

**Environmental RTDI Programme 2000–2006**

**Development of a Cleaner Production Programme  
for the Irish Hotel Industry – Greening Irish Hotels**

**(2004-CP-O)**

**Final Report**

Prepared for the Environmental Protection Agency

by

Clean Technology Centre, CIT

and

Hospitality Solutions Consulting Ltd

**Authors:**

**James Hogan and Maurice Bergin**

**ENVIRONMENTAL PROTECTION AGENCY**

An Ghníomhaireacht um Chaomhnú Comhshaoil  
PO Box 3000, Johnstown Castle, Co. Wexford, Ireland

Telephone: +353 53 916 0600 Fax: +353 53 916 0699

E-mail: [info@epa.ie](mailto:info@epa.ie) Website: [www.epa.ie](http://www.epa.ie)

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## **CLEANER PRODUCTION**

The Cleaner Production Section of the Environmental RTDI Programme addresses the need for research in Ireland to inform policymakers and other stakeholders on a range of questions in this area. The reports in this series are intended as contributions to the necessary debate on cleaner production and the environment.

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## Details of Project Partners

### **Irish Hospitality Institute**

8 Herbert Lane  
Dublin 2  
Ireland  
Tel.: +353 1 6624790

E-mail: [info@ihi.ie](mailto:info@ihi.ie)

### **James Hogan**

Clean Technology Centre  
Cork Institute of Technology  
Unit 1, Melbourne Business Park  
Model Farm Road  
Cork  
Ireland

Tel.: +353 21 4344864

Fax: +353 21 4344865

E-mail: [james.hogan@cit.ie](mailto:james.hogan@cit.ie)

### **Maurice Bergin**

Hospitality Solutions Consulting Ltd  
First Floor  
East Gate Village  
Little Island  
Cork  
Ireland

Tel.: +353 21 4536151

E-mail: [maurice@hsc.ie](mailto:maurice@hsc.ie)



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# 1 Summary

The Irish Hospitality Institute (IHI) proposed to develop and introduce a cleaner production (CP) programme for Irish hotels. This would incorporate CP audits, identification of CP opportunities and assistance with development of CP programmes.

The progress and results achieved would result in a CP model for Irish hotels together with a benchmark of achieved standards. It was proposed that an interactive website be established to allow hotels in Ireland compare their environmental performance against national benchmark standards.

It was expected that the core group would achieve c. €831,000 reduction in direct costs per annum and reduce their environmental impacts by a reduction of 3,000 t of CO<sub>2</sub> emissions, reduce waste going to landfill by 870 t and reduce water consumption by 50,000 m<sup>3</sup>.

The programme achieved the following:

- 56 hotels were engaged in more than 20 counties. Hotels involved in the programme included 3, 4 and 5 star hotels with sizes ranging from 30 to 255 bedrooms. These hotels represented c. 10% of Irish hotel room stock.
- 20 training sessions/workshops were held with over 600 person-training sessions delivered.
- 40 environmental reviews were carried out and CP plans created. Environmental management principles were introduced to in excess of 3,000 employees. Best practice standards were identified across waste, water and energy, and the Irish hotel industry was environmentally benchmarked for the first time.
- Quantifiable environmental achievements included 1,113 t of waste diverted from landfill and 3,000 t of CO<sub>2</sub> output reduced by the end of 2006.

The programme also identified future industry opportunities for:

- Energy savings of €61.9 million include fuel switching which could save €16 million
- Waste and water savings of €19.4 million
- CO<sub>2</sub> reductions of up to 162,000 t
- Water consumption reductions of up to 4.5 million m<sup>3</sup>
- Landfill waste reductions of up to 56,000 t.

The programme has engaged the industry and created an environment for change (Table 1.1) – the CP programme is replicable across all the accommodation and catering sectors.

**Table 1.1. Summary of environmental improvements.**

		Tonnes/annum <sup>1</sup>
<b>Landfill waste</b>	Proposed programme reductions	870
	Reductions achieved by core hotels by end of 2006	1,110 (40)
	Potential reductions for core hotels if best practice achieved	2,300
	Potential reductions for Irish hotel sector	56,000
<b>Water</b>	Proposed programme reductions	50,000
	Reductions achieved by core hotels by end of 2006	5,000 (5)
	Potential reductions for core hotels if best practice achieved	210,000
	Potential reductions for Irish hotel sector	4,500,000
<b>CO<sub>2</sub></b>	Proposed programme reductions	3,000
	Reductions achieved by core hotels by end of 2006	3000 (40)
	Potential reductions for core hotels if best practice achieved	7,500
	Potential reductions for Irish hotel sector	162,000

<sup>1</sup>Numbers in parentheses represent the number of hotels.

## 2 Background – Aim and General Description

### 2.1 Participant Description

The IHI (formerly the Irish Hotel and Catering Institute (IHCI)) was founded in 1966 as the professional body for managers in the hotel, tourism and catering industries in Ireland, collectively known as the hospitality industry. It is a voluntary non-profit organisation with a focus on the professional interests and needs of managers in the Irish hospitality industry.

The three core functions of the IHI are:

1. management development
2. establishing the IHI as a main reference and information point for hospitality managers, and
3. furthering the needs of members through events and networking.

The IHI currently has in excess of 1,200 members across all sectors of the hospitality industry. It adopted the Cleaner Greener Production Programme (CGPP) on behalf of the hotel sector and actively recruited member hotels.

Forty hotels joined the programme as core properties. Each received environmental reviews identifying immediate opportunities and their data were used for benchmarking purposes. A further 16 hotels joined as non-core hotels. These provided data only, but did not receive direct support.

Hotels were chosen across the whole country. See [Appendix 1](#) for a list of the participating hotels and an analysis of their regional spread, size and star rating, respectively.

### 2.2 Aim of the Project

The IHI proposed to develop and introduce a CP programme for Irish hotels. This would incorporate CP audits, identification of CP opportunities and assistance with development of CP programmes.

The CP programme was to be pilot tested in 20 core hotels in various regions around the country together with

a non-core or group set of c. 80 other interested hotels. Hotels involved in the programme would be benchmarked for energy consumption, water consumption and waste generated.

The progress and results achieved would result in a CP model for Irish hotels, together with a benchmark of achieved standards. It was proposed that an interactive website be established to allow hotels in Ireland compare their environmental performance against national benchmark standards.

It was expected that the core group would achieve c. €831,000 reduction in direct costs per annum and reduce their environmental impacts by a reduction of 3,000 t of CO<sub>2</sub> emissions, reduce waste going to landfill by 870 t, and reduce water consumption by 50,000 m<sup>3</sup>.

Whilst none of the individual elements were innovative in their own right, the holistic approach adopted, whereby questionnaires, data collection, environmental reviews/site visits, training, workshops, best practice development, website and conference were all included within the programme, was in itself innovative.

The requirement for individual businesses to interrogate their own processes, and deliver information back to the consultants to allow for benchmarking, created a continuous feedback loop, and further enhanced the learning environment created. This approach necessitated a large input from the consultants, as it was very time consuming and involved constant communication with participants, who were required to implement new processes and procedures throughout the programme. With other business pressures many hotels were not able to deliver on the expected results.

For the hotel sector, the creation of environmental benchmarks was an innovation, and one which encouraged direct action by many properties, including properties that were not part of the CGPP – the ability to compare performance has galvanised many hotels to improve their performance.

