

# WORLD ENERGY DIRECTORY



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# World Energy Directory

**A guide to organizations  
and research activities in non-atomic energy**

**Consultant Editors**

**J. A. Bauly, BSc, PhD, CEng, FIMechE and C. B. Bauly, BA**



E8263125

**FRANCIS HODGSON®**

Published by Longman Group Limited

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## **WORLD ENERGY DIRECTORY**

Published by Longman Group Limited, Sixth Floor,  
Westgate House, The High, Harlow, Essex CM20 1NE, UK

Distributed exclusively in the USA and Canada  
by Gale Research Company, Book Tower, Detroit,  
Michigan 48226, USA

### **British Library Cataloguing in Publication Data**

World energy directory.

1. Power resources – Research – Directories

I. Bauly, J. A.                      II. Bauly, C. B.

621.042'072                      TJ163.2

ISBN 0-582-90011-5

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Printed in Great Britain by  
Redwood Burn Limited, Trowbridge

# Foreword

In recent years, energy has emerged as a major world economic and political issue, and clearly its importance will continue to increase in the foreseeable future. Consequently, many research and development programmes have been started up recently, and still more will be initiated, in industrial firms, technical institutes, and universities throughout the world.

Research workers, programme sponsors, and planners at all levels, including governmental policy makers on overall energy strategy, need a reference source for locating active centres, and co-workers, for assessing the state-of-the-art, for considering fruitful areas of research, and to provide data for making statistical studies. This **World Energy Directory** is aimed at meeting these requirements. This compilation excludes atomic energy research, which is covered by the companion volume **World Nuclear Directory**.

This directory has been compiled from a worldwide survey of energy projects in technical and scientific institutes, industry, and universities. The scope of the survey includes all 'research and development' projects where 'energy' is the main theme, and projects which are aimed at making significant advances in technological practice or in scientific knowledge. Product development is included if the product introduces novel features that have resulted from a significant research and development programme. The following areas are included:

- the efficient use of non-renewable resources such as oil, coal, shale oil, gas, peat, and wood;
- the harnessing of renewable sources such as wave, geothermal, wind, tidal, and solar energy;
- the production of fuels from vegetable material;
- energy storage;
- energy handling machinery and plant such as heat pumps, engines, and boilers.

The finding, extraction, and mining of fuels are not included.

Obviously, every industrial enterprise and technical institute is involved in some way in energy. As users of energy they will at least be concerned about their own energy costs and thus may well have on-going programmes of conservation by insulation, waste heat recovery and reduction in space-heating temperatures. Many companies directly involved in energy-related products will have programmes to develop their existing products for higher efficiency, improved control, or improved insulation. There are probably tens of thousands of such projects going on in thousands of companies and institutes. Although highly important activities, unless these projects are aimed at making significant advances in technological practice or in scientific knowledge, they will not be covered in this directory. To achieve such advances, the costs and resources needed will generally be large and are thus usually viable only for large companies or corporations



– and then often with the help of government funding. This is reflected in this publication, where relatively few small or medium sized companies are mentioned. As may be expected, the majority of energy R&D in industry is being carried out by the large (often multinational) corporations involved in oil, coal, semiconductors (for solar cells), large central power plant equipment, civil engineering and the automotive industry.

Since the ‘energy crisis’ of 1973 alarmed the entire world, governments and large companies have set up new and often huge energy programmes. Some of these aim at harnessing alternative energy sources such as sea, wind, and solar energy. Numerous solar energy projects for water heating by solar panels are being carried out in almost all countries except those with minimal sunshine. Applications range from domestic hot-water heating to large scale desalination plants as in Saudi Arabia. Solar cell (photovoltaics) development, on the other hand, is limited mainly to the larger companies prominent in semiconductors or oil, and some universities. In 1978 the US Congress authorized \$1.5 billion on photovoltaics over ten years. In the UK the Department of Energy is sponsoring a wave energy programme with an annual budget of around £5 million, and the Central Electricity Generating Board in collaboration with universities and various companies is investigating the design and application of windmills for electrical power generation.

In areas such as the USA, USSR, South America, and Canada, large projects are in progress to exploit the non-renewable resources, particularly coal, and oil from oil shales or tar sands. The projects here include fluidized bed combustion, and the manufacture of synthetic fuels by coal gasification or liquefaction.

