TECHNICAL BULLETIN

Prepared by WG-5 Environment

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Energy Efficiency: Compliance with Legal Requirements and Best Practices

1. Summary

EIGA has compiled this technical bulletin to give information to EIGA members, specifically to directors, technical managers, company environmental specialists and national industrial gas associations on the legal requirements and best practices for energy efficiency in order to comply and reduce energy consumption and energy wastage.

2. Introduction

Efficient energy use, called also energy efficiency, means using less energy to provide the same level of energy service. In industry, the most commonly used definition for energy efficiency is the amount of energy consumed per unit of product or output, which can also be called specific energy consumption or energy intensity factor.

Improving energy efficiency, therefore, means reducing the amount of energy required to produce a unit of product.

Energy efficiency is one of the main targets of the emissions trading schemes such as the Kyoto protocol and the European Union Emission Trading Scheme for reducing Greenhouse Gas (GHG) emissions. The burning of fossil fuels to release energy is the major anthropogenic source of GHG. Improvement in energy efficiency can reduce greenhouse gas emissions in two ways:

- Energy efficiency measures for combustion systems (for example boilers, furnaces and ovens) reduce emissions in direct proportion to the less consumed amount of fuel.
- Reductions in consumption of electricity lower demand for electricity and, consequently, reduce emissions from thermal electrical power generating stations.

Reducing energy intensity not only improves the competitiveness of the economy, it is a very effective way for ensuring reliable energy supplies, reducing greenhouse gas emissions and promoting market development of highly energy-efficient technologies. Therefore energy is a priority issue within the European Union which has developed a common energy and climate policy.

3. Impacts on the Industrial Gases Industry

Energy is the key raw material for the production of industrial gases.

Industry's potential to increase energy efficiency are through energy management and implementation of energy-saving technologies that are related to systems like combustion, steam systems, power production, cogeneration, heat recovery systems, pumping systems, compression systems, transport, etc. In the industrial gas industry many of these energy systems are used, therefore common guidance and best available techniques for energy efficiency in industry can be effectively implemented.

4. Legal framework

The European Energy Efficiency Directive [EED] is effective from December 2018. It establishes a set of binding

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measures to help the EU reach its (at least) 32.5% target for improvement in energy efficiency by 2030 [1] [1]. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption.

NOTE This Directive is currently under review and will set a new target of 55% reduction in GHG emissions by 2030.

EU countries were required to transpose the Directive's provisions into their national laws by 5 June 2014. Means of compliance with national legislation can vary. This can be by certification to ISO 50001 or submitting the results of an energy audit.

The core of the requirements (Article 8: Energy audits and energy management systems) is an energy audit that is carried out every 4 years, covering the majority of the company energy use (usually defined as 90% or more) [2]. Certification in accordance with ISO 50001 is considered compliant to the requirements of the EED and some Member States have specified other means to comply with the requirements for energy auditing.

Annex 6 of the EED specifies the minimum criteria that shall be considered in the evaluation of energy use and the scope of the audits – see Appendix C [1].

The Industrial Emissions Directive (IED) requires that all installations are operated in such a way that energy is used efficiently [3]. For this reason energy efficiency is a 'horizontal' issue in IED permitting. Energy efficiency requirements for each installation will be specified in the permits. For EIGA members this will be for hydrogen, carbon dioxide, acetylene and lime, nitrous oxide production plants and combustion plants.

To promote the energy efficiency provision of the IED, the reference document on Best Available Techniques for Energy Efficiency was prepared [4]. The document reflects an information exchange on best available techniques and is very useful guidance for all industries, not only for the IED installations. Therefore, it would be useful to also take these into consideration in the industrial gas industry.

The Directive does not apply to the category of micro, small and medium-sized enterprises being those which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.

5. How to improve and manage energy efficiency

Energy should be viewed as any other valuable raw material resource required for running a business. Energy has costs and environmental impacts and needs to be managed well in order to increase the business' profitability and competitiveness. By enacting energy efficiency measures organisations simultaneously save costs and reduce environmental impacts and risks.

