



# Large **Industry Energy Network**

**Annual Report** 2001 : 2002





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Fiona Murray  
Project Manager, Large Industry Energy Network, Sustainable Energy Ireland

Reflecting its interactive nature and anticipated developments in policies and measures such as negotiated agreements, emissions trading and IPPC licensing, the Large Industry Energy Network became the new name in 2002 for the programme previously known as the Annual Self Audit and Statement of Energy Accounts Scheme. Although its name and logo have changed, its aim remains as before: to establish and support a core of major players in Irish industry dedicated to reducing their energy intensity. The 78 member companies committed to this goal report on their 2001 results in this, the fifth Annual Report of its kind.

Continuing the success of previous years, the Network plays a vital role in helping industry to put in place the structures and competencies necessary for developing and implementing comprehensive energy saving plans. This is important not only at an organisational level, but also in the context of national efforts to reduce energy use and related emissions. The need to work towards best international practice on energy performance is highlighted in the Irish National Climate Change Strategy, which also provides the backdrop to Sustainable Energy Ireland's pilot project on negotiated energy agreements currently under way, with the active participation of several members of this network.

Increases in the price of energy have continued to play a major role in influencing members' decisions on implementing energy related projects. Another recurring theme reported by members is the intrinsic difficulty of reporting a meaningful energy performance indicator (EPI) when faced with a wide and ever changing product mix. Some sites manufacture hundreds of different products, which makes a comparison with single commodity producers complex. The introduction of new, high added value products also remains an issue, as these often require more energy intensive processes. For these reasons it is beneficial to draw from the experience of other companies in related industries, and the Large Industry Energy Network provides an opportunity for shared approaches to be adopted for reporting energy performance progress and

setting realistic targets. Sharing information and replicating best practice continue to be major benefits of the Large Industry Energy Network (LIEN), which will be developed further in the future.

With the Sustainable Energy Act becoming law in 2002, Sustainable Energy Ireland (SEI) has emerged as the new national authority responsible for promoting sustainable energy throughout all sectors of the economy. This has resulted in a wider remit for SEI, and a number of staff changes including those directly involved with the Large Industry Energy Network. We will continue to assess members' needs to ensure that the Network develops in response to their requirements, against the backdrop of a changing business market. The Large Industry Energy Network will remain an important resource for helping members to remain competitive in the marketplace. The new, stronger identity of the Large Industry Energy Network will serve to promote the energy management efforts of its dedicated members, while assisting them to make informed decisions in energy related areas.

Fiona Murray

Project Manager, Large Industry Energy Network  
Sustainable Energy Ireland



## 02. MESSAGE FROM MR DERMOT AHERN TD

Minister for Communications, Marine and Natural Resources

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Mr Dermot Ahern, TD  
Minister for Communications, Marine and Natural Resources

The past year has seen important developments in the Irish energy infrastructure. Sustainable Energy Ireland, established in 2002 as an independent energy authority, will play a key role in the years ahead, both in promoting sustainability and in helping to ensure that Ireland meets its international obligations to mitigate greenhouse gas emissions. The government remains firmly committed to ensuring that we meet these obligations, through the long term programme of actions described in the *National Climate Change Strategy*.

The ongoing development of the Large Industry Energy Network – represented in the change in its identity which also took place earlier in 2002 – is evidence of the partnership between government and industry in working to reduce energy consumption and energy related emissions. Progress in this area is important both at a national level and at the level of the individual enterprise. The partnership approach embodied in the Large Industry Energy Network represents the best means of ensuring that energy and emissions reduction objectives are achieved whilst protecting and indeed enhancing our industrial competitiveness.

This Annual Report reflects the changing global trading conditions within which business operated during 2001. In such an environment, it requires dedicated professionals to maintain an adequate focus on energy efficiency, and it is here that the Large Industry Energy Network offers real support to its members. As reported here, their efforts resulted in an

overall reduction during 2001 of 285 GWh of energy consumption, and a consequent reduction in emissions amounting to 120,000 tonnes of carbon dioxide.

I welcome the publication of this report and congratulate the members of the Large Industry Energy Network and Sustainable Energy Ireland for their dedication in maintaining a focus on reducing energy consumption and working towards best international practice in this field.

A handwritten signature in black ink that reads "Dermot Ahern". The signature is written in a cursive, flowing style.

Mr Dermot Ahern, TD

Minister for Communications, Marine and Natural Resources



Pictured above [from left to right] : David Taylor, Chief Executive, Sustainable Energy Ireland; Dermot Ahern TD, Minister for Communications, Marine and Natural Resources; Frank Convery, Chairman, Sustainable Energy Ireland.



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1,4. Energy management workshop at Hewlett-Packard; 2. New brand for the Large Industry Energy Network introduced; 3. LIEN member and negotiated agreement pilot participant, Aughinish Alumina.

2002 has been a year of name changes in the energy arena. The activities of the Irish Energy Centre have been consolidated and broadened under the Sustainable Energy Authority of Ireland. The new authority, which was established as a statutory body in May 2002, now operates under the title Sustainable Energy Ireland.

There have also been changes to the government department with responsibility for sustainable energy. Previously the Department of Public Enterprise, it is now known as the Department of Communications, Marine and Natural Resources, reflecting the transfer of transport into a separate department.

Driven by an independent agenda, but coinciding with these changes, the programme at the heart of this report has also been re-branded. The Large Industry Energy Network is the new name for what was formerly known as the Annual Self Audit and Statement of Energy Accounts Scheme.

The guiding principles of the scheme remain unchanged. Its key objectives remained focused on the development of a core of major players within Irish industry who are publicly and proactively committed to an ongoing voluntary programme of energy and emissions reduction. Likewise, the Network will continue to support members in auditing energy use on an annual basis, setting targets for improving performance and identifying strategies to achieve those targets.

The new brand, however, captures the scheme's underlying philosophy more accurately and concisely, reflecting the evolution of the programme since its establishment as a pilot scheme with 10 members back in 1995. Crucially, it highlights the increasing emphasis on the supportive information sharing and networking elements of the programme, which are designed to help members learn together and from each other.

The new name and logo also give the programme an identity distinct from negotiated agreements, which are now emerging throughout Europe as an important tool for sharing national

energy efficiency and environmental obligations across industry in an equitable way. In the past year, Sustainable Energy Ireland has initiated a pilot project on negotiated energy agreements – indeed, a number of LIEN member companies are participating in this important project.

Against this background, Sustainable Energy Ireland believes that the Large Industry Energy Network will have a distinct but equally vital part to play in promoting environmentally responsible and economically competitive energy use by Irish industry.

The types of negotiated agreements that have been adopted internationally are usually binding, and in some cases penalties apply if obligations are not met. Furthermore, not all agreement structures feature a supportive element to help companies meet their target. The voluntary and supportive nature of the Large Industry Energy Network helps to encourage openness and remove barriers to information sharing and networking among companies. It gives individual members the flexibility and independence to plan and choose the energy-saving technologies and practices that they themselves can implement most conveniently and cost-effectively.

The Large Industry Energy Network's members are its central core, and the scheme's new identity is intended to reflect that ethos above all. Members are encouraged to use the new logo on their company stationery, website and internal communication documents, and more than ever to make participation in the scheme part of their identity as forward-looking companies committed to being leaders in sustainable energy use.

The Large Industry Energy Network's strength is in its members: the knowledge and experience, commitment and enthusiasm they bring, and their willingness to ask questions and share information.

Seventy-eight industrial facilities now participate in the Network, capturing more than 40 per cent of total energy spend by Irish industry. Over the programme's lifetime, membership has matured to the degree that it reflects the broad spread of Irish industry, from multinationals to indigenous players and from sectors as diverse as textiles and air transport to food and drink and healthcare.

However, all participants have two things in common. First, all are high energy users, either by virtue of the sheer size of their operations or by the energy intensive nature of their processing activities. To participate, a facility must have an energy bill of at least €0.6 million per year. In reality, many members' annual energy-spend is much higher.

Second, all members are committed to pursuing energy efficiency as a corporate objective, and to publicly communicating their annual targets and performances in a transparent manner.

#### New members

The Network's membership has grown steadily over the past decade. During the last 12 months, six new members signed up to the programme:

- Pfizer Ireland Pharmaceuticals' Little Island facility in Cork
- GlaxoSmithKline's Dungarvan plant in Waterford
- Cadbury Ireland's facility in Coolock, Dublin
- Merck Sharpe & Dohme's Ballydine plant in Tipperary
- The Limerick-based electronics facility Analog Devices BV
- Masonite's wood processing facility in Co. Leitrim

The Cadbury, Pfizer and GlaxoSmithKline facilities join other sites in their corporate groups already participating in the Network, reflecting these members' positive experiences.

Their participation, together with that of Merck Sharp & Dohme and Analog Devices, builds on the strong clusters of companies emerging within the scheme in the pharmaceutical, food and drink, and electronics sectors.

Sustainable Energy Ireland was also delighted to welcome Masonite as the first representative of the wood processing industry – an area set to increase in importance as accelerated investments in forestry come to fruition over the coming years.

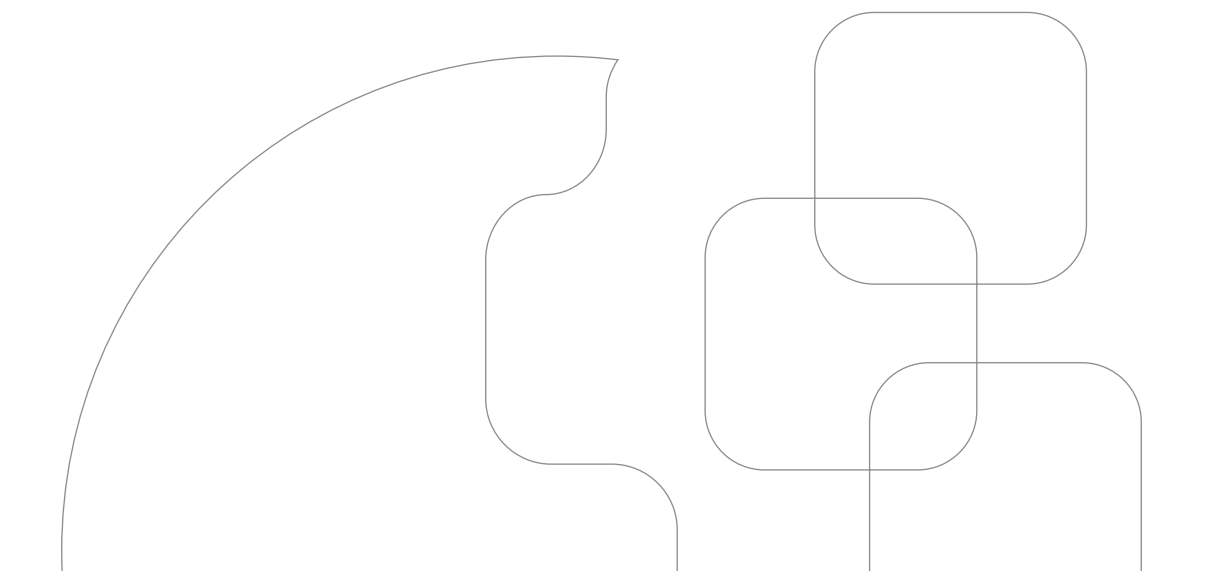
#### Membership losses

Due to the difficult trading climate over the past year and the continued transformation of the Irish economy from heavy processing towards knowledge-based industries, three LIEN members unfortunately suffered company closures:

- Irish Glass Bottle, Dublin, and Irish Ispat, Cork, are no longer trading, and, as a consequence, will not report on performance in this year's report.
- Irish Fertilizer Industries has also ceased operation, but reports on performance for 2001.

Participation in the Large Industry Energy Network is above and beyond members' legislative requirements and, as a voluntary initiative, members derive benefits only if they are genuinely committed to energy efficiency and open auditing and reporting of results.

During the past year, Green Isle Foods became the first member to leave the Network. Also during the 12 months, the Charleville food ingredients facility in Cork, formerly run by Golden Vale but now owned by the Kerry Group, opted out of the Network. Charleville had been an active member, having invested in combined heat and power, and having improved its energy performance index by 7 per cent since joining the scheme in 1996.



### Ownership and name changes

Three members have had changes in ownership during 2002:

- The Whitegate Refinery in Bantry, Co. Cork, previously owned by Irish Refining was sold to the US oil company Tosco in 2001 and now forms part of Texas headquartered ConocoPhillips, as a result of a merger between Phillips and Conoco.
- The Bailieboro infant nutrition production facility, formerly owned by Golden Vale, has now been bought by Lakeland Dairies.
- The former Nestlé plant at Tallaght, Dublin has been sold to a management buy-in and now trades as Fruitfield Foods Ltd.

In all three cases, the companies have committed to remaining within the Network.

Also during the year, Dawn Meats split into two divisions: Dawn Meats and Western Proteins, with each now reporting energy performance separately. Meanwhile, other members have also undergone changes in trading names: the new name for De Beers Industrial Diamonds Division is Element Six; the international food company Heinz has been re-named HJ Heinz; the Great Northern Brewery is now known as Dundalk Brewery; and Guinness St James's Gate is now referred to as Diageo St James's Gate.

### Industry Sectoral Representation within LIEN (2001)

Membership is spread across 13 different sectors, with major clusters now emerging in the pharma/chem and health-care, food and drink, electronics and metal, minerals and engineering sectors, mirroring the importance of these industries to Ireland's economy.

Pharm/Chemicals	24	Oil/Gas	2
Food/Drink	21	Textiles	2
Metal/Engineering	6	Mining	2
Non-metallic Minerals	5	Air Transport	1
Healthcare	4	Plastics	1
Electronics	6	Wood/Timber	1
Print/Paper	3		
<b>Total</b>			<b>78</b>

The Large Industry Energy Network is founded on two complementary pillars: annual auditing of energy use, targets and plans for continuous improvement are supported by networking and information sharing between energy managers. The largest section of this report is dedicated to members' statements, their energy performance indices from previous audits and their targets for future performance. But the supporting networking and information sharing elements play at least as important a role in promoting energy efficiency among members, as reflected in the programme's new name.

### Workshops

Workshops are the lifeblood of the Large Industry Energy Network, providing a platform for Sustainable Energy Ireland to act as a facilitator in establishing an environment for members to learn from invited speakers and from other energy managers. This open environment of information sharing is enhanced by the fact that workshops are typically hosted by a member of the Network, enabling participants to hear from their peers how they translate energy efficiency theory into practice – what does and does not work, what adaptations or innovations may be required, where the problems and challenges lie and how they can be anticipated and surmounted.

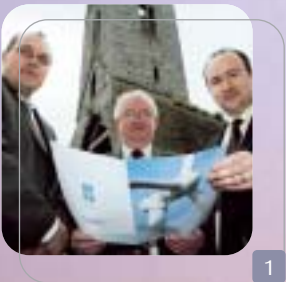
- In November 2001, a workshop aimed at informing members about technology energy auditing and implementation was hosted by Boston Scientific in Galway, and included a site tour of the facility. The event focused on 'model' audits in the key technology areas, carried out at the facilities of LIEN members Dairygold, Lakeland Dairies, Carbery Milk Products, Wyeth Medica Ireland, and Hewlett-Packard, with support from Sustainable Energy Ireland. Attendees heard how the audits can be carried out on the targeted technology areas of refrigeration, compressed air and clean-rooms, taking into account existing plant design, current system operation, and performance; and how the audits had been used to identify energy efficiency opportunities for improving plant performance.

- In March 2002, Hewlett-Packard in Leixlip hosted a workshop focusing on re-invigorating energy management within a company. Pat Kirwin and Alan Ryan, both from HP, took attendees through operations at the Kildare plant and explained how they had succeeded in the difficult task of sustaining momentum for energy management over time. Participants also heard from Jonathan Pugsley of Masonite, Martin Corkery of Pfizer, Loughbeg, and Paul Miller of Bristol-Myers Squibb about their experiences in establishing and running energy management teams.

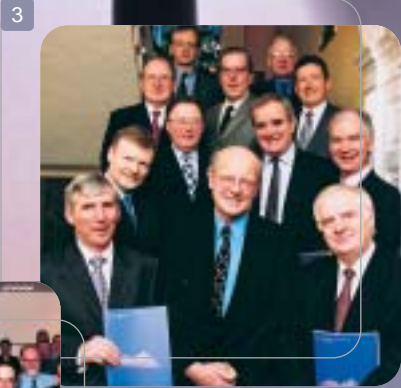
- In April, SEI responded to members' requests for information about the role of renewable energy sources in industry. At a workshop in Kilkenny, attendees heard from international experts about the opportunities for using wind power, heat pumps, solar power and wood fuel in industrial facilities. Again, the event was hosted by a LIEN member – in this case St Francis Abbey Brewery – and the day concluded with chief engineer Denis Barry taking participants on a site tour of the brewery.

### Sustainable Energy Ireland events

Large Industry Energy Network members are always welcome to attend events not run specifically for the LIEN, but with a relevance to energy management in industry. A number of such events involved strong participation by members during the past year.



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1,4,5. Renewable Energy workshop at St Francis Abbey Brewery; 2. Energy Auditing workshop at Boston Scientific; 3. Launch of 2000:2001 Annual Report.

- Sustainable Energy Ireland's programmes for energy efficiency in boiler operations are of strong interest to many LIEN members. A Boiler Study Tour, which took place in March 2002, focused on best practice in boiler and combined heat and power operations, and included site visits to LIEN members Hewlett-Packard in Kildare, and Tyco Healthcare and the Guinness Brewery, both in Dublin.
- In April 2002, an energy awareness training course for industry was held in Shannon to which LIEN members were invited. The course took a 'back-to-basics' approach to energy management. The aim was to help participants gain a better understanding of where energy is used, and to help in identifying areas where operating costs can be reduced using easy-to-apply measures. Participants were reminded of no- and low-cost energy efficiency measures and the potential savings from electricity tariff analysis.
- The Energy Show 2002, which took place on 15 and 16 May 2002 in the RDS Dublin, combined an exhibition of sustainable energy technologies and services available on the Irish market with workshops on a range of topics, including renewable energy, energy auditing, combined heat and power, and motive power and transformers. A number of senior managers from the LIEN member companies attended the speakers' dinner, which was held on the evening of 15 May.
- Energy Awareness Week ran from 22 to 28 September 2002, with the slogan 'Energy Use. The Environment. And You'. This week is the biggest single promotion event in the Irish energy calendar, and many LIEN members ran their own on-site awareness campaigns during the seven days. During this year's Energy Awareness Week, the Large Industry Energy Network formally became the new name for the Annual Self Audit and Statement of Energy Accounts Scheme.

### Studies and analyses

Sustainable Energy Ireland studies and analyses, either carried out in-house or by external consultants, are often of interest to LIEN members, particularly when they focus on energy efficiency in large industry.

At the launch of the Large Industry Energy Network annual report in December 2001, SEI co-launched a report on the future potential of CHP in Ireland. Produced on behalf of the Department of Communications, Marine and Natural Resources and the Commission for Energy Regulation, the report examines the future potential of combined heat and

power in Ireland in the light of market liberalisation, technology advances, fuel sources, extension of the gas grid, and financial incentives. Moreover, it identifies a number of ways to stimulate the CHP market, such as subsidies, regulation or legislative changes.

### Pilot programmes

Ireland's National Climate Change Strategy, published in October 2000, identified an important role for negotiated energy agreements, alongside fiscal measures and appropriate supports, in meeting targets in the industrial and commercial sectors. It envisaged that development of these agreements would commence in 2002, as part of a rolling programme to be fully implemented as soon as possible after 2005.

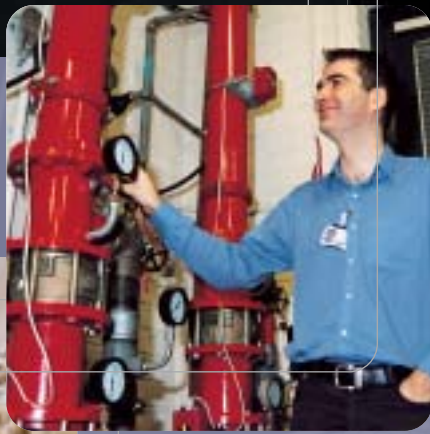
Within the past year, SEI has initiated a pilot project on negotiated energy agreements, and although participation was not restricted to Large Industry Energy Network companies, LIEN members feature strongly among the companies taking part in the pilot agreements. Sustainable Energy Ireland's motivation in initiating the pilot agreements was to prepare industry for the introduction of negotiated agreements and to explore suitable frameworks for application in Ireland.

The pilot project involves the development of three different kinds of draft agreement:

- Aughinish Alumina has entered into one of the pilot agreements as an individual firm whose annual energy consumption is exceptionally high compared with Irish industry generally. This agreement will cover key aspects of energy use within Aughinish that are specific to the firm's technologies and processes.
- LIEN members GlaxoSmithKline (Cork), Janssen Pharmaceutical, Micro Bio, Leo Laboratories, Novartis, Pfizer Little Island and Loughbeg and Wyeth Medica are among the sites that have signed up to develop a draft collective agreement for the pharmachem sector. This agreement will address all of the principal aspects of the energy end-use technologies within the group of participating firms.
- LIEN members Aer Rianta, Cadbury (Dublin), Dawn Meats, Glanbia Ballyragget, Hewlett-Packard, Smurfit Paper Mills, Transitions Optical and Tyco Healthcare, Mulhuddart are among a diverse grouping of facilities that are assisting in the development of a draft agreement on specific energy end-use technologies. This strand of the project is focusing on thermal energy and covers hot water and steam boilers, and heat distribution and recovery.



