# UK oil refining and the atmospheric emission of dioxins

A briefing paper

2nd edition

energy institute

# UK OIL REFINING AND THE ATMOSPHERIC EMISSION OF DIOXINS
# A BRIEFING PAPER

2nd edition

November 2014

Published by
**ENERGY INSTITUTE, LONDON**
The Energy Institute is a professional membership body incorporated by Royal Charter 2003
Registered charity number 1097899

The Energy Institute (EI) is the chartered professional membership body for the energy industry, supporting over 19 000 individuals working in or studying energy and 250 energy companies worldwide. The EI provides learning and networking opportunities to support professional development, as well as professional recognition and technical and scientific knowledge resources on energy in all its forms and applications.

The EI's purpose is to develop and disseminate knowledge, skills and good practice towards a safe, secure and sustainable energy system. In fulfilling this mission, the EI addresses the depth and breadth of the energy sector, from fuels and fuels distribution to health and safety, sustainability and the environment. It also informs policy by providing a platform for debate and scientifically-sound information on energy issues.

The EI is licensed by:
– the Engineering Council to award Chartered, Incorporated and Engineering Technician status;
– the Science Council to award Chartered Scientist status, and
– the Society for the Environment to award Chartered Environmentalist status.

It also offers its own Chartered Energy Engineer, Chartered Petroleum Engineer and Chartered Energy Manager titles.

A registered charity, the EI serves society with independence, professionalism and a wealth of expertise in all energy matters.

This publication has been produced as a result of work carried out within the Technical Team of the EI, funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

For further information, please visit **http://www.energyinst.org**

The EI gratefully acknowledges the financial contributions towards the scientific and technical programme from the following companies

BG Group
BP Exploration Operating Co Ltd
BP Oil UK Ltd
Centrica
Chevron
ConocoPhillips Ltd
Dana Petroleum
DONG Energy
EDF Energy
ENI
E. ON UK
ExxonMobil International Ltd
International Power
Kuwait Petroleum International Ltd
Maersk Oil North Sea UK Limited
Murco Petroleum Ltd
Nexen
Phillips 66
Premier Oil
RWE npower
Saudi Aramco
Scottish Power
SGS
Shell UK Oil Products Limited
Shell U.K. Exploration and Production Ltd
SSE
Statkraft
Statoil
Talisman Sinopec Energy UK Ltd
Total E&P UK Limited
Total UK Limited
Tullow
Valero
Vattenfall
Vitol
World Fuel Services

However, it should be noted that the above organisations have not all been directly involved in the development of this publication, nor do they necessarily endorse its content.



ISBN 978 0 85293 709 9

Published by the Energy Institute



Hard copy and electronic access to EI and IP publications is available via our website, **www.energypublishing.org**.
Documents can be purchased online as downloadable pdfs or on an annual subscription for single users and companies.
For more information, contact the EI Publications Team.
e: **pubs@energyinst.org**

# CONTENTS

# FOREWORD

In 2004 the EI (then Institute of Petroleum) published the paper *UK oil refining and the atmospheric emission of dioxins*.

This second edition of the EI paper reviews the latest health effect data as well as the contribution of the refining industry to the UK dioxin and furan inventory. It also updates the legislative references.

# ACKNOWLEDGEMENTS

The update of this report was commissioned by the Energy Institute's (EI) Emission Working Group and the work was undertaken by AMEC Environment & Infrastructure UK Limited.

The EI wishes to thank Adam Clegg, Rob Whiting and Caspar Corden as the authors of this report, and also the EI's Emissions Working Group for steering this project through to completion.

Members of the Steering Committee for this project include:

| | |
|---|---|
| Ian N. Althorp | Exxon Mobil |
| Bernard Brown | Murco Petroleum Ltd. |
| Sarah Catmull | P66 |
| Timothy A. Davies | Valero |
| Kevin Lenthall | Total |
| Brian Smithers | |

# 1 INTRODUCTION

This briefing paper is not intended to be a comprehensive technical review. Rather it is a synthesis of material in the public domain, compiled to inform the non-expert. It is structured to set context first by covering topics common to all sources (potential formation pathways, adverse effects, national emissions, policy), then the focus moves to refinery specifics in section 7.

Until recently, dioxins were thought to be a problem only because of their presence as contaminants of certain industrial and agricultural chemicals. Over the last 30 years or so, there has been an enormous increase in the sensitivity of analytical techniques used to measure dioxins and these contaminants can now be detected at extremely low levels which were previously too low to measure. It is now clear that dioxins are widely distributed in the environment, albeit at exceptionally low concentrations and that they are produced not just as by-products of chemical manufacture but also as common products of combustion.