Basis of an energy management system

One of the most commonly used models for energy management is a plan-do-check-act (PDCA) cycle, which is often known by company management from contexts other than energy. This approach is also in line with the most commonly used management approaches and standards that are relevant to industry. Good energy management practices are usually based on a standard or a specification, for example the ISO 9001 management standard and the related environmental management standard ISO 14001 or EMAS and ISO 50001 Energy Management [5, 6, 7, 8]. Features of a successful energy management system to comply with the IED are included in Appendix A.

Successful implementation of an energy management system requires commitment by the company management:

- conducting internal energy audits for a meaningful sample of all company locations;
- analysis and target setting;
- setting up a monitoring/measuring system - this requires appropriate KPIs to be defined;
- motivating staff; and
- having management reviews.

Finally, it is necessary to implement the energy management system with a corresponding structure throughout

[1] References are shown by bracketed numbers and are listed in order of appearance in the reference section.

the company on a permanent basis to ensure the continuous follow-up and improvement of energy efficiency.

Integrating energy management with nearby facilities is another way to improve energy efficiency.

Energy management can be used in all companies because it provides a general approach and structure that offers flexibility to accommodate any specific branch of business. With respect to corporate management, this may be understood as being either the management of the holding company, or of a business unit of a site.

Energy efficiency management

A key element to deliver energy efficiency at an installation level is a formal management approach. The techniques to achieve management of energy efficiency are applicable to all installations.

Energy management is a useful instrument to improve the efficiency of energy systems both at company and site level. Energy management does not only focus on technical possibilities but also takes into consideration the organisation, the motivation of employees, good practices, co-operation of different departments, and costs. It means structured attention to energy with objectives of continuously reducing energy consumption and improving efficiency in production and utilities, and sustaining the achieved improvements. Very often energy management (for example use of renewable or non-renewable resources) is an integral part of an environmental management system or other management systems.

Organisations can save energy by applying the same management principles and techniques they use elsewhere in the business for key resources such as raw materials as well as for environment and health and safety. These management practices shall include full managerial accountability for energy use. The management of energy consumption and costs eliminates waste and brings in cumulative savings.

A checklist for basic energy efficiency techniques is included in Appendix B.

6. Actions

The EIGA member companies shall make sure that they:

- comply with all regulatory demands on energy efficiency, including the requirement for energy audit under EED which should have been completed before 5th December 2015 and shall be completed every 4 years thereafter; and
- consider best practice techniques to improve and manage energy efficiency.

7. References

[1] Directive (EU) 2018/2002 *on energy efficiency*, www.europa.eu.

[2] SWD/2013/0447 Commission Staff Working Document - Guidance note on Directive 2012/27/EU on energy efficiency, www.europa.eu.

[3] Directive 2010/75/EU *on industrial emissions (integrated pollution prevention and control)*, www.europa.eu.

[4] *Reference Document on Best Available Techniques for Energy Efficiency* (BREF ENE), www.europa.eu.

[5] ISO 9001, Quality management systems – Requirements, www.iso.org.

[6] ISO 14001, Environmental management systems -- Requirements with guidance for use, www.iso.org.

[7] EU Eco-Management and Audit Scheme (EMAS), Regulation (EC) 1221/2009 *on the voluntary participation by organisations in a Community eco-management and audit scheme* (EMAS III), www.europa.eu.

[8] ISO 50001, *Energy management systems -- Requirements with guidance for use*, www.iso.org.

[9] ISO 50002, *Energy audits -- Requirements with guidance for use*, www.iso.org.

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Appendix A
Energy management system features

In the IED Reference Document on BAT for Energy Efficiency the energy efficiency management system (ENEMS) is based on a PDCA (Plan-Do-Check-Act) cycle and incorporates the following features [4]:

1. **Commitment of top management**

2. **Definition of an energy efficiency policy** for the installation by top management.

