



***HANDBOOK ON BEST PRACTICES FOR THE
SUCCESSFUL DEPLOYMENT OF
RENEWABLE ENERGY AND
DISTRIBUTED GENERATION IN INDIA***

Compiled by the United States Energy Association

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on Clean Development and Climate

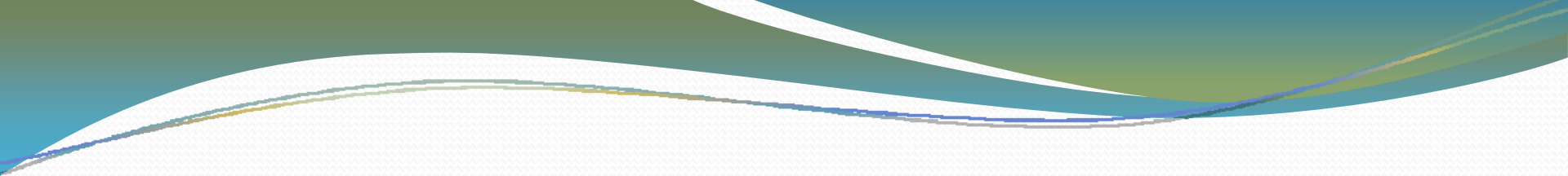
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- The *Handbook* was created under the U.S. Department of State Asia Pacific Partnership on Clean Development and Climate as a tool to assist in the removal of barriers to the deployment of clean energy technologies.
 - The handbook is intended for policy makers, utility executives, regulators, and project developers.
 - This handbook is a compilation of open source documents that are cited and listed at the end of each topic as well as in the bibliography.

TABLE OF CONTENTS

Policy, Regulatory and Legal Issues and Best Practices

- *Components of Good Policy*
- *Examples of Good Market Policies*
- *Legal Structure to Encourage RE/DG*

Financial Issues and Best Practices

- *Tariff Pricing*
- *Incentives*
- *Insurance*

Technical Issues and Best Practices

- *Equipment Requirements*
- *Grid Stability and Protection*

Testing Requirements

Application Processing Issues and Best Practices

Other Best Practices

- *Refund of Salvage Value*
- *Dispute Resolution*
- *Electric Supply/Purchase Agreement*
- *Power Purchase Agreements*

Technical Issues: Grid Stability and Protection

3.2.15 Monitoring provisions

- Issue: Developers and utilities disagree over what if any monitoring of facilities and equipment is needed and who pays for the monitoring.
- Utility Perspective: Distributed generation facilities must be monitored for their connection status, real power output, reactive power output and voltage at the point of connection to ensure personnel safety and avoid operating problems, especially if the facility is exporting power to the utility.
- Developer Perspective: Utilities often insist on performing the monitoring themselves for a fee which increases the cost to develop the project. The utility is also not always familiar with the equipment the developer uses and will often insist the developer use familiar equipment that is more expensive so the utility can monitor it. Furthermore, most modern distributed generation units have multi-function microprocessor-based control systems with the capacity to log data around fault condition and store data.
- Regulator Perspective: Monitoring of equipment is important to maintain system integrity and is included in the contract or tariff between the developer and the utility.
- Solution/Best Practice: Units under 200 kW require no monitoring, units from 200 kW to 1 MW do not require monitoring if there is protective relaying that prevents the facility from injecting energy into the utility's network, and all units over 1 MW require monitoring. The monitoring arrangement should include a Remote Terminal Unit that performs SCADA, communications equipment, telephone circuit protection equipment, transducers, potential and current transformers, electrical energy and demand information, reactive power information, voltage information and alarms. The monitoring should display two seconds of data from before and after any fault and should keep data for the last 10 fault conditions. The utility should receive signals for remote monitoring of the isolation device status, normal voltage and frequency levels, and notice that the distributed generator is unable to connect to the utility network.

Source and For More Information: The NRECA Guide to IEEE 1547 (March 2006) pgs. 36-38
<http://www.nreca.org/Documents/PublicPolicy/DGApplicationGuide-Final.pdf>