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# Streamlining the Bankability Process using International Standards

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***Problem: PV systems are complex and may have many different problems.***
- *How does a customer/investor know that a PV system is "good"?*
- *How much more should a customer pay for a higher quality system?*

***Solution: International standards implemented consistently***
- *Improve confidence by capturing the collective wisdom of the global community*
- *Reduce costs by streamlining processes*

***IECRE History:***
*Both the wind and PV industries observed system-level failures that could not be adequately addressed by existing standards. In 2014, IECRE was formed to fill the need for certification at the system level. IECRE serves three sectors:*

Wind | PV | Marine

***IECRE provides certificates (based on IEC technical standards) for each step in the project timeline (only a subset is shown here)***

## Project Timeline

### Design Qualification

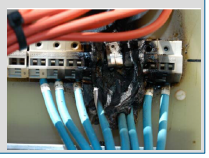
**Example Considerations:**
- Local code requirements met
- Component selection
  - Qualified for application
  - Quality control during manufacturing
- Safety:
  - Restricted access if appropriate
  - Continuously monitored
  - Overcurrent protection
- Good design
  - Shading considered
  - Trenching
  - Robust structure for use environment

**Example Standards Referenced:**
- Module selection
  - IEC 61215 – Design Qualification Test
  - IEC 61730 – Safety Test
  - Additional changes are in the works
  - IEC 62941 – Quality control during manufacturing
- PV plant design guidelines:
  - IEC 62548 – Small systems guidelines
  - IEC 62738 – Utility-scale systems guidelines – publish in 2017

### Substantial Completion

**Example Considerations:**
- Local code requirements met
- Commissioning completed
- Component quality verified
- Quality management during installation:
  - Workers trained with oversight
  - Any design changes reviewed
  - Continuous improvement
- Performance check
  - Does power output match the design?

**Example Standards Referenced:**
- IEC 62446-1 – Commissioning
- IEC 63049 – Quality management for installation process
- IEC 61724-2 – Capacity test
- IECRE OD-401



### Annual Performance

**Example Considerations:**
- Based on measured weather and original model, does plant perform as expected?
  - Energy availability (e.g. if inverters break, the plant could be "off line" and unavailable)
  - Performance index (measured performance divided by expected performance based on measured weather)
- O&M costs
  - Relative to planned cost, how much did it cost to keep the plant running?

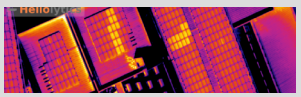
**Example Standards Referenced:**
- IEC 61724-3 – Energy test
- IECRE OD-402

***At end of year:***
***Performance index: 100%***
*Delivered 100% of expected energy*
*(calculated from model and measured weather)*
***Energy availability: 99%***
*Plant was functioning to deliver 99% of energy*
***O&M costs: 90% of planned costs***

### Asset Transfer

**Example Considerations:**
- Has plant output been consistent with original model?
- Have O&M costs been consistent with original model?
- Is there evidence of problems to come? (Cracked cells, weeds growing through the modules, hot spots)

**Example Standards Referenced:**
- IEC 61724-3 – Energy test
- IEC 63049 – Quality management of O&M service
- IEC 62446-2 – O&M guide
- IEC 62446-3 – Plant inspection
- IECRE OD-404



***IECRE implementation***

*1. Only IECRE-accredited organizations can issue certificates*
***Each organization must demonstrate competency to ensure credibility of issued certificates***

*2. Peer review process ensures consistency*
***Variation in implementation are identified during peer reviews***

*3. Data sets are standardized for easy comparison*
***Align performance metrics so data can be compared directly***

***Three ways to participate in IECRE:***

*1. Want to leverage the IECRE process?*
***Write IECRE certification as contractual requirement in your next RFP***

*2. Want to issue IECRE certificates?*
***Use OD-406 at iecre.org/documents/refdocs/***

*3. Want to contribute to improving IECRE implementation?*
***Become a member at iecre.org/members/bodies/***

***International Standards***

IEC → *Technical standards* → IECRE → *Certificates for system*

*IEC Technical Committee 82 writes technical standards; IECRE implements these*

***IEC and IECRE standards and certificates are available for use today to reduce uncertainty and streamline the due diligence processes***
***Visit: iecre.org***
***IECRE is currently processing 14 applications for organizations to become Certifying or Inspecting Bodies. Visit: iecre.org/members/certification/***

(If needed, use this space to credit NREL Center and/or DOE program that supported the work.)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