

Jane Galloway has over 25 years' experience in energy efficiency and low carbon energy consulting, spanning in-depth audits, technology assessments and solutions development through to operational, strategic and management aspects of energy use.

Because she has worked across a wide range of sectors and with many established, as well as emerging, technologies, she is able to bring to projects practical insights that can add substantial value. Her attention to detail, the rigour with which she approaches projects and the integrity of her advice are greatly appreciated by clients and colleagues.

She has particular expertise in complex industrial process environments, especially in the food and drink sector and food retail establishments in the commercial sector. In terms of technologies, Jane's experience is wide-ranging: however she is especially strong in all aspects of refrigeration. Work in refrigeration has included energy reduction programs, refrigerant phase out strategy studies, performance specification for new plant, cooling load assessments, modelling and strategy studies.

Complementing this strong engineering competency, is an equal knowledge of the management and organisational aspects of energy use, which are increasingly seen as the key to successful energy efficiency and carbon management programs. This expertise includes an in-depth understanding of Monitoring and Targeting (or M&T, a technique to achieve continuous improvement in energy use), through to the integration of energy efficiency within wider organisational systems such as TPM.

Jane has developed and presented an extensive portfolio of training and workshop materials, covering subjects including refrigeration, audit techniques and M&T.

Finally, Jane is also very experienced in terms of the use of information technology in energy efficiency. This ranges from a leading-edge real-time controls system, refrigeration fault-diagnostic expert system, statistical analysis techniques to identify energy variability, the design and specification of metering systems and the design of operator interfaces to drive continuous improvement.



### Fields of Competence

- Energy Auditing
- Refrigeration and Air Conditioning
- Process Energy Use including Boiler Systems, Heating Systems, Compressed Air Systems, Motors & Drives and Controls
- Carbon/Energy Management
- Carbon Footprinting
- Renewables/Low Carbon Technologies
- Monitoring and Targeting (M&T)

### Education

- BA Hons, Chemical Engineering, University of Cambridge.
- MA Hons, Chemical Engineering, University of Cambridge.

### Professional Memberships

- Member of the Institute of Refrigeration.

### Key Industry Sectors

- Manufacturing, Food and Drink, Dairy, Breweries, Chemicals Industries
- Water and wastewater sectors
- Supermarkets and other retailers
- Offices, Hotels, Retail Property, Airports

## Project Examples

### Detailed Energy Audits

Lead auditor for detailed energy audits at 13 manufacturing sites across Europe for a large multinational company aimed at identifying energy use and carbon emission reduction opportunities.

Detailed surveys to identify energy and carbon saving opportunities at several distribution centres for chilled and frozen product in Europe for a leading supply chain company. For each site a Display Energy Certificate (DEC) assessment was performed based on the UK Methodology.

Detailed surveys of two food manufacturing sites in Spain for a large multinational company to identify energy/carbon saving opportunities.

### Carbon Management Programme

Project manager for the carbon management programme with Young's Seafood since 2010. The scope of work included carbon footprint assessments, energy efficiency and ESOS surveys for opportunity identification at all 12 UK manufacturing sites, refrigeration analysis and optimisation, feasibility studies on steam/HPHW decentralisation, review of renewable energy opportunities and development of energy management software tools.

### Energy Audits, Water Sector

Jane has carried out energy surveys of numerous water and wastewater treatment works for Thames Water, Yorkshire Water and United Utilities to identify energy saving opportunities and develop the business case for the projects.

Jane also took part in a large pilot project to design and install a real time automatic energy monitoring and reporting system. Roles included acting as the wastewater treatment technical expert and carrying out scoping studies at several wastewater and water treatment works, aimed at identifying energy saving opportunities and the energy performance monitoring requirements. Project manager for the implementation of a pilot energy management programme at one wastewater treatment works.

Assessment of performance of existing anaerobic digestion, CHP and Sludge Powered Generators.

### Independent Energy Auditor, Water Sector

Jane acts as the Independent Energy Auditor for Project Alpha, a Public Private Partnership between Northern Ireland Water and Dalriada Water and Project Omega, a Public Private Partnership between Northern Ireland Water and Glen Water. As part of her role she carries out an annual audit of energy performance at four water treatment sites, six wastewater treatment sites and a large sludge incinerator in Northern Ireland.