Thus we see that the scope of energy R&D is very wide indeed. In recent years there has been much debate on the use and potential hazards of nuclear power, and it is sometimes said that insufficient effort is put into the exploitation of non-nuclear energy. This directory will help throw more light on such arguments.

The directory was compiled mainly from data obtained from questionnaires sent to over 5000 technical and scientific institutes and industrial organizations worldwide. Supplementary data was obtained from other sources such as publications, conference proceedings, and personal contacts. The directory is indexed by title and subject, so that the reader can, for example, quickly access all projects in any particular category such as ‘solar cells’, ‘heat pumps’, ‘windmills’, and so on.

A work such as this can be compiled only if those concerned are willing to provide the necessary information. We have been pleased by the good and thorough response we have had to our questionnaires and take this as an indication of the widespread recognition of the need for an authoritative reference book of this kind. However, we cannot claim that the directory has achieved absolute accuracy and 100 per cent worldwide coverage. We would be glad to hear of omissions or inaccuracies which can be covered in future editions. We believe that good coverage has been achieved of the USA, UK, Europe and the Western World generally. Obtaining comprehensive data from China, USSR, and Eastern Europe has proved difficult, and we appreciate that a more thorough coverage is desirable. Data gathering from these areas will be continued for inclusion in later editions.

It only remains to thank the very many research workers, managers, and

administrators in all the countries who gave their time and information for our survey; and Longman–Francis Hodgson Editorial Team for compiling the data and publishing it as this directory.

Bishop's Stortford  
Hertfordshire, UK  
April 1981

**J. A. Bauly and C. B. Bauly**  
Consultant Editors

## **A Note on the Editors**

After completing his studies in aeronautical engineering, John Bauly began his career with the de Havilland Aircraft Engine Company where he worked on design aspects of piston, turbo-jet, and jet engines. In 1962 he joined the Clarke Chapman Group (now Northern Engineering) and carried out research, development, and design work on fossil-fired and nuclear power plant. In 1973 he joined ITT at their central laboratory, Standard Telecommunication Laboratories in Harlow, UK, to set up a research and development capability, which he now manages, for ITT's worldwide multi-billion pound Industrial and Energy Products Groups.

German-born Christina Bauly began her career in Germany as a pharmacist before settling permanently in the UK in 1966. More recently she has carried out a wide range of freelance editorial and translation activities, including undertaking the role of technical editor for a German export trade newspaper.

# Publisher's Introduction

The publishers are proud to bring out the first edition of this worldwide reference work on non-atomic energy research and engineering developments at a time when there is a broad-ranging discussion of the future sources and uses of energy generation. The **World Energy Directory** gives details of establishments, in over eighty countries in the world, which conduct or promote research into solar, geothermal, wind, tidal and wave energy, hydroelectric power, fuel from plant material, batteries, fuel cells, and the efficient use of coal and petrochemicals. This directory forms a companion volume to our **World Nuclear Directory: a guide to organizations and research activities in atomic energy**. The arrangement of the book is described below.

This worldwide reference guide is arranged by countries in alphabetical order. Organizations spanning more than one country are listed in the opening section entitled International. To locate a particular organization, the reader can either refer directly to the country section, or use the Title and Keyword Index of establishments mentioned in the text. The Subject Index, which completes the book, allows the reader to identify where specific research activities are being conducted. Thus, this book allows the reader to identify research and organizational details of establishments by country, by title, and by subject matter.

Each country section comprises research establishments and related organizations arranged in alphabetical order in the language of that country. For countries which do not use the Roman alphabet, the title is given in English translation. Universities are entered under the English version of the place name mentioned in their title or the city in which they are located, even if this is not the first word in the title, eg the Politecnico di Milano will be found under Milan, and the Technische Hogeschool Delft will be found under Delft.

Each entry is introduced with the full title of the organization, accompanied by its acronym if used. If the title is in a language other than English, a translation is supplied. It should be noted that the translated title is not necessarily an exact translation of the original language but is intended to give an indication of the work of the particular body. The following details are also included where available: full postal **address**; **telephone** number, and **telex** address; **status** indicates the establishment's own description of the type of body – in some cases this description applies to the head organization; details of **affiliation** or parent body; names of senior staff such as **research director**; and names of **managers**, their sections, and other **research leaders**; the total number of research and development technical staff in the organization expressed as a ratio of the number of staff working on energy projects; **projects** being investigated; **additional information** on the organization's energy projects; any major or unique **facilities** for the R&D of energy projects; and relevant **publications** issued by that organization. In this paragraph the introductory word or phrase given in the entry has been printed in bold type.