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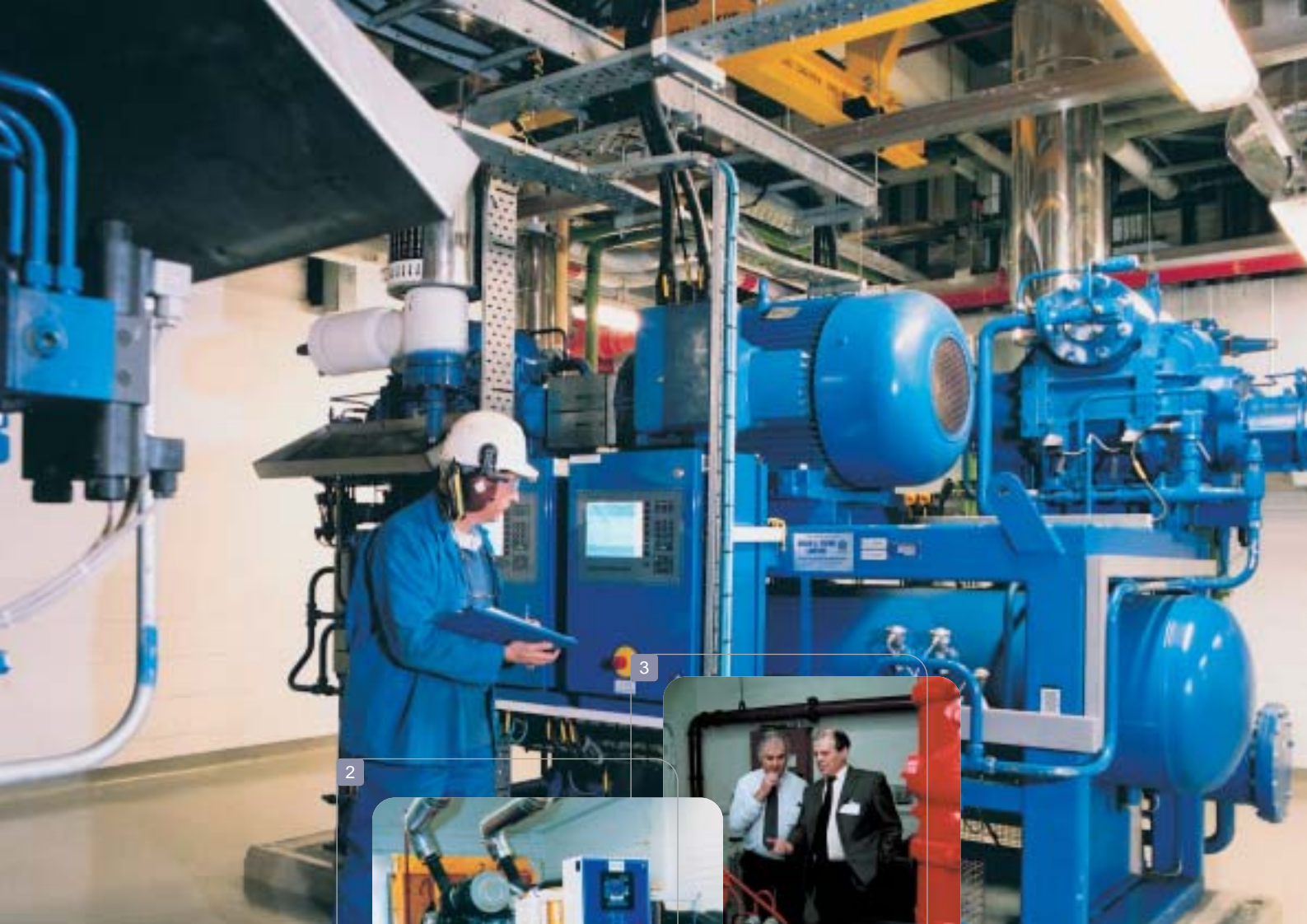


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1,4. Launch of 2000:2001 Annual Report; 2. Energy Auditing workshop at Boston Scientific; 3. Renewable Energy workshop at St. FrancisAbbey Brewery.



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Main picture: Pfizer Ireland Pharmaceuticals, Ringaskiddy – winner of the Definitive Boilerhouse Perpetual Trophy 1. Klinge Pharma receiving award for overall winners of the "IBEC Environmental Management Award for Sustainable Development" for 2001; 2&3. Plant tour at Boston Scientific; 4. Launch of report on future potential of CHP in Ireland.

Members of the Large Industry Energy Network tend to be leaders in their field, dedicated to best practice and committed to good corporate citizenship. Thus it is no surprise that during the past year many have achieved recognition outside the LIEN for outstanding achievements in the areas of sustainable energy use and wider environmental protection.

### European recognition

One of the most prestigious awards went to Pat Jackson of Wyeth Medica Ireland, who received the Wyeth Corporation 2002 European Energy Manager of the Year award. This is a great achievement, given the scope of Wyeth's international operations. Headquartered in Madison, New Jersey, Wyeth employs 52,000 people worldwide, has annual sales in excess of US\$13.5 billion, and sells into over 140 countries.

European recognition for environmental performance also went to two other members of the scheme: Klinge Pharma in Co. Kerry and Masonite Ireland in Co. Leitrim.

Both companies were nominated for the European Commission's European Awards for the Environment, and although neither received an overall prize, this was the first time since 1997 that Irish companies had been short-listed in the top 20 environmental performers across EU and accession countries. Both Klinge Pharma and Masonite were presented Honourable Mention diplomas by the EU Commissioner for the Environment, Margot Wallström, at an awards ceremony in Budapest.

Both companies were also overall category winners in this year's IBEC Environment Awards, an initiative aimed at recognising and rewarding companies that develop innovative solutions for the environmental problems faced by industry.

### IBEC Environmental Awards

Klinge Pharma was the overall winner in IBEC's Managing for Sustainable Development category. The company earned the award for its integrated approach to environmental management, which is based on three core elements:

1. Integration of environmental management into all aspects of operation and all departments, including support activities such as quality control, environment,

safety engineering, administration and materials, where about 60 per cent of staff are deployed.

2. Communication and openness, aimed at building trust and co-operation among employees and the public, through initiatives such as a regular *Environment News* publication, updates on environmental performance on the company website ([www.klinge.ie](http://www.klinge.ie)), and a partnership with Glounaguillagh National School, supporting an environmental study of the local Caragh Lake.
3. Continuous improvement in all aspects of the operation. Examples of Klinge's initiatives in this category include bringing the discharged parameters for wastewater below the limits specified in its IPC licence, the replacement of landfilling of waste sludge with composting, and the control of volatile organic compound (VOC) emissions.

In the same awards, Masonite earned the title of Overall Winner in the Clean Technologies category for the redesign of a paint coating process. The project involved the installation of new coating booths and the replacement of a thermoset paint type with a thermoplastic paint material. The new set-up, which is effectively a closed loop system, has increased coating efficiency to over 97 per cent and led to a 40 per cent reduction in the quantity of waste paint generated. Moreover, the self-cleaning technology employed requires 60 per cent less water to clean the booths, reducing water consumption and wastewater production. Furthermore, the new paint contains less hazardous chemicals and 50 per cent less volatile organic compounds, and no direct emissions to the atmosphere are generated.

Other LIEN members among this year's IBEC Environmental Award winners included Glanbia Ingredients Ltd, Merck Sharp & Dohme, and Intel Ireland Ltd.

### National Boiler Awards

The National Boiler Awards are presented annually by Sustainable Energy Ireland and sponsored by HDS Energy Group. This competition is intended to highlight and reward best practice in the use and management of industrial and commercial boiler plant, and the interaction with associated service companies. The aim is to promote the maintenance of existing high standards and provide an incentive to boiler users to strive for higher performance.

In the past, LIEN members have featured strongly among the prizewinners, and this year's awards were no exception.

The Definitive Boilerhouse Perpetual Trophy went to Pfizer's facility in Loughbeg, Co. Cork. The judges deemed this boilerhouse to be an excellent example of the level of performance achievable using modern, well-designed technology. Combustion efficiencies reach 93 to 93.5 per cent on high fire, and very low emission levels for oxides of nitrogen (NOx) – of the order of 70 ppm – are obtained without the use of specialised low-NOx technology. The plant has also been designed with a high degree of redundancy to ensure that production is not shut down due to failure of any one piece of equipment. The boilerhouse consists of three natural gas-fired 13.6 tonne/hr shell boilers of which a maximum of only two are required at any one time, with the third boiler serving as a standby. In addition, the water treatment facility at the 'front-end' of the boiler plant is duplexed, as is the power supply. This set-up has allowed for continuous steam production 24 hours a day, seven days a week for the past 24 months without a break.

The Boilerperson of the Year Award went to Eamon Roche of Aughinish Alumina in Askeaton, Co. Limerick. Eamon has worked as a boilerman with Aughinish Alumina for the last 17 years, and as part of his on-going career development he has undertaken City & Guilds and Central Electricity Generating Board boilerhouse operators courses. Responsible for three 220-tonne boilers operating at pressures of 5,600 kPa, Eamon has a challenging job, requiring high levels of skill and concentration. During his normal shift, which lasts 12 hours, Eamon controls up to 250 parameters, including steam flow throughout the plant and combustion within the boiler, while at the same time ensuring performance remains within the strict emissions limits set by the Environmental Protection Agency.

The top award for Large Steam Boilerhouse of the Year went to Lakeland Dairies in Co. Cavan. The boilerhouse has featured strongly for many years in the National Boiler Awards,

providing a model of good maintenance, housekeeping, and data logging practice in an older plant. The boiler plant, which consists of two 11.33 tonne/hr and two 9.07 tonne/hr boilers, incorporates variable speed drive technology, direct digital combustion control, and oxygen trim. In addition, two of the boilers have been fitted with economisers, generating total fuel savings of 3 per cent.

In an unusual project, carried out between March and July 2001, tallow was used instead of natural gas to fuel the two boilers not fitted with economisers, resulting in net savings of over €175,000, with the added environmental benefit of dealing with what could potentially have become a waste product during this foot and mouth alert period.

Boston Scientific Europe's Galway plant was the overall winner in the Hot Water Category. This boilerhouse is equipped with two low-pressure hot water boilers each rated at 800 kW and fired by low sulphur light fuel oil. Over the past three years, these boilers have been fitted with sequence controls, and a fuel additive has been used to improve performance. Typical efficiencies are 82% on high fire and 87% on low fire. The plant's hot water distribution system is insulated to a very high standard, and every effort has been made to reduce standing losses. Key controls are linked to the site building energy management system, and the plant is well metered, with all data automatically logged and trended.

Gate Power Ltd earned the Large CHP System of the Year Award for its combined heat and power plant at Diageo's St James's Gate Brewery. The plant features three 4.8 MWe gas turbines and four steam boilers each rated at 64,250 lbs/hr operating at 13 bar. The three waste heat boilers are all fitted with economisers, as well as with Saacke burners for supplementary firing should it be needed. One of the turbines is fitted with a dump facility to cater for situations when supply outstrips demand. The plant is run to high operational and safety standards. It is located outside the main build facilities and is insulated and weather-proofed to a very high standard to meet external conditions.

Highly Commended or Commended National Boiler Awards went to two other Large Industry Energy Network members: Tyco Healthcare, Mulhuddart, and Merck Sharp & Dohme. Meanwhile, Commended and Highly Commended awards also went respectively to Ballyragget Power for its combined heat and power plant at Glanbia, Ballyragget, and to Co-Gen Ltd for its CHP plant at Dairygold, Mitchelstown, Co. Cork.



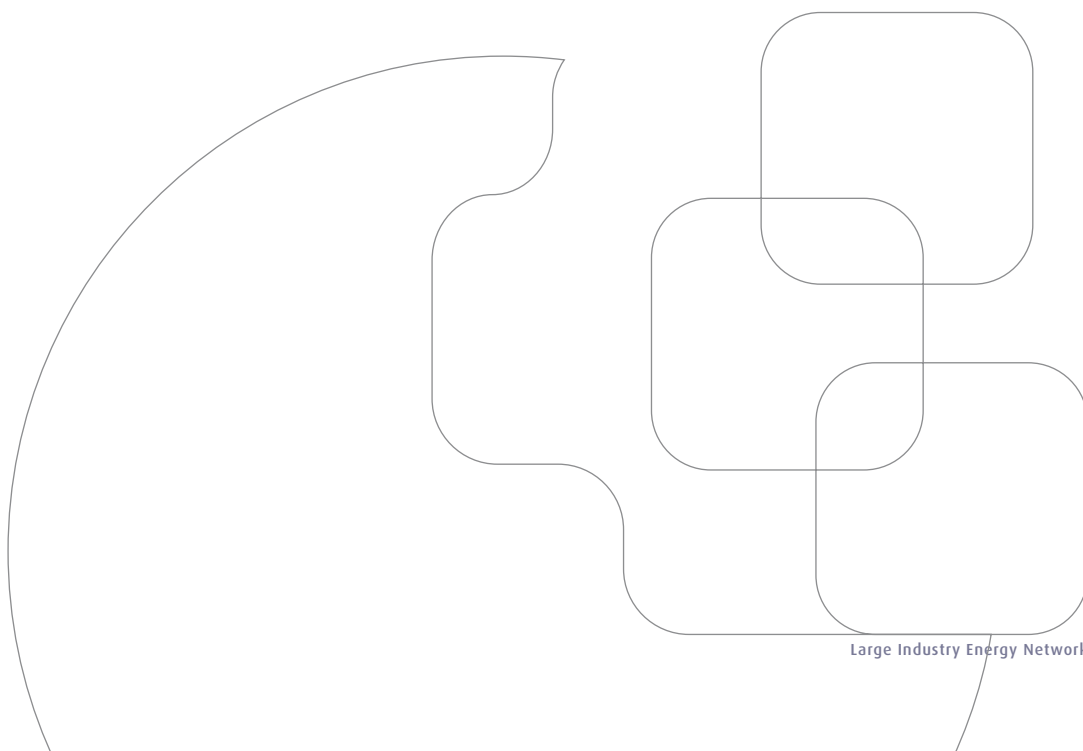
The result for each company is expressed in the form of an energy performance index (EPI). This is based on the ratio of annual energy consumption to aggregate product output, measured in a format developed individually by each company to reflect their unique mix of products and processes. For a member's first year of joining the Network, this index is normalised to 100, and subsequent improvements or deteriorations in energy performance are reflected in a decrease or increase in EPI.

### The results for 2001:2002 are presented as follows:

- The table starting on page 19 lists the members of the Network and highlights their yearly EPI performance since joining the LIEN. In this section, there is a particular emphasis on targets as compared with actual performance for 2001:2002, and targets for 2002:2003 are also highlighted.
- In the subsequent pages, members' EPIs and targets are again presented, this time in chart form, along with a short statement from each of the companies summarising the key elements of their energy management programmes, the factors that have influenced their EPIs and their plans for the future.
- An analysis of the factors underlying movements in EPI during 2001 is presented on page 22, alongside a brief discussion on the aggregate performance of the Network as a whole.

For a small number of members, EPI figures for previous years have been re-calculated to reflect very significant changes in operations or the emergence of relevant new data that had been previously unavailable. Such cases are clearly identified in the text.

New members are given the choice of providing backdated information for the year prior to joining the Network, so some show performance from 2000.



Company	Energy Performance Index (EPI)							Target
	1995	1996	1997	1998	1999	2000	2001	2002
Abbott Ireland, Cavan		100.00	93.28	121.23	120.82	118.69	106.43	105.37
Aer Rianta, Dublin	100.00	93.68	85.68	91.72	91.86	95.80	95.69	98.56
Allergan Pharmaceuticals Ltd				100.00	100.69	118.94	110.89	110.89
Analog Devices BV						100.00	130.81	128.20
Atlas Aluminium	100.00	99.87	99.90	79.34	99.12	105.23	127.90	124.07
Aughinish Alumina	100.00	97.05	96.33	96.33	95.92	94.74	94.96	94.47
Bausch & Lomb Ireland (Contact Lens Division)	100.00	74.59	46.17	66.19	111.02	91.69	66.35	63.03
Baxter Healthcare S.A.	100.00	97.47	92.24	91.74	92.09	79.79	76.67	74.37
Boston Scientific Ireland Ltd, Galway					100.00	77.39	71.44	71.44
Braun Ireland Ltd	100.00	104.65	105.19	118.95	100.75	80.22	57.85	58.43
Bristol-Myers Squibb, Swords			100.00	99.40	104.24	105.57	122.25	118.58
Buckeye Technologies Ireland Ltd			100.00	71.47	52.29	60.35	57.91	57.91
Cadbury Ireland Ltd, Dublin			100.00	101.62	103.01	95.96	97.51	96.54
Cadbury Ireland Ltd, Kerry	100.00	90.78	87.26	88.65	86.02	84.68	84.62	83.78
Cantrell and Cochrane Ireland Ltd				100.00	114.22	108.76	79.27	77.69
Carbery Milk Products Ltd	100.00	96.53	83.95	86.64	73.69	77.28	74.60	74.60
Cognis Ireland Ltd		100.00	95.42	100.66	94.99	107.94	113.34	107.67
ConocoPhillips, Whitegate Refinery		100.00	96.25	97.30	91.55	98.64	102.18	97.07
Dairygold Co-op Society	100.00	101.31	91.97	90.41	89.79	86.65	83.06	83.06
Dawn Meats, Ballyhaunis		100.00	97.11	91.92	95.76	107.01	99.60	99.60
Diageo Ireland, St James's Gate			100.00	72.21	74.78	83.60	87.73	87.73
Dundalk Brewery	100.00	92.65	84.19	86.45	84.82	84.98	109.16	102.61
Elan Pharma Ltd			100.00	100.72	107.18	218.87	227.51	311.68
Element Six			100.00	79.00	67.00	64.00	58.00	56.80
Eli Lilly S.A. – Irish Branch	100.00	85.98	89.30	76.78	76.04	69.43	90.56	89.29
Fruitfield Foods Ltd				100.00	105.02	138.71	185.58	185.58

Company	Energy Performance Index (EPI)							Target
	1995	1996	1997	1998	1999	2000	2001	2002
Garrett Engine Boosting Systems		100.00	79.84	92.66	51.65	49.07	50.39	47.88
Glanbia Ingredients, Virginia	100.00	95.41	92.04	95.77	99.10	97.49	96.57	96.48
Glanbia Meats, Roscrea	100.00	91.44	81.15	74.07	76.17	77.72	78.86	76.50
Glanbia Meats, Ruskey	100.00	91.70	84.42	82.81	80.68	91.36	106.90	106.90
Glanbia Plc, Ballyragget	100.00	91.49	94.58	100.40	90.69	75.82	72.53	71.44
Glanbia Plc, Inch		100.00	102.17	111.73	113.89	106.29	137.42	123.68
GlaxoSmithKline, Cork		100.00	62.20	66.73	60.21	51.28	47.21	45.56
GlaxoSmithKline, Dungarvan							100.00	90.00
Gypsum Industries Ltd	100.00	98.31	92.65	97.57	100.08	103.87	100.43	99.43
HJ Heinz			100.00	89.14	77.29	83.00	80.75	76.72
Hewlett-Packard (Manufacturing) Ltd			100.00	95.06	92.06	69.65	57.72	55.99
IBM Technology Campus					100.00	86.53	76.82	73.75
Intel Ireland Ltd	100.00	92.80	40.22	110.72	73.19	59.16	66.29	63.64
Irish Fertilizer Industries Ltd	100.00	102.94	85.89	93.76	91.90	102.54	89.02	
Irish Shell Ltd			100.00	95.46	92.23	100.26	124.74	124.74
Irish Sugar Ltd	100.00	92.51	92.93	83.72	83.56	90.69	95.20	82.82
Janssen Pharmaceutical Ltd		100.00	99.69	98.39	49.34	51.28	38.69	38.30
Klinge Pharma		100.00	79.43	61.14	61.26	61.24	63.32	62.06
Kostal Ireland		100.00	86.35	80.11	105.49	133.60	137.04	137.04
Lakeland Daries, Bailieboro	100.00	101.55	95.59	92.26	93.52	92.82	96.66	96.66
Leo Laboratories		100.00	98.07	98.10	102.03	118.05	111.85	117.45
Lisheen Mine						100.00	105.63	105.63
Masonite Ireland							100.00	95.00
Merck Sharp & Dohme (Ireland)						100.00	92.04	90.00
Micro-Bio Ireland Ltd, Fermoy		100.00	95.65	86.21	81.08	76.49	80.00	74.80
NEC Semiconductors Ireland Ltd	100.00	145.09	116.48	95.89	127.95	92.83	101.40	99.37

Company	Energy Performance Index (EPI)							Target
	1995	1996	1997	1998	1999	2000	2001	2002
Novartis Ringaskiddy Ltd		100.00	60.00	50.39	55.68	42.55	26.51	26.24
Outokumpu (Tara Mines) Ltd	100.00	108.35	110.15	107.82	107.80	111.82	126.96	120.61
Pfizer Ireland Pharmaceuticals, Little Island						100.00	63.90	60.71
Pfizer Ireland Pharmaceuticals, Loughbeg		100.00	140.30	244.26	474.24	406.87	261.64	248.56
Pfizer Ireland Pharmaceuticals, Ringaskiddy	100.00	93.76	75.89	74.31	73.36	94.51	154.52	200.88
Premier Periclas Ltd	100.00	92.95	91.28	92.03	97.65	91.97	96.46	95.50
Pure Fresh Dairies Ltd	100.00	98.71	93.23	93.64	91.73	96.19	86.48	82.16
Roche Ireland Ltd	100.00	101.45	105.98	246.72	272.47	230.78	208.03	199.71
Saehan Media Ireland Ltd	100.00	89.57	92.58	106.67	99.62	86.01	94.63	91.79
Schering-Plough (Avondale) Co.	100.00	81.54	82.48	85.29	146.69	137.03	196.87	190.00
Schering-Plough (Brinny) Co.	100.00	85.35	83.98	81.29	68.70	61.77	72.38	72.38
SerCom Solutions	100.00	97.87	93.26	88.70	80.73	80.43	82.99	78.01
Smurfit Paper Mills Ltd	100.00	93.88	90.48	92.95	90.55	89.55	89.89	88.99
St Francis Abbey Brewery		100.00	102.26	106.48	105.33	108.89	126.62	126.62
Takeda Ireland Ltd					100.00	80.63	56.47	54.78
Thermo King Europe	100.00	98.75	92.48	75.66	77.48	82.14	76.85	75.31
Transitions Optical Ltd				100.00	112.28	130.18	152.70	137.43
Tyco Healthcare, Athlone		100.00	97.49	82.76	91.25	93.22	92.04	91.12
Tyco Healthcare, Mulhuddart	100.00	89.41	73.54	69.42	75.90	79.73	79.87	79.47
Unifi Textured Yarns Europe Ltd	100.00	81.20	75.09	77.12	81.69	73.11	87.77	86.01
Waterford Crystal Ltd	100.00	81.76	53.96	47.79	32.89	26.94	29.19	29.19
Wellman International Ltd	100.00	98.50	102.70	106.90	109.67	107.11	106.56	104.43
Wessel Energy Cables Ltd	100.00	97.44	83.40	81.05	102.69	101.47	98.63	96.66
Western Proteins						100.00	100.70	95.67
Wyeth Medica Ireland Ltd	100.00	97.86	81.72	90.44	92.06	84.88	84.56	84.56
Yamanouchi Ireland Co. Ltd	100.00	66.45	101.93	89.67	96.73	177.57	149.31	141.85

In the Large Industry Energy Network, the Energy Performance Index (EPI) is the indicator used to benchmark a company's energy performance over time. The EPI is a measure of a firm's energy consumption per unit of product output, expressed in the most appropriate and relevant way for that company – be it weight, volume, or monetary value.

