

ELG4126

# Portfolio of Three Case Studies

Draw a block diagram for a complete power system starting from a power plant and ending with a utilization system (city, for example).

Connect your 3 projects (case studies) to the appropriate sections of the power system (block diagram). The block diagram makes the first page of your portfolio. 15-20 pages should be enough for the entire submission.

# Phase 1: Wind Farm

- Conduct a feasibility study for initiating a profitable wind energy farm in Ontario. You may add electricity storage to your project to benefit from the peak premium! Generally the development and operation of a wind farm can be subdivided into the following four steps:
- **Initiation and Feasibility (concluded by go/no-go)**
  - Municipal consultation.
  - Site selection and wind assessment (proposed site; available wind resource; wind power forecasting)
  - **Technical feasibility:** Description of candidate turbines; See next page!
  - Main risk assessment: Obstacles and impacts.
  - Planning requirements of local authorities.
  - Economics based on annual energy production: Revenue, costs, economic indicators.
- **Prebuilding (concluded by go/no-go)**
  - Wind farm design including energy yield predictions (wake losses; grid losses; availability)
  - Planning procedures (environmental issues; noise; visual impact; safety)
  - Grid connection
  - Selection of suppliers
  - Project financing.
- **Building**
  - Overview of the building process
  - Quality control during production and construction
  - Commissioning and handover.
- **Operation and Maintenance**
  - Daily operation
  - Warranties and insurance
  - Maintenance and repair.

# Phase 2: Hybrid Distributed Generation System

- Conduct a feasibility study for initiating a profitable hybrid (photovoltaic [40 kW) + diesel (40 kW)] Standalone/Grid-connected distributed generation system. You may add fuel cells, wind turbines, and electricity storage to your project to benefit from the peak premium! Generally the development and operation of a hybrid generation system can be subdivided into the following four steps:
- **Initiation and Feasibility (concluded by go/no-go)**
  - Municipal consultation.
  - Site selection and solar assessment (proposed site; available solar energy)
  - **Technical feasibility:** Description of candidate technologies!
  - Main risk assessment: Obstacles and impacts.
  - Planning requirements of local authorities.
  - Economics based on annual energy production: Revenue, costs, economic indicators.
- **Prebuilding (concluded by go/no-go)**
  - Hybrid farm design including energy yield predictions (intensity, estimated snowfall, grid losses; availability)
  - Planning procedures (environmental issues; noise; visual impact; safety)
  - Grid connection
  - Basic mounting options and tracking considerations.
  - Selection of suppliers
  - Project financing.
- **Building**
  - Overview of the building process
  - Quality control during production and construction
  - Commissioning and handover.
- **Operation and Maintenance**
  - Daily operation
  - Warranties and insurance
  - Maintenance and repair.

# Phase Three

## Sustainable Development for Electrical Engineers

- Conduct a feasibility analysis for initiating a profitable electrical sustainable development for an existing load (building, neighbourhood, small town, part of a town or downtown, etc.). Generally the development can be subdivided into the following four steps:
- **Initiation and Feasibility (concluded by go/no-go)**
  - Consultation.
  - Existing electrical situation assessment (lighting; machines, conductors, etc.)
  - **Technical feasibility:** Description of candidate technology replacements!
  - Obstacles and impacts
  - Planning requirements
  - Economics based on annual energy consumption.
- **Prebuilding (concluded by go/no-go)**
  - Design of new electrical loads and specifications
  - Planning procedures (environmental issues; noise; visual impact; safety)
  - Selection of materials
  - Project financing.
- **implementation**
  - Overview of the process
  - Quality control during implementation
  - Commissioning and handover.
- **Operation and Maintenance**
  - Daily operation
  - Warranties and insurance
  - Maintenance and repair.