

Networks operation

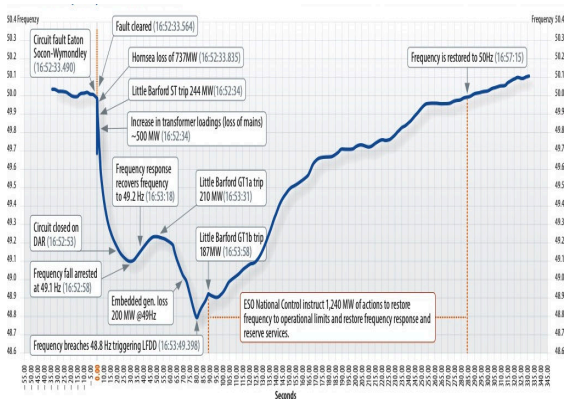
Ref : T - ENERSOLE – SYS-1.001-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- Basic knowledge of electrical networks



Objectives :

- Know the main architectures of networks dispatch centres
- Know the load and generation forecasts principles
- Understand the concepts of networks stability
- Understand networks defence plans
- Introduction to electricity market

Content :

- Introduction to networks operation principles
- Dispatch centres architectures
- Forecasting of loads and generations from day-ahead to year-ahead
- Concepts of primary, secondary and tertiary reserves along with inertia involved in networks stability
- Networks defence plans and risks management
- Electricity market mechanisms

Power system planning

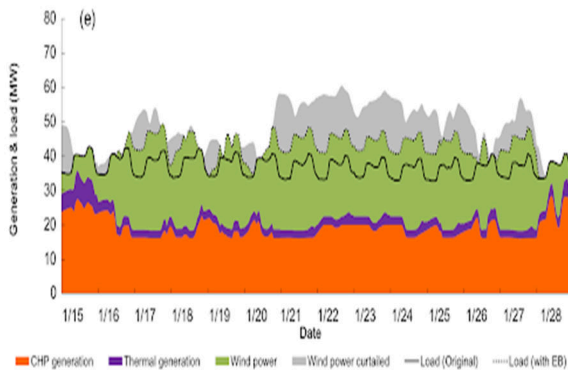
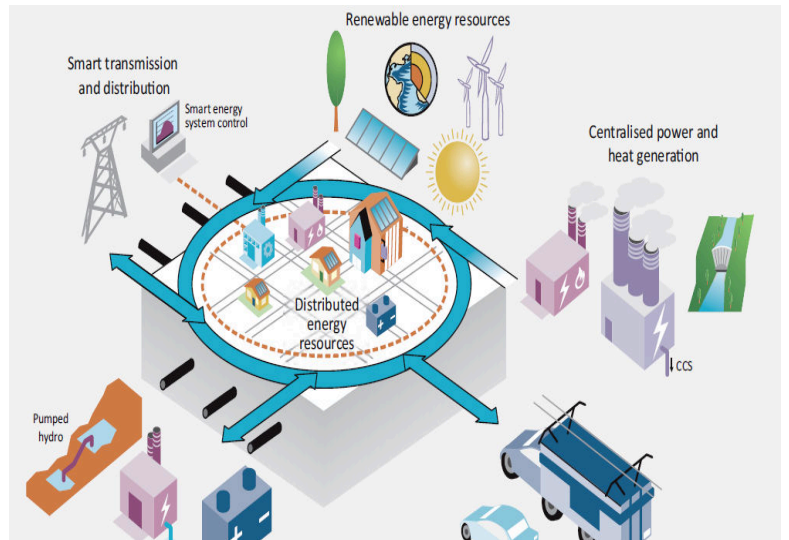
Ref : T - ENERSOLE – SYS-1.002-A

Attendants :

- Engineers

Prerequisites:

- Basic knowledge of electrical networks
- Commercial software (Plexos,...)