As can be seen from the EPI data presented in the previous section, many members made very significant progress in reducing their EPIs during 2001, with resultant saving in energy costs of a magnitude capable of making a real impact on profitability.

Abbott Ireland (Cavan), Braun Ireland, Bausch & Lomb, Cantrell and Cochrane, Hewlett-Packard, IBM Technology Campus, Janssen Pharmaceuticals, Novartis Ringaskiddy, Pfizer (Little Island and Loughbeg), Roche, and Yamanouchi all improved their EPIs by at least 10 percentage points, and, in some cases, considerably more.

Meanwhile, over the 12 months, the aggregate EPI for the Network as a whole improved by 1.77 percentage points (see table opposite).

What this means is that members have become more efficient and energy-lean in their processing and production operations: for every unit of product produced, they are now using less fuel and electricity than they did this time last year. As emphasised in previous reports, this is a key objective in the development of a sustainable society.

Indeed, the 1.77 percentage point improvement is a considerable achievement, given the difficult trading conditions that a number of LIEN members faced over the 12 months. The buoyant market conditions, which persisted for much of the late 1990s and into 2000, had stimulated significant investment and expansion in facilities among many LIEN members. And, while overall production output for the Network continued to increase, a sharp and unexpected contraction in demand brought about by a combination of factors, including the September 11 attacks and global economic slowdown of 2001, caused operational difficulties

for a number of members. In this environment, congratulations would be in order even if LIEN participants had held their position. The fact that they have done better than that is a testament to their hard work and commitment and the effectiveness of their energy management programmes.

Had it not been for these initiatives, Sustainable Energy Ireland estimates that total energy consumption by Network members would have been almost 286 GWh higher, under a 'business as usual' scenario. This saving translates, in environmental emission terms, to a saving of around 120,000 tonnes of the greenhouse gas carbon dioxide.

These savings impact directly on members' profitability and are especially important in an era of increasing energy costs and uncertainly about future energy prices. They are also important to Ireland – a net importer of energy products – as we strive to optimise our balance of payments and reduce our fuel import dependency.

The environmental savings are also vital both on the individual company level, and nationally, as Ireland grapples with the challenge of meeting its commitment made under the Kyoto Protocol to stabilise greenhouse gas emissions at 13 per cent above 1990 levels over the period 2008 to 2012. In fact, a proposed European Commission directive, which could see participation in emissions trading become mandatory for certain companies before the end of the decade, could give energy efficiency a double value: both in terms of its direct impact on a firm's energy bill and in avoiding additional costs associated with the generation of energy-related greenhouse gas emissions.

### Large Industry Energy Network – Overall Performance

Total energy consumption 2001	15,182 GWh
Aggregate EPI for current members of LIEN (2000)	95.98 <sup>1</sup>
Aggregate EPI for current members of LIEN (2001)	94.21
Improvement in EPI (2000 to 2001)	1.77
Energy decrease from 'business as usual' scenario	285.24 GWh
Decrease in CO <sub>2</sub> emissions from 'business as usual' scenario	119,473 tonnes CO <sub>2</sub>

1 Note that due to an ongoing examination of members' approaches to measuring EPI, some individual indices were altered in order to ensure the most accurate figures possible. Also, the composition of the Network altered somewhat with the addition of new members and with some members not reporting results for this year. For these reasons, the EPIs reported in the table above, and in the detailed results pages, are not always directly comparable with the results in the previous annual report.

### The underlying factors

**Energy-saving initiatives:** One thing all the sites that improved their EPI over the past year share is a commitment to identifying and eradicating energy wastage, be that through investment in new technology and equipment, the 'softer' approaches such as energy management and awareness building, or a combination of both strategies.

As the panel on page 25 illustrates, boiler and steam utilisation projects were among the main areas identified by LIEN members as having a positive impact on energy performance. This is hardly surprising given that boilers are one of the biggest single users of fuel in industry, and that research by Sustainable Energy Ireland in steam boiler-houses has indicated that boiler fuel savings of about 10 per cent are possible, mainly through low- or no-cost measures.

Another popular area of focus was on tackling electricity usage through a range of technology initiatives. These included the targeting of motive power applications, which can account for as much as 80 per cent of a company's electricity bill, but can be cut significantly through informed purchasing policies, the use of variable speed drives and good housekeeping practices and an emphasis on compressed air – a versatile but expensive and often abused resource – and on lighting, which can be optimised with the use of appropriate fittings, lamps and intelligent control.

Sustainable Energy Ireland also welcomes the increased role of what traditionally have been less commonplace approaches to energy savings, such as the targeting of water utilisation and the increased emphasis on plant control, coupled with the implementation of cleanroom and cooling and refrigeration projects.

These latter two technologies have been the focus of a Model Audit project, which engaged a number of LIEN members. With growing awareness of the potential savings from these areas, SEI envisages they will play an ever-increasing role in energy management.

Of course, the human dimension to energy saving is at least

as important as the technology aspects. Senior management needs to be on board to secure corporate commitment and win approval for major capital projects. Employees using equipment on a daily basis are often best placed to identify and implement savings, and simple awareness building among all staff on issues such as the importance of switching off equipment when not in use can make a significant difference to the annual energy bill. So again, it is not surprising that members have placed a strong emphasis on the establishment of energy management teams and the co-ordination of awareness-raising activities. Elsewhere in this report, two case studies illustrate the structured and focused approach adopted by Hewlett-Packard in re-invigorating its energy management team, and by Pfizer, Loughbeg in establishing an energy awareness campaign for the first time on site.

**Non-production related facilities and environmental projects:** A number of members have identified the incorporation of non-production related activities on site as a negative influence on energy efficiency. This is typically because the new facilities – be they offices, an R&D centre or previously outsourced warehousing or packaging operations – are consuming energy in the form of heating, lighting, air conditioning etc, but are not adding to production output.

Companies can have similar experiences when they commission a new plant or piece of equipment to achieve environmental compliance or improve environmental performance. Irish Shell, for instance, noted in its statement this year that the installation of a vapour recovery unit to meet Irish and European environmental regulations led to a significant increase in EPI, as it has increased energy consumption without boosting product output.

This underscores the need for a holistic approach, viewing energy and environmental goals as complementary rather than competing objectives, and for a greater emphasis on lifecycle analysis for evaluating impacts in a 'cradle-to-grave' manner.

Having said that, environmental upgrades do not necessarily have a negative impact on energy performance; quite often the reverse can be true. As a result of a project carried out by LIEN member Schering-Plough (Avondale), volatile organic compounds (VOCs) are removed from wastewater by a newly installed steam stripper at the plant, and are then fed to a thermal oxidiser, resulting in a significant net energy reduction with the potential to cut total fuel consumption by up to 3 per cent.

**Stability in plant operation and output:** Over the past number of years, plant operational stability has emerged as a key driver in energy efficiency for LIEN members. As can be seen from the panel opposite, plant expansion and upgrade projects are among the most commonly cited reasons for companies experiencing deterioration in EPI.

During construction, there can be disturbance to the site, staff resources are sometimes constrained and with complex processes such as validation energy consumption begins to increase while output levels remain stable.

As production ramps up over time, however, the EPI generally tends to correct itself. Thus, it can sometimes be more instructive to look at trends in a company's EPI over a number of years, in order to get a clearer picture of how its energy performance is changing with time. This point is made in the statement from Intel, which is currently commissioning its major Fab 24 facility.

More serious challenges arise for industry when there is an unanticipated drop in production output due to market conditions or other external factors beyond the company's control. Some members facing this difficulty find that they have certain fixed energy costs associated with items such as the operation of their HVAC system, which cannot simply be scaled down in response to reduced output.

Conversely, as the panel also indicates, increases in output up to optimum design capacity can be an important contributor in enhanced energy efficiency. Increased production demand, for instance, boosted Bausch & Lomb's energy performance in this way during 2001.

At the same time, for a small number of companies increased production was cited as having a negative influence on energy efficiency, and in general this was attributable to plant being run above optimal capacity or extra production shifts having to be scheduled for periods when the plant would normally be shut down.

### Sectoral analysis

By international standards, Ireland's industrial base is small and, as a consequence, many sectors in reality contain only a small number of companies, of varying sizes and engaged in a diverse set of activities. This is evident from the Large Industry Energy Network's membership, in which some areas of economic activity – air transport, plastics and wood processing – are represented by just a single facility.

In other areas, however, distinct clusters of activity are now emerging, and it can be instructive to look at overall trends for these sectors.

Taken as aggregates, the *healthcare and pharmaceutical* sectors have both seen a strong improvement in their overall EPIs. For the pharmaceutical sector, this can be attributed in part to a lessening of the disturbances of recent years that were brought about by a period of intense expansion activity, with the result that inflated EPIs are now beginning to return to their baseline levels.

A second factor is that global demand and prices have remained predominantly strong for both the pharmaceutical and healthcare sectors, so promoting a 'virtuous circle' of operation, whereby production remains at optimum levels, and adequate capital and human resources are available for investment in energy management.

However, while the overall EPI trend for these two sectors has been downward, there have been variations between companies, with some firms showing increases in EPI either due to continued expansion or as a result of difficult trading conditions and, as a consequence, a reduction in output. This highlights the point that whilst operating in the same broad sector, each company still faces its own unique mix of factors affecting energy performance.

### Energy Performance Index analysis

Improved aggregate over 2001	Reduction from 2000	Disimproved aggregate over 2001	Increase from 2000
Air Transport	0.11 (1)	Electronics	8.20 (6)
Healthcare	11.47 (4)	Food & Drink	0.71 (21)
Non-Metallic Minerals	9.25 (5)	Metal & Engineering	0.33 (6)
Pharmachem	8.08 (24)	Mining	10.33 (2)
Plastics	22.37 (1)	Oil & Gas	3.89 (2)
Wood	New entrant (1)	Printing & Paper	0.34 (3)
		Textiles	10.33 (2)

Similar factors apply to the *food and drinks* sector, which experienced a small aggregate deterioration in EPI.

In the drinks sub-sector, for instance, Dundalk Brewery attributed its increase in EPI to substantially reduced product demand, whereas Diageo St James's Gate's increase was attributed to the continued addition of non-production related facilities to the site. Likewise, while the EPI for three members of the Glanbia group remained relatively stable, the Ruskey plant's energy performance was adversely affected by a serious fire, which took place on the site during 2001. Meanwhile, Glanbia attributed the increase in EPI for its Inch plant over the year to staff resources being temporarily drawn away from energy management.

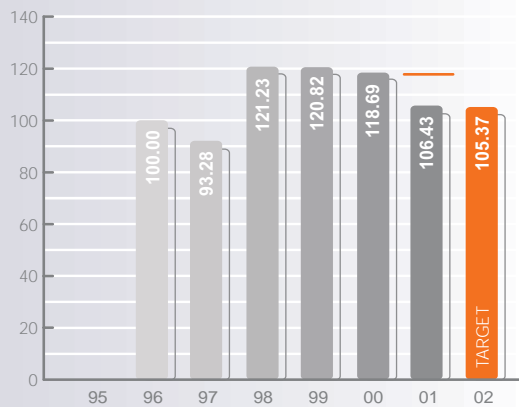
As part of a hi-tech, fast-moving, consumer-oriented sector, *electronics* firms face constant pressures to update and

modify their products, with resultant challenges for energy efficiency. Although Hewlett-Packard and IBM significantly cut their EPIs during 2001, the aggregate result for the sector was an increase in EPI. Indeed, this reflects the mixed economic performance of the electronics sector as a whole in Ireland during the year, with some companies expanding and increasing output, whilst others contracted and experienced a reduction in product demand.

In contrast, the two members of the *oil processing* industry represented in LIEN (ConocoPhillips and Irish Shell) both faced similar challenges during the year, in the form of tougher regulatory environmental requirements. In both cases, this resulted in increased energy consumption and EPIs, but improved environmental performance in other areas, again reinforcing the need to consider energy and environmental impacts in an integrated manner.

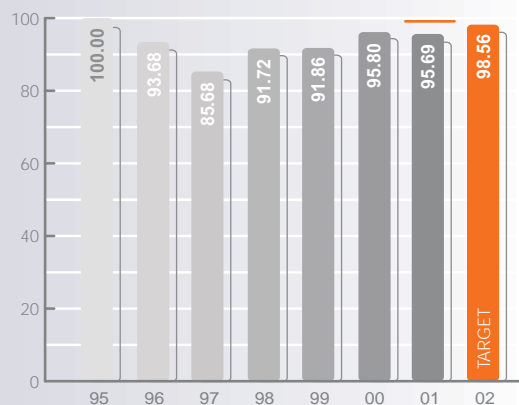
#### Positive and negative influences on energy performance (ranked in decreasing order of frequency reported)

Positive influences	Negative influences
+ Increased production output	- Plant expansion and upgrade projects and commissioning and start-up
+ Boiler and steam utilisation projects	- Reduced production output
+ Staff awareness programmes and energy management teams	- Changes in the product specification, mix or raw materials
+ Initiation or enhancement of monitoring and targeting	- Addition of non-production-related facilities to the site
+ Motive power projects	- Environmental projects
+ Cooling and refrigeration projects	- Increased production output
+ Compressed air projects	- Pressures on staff/management time resources
+ Improved emphasis on plant control and 'switching things off'	- Unscheduled plant shutdown
+ Water utilisation projects	
+ Lighting projects	
+ Installation of variable speed drives	
+ Use of combined heat and power (CHP) plant	
+ Air conditioning/humidification/cleanroom projects	
+ Energy audits	
+ Change to a less energy-intensive product	
+ Maintenance regimes	
+ Incorporation of energy efficiency concepts into new plant design	



### Abbott Ireland, Cavan

Our success in improving our EPI over the past year is due to action in a number of areas. We made further investments in process technology, improved maintenance standards in key areas, and installed additional monitoring equipment. Added to this were the benefits of continuous operation of the plant during the summer period, compared with our normal practice of shutting down for three weeks. This significantly increased production levels and, as a result, improved our energy-to-output ratio. But perhaps the most significant factor in our improved performance was the coming to fruition of groundwork put in over previous years on a number of longer term energy projects.

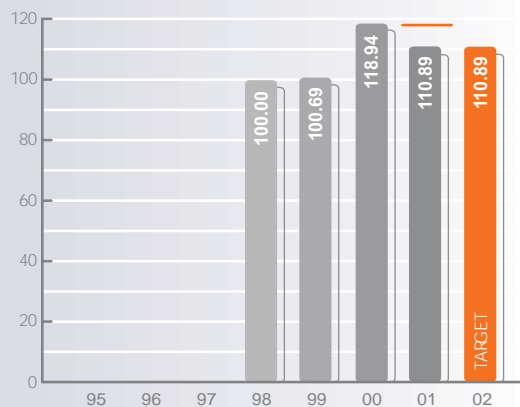


### Aer Rianta, Dublin

Energy consumption increased by the target amount of 3.5% in 2001, but passenger traffic also increased by approximately the same amount over the year, which had the effect of keeping our EPI roughly the same as that for the previous year.

Our continued commitment to energy monitoring and better management of energy consumption should allow for a small decrease in energy consumption in 2002. The continued upgrade of our HVAC systems – together with the installation of a third CHP unit of 2.7 MWe – will assist in controlling energy consumption while continued expansion takes place at Dublin Airport into the future.

— Previous Target



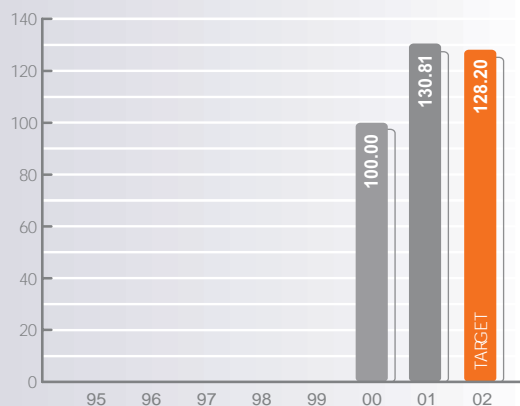
### Allergan Pharmaceuticals Ltd

Although we experienced an increase in manufacturing costs and total energy consumed during the year, we also significantly increased our output.

The improvement to our EPI in part reflects this increased output, but it can also be attributed to efficiency enhancements in the production process.

These included the installation of new energy efficient motors, secondary heating and cooling of process vessels through a closed-loop system and automation in the form of less energy intensive technology in filling and packaging operations.

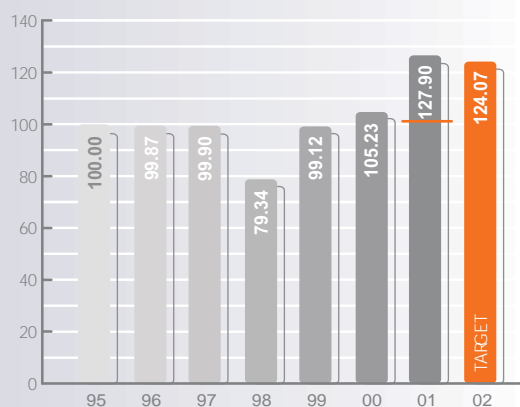
As to the year ahead, we are exploring the possibility of replacing gas oil with natural gas, which may become available with the development of the Corrib field.



### Analog Devices BV

Analog Devices is committed to using energy responsibly and efficiently throughout the site. During 2001, energy consumption increased due to the addition of new production tools, an increase in the size of the production area, and expansions in support service and office space.

The market demand for new technology means that our process must continually grow and change. We continue to strive to minimise any impacts on energy by purchasing the most efficient energy equipment, and by application of conservation measures in line with the objectives set out in our environmental management programme.

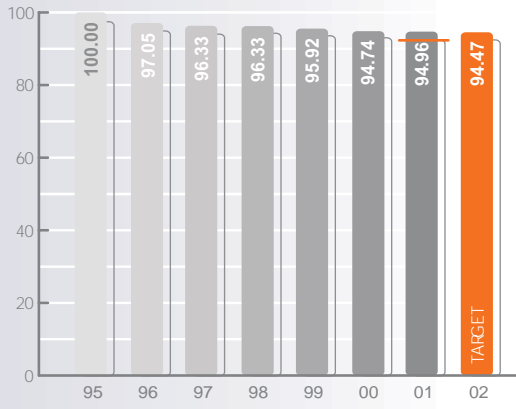


### Atlas Aluminium

Atlas Aluminium's EPI for 2001 increased, although actual energy usage decreased during this period.

The main reason for this performance was a significant and unexpected reduction in production output, due to a reduction in customer requirements.

Atlas is committed to continued energy efficiency and expects to reduce its EPI to below 1999 levels during 2002. The main focus will be on improving the energy efficiency of our furnaces and compressed air system.

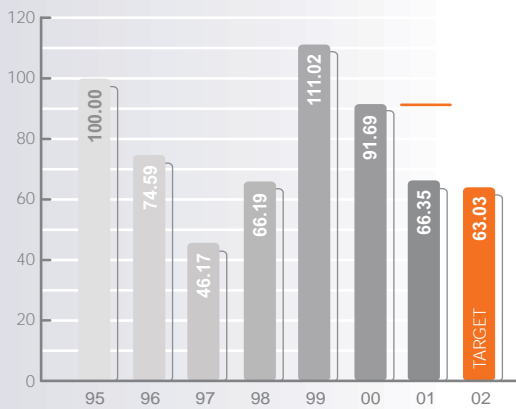


**Aughinish Alumina**

Our energy usage has continually increased over the past year. However, due to production increases and investment, the energy efficiency of the plant has remained reasonably stable.

Energy monitoring is carried out through a continuous on-line process, tracking up to 200 variables in order to determine the optimum operational parameters from an efficiency perspective.

Further strategic investment is being channelled into the development of a CHP plant that will boast an efficiency of close to 80%, as well as contributing to reduction in greenhouse gas emissions.



**Bausch & Lomb Ireland (Contact Lens Division)**

During 2001, there were significant increases in gas prices, which accounted for 38% of the total energy costs from 2000. However, the negative impact of this increase was offset by increased production, together with the successful completion of several energy-related continuous improvement projects.