The individual topics entered after the heading **projects** are placed in order of importance by the responder, and in many instances we are able to indicate the number of staff working full-time on each project. The

recipient of each questionnaire was provided with the following project subjects: coal, oil, oil shales, gas, hydrogen, solar cells (photovoltaic), solar collectors (panels), solar boilers, biomass, hydroelectric, windmills, tidal, wave, ocean, geothermal, batteries, fuel cells, engine research, electrical generator research, special boilers, heat pumps, total energy, district heating, waste incineration (energy from), waste heat recovery, insulation, heat storage, magnetohydrodynamics, thermoelectric, other.

The entry information is intended to indicate the size of the organization, its major personnel and an overview of its research activities and interests. The work of individual scientists and the scope of particular research projects, which may be of short duration, have not been included.

An asterisk (\*) appearing after the title indicates that a reply was not received in time for inclusion in the book. However the Editors believe these organizations are conducting activities which fall within the scope of this directory, so they have been included. In these cases the entry contains data available from public sources.

The Title and Keyword Index includes titles of all establishments listed in this reference book, and directs the user by country and entry number to the full information on that establishment. An establishment with a title in a language other than English is entered under both its original language title and its English translation, as given in the entry. In addition, English language titles have been revolved to bring keywords to the beginning of the title, so that the title is also listed alphabetically by keywords.

The Subject Index is compiled primarily from the 'projects' entry of each organization and allows the reader to identify where specific research activities are being carried out in the world.

The continuing development of energy R&D programmes means that any reference guide of this nature needs regular updating. Consequently it is hoped to produce revised editions of the **World Energy Directory** at regular intervals in the future. The publishers would appreciate hearing from users who may have suggestions to make for the improvement of future editions, or who are able to point out any errors of omission or commission.



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## International

### INTERAMERICAN ORGANIZATION FOR HIGHER EDUCATION - OUI

1

Address: 2875 Boulevard Laurier, Québec, Canada G1V 2M3

Telephone: (418) 657 2430. Telex: 051 3488

Status: University

Director: Dr F. Lorient

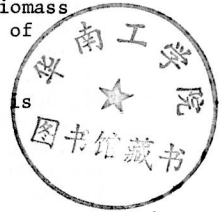
Staff on energy projects: 5

Projects: Hydroelectric (2 staff)/Windmills (2 staff)/Biomass  
(1 staff) - developing mini-centres in remote areas of  
Latin America.

District heating.

Additional information: Participation in these projects is  
taken by universities of Canada and Latin America.

Publications: *Boletín OUI Bulletin.*



### INTERNATIONAL ENERGY AGENCY - IEA \*

2

#### AGENCE INTERNATIONALE DE L'ÉNERGIE

Address: c/o OECD, 2 rue André Pascal, F-75775 Paris Cédex 16,  
France

Affiliation: OECD

Activities: The IEA aims to promote co-operation amongst its members, which are the member states of the OECD, to reduce dependence on imported oil. To effect this aim the IEA members undertook, under the International Energy Program, co-operative programmes in four main areas: i) conservation of energy; ii) development of alternative resources; iii) energy research and development; and iv) uranium enrichment. Research and development programmes have included: waste heat utilization; use of municipal and industrial waste to produce energy; production of hydrogen from water; coal technology; nuclear safety; radioactive waste management; energy conservation techniques; controlled thermonuclear fusion; solar energy; high temperature reactors; small solar power sources; geothermal energy; wind power; wave power; ocean thermal gradients; and biomass conversion. The IEA fosters co-operation among nations with a view to establishing stable international energy trade and to improving management of world energy resources. It provides information on the international oil market and has created a system of oil allocation for use in the event of a major disruption in oil supplies.

For nuclear activities, consult our World Nuclear Directory

INTERNATIONAL SOLAR ENERGY SOCIETY \*

3

Address: Mechanical Engineering Department, University of  
Melbourne, Parkville, Victoria 3052, Australia  
President: W.W.S. Charters

ISTITUTO INTERNAZIONALE PER LE RICERCHE GEOTERMICHE

4

(International Institute for Geothermal Research)

Address: 1 via del Buongusto, 56100 Pisa, Italy  
Telephone: 50-41503/50-46069

Status: National Laboratory/Institute

Research Director: Dr L. Taffi

Research leaders: Dr R. Celati, reservoir engineering; Dr M.  
Fanelli, international post-graduate course in geothermics;  
Dr P. Squarci, geological research; Professor C. Panichi,  
national geothermal programme

Total R&amp;D staff: 30

Project: Geothermal (30 staff) - drafting of a geothermal map of  
the national territory; marginal areas and deep structures in  
operating areas; hypothesis for exploitation of hot rocks;  
geochemical and geophysical prospecting in geothermal areas;  
hot water utilization; energetic utilization of geothermal  
waters; geothermal mapping; environmental impacts of using  
geothermal fluids; projects of heat extraction from hot rocks;  
evaluation of productive power of high enthalpy geothermal  
fields.