## 3 Project Implementation

### 3.1 Investigation of Prevention Opportunities

#### 3.1.1 Strategy to identify prevention opportunities

The *Greening Irish Hotels* programme identified prevention opportunities using the following tools:

- Environmental review
- Environmental benchmarking
- Networking and supplier review.

#### 1. Environmental review

Each of the 40 core hotels in the programme received an environmental review from the programme consultants. The review involved an on-site review of unit operations, as well as interviews with staff and management by skilled environmental auditors. Opportunities for environmental improvements/CP were identified and outlined in the reviewer's report. Each hotel was revisited by the programme consultants and an environmental management programme was developed to target opportunities for environmental improvement/CP.

#### 2. Environmental benchmarking

All member hotels were asked for detailed information on their 2004 and 2005 accounts and statistics. This included information on waste produced, energy and water consumed, bed nights sold, meals sold and number of leisure centre users. This information allowed the programme consultants to develop for the first time actual benchmarks for the Irish hotel sector. The key benchmarks produced included:

- Waste: kilograms of landfill waste per sleeper
- Water: litres of water per sleeper
- Energy: kilowatt hours (kWh) per square metre of internal hotel space per annum.

Irish benchmarks established during this programme were used to rate the environmental performance of individual participant hotels and to identify potential environmental and cost savings for each premises.

International benchmarks<sup>1</sup> were also used to identify potential environmental improvements for individual Irish hotels and to determine the potential environmental improvements for the entire Irish hotel sector. Potential savings for the Irish hotel sector are outlined in [Section 4.2](#).

#### 3. Networking and supplier review

Integral to the *Greening Irish Hotels* programme was a series of workshops on CP and environmental improvement. A total of 20 workshops were held nationally to raise participant awareness in elements of environmental management, water, waste and energy management, green procurements and biodiversity.

These workshops allowed participants to develop their skills in environmental benchmarking and environmental management, and to learn about the latest CP technologies. It allowed participants to engage with both the programme consultants and other participating hotels in the programme. This networking allowed hotels to gain valuable knowledge on what environmental actions were successful in the industry and what actions and technologies were cost-effective. It also allowed participants to compare and benchmark supplier charges and subsequently to seek more competitive rates from their suppliers.

Armed with this information many hotels reduced their energy and waste charges. While there was no direct environmental benefit from this process, the economic savings achieved by these hotels did encourage hotels to justify spending on environmental programmes that had environmental benefits.

These three strategies allowed participants to identify their existing performance – knowledge that they did not have prior to the programme. This benchmarking information assisted them in identifying activities that

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1. International benchmarks were derived from a combination of benchmarks produced by the IHEI, IBLF, Green Globe, Green Seal, Accor Hotels, BenchmarkHotel, OEE Canada – see [Chapter 7](#).

included prevention strategies, as opposed to adopting random actions based solely on cost-reduction principles.

### **3.1.2 Knowledge of company operations**

Prior to the programme's development there were no key performance indicators (KPIs) regarding hotel environmental management in Ireland. Internationally there were some, but there was no major industry usage of them. Annually, a number of reports would be produced which analysed total energy costs as a percentage of turnover – but nothing addressing the environmental issues.

As part of this programme the environmental reviews identified a significant lack of knowledge throughout the hotel sector in terms of understanding of waste, water and energy management, with the greatest lack of knowledge being in the area of energy management.

The KPIs developed during the programme allowed hotels to identify their performance levels and then take action to reduce waste. Best practice standards identified through research and practical application were disseminated, which allowed hotels understand better how to improve their performance. The results achieved in respect of waste and energy through the programme showed that hotels' knowledge was improving.

However, a key element identified during the programme was the necessity for the holistic approach. Hands-on support/training/workshops, coupled with best practice guides and benchmarking, resulted in hotels achieving improved performance. Those hotels that only received information on environmental best practice rarely initiated any improvements – even when they could achieve significant cost reductions.

The holistic model adopted has identified that a continuation of the same process will deliver results in the short, medium and long term.

### **3.1.3 Prioritised improvement options**

Each of the 40 core hotels in the programme received an environmental review from the programme consultants. Opportunities for environmental improvements/CP were identified and outlined in the consultants' report.

Opportunities for CP were prioritised by Green Teams in conjunction with the programme consultants, and were based on potential economic saving, potential

environmental savings, ease of implementation and legislative compliance.

Environmental reviews suggested that the hotels in the programme could typically reduce their environmental costs by 20–50% by a combination of no-cost, low-cost and capital investments. No-cost and low-cost investments alone can deliver savings of up to 25%. This equates to savings of up to c. €100,000 per annum per hotel of 60+ bedrooms.

In environmental terms, typical hotels that joined the programme were shown how to reduce their waste sent to landfill by up to 50%, reduce their water consumption by up to 50%, and reduce their energy consumption by up to 25%.

### **3.1.4 Implemented improvements**

In some cases, the results have been remarkable. For example, one Irish hotel has now achieved waste production figures of 0.68 kg waste landfilled per sleeper. This compares to the international average benchmark of 1.5 kg waste landfilled per sleeper. Several other hotels have also surpassed this benchmark. Hotels participating in this programme, and which have been benchmarked for 2004 and 2005 have shown an average waste reduction of 25%.

It is interesting to note that the two best performing hotels in relation to waste, also surpass the international energy benchmark (313 kWh m<sup>2</sup>/annum). With 3.5 million m<sup>2</sup> of floor space in Irish hotels and 16 million sleeper nights sold, the potential savings are phenomenal.

For measured benefits refer to [Sections 4.1](#) and [4.2](#) and case studies in [Appendix 3](#).

## **3.2 Changes in Practices or Processes**

### **3.2.1 Outline description of the project**

The IHI in conjunction with its consultants, Clean Technology Centre (CTC, Cork Institute of Technology) and Hospitality Solutions Consulting (HSC), developed a CP programme for the hotel industry entitled *Greening Irish Hotels*. This programme incorporated environmental reviews of 40 'core' hotels, identification of CP opportunities in these hotels and assistance with the development of environmental programmes. The entire programme involved 56 hotels from all corners of Ireland, from Derrynane to Sligo to Rosslare. All of these hotels were provided with best practice guidelines in energy,

water and waste management that allowed them to improve environmental performance.

All hotels involved in the programme were benchmarked for energy consumption, water consumption and waste generated. Information gathered allowed Irish hotels to be benchmarked against international hotels and against each other, allowing individual hotels to compare their environmental performance against both national and international standards.

The results of this programme will allow any Irish hotel to benchmark itself against the 2005 national benchmark. This programme has developed an interactive website for this purpose.

A key element of this programme was networking workshops which were held regionally on a quarterly basis. These workshops allowed hotels to gain knowledge on cutting-edge environmental technologies and benchmarking from the project consultants and from their peers. The workshops also allowed for a dissemination of environmental knowledge within the hotel sector (Figs 3.1 and 3.2).

### **3.2.2 Project management**

Overall project management was delivered by the IHI with support from the project consultants CTC and HSC.

The IHI acted as chief correspondent between the 56 hotel participants and the project management team. The IHI was responsible for promoting the programme, signing up participants, dissemination of literature, organisation of training events, marketing and organisation of a national conference. The IHI also acted as chief contact for correspondence with the Environmental Protection Agency (EPA) and the project sponsors. The IHI invested a considerable amount of time seeking co-funding for the programme from many industry sponsors.