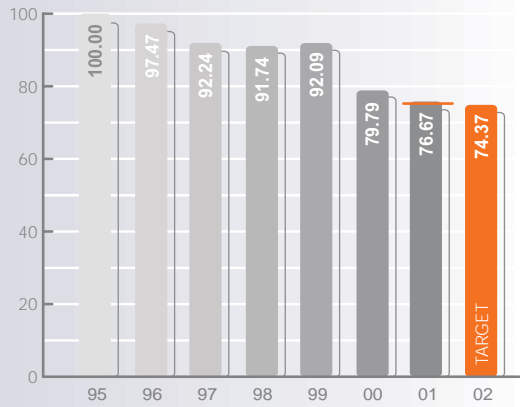
Our output was up by 29% on 2000 production levels due to the Waterford plant successfully acquiring the sole manufacturing supply of RP3 Soft Contact Lenses for the Bausch & Lomb corporation, during the first quarter of 2001, and increasing market share for our Cast Mold Toric lenses.

In addition, utilisation of our CHP plant increased significantly during the year, with electricity imports from the grid being cut by 80%.

Projects planned for 2002 include the construction of a new 20,000 sq. ft. pharmaceutical facility to manufacture a slow release drug for the treatment of back of the eye diseases. The major plant-wide energy-savings initiatives for 2002 are all related to, and based around, our two-year strategy programme to upgrade our building management system. The plan incorporates the installation of a new Desigo software package in the new pharma plant and in three other major processes, with an eventual rollout to all processes and services, together with monitoring and targeting.

We expect this project to yield savings of €50,000 for 2002, and for the project to be completed in full by the end of 2003.

— Previous Target



### Baxter Healthcare S.A.

The downward trend in the EPI for Baxter Healthcare over the past number of years is the result of very focused efforts in the area of energy utilisation and efficiency.

The major consumers of energy across the boiler plant, cooling towers, pumping stations, compressed air plant, distilled water production and other areas have been evaluated for efficiency, and several high-value energy-saving projects have been implemented.

The coming years present challenges, as the facility expands in footprint, and the focus is on engineering plant and equipment expansions. During this period, we will ensure that the emphasis remains on latest technology installations in the energy field.

Since 1990 Baxter has achieved more than a 40% reduction in its EPI and, in the current environment of high energy pricing, we will remain clearly focused on continuing this downward trend.

### 01 : Cold Storage

**carbery**  
GROUP

## Cold storage at Carbery Milk Products



Carbery Milk Products expects to make significant savings from a simple project aimed at reducing energy consumption in its cold room facilities.

Carbery processes 320 million litres of milk every year, and cheese and dairy products make up a large portion of its product portfolio; so cold storage is an important part of the company's operations, and a major element of its energy bill.

The project is focused on replacing a conventional hanging plastic strip screen, covering a 3 metre x 3 metre entrance to one of the cold rooms. This type of 'door' is relatively common in older production facilities, and is favoured due to its low cost and good performance under unchallenging conditions. However, Carbery's high production volumes mean that there is continuous fork-lift traffic into and out of the store room, and the doors tend to become ripped and damaged over time, resulting in increased heat transfer into the room and loading of the cooler systems.

To alleviate the problem, a decision has been taken to install a new automated roller shutter door. This is fitted with a sensor so that when a forklift truck approaches the cold room door, the plastic sheet rolls up quickly, and once the truck has entered, it unrolls



again, so reducing the flow of warm area into the cold room area.

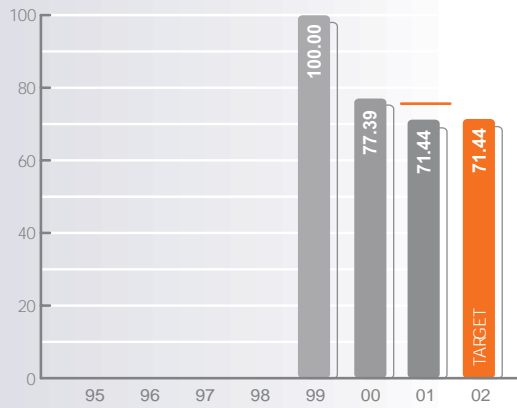
The potential savings achievable were evaluated by monitoring energy consumption for two days of normal operation with the main outer cold room door closed, and comparing this with energy use when the hanging plastic strip screen is the only barrier to heat transfer. This indicated that the project would have a payback of less than two years, which meets the company's criterion for investment in energy saving projects.

**Boston Scientific Ireland Ltd, Galway**

Boston Scientific is a committed member of the Large Industry Energy Network. The company continues to invest heavily in energy reduction projects, and to date all the projects we have implemented have achieved their desired results in terms of achieving substantial energy savings with payback periods of less than two years.

During 2001, we expected our energy consumption to increase by between 15 to 20% due to a new building extension and the transfer of production lines from the US. However, we are pleased to report that the actual energy increase was under 5%.

All energy-saving technologies already installed and validated throughout the plant were included in the design of the new building extension, resulting in cost savings.



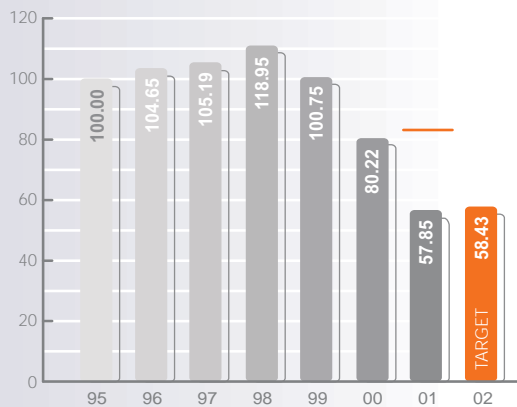
**Braun Ireland Ltd**

Over the past year, our EPI has been influenced by changes in our product mix. The plant is moving from a device manufacturing operation to a highly automated facility, outputting large numbers of consumable products. So, although actual energy usage increased by 5.5%, the even larger increase in plant output has resulted in a substantial improvement in our EPI.

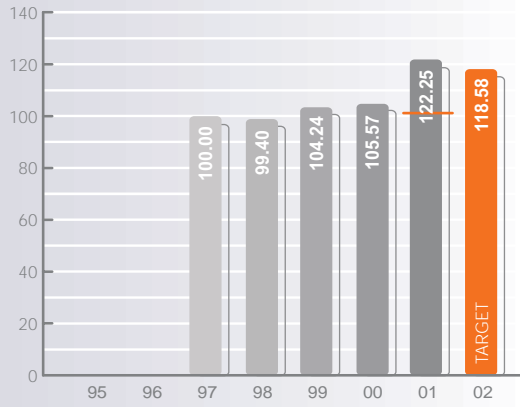
This satisfactory performance is due largely to energy-saving projects implemented in previous years now beginning to reap rewards.

Over the past year, we have installed variable speed drives on our moulding chilled water process pumps, which as well as improving processing conditions will bring moderate energy savings.

No major energy saving projects are planned for the coming year. However, during the planned installation of a major new production line, we will endeavour to put in place a system for measuring all energy inputs so that an accurate picture of energy performance can be obtained for that section of the plant.



— Previous Target

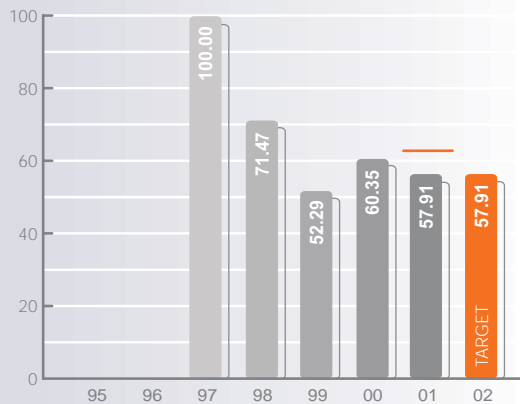


### Bristol-Myers Squibb Company, Swords

Bristol-Myers Squibb is committed to energy conservation and has invested substantially in this area over the past four years. It forms an integral part of our environmental policy, and this commitment is reflected in our strategy aimed at continuous improvement in energy management.

Energy consumption at the site increased over 1997 baseline figures due to higher production output and continued expansion of the plant. However, energy efficiency initiatives have helped minimise potential increases in EPI, due to the addition of non-production and environment-related activities to the site.

One key project planned for the coming year centres on the automation of chiller systems using sequence controllers and variable speed drive distribution pumps.



### Buckeye Technologies Ireland Ltd

Buckeye Technologies Ireland Ltd commenced production in 1997. Since that date, our EPI has been reduced from 71.47 in 1998 to 57.91 in 2001.

Our improvement in EPI during 2000, which was achieved against a backdrop of decreasing product output, is due to our continued emphasis on energy efficiency.

Currently we are focusing on reducing energy consumption through an extensive monitoring and targeting programme using existing equipment. In addition, we have just authorised an external energy consultancy firm to conduct an energy audit for the site.

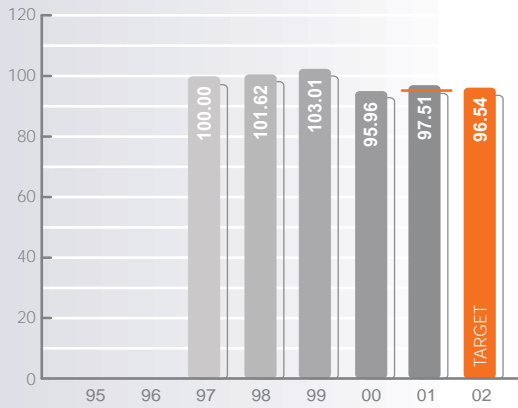
Energy management and reduction is one of the documented programmes of our environmental management system, ISO14001. As the cost of energy increases, energy utilisation is a major component of the company's business plan.

**Cadbury Ireland Ltd, Dublin**

*[Cadbury Ireland Ltd, Dublin joined the Large Industry Energy Network within the past year, but they have supplied historical EPI data for all years since 1997.]*

Cadbury Dublin is in a dynamic phase at present, investing in state-of-the-art plant and equipment. In 2002 and 2003, more equipment, aimed at further automation, will be added to the plant. This will lead to increased energy consumption but benefits will accrue through higher efficiencies in production.

During 2002, an energy audit is planned, in order to inform a strategy for achieving savings in energy use over the next five years. Meanwhile, a rigorous environmental programme will help to improve energy performance, and should position the Dublin factory as a flagship for best practice throughout the Cadbury Schweppes Group.

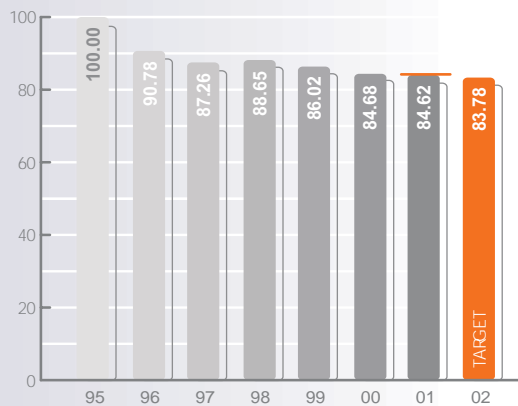


**Cadbury Ireland Ltd, Kerry**

Our energy usage target for 2001 was met, due largely to the maintenance of our energy efficient systems and our large volume of production output.

Our Board is committed to good environmental practice and has charged each site within the group with optimising-energy usage, in order to reduce emissions of the greenhouse gas carbon dioxide.

No new energy-related capital investment projects are planned for the year ahead. However, an overhaul of the flash steam recovery system, involving an upgrade of the safety relief valves and steam traps and the installation of a sulphuring valve, will allow excess low-pressure steam to be fed into the low pressure steam system, which should yield some energy savings for 2003.

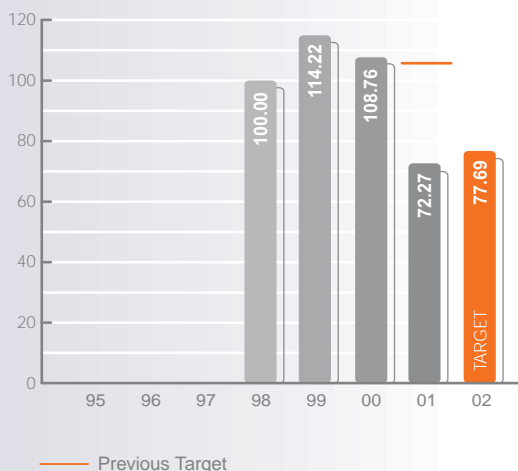


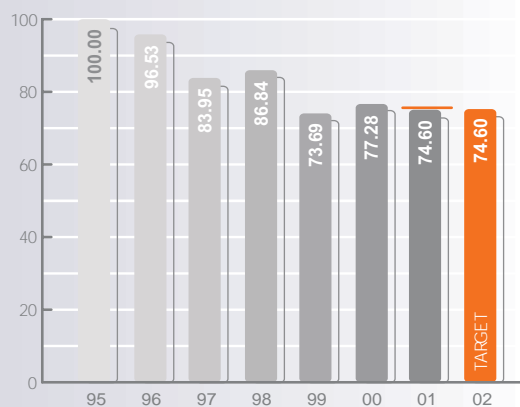
**Cantrell and Cochrane Ireland Ltd**

Cantrell and Cochrane has continued to see reductions in its energy input per litre of product produced.

This improved performance is due to growth in the market-place and a continuing increase in the use of PET (polyethylene terephthalate) plastic relative to the more energy-intensive returnable bottle.

As we reach full plant capacity, we expect energy efficiency improvements from this source to cease and, as part of our initiative to further reduce energy usage on site, an on-site energy-saving team is being established to deliver energy savings into the future.

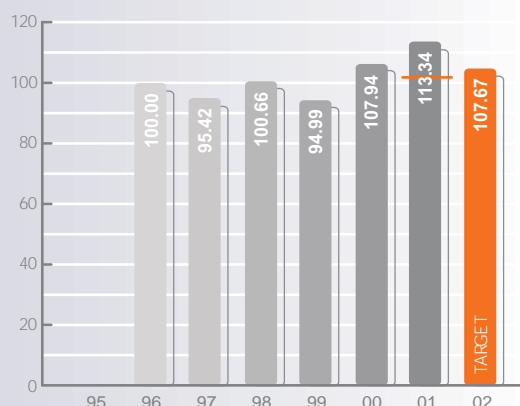




### Carbery Milk Products Ltd

Our EPI improved slightly in 2001, although our energy saving target was not quite met despite our continued commitment to energy monitoring, analysis and reduction. This can be attributed to non-productive fuel usage during the installation and commissioning of various new facilities, including a 4.7 MW CHP plant and a new cheese production line. As the CHP plant will generate steam for the site as a by-product of electricity generation, fuel efficiency should almost double over the coming year.

Investment in energy-saving projects will remain a high priority for the Carbery Group. Installation of automatic roller doors and intelligent lighting systems for our cold stores, and independent audits of our steam and compressed air distribution systems, are planned for the coming year.



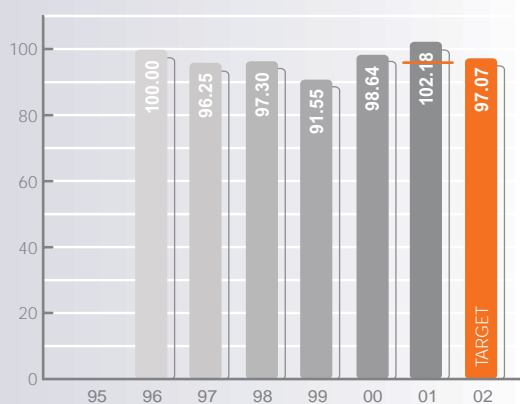
### Cognis Ireland Ltd

Our EPI has increased during the last year despite conditions on the site, such as good plant utilisation, being favourable to a reduction of specific energy consumption.

This can be explained by the fact that over the past number of years, we have invested in a number of environmental projects. These, by definition, will benefit the environment. However, they also consume energy without contributing to the production output, with an adverse impact on EPI.

Nevertheless, we remain committed to energy efficiency, and we will continue to invest in projects to improve energy performance on the site.

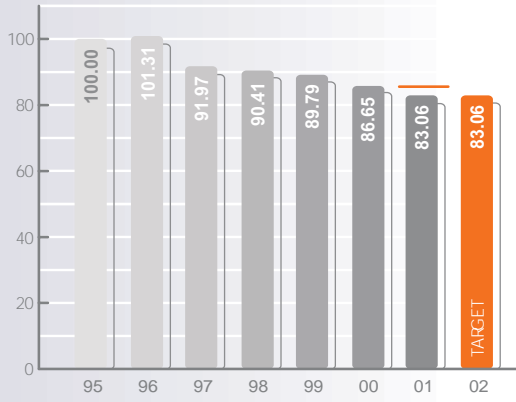
In the year ahead, we plan to implement an energy monitoring and targeting system.



### ConocoPhillips, Whitegate Refinery

At ConocoPhillips, we believe that the key to energy management and, in turn, fuel minimisation is to gain accurate information about fuel usage. As the process plant is now controlled by a digital control system, we know exactly the quality and composition of fuel travelling through the plant and being consumed in the furnaces. Our EPI has deteriorated recently, principally as a result of more severe processing needed to manufacture the cleaner transport fuels for the Irish market. More accurate fuel usage data is now available and this will enable us to make improvements in the future.

Our capital investments are all environmentally driven, and from our experience a greater energy input is required to meet tighter environment limits.



### Dairygold Co-op Society

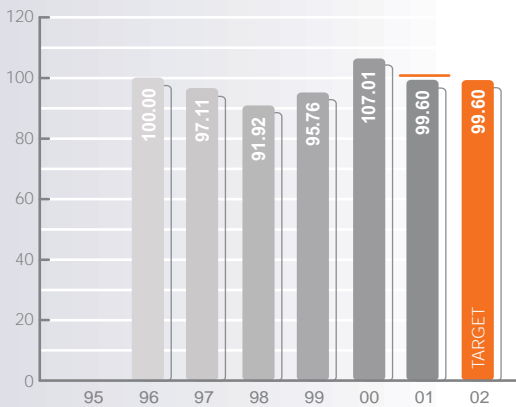
Energy efficiency continued to be a high priority in 2001, and the improvement in our EPI of approximately 4% is mainly due to a series of energy-saving projects implemented during the year.

Key among these was an improved staff energy awareness programme and high levels of commitment from key on-site personnel. Other energy-saving initiatives included

- the installation of energy efficient motors, lighting and variable speed drives where possible;
- ongoing fine-tuning of the refrigeration system;
- a reduction in water usage and increased use of recycled water using reverse osmosis;
- improvement of production process control measures;
- continuous investment in our monitoring and targeting system.

Significantly, a review of our compressed air system resulted in a reduction in main pressure by 2 bar, and a programme focused on repairing air leaks has now become a permanent feature of plant maintenance.

Furthermore, the efficiency of our combined heat and power plant (CHP) has resulted in significant energy savings as well as reductions in carbon dioxide and sulphur dioxide emissions.

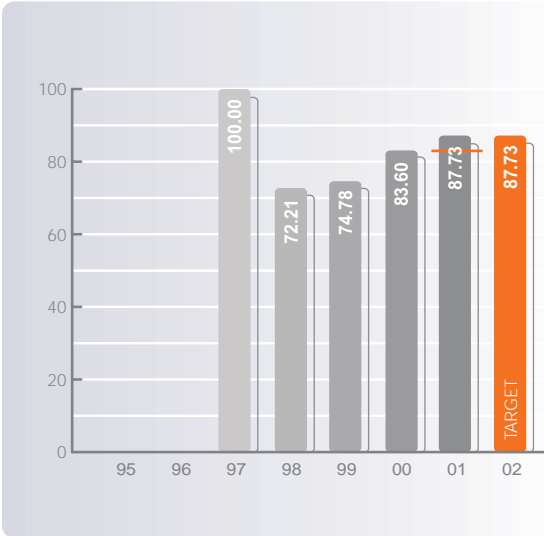


### Dawn Meats, Ballyhaunis

Energy usage per unit processed has been cut significantly due to a number of factors. Less processing of the product was required in 2001, a monitoring and targeting system utilised to aid measurement of the key performance indicators has proven successful, and investments in equipment and personnel have also contributed to our performance improvement.

We do not expect to be able to achieve an equivalent improvement in 2002. However, we will continue to strive towards best practice through investments in new technology.

— Previous Target



**Diageo Ireland, St James's Gate**

Our EPI for the St James's Gate site disimproved during 2001, and we did not meet our target for the year.

Energy consumption increased, as predicted, with the planned centralisation of corporate activities and relocation of personnel to St James's Gate.

Furthermore, the Guinness Storehouse completed its first full year of operation, and these events, combined with changes in production volumes served to adversely affect the energy ratios for the site.

Our target for the St James's Gate site for the coming year is not to exceed usage for 2001.

02 : Transformers



**Looking to the next generation in transformer efficiency: Tara Mines**

At Tara Mines, there has always been an emphasis on specifying the most efficient power transformers available. Transformers are an essential component in supplying electricity to end-users, enabling voltages to be raised for transmission over long distances from distant power stations, and then progressively reduced to the levels required at point-of-use to run motors and power equipment. Losses from transformers can be high, but they are often overlooked as a source of potential savings.

Tara Mines is one of the largest industrial consumers of electricity in the country, and a significant number of high efficiency transformers are used at the site. Power is taken directly from the grid at a voltage of 110 kV, before being distributing through the plant at 20 kV and 6.6 kV. All transformers used underground are of the 'dry' type, having no oil cooling arrangements. These systems, typically operating in the 750-kVA to 1000-kVA range, are used for transforming from 6.6-kV down to 660-V. Here, high efficiency transformers of 97 to 98% have been specified, compared with a typical efficiency of approximately 95% for a standard dry transformer.