Objectives :

- Know the basic knowledge of power system planning
- Understand numerical modelling requirements
- Know how to validate simulations results

Content :

- Introduction to power system planning
- Generation, transmission and distribution Master planning
- Investments techno-economic and cost-benefit analyses
- Grid code requirements elaboration

Grid impact studies

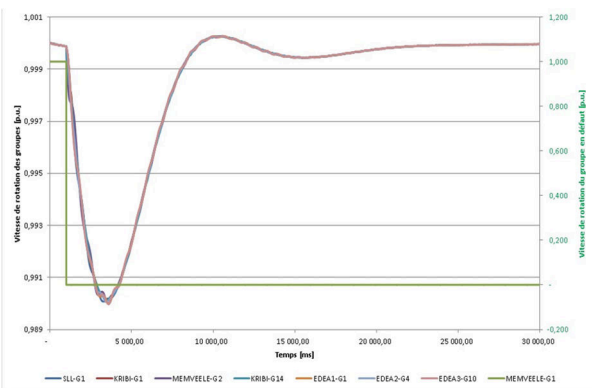
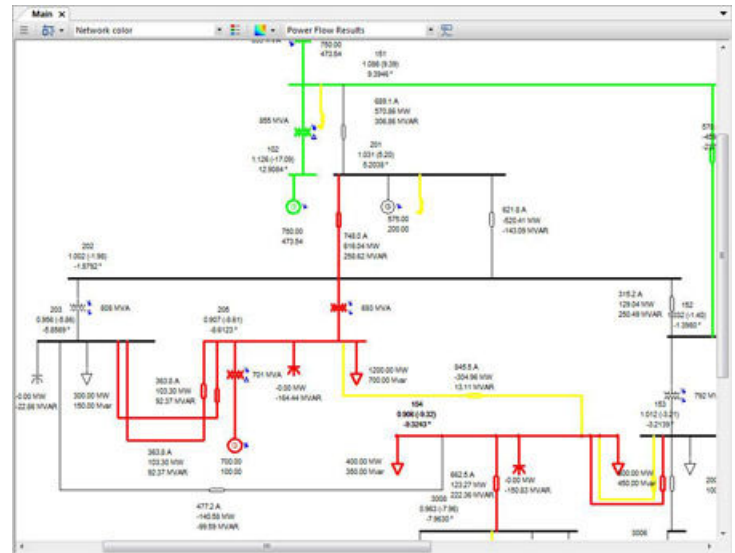
Ref : T - ENERSOLE – SYS-1.003-A

Attendants :

- Engineers

Prerequisites:

- Basic knowledge of electrical networks
- Commercial software (CYME, POWER FACTORY, PSS/E, ETAP)



Objectives :

- Know the basic knowledge of grid impact studies
- Understand numerical modelling requirements
- Know how to validate simulations results
- Introduction to power system planning

Content :

- Introduction to grid impact studies
- Probabilistic analysis and techno-economic optimization of units dispatch
- Static analysis
 - Load flow analysis
 - N-K contingencies analysis
 - Short-circuit currents analysis
 - Voltage ride through analyses (LVRT, HVRT)
 - Harmonic analysis
 - Voltage plan and reactive compensation optimization
- Dynamic analysis
 - Transient voltage and frequency stability analyses
 - Small signals stability analysis

Networks studies

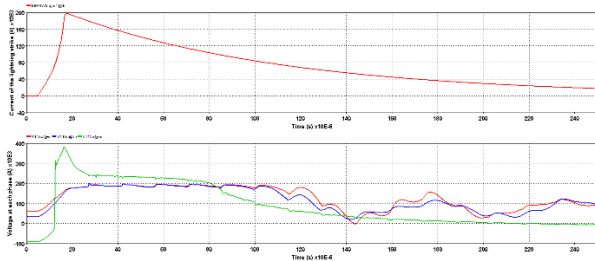
Ref : *T - ENERSOLE – SYS-1.004-A*

Attendants :

- Engineers

Prerequisites:

- Basic knowledge of electrical networks
- Commercial software (EMTP-RV, WASP, PLEXOS, CYME, POWER FACTOR, PSS/E,...)