Project consultants CTC and HSC were responsible for delivery of environmental reviews, preparation of environmental management programme for participants, delivery of regional workshops, delivery of training manual and best practice guides, preparation of the electronic benchmark tool, and preparation of quarterly technical and final reports.

The consultants also acted as advisors to the IHI on potential sponsors, conference organisation and marketing. During the course of the programme, the



**Figure 3.1. Greening Irish Hotels participants attending a regional workshop.**



**Figure 3.2. Participants of Greening Irish Hotels viewing the in-vessel compost system at the Brooklodge Hotel and Spa.**

consultants prepared numerous press releases. Refer to [Section 5.2](#) for publicity.

### **3.2.3 Operating history**

The project commenced in January 2005, with an initial four training courses held regionally, followed by environmental reviews, quarterly workshops, benchmarking, research, communication, website design and development, and culminated in a national hospitality environmental conference in September 2006.

Officially, the programme has ceased since the conference date and member hotels are now left to their own actions. However, many of the participant hotels have expressed a keen interest in continuing the programme as many of them were only starting to

implement some of the core principles towards the end of the programme.

CTC and HSC would like to continue the programme and continue to deliver support, training, advice and benchmarking to existing members, and to expand the target market to encompass the hospitality industry as a whole. The findings from the programme identified the need for such a service and that success comes from close interaction between the experts and the businesses.

The nature and extent of the new programme will be dependent on financial constraints, as a core part of the requirement is for ongoing training and development.

### **3.2.4 Implementation experiences**

If anything, this programme was about change – moving hotels from a focus of any expenditure for guest comfort to a balanced view that comfort can be achieved at a viable environmental cost, and that waste of resources is not required to deliver quality service.

Getting this message across to participants was hard but was assisted by the use of workshops and individual hotel case studies and experiences. Non-performing hotels were able to talk to performing properties that extolled the benefits of improved performance, with no negative guest impact.

Lack of knowledge of plant and equipment and especially in the area of energy management was, and still is, a key problem. Hotels do not employ key technical staff with the ability to implement best practice and rely on external contractors, many of whom installed the equipment initially.

The programme encouraged lighting audits, major equipment surveys and departmental action plans to highlight areas where action could be taken. The KPIs assisted here, as a hotel could see that they were poor performers and what the economic cost was – and the potential savings.

Another issue was the lack of information available within hotels on their environmental performance. Any data available were generally purely financial with no resource consumption data. The benchmarking process started such data collection in many hotels and most have continued to collate the data for their own internal usage.

### **3.2.5 Equipment performance**

The success of this programme was supported by technology in many cases. The technologies that had the greatest impacts are listed in [Table 3.1](#).

The success of some of these technologies is demonstrated in the case study section of this report (see [Appendix 3](#)).

### **3.2.6 Modifications**

In general, the programme ran as per the original specification. The main changes included:

- Number of hotels changed – target was for 20 core hotels and 40 joined, 80 non-core and 16 joined. In hindsight it was clear that the core hotels would receive a better service and without the hands-on approach non-core would deliver little improvement.
- Slow to recruit – because this programme was nationwide with a diverse audience it took up to 4/5 months to recruit all hotels. This meant that hotels performed at different levels depending on when they started.
- The programme was officially extended to September 2006 as it was agreed that the timing of the national conference was better suited to this time of year to encourage maximum attendance.
- Costs, in general, remained as per the budget with some changes in detail on travel expenses. Reduced costs for the conference and the website were used for the extra 20 core hotels environmental reviews.

### **3.2.7 Measurement/monitoring**

The KPIs used during the programme were:

- Waste: kilograms of landfill waste per sleeper
- Water: litres of water per sleeper
- Energy: kWh/m<sup>2</sup> of internal hotel space per annum.

These were chosen as they are the KPIs used internationally by the hotel sector. It became clear towards the end of the programme, as benchmarking data were being interrogated, that these benchmarks did not adequately reflect the differing activity levels of member hotels. An example of this can be seen in waste management. For example, a 60-bedroom hotel with a busy ground floor business could serve up to 250,000

**Table 3.1. High-impact technologies.**

<p><b>Energy</b></p> <ul style="list-style-type: none"> <li>Woodchip and wood pellet boilers</li> <li>Gas condensing boilers</li> <li>Combined heat and power plant</li> <li>Building management systems (BMSs)</li> <li>Heat exchangers (for heat recovery from expelled air)</li> <li>Range of energy-efficient lighting</li> <li>Motion and light sensors</li> <li>Solar panels</li> <li>Energy-efficient kitchen appliances</li> <li>Liquid pool cover</li> <li>Electrical sub-meters</li> </ul> <p><b>Waste</b></p> <ul style="list-style-type: none"> <li>In-vessel compost systems</li> <li>Combined macerator and dewaterer</li> <li>Bulk oil dispensers</li> </ul> <p><b>Water</b></p> <ul style="list-style-type: none"> <li>Sub-meters</li> <li>Low-flow shower heads</li> <li>Water-efficient kitchen appliances</li> <li>Low-flush urinals</li> </ul>
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**Figure 3.3. Solar energy from solar panels can complement other energy sources.**



**Figure 3.4. Brooklodge Hotel herb garden utilising organic compost produced on site.**

food covers per annum. The same hotel may only have 20,000 sleepers in the same period. Every food customer creates waste, and in the current KPI scenario all the food waste will be 'charged' to sleepers. A similar size hotel with no banqueting would immediately have less waste per sleeper and would appear better.

This disparity was identified and initial steps have been taken to develop a new benchmark KPI to reflect different types and levels of activity within hotels. This initial work needs to be validated and continued into the future to allow for accurate benchmarking, which will allow companies to reflect their actual performance.

International water and energy benchmark standards also currently suffer the same issues and need to be fine-tuned to improve benchmark effectiveness.

### 3.3 Capacity Building

#### 3.3.1 Training of staff

There were two elements to training – training the managers and training individual staff members within each hotel. This programme concentrated on training the managers, part of whose role was then to return to their properties and train their staff – or bring in external trainers.

Training consisted of a series of training sessions, workshops/seminars and a national conference held throughout the lifespan of the programme. The model was that members needed to be supported approximately every 3 months to identify best practice, enable networking, deliver relevant training sessions and maintain benchmarking.

A total of 20 separate sessions were held throughout Ireland – four initial training sessions on environmental management systems (EMSs) and waste, water, energy management and green procurement, followed by a series of four workshops over a 16-month period – four workshops every 4 months.

The programme also engaged with Sustainable Energy Ireland (SEI) which ran a series of three energy management 1-day courses specifically designed for hotels.

The final event was the 1-day National Hospitality Environmental Conference held on 5 September 2006 in Killashee House Hotel, which was attended by c. 200

delegates with 30+ exhibitors and was addressed by national and international experts (Fig. 3.5) and the Minister for the Environment, Heritage and Local Government, Mr. Dick Roche (Fig. 3.6).



