

## Day 1 – Foundation Modules

### Power System Fundamentals

- Structure of power systems – Generation, Transmission, Distribution
- Introduction to Renewable Microgrids
- Overview of Electricity Generation Technologies
- Power System Monitoring, Measurement, Analysis and Modeling Power system Reliability and Security

### Power System Dynamic Performance & Stability

- Power system Dynamic Performance & Stability (frequency, voltage, reactive power, fault ride-through, system strength/fault levels, power quality, protection systems)
- Why HVDC? When HVDC?

### Power Electronics Fundamentals

- Three phase converter and PWM and Modeling
- Power Quality, Harmonics and Distortion
- HVDC Converters

### Energy Storage Technologies

- Battery Energy Storage (including EV's)
- Pumped Hydro Storage
- Thermal
- Compressed Air Energy Storage

### Wind Generation

- Global Wind Market, Resource and Technology Trends
- Wind Generation fundamentals
- Designing, operating and maintaining wind farms

Course Timing	08.00 am to 05.00 pm
Tea	10.00-10.30 am &
Break	03.00-03.30 pm
Lunch	12.00pm to
break	01.00 pm

## Day 2 – Renewable Generation Technologies

### Solar Photo Voltaic Systems

- Global PV Market, Resource and Technology Trends
- Solar Photovoltaic fundamentals
- Solar PV Cell and Module Engineering
- Solar PV Reliability, Failure Modes and Mechanisms
- Solar PV systems : Basic System Design and Modeling
- Grid Inverters and their Control – (tentative) Lightning Protection of Outdoor Renewable Energy Equipment

### Overview of Global Energy Markets and Trends

- Examples of Market Structures
- Wholesale/spot markets, Power Purchase Agreements
- Incentivizing Renewables: Tariff Structures, Feed-in Tariffs, Net vs. Gross Metering

### Fundamental economic costing concepts

- Capital costs
- Fuel costs, O&M
- LRMC, SRMC and Lifecycle Costing/LCOE
- Technology Cost Trends

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Tea Break	10.00-10.30 am & 03.00-03.30 pm
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## Day 3 – Energy Markets & Economics, Regulation and Grid Codes

### National Grid/Electricity Codes/Rules

- Singapore
- Australia
- Regional Grid codes

### Renewable Energy Integration

- Technical, Economic and Regulatory Considerations, Challenges & Opportunities

### International Case Study Examples

- Australia/South Australia
- Tasmania
- Hawaii
- Ireland
- Texas
- South-west USA

### Projects and presentation

Course Timing	08.00 am to 05.00 pm
Tea Break	10.00-10.30 am & 03.00-03.30 pm
Lunch break	12.00pm to 01.00 pm