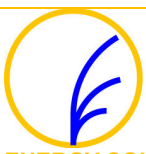


Objectives :

- Know the basic knowledge of network studies
- Understand numerical modelling requirements
- Know how to validate simulations results

Content :

- Introduction to network studies
- HVDC and HVAC cross-border interconnections analysis
- Battery energy storage systems assessment
- Protection systems coordination studies
- Incidents analysis



Energy evacuation works maintenance

Ref : T - ENERSOLE – E-1.001-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- Basic knowledge of electrical networks



Objectives :

- Know the main architectures of energy evacuation works
- Understand the main design criterion
- Know the maintenance requirements
- Identify the costs of maintenance

Content :

- Introduction to transmission lines and switchyards main architectures
- Maintenance policies and rules for switchyards and transmission lines
- Costs of equipment replacement or repair along with supply shortages
- Planning of maintenance activities
- Documents of reference



Design of switchyards

Ref : T - ENERSOLE – E-1.002-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- None

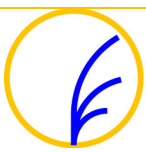


Objectives :

- Know the role of switchyards in power systems
- Understand the main elements constituting a switchyard
- Know the different types of architectures of switchyards
- Understand the designing criterion of a switchyard
- Know the maintenance requirements

Content :

- Introduction to switchyards in transmission and distribution systems
- Elements constituting a switchyard
- Main architectures of switchyards and associated protection policies
- Switchyards main components sizing criterion
- Costs and planning



Design of high voltage overhead transmission lines

Ref : T - ENERSOLE – E-1.003-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- None



Objectives:

- Understand the principles of mechanical, electrical and economical calculations of high voltage overhead transmission lines
- Know the manufacturing, erection and testing methods
- Understand the maintenance requirements

Content :

- Introduction to overhead transmission lines in power systems
- Elements constituting a transmission line
- Main electrical, mechanical, environmental and economical sizing criterion
- Manufacturing and erection process
- Maintenance costs and planning

Design, operation and maintenance of photovoltaic power plants

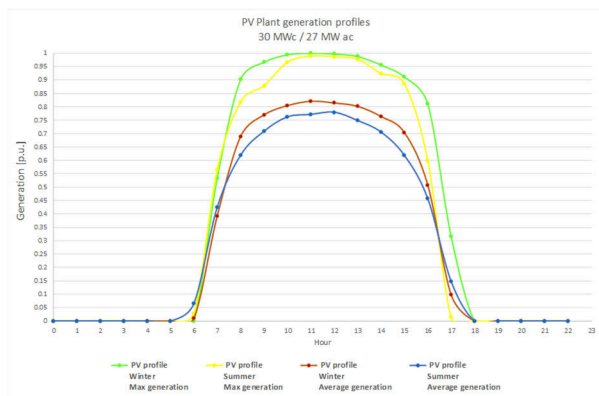
Ref : T - ENERSOLE – ENR-1.001-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- Basic knowledge of electrical networks



Objectives :

- Know the basic knowledge of PV plants
- Know the design criterion of a PV plant
- Know how to operate and maintain a PV plant

Content :

- Introduction to solar and photovoltaic energy
- Estimation of sites solar potential
- Photovoltaic technologies and marketplaces
- PV plants design and grid integration studies
- PV plants operation and maintenance