Additional information: Part of the above project has been  
contracted to the institute by the Italian Consiglio  
Nazionale delle Ricerche under their finalized energy  
programme (see separate entry for Progetto Finalizzata  
Energetica). In 1979 the budget for this project was 1224  
million lire.

Publications: *Geothermics*, international journal of geothermal  
research and its applications.

JOINT RESEARCH CENTRE - JRC

5

Address: 200 Rue de la Loi, B-1049 Brussels, Belgium

Telephone: 735 00 40; 736 60 00. Telex: 21877 COMEU B

Status: Laboratory/Technical Centre (government-controlled)

Parent body: Commission of the European Communities

Director-General: S. Villani

Director of Programmes: J.P. Contzen

Deputy Director-General, JRC, and Director Ispra establishment:  
R. Mas

Total R&D staff : staff on energy projects: 1110 : 230 (plus  
700 on nuclear research)

Projects: Solar (117 staff) - testing of complete solar systems  
for heating and cooling (Habitat project); testing of  
thermal collectors and photovoltaic cells to measure  
performance, estimate endurance, resistance to corrosion  
and climate, definition of test procedures and methodologies  
(European Solar Test Installation - ESTI project);  
semiconductor-electrolyte solar cells; bioconversion of  
solar energy by photosynthesis.

Hydrogen (79 staff) - production; higher efficiency; transport  
and storage of energy.

Total energy - higher efficiency.

Heat storage - higher efficiency.

For nuclear activities, consult our World Nuclear Directory

Joint Research Centre - JRC (continued)

Heat pumps - higher efficiency.  
 Additional information: The Joint Research Centre (JRC) was established twenty years ago as a nuclear research centre for the Commission of the European Communities. Since then its brief has been expanded to include, among other topics, research into new forms of energy, which now occupies 18 per cent of its research effort. JRC operates from four establishments: the Petten Establishment, Netherlands; Central Bureau for Nuclear Measurements - CBNM at Geel, Belgium; Institute for Transuranium Elements at Karlsruhe, German FR; and the Ispra Establishment, Italy, which is where its non-nuclear research is centred. In 1978 JRC achieved the first thermochemical continuous production of hydrogen.  
 Specialized facilities: ESTI - European Solar Testing Installation, indoor and outdoor laboratory for testing solar thermal collectors and photovoltaic cells.  
 Publications: Reports; *JRC Science News*.

UNESCO REGIONAL OFFICE FOR SCIENCE AND TECHNOLOGY FOR THE ARAB STATES - SC/ROSTAS

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Address: Room B, 1535, Unesco, 7 place de Fontenoy, Paris 75700, France  
 Telephone: 577 16 10. Telex: 204461 Paris  
 Status: A specialized UNESCO regional office  
 Director: Dr Saad Al-Rawi  
 Section head: Dr O.M. Abayazid, engineering and technological research and higher education  
 Total R&D staff : staff on energy projects: 8 : 1  
 Projects: Regional (1 staff) - feasibility study of a regional information network on NRSE.  
 Rural energy (1 staff) - development of more efficient rural stoves.  
 Additional information: UNESCO provides research grants for a number of projects on the development of endogenous technologies and some of these grants are concerned with "rural energy" projects in developing countries.  
 Publications: *Bulletin of the UNESCO Regional Office for Science and Technology for the Arab States*.

WORLD ENERGY CONFERENCE

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Address: 34 St James's Street, London SW1A 1HD, UK  
 Telephone: 01-930 3966/7. Telex: 21120 Mono Ref: 1172  
 President: A.G. Mutdoğan (Turkey)  
 Chairman, International Executive Council: J.R. Kiely (USA)  
 Honorary Chairmen: Sir Vincent de Ferranti (UK), Lord Hinton of Bankside (UK), Walker L. Cisler (USA), Roger Gaspard (France), E. Graftström (Sweden)  
 Secretary-General: E. Ruttley  
 Objectives: To promote the development and peaceful use of energy resources to the greatest benefit of all, both nationally and internationally by collecting and publishing data on potential resources and energy consumption and holding conferences on subjects on or related to these subjects. The 12th World Energy Conference is planned for 19-23 September 1983 in New Delhi.