This difference of 2 to 3% in performance may seem small, but because the transformers are in constant use, it adds up to significant energy savings over time, resulting in a payback period of as little as two years, at nominal load factors and average power costs. And when these savings are considered over the 20-year minimum lifetime of a typical transformer, their significance becomes even more apparent.



Tara Mines is now looking to the future and closely watching the development of the next generation of so-called ultra-low-loss transformers. These incorporate a fundamentally new type of core material – amorphous iron, produced by cooling molten metal alloy very rapidly – allowing further improvements in efficiency, particularly at low load factors. The company is currently evaluating their environmental impact, payback and suitability for the arduous operating conditions encountered in the mining industry, where safety considerations are of paramount importance. Other considerations will include lower operating temperatures (thus minimising the cooling burden); smaller overall volume, requiring less floor and room space; and greater overload capacity.

Tara's conclusions are likely to be of keen interest to other businesses, as the use of sub-distribution transformers is very widespread within medium to heavy industries.

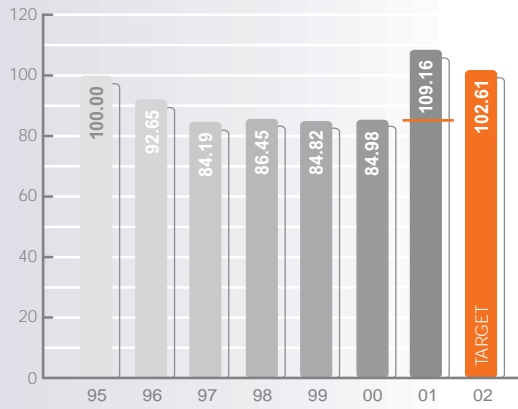
**Dundalk Brewery**

The Dundalk Brewery's EPI worsened significantly during the past year.

This was due to a combination of factors, including reduced time availability from senior management to pursue energy savings; a 30% reduction in total plant throughput over the last two years; and an increased non-productive energy load as a result of the relocation of non-production functions onto site.

Because of global over-capacity in the industry, the cost of production has come sharply into focus, with third-party suppliers eager to supply our markets. Cost has therefore become a central consideration in all future planning.

To that end, the site has identified the contracting out of our utilities supply operation as an opportunity to reduce costs. This will be achieved in part by the reduction of 6% in our energy consumption but also by sharing future savings with the utility supplier.



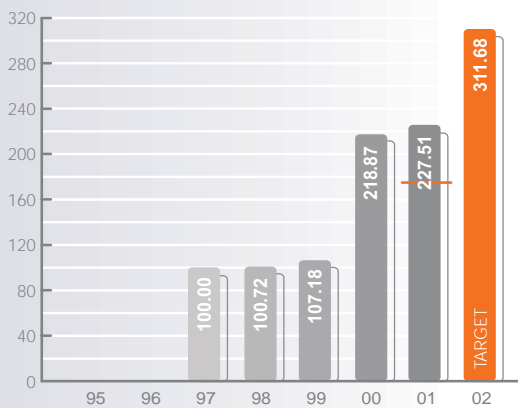
**Elan Pharma Ltd**

Our EPI deteriorated by 4% over the past year, due in part to site expansion, which commenced during the year being reported upon.

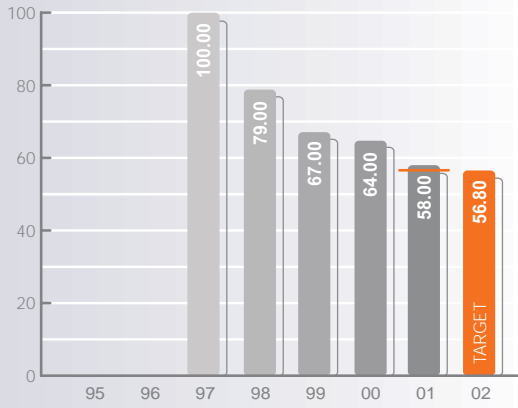
This will continue in 2002, with further increases in EPI as a result of continuing construction and validation of the new manufacturing facilities.

We remain committed to energy efficiency. The projects completed since 2000 include the commissioning of an energy management system on the main plant compressed air dryer, monitoring and targeting (M&T), and the implementation of an energy efficient process chiller project.

Further M&T, energy efficient chillers, and energy efficient air compressors projects are planned for the future.



— Previous Target

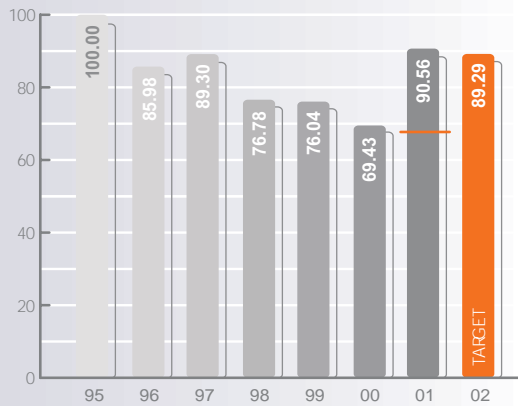


### Element Six Industrial Diamond Division (Ireland)

Element Six Industrial Diamonds has an active and ongoing energy management strategy, which includes the use and upkeep of a building management system, to continually monitor energy consumption with a view to reducing costs and using energy more efficiently.

The EPI for the site, although not quite meeting the target, shows a continuous improvement due to the ongoing effort to drive down energy consumption across all aspects of production and processing, the establishment of more efficient batch sizes to permit maximum use of equipment, and continuing upgrade of pumps and motor controls to increase efficiency.

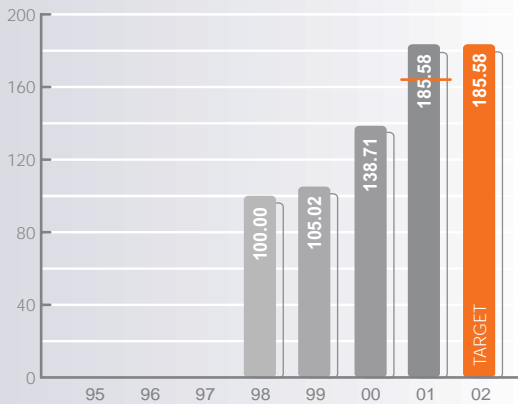
Given the variation in product and the complex nature of the manufacturing process, we are investigating the possibility of reducing our EPI through the use of new technologies.



### Eli Lilly S.A. - Irish Branch

Eli Lilly's EPI increase is mainly due to production volume and production mix changes, and an increased base energy load. Commissioning of new facilities, which did not commence production until late in the year, and the manufacture of a smaller volume of one significant product, reduced the total volume output for the site. Furthermore, the introduction of complex new products led to additional resources on site, thereby contributing to an increase in the base energy load.

However, significant energy savings were still achieved from specific projects that were completed, such as the installation of a high-efficiency chiller plant, and the installation of energy-efficient motors and lighting on new site facilities.



### Fruitfield Foods Ltd

As a new company operating on the former Nestlé Ireland site, Fruitfield Foods Ltd have stated their commitment to reducing energy levels in the Tallaght site. The site's EPI has risen over the last few years mainly due to the relocation of our confectionery facility and the introduction of shift and extended working hours.

2002 should see a busy schedule for energy saving projects, in particular our boilerhouse project, which should yield savings in the region of 20%. The completion of our two year long utilities upgrade is also expected along with the commissioning of various water saving initiatives, which are expected to reduce our water usage by 15%.

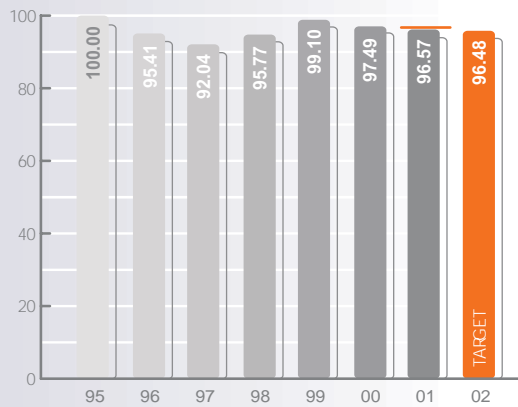


### Garrett Engine Boosting Systems

Our EPI remained fairly constant during the past year.

Our commitment to energy efficiency has several strands. On one front, we are completing the linkage of our energy management systems to newer electrical and gas usage points and to a number of processors throughout the plant. We also carry out compressed air audits throughout the plant and maintain a continuous focus on reducing idle consumption by switching off equipment at weekends. In addition, we consider energy efficient criteria when purchasing new components, and we specify variable speed drives where their benefits are demonstrable.

Looking to the future, increasing product demand may drive our energy costs up, as we may have to return to a 6.5-day, three-shift process.

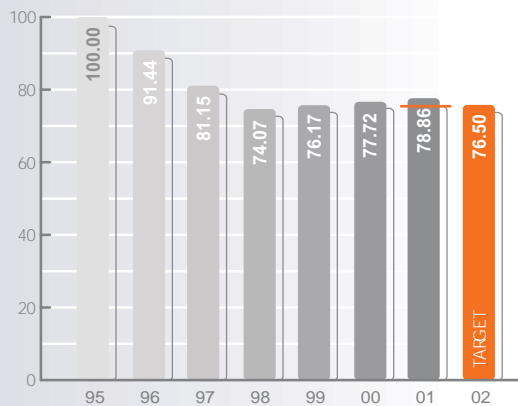


### Glanbia Ingredients, Virginia

Glanbia Ingredients, Virginia, has been a member of the Large Industry Energy Network (previously Self Audit Scheme) since 1995, underscoring the company's commitment to conserving energy and resources. Efficient utilisation of energy throughout the site resulted in an improved EPI for 2001.

A number of energy-saving projects were implemented during the year, including completion of a refrigeration plant project, initiated in 2000 with the assistance of Sustainable Energy Ireland.

The large increases in energy costs in 2001 mean that energy utilisation and efficiencies will remain as a key component of the company's business plan for the future.



### Glanbia Meats, Roscrea

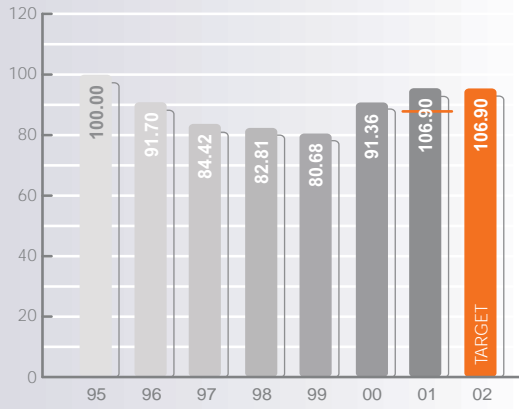
Our EPI increased slightly over the past year, and unfortunately we were unable to meet our projected figures for 2001. Our electricity usage was controlled and we met our targets, but due to a very inefficient and obsolete steam boiler, only 13 years old, our oil and LPG usages were outside our projections.

We have taken corrective action on this issue, installing a new Thompson Cochrane boiler in March of this year.

We are also currently installing a monitoring and targeting system, with the assistance of an outside energy consultancy firm. However, the benefits of this project will not be seen until 2003.

In the year ahead, we may also see further improvements in energy efficiency due to the new boiler and to anticipated increases in plant throughput.

— Previous Target



### Glanbia Meats, Ruskey

Energy performance at our Ruskey site has unavoidably been impacted negatively by a fire in May, which resulted in the whole pig processing plant being destroyed.

However, the focus on energy saving continues. We have introduced a 'Chrysalis Benefits Realisation Programme' within the meat group, through which we are evaluating a range of energy-saving methods and schemes, and our first meeting has already taken place.

### 03 : Lighting



## Intelligent lighting: Thermo King



Thermo King in Galway has used the introduction of a new assembly line as an opportunity to incorporate high energy-efficiency lighting into that part of the plant.

This is Thermo King's second major lighting project in the past decade. In the early 1990s, the company re-lamped the entire factory, achieving savings of 50 to 55 per cent on its lighting bill. The possibility of replicating that system in the current project was initially considered. Instead, however, a decision was taken to opt for more expensive high-frequency fluorescent lighting, with a light sensor and a passive infrared (PIR) motion sensor fitted to each of the 25

lamps installed in the area. The system works by automatically switching the lighting on when movement is registered within a specified area and when the daylight levels are below a set point; and by switching it off again after a pre-set delay, once the movement has stopped. As an additional safeguard against energy wastage, each of the PIR sensors is fitted with a shield so that it will only detect movement in its immediate vicinity. The result is that a light will only switch on if someone is working directly underneath it, as opposed to all of the lights switching on when somebody walks up or down the main aisle.



The company was able to justify the expenditure on the project, since new lighting fittings were required in any case. The area had previously been used for storage, and its conversion to a production facility meant that higher lighting levels were required.

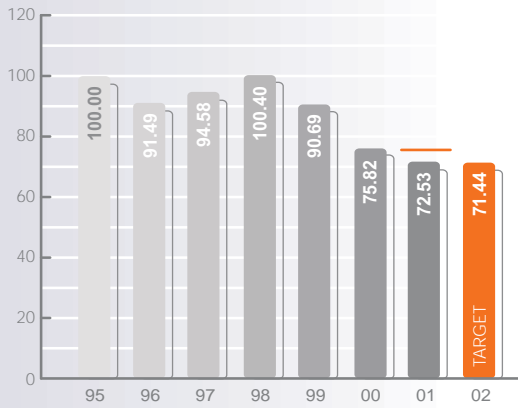
Compared with the lighting used elsewhere in the plant, significant energy savings are being achieved, estimated at over €3,686 annually. A payback period of 2.9 years is anticipated. Thermo King believes that this would be even shorter for a company that had not already undertaken significant upgrades of its lighting in recent years.

**Glanbia Plc, Ballyragget**

We achieved further improvements in our EPI during 2001, primarily due to the first full year's operation of the CHP plant, which was commissioned in the spring of 2000.

Rising fuel prices during 2001 underscored the importance both of the Large Industry Energy Network and of attention to energy efficiency at the Ballyraggett site, where energy is a major component of our cost base.

In 2002, we expect to see some further improvements in our EPI, as a number of projects and initiatives are planned in the areas of water conservation and heat recovery.



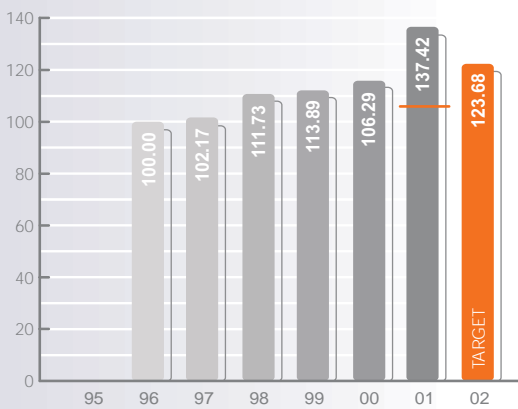
**Glanbia Plc, Inch**

There have been a number of managerial changes in the department with responsibility for energy management over the last two and a half years, which have relegated this area to a status of lesser importance.

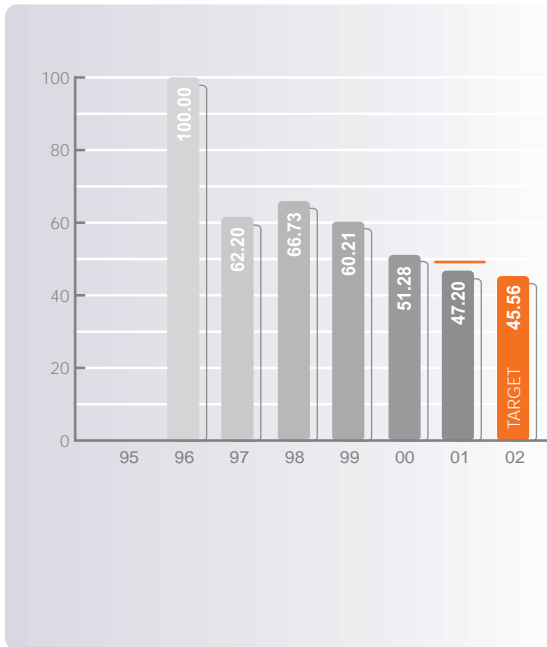
During the last few months, however, the situation has been rectified. We have commissioned a review of our energy use with the dual objectives of bringing about a reduction in energy consumption and of taking an imaginative look at alternatives for supplying the energy needs of the site for the next 10 to 15 years. In establishing the terms of reference of the review, we took the view that all possibilities could be adapted to meet our requirements, to ensure that possible sources of green energy/renewable energy were not ruled out.

We have now studied the finding of this study and will be providing capital expenditure to implement those projects recommended that are compatible with our long-term strategic plan for the site.

We want to look to the future and concentrate on sources of energy that will not be subjected to punitive energy taxes and, more importantly, that will have a positive impact on the green issues impinging on the community in which we operate.



— Previous Target



### GlaxoSmithKline, Cork

In 2001, our EPI improved well above our targeted expectations. This can be attributed partially to an increase in reactor capacity usage, in parallel with strict monitoring and control of site energy consumption. Another significant contributory factor was the installation of a facility to recover waste heat from our incinerator for steam generation. This has reduced our boiler gas consumption by over 70%, with a corresponding reduction in boiler carbon dioxide emissions of over 4,900 tonnes.

In 2002, our focus will increasingly be on improved energy management, which will include developing a formal energy strategy, implementing training and awareness programmes, continuous energy monitoring, and regular energy audits to ensure compliance with stringent targets.

04 : Process Control

**ConocoPhillips**  
Whitegate Refinery

## Process control and VSD: ConocoPhillips

Over the past year, ConocoPhillips (formerly Irish Refining) has undertaken a massive project aimed at bringing the Whitegate facility under state-of-the-art control.

About 80% of the plant has been involved in the upgrade, which has seen new instruments being installed and implemented, as part of a digital control system supplied by Honeywell and designed in partnership with Irish Refining. Temperatures, pressures, and flow-rates across the plant can now be monitored, controlled and altered with the touch of a screen.

The motivation for carrying out the work was to boost overall efficiency and control, but the project has had a number of specific energy-related benefits. A huge



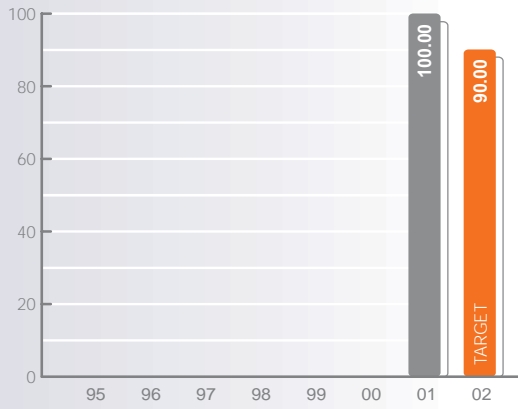
database of information is available, which has given plant operators a more accurate picture of actual fuel usage. In turn, this has facilitated energy monitoring, allowing the areas of greatest energy use to be identified and targeted for future efficiency improving upgrades. Moreover, energy wastage has been cut through overall operation of the plant within tighter control parameters.

In a separate project also carried out during the year, variable speed drives (VSDs) were fitted on the fan motors of a number of fin-fan heat exchangers. The idea of VSD control is to allow motor speeds – and hence electricity usage – to be adjusted in response to variations in plant load, so tackling inefficiencies caused by motors running at full speed when plant is operating at only part load. This is important for operations, since the level of cooling required tends to vary depending on the external weather conditions. On hotter days, the fin fans may be required to run at full speed whereas, on a colder day, the ambient air temperature will reduce the load on the exchangers, and they can operate at a lower level to achieve product cooling.

The energy savings from the VSDs are expected to result in a payback period of between two and three years, with spin-off benefits in the form of extended fan life.

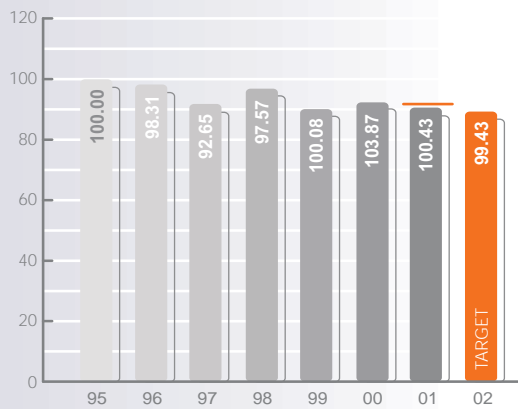
**GlaxoSmithKline, Dungarvan**

GlaxoSmithKline, Dungarvan is constantly expanding. Over the last five years, additional plant and production activity has increased energy consumption figures by an average 11% annually. 2001 saw greater emphasis being placed on energy reduction, with an energy management initiative entitled 'Project Helios' being set up and the site joining the Large Industry Energy Network. Future plans include the installation of more efficient compressors with sequence control, and a feasibility study of more energy efficient lighting throughout the plant.



**Gypsum Industries Ltd**

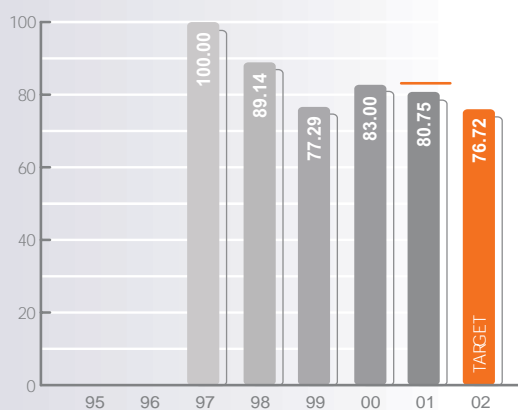
Gypsum Industries recorded an improvement of 3.44 percentage points in its EPI for 2001. Although no major projects were undertaken, this performance can be attributed to our commitment to energy conservation throughout all aspects of our day-to-day operations and, in particular, to the practice of energy monitoring and targeting at the site.