Design of hydroelectric power plants

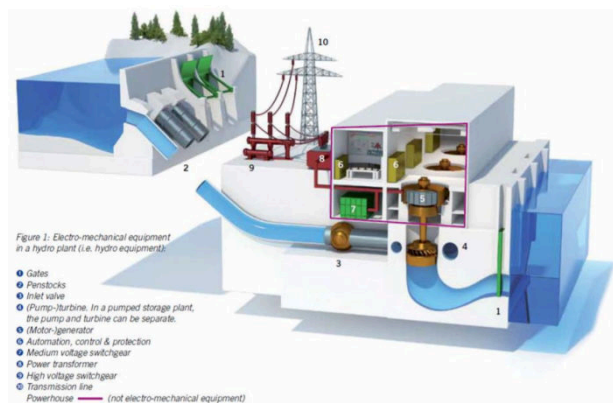
Ref : T - ENERSOLE – HY-1.001-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- None



Objectives :

- Understand the hydropower marketplace in the world
- Know the different elements of a hydroelectric power plant
- Know the main designing criterion

Content :

- Introduction to hydroelectric power plants
- Elements of the water way
- Different types of hydraulic turbines and their fields of application
- Regulation systems (mechanical and electrical systems)
- Energy evacuation works (transmission lines and switchyards)
- hydroelectric power plants sizing
- Costs and planning
- Case study

Design of hydroelectric generators

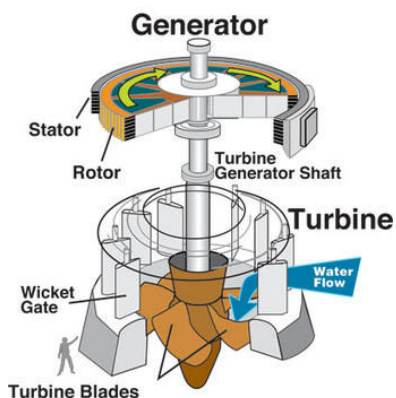
Ref : T - ENERSOLE – HY-1.002-A

Attendants :

- Engineers
- Technicians

Prerequisites:

- Basic knowledge of hydroelectric power plants



Objectives :

- Know the main design criterion of hydroelectric generators
- Understand the manufacturing and installation process
- Know the commissioning tests and maintenance requirements

Content :

- Introduction to hydroelectric generators
- Electric and electromagnetic sizing
- Types and selection of excitation systems and power system stabilizers
- Manufacturing of components and assembly
- Commissioning tests and maintenance requirements
- Costs and planning
- Innovations