For nuclear activities, consult our World Nuclear Directory

## INTERNATIONAL

### World Energy Conference (continued)

Membership: National Committees in: Algeria; Argentina; Australia; Austria; Bangladesh; Belgium; Brazil; Bulgaria; Canada; Chile; Colombia; Costa Rica; Cuba; Czechoslovakia; Denmark; Ecuador; Egypt; Ethiopia; Finland; France; German DR; German FR; Ghana; Greece; Hungary; Iceland; India; Indonesia; Iran; Ireland; Israel; Italy; Ivory Coast; Japan; Jordan; Korea; Liberia; Luxembourg; Malaysia; Mexico; Morocco; Nepal; Netherlands; New Zealand; Nigeria; Norway; Pakistan; Paraguay; Peru; Philippines; Poland; Portugal; Romania; Senegal; Sierra Leone; Singapore; South Africa; Spain; Sri Lanka; Sudan; Sweden; Switzerland; Tanzania; territories of Taiwan, Kinmen, Hatsu, and Penghu of the Republic of China; Thailand; Trinidad and Tobago; USSR; UK; USA; Uruguay; Venezuela; Vietnam; Yugoslavia; Zambia

Publications: *Survey of Energy Resources 1980*; *World Energy Resources 1985-2020*; *Directory of Energy Information Centres in the World*.



# Argentina

BUENOS AIRES: UNIVERSIDAD DE BUENOS AIRES  
(Buenos Aires University)

1

## Engineering Faculty

2

Naval Research and Development Service

3

Address: Edificio Libertad 8/26, Comodoro Py y Corbeta  
Uruguay, 1104 Capital Federal, Buenos Aires, Argentina  
Telephone: 32-7940

Status: National Laboratory/Institute

Research Director: Dr Ing Ricardo A. Bastianon

Section head: Ing Luis Lorenzo

Total R&D staff : staff on energy projects: 6 : 3

Project: Windmills (3 staff) - horizontal axis and  
cycloturbine.

YACIMIENTOS PETROLIFEROS FISCALES, SOCIEDAD DEL ESTADO - YPF  
(National Government Oilfield)

4

Gerencia Investigación y Desarrollo (Management of Research and  
Development)

5

Address: Avenida Calchaquí, Km 23.5, Casilla de Correo 71,  
1888 Florencio Varela, Provincia de Buenos Aires, Argentina  
Telephone: 255-2240/2243. Telex: 121792 - 121999

Status: Laboratory/Technical Centre (government-controlled)

Manager, Research and Development: Ing Isidro Lopez

Department heads: Lic Juan Mange, Area Studies; Ing Abel

Ojeda, Petroleum Refining; Ing César Ausili, Petroleum

Production; Lic Gustavo Buhler, Minerals

Total R&D staff : staff on energy projects: 107 : 18

Projects: Oil (10 staff) - enhanced recovery; steam; carbon  
dioxide; miscella solution.

Hydrogen (3 staff) - obtainment; steam reforming; higher  
efficiency.

Motor fuels (4 staff) - methanol; mixtures with gasoline.

Waste heat recovery (1 staff) - optimization; heat  
exchanger arrays.

Additional information: The oil project group comprises  
laboratory studies, simulation, thermodynamics and other  
work in reservoir engineering. The hydrogen project has  
finished the laboratory-scale studies; a pilot plant is now

ARGENTINA

Yacimientos Petroliferos Fiscales, Sociedad del Estado - YPF  
(continued)

Gerencia Investigación y Desarrollo (Management of Research and Development) (continued)

in construction. The motor fuels project will comprise also other non-conventional fuels in the near future.

# Australia

## ADELAIDE: UNIVERSITY OF ADELAIDE

1

Geology, Department of Economic

2

Address: GPO Box 498, Adelaide, South Australia 5001, Australia

Telephone: (08) 2234333. Telex: UNIVAD AA89141

Status: University

Chairman: Professor Peter J.M. Ypma

Research leaders: Professor P.J.M. Ypma, uranium, remote sensing; Professor D.M. Boyd, geophysics

Total R&D staff : staff on energy projects: 14 : 7

Projects: Oil (3 staff) - source rock studies; offshore oil seepage.

