



## 3D TRASAR® Boiler Technology delivers sustainability performance improvement and compliance with Integrated Pollution Prevention & Control (IPPC) for energy efficiency

### Introduction

The Integrated Pollution Prevention and Control (IPPC) directive is the first comprehensive legal framework implemented across the European Union to ensure the conservation of environmental resources, the reduction of emissions and waste, and the comprehensive protection of the environment from the impact of industrial and agricultural activities. IPPC applies to most industrial companies and promotes the sustainable operation and development of their operations.

In order to help industry meet its IPPC obligations and permit requirements, Nalco offers a range of programmes which deliver reductions in resource demand, energy use, emissions and waste. In particular 3D TRASAR Boiler Technology meets the requirements for the Best Available Techniques (BAT) specified under IPPC for energy efficiency. This bulletin outlines the specific contribution 3D TRASAR Boiler Technology can make to improving the sustainability performance of steam generating equipment within the requirements of the IPPC regulations.

### 3D TRASAR Boiler Technology

Nalco's 3D TRASAR® Boiler Technology is the innovative and unique boiler treatment package, designed to deliver superior sustainability performance, operational efficiency, and asset protection. This ground-breaking modular technology continuously responds to changes in boiler operation and feedwater quality, reducing system corrosion, ensuring clean waterside surfaces, and minimising water and energy resource use. The result is continuity of production, conservation of resources, and minimisation of emissions including Greenhouse Gases (GHG), and improved cost management.

3D TRASAR Boiler Technology is used by leading corporations around the world to secure improvements in their environmental and economic performance, optimise boiler efficiency, meet sustainability goals, specifically in the areas of water and energy use reduction, and to protect assets, a key driver in boiler management and steam generation.



3D TRASAR Boiler Technology Control Module

3D TRASAR Boiler Technology also meets the requirements of the Best Available Techniques for energy efficiency under the EU Integrated Pollution Prevention & Control (IPPC) legislation in the categories of increasing overall energy efficiency, reducing water use, reducing emissions to air, and reducing emissions to water.

### Application of Best Available Techniques (BAT)

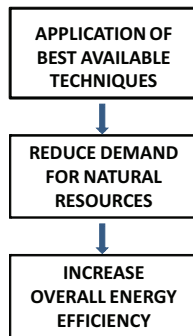
For energy efficiency, IPPC is focused upon two specific areas of environmental protection:

- 1 Reduced demand for natural resources through increased overall energy efficiency.
- 2 Reduced environmental impact of system operation through air emissions.

Reference can also be made to the application of Best Available Techniques for large combustion plants and industrial cooling systems, which with reduced water use and water emissions defines a comprehensive site-wide approach to compliance with IPPC.

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## BAT 1: The impact of 3D TRASAR Technology on reducing the demand for natural resources



### **BAT 1.1: To increase overall energy efficiency**

In order to improve the energy efficiency of steam generating systems, BAT describes four specific areas of activity, and in each of these the operational impact of 3D TRASAR Boiler Technology matches the requirements of BAT:

#### **BAT - Prevention of scale deposits on heat transfer surfaces (Section 3.2.6)**

3D TRASAR Boiler Technology programmes are designed to prevent the formation of scale and deposits that impede heat transfer and could lead to tube failures, downtime and loss of production. The technology is designed to continuously responding to changes in boiler operation and feedwater quality, maximising energy efficiency, and minimising energy demand and emissions.

#### **BAT - Minimise blowdown from the boiler (Section 3.2.7)**

The blowdown can be controlled based on conductivity or cycles utilising 3D TRASAR. Minimised blowdown means that energy losses via the blowdown water are effectively controlled to the lowest level but still assuring reliable, safe and efficient boiler operation.

#### **BAT - Minimise pre-boiler system corrosion (Section 3.2.8)**

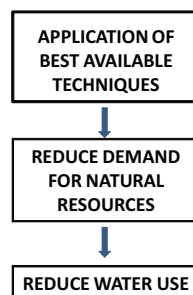
The Nalco Corrosion Stress Monitor (NCSM) detects variations in the corrosivity of the feedwater that lead to pre-boiler corrosion, reducing the equipment life-span, unit availability, and energy efficiency. This variability in corrosivity can be the result of, for example, poor mechanical oxygen removal, pH, or ingress of contaminants, such as process contamination. 3D TRASAR Boiler Technology provides adequate corrective action and alarms, allowing plant personnel to troubleshoot the system in the early phase of the upset.

#### **BAT - Minimise boiler short cycle losses (Section 3.2.9)**

Energy losses can occur every time a boiler is switched off, for instance during the night or weekend, and during consequent start-up. Moreover, these events can result in scale and corrosion events when not adequately responded to. By using 3D TRASAR Boiler Technology heat losses can be minimised, while responding adequately to corrosion stress at start-up.

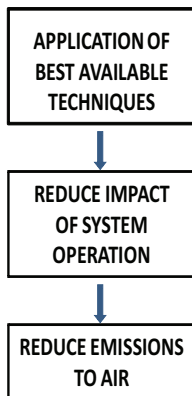
#### **Overall sustainability impact**

Economic sustainability is delivered through minimising spend on purchased energy requirements and fuel, water and other related consumable resources. This impacts environmental sustainability through reduced demand for both non-renewable fossil fuels and renewable resources such as fresh water. The reduction in energy demand has a consequent impact on the reduction of greenhouse gas emissions, thereby reducing the contribution to global warming and climate change. By lowering demand for local renewable resources this supports social sustainability by safeguarding public water supplies, and reduced emissions means better air and environmental quality for the local community.