N°	Reference	Topic	Content	Main objectives	Program	Duration	Price	Trainers
1	T - ENERSOLE – SYS-1.001-A	Power systems	Networks operation	<ul style="list-style-type: none"> •Know the main architectures of networks dispatch centres •Know the load and generation forecasts principles •Understand the concepts of networks stability •Understand networks defence plans •Introduction to electricity market 	<ul style="list-style-type: none"> •Introduction to networks operation principles •Dispatch centres architectures •Forecasting of loads and generations from day-ahead to year-ahead •Concepts of primary, secondary and tertiary reserves along with inertia involved in networks stability •Networks defence plans and risks management •Electricity market mechanisms 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
2	T - ENERSOLE – SYS-1.002-A	Power systems	Power system planning	<ul style="list-style-type: none"> •Know the basic knowledge of power system planning •Understand numerical modelling requirements •Know how to validate simulations results 	<ul style="list-style-type: none"> •Introduction to power system planning •Generation, transmission and distribution Master planning •Investments techno-economic and cost-benefit analyses •Grid code requirements elaboration 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
3	T - ENERSOLE – SYS-1.003-A	Power systems	Grid impact studies	<ul style="list-style-type: none"> •Know the basic knowledge of grid impact studies •Understand numerical modelling requirements •Know how to validate simulations results •Introduction to power system planning 	<ul style="list-style-type: none"> •Introduction to grid impact studies •Probabilistic analysis and techno-economic optimization of units dispatch •Static analysis <ul style="list-style-type: none"> oLoad flow analysis oN-K contingencies analysis oShort-circuit currents analysis oVoltage ride through analyses (LVRT, HVRT) oHarmonic analysis oVoltage plan and reactive compensation optimization •Dynamic analysis <ul style="list-style-type: none"> oTransient voltage and frequency stability analyses oSmall signals stability analysis 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
4	T - ENERSOLE – SYS-1.004-A	Power systems	Networks studies	<ul style="list-style-type: none"> •Know the basic knowledge of network studies •Understand numerical modelling requirements •Know how to validate simulations results 	<ul style="list-style-type: none"> •Introduction to network studies •HVDC and HVAC cross-border interconnections analysis •Battery energy storage systems assessment •Protection systems coordination studies •Incidents analysis 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
5	T - ENERSOLE – E-1.001-A	Electrical equipment	Energy evacuation works maintenance	<ul style="list-style-type: none"> •Know the main architectures of energy evacuation works •Understand the main design criterion •Know the maintenance requirements •Identify the costs of maintenance 	<ul style="list-style-type: none"> •Introduction to transmission lines and switchyards main architectures •Maintenance policies and rules for switchyards and transmission lines •Costs of equipment replacement or repair along with supply shortages •Planning of maintenance activities •Documents of reference 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
6	T - ENERSOLE – E-1.002-A	Electrical equipment	Design of switchyards	<ul style="list-style-type: none"> •Know the role of switchyards in power systems •Understand the main elements constituting a switchyard •Know the different types of architectures of switchyards •Understand the designing criterion of a switchyard •Know the maintenance requirements 	<ul style="list-style-type: none"> •Introduction to switchyards in transmission and distribution systems •Elements constituting a switchyard •Main architectures of switchyards and associated protection policies •Switchyards main components sizing criterion •Costs and planning 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
7	T - ENERSOLE – E-1.003-A	Electrical equipment	Design of high voltage overhead transmission lines	<ul style="list-style-type: none"> •Understand the principles of mechanical, electrical and economical calculations of high voltage overhead transmission lines •Know the manufacturing, erection and testing methods •Understand the maintenance requirements 	<ul style="list-style-type: none"> •Introduction to overhead transmission lines in power systems •Elements constituting a transmission line •Main electrical, mechanical, environmental and economical sizing criterion •Manufacturing and erection process •Maintenance costs and planning 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
8	T - ENERSOLE – ENR-1.001-A	Photovoltaic power plants	Design, operation and maintenance of photovoltaic power plants	<ul style="list-style-type: none"> •Know the basic knowledge of PV plants •Know the design criterion of a PV plant •Know how to operate and maintain a PV plant 	<ul style="list-style-type: none"> •Introduction to solar and photovoltaic energy •Estimation of sites solar potential •Photovoltaic technologies and marketplaces •PV plants design and grid integration studies •PV plants operation and maintenance 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
9	T - ENERSOLE – HY-1.001-A	Hydro power plants	Design of hydroelectric power plants	<ul style="list-style-type: none"> •Understand the hydropower marketplace in the world •Know the different elements of a hydroelectric power plant •Know the main designing criterion 	<ul style="list-style-type: none"> •Introduction to hydroelectric power plants •Elements of the water way •Different types of hydraulic turbines and their fields of application •Regulation systems (mechanical and electrical systems) •Energy evacuation works (transmission lines and switchyards) •hydroelectric power plants sizing •Costs and planning •Case study 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer
10	T - ENERSOLE – HY-1.002-A	Hydro power plants	Design of hydroelectric generators	<ul style="list-style-type: none"> •Know the main design criterion of hydroelectric generators •Understand the manufacturing and installation process •Know the commissioning tests and maintenance requirements 	<ul style="list-style-type: none"> •Introduction to hydroelectric generators •Electric and electromagnetic sizing •Types and selection of excitation systems and power system stabilizers •Manufacturing of components and assembly •Commissioning tests and maintenance requirements •Costs and planning •Innovations 	Upon request	Upon quotation	A. BATHILY Senior Power System Engineer