Uranium (3 staff) - new exploration methods.

Coal (2 staff) - development of exploration methods.

Gas (2 staff) - natural gas from coal in-situ.

Additional information: Activities include: demonstration of oil potential of lower palaeozoic carbonate basins in Africa and Australia; demonstration of oil potential from Jurassic coal sequences in Cooper Basin, Australia.

Specialized facilities: Airborne spectroradiometer capable of Fraunhofer line discrimination for the detection of luminescence of natural oil seepage in the marine environment.

## AUSTRALIAN ATOMIC ENERGY COMMISSION - AAEC

3

Research Establishment

4

Address: New Illawarra Road, Lucas Heights, Private Mail Bag, PO Sutherland, New South Wales 2232, Australia

Telephone: Sydney 543-0111. Telex: Atomre AA 24562

Status: National Laboratory/Institute

Director: Professor S.T. Butler

Deputy Director (Operations): Dr G.L. Miles

Deputy Director (Research): Dr R. Smith

Divisional heads: Dr D.J. Richardson, Applied Mathematics and Computing; D.R. Ebeling, Centrifuge Enrichment Project; Dr P.G. Alfredson, Chemical Technology; G.W.K. Ford, Engineering Research; D.R. Davy (acting), Environmental Science; Dr A.J. Tavendale (acting), Instrumentation and Control; Dr J.G. Clouston, Isotopes; Dr P.M. Kelly, Materials; Dr J.K. Parry (acting), Physics

Total R&D staff : staff on energy projects: 310 : 9

For nuclear activities, consult our World Nuclear Directory

AUSTRALIA

Australian Atomic Energy Commission - AAEC (continued)  
Research Establishment (continued)

Projects: Coal (7½ staff) - analysis; nuclear techniques; on-line; improved utilization.  
Solar collectors (1 staff) - sun tracking mirror; lighter weight; lower capital cost.  
Solar cells, photo-electrochemical (½ staff) - generation of electricity and hydrogen; higher efficiency; inexpensive materials.  
Additional information: The energy research of the AAEC is predominantly nuclear, see entry in World Nuclear Directory.

AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES - AMDEL \*

5

Address: Flemington Street, Frewville, South Australia 5063, Australia  
Telephone: Adelaide 79 1662. Telex: AMDEL AA82520  
Status: Independent Laboratory/Technical Centre  
Technical Director: R.E. Wilmshurst  
Projects: Coal - review of South Australian coal deposits for their suitability for use in combustion for steam raising, gasification, in situ gasification, liquefaction, and chemical manufacture.  
Solar collectors - thermal characteristics of flat plate collectors operating about 80°C (mostly sponsored by CSIRO, Department of Mechanical Engineering).  
Solar energy - investigation of a process for the chemical conversion of solar energy to electricity (sponsored by the National Energy Research Development and Demonstration Council).  
Additional information: AMDEL achieved total annual sales of \$4.3 million from the following divisions: Analytical Chemistry Division, Applied Technology Division, Geological Services Division, Materials Division, Operations Division, and consulting activities.  
Publications: *AMDEL News*, three times a year; occasional bulletin.

BROKEN HILL PROPRIETARY COMPANY LIMITED - BHP

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Address: GPO Box 86A, Melbourne, Victoria 3000, Australia  
Telephone: Melbourne 6093611. Telex: BHP 30408  
Status: Laboratory/Technical Department  
General Manager, Research and New Technology: Dr R.G. Ward  
Laboratory Directors: Dr G.R. Belton, Central Research Laboratories; H.C. Coe, Melbourne Research Laboratories  
Superintendent, Rock Mechanics and Strata Control Office: Dr A. Hargraves  
Managing Director, Orbital Engine Company: T.R. Sarich  
Total R&D staff : staff on energy projects: 600 : 160  
Projects: Engine research (25 staff) - orbital engine; low weight; smaller size; novel construction.  
Coal (125 staff) - coal conversion combustion; fluidized bed; coal-oil mixtures; solvent refine coal; pipeline transport; blast furnace injection; mine exploration using microseismic; electrochemistry; coal preparation; analyses; cokemaking.  
Gas (3 staff) - catalytic conversion to gasoline.  
Solar collectors (2 staff) - space heating and cooling in

For nuclear activities, consult our World Nuclear Directory