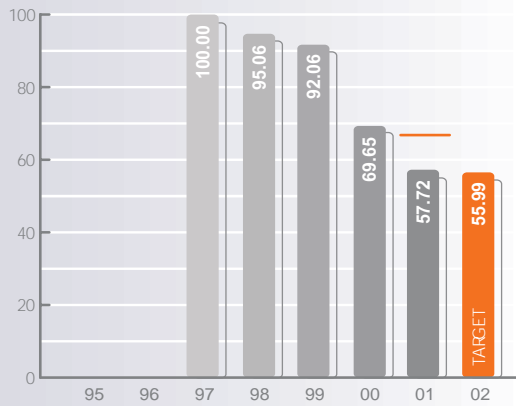
**HJ Heinz**

Our EPI improved slightly over the past 12 months. Changes in our output profile and the commissioning of new plant led to poor energy efficiency in the first quarter of 2001. However, corporate management continues to show a willingness to invest capital in improving energy efficiency, and we anticipate an improvement of the order of 5% during 2002, based on increased line efficiencies and future investment.

The replacement of one of our cooling sets, in particular, will improve the steam-cycle efficiency by increasing the percentage condensation. Moreover, gas consumption will be reduced by shortened cooling times.



— Previous Target

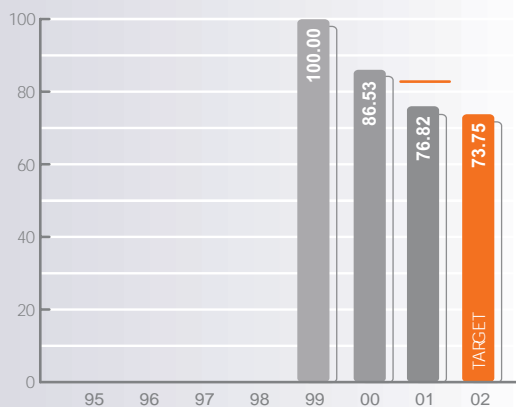


### Hewlett-Packard (Manufacturing) Ltd

Hewlett-Packard's EPI again improved significantly in 2001, beating our target by 11 percentage points.

This was due to a significant increase in production output, and the site's Energy Reduction Team achieving energy savings through a monitoring and targeting programme. In particular, we succeeded in reducing non-essential and general service consumption, and matching energy use to production uptime schedules.

In 2002, we will continue these initiatives. We are currently evaluating projects that will optimise site management and consumption of compressed air, vacuum and chilled water. We are also carrying out an in-house investigation into the feasibility of CHP for the site.



### IBM Technology Campus

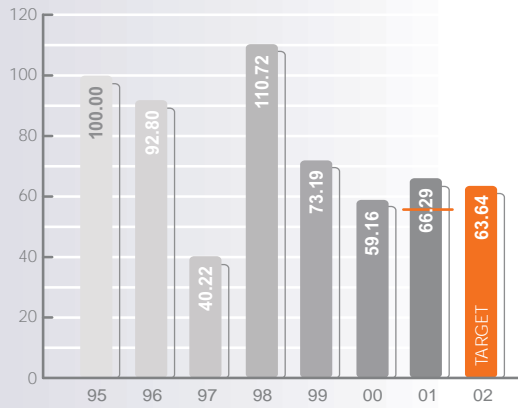
At the IBM Technology Campus in Dublin, we continue to work towards achieving an improvement in energy efficiency of 4% per year.

This target is based on savings we expect to achieve through planned projects.

Our improvement in EPI for 2001 can be attributed to such projects. These include, but are not restricted to,

- a focus on staff energy awareness
- optimisation of electrical equipment, air conditioning and boilers.

Into the future, the campus's Energy Management Team will continue to identify and implement appropriate energy-saving projects across the site.

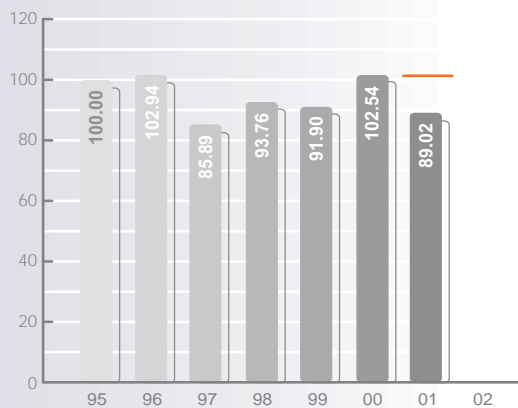


#### Intel Ireland Ltd

Over the past number of years, Intel Ireland's investment in approximately 200 individual energy efficiency projects has resulted in a downward trend in EPI compared with our base-line performance. We believe that this 'EPI trend' averaged over a number of years is more meaningful than year-to-year EPI variations, because of the frequent changes in output volumes as older technologies are replaced, and as new facilities such as Fab 24 are brought on line.

We forecast that total energy demand for 2002 will increase due to work associated with the construction and start-up of Fab 24 and of additional ancillary buildings to service the enlarged site.

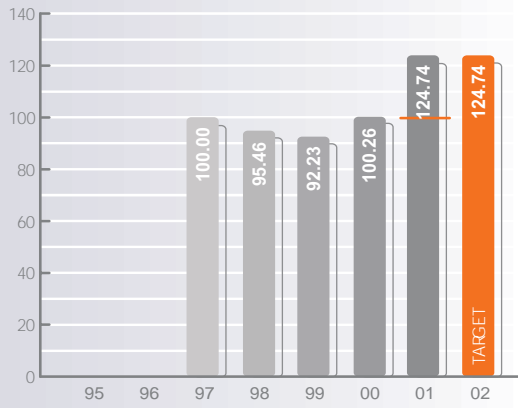
However, these expansions to the site will incorporate energy-efficient technologies wherever this is possible, and we will benefit considerably from this when the new facilities are commissioned. This is not due to commence until 2003/2004, and thereafter, the year-on-year EPI is expected to decline.



#### Irish Fertilizer Industries Ltd

IFI saw a significant improvement in EPI for 2001 but sadly has ceased operation and at the time of going to press closure of the Cork plant is imminent.

— Previous Target



**Irish Shell Ltd**

At Irish Shell, we remain firmly committed to decreasing our energy consumption levels, despite the increase in our EPI in 2001.

The major factor for this decline in energy performance was the introduction of our polymer modified bitumen plant. Last year was its first full year in operation, which resulted in an increase in the use of product heating facilities on a continuous basis. It is worth noting, however, that this plant is an energy efficient plant per cubic tonne produced.

Another factor contributing to our increased EPI was the installation of a vapour recovery unit on our white oils site in the fourth quarter of 2000. This was installed in order to meet EU and Irish environmental regulations. It has had a major impact on energy performance as it has increased energy consumption without increasing product throughput.

We are currently assessing the heating facilities on our bitumen site with a view to improving their efficiency. We plan to replace the existing boilers in 2003, as part of a capital upgrade of the site. We are also committed to a policy of fitting all new pumps on site with variable speed drives to help decrease our energy consumption.

05 : Compressed Air



**Energy efficient compressed air generation: Leo Laboratories**



Leo Laboratories expects to reap significant savings from the recent replacement of aging compressed air plant with new technology.

Compressed air generation is one of the single biggest consumers of electricity at the Leo site, being used in a range of applications, from the dyeing of vessels after clean in place/steam in place (CIP/SIP) cycles, to breathing air, to pneumatic uses such as moving machine arms on packaging equipment. Prior to the installation of the new 300 kW Ingersoll Rand compressor, the facility's compressed air requirements were met by two older Atlas Copco compressors, with a combined rating of 280 kW, serving two separate areas of the site.

A large part of the motivation for carrying out the upgrade was that a new nitrogen generator was planned for the site. By investing slightly more money in a bigger system, it was envisaged that it would be possible to meet the compressed air needs of the nitrogen generation system as well. This makes it difficult to calculate an exact energy-efficiency payback

period for the project, but it is clear that the new compressed air plant will provide energy savings in a number of areas. Firstly, the air ends on the existing compressors had become worn over time, resulting in a significant drop-off in efficiency. Secondly, compared with the old compressors, which featured on-off control, the new system incorporates variable speed drive technology and intelligent control, which will result in savings in motor running speed at part load. Finally, because the replacement compressor is air-cooled rather than water-cooled, there will be a reduced load on the chillers and cooling towers.

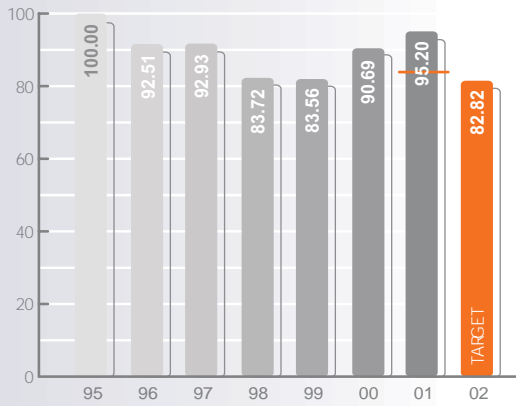
Commissioning was followed by an overall system leak check and repair, thus ensuring efficiency of distribution as well.



**Irish Sugar Ltd**

Our philosophy at Irish Sugar dictates that energy efficiency is always a priority when planning investments and process improvements.

During 2001, energy usage increased as a result of an unplanned process shutdown/restart along with new plant commissioning, both of which had a negative impact on our EPI.



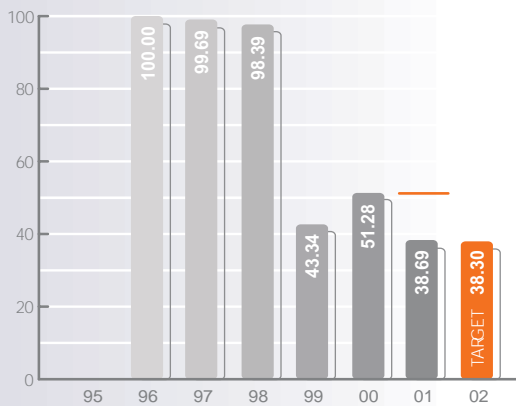
**Janssen Pharmaceutical Ltd**

The motivation at Janssen Pharmaceutical to reduce energy costs stems from sound business sense and a willingness to address environmental responsibilities.

During the past year, our EPI improved significantly, illustrating the major role that energy policy can have in improving industrial competitiveness.

This improvement in our EPI is as a result of several initiatives, which have led to substantial reductions in the amount of energy consumed. These include the replacement of a desiccant dryer on the breathing air system with a more efficient design, capable of running continuously throughout the year, and the installation of a temperature controller on the hot loop located in our central cleaning building.

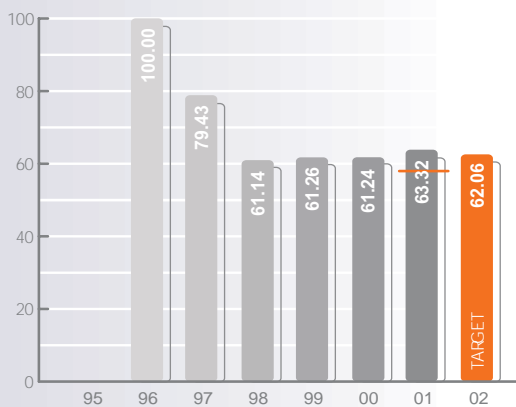
Looking to the year ahead, Janssen will remain committed to continued reduction in energy usage. Plans include optimisation of the Vara unit and compressed air systems. In addition, the commissioning of an automated energy monitoring system is due to be completed by the end of the year.



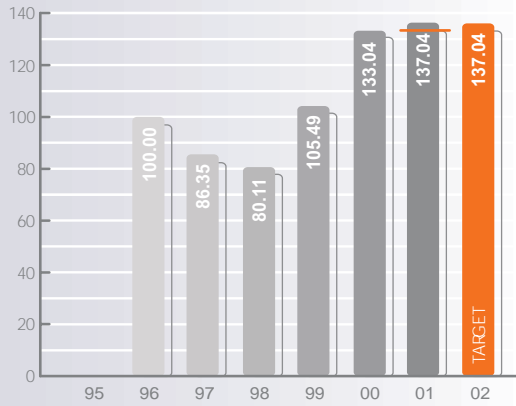
**Klinge Pharma**

Our product mix has a significant impact on our energy consumption per unit of output, and current demand trends indicate a shift from the high-volume bulk pharmaceuticals to low volume ingredient products.

This, for a large part, explains our increase in EPI over the past year and will necessitate the introduction of more stringent controls and monitoring of energy usage. We will continue our programme of continuous improvement, focusing on the elimination of waste during non-productive periods, with the goal of attaining an overall reduction of 2% across all forms of energy consumed on site.



— Previous Target

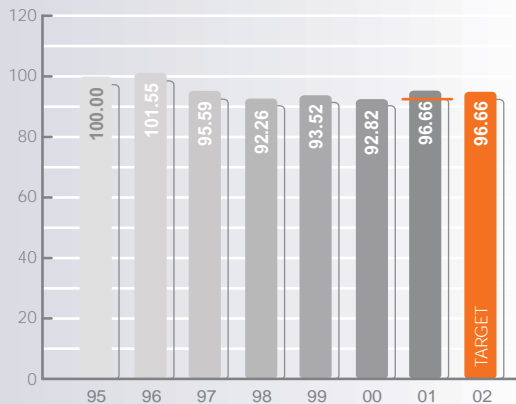


### Kostal Ireland

At Kostal Ireland, our EPI increased over the past year. This was due largely to three factors: more energy intensive technology within new product ranges; the re-introduction in-house of sub-assembly business that had previously been subcontracted; and the upgrading of our cleanroom to class 10,000, which led to higher energy costs for a larger HVAC plant.

The range of products produced at Kostal varies substantially in terms of technical complexity and energy intensity, and this issue is further complicated by the fact that our output is not homogeneous.

We plan to devise a more accurate way to express our production levels over the next year and, if necessary, recalculate our EPI since 1995. We feel that our energy performance results for recent years do not accurately reflect our efforts to minimise energy usage, given that our main energy input has decreased in 2001 despite the factors mentioned above.



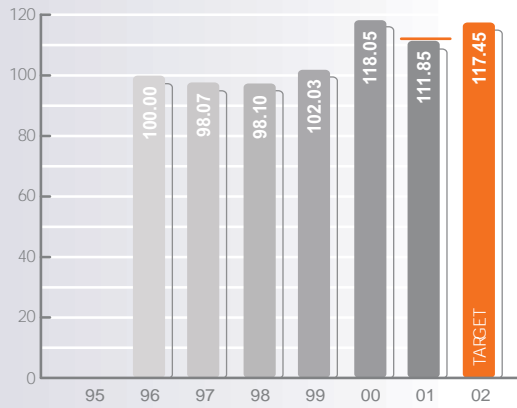
### Lakeland Dairies, Baileboro

As a result of upgrading of our drier over a two-month period, there was a significant amount of partial processing and sales of unprocessed milk to other processors during the past year. This has distorted our EPI figure, which is based on finished product (butter and powder) and not partially processed or evaporated-only product.

Aside from this negative impact, two important energy-saving projects were undertaken: the replacement of a two-stage vacuum pump with a single-stage pump, and the improved utilisation of raw water for product-cooling, which has resulting in reduced refrigeration.

In 2002, the facility – formerly owned by Golden Vale – was taken over by Lakeland Dairies. This has resulted in uncertainty about the budgeted amount of product to be processed for the year ahead, which in turn makes the future EPI difficult to predict.

One negative impact on EPI will come from a new filtration system installed on the drier exhaust, as this abatement device will result in increased power consumption. At the same time, however, improvements are being sought through enhanced process control, reduced plant downtime, a new metering programme, a revision of targets by department, and the incorporation of best technologies into new projects where possible.

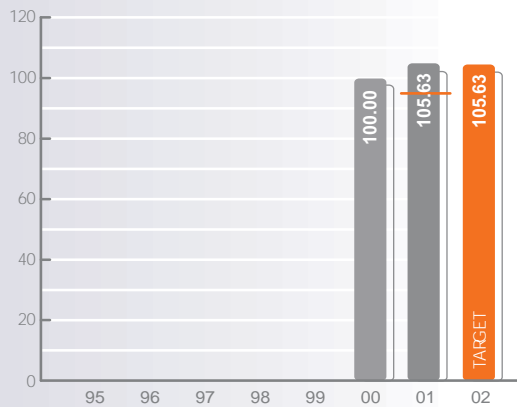


**Leo Laboratories**

Our EPI for 2001 has fallen by 6% to below our target level. This was achieved by minimising energy consumption increases, despite increases in production volumes.

We continue to invest in an energy plan that concentrates on reducing our energy costs. A number of major projects planned for 2002 include the replacement of our main site air compressor and the installation of nitrogen generation facilities. The energy team has also begun an internal campaign to highlight the relationship between energy efficiency, overall process efficiency and good maintenance practices.

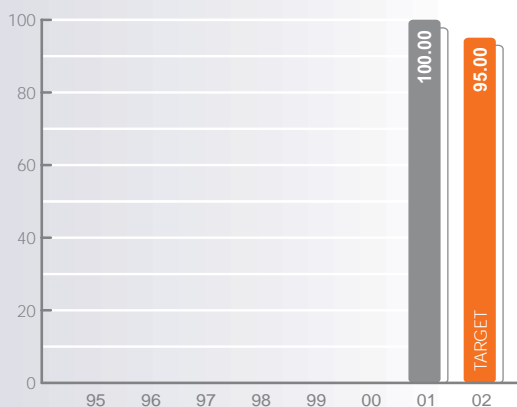
We anticipate a slight increase in our EPI in 2002, due to the construction and validation of an extension to our main production plant, which will not enter production until 2003.



**Lisheen Mine**

Our energy usage increased during the year due to production ramp-up, as reflected in our increased EPI.

However, also during that period an energy awareness team was established to review energy usage throughout the site. In addition, a number of energy saving projects were successfully undertaken, including the installation of 'off' timers on underground fans and the implementation of a fan switching schedule for main ventilation fans in unoccupied areas.



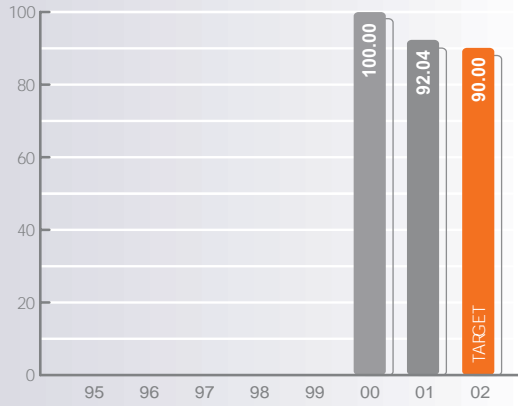
**Masonite Ireland**

Masonite is a new member to the Large Industry Energy Network (LIEN). One of our corporate goals is the minimisation of environmental impact. Already, our site has the environmental advantage of producing large thermal energy volumes using biomass wood fuels that have a carbon dioxide- neutral classification.

We intend to be an active member of the LIEN to maximise potential energy saving from initiatives identified. We have carefully considered our position on energy use and documented this in our energy policy statement. In addition, an energy management team has been created to identify opportunities to improve energy performance.

In 2002, we intend to reduce our EPI by 5% by monitoring and targeting electrical energy use in all operations across the site.

— Previous Target



**Merck Sharp & Dohme (Ireland)**

Merck Sharp & Dohme (Ireland) Ltd was pleased to be invited to join the Large Industry Energy Network and became a member in 2001. The site has been involved with Sustainable Energy Ireland through the Boiler Awards Scheme since 1999.

In April 2000, Merck & Co launched a campaign to reduce energy consumption at each of its manufacturing sites worldwide. Since then more than 30 sites have agreed to take up the challenge of cutting energy use by at least 2% each year. At the Merck Sharp & Dohme site in south Tipperary, we responded to this challenge by setting up an energy management team in 2000.

The report from an energy consultant who was commissioned by the team to complete a comprehensive energy audit of the site has formed the basis for the energy saving projects currently in progress.

Energy saving projects to date have focused on boiler efficiency, steam distribution systems, compressed air systems, wastewater treatment plant operations and lighting.



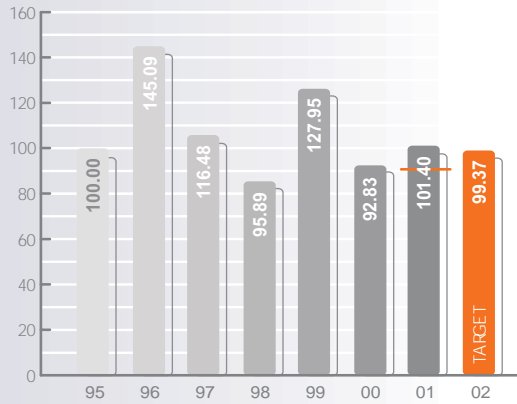
**Micro-Bio Ireland Ltd, Fermoy**

Total energy consumption increased by 11.9% during the year as a result of increases in product output. This has resulted in a disimprovement in our EPI. However, energy usage would have been significantly greater if it were not for the installation of improved technology including our new electrolysis plant in 1998.

During the past year, we undertook a programme of replacing all motors with energy efficient models, based on the findings of a site energy audit, which indicated an average payback period of 10 months for the project. In addition, all new motors were specified as energy efficient. Also a new effluent treatment plant was installed, which contributes to energy saving as gravity feed is now employed instead of pumped delivery. In early 2002 we plan to install four variable speed drives to motive systems.

### NEC Semiconductors Ireland Ltd

Our anticipated EPI was exceeded during 2001, due to an increase in oil consumption for heating purposes; our electricity costs increased also. Energy-saving projects were continued, but investment in these projects has been reduced in the short term due to the current market situation for our Application Specific Integrated Circuits products, which are predominantly used in the European automotive industry.