3. **Planning and establishing objectives and targets** – essential for this first step is the inventory of actual status (energy audit) to identify energy consumption, flow of energies, consumers, and energy accounting system. On this basis the targets to decrease the consumption, can be set up. The energy targets shall be clearly defined and measurable.

4. **Implementations and operation of procedures** paying particular attention to staff structure and responsibilities, training, awareness and competence; communication, employee involvement; documentation; efficient control of processes, maintenance programmes, emergency preparedness and response; safeguarding compliance with energy efficiency related legislation and agreements.

5. **Benchmarking -** energy benchmarking is a tool which comprises the collection, analysis and reporting of data to provide an industrial company with a context for assessing its energy efficiency in comparison to previous years of the company itself or to others in the same sector, process or building type.

6. **Checking performance and taking corrective action** paying particular attention to monitoring and measurement; corrective and preventive actions, maintenance of records, independent internal auditing to determine whether or not the ENEMS conforms to planned arrangements and has been properly implemented and maintained.

7. **Review of the ENEMS and its continuing suitability, adequacy and effectiveness** by top management.

8. **Development** of energy efficient technologies and to follow developments in energy efficiency techniques.

Appendix B
Check list for improvement and managing energy efficiency

- **Energy management and supply:**

Does the site record monthly energy unit usage for electricity and heating energy?

Does the site check actual recorded energy usage against invoiced amounts at least annually?

Has site identified high energy user equipment consumptions to pinpoint critical areas for improvement?

Has an energy awareness initiative or training been conducted within the last 12 months?

Are there managed action plans/projects in place for improving and reviewing energy consumption on site?

- **Compressed air (utility):**

Are all compressors regularly maintained as per manufacturer guidelines?

Are compressors stopped when there is no demand for air?

Have all air leaks on site been repaired and are new leaks repaired within a designated time frame?

Has a survey been conducted of compressed air demand versus supply and capability?

- **Heating, Ventilation and Air Conditioning (HVAC):**

Have site boilers been serviced in the last 12 months to manufacturer recommendations?

Are all thermostats for HVAC systems adjusted to appropriate temperature settings?

Are all heating pipes sufficiently insulated and the insulation in good repair?

- **Lighting:**

Is lighting turned off outside occupancy hours?

Is lighting turned off at all times and all areas where natural daylight is sufficient?

Are automatic lighting switching controls fitted in each area of the site where appropriate?

Are energy-efficient lamps in use?

Is there possibility to use existing local lighting?

- **Process plant:**

Is all process plant equipment turned off when not in use?

Are automatic controls fitted to all process equipment to switch off when not in use?

Are the technological processes optimized? (Are the appropriate settings of temperature, pressure, flow, speed etc. identified?)

Is there an analysis of the minor changes in technology to lower energy consumption?

Re-instrumentation projects (smart systems).

- **Energy Efficiency Good practice:**

Is all high-energy using equipment listed on the site maintenance schedule as required?

Is all office equipment shut down outside of working hours?

Is there a policy in place to ensure that all new equipment is of high energy efficiency rating?

Benchmarking of Key Performance Indicators (KPI).

Energy conservation project(s).

Appendix C

Minimum criteria for energy audits under Annex 6 of the energy Efficiency Directive [1]

Minimum criteria for energy audits including those carried out as part of energy management systems

The energy audits referred to in Article 8 shall be based on the following guidelines:

(a) be based on up-to-date, measured, traceable operational data on energy consumption and (for electricity) load profiles;

(b) comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transportation;

(c) build, whenever possible, on life-cycle cost analysis (LCCA) instead of Simple Payback Periods (SPP) in order to take account of long-term savings, residual values of long-term investments and discount rates;

(d) be proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant opportunities for improvement.

Energy audits shall allow detailed and validated calculations for the proposed measures so as to provide clear information on potential savings.

The data used in energy audits shall be storable for historical analysis and tracking performance.

NOTE See also ISO 50002 Energy Audits [9].

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