

The 2007 ngNOG Workshop on Network Technology, Power and Policy

Track APT – Energy Planning and Appropriate Power Technology: focused on Energy Planning for Networks, backups, and alternative power technologies for networks in energy-challenged environments.

Track APT – Energy Planning and Appropriate Power Technology

DAY 1: Renewable Energy Sources (Definition):
Solar, Wind, Micro-hydro, Bio-gas, Geo-thermal, Hydrogen, Oceanic

1. a. **Solar power Technology & Applications**
 - *History and Development*
 - *Photo-voltaic modules (Crystalline, Polycrystalline & Amorphous silicon (Uni-solar))*
 - *Irradiance & The Concept of Sun Hour*
 - *Electrical Specifications of PV*
 - *Location of Array*
 - *Wiring the PV*
 - *The PV Power Curve*
- b. **Back-up's**
 - *Inverters (Modified sine wave, Sine wave)*
 - *Inverter Functions (Battery Charging, High & Low Voltage Shut-off, Search function, Generator & Grid tie-in)*
 - *Stacking Inverters*
 - *Essential Accessories*
 - *Computer Interface*
2. **DAY 2:**
 - a. **Battery Technology & Charge Controllers**
 - *AC & DC Electricity*
 - *The Battery Cell*
 - *Battery Types (Flooded, AGM, Gel, Vented - VRLA etc.)*

- *Comparative Analysis of Battery Types*
 - *The Chemistry in Battery Charging (Electrolysis)*
 - *Gassing*
 - *Battery Temperature*
 - *Battery Charging Operation (Bulk, Absorption, Float & Equalization Charging)*
- b.
- *Causes of Battery Failure (Sulphation, Sludging, Positive plate growth, Negative plate shrinkage, Warping, Other causes.*
 - *Battery Management (Precautions and Location of Batteries, Determining the State of Charge, Using the hydrometer, Temperature correction)*
 - *Charge Controllers*
 - *Wind Generator Controllers*
 - *Other Uses for Controllers (Load Controller, Diversion Load Controller)*
 - *MPPT Technology*
3. **DAY 3:** a. **Wind power**
- *Functions*
 - *Features of a Wind Generator (Types of Wind Gen. - AC or DC)*
 - *Towers (lattice, Pole, Guyed)*
 - *Location of a Wind Generator*
 - *Determination of Availability of Wind Resources (Wind map, Griggs Putnum Wind Energy Index)*
- b.
- *Local Laws & Regulations (Utility Company & NERC Requirements, Incentives & Rebates)*
 - *General Operation*
 - *Installation*
 - *Accessories*
 - *Wiring*
 - *Batteries*
 - *Radio Interference*
 - *Other Applications (Water Pumping, Streetlight etc)*
4. **DAY 4:** a. **System sizing, System Design & System Protection**
- *Load Management Exercise*
 - *Load Sizing*

- *PV, Wind Gen. Hydro power system &/or Back-up power system Sizing*
- *System Design*
- *Cable Sizing*
- *Protection & accessories (Charge Controllers, Battery Temperature Sensor, Monitoring Equipment, Auto-Gen-Start etc.)*
- *System Monitoring*
- *System Earthing*
- *Warranty Issues*

*b. **Practical Demo/Case Study***