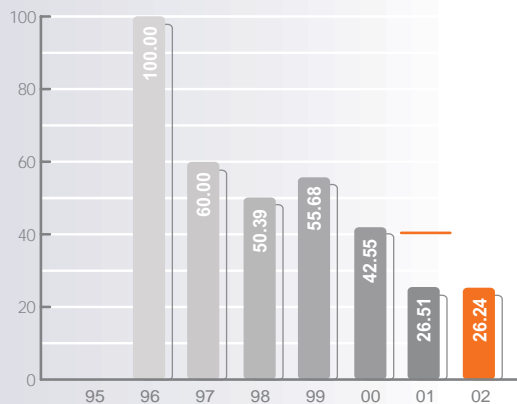


### Novartis Ringaskiddy Ltd

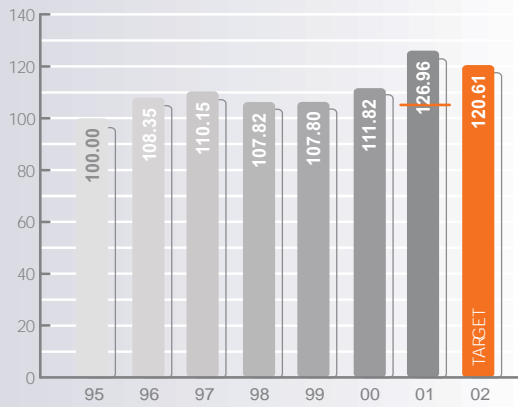
The EPI for Novartis Ringaskiddy Ltd continues to improve. The main drivers of this improvement were increased demand and change in product mix. There was also a significant reduction in natural gas usage due to increases in liquid waste incineration.

An audit of our chilled water system identified opportunities for savings, some of which were also reflected in our improved performance this year. In addition, our Energy Review Group was refocused to provide support to the site's major energy customers.

Our goal for 2002 is a reduction of 1% in carbon dioxide emission per kilogram produced, in line with our corporate objectives. Further improvements in the management of energy demand should come from facilitating the largest energy customers in assessing their energy use. The key objective for the Energy Review Group will be to provide relevant and valuable energy use information and analysis to the users.



— Previous Target



**Outokumpu (Tara Mines) Ltd**

World zinc prices, which had been trending downwards for some time, reached the point in 2001 where commercial operations at Tara Mines could no longer be sustained, and a decision was taken to suspend operations for a period from mid-November 2001. This move was intended to reduce costs until the markets recovered. However, they also had an obvious negative impact on our EPI for the year.

During this period, three significant capital projects, all having energy saving and efficiency improvement components, were progressed and, at the time of reporting, two were commissioned and the third was almost complete.

A major maintenance upgrade of the entire plant, costing in the region of €13 million, also commenced, and this too will have a significant energy saving impact when production resumes. These measures illustrate the company's ongoing positive attitude to energy saving and the environment.

06 : Boiler Efficiency



**Boiler efficiency: Wellman International**



Wellman International has dramatically reduced energy consumption by replacing two older boilers with new plant.

The company uses large quantities of high and low pressure steam in the production of polyester and nylon staple fibre, and originally this steam was derived from heavy fuel oil. However, a switch was made to natural gas when this fuel became locally available. As a consequence of the conversion the boiler plant was de-rated, and its inefficiencies became apparent. After a detailed investigation, a decision was taken to replace the two old boilers with a 8,000kg/hr Wellman Robey boiler incorporating a low-NOx natural gas burner.

The new furnace and tube bank design provides an efficiency of over 80%, with minimum reduction

across the turndown range. Meanwhile, a revamped condensate return collection system, together with upgraded steam traps throughout the plant, boosts the feedwater to a temperature of over 90°C.

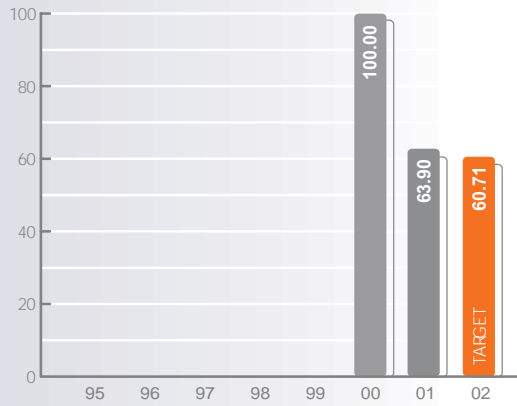
The installation has resulted in energy savings of 7GWh per annum, or 25% of the previous boilers' consumption. Improved reliability and lower maintenance are additional benefits.



**Pfizer Ireland Pharmaceuticals, Little Island**

We are experiencing a period of significant change in the plant, with increasing production volumes and related investment. Thus, it is difficult to produce precise energy reduction figures. However, our declining EPI illustrates our success in keeping energy consumption under control. Our actual energy usage fell by 19% while production volumes increased by 27% on the previous year.

We are confident that the launch of our three-year energy management programme, which will be based on an integrated approach to energy management and includes energy awareness, technology improvements and improved information through a new M&T system will result in continuing reduction in energy consumption and related greenhouse gases.

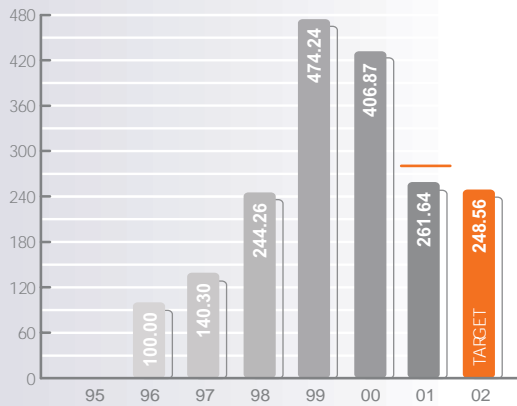


**Pfizer Ireland Pharmaceuticals, Loughbeg**

Our EPI dramatically improved in 2001 due to the efficiencies gained through increases in production output. Overall energy consumption was also reduced due to a focus on thermal energy reduction initiatives, and both our electrical and thermal energy EPIs fell during the year.

Thermal energy consumption is expected to be reduced further in 2002, and there is now a growing commitment to, and awareness of, the need for management of electrical energy on site.

The site was awarded ISO14001 accreditation during the year.



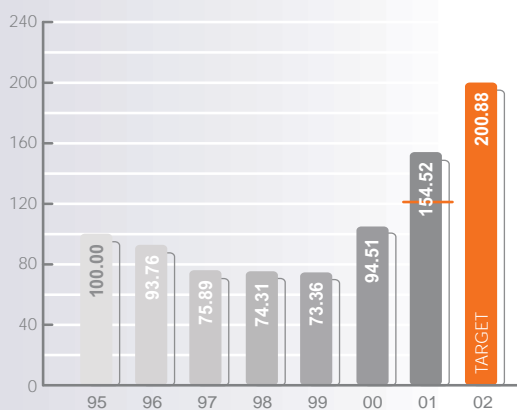
**Pfizer Ireland Pharmaceuticals, Ringaskiddy**

We are firmly committed to the conservation of energy and resources.

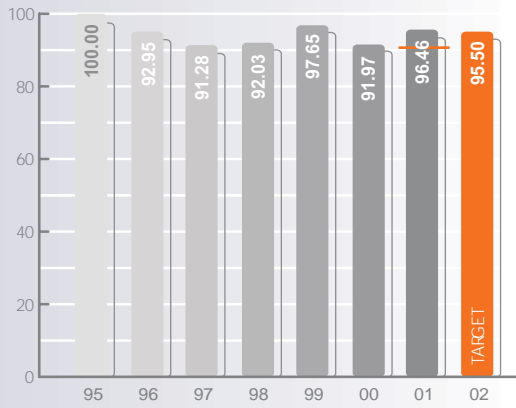
Increased energy usage in 2001 and projected increases in 2002 are a result of significant expansion of site facilities.

The increase in EPI is due to growth in production capacity on site, and the measured EPI is expected to remain inflated above past levels until these new facilities are fully commissioned and operating to capacity.

In the year ahead, we will continue to investigate opportunities for improved energy efficiencies through the use of new technologies and practices.



— Previous Target



### Premier Periclase Ltd

Our EPI deteriorated somewhat over the past year. This is attributable to major environmental plant which was commissioned early in the year, and slightly reduced production for the year as a whole, both of which had negative influences on energy efficiencies.

The increase in EPI would have been higher, however, had it not been for a reduction in electricity usage as a result of major investment in a new filtration system. In addition, the installation of a petroleum coke system has allowed some fuel substitution for natural gas, which has increased significantly in price.

## 07 : Energy Management

### Re-invigorated energy management at Hewlett-Packard



During the past year, HP has re-invigorated its energy management team with the goal of ensuring a focused approach to driving down energy usage on the site.

Energy management is now co-ordinated through a structured process of continuous improvement, based on data accumulation, and leading on to analysis, planning, implementation, control and monitoring; through to review and further data collection. The steps are as follows:

- Data on electrical usage is accumulated on a weekly basis from a kWh reading of the Powerlogic system, and on a monthly basis from utility bills. Likewise, data on natural gas usage is collated both from gas bills and the building management system (BMS) meter readings, and data on water consumption is gathered from BMS and mains supply meter readings.
- This data is then processed using Pareto and other forms of analysis in order to gain meaningful information about the major energy users and their needs. At this stage, any potential barriers to progress such as time or financial limitations are also identified.
- Next, planning is set in train in order to formulate policy, gain commitment from financial management, and set objectives and targets.
- Monthly brainstorming meetings take place, with the aim of identifying potential energy saving projects, using materials from Sustainable Energy Ireland, overseas energy agencies and suppliers for inspiration. Ideas, along with responsibilities and actual savings made, are tracked on a project register. Potential projects are divided into



zero, low-to-medium and high cost categories. Zero-cost projects are set in train immediately, while other projects form part of an action plan to be submitted for investment approval. At the meeting, approved projects are scheduled, and an action plan is drawn up for their completion. Throughout this process, members of the energy management team ensure that all the staff members involved are adequately trained, and that the engagement of those in production and management is sought.

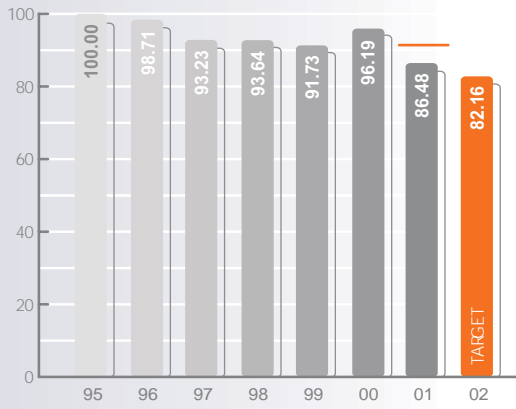
- Actual performance is monitored against targets, checking data against key indicators such as degree-days. Progress is reviewed on the project register, and each leader provides an update. New loads added to or removed from the plant are reviewed, and a monthly report is presented to senior management and staff.
- This process allows for trends to be established and month-on-month and year-on-year results to be compared, and this in turn is fed into a yearly management report and review. There is an ongoing focus on continually investigating new projects and measures, and on reviewing all of the previous steps.

**Pure Fresh Dairies Ltd**

In 2001, we improved our EPI by a significant 10 percentage points, and into the future, Pure Fresh Dairies is committed to an ongoing emphasis on energy management.

During the past year, we achieved energy savings by reducing the operating pressure of our steam boiler from 7.5 bar to 5 bar.

In the year ahead, we intend to focus on a number of areas, including our electricity supplier's winter demand reduction scheme, air compressor output, the use of invertors where applicable and more energy efficient lighting.



**Roche Ireland Ltd**

For the 2001 reporting year, we have included energy consumption figures for our on-site incineration processes, which also provide a large proportion of our steam needs.

These figures have been backdated to 1999 when the incineration plant was commissioned to give a more accurate EPI, thus figures have changed from previous years.

In 2001, plant throughput increased and we operated steadily, observing our established energy management procedures. This increase in production accounts for most of the improvement in EPI, and for 2002 we envisage a continuation of this trend.

No major projects were undertaken during the year.

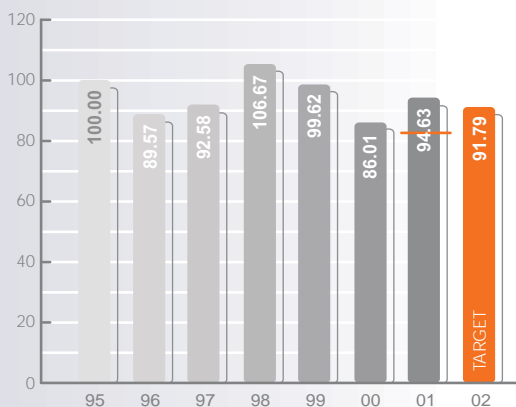


**Saehan Media Ireland Ltd**

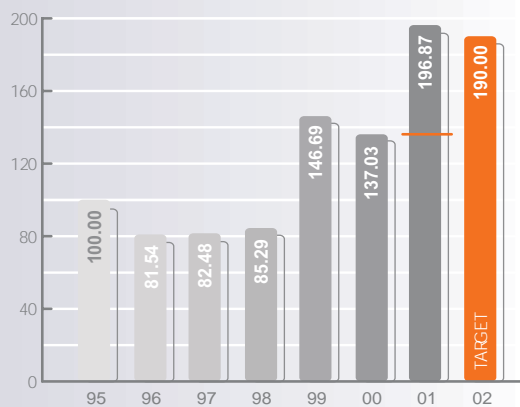
During the past year, we re-established our energy-saving committee, bringing together both production and technical people at Saehan Media.

Unfortunately, our EPI increased substantially over the year, due to intensive R&D activities, resulting in significant interruptions to production.

Our target for 2002 is to increase manufacturing output by 5%. Planned energy-saving projects include the installation of an energy efficient water chiller and the reduction of steam heating to an ageing tower.



— Previous Target

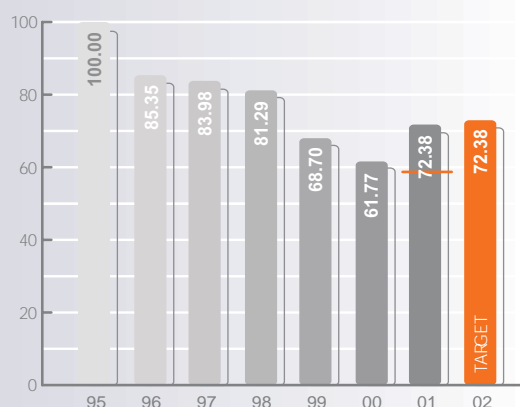


### Schering-Plough (Avondale) Co.

Our increased EPI for 2001 reflects a reduction in production activity, rather than significant increases in energy consumption. Total energy consumption for the year was up by 6.8%, which although lower than anticipated, was attributable to a number of factors including facility expansions, increases in staff numbers and associated increases in accommodation.

Among the energy efficiency projects carried out was the commissioning of a steam stripper. This removes volatile organic compounds (VOCs) from our wastewater and feeds them to our thermal oxidiser, reducing supplemental fuel requirements. This resulted in significant net energy reductions, with the potential of cutting total annual fuel consumption by up to 3%.

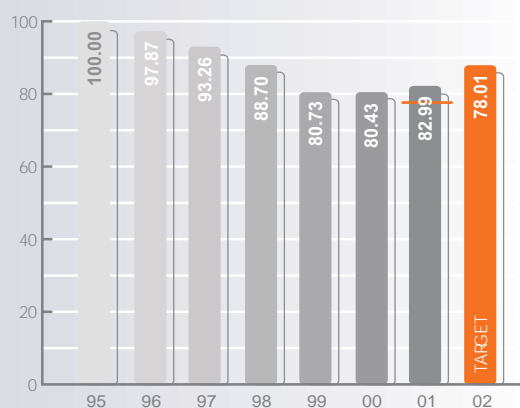
Ongoing projects include the conversion of our boiler to natural gas. This project will incorporate energy efficient technologies, including the installation of an economiser and variable speed drives.



### Schering-Plough (Brinny) Co.

Our EPI deteriorated during the past 12 months due to one of our production buildings undergoing a major upgrade, which lasted for six months.

One example of a project carried out during the year involved the conversion of an older boiler, operating in standby mode, from heavy fuel oil to diesel fuel. Natural gas has recently been introduced to the site, and this is an interim measure put in place until the boiler is eventually replaced with a new gas-burning model.



### SerCom Solutions

Over the year, a new warehouse extension increased the overall square footage of the site by 23%, which is reflected in a slight increase in energy consumption and EPI. However, this was not to the degree that would have occurred if no energy conservation measures had been put in place.

In fact, over the period March to November 2000, a 31% reduction in maximum electricity demand was achieved through the implementation of many energy saving projects, including PIR (Passive Infra Red) lighting installations in three areas – offices, corridors, and production areas, compressed air system improvements, timer installations and boiler improvements.

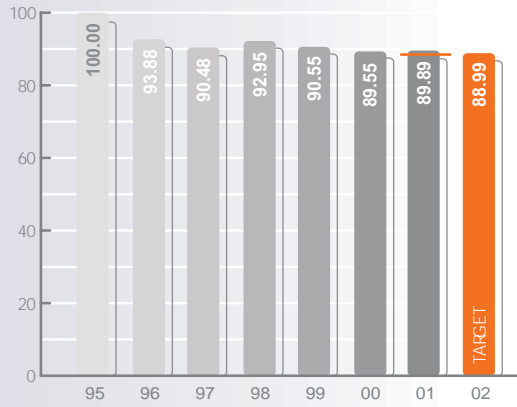
SerCom Solutions, a DCC plc company, is very proud of its progress in 2001, and will continue to implement more energy saving projects in 2002 in line with the ongoing energy strategy to which top management are committed.

**Smurfit Paper Mills Ltd**

During the past year, our EPI deteriorated slightly due to a number of factors.

Changes to our market and higher quality requirements necessitated a change to our raw material mix, which required the use of additional cleaning equipment. Furthermore, higher landfill costs affected the quality of the raw material by introducing higher contaminants, and this in turn meant that additional energy was required for processing. Nevertheless, the increase to the EPI was kept to a minimum through improved internal efficiencies.

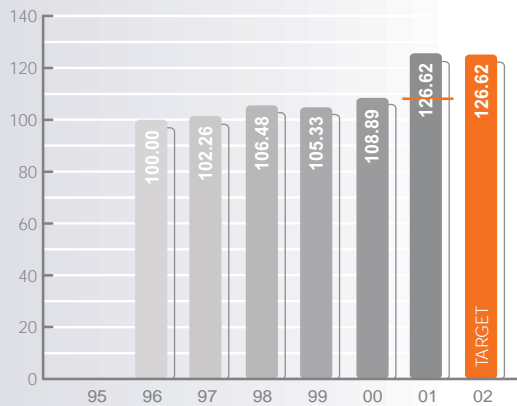
The higher target index for 2002 shows an improvement of just 0.9 percentage points ahead of the 2001 figure, but it is our intention to improve on this.



**St Francis Abbey Brewery**

Our EPI increased substantially over the past year due largely to increased activity in the hygiene preparation of process plant and equipment, and a reduction in our throughput volumes.

We are currently undertaking a comprehensive review of the operation of utilities plant with a view to identifying further opportunities for making savings in the area of water and electricity consumption and effluent production. This report is due to be completed shortly.



**Takeda Ireland Ltd**

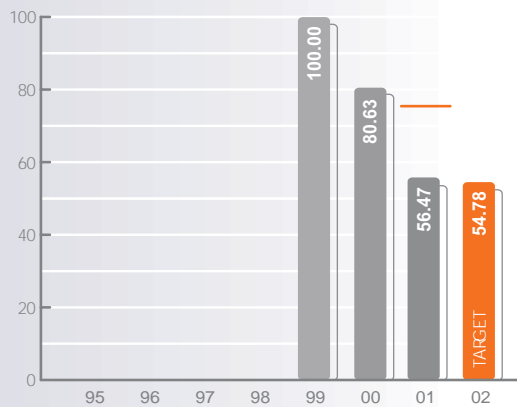
Our production output increased by 86% on the year 2000, helping to reduce our EPI by over 24 percentage points or by 30% relative to 2000.

The year ahead will see additional increases in output, and we hope that this will further improve our EPI.

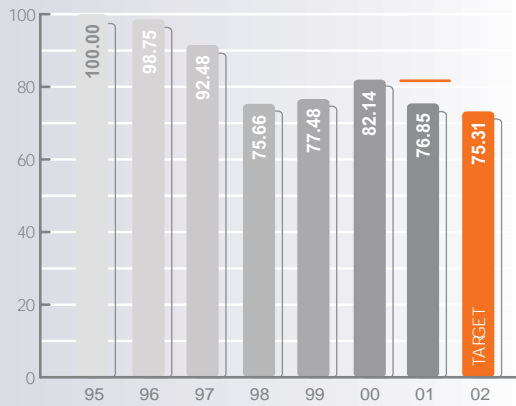
The projects to be undertaken in 2002 should allow us to reduce energy consumption and also enable us to identify areas to target for further improvements.

Specifically, we intend to install and commission a utilities metering system, feeding readings into the existing building management system (BMS) PC in our engineering office. The services that will be covered include steam, chilled water, low-pressure hot water, compressed air, mains water, cold water, hot water, natural gas and nitrogen.

We also hope to install an energy management software package that will assist us with reporting. We expect this work to be completed by the end of July 2003.



