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Best Available Techniques as a sustainability tool in manufacturing: case study in the dairy sector

Damien Evrard [a*], Valérie Laforest [a], Jonathan Villot [a], Rodolphe Gaucher [b]

[a]*UMR CNRS 5600 EVS, Mines Saint-Étienne, 158 cours Fauriel, 42023 Saint-Etienne cedex 02, France*
[b]*INERIS, Parc Technologique ALATA BP 2, 60550 Verneuil-en-Halatte, France*

* Corresponding author. Tel.: +33 (0)477426671; fax: +33 (0)4 77 42 66 33. *E-mail address:* damien.evrard@mines-stetienne.fr

Abstract

Best Available Techniques encompass preventive and end-of-pipe solutions aimed to contribute to the sustainability of the European industry. They are determined by the official Sevilla Process based on extensive data collection and analysis, supporting formal negotiation steps. This article presents a statistical multicriteria method applied to the dairy sector to help determine reference sites likely to use BATs. This 5-step methodology is based on two classifications: representative or performant sites. Performant sites selected by the Pareto front analysis are better than representative sites. In the representative analysis, the size of installations seems to be inversely proportional to their environmental impacts.

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1. Introduction

Best Available Techniques (BAT) were first introduced in 1996 by the Integrated Pollution Prevention and Control Directive [1]. Their role was then extended and strengthened by the Industrial Emission Directive in 2010 [2]. Moreover, they have become an essential tool of the European regulation for regulating industrial emissions. The industrial sectors within the scope of the directive encompass about 50,000 installations (e.g. food, drink and milk; wood-based panels; large combustion plants; or sanitary landfills).

The overall goal of the IED is "to prevent, reduce and as far as possible eliminate pollution arising from industrial activities in compliance with the 'polluter pays' principle and the principle of pollution prevention" [2]. Furthermore, the concept of "Best Available Technique" is defined in the directive as "the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole" [2].

Thus, in the concept of BAT:

- **"Technique"** encompasses both "the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned" [2]. Therefore, it is not limited to a pollution abatement device but can also be a management approach such as an environmental management system.
- **"Available"** means the technique considered is "developed on a scale which allows an implementation in the industrial sector, under economically and technically viable conditions" [2]. These conditions take into consideration its costs and advantages, whether it is used or produced inside a given Member State or not, and if it is reasonably accessible to the operator.
- **"Best"** means that the technique considered is the "most effective for achieving a high general level of protection of the environment as a whole" [2].

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This concept has involved obligations at two levels. First, at European level, sector-specific reference document need to be drawn up. An official framework named the "Sevilla Process" has been established for information exchange on BATs. This process leads to the creation of Best Available Technique Reference documents (BREFs). It is thus based on a consensual step to gather the European "good-performing" industries. Because a large number of installations may be targeted, only a few reference installations can usually be studied and consequently need to be identified.

Secondly, at local level, operators have to compare environmental performances of a given installation with the information contained in their reference documents, in particular with BAT-Associated Environmental Performance Levels (BATAEPL). If they do not reach these BATAEPLs, they will have to provide a plan to improve their environmental performances or justify this impossibility with technical and economic arguments.

After a brief presentation of its context of application, this article describes a statistical method, applied to the dairy sector, for the determination of these sectoral reference installations. Then, the use of the concept of BAT as a sustainability tool in manufacturing, beyond its legal context of application is explored.

2. Context

2.1. Legal background

BATs are defined during an exchange information process named the Sevilla Process. This framework is described in an implementing decision [3,4]. Its first steps are aimed to define the environmental, economic and technical information about installations and techniques to be collected and shared among stakeholders. Fig. 1 illustrates the interactions among the various groups involved in this technical work in coordination with the European IPPC Bureau (EIPPCB). Thus, at European level, a Technical Working Group (TWG) composed of representatives of Member States, the European Commission, the Industry, and environmental NGOs is created. Its first task is to define the scope and the “key environmental issues” which will be considered. In order to coordinate the national contributions to the Sevilla Process, discussions among stakeholders are optionally undergone by a "shadow group". This shadow group can include representatives of the industry, national authorities and environmental non-governmental organisations, depending on the choices of the Member State.

After publication of a BREF, site operators and environmental authorities are concerned with the application of the BAT conclusions since they use the BREF in order to verify that an installation has a level of environmental performance comparable to BATs'.

Then, an extensive data collection is carried out, targeting performances and characteristics of sites currently operating in Europe. The transition from this step of information analysis to the definition of BATs highly relies on the expertise of its actors with a risk of biased assessment due to differences of interpretation.

The outcome of this process is a reference document (BREF) whose most important aspect is a description of sectoral BATs and emission levels associated with these techniques (BATAEL). The “BAT conclusions” extracted from these BREFs are published as European Commission Decisions and thus, bear a legal value which makes them essential to the directive.

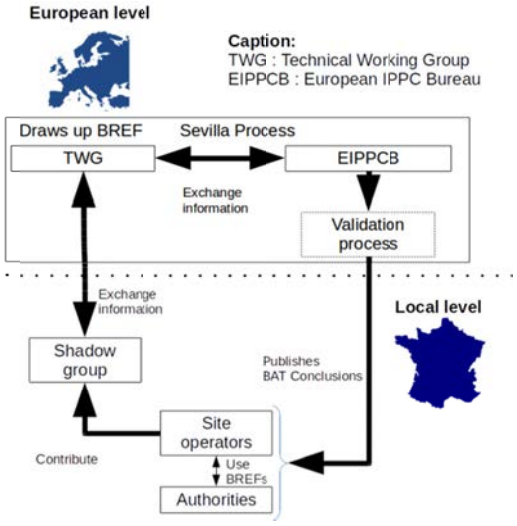

Fig. 1. Interactions among stakeholders involved in the IED.

Furthermore, other sectors, outside the scope of the IED must also apply BATs (e.g. nuclear installations in France [5]) whereas they do not possess any framework similar to the Sevilla Process.

2.2. Previous works on BAT selection

Several methods have been developed since the late 90s to help decision-makers to determine BATs at sector or installation levels [6–10]. They have been analyzed for this project in a previous literature review [11]. The main teachings of the study of existing researches was that they address three main issues: (1) local application of the IPPC directive or the IED for operational permits [9,10]; (2) selection of BATs at industrial sector scale with tools ranging from expert judgment [6] to Life Cycle Assessment [7] or potential impact assessment [8]; (3) determination of emission levels associated with BATs (BATAELs) [12]. In sectors outside the scope of the IED, like in the nuclear industry [2], operators must prove that they apply BATs but have no reference documents and therefore have to find their own references to assess their installations. They can do so using existing BREFs to find applicable techniques although they were not made for their sector or resort to their own resources to look for any helpful data.

Previous works on the topic of BAT identification differ according to their goals and scope. A local BAT determination method mainly relying on expert judgment was found [6,12], while two other methods were aimed to reduce subjective elements [13,14]. Thus, Geldermann and Rentz