**Figure 3.5. Speakers at the *Greening Irish Hotels* National Conference: Larry Stapleton, EPA, Noel Duffy and James Hogan, CTC, Maurice Bergin, HSC and Adrian Cummins, IHI.**



**Figure 3.6. Mr. Dick Roche, Minister for Environment, Heritage and Local Government at *Greening Irish Hotels* National Environmental Conference for the Hospitality Sector.**

Approximately 100 managers attended the initial training sessions, and an average of 15 managers/supervisors attended each workshop, giving a total of c. 240 attendees at workshops. An additional 60 managers/facility managers attended the SEI energy course.

In total, therefore approximately 600 person-training sessions were delivered throughout the extent of the *Greening Irish Hotels* programme. Experts from SEI, NIFES, the ESB, Dalkia, Igneus, etc., delivered training and information.

Areas covered within the training, workshops, etc., included implementing an EMS, data collection, understanding facility bills, understanding plant and equipment, leisure centre management, waste management, water management, energy management, green procurement, benchmarking, lighting, controls and building management system – a broad spectrum of knowledge across all areas of environmental management.

### *3.3.2 Integration of knowledge from external assistance*

A large part of the research within the programme was to identify best practice from national and international sources. This knowledge was incorporated into the training and workshops and best practice guides, and delivered to the participants. In many cases, this knowledge was incorporated into daily management activities and assisted managers to develop EMSs.

Benchmarking KPIs used were those that are in international use, and the programme was able to compare Irish KPIs against international KPIs. The effect of these was to show that the Irish hotel industry had great potential to improve its performance.

Best practice guides are published on the *Greening Irish Hotels* website [www.greeningirishhotels.ie](http://www.greeningirishhotels.ie). See [Chapter 7](#) for a list of sources used.

## 4 Project Outcomes

### 4.1 Environmental Impact

The targets set in the project proposal for this programme were to reduce the combined environmental impacts as follows:

- A reduction of 3,000 t of CO<sub>2</sub> emissions
- A reduction of waste going to landfill by 870 t
- A reduction of water consumption by 50,000 m<sup>3</sup>.

Based on the benchmark data available to the consultants, it is estimated that:

- Participant hotels will reduce CO<sub>2</sub> by 3,000+ t by the end of 2006
- Participant hotels have reduced waste to landfill by 1,100 t
- Participant hotels have commenced reduction in water use, but this has not yet been quantified.

#### 4.1.1 EMS activities

The 40 core hotels were assessed for the level of EMS activity present during the programme (Fig. 4.1).

The level of EMS uptake is quite poor with over 50% of core hotels not implementing a formal EMS programme, even though the CGPP provided a 'soft' EMS option. Even some of the successful hotels were driven by project activities as opposed to a holistic approach. They tended to focus on individual projects that deliver large cost savings, and this reflects in the results that a number of hotels experienced.

Water management is an area that had fewer successes during the lifetime of the programme – mainly because initial efforts were directed at implementing waste management procedures followed by larger-scale projects involving energy management. Many hotels had not yet seen water bills increase, or did not know what they were paying for water and did not react positively. However, since the programme commenced water has become more of an issue, and, as waste management costs are marginalised, water costs are appearing as increasingly expensive – so action is being taken.

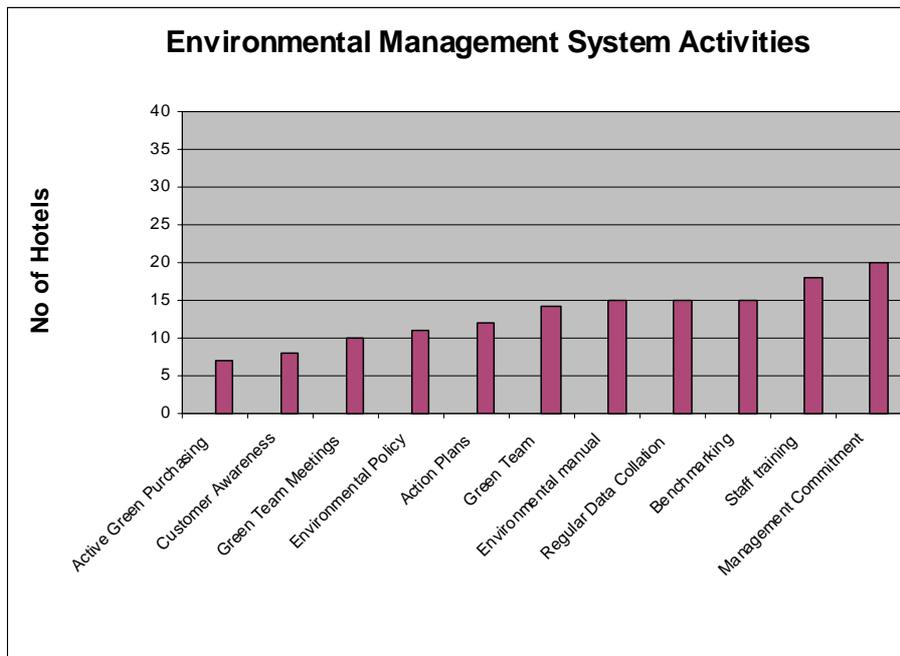


Figure 4.1. Environmental management system activities.

Some individual hotels in Ireland have achieved reductions in consumption/production as follows:

- Waste – reductions to landfill of up to 85%
- Water – reductions in consumption of up to 50%
- Energy – reductions in consumption of up to 25%.

These figures, together with the international benchmarks, show that Irish hotels have the potential to greatly reduce their environmental footprint.

#### 4.1.2 Waste management

Core hotels averaged 3.5 kg of landfill waste per sleeper in 2004, against an international average of 1.5 kg per sleeper (Fig. 4.2). In 2005, the core hotels reduced this to 2.5 kg per sleeper – a c. 30% reduction – this equates to a total reduction of waste to landfill of 1,110 t per annum. If the same hotels had reached the international average of 1.5 kg per sleeper the total tonnes reduced would have been c. 2,300 t. This is achievable as one Irish hotelier (Fig. 4.3) has reduced the figure to 0.68 kg per sleeper – close to the world best (2006 data have shown this hotel approach the 0.5 kg figure). When extrapolated for the entire industry in Ireland the real potential becomes clear.

In 2004, the estimated total Irish hotel landfill tonnage was 65,228 t based on extrapolation of waste produced by core hotels (Fig 4.4). If all Irish hotels were to achieve what participant *Greening Irish Hotels* did in 2005, the estimated landfill tonnage is reduced to 46,312 t. And if Irish hotels were to achieve world average levels for landfilled waste the tonnage would be 27,955 t.

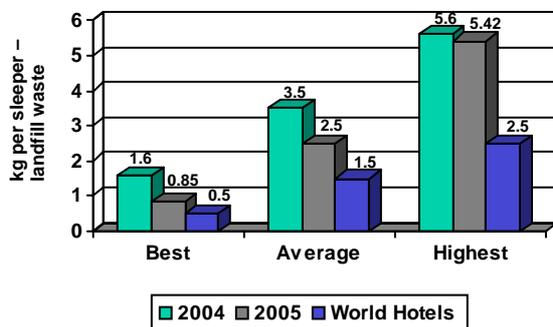


Figure 4.2. Benchmark data – waste landfilled by core hotels 2004/2005 and worldwide hotels benchmark.



Figure 4.3. Michael Lennon, Westport Woods Hotel, speaking about his hotel’s achievements with the *Greening Irish Hotels* programme.

