, Sagaing, and Magway regions) and some additional states; (ii) geospatial least-cost energy access and investment plans for select regions and states of the country developed; and (iii) skills and abilities of staff in government entities and the private sector strengthened.

**Delivery of Inputs and Conduct of Activities:** During the TA consultation mission in January 2015, the executing agency informed that the government intends to finance solar off-grid electrification in some of the additional states outside the central dry zone using its own funds as it has the budget and technical knowledge to implement solar home systems quickly, and drop some of the originally planned locations due to lack of commitment from local governments for the pilot project. Therefore, the TA activities were carried out only in the central dry zone (Mandalay, Sagaing, and Magway regions).

During the TA implementation, solar PV mini-grid systems at villages with more than 200 households were selected for off-grid electrification model, though costly, rather than solar home systems at individual households to improve effectiveness and viability of pilot systems. As such, the TA financed mini-grid systems at nine villages within the TA's allocated budget for pilot equipment. Per the government's request to pilot more systems, mini-grid systems at three villages were financed by ADB's Energy for All Program in collaboration with the Energy Sector Group under the Sustainable Development and Climate Change Department. A total of 12 solar PV mini-grid systems were piloted at villages in Mandalay, Sagaing, and Magway regions.

ADB recruited a consulting firm with 102 person-months of consulting services: 40 person-months for international consultants and 62 person-months for national consultants, which was envisaged at 101 person-months of consulting services: international 36 person-months and national 65 person-months at the TA approval. The consultant delivered all outputs successfully: (i) installed solar PV mini-grid systems at 12 villages including engineering, procurement, and commissioning; (ii) developed an investment plan for off-grid electrification using geospatial mappings for Mandalay, Sagaing, and Magway regions; and (iii) conducted capacity training on various renewable energy for the staff from relevant ministries. The consultant's overall performance was evaluated as satisfactory.

MOALI provided counterpart staff, meeting facilities, logistical support to the consultant, and facilitated interagency coordination. It also financed taxes and duties applicable for all pilot mini-grid systems. MOALI's performance was satisfactory.

The ADB project team conducted nine review missions, frequently interacted with MOALI and the consultant, and participated actively in producing quality outputs. ADB's performance was satisfactory.

The TA was originally designed for completion by 30 June 2017 but was extended until 31 December 2017 to further ensure the accomplishment of the defined outputs and activities. The TA was completed with 24% savings, without needing to use contract contingencies and administrative costs, due to close monitoring of consultant's activities.

**Evaluation of Outputs and Achievement of Outcome:** The TA achieved the expected outcomes. The TA improved the capacity of the executing and implementing agencies and local governments to design and implement small-scale renewable energy systems as well as to manage its off-grid national electrification program through piloting mini-grid systems and various training on renewable energy.

The TA mostly produced the expected outputs efficiently and successfully with the exception of renewable energy systems, as only 12 solar PV mini-grid systems out of the envisaged 25 systems were installed. Twelve (12) solar PV mini-grid systems were constructed at villages in the Mandalay, Sagaing, and Magway regions. The TA developed a sustainable and viable business model to realize the government's off-grid rural electrification program. The mini-grid systems built under the TA were the first pre-paid meters and pay-as-you-go systems in Myanmar and electrified a total of 2,310 households (10,598 persons). Significant women participation was demonstrated during the TA implementation. Village electrification committees were established under the TA and more than 50% of their members were women who facilitated the collection of bill payments and managed solar PV mini-grid systems.

The geospatial analysis and investment plan identified new opportunities for 28 potential mini-grid projects, and a geospatial web-mapping tool was developed to leverage geospatial data. Ten (10) training workshops were conducted covering a wide range of topics such as solar PV mini-grids, bioenergy, micro-hydropower mini-grids, geographic information system, business modeling, and gender mainstreaming in off-grid electrification projects.

An international investment forum was held on 9 May 2017 in Nay Pyi Taw that featured presentations about the TA outputs and outcome to the government, private sector, and other stakeholders. The forum generated private sector interest and financing for off-grid village-scale electrification using renewable energy.

The TA also implemented additional outputs: (i) a guidebook, "Developing Renewable Energy Mini-Grids in Myanmar," which was published in December 2017 documenting the experiences and lessons learned from the TA and training materials from the capacity building activities; (ii) an internet web-based visualization tool and a training workshop on geographic information system and web-mapping; and (iii) secondary data logger systems installed to monitor the mini-grid systems performance remotely.

The DRD appreciated ADB's assistance and indicated its intention to use the TA outputs and lessons as references to accelerate deployment of mini-grid systems and achieve the national electrification targets.

**Overall Assessment and Rating:** The TA is rated as successful. It successfully delivered the outputs well within the original TA budget. The DRD was satisfied with the TA outcome, especially the capacity building workshops that were delivered. The DRD has acknowledged the pilot solar PV mini-grids built under the TA as the first in Myanmar to use pre-paid meters and pay-as-you-go payment system.

**Major Lessons:** Obtaining and maintaining villagers' interest and ownership of the pilot project was a major challenge during the TA implementation. Thus, the involvement of local communities at an early stage of TA implementation is considered one of the most critical elements to ensure success of TAs of similar nature.

**Recommendations and Follow-Up Actions:** The TA developed a viable community-based business model for off-grid electrification and an investment plan identifying 28 potential projects in the three focus regions in Myanmar. It is recommended that ADB consider continuous support to take further steps in harnessing these off-grid renewable

energy electrification projects identified under the TA. Also, a geospatial web-mapping tool developed under the TA has been effectively used to identify potential investment opportunities. It is recommended that ADB consider supporting the development of similar or same tools for other states and regions in Myanmar.

TA = technical assistance.

Prepared by: Choon-Sik Jung

Designation: Senior Energy Specialist, SEEN