

***GRID INTERCONNECTION
ARRANGEMENT***

TO ADDRESS THREE MAJOR ISSUES:

- *Safety*
- *Power Quality*
- *Metering*

TYPES OF DISTRIBUTED GENERATING PLANT

- *Inverter*
- *Induction Machine*
- *Synchronous Machine*

INVERTER

Used for Photovoltaic Power

Characteristics:

- *Low Inertia (fast response)*
- *Low fault current capability (less than 1.2 times normal current)*
- *Low power quality (major harmonic distortion)*

INDUCTION MACHINE

Used for Wind Power

Characteristics:

- *High Inertia (slow response)*
- *Medium fault current capability (6 times normal current)*
- *Good power quality*
- *Low power factor (Reactive drawal as high as 60% of rated power at full load)*

SYNCHRONOUS MACHINE

Characteristics:

- *High Inertia (slow response)*
- *High fault current capability (10 times normal current)*
- *Good power quality (low harmonic distortion)*
- *Power factor controllable, hence no issue*

OTHER ISSUES

Islanding issues:

- *Unintentional Islanding*
- *Intentional Islanding*

Islanding is a situation where a portion of an electrical system that contains loads and generator source, is isolated from the rest of the system, but remains energised

ISLANDING (CONTINUED)

Major safety issues arise when a system fails to detect loss of utility power and continues to energise an isolated section of the utility grid

UNINTENTIONAL ISLANDING

Three primary concerns related to lack of utility control over unintentional islanding:

- *Shock hazards for utility line personnel*
- *Damage to equipment resulting from low quality power production by islanded generation*
- *Interference with protection functions such as reclosing*

A strong provision for utility disconnect is essential

POWER QUALITY

- *Harmonics*
- *Power Factor*
- *DC Injection*
- *Flicker*

Agreements to be designed in a manner to control the above harmful effects

METERING

- *Two separate Metering/Billing – Import & Export*

Or

Net Metering/Billing

- *If Net Metering - How TOU consumers will be addressed*
- *What will be the period of netting – Monthly or Annual or any suitable intermediate cycle*

WEST BENGAL RULES

West Bengal Grid Code notified:

- Connectivity conditions laid down, covering:
 - *Connection procedure*
 - *Connection point / voltage*
 - *Compliance requirement*
 - *Protection*
 - *Metering*
 - *Connection Agreement*

Connection Agreement to contain above provisions