
COURSE DESCRIPTION

CHS060 – Smart Grid the Power System of the Future – Fundamentals & Applications

Course goal

The participants become familiar with the power system of the future commonly named smart grid. They understand the requirements and trends of this future power system and learn the key definitions of smart grid. They are aware about the interdependency between technology and business in power systems. They understand the requirements of this future power system in detail and learn some key solution for smarter grids.

Main learning objectives

The participants will be able to:

- Become aware about the trends for future power systems
- Explain the driving forces for the evolution of the power system towards a smart grid
- Explain the power system of the future with all its essential components and functions
- List in addition to the conventional energies also the alternative (renewables) ones with their potential, risks and ecological footprints
- Understand the need for energy storage in the power system on all levels and the most common storage technologies
- Compare the benefits and drawbacks of centralized and decentralized power production
- Explain the impact of the connection points of renewables on the future grid structure
- Describe the mechanism and benefits of Microgrids
- Explain the concept of DC homes
- Understand the special importance of stability in power systems
- Explain how the increasing smartness of the market results in a better balance between generation and consumption
- List some functions which are needed for the transition from today's power systems to the smart grids of the future
- Summarize the smart solutions for the power system of the future

Participant profile

Technical people like consultants, lead engineers, people being responsible for the power system design and operation strategy. Engineers working on solutions in some area of the smart grid. Technical personnel of ABB companies

Prerequisites

Engineering degree, technical college qualifications or equivalent.

Recommended courses or equivalent experience:

- CHS100 Power System Technology

Topics

- Introduction: Driving forces towards the power system of the future (smart grid)
 - Ecological foot print of generation*
 - Fuel production and waste deposit*
 - CO₂ and other impacts on environment*
 - Impact on climate*
- Power systems
 - Generation, transmission and distribution, consumption*
 - Power systems today and tomorrow*
 - Ecological aspects, CO₂, pollution, waste*
 - New elements in future power systems: renewable volatile generation, HVDC, FACTS, energy storage*
 - Changes in power system topology*
 - Communication for substation automation and protection*

- Type and potential of renewables
Hydro, solar-thermal, solar-photovoltaic, wind, biomass, geo-thermal
- Energy storage for volatile production
Pump storage schemes, fly-wheels, pressurized gas storage, batteries, thermal storages, H2 (fuel cells)
- Centralized vs. decentralized production
Centralized: *Conventional power plants (nuclear, fossil), big hydro, wind and solar plants, long lines*
Decentralized: *CHP, small hydro, biomass, solar-photovoltaic, short lines*
- Grid structure impacted by generation in-feed
Input of renewables complementing or replacing conventional generation at transmission level
long transmission lines (HVDV), HVDC superimposed transmission grid
Input of renewables at distribution level: meshed distribution grids with upgraded protection and control schemes
- Smarter grids
Microgrids for local balance of generation and consumption (“wanted islands”), net of Microgrids
DC homes
Stability of grids with renewables and producing consumers
- Smarter energy markets
Demand-response schemes
Incentives in consumer contracts
Smart consumers
Smart energy market
- Global view

Global production capacities vs. global consumption needs

- Global grids
Secondary systems enabling smartness
Control, automation, protection, communication
- Investments
Production, transmission and distribution grid, reduction of energy consumption

Course type

This is a face to face class room training with maximum 12 participants.

Learning methods and tools

Lectures, demonstrations, mini-workshops.

Laptop or tablet is required to have access to the e-documentation. Please bring your own device

Duration

4 days

To Register:

LMS:-MyLearning

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