Practical Information

When?
13 - 17 september 2010

Where?
HOWEST Dept. GKG
Address: Graaf Karel de Goedelaan 5
8500 Kortrijk - Belgium
Contact: + 32 (0)56 24 12 39 - Jan Desmet
jan.desmet@howest.be
+ 32 (0)56 24 12 35 - Bart Verhelst
bart.verhelst@howest.be

Where to stay?
For a list with hotels and prices contact:
jorg.baeten@cogenvlaanderen.be

How to get there?
Kortrijk is approx. 100 kms west of Brussels.
Brussels Airport – Kortrijk by train: 1h30, 3 times/hour.
30 min. by train or car from Lille.

Registration fees
- Members of COGEN Vlaanderen or COGEN Europe:
  - Parts 1 & 2: € 1850
  - Part 2: € 1700
- Non-members:
  - Parts 1 & 2: € 2100
  - Part 2: € 1850
- Sponsoring with participation: € 2500
  The logo of your organisation will be printed on the syllabus and you will be given the opportunity to distribute an informational map of your company among the participating sponsor.
- Students: € 325

Sponsorship
We give companies the chance to promote themselves without participating in the course. For a sponsor fee of € 500 you will have the same sponsorship-package as mentioned above.

Registration fee includes
Lunches, refreshments, dinner on wednesday and syllabus.

Registration
You can register by any of the methods outlined on the registration form.

Considering the interactive character, the course is limited to 25 participants. Final day to register is september 6th.

Registration Form

Participant Details

☐ Dr ☐ Mr ☐ Mrs ☐ Ms
☐ Miss ☐ Other .....

Surname: .....
First name: .....
Job Title: .....
Tel.: .....
Fax: .....
E-mail: .....

☐ Members of COGEN Vlaanderen, COGEN Europe
☐ Other: .....
☐ Sponsors with participation
☐ Sponsors without participation
☐ Students

Company Details
Company name: .....
Nature of Business: .....
Address: .....
Town/City: .....
Postcode: .....
Country: .....
VAT N°: .....

Register today by either of these Methods
Website: www.cogenvlaanderen.be
E-mail: mail this registration form to
jorg.baeten@cogenvlaanderen.be
Fax: Fax the completed form(s) to COGEN Vlaanderen
+32 (0)16 62 18 91

Payment methods
- You will receive an invoice.
VAT: VAT is only chargeable for the Belgian delegates at the rate of 21%.

***Substitution/Cancellation Policy**: Please remember: if you cancel at any time up to September 2nd 2010, we will refund all fees less a 20% cancellation charge. After this date there will be no refunds. If you are unable to attend for any reason, you may make substitutions at no extra charge but we would appreciate prior notification of the substitute delegate's details.*

Date .....

Signature .....

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jorg.baeten@cogenvlaanderen.be • www.cogenvlaanderen.be

COGEN Vlaanderen

COGEN europe

Ecole d'Ingénieurs Centre de Recherche Mines de Douai LILLE EUROREGION

howest De Hogeschool West-Vlaanderen

13-17 september 2010, Kortrijk - Belgium

BASE COURSE ON COGENERATION

10th Edition !

Under auspices of COGEN Europe

Cogeneration is decentralised production; this means it has a major advantage to implement this system in installations where heat and electrical energy are being used. In order to understand both, advantages and implementation of CHP, it is essential to have sufficient knowledge about this energy-efficient technology.

This course on cogeneration is much more than a classic course on cogeneration. It is a combination of lectures and practical sessions (labs and computer sessions) that will allow you to receive a good basic knowledge of aspects related to cogeneration. The course includes a one day basic introduction and a four days advanced course on CHP. During the course a visit to a cogeneration plant is scheduled.

COGEN Europe wishes to encourage educational initiatives concerning CHP, considering it as an efficient way to promote this interesting technology. Therefore COGEN Europe gives its full support to the base course on CHP, which has been given for many years now. The lectures will be given by professors from universities and colleges as well as by senior specialists at CHP-companies and research institutes. According to a survey by COSPP, a renowned magazine specialised in CHP, this course is unique in the world.

Considering the interactive character, the course is limited to 25 participants.

Course is entirely in English

Base Course on CHP 13-17 sept. 2010
Howest Dept. GKG, Kortrijk

PART 1

MONDAY - 13 SEPT.

9h00 - 9h30
Registration
Coffee and light breakfast

9h30 - 9h45
Introduction to the course
To start the course we have a short walk trough the program and we will go over its practical aspects.

9h45 - 11h00
Fundamentals on energetics and the role of CHP
The way human beings use energy is schematically presented in "the four layer approach". The role of CHP in that scheme is discussed. The basic laws of energetics are presented.

