Solar PV Rooftop Projects for Developing Countries in Asia
Benchmarking of Generation Cost and Successful Development Approach

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• More than 5 GW of Solar Projects in Asia (12 GW global)

• More than 7 GW of Wind Projects in Asia (70 GW global)
Today’s Agenda

1. Rooftop System and Challenges
2. Successful Approach
3. Generation Cost Benchmark
4. Summary
1. Rooftop System and Challenges
Typical Solar Rooftop Configuration
Challenges
Commercial aspect

1. Policy and Regulation
2. Grid Utilities
3. Insurance Coverage
1 Structural

Challenges
Technical aspect

2 Site Constraints

3 Electrical equipment

4 Accessibility

5 Monitoring System
Project
9.4 MWp Portfolio Rooftop

Client
Local Company

Location
Thailand

Role
Lender Technical Advisor (LTA)

Opportunity
Carry out technical due diligence report for Rooftop Portfolio – Site assessment, technologies review, plant design review, EYA, contractual review, and Financial assessment

Challenge
Site assessment: some sites locate in the flood risk area.
Plant Design: installations were proceeded based on the installers experience rather than actual designs, structural issues
Contract: PR guarantee is provided but no monitoring equipment and pyranometer installed at the site.
O&M: relatively high maintenance cost cost
Opportunity
The scope covers technologies review, EYA, design review, contractual review, and financial review.

Challenge
This project consists of 4 sites and has now operated for 3 years. Overall, plant is well-maintained where PR is approximately 75-76% at year 2. Minor issues are associated to cleaning of the pyranometer and the tilt angle of pyranometer.
2. Successful Approach
Successful Approach for Solar Rooftop
From our experience

1. Understanding requirement on permits and regulations.

2. Site assessment and energy yield prediction.

3. Acquire credible contractors and ensure all required safety equipment are installed according to grid code.

4. Perform O&M activities to maintain high operation performance.
3. Generation Cost
Solar Rooftop System Cost for Developing Countries in Asia

Based on MM’s project experiences and analysis

**India**
- CAPEX = 950 – 1,400 USD/kWp
- OPEX = 9 – 20 USD/kWp

**Malaysia**
- CAPEX = 1,100 – 1,700 USD/kWp
- OPEX = 10 – 25 USD/kWp

**Indonesia**
- CAPEX = 1,100 – 1,700 USD/kWp
- OPEX = 10 – 25 USD/kWp

**Myanmar**
- CAPEX = 1,000 – 1,600 USD/kWp
- OPEX = 10 – 20 USD/kWp

**Thailand**
- CAPEX = 1,100 – 1,700 USD/kWp
- OPEX = 10 – 25 USD/kWp

**Philippines**
- CAPEX = 1,200 – 1,800 USD/kWp
- OPEX = 10 – 25 USD/kWp
Levelised Cost of Energy (LCOE)

Based on MM's analysis and derived assumptions
Summary

With a good understanding of project site’s constraints and proper design using the right equipment, LCOE of solar-rooftop can be very attractive
Thank you

Q&A