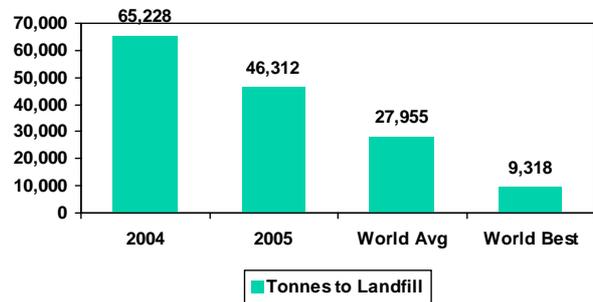


Figure 4.4. Scenarios for waste landfilled by the Irish hotel sector extrapolated from Irish hotel benchmark (2004/2005) and world hotel benchmarks.

If they achieved world best – the estimated tonnage would be 9,318 t. This equates to an 86% reduction in 2004 levels of landfill waste – a total of 56,000 t.

Hotels engaged in a number of waste management activities. The types of waste reduction activities employed by members are shown in Fig. 4.5. What is clear is that the top ten activities can be applied by the majority of hotels – and that they work.

#### 4.1.3 Water management

The potential water-use reduction for Irish hotels is very significant. If Irish hotels were to achieve world standard, they would reduce consumption by 45% which is equivalent to 4,501,000 m<sup>3</sup> or 5,400 m<sup>3</sup>/hotel.

Only five of the participating hotels achieved measurable water reductions during the period of the programme. The activities they undertook are shown in Fig. 4.6. It is

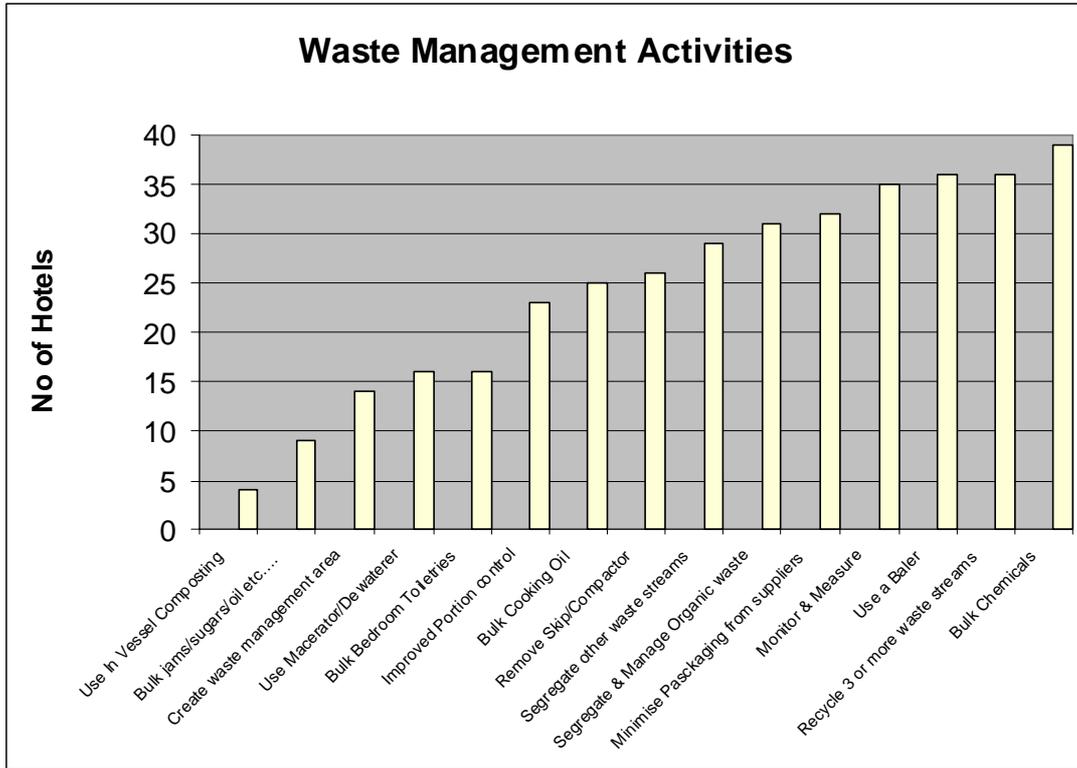


Figure 4.5. Waste reduction activities employed by core members of *Greening Irish Hotels*.

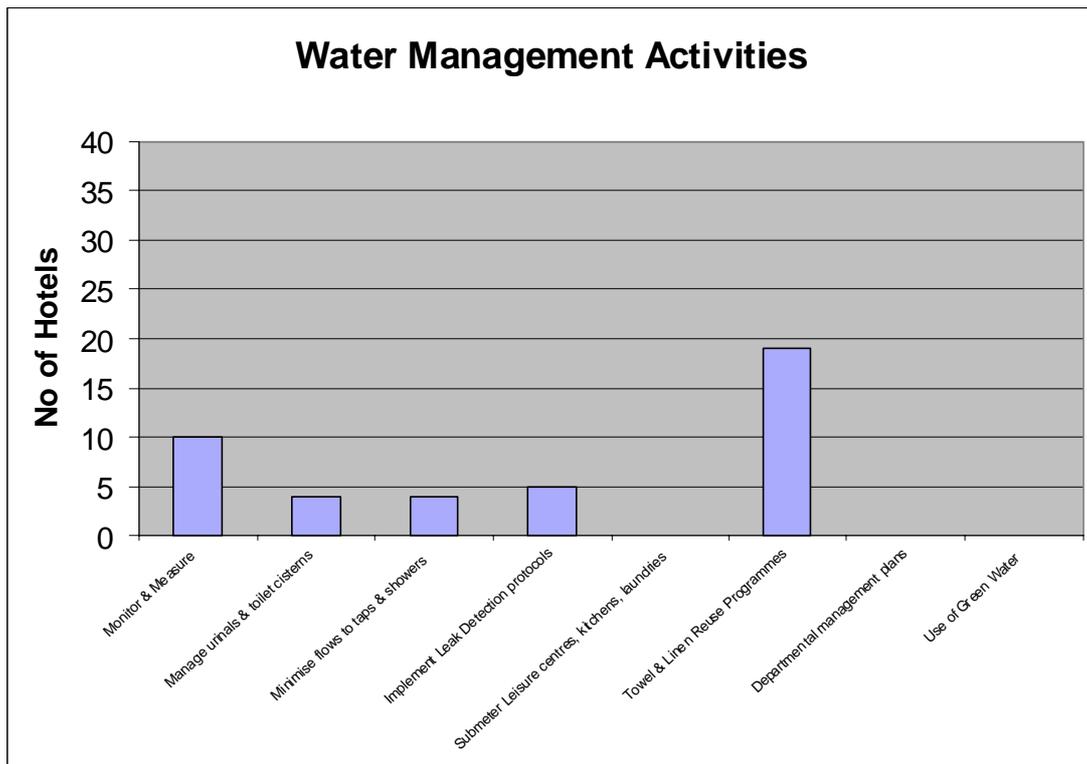
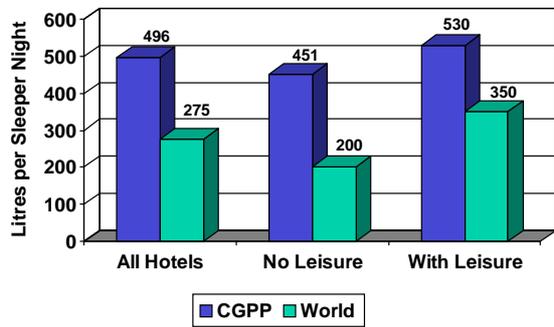


Figure 4.6. The uptake of water management activities by the core members of *Greening Irish Hotels*.