### CHP and Trigenation Studies

Analysis of the various cooling systems (absorption chiller, electric chillers, canal water free cooling) which supply MediaCityUK and identification of how the provision of cooling could be optimised.

Review of refrigeration systems at leading poultry processing facility, including energy efficiency, carbon emissions and options for phase out of refrigerants. Feasibility study of tri-generation plant to provide electricity, steam and cooling.

Review of existing anaerobic digesters, absorption cooling and CHP plant at two food manufacturing sites in Italy for a large multinational company. The operation, control and efficiency of the existing anaerobic digestion, absorption cooling and CHP plant were investigated. The energy usage, costs and CO<sub>2</sub> emissions of the absorption cooling and CHP plants were then assessed for several different future options and recommendations made for optimisation.

### Best Available Technology Assessment Study

Technical lead for three BAT assessment studies for National Grid investigating heating/cooling/ventilation of operational and non-operational buildings and anti-icing systems for gas turbine air intakes.

### Alternative Technologies Feasibility Studies

Project manager and technical lead of in-depth feasibility studies for large supermarket chain of nine technologies including organic rankine cycle, solar air conditioning, liquid desiccant air conditioning, CO<sub>2</sub> and gas absorption heat pumps. Computer models were developed for each technology to assess the energy, carbon and cost benefits compared to the current store design.

### **Hydropower Feasibility Studies**

Identification of hydropower generation opportunities at water and wastewater treatment sites across the Thames Water estate and development of business case for each option.

Feasibility study of hydropower generation options from outfall of wastewater treatment works.

### **DECC Enhanced Capital Allowance Scheme**

Completion of numerous research projects of refrigeration, air conditioning and heat pump technologies for the Energy Technology List.

Assessment and approval of new product applications for the Energy Technology List.

### **Greenhouse Gas Emissions Research**

Project Manager of a large project for Defra which investigated the potential to reduce greenhouse gas emissions from refrigeration systems used in the food chain, due both to their energy usage and refrigerant leakage.

### **Refrigeration Best Practice Guidance Materials**

Technical expert and lead author of energy Best Practice Guides and Carbon Trust web site on refrigeration. Development and presenter of refrigeration webinar.

### **Refrigeration Reviews**

Evaluation of the performance of the installed refrigeration systems at a large brewery, analysing the cooling capacity of the existing plant compared to the expected future cooling demand and identifying a range of possible projects that could be implemented to increase capacity, improve efficiency, improve long term reliability or reduce operating risks.

### **Supermarkets**

Delivery of refrigeration reviews at over 20 supermarkets for several leading supermarket chains and operation of energy management programmes.

### **Refrigerant Phase Out**

Review of options for R22 phase out at two chilled distribution centres for Marks & Spencer. Independent assessment of a trial to replace R22 with a suitable alternative refrigerant at one of the

distribution centres, with the aim of ensuring complete impartiality for all recommendations provided. Advice on programme of work at second distribution centre.

Study investigating how best to phase out the use of R22 refrigerant at a UK dairy whilst improving energy efficiency. The project included assessment of the options available for the design of the planned new refrigeration systems and the preparation of draft performance specifications.

Leading member of a small team which carried out major projects to assess the implications of the EU Ozone Depleting Substances (ODS) Regulation on the use of HCFC refrigeration systems for Northern Foods and Greencore. The programme of work included surveys of around 27 food factories and the development of a strategic plan to manage the transition from HCFC refrigerants to alternative non-ODS alternatives.

### **Monitoring & Targeting (M&T)**

During her career, Jane has carried out a large number of M&T projects including implementation of M&T at several breweries, dairies, chemicals and food & drink sites; numerous scoping studies; development of M&T software and design of an Expert System for the analysis of M&T reports.

Previously, Jane was responsible for the preparation of two Monitoring and Targeting (M&T) packages for the UK Energy Efficiency Office. These gave guidance to companies with medium and large energy bills on introducing M&T.

### **Training**

Production of customised refrigeration training courses covering refrigeration theory, description of different types of refrigeration systems, factors that affect energy efficiency and identification of energy saving opportunities. Delivery of courses in Switzerland and Canada to engineers from several manufacturing sites.

Preparation and presentation of 3-day energy management training courses held in Italy, Germany and Indonesia for a large multinational manufacturing company.