— Previous Target



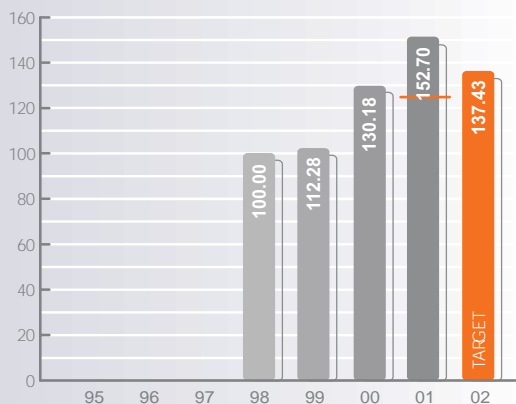
### Thermo King Europe

There were major changes for Thermo King Ireland during 2001. Our Dublin facility was closed and its production integrated into Galway. During the first half of the year, production figures were down substantially, but improved considerably in the latter part of the year.

For 2002, additional product integrations are planned for Galway, and the focus is shifting toward assembly and away from in-house fabrication.

A new air compressor incorporating variable speed drive technology will be installed as the primary compressed air source, and this is expected to yield savings of approximately €13,000 annually in energy costs.

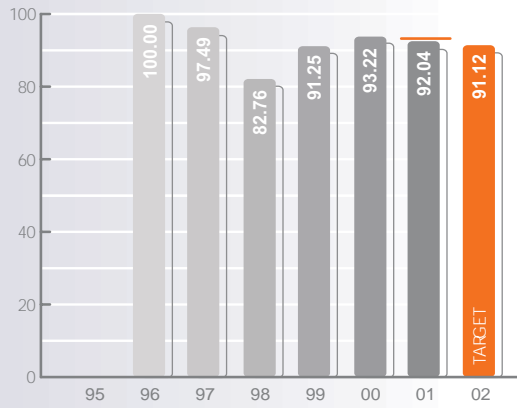
Due to the variety of unit types now being produced, we have changed our output factor for calculating EPI from 'units of product' to 'thousands of kgs of product'. This will introduce an element of consistency irrespective of our product mix.



### Transitions Optical Ltd

Production volumes in our facility have decreased due to our move to manufacturing a lower-volume speciality product. A significant proportion of Transition Optical's energy consumption is not directly related to the volume of product manufactured, as the majority of energy use is for producing cleanroom air at a defined humidity. Consequently, the decrease in production numbers caused our energy use per unit and our EPI figure to increase.

In absolute terms, however, our total energy use dropped by 8%, and we attribute this to a number of energy savings projects undertaken during the year. Two of the main projects were the installation of variable speed drives on our larger air handling units and the initiation of controlled trials on the effect of increased humidity on the quality of our product. We also worked on a series of smaller projects, such as increasing chiller temperature set points and lowering boiler temperature set points, and reprogrammed our chiller farm to utilise a duty chiller, which lowered energy consumption.



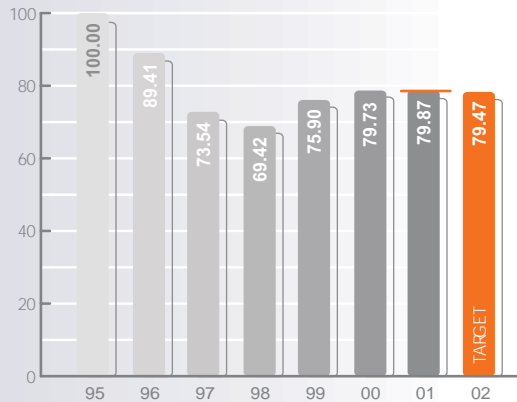
**Tyco Healthcare, Athlone**

Our EPI improved slightly over the past 12 months.

During 2001, we established an equipment shutdown procedure, which must be verified by the respective manufacturing supervisor signature thus avoiding non-scheduled equipment being left in the running or idling mode.

Other initiatives include the establishment of a monthly plant and equipment check for air leaks. During the period 2001 to 2002, we made a commitment to ESB that during winter maximum demand periods we would run our standby generators if required.

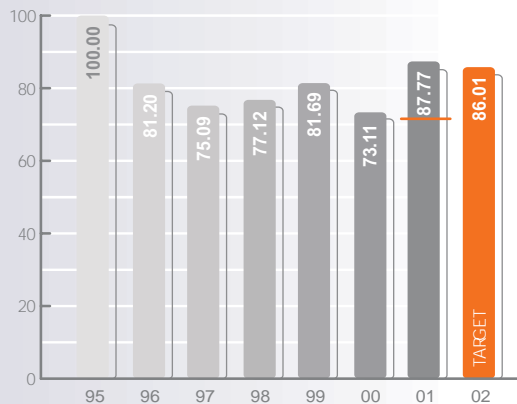
During Energy Awareness Week we made information such as flyers, posters and literature available to our staff, to highlight the importance of energy efficiency within the workplace and within the home.



**Tyco Healthcare, Mulhuddart**

2001 was a very successful year for the company. Production volumes increased without a significant increase in overall energy use on a per unit output basis. Significant improvements were made in electricity use due to the installation of a higher efficiency aeration system, in the latest expansion of the wastewater treatment facility. A full survey of steam traps was also carried out, resulting in a number of improvements to the condensate collection system.

A full energy audit was performed by an external consultant to indicate the direction for further energy saving investments in the year 2002, and a project team has been set up to study the best deployment of investment funds to optimise the energy use on site in the years ahead.



**Unifi Textured Yarns Europe Ltd**

Our EPI has been negatively impacted by a 25% reduction in textured output coupled with the fact that our energy consumption in the raw material stage has remained constant.

Product mix has also impacted on the EPI, with a 25 tonne per week reduction in twisting volume in favour of a focus on higher value-added production of more specialist product, which has a higher energy cost per unit.

On the positive side, however, we have established an Energy Monitoring Team and an Action Plan. Furthermore, initiatives in the area of energy efficient lighting have amounted to savings of €42,600 per annum, and ongoing projects include the conversion of compressors to low-pressure generation and the review of product specifications to reduce air consumption.

— Previous Target

## Targeting no- and low-cost energy saving projects: Pfizer, Little Island



Over the past year, Pfizer Little Island has made annualised energy savings of over €150,000. These savings are all the more remarkable as are they were achieved largely through no- and low-cost projects, and they illustrate well the kinds of savings that can be achieved through teamwork.

The Little Island site spends an average of €2.5 million per year on energy and water, and energy is its sixth biggest cost. The energy team comprises four members: two from engineering, and two from the environmental health and safety department. Their aim is to reduce site consumption by 5 per cent over the next year.

The initial emphasis on low- and no-cost measures was aimed at building up credibility, to gain support from management for more ambitious energy projects that might demand significant capital expenditure in the future, and to raise awareness among all staff of the real difference that energy-saving initiatives could make to the bottom line. In total, 34 separate projects were carried out over a 12 month period. For example, the team examined the HVAC system: simple measures, such as cleaning the coils and reducing the pressure drop by selecting different filters, allowed the fan running speeds to be reduced from 100% to 80% of full speed. This represents an energy saving of close to 50% for the same airflow.

Another area of focus was on the cooling water strategy for the condensers. Here, flow restrictions were implemented, forcing the cooling water to flow more slowly through the system and, as a result, to absorb more heat. Leaks in the air/water nitrogen systems were also targeted. The cooling water valves, for example, were completely overhauled, and the energy team operated to a prompt turnaround, based on the

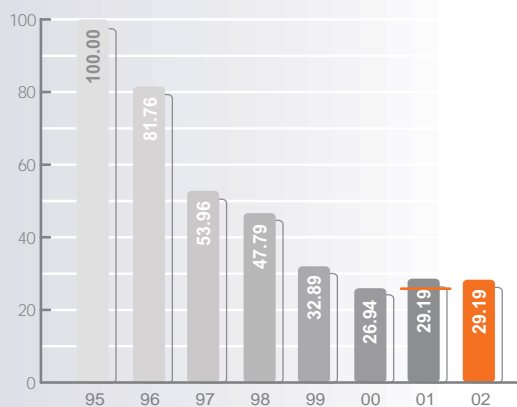
philosophy that when staff members reported a leak and it was fixed immediately, they would be more likely to report another leak in the future. Other projects involved assessing how particular requirements had changed over time, and adjusting controllers accordingly, temperature control being the focus of one of the projects in this area.

As well as driving energy savings through technical projects, the energy team attempted to bring about behaviour changes among staff in areas such as switching off lighting and equipment when not needed. An awareness campaign was run for the first time ever on site, and a high quality newsletter, *Energy Matters*, was distributed, promoting the slogan 'The power is in your hands.'

The majority of the projects involved very little expenditure, with the costs being in the form of person-hours rather than money. The only project involving significant capital expenditure was the installation of variable speed drives on the boiler feed-water pumps and forced draught fan. This investment totalled €15,000, with a payback of 12 to 15 months and additional advantages in terms of producing a quieter working environment.

The plant currently has an energy monitoring and targeting study in progress, and the aim for the future is to establish an Energy Accounting Centre for each building, so that responsibility for energy efficiency is handed over to the manager of each area.

All this work has been carried out in the context of a three-year plan for energy management in the plant. The plan outlines plant-wide responsibility for energy, and sets specific targets for savings. It is reviewed and updated on an annual basis.

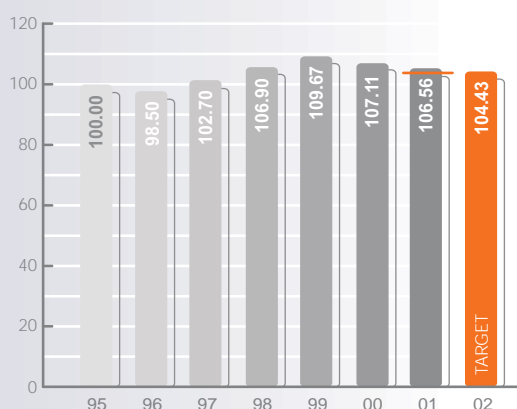


### Waterford Crystal Ltd

Due to the events of September 11, the tourist trade took a rapid downturn. This has resulted in production at Waterford Crystal being reduced dramatically and accounts for our increase in EPI.

As a knock-on effect of these events, no major schemes were implemented during this period.

However, Waterford Crystal continues to pursue existing energy management practices, and we are dedicated to reducing our EPI for 2002.



### Wellman International Ltd

In 2001 we achieved a reduction of about 0.5% in our EPI despite essential maintenance that necessitated removing insulation from two of our dryers, which had a negative impact of 2% on our gas consumption. This was more than compensated for by the completion of a number of energy-efficiency projects, resulting in the overall improvement in EPI. A new 8,000 kg/hr high-pressure boiler was commissioned, flash steam from condensate was recovered to heat process water, and a new 110 kW (810 CFM) screw compressor was installed. Insulation was applied to a number of extruder barrels, and the lighting in the sorting department was upgraded. The full benefits of these projects will be seen in 2002.

Also during 2002, we plan to install a second 100 kW (810 CFM) screw compressor. Additionally, we plan to install an economiser on the new boiler, insulate the remaining extruder barrels, re-insulate dryers where necessary, and introduce a maintenance schedule to combat compressed air leaks.

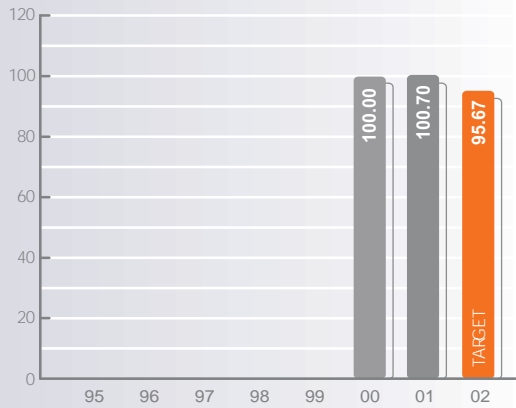


### Wessel Energy Cables Ltd

A 10% increase in throughput in 2001 resulted in decreased energy usage per km produced, due to fixed energy costs – such as heating and lighting – being spread over a larger production volume. This is reflected in our improved EPI.

Work on power factor correction has cut electricity usage, and work on building insulation has cut gas heating requirements.

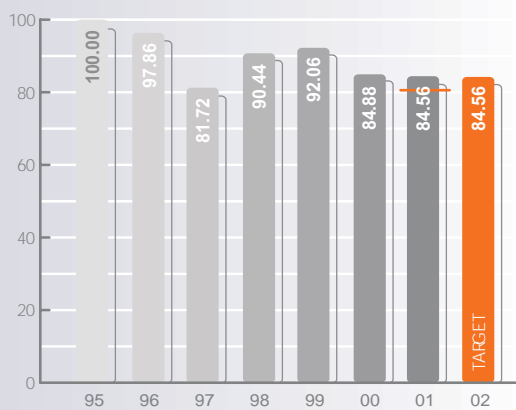
— Previous Target



### Western Proteins

Despite throughput being up, our EPI has increased. The main factors behind this trend were modifications made for environmental reasons, and changes in the processing conditions driven by customer requirements, which entailed a greater utilisation of steam energy for heat treatment.

During 2002, energy savings will be achieved by the commissioning of condensate recovery equipment and the automated control of aeration equipment.

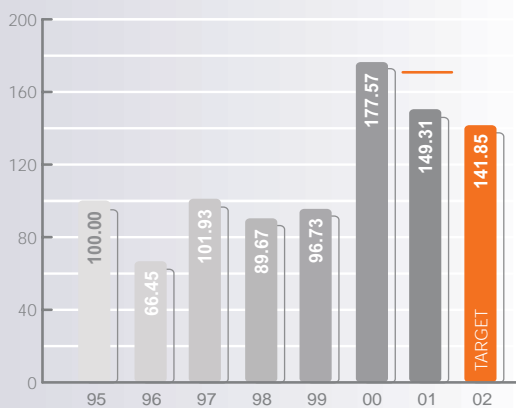


### Wyeth Medica Ireland Ltd

Due to ongoing plant expansions, our overall energy demands have increased, although our EPI has remained stable. Increases in demand will continue over the next several years, as more expansions are planned.

Following major overhauls, the CHP unit is now performing satisfactorily, and better results are anticipated in 2002. A sharp gas price increase (65.2%) on January 1, has forced us to shut the unit over the nighttime period, but various options are being examined that may make it viable to run the unit at night.

As in recent expansions, energy-efficient lighting (electronic ballasts) will be installed in all future additions. Selected areas are also being retrofitted with electronic ballast fittings, and motion detectors/presence detectors are being installed to switch off lighting when the building is unoccupied. Additionally, variable speed drives and energy efficient motors are being specified.



### Yamanouchi Ireland Co. Ltd

Our EPI improved strongly over the past year. This was due to variations in the amount and type of pharmaceuticals produced having caused a significant reduction in the usage per tonne of product processed.

Energy remains an important element of the site's environmental policy and is reported as part of our EMAS statement.

Abbott Ireland, Cavan	Irish Fertilizer Industries Ltd
Aer Rianta, Dublin	Irish Shell Ltd
Allergan Pharmaceuticals Ltd	Irish Sugar Ltd
Analog Devices BV	Janssen Pharmaceuticals Ltd
Atlas Aluminium	Klinge Pharma
Aughinish Alumina	Kostal Ireland
Bausch & Lomb Ireland (Contact Lens Division)	Lakeland Dairies, Bailieboro
Baxter Healthcare S.A.	Leo Laboratories
Becton Dickinson Insulin Syringe Ltd	Lisheen Mine
Boston Scientific Ireland Ltd, Galway	Masonite Ireland
Braun Ireland Ltd	Merck Sharp & Dohme (Ireland)
Bristol-Myers Squibb, Swords	Micro-Bio Ireland Ltd, Fermoy
Buckeye Technologies Ireland Ltd	NEC Semiconductors Ireland Ltd
Cadbury Ireland Ltd, Dublin	Novartis Ringaskiddy Ltd
Cadbury Ireland Ltd, Kerry	Outokumpu (Tara Mines) Ltd
Cantrell and Cochrane Ireland Ltd	Pfizer Ireland Pharmaceuticals, Little Island
Carbery Milk Products Ltd	Pfizer Ireland Pharmaceuticals, Loughbeg
Cognis Ireland Ltd	Pfizer Ireland Pharmaceuticals, Ringaskiddy
ConocoPhillips, Whitegate Refinery	Premier Periclase Ltd
Dairygold Co-op Society	Pure Fresh Dairies Ltd
Dawn Meats, Ballyhaunis	Roche Ireland Ltd
Diageo Ireland, St James's Gate	Saehan Media Ireland Ltd
Dundalk Brewery	Schering-Plough (Avondale) Co.
Elan Pharma Ltd	Schering-Plough (Brinny) Co.
Element Six	SerCom Solutions
Eli Lilly S.A. – Irish Branch	Smurfit Paper Mills Ltd
Fruitfield Foods Ltd	St Francis Abbey Brewery
Garrett Engine Boosting Systems	Takeda Ireland Ltd
Glanbia Ingredients, Virginia	Thermo King Europe
Glanbia Meats, Roscrea	Transitions Optical Ltd
Glanbia Meats, Ruskey	Tyco Healthcare, Athlone
Glanbia Plc, Ballyragget	Tyco Healthcare, Mulhuddart
Glanbia Plc, Inch	Unifi Textured Yarns Europe Ltd
GlaxoSmithKline, Cork	Waterford Crystal Ltd
GlaxoSmithKline, Dungarvan	Wellman International Ltd
Gypsum Industries Ltd	Wessel Energy Cables Ltd
HJ Heinz	Western Proteins
Hewlett-Packard (Manufacturing) Ltd	Wyeth Medica Ireland Ltd
IBM Technology Campus	Yamanouchi Ireland Co. Ltd
Intel Ireland Ltd	

## Websites:

Action Energy UK	<a href="http://www.actionenergy.co.uk">www.actionenergy.co.uk</a>
American Council for an Energy Efficient Economy	<a href="http://www.aceee.org/altsites/index.htm">www.aceee.org/altsites/index.htm</a>
Bord Gáis Éireann	<a href="http://www.bge.ie">www.bge.ie</a>
Centre for the Analysis and Dissemination of Demonstrated Energy Technologies (CADET)	<a href="http://caddet-ee.org/">http://caddet-ee.org/</a>
Cogen Europe	<a href="http://www.cogen.org">www.cogen.org</a>
Combined Heat and Power Association, UK	<a href="http://www.chpa.co.uk">www.chpa.co.uk</a>
Commission for Energy Regulation	<a href="http://www.cer.ie">www.cer.ie</a>
Department of Communications, Marine & Natural Resources	<a href="http://www.marine.gov.ie">www.marine.gov.ie</a>
Department of the Environment and Local Government	<a href="http://www.environ.ie">www.environ.ie</a>
EC Cordis database	<a href="http://www.cordis.lu">www.cordis.lu</a>
EC Directorate General for Energy	<a href="http://www.europa.eu.int/comm/dgs/energy_transport/index_en.html">www.europa.eu.int/comm/dgs/energy_transport/index_en.html</a>
Eirgrid	<a href="http://www.eirgrid.com">www.eirgrid.com</a>
Energy Ireland 2002	<a href="http://www.energyireland.net">www.energyireland.net</a>
Energy Star United States Environmental Protection Agency	<a href="http://yosemite1.epa.gov/Estar/business.nsf/webmenus/industry">http://yosemite1.epa.gov/Estar/business.nsf/webmenus/industry</a> <a href="http://www.energystar.gov/default.shtml">www.energystar.gov/default.shtml</a>
Environmental News Network	<a href="http://www.enn.com/">www.enn.com/</a>
Environmental Protection Agency	<a href="http://www.epa.ie">www.epa.ie</a>
ESB Energy Efficiency information	<a href="http://www.esb.ie/main/energy_business/energy_intro.jsp">www.esb.ie/main/energy_business/energy_intro.jsp</a>
European Commission Representation in Ireland	<a href="http://www.euireland.ie/news/trans">www.euireland.ie/news/trans</a>
European Council for an Energy Efficient Economy	<a href="http://www.eceee.org">www.eceee.org</a>
European Energy Network	<a href="http://www.enr.network.org">www.enr.network.org</a>
IBEC	<a href="http://www.ibec.ie">www.ibec.ie</a>
Index Ireland	<a href="http://www.indexireland.com/business_and_finance/energy">www.indexireland.com/business_and_finance/energy</a>
Institute for Global Communications Energy Links	<a href="http://www.igc.org/econet">www.igc.org/econet</a>
International Energy Agency (IEA)	<a href="http://www.iea.org">www.iea.org</a>
Northern Ireland Centre for Energy, Research & Technology	<a href="http://www.ulst.ac.uk/faculty/science/nicert">www.ulst.ac.uk/faculty/science/nicert</a>
Sustainable Energy Development Authority New South Wales Australia	<a href="http://www.seda.nsw.gov.au">www.seda.nsw.gov.au</a>
Sustainable Energy Ireland	<a href="http://www.sei.ie">www.sei.ie</a>
USA Office of Industrial Technologies	<a href="http://www.oit.doe.gov">www.oit.doe.gov</a>
UK Government Energy Efficiency Best Practice Programme (EEBPP)	<a href="http://www.energy-efficiency.gov.uk">www.energy-efficiency.gov.uk</a>
US Department of Energy	<a href="http://www.eren.doe.gov">www.eren.doe.gov</a>
World Energy Efficiency Association	<a href="http://www.weea.org/">www.weea.org/</a>

For the members of the Large Industry Energy Network, the primary objectives are to adopt a responsible approach to managing energy use, and to minimise their energy bills. For Sustainable Energy Ireland, the objectives are somewhat broader than that; the principal current objectives of the LIEN include the following:

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- 1 To develop a core of major players within Irish industry who are publicly and proactively committed to an ongoing voluntary programme of energy and emissions reduction.
  - 2 To create a network of companies which are willing to share knowledge and experience with one another in order to maximise the energy savings that are possible.
  - 3 To contribute to the competitiveness of Irish industry by assisting in reducing energy costs to a minimum, using the most effective means available.
  - 4 To engage not less than 33 per cent of the overall Irish industry spend on energy in active energy management.
  - 5 To achieve overall energy cost savings, within the members of the Network, and to reduce emissions to the environment.
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