SUZLON ENERGY LTD.

Wind Energy Projects

- Best Practices

Issues & Challenges

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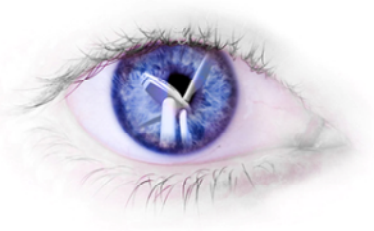


Vision.

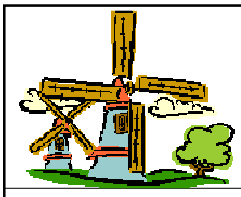
Practice -
A repetitive application methodology to produce intended results in a given set of resources and circumstances.

...Being the best
Achieving significantly higher than the expectation

*To achieve this **Vision**, we have to achive **:***

Best Practice Vision

- *Quality*
- *Cost*
- *Speed*



…Best Practices

Level Playing Field

- ✓ *Every industry has best practices.*
- ✓ *Best Practices get established over the years*
- ✓ *Function of resources – Technology, Finance, Time, People & Attitude.*
- ✓ *Systems & Infrastructure influences best practices.*
- ✓ *Objectives set the course.*
- ✓ *'Planning' defines the 'means' and 'results' the 'end'.*
- ✓ *Benchmarking is an accepted practice of emulation.*

Wind Energy Projects
(Best Practices)

Project Related

- ✓ *Site Selection*
- ✓ *Project Feasibility*
- ✓ *Detailed Assessment*
- ✓ *Project Application*
- ✓ *Construction*
- ✓ *Operation*
- ✓ *Decommissioning*

Information Related

- ✓ *Disclosure of Generation details.*
- ✓ *Insurance & Indemnity practices.*
- ✓ *Public filing of land related information.*
- ✓ *Non-serviceability of wind rights.*

Site Selection - - A crucial factor

Influencing Factors

- ✓ *Desk based studies of metrological data.*
- ✓ *Test mast data more accurate.*
- ✓ *Estimation of avg.wind velocity p.a.*
- ✓ *Micro-siting based on land topography*
- ✓ *Calculation of energy density(w/m²)*
- ✓ *Availability of infrastructure:*
  - ❑ *Roads*
  - ❑ *Telecommunication*
  - ❑ *Grid – Transmission & distribution.*
  - ❑ *Maintenance facilities.*
- ✓ *Other factors.*

Site Selection - - Other factors

Influencing Factors

- ✓ *Environmental issues(flora,fauna,erosion…)*
- ✓ *Visibility issues.*
- ✓ *Proximity to dwellings.*
- ✓ *Ecology.*
- ✓ *Archeological / Heritage.*
- ✓ *Recreational usages.*
- ✓ *Conjunction usages.*
- ✓ *Civil / Military airports.*
- ✓ *Restricted areas.*
- ✓ *Safety & security.*
- ✓ *Emergency services.*

Project feasibility

Influencing Factors

- ✓ *Technical feasibility.*
  - ❑ *Wind resource & predictability*
  - ❑ *Grid availability & Plant load factors*
  - ❑ *Technology selection of plant & machines.*
  - ❑ *Power generation*
  - ❑ *Operation & Maintenance*
- ✓ *Commercial feasibility*
  - ❑ *Investments & funding decisions*
  - ❑ *Operation & Maintenance costs*
  - ❑ *Financial & Other benefits*
  - ❑ *Internal rate of returns*
  - ❑ *Break-even analysis.*
- ✓ *Others*
  - ❑ *Statutory, Taxation & legal issues.*

Detailed Project assessment

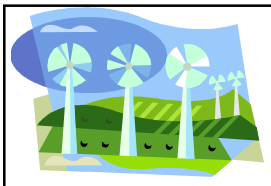
Influencing Factors

- ✓ *Ground conditions (including seismic zones.)*
- ✓ *Site access for heavy vehicles*
- ✓ *Site access for ODC consignments.*
- ✓ *Electricity sub-stations / evacuation.*
- ✓ *Project scoping document.*
- ✓ *Dialoguing with local community.*
- ✓ *Environmental considerations*
  - ✓ *Visual & Landscape assessment*
  - ✓ *Noise assessment*
  - ✓ *Ecological impact assessment.*
  - ✓ *Geological issues (mining / minerals)*
- ✓ *Support from local authorities & EBs.*