**Figure 4.7. 2004 water consumption per sleeper night for CGPP hotels compared to the international average.**

estimated that these few hotels achieved a reduction of c. 5,000 m<sup>3</sup>/annum.

Whilst most hotels did not achieve major reductions in water usage (Fig. 4.7), there is now awareness amongst *Greening Irish Hotels* members that water is an asset that is expensive, but its use can be reduced considerably. The potential for the industry is to reduce water consumption by up to 45% to come in line with the world average consumption.

Figure 4.6 shows the poor uptake of water management activities. However, with local authorities currently undertaking a replacement water metering programme across the country, hotels will start to implement water-saving activities early in 2007. Some local authority areas have seen water delivery/waste costs increase by more than 100%. With new billing and more accurate meter readings water consumption will become a major issue with hotels.

It is a measure of the focus that the hotel sector has on costs that reduction activities will only take place when the economic cost increases substantially.

Of particular note was the failure of the industry to implement water reduction processes in the new hotels built within the 2004–2006 period. Only one new hotel in Ireland has been identified that has built in a green water system to use rainwater for toilet flushing. However, the achievements of one hotel are described below.

One of the Great Southern Hotels took action to reduce water consumption by fitting flow restrictors on showers and taps. They also reduced the size of their toilet cisterns by installing water displacement measures. At a cost of

**Table 4.1. Cost savings resulting from water-saving measures adopted in one Great Southern Hotel.**

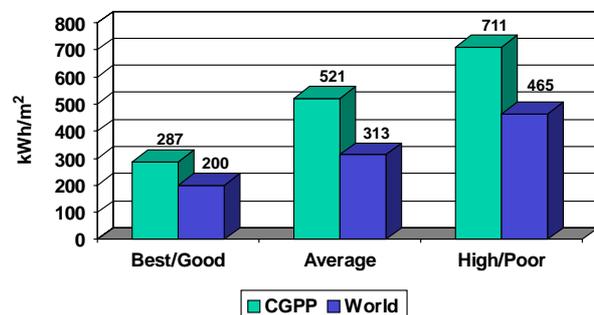
Cost savings	Cold water	Hot water (including energy)
Showers	€1,020	€5,100
Wash basins	€2,907	€14,435
Toilet cisterns	€1,187	
Kitchen	€1,000	€ 4,000
<b>Total</b>	<b>€6,114</b>	<b>€23,535</b>
<b>Payback</b>	2 months	2 weeks

€1,000 this Great Southern Hotel reduced water consumption by an estimated 2.7 million litres with no impact on customers. The payback based on the reduced water purchases alone was two months (Table 4.1). However, in reality, significant saving were also made by reducing the usage of hot water which reduces energy bills. When water and energy costs are considered, measures taken saved the hotel €23,535/annum. Improved training and awareness and capital expenditure on green and grey water initiatives would allow the hotel to substantially further reduce its water consumption.

Each hotel would need to undertake a cost–benefit analysis.

#### 4.1.4 Energy management

The KPI used internationally for energy consumption is kWh/m<sup>2</sup> per annum. The world average in 2005 was 313 kWh/m<sup>2</sup> whilst *Greening Irish Hotels* achieved 521 kWh/m<sup>2</sup> (Fig. 4.8). This shows a c. 40% divergence and suggests a poor performance from Irish hotels. However, the fact that one hotel achieved a 287 kWh/m<sup>2</sup> result shows that Irish hotels have the capacity to reduce energy consumption substantially.



**Figure 4.8. Energy consumption (kWh/m<sup>2</sup>) for CGPP hotels compared to International values.**

Energy consumption in *Greening Irish Hotels* did not change appreciably between 2004 and 2005 as the lead time from the programme commencement in early 2005 to the end of 2005 was not enough for key activities to take place. The majority of the key actions occurred in 2006 and the impact will be seen when these figures are analysed, and further improvements are expected in 2007.

Most hotels initially identified large projects to structurally alter their consumption patterns as energy costs are starting to impact upon their operations. Such projects (e.g. woodchip boilers, CHP, dishwasher changes, etc.) required cost-benefit analyses and lead times. Once these are in place, more emphasis can be placed on achieving softer day-to-day solutions, such as energy-efficient equipment, sensors, housekeeping measures, etc.

Participant hotels have already seen substantial reductions in energy consumption and costs through fuel switching, re-bulbing, installation of sensors, management of plant and equipment, training and awareness (Fig. 4.9).

Management of energy has the potential to realise the most significant cost reductions within hotels. Most hotels are driven to become more efficient on this basis, but are failing to realise the full opportunities available to them. This is in part due to the poor implementation of an EMS

programme where all the opportunities would be identified.

**4.1.5 Greenhouse gas emissions**

Reductions in energy use will impact upon greenhouse gas emissions from the Irish hotel sector. The benchmark data from Irish and international hotels show that Irish hotels consume 40% more energy than similar hotels worldwide. The programme quantified the potential reductions in CO<sub>2</sub> emissions if all Irish hotels moved to the international average. Achieving best practice would deliver even greater results.

The target for the commercial and services sector in Ireland is to reduce CO<sub>2</sub> by 175,000 t.<sup>2</sup> Hotels represent approximately 10% of this sector. However, it is estimated that Irish hotels can achieve reductions of 162,600 t CO<sub>2</sub> by fuel switching and implementation of energy-efficient measures (Fig. 4.10).

Table 4.2 identifies the annual CO<sub>2</sub> reductions that will be made from the *Greening Irish Hotels* core members by the end of 2006.

Through general electrical efficiencies, equipment improvements and re-bulbing and other lighting activities, hotels have improved their electrical efficiencies by 10% (estimated by theoretical kWh reductions by, for example, changing light bulbs). Other reductions have been

2. National Climate Change Strategy (2000).

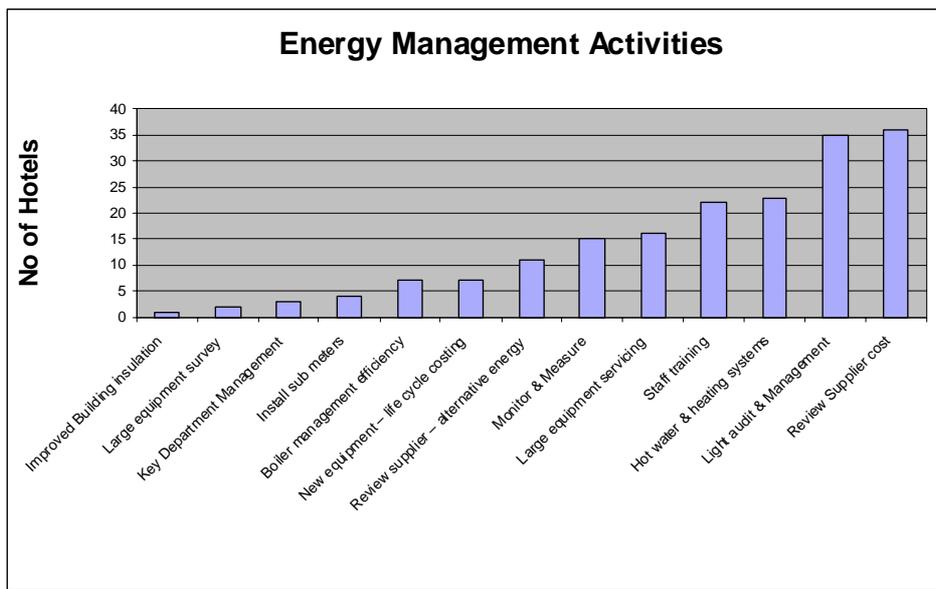


Figure 4.9. Energy management activities adopted by participating core members.

