



**ENERGY  
SUMMER  
SCHOOL**

**Courses  
contents**



## CHP energy generation and its industrial application. A UK perspective. ”

Neil Peacock

**KINDLY NOTICE THAT THIS WORKSHOP WILL BE PROVIDED IN ENGLISH. PARTICIPANTS IN NEED OF SIMULTANEOUS TRANSLATION ARE KINDLY REQUIRED TO WRITE IT IN THE SUBSCRIPTION MODULE.**

### Workshop synopsis:

#### CHP provides the following direct benefits:

- minimum 10% energy savings, but typically higher
- cost savings of between 15% and 40% over electricity sourced from the grid and heat generated by on-site boilers
- minimum 10% CO<sub>2</sub> savings for good quality natural gas CHP in comparison to conventional forms of energy generation
- high overall efficiency – up to 80% or more at the point of use

additional guarantee of continuity in energy supplies for operator & consumer

#### These in turn deliver a range of beneficial outcomes:

- a reduction in the cost of energy, improving the competitiveness of industry and business, helping alleviate fuel poverty and lowering cost in delivery of public service
- enhanced security of supply, making energy go further, through more efficient use of fuel –

- regardless of whether the fuel is renewable or fossil
- increased flexibility and reliability of energy supply, both nationally and locally – as CHP can complement and enhance other forms of energy generation
- flexible and responsive heat supplies – the thermal energy (heat or cooling) produced by CHP can be easily stored and later delivered to meet demand
- reduced overall demand from centralised, such as large scale coal or gas fired power stations – thus reducing stress on the electricity grid

During this workshop participants will study numerous case studies from the successful implementation of CHP in several industries and will try to draw conclusions on whether the above are correct and what else can be added as benefits.

### Trainer:

A chartered Mechanical Engineer, **Neil Peacock** has considerable experience of working with organizations of all types and size to help manage their energy costs and environmental impact. Holding management positions in manufacturing, contracting, sales, energy services and consulting culminated to his broad project experience in various parts of the world. Neil is accredited with the Energy Institute / ESTA register of Professional Energy Consultants. His career and knowledge in energy has spanned 30 years implementing strategies to achieve significant energy cost savings, genuine

green credentials and compliance with relevant legislation. An acknowledged UK energy expert, Mr Peacock's knowledge base includes building services, energy performance contracting, process engineering and CHP. When not working, Neil is a keen sailor and yachtsman competing in races. Walking, swimming, spending time with the family and DIY are his other passions. Neil's top-level expertise and a wealth of experience qualify Mr Peacock as an experienced trainer for our Energy Summer School.



How can techniques from predictive maintenance help industries save energy?"

Fabrice Brion

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## Workshop synopsis:

Because industrial processes are so diverse it is impossible to describe the multitude of possible opportunities for energy efficiency in industry. Many depend on the specific technologies and processes in use at each industrial facility. There are, however, a number of processes and energy services that are widely used in many industries. Advanced boilers and furnaces can operate at higher temperatures while burning less fuel. These technologies are more efficient and produce fewer pollutants.

Electric motors usually run at a constant speed, but a variable speed drive allows the motor's energy output to match the required load. Motor coils made of superconducting materials can also reduce energy losses. Motors may also benefit from voltage optimisation. Industry uses a large number of pumps and compressors of all shapes and sizes

and in a wide variety of applications. The efficiency of pumps and compressors depends on many factors and often many opportunities for improvement are being overlooked due to the capital intensive nature of operations.

According to the US Department of Energy, by implementing better process control and better maintenance practices, industry can achieve energy savings ranging from 3 to 60 percent. During this workshop participants will be able to study examples of successful maintenance plans that have produced comparable results. Furthermore, participants will be taught techniques, methods, and standards from predictive maintenance. Finally various technologies from predictive maintenance will be examined to see what is their influence on process and energy efficiency.

## Exercise:

### Vibration analysis in predictive maintenance

## Trainer:

**Fabrice Brion** is an expert in the fields of reliability engineering, oil analysis, diagnostic ultrasound and vibration testing. He has won many awards for his entrepreneurial activities, such as Grand Prix wallon de l'entreprise en croissance in 2011 and Prix Mercure in 2007. In 2001, Fabrice Brion obtained with highest distinction a Master's degree in mechanical engineering from the "Institut Supérieur Industriel Catholique du Hainaut" (ISICHT) in Belgium. For three years, he has

been learning about predictive maintenance at CSI. Besides his occupational activities, he also completed a Master's degree in management from the "Faculté Polytechnique de Mons". With a wealth of experience behind him, he decided to take flight and to establish his own company dealing with setting up a new standard of excellence in predictive and proactive maintenance. He is regularly giving workshops for the Belgium Maintenance Association (BEMAS).



## Power production optimization in a co-generation plant. Case study from Milano Malpensa Airport.

Michele Cilfone and SEA Energia

### Workshop synopsis:

One of the problems with managing a power generation plant, in particular co-generation, is in identifying wastes and choosing the optimum production scenario. One solution to this problem is a system in which, through energy modeling, it is possible to monitor plant energy performance in real time and optimize the process of power generation—simultaneously and in a lean cycle.

In this workshop a 68 MW tri-generation power plant is analyzed. The described power plant is situated at the main airport in Milan (Italy) and it produces electricity, heat and chilled water: part of

the electricity is sold to third parties through the national grid, while heat and chilled water are only used inside the airport. Most of the electricity produced is of course used to feed the energy needs of the airport and its facilities.