Project Application

Influencing Factors

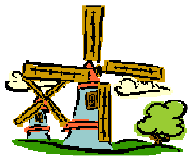
- ✓ *Financial planning & funding arrangements*
- ✓ *Land approvals – Grampanchayat / Forest dept*
- ✓ *Nodal agency project approval*
- ✓ *Local SEB permission for grid interface*
- ✓ *Sales tax registration*
- ✓ *Electrical inspectorate*
- ✓ *Other statutory inspections*
- ✓ *EB certification / charging*



Project Construction

Influencing Factors

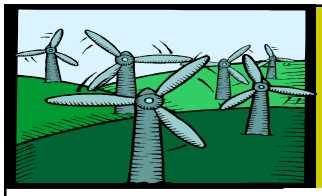
- ✓ *Project planning & scheduling*
- ✓ *Resource mobilization at site*
- ✓ *Dialoguing with local population*
- ✓ *Creation of construction resources*
- ✓ *Phase wise completion*
- ✓ *In-coming quality assurance*
- ✓ *Process quality assurance*
- ✓ *Completion of construction process*
- ✓ *Commissioning*
- ✓ *Generation measurements*
- ✓ *Fine-tuning project performance*



Project Operation

Influencing Factors

- ✓ *To establish a comprehensive manual of operation.*
- ✓ *To keep machine availability + 99%*
- ✓ *Grid availability ? a SEB subject*
- ✓ *Spares management*
- ✓ *Facility management*
- ✓ *Employee training*
- ✓ *Operational MIS*
- ✓ *Fine-tuning & improvements*
- ✓ *Periodic maintenance, repairs and replacements*



De –Commissioning of spent Projects

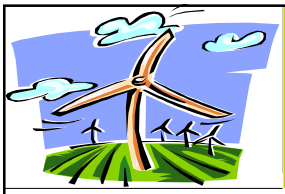
Influencing Factors

- ✓ *Wind mills having outlived their life / useful performance period needs to be de-commissioned.*
- ✓ *De-commissioning may require permission from local authorities.*
- ✓ *Life extension / replacement programmes can be worked out.*
- ✓ *Care should be taken to avoid collateral damage during de-commissioning.*
- ✓ *Depreciation amounts are normally set aside during the useful life period of the equipment.*

Disclosure of Generation details

Influencing Factors

- ✓ *Periodic sharing of generation information is useful to build a strong databank for further investment.*
- ✓ *Information sharing includes energy generated, avg. wind velocities, power factor, RKVAH, grid availability, machine availability etc.*
- ✓ *Disclosure of power purchase agreement and service level agreements is beneficial to potential investors.*
- ✓ *Any unforeseen issues that have profound impact on the generation of wind energy should also be shared.*



Insurance & Indemnity practices

Influencing Factors

- ✓ *Currently, the equipment and parts are covered by insurance for accidental break-downs.*
- ✓ *When the industry matures and backed up by a strong industry association, it may be possible to insure performance also.*
- ✓ *The current industry practice is to guarantee energy generation (or PLF) to the investor.*
- ✓ *Machine availability is also guaranteed by the wind farm developer.*
- ✓ *However, grid availability is the most important factor to be ensured by SEB.*
- ✓ *Currently, some SEBs Owe money to wind mill customers against power purchased.*

Excellence as a Habit…

Industry Strives on Best Practices

- *Integrate "Best Practices" into SOPs*
- *Minimize adverse impacts through project design and mitigation (if need arises)*
- *Make the environmental case for wind strongly to NGOs and regulators.*
- *Start early on permissions and spend quality time on education of regulators and investors.*
- *Develop best industry association with transparency in information sharing and symbiotic relations with society.*
- *EDUCATE, EDUCATE and EDUCATE on the Green Power for Future.*