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## BAT 2: The impact of 3D TRASAR Boiler Technology upon reducing the environmental impact of system operation



### **BAT 2.1: To reduce water use**

To reduce the demand for fresh water for generating steam, BAT describes two specific areas of activity that also impact energy efficiency. 3D TRASAR Boiler Technology specifically addresses these requirements.

#### **BAT - Minimise blowdown from the boiler (Section 3.2.7)**

The boiler blowdown can be minimised by the application of 3D TRASAR Boiler Technology. The blowdown regime can be controlled based on conductivity or cycles utilising the next generation of Nalco's fluorescence sensor technology coupled with advanced boiler internal treatment programmes, resulting in lower water requirements.

#### **BAT - Minimise boiler short cycle losses (Section 3.2.9)**

The inefficient use of water can occur every time a boiler is switched off, for instance during the night or weekend, and during consequent start-up. 3D TRASAR Boiler Technology ensures that maximum cycles of concentration are maintained at all times, minimising fresh water demand and conserving water supplies.

#### ***Overall sustainability impact***

Reduced spend on fresh water makeup and wastewater costs through maximised cycles can reduce the total cost of operation of the system and contribute to profit improvements for the operating company. This contribution to renewable resource conservation helps to meet customer sustainability goals as well as safeguarding the local public water supplies for the local community, many of whom can be employees or other company stakeholders.

### **BAT 2.1: To reduce emissions to air**

Emissions to the air are directly related to the energy efficiency of the steam generation systems. Any action that improves energy efficiency will thus also reduce the emissions of pollutants, such as CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>, Particulates (PM), and Volatile Organic Carbon (VOC), to the air.

### **BAT 2.2: To reduce emissions to water**

Steam generator blowdown water can be a significant source of emissions to surface waters and is made up of the blowdown volume, temperature, and dissolved and suspended contaminants. To reduce these emissions to water, 3D TRASAR Boiler Technology matches the three areas of BAT specified to protect the environment from such emissions:

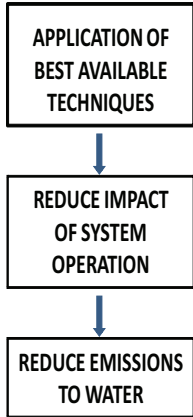
#### **BAT - Maximise corrosion and scale control and reduce corrosion and leaks and their impact**

The combination of 3D TRASAR Boiler Technology, and Nalco's on-site service regime provides real-time control, prediction and risk minimisation, preventing scale deposition, corrosion, and subsequent leakage or inefficiencies.

#### **BAT - Optimise/reduce chemical through increased control & monitoring**

3D TRASAR technology combines on-line water chemistry management that controls corrosion and secures clean heat transfer surfaces, whilst maximising cycles of concentration within the operating limits of the steam generation system. This delivers precise prevention of scale, deposition and corrosion with minimised chemical addition.

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**BAT - Minimise volume of treatment chemicals and corrosion products (Section 4.6.3.2)**

Emissions can also include the release of regenerant or reject water from the pre-treatment plant, which can then contribute to the volume and contaminants present in wastewater. 3D TRASAR Boiler Technology provides the complete modular water management package for steam generation systems, maximising protection from scale, deposits and corrosion, and utilises the minimum amount of chemical treatment and the latest innovations in sustainability from Nalco. This total approach means that the amount of treatment chemicals, and any soluble or suspended products from system corrosion, are managed to minimum levels using novel technologies. This not only minimises the volume of wastewater to be treated, and the concentration of contaminants, but also protects the receiving water course from pollution, a key requirement of the IPPC directive.

**Overall sustainability impact**

The environment is protected through reduced demand for precious water and energy resources, reduced emissions to air, and ultimately reduced wastewater emissions, specifically safeguarding both fresh water and surface water resources. Protecting system assets through minimised corrosion avoids premature and costly replacement and depletion of the non-renewable resources required. Economic sustainability is delivered through cost reduction and consequent profit improvement including CAPEX avoidance. Finally, society is protected from pollution.

Section References are taken from:

European Commission (2009) Reference Document on Best Available Techniques for Energy Efficiency. EC JRC. 398pp

European Commission (2001) Reference Document on the application of Best Available Techniques to Industrial Cooling Systems. EC JRC. 313pp.

**Sustainability performance improvement**

IPPC is entirely focused upon the protection of the environment around us from emissions from industry and agriculture, both through emission reduction, and reduction of the impacts of those emissions. At the same time emission control strategies can positively impact the conservation of both renewable and non-renewable resources, environmental quality, waste minimisation, community, and cost reduction.

**Helping to meet sustainability goals**

The application of Nalco's global and market-leading 3D TRASAR Boiler Technology can meet the very specific requirements of the areas of Best Available Techniques required to be used when operating steam generation systems. Such compliance is entirely consistent with commitments to protect the environment, build a safe and stable society, and deliver the economic prosperity needed to support them. Such commitments to our common future are implicit in the sustainability goals of most industrial and agricultural corporations around the world, and Nalco is committed to delivering innovation, on-site-support, and value that helps our customers to meet those goals.

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