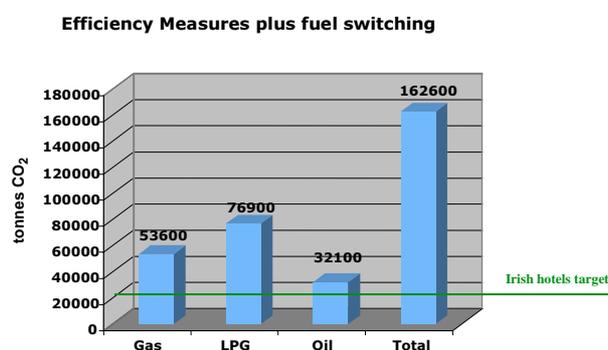


Figure 4.10. Irish hotel sector – estimated potential CO<sub>2</sub> reductions per fuel type (base 2004).

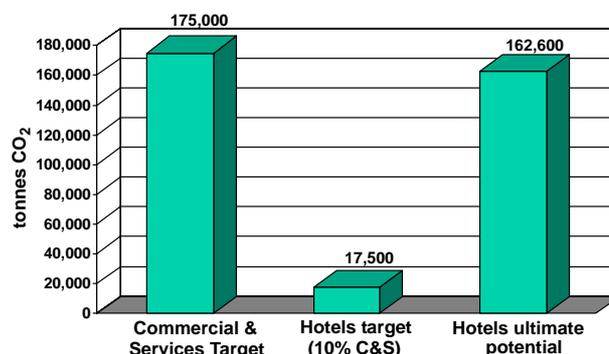


Figure 4.11. Estimated potential CO<sub>2</sub> reductions for the Irish hotel sector (base 2004).

Table 4.2. Annual CO<sub>2</sub> reductions that will be made from the Greening Irish Hotels core members by the end of 2006.

Reduction method	Annual CO <sub>2</sub> reductions by switching from			Tonnes CO <sub>2</sub> per annum
	Electricity	Oil	LPG	
To woodchip	NA	583	124	707
To CHP plus fuel switch	338	ND	76	414
<i>Other measures</i>				
Electricity efficiency	1,862	NA	NA	1,862
<b>Total CO<sub>2</sub> reductions</b>	<b>2,200</b>	<b>583</b>	<b>200</b>	<b>2,983</b>

NA, not applicable; ND, no data.

Table 4.3. Potential CO<sub>2</sub> reductions in Irish hotels (base 2004).

	Current Fuel Type			Totals
	Natural gas	LPG	Oil	
kWh per hotel per annum	834,169	493,173	144,804	1,472,146
CO <sub>2</sub> equivalent tonnes per hotel per annum	158	107	38	303
Reduction in CO <sub>2</sub> tonnes per hotel, if international average achieved	63	43	15	121
<b>Total CO<sub>2</sub> tonnes reduced for all Irish hotels if international average achieved (i.e. 40% reduction)</b>	53,634	36,215	12,838	<b>102,687</b>
Further reductions if all hotels switch to renewables	Not considered	40,700	19,300	<b>60,000</b>
<b>Total potential reduction of CO<sub>2</sub> (tonnes/annum)</b>	<b>53,634</b>	<b>76,915</b>	<b>32,138</b>	<b>162,687</b>

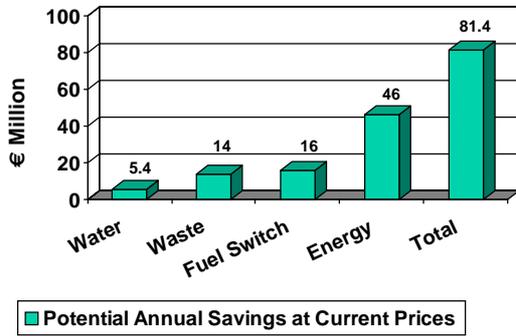
delivered by three hotels switching to woodchip boilers from oil and LPG and one hotel which had installed a CHP system.

Figure 4.11 shows the potential for the sector that is only just being realised. Further work is required to move the industry towards a more sustainable energy management future and ultimately to adopt environmental management as a core philosophy of their management ethos.

Table 4.3 shows where CO<sub>2</sub> reductions can be achieved in Irish hotels. Electricity is excluded as the Kyoto calculations do not allow electricity reductions generated off site to be included.

## 4.2 Economic Impact

When extrapolated across the industry, the total economic benefit to Irish hotels totals €81.400 million per



**Figure 4.12. Potential annual savings for the Irish hotel sector at 2005 prices.**

annum at 2005 prices (Fig. 4.12). With energy and water seeing price rises well above the CPI these potential savings will increase on an annual basis.

There is a very strong economic argument to be made for hotels to improve their performance as their bottom line will improve whilst Ireland’s emissions will decrease.

A key finding of the CGPP was that the costs associated with environmental improvements were rarely uneconomic – paybacks generally exceeded any return businesses could find in the financial markets. An example of this would be the water management improvements made by the Great Southern Hotel noted above where a €1,000 investment returned €6,000 in reduced costs in 1 year – a 2-month payback.

Other examples include:

- Kelly’s Resort Hotel – €100,000 biomass plant with a 14-month payback
- Fitzgerald’s Woodlands Hotel – €85,000 dishwasher with a 3-year payback
- Shannon Oaks Hotel – €17,000 re-bulbing programme with an 11-month payback
- Merrion Hotel – €250 pump timing system with a 4-day payback
- Toilet lights sensor installation – 6- to 8-month paybacks
- Sligo Park Hotel – organic waste management system – 2-year payback

- CGPP hotel – fuel switch – €100,000 annual cost reduction

(Some hotels not identified for confidentiality purposes.)

These and many more show that environmental improvements can be extremely cost beneficial and make sound investments. When coupled with longer-term payback activities, the overall returns remain very attractive – and the bonus is the reduction in environmental pollution.

### 4.3 Other Benefits

Apart from the obvious gains, a real success has been the co-operative action by members of the commercial sector. This type of networking and information sharing has been shown elsewhere to be a major factor in the innovation process. Such shared innovation inevitably leads to improved performance in business. The IHI programme should be an example to other sectoral groups, at a time when waste and energy costs have become a significant factor on business profitability.

There has been a strong welcome and acceptance of the principles by many employees, as many of the practices undertaken are those that they, and their children, are implementing on a daily basis in their own homes. In many ways, the hotels are only catching up on practices that are accepted within the social community.

Few hotels have adopted a public green image and actively engage their customers, but an awareness of a growing consumer base of environmentally driven customers is appearing and the international brands are all including environmental management policies under their corporate social environmental responsibility sections. As consumers become more aware, more hotels will use their Green credentials to improve their image.