11h15 - 12h45
Fundamentals on thermodynamics
This session recalls the basics of thermodynamics and introduces the notion of exergy on several applications.

14h00 - 16h00
Fundamentals on electrical generators
We start of with a review of the operating principles of synchronous and asynchronous generators. After this review, the interaction of the generator with the grid is analyzed. How do we control active and reactive power and what happens when we switch to islanding operation?

16h15 - 17h30
Basics of CHP
From a birds view we look at CHP and answer the following three questions. What is CHP ? Why should CHP be used ? What are the technologies for CHP and their applications ?

PART 2

TUESDAY - 14 SEPT.

9h00 - 10h00
Combustion basics
Basics of combustion for gas, liquid and solid fuels, and concepts on industrial scale applications are presented. An introduction to the main pollutants formation mechanism is given, with special emphasis on NOx.

10h00 - 11h00
From biomass to energy : pretreatment and conversion principles
Biomass can be converted to energy. As a wide range of biomass types is available, several different conversion technologies are applied nowadays. The pretreatment methods, together with the most applied thermal, chemical, biochemical and physical conversion technologies for biomass are presented regarding principle of operation, process conditions,energy carriers and applications. Drawbacks, benefits and future technical challenges are discussed.

11h15 - 12h15
Boilers
Boiler types and technical solutions for air pollution control systems: dust filtration techniques, abatement of acid gases, dioxins and heavy metals.

13h30 - 17h30
Course on gasengines
The engine part of the course explains performance, fuel efficiency and the energy balance of gas engines. Further, the importance of gas quality and fuel flexibility is treated. Also, practical engine aspects for cogeneration installations are highlighted.

WEDNESDAY - 15 SEPT.

9h00 - 11h00
Gas and steam turbines
Axial gas and steam turbines technologies: introduction, functioning principle, isentropic efficiency, action and reaction turbines. Cycles including gas turbines: simple cycle, improved installations and associated efficiencies. Cycles including steam turbines: simple cycle, improved installations and associated efficiencies. Combined gas-steam cycles.

11h15 - 12h15
Practical session 1
Description of a CHP-Unit
Since 1995 a 288 kWe/478 kWth CHP is in use within the laboratory of Industrial Physics and Applied Mechanics. As it is full didactical equipped with 78 registered operating parameters, the installation and files are used to perform energy balances, exhaust gas analysis, sound and vibration measurements. Learn from our 15 years of experience!

14h00
Excursion to CHP-unit & dinner

THURSDAY - 16 SEPT.

9h00 - 11h00
Introduction to ORC
An Organic Rankine Cycle is familiar to the classical steam cycle. It is often designed as a CHP. An overview is given of the ORC technology, application possibilities and the current market supply. The integration of an ORC within an existing CHP is discussed. This offers the possibility to "renew" an old CHP within the scope of the Flemish CHP-certificate system.

11h15 - 12h45
µ-CHP and new technologies
µ-CHP has a lot of opportunities. The most important facts on micro-CHP are explained in combination with new technologies such as Stirling, fuel cell and ORC who are frequently used for smaller systems. A comparison is made between the different technologies and of course we also include the classic gas engine.

14h00 - 15h45
Absorption Cooling and Trigeneration
The thermodynamics of the absorption cooling cycle is explained. Resulting efficiencies and parameters controlling this efficiency are discussed. Current state of the art technology is shown. Trigeneration is defined and a comparison is made with other possibilities of heat and cold production.

16h00 - 17h45
District heating for CHP
District heating makes it possible to connect several heat consumers to a single CHP plant. The goals for energy efficiency and sustainable energy can be met by developing district heating grids with CHP, waste incinerators, biomass, heat pumps and geothermal energy.

FRIDAY - 17 SEPT.

9h00 - 10h30
Grid Connection
After discussing the synchronization aspects of both induction and synchronous generators, grid connection problems and grid quality with respect to CHP generator will be discussed. Dimensioning of CHP generators in case of non linear load conditions are analyzed. Some technical preconditions in case of energy supply to the electricity network will be discussed.

10h45 - 12h15
Practical session 2 - Electrical Generation
Both synchronous and asynchronous generating are discussed and demonstrated, including active and reactive power delivery. Terms of parallel connection will be evaluated and power quality problems will be discussed and demonstrated.

13h30 - 15h30
Economics on CHP
This session is devoted to the economical aspects of a CHP project. After a brief discussion on how to check whether a CHP is a feasible option, the different cost and benefit factors of a CHP project will be analysed more into depth, such as investment cost, maintenance cost, fuel costs, power benefits, etc. Special attention is paid to support.

15h45 - 17h00
Legal Aspects of CHP
This lecture will focus on current and future European CHP legislation.

17h00 - ...
Evaluation base course, reception and handing out the certificates.