A large airport is an excellent recipient for the combined generation of electricity and heat, as it guarantees that the supply will be absorbed with a high level of continuity, day and night all year round. For this Milan airport, in particular, co-generation is even an important source of revenue, as non-used electricity is sold to the market.

### Trainer bio:

At the age of 28, **Michele Cilfone** had already completed a data historian software, an energy monitoring tool and was on the edge for creating the first industrial software platform for energy management. An energy geek, Michele is now shareholder and R&D manager of one of the biggest software companies in Italy. He is the first one who introduced the concepts of energy modeling as a tool for predicting failures in power generation plants. Furthermore, Michele developed an

energy modeling technique to forecast energy consumption and energy budgets for industrial plants. Mr Cilfone was part of the R&D team who first created a benchmarking tool to cluster the energy consumption of distributed assets, such as radio base stations and international retail chains. Mr Cilfone's new research interests are the internet of things applied to energy demand forecasting, energy aggregation and the management of domestic energy storage systems.



## How to benefit from multiple paralleled generators instead of the traditional single generator? ””

Jacob Klimstra

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### Workshop synopsis:

Reliability, availability, fuel efficiency and flexibility are key performance indicators of electricity generators. This course will show how a power plant or cogeneration plant consisting of a larger number of generators in parallel can provide a high operational efficiency and offer maximum reliability and

flexibility. Moreover, maintenance can be carried out while losing only a fraction of the available power output. These aspects are increasingly important with a substantial amount of renewable electricity sources in a system.

### Trainer:

Jacob Klimstra is an acknowledged energy and engine specialist, who was prized with many awards and finished his Bachelor's degree in Electrical and Electronic Engineering with honours from the Technical College of Leeuwarden in The Netherlands. His scientific career is presented in about 100 papers on energy supply, cogeneration, engine development and numerous publications for international papers on subjects related to energy use and engines.

Mr Klimstra was an active board member and adviser of educational and research institutes in The Netherlands. Besides his various work stations in power plants and gas infrastructure companies, Mr Klimstra is engaged in activities as a part-time lecturer since more than 20 years where he is sharing his work experience on pulsating combustion, vibration-based gas turbine diagnostics, process measurement and control as well as his experience in how to convert diesel buses and boats to natural gas.

In 1984 Jacob concluded his Ph.D thesis on the optimisation of reciprocating engine-compressor combinations from the University of Southampton and was honored with the Richard Way Memorial Prize. In 2003, he became recognised as Registered Energy Advisor.

Jacob received the Van Oostrom Meyjes Prize from The Royal Netherlands Institution of Gas Engineers for his work on cogeneration and received 5 Oral Presentation Awards and the Distinguished Speaker Award from SAE.

By giving workshops for universities and renowned organizations Jacob Klimstra is striving to use his broad experience and skills in exciting and demanding tasks that could result in a cleaner, more energy-efficient and peaceful society.



## Infrared thermography application in the photovoltaic industry: will drones revolutionize PV maintenance? ”” Marco Costa

### Workshop synopsis:

In this workshop maintenance practices and operation modes of PV installations will be examined with a specific focus on infrared thermography. The workshop will be based on a case study where drones with infrared technology perform operation check and problem diagnosis in a PV plant. From there participants will be taken to other applications of the infrared thermography.

Infrared thermography training provides the basics for the success of any infrared thermographer and their program. Properly trained and qualified IR technicians provide companies with a greater

return on their investment and, more importantly, avoid the liability associated with unqualified work. Taking this infrared training will allow you to quickly grasp important concepts, camera operation and inspection techniques that will allow you to deliver high-quality infrared inspections to your customers.

### Trainer:

**Marco Costa** is a mechanical engineer with a strong passion for reliability and maintenance and a concern for a safe work environment. He has a wide experience in the industrial field, both in predictive maintenance and in maintenance engineering.

His passion for Infrared (IR) is well known in the industry and many Plant Leaders, Maintenance Leaders, and Reliability Engineers rely on his knowledge and experience.

Marco was in the founding team of I-care Italy, a leading Italian company in the field of predictive maintenance. His responsibilities were the condition monitoring of equipment both above and below ground. He was also able to develop uses of the Infrared (IR) technology by working with the Quality Control and Research and Development teams.

Marco is a certified Level II Thermographer, certified Level II Vibration Analyst and a Level 1 in UE.



How can techniques from predictive maintenance help industries save energy?"

Andrea Grava

## Workshop synopsis:

Finding out the production plan that guarantees the highest possible profit, considering the specific needs of the plant, and simultaneously allowing the possibility to sell to the grid the extra energy capacity generated. For this problem energy models are used to predict plant production and system revenues at the forecasted operational requests and economic conditions.

### Thanks to this training, you will learn:

- what is an energy model and why we should care
- how to use energy modelling to predict power production
- how to identify external drivers that may affect power production and build a credible scenario

## Practical Exercise:

**Group exercise on building an energy model with a simulation software and use it to forecast power production capacity**

## Trainer Bio:

**Andrea Grava** is a Certified Expert in Energy Management (EGE) according to UNI 11339 SECEM since 2010, with a wide experience of implementing ISO 50001 energy management system including energy auditing activities according to UNI CEI TR 11428. Andrea is also an expert in energy certification of buildings according to Dlgs.192 and in the use of thermographic analysis

to detect energy waste. Before becoming fully dedicated to energy management, Andrea worked more than 10 years as a civil engineer to design water and heat distribution systems in production plants, acquiring a wide experience in CHP systems, building energy modelling and thermal distribution systems.