Some hotels have received national awards, partly due to their actions through the *Greening Irish Hotels* programme – in 2005, the Westin Hotel and the Ferrycarrig Hotel were joint winners of the Repak Hotel Award, and, in 2006, the Ferrycarrig Hotel won this outright.

Hotels with sister properties have seen the findings replicated across these other hotels. They are using the knowledge gained within one unit to benefit the whole group/chain.

#### 4.4 Involvement of Other Business

The *Greening Irish Hotels* programme was very much a hospitality industry programme. As well as involving 56 hotels directly in the programme, it attracted interest from other hotels, restaurants, hotel chains, contract caterers and from industry bodies such as the Irish Hotels Federation, Fáilte Ireland and The Restaurant Association of Ireland.

The programme was regularly featured in *Hotel and Restaurant Times* where lessons on environmental improvement have been outlined to a large audience of the hospitality sector.

The *Greening Irish Hotels* programme also attracted considerable interest from suppliers to the hospitality sector, many of whom supported the programme through sponsorship or by attending the programme's national conference. The programme sponsors were Philips, Sustainable Energy Ireland (Fig. 4.13), Dalkia, ESB Customer Supply, Igneus (Fig. 4.14) and Greenstar Waste Management.

There were mutual benefits for the IHI, Irish hotels and suppliers through the networking of this programme. Hotels had the opportunity to gain knowledge on cutting-edge environmental technologies and information from suppliers while suppliers gained access to an environmentally committed audience.



Figure 4.13. Patrick Liddy and Deirdre Farrelly – Sustainable Energy Ireland – who contributed to the programme.

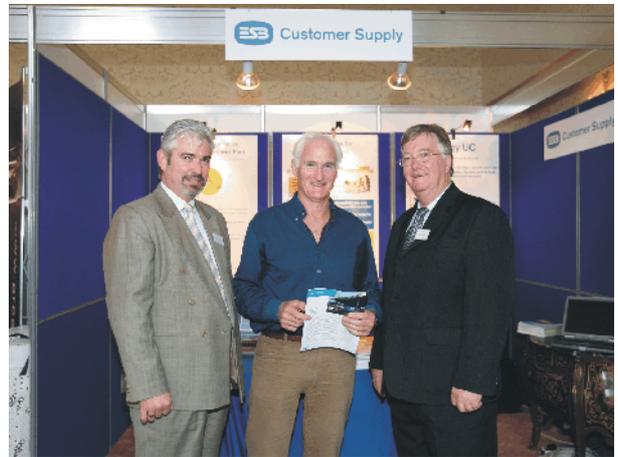


Figure 4.15. Duncan Stewart with Colman Kenny and Brendan Tonge, ESB Customer Supply, *Greening Irish Hotels* Exhibition.



Figure 4.14. Igneus Renewable Energies at the *Greening Irish Hotels* exhibition.



Figure 4.16. Larry Stapleton, Kevin Woods and Brian Donlon at the *Greening Irish Hotels* conference.

## 5 Promotion and Publicity

### 5.1 Potential Replication in Other Enterprises

The *Greening Irish Hotels* programme was a first for the Irish hotel industry. The majority of the lessons learned can be replicated across the hotel and hospitality industry and have opportunities to be extended to the medical sector and the office and retail sectors.

However, it is noted that the actual results were not replicated across all the participating hotels. Some performed remarkably well, particularly the owner-managed properties. The knowledge of CGPP member hotels has increased substantially and the knowledge of the industry's potential is clear. Translating this into the reductions in consumption will not happen overnight and requires a sustained effort by the key stakeholders to spread the message and deliver solutions designed to encourage the hospitality sector to engage.

A programme of information dissemination and training/seminars is needed, linked to a benchmarking programme to quantify and demonstrate improvements. The industry clearly needs direct support on an ongoing basis but the potential results for Ireland are also clear.

Given the progress already made by the existing *Greening Irish Hotels* members and the planned actions members will take over the next 12 months, it is expected that the hotel sector target for Kyoto will be achieved by the end of 2007 (17,500 t of CO<sub>2</sub>). But this is only 10% of the potential of the total hotel sector. A focused programme is required to move the industry as a whole towards this result. Even if 50% of the potential is realised this would result in a reduction in CO<sub>2</sub> of 81,300 t per annum, which at €15 per tonne (November 2006) equates to a saving to Ireland of €1.22 million per annum. (This is approximately 50% of the total target for the commercial and services sector.)

### 5.2 Dissemination of the Results

To date the results of this project have been disseminated as follows:

- Results on the outcome of the project were presented by CTC and HSC at the First National Environmental Conference for the Hospitality Industry held in Killashee House on 5 September 2006. This conference was attended by 200 delegates associated with environmental management in the hospitality industry. Presentations from a participant hotel, industry sponsors, Fáilte Ireland and other experts in environmental management in the hospitality sector were delivered at the conference all of which are available on the programme website.
- Hospitality journals and national press. Numerous articles on the findings of the programme have been published in *Hotel and Catering Review* and *Hotel and Restaurant Times*, the Irish Hotel Federation's *innsight* magazine, the ESB's internal newsletter and the national press. These articles are available on the programme website.
- During the course of the programme all new information and findings from the programme were disseminated to the 56 hotels at the quarterly regional workshops.
- Duncan Stewart screened an episode of *Eco Eye* nationally in early 2007 on the *Greening Irish Hotels* programme. This episode featured Westport Woods Hotel.
- Presentations on the outcome of the programme delivered to Race Against Waste in Cork and Sligo, SEI EnergyMAP review group, IHF Cork and South East Branches, and Fáilte Ireland MERGO group.

## 6 Lessons Learned for the Future

### 6.1 Lessons learned

- The level of in-house technical expertise in relation to environmental management/utility management is generally low in Irish hotels. Clearly the hotels that had the greatest success in this programme were those in the core group. These hotels were provided with hands-on expertise from the programme consultants who assisted hotels with the assessment of their environmental performance, made recommendations on cost-effective action plans, and assisted hotels with the development of environmental management programmes.

In general, hotels that engage independent specialists on energy management, lighting, utility maintenance, waste management, etc., experienced economic and environmental success.

- Awareness and knowledge: Time and owner support are the key ingredients lacking in hotels that are not performing as well as they could. Hotel managers are too busy to give the time and effort needed to implement the changes within the organisation and do not have sufficient knowledge of the potential solutions. Put simply, hotel managers must take the time to review their operation, benchmark their current performance against Irish norms, (ref. [www.greeningirishhotels.ie](http://www.greeningirishhotels.ie)) and decide that they must take action.

In general, General Managers do not calculate the total annual utilities costs (energy, waste, water, maintenance – labour and costs, plant depreciation) and estimate the value of their total plant and ask themselves who is managing these costs and assets and do they have the skills in-house to do so?

### 6.2 Recommendations for future programmes

- **Provide more hands-on expertise in future programmes.** While core hotels did perform better than non-core hotels because of hands-on assistance from consultants, many of the core participating hotels felt that more hands-on assistance would have

enhanced their performance even further. In order to achieve this, one would need to reduce the number of hotels participating in the programme or increase the time allowed for direct contact with consultants.

- **Ensure management is more committed.** General Managers must not take the implementation role upon themselves unless they can guarantee the time required – they must liaise with owners/financiers and support and encourage the Green Team within the hotel. Each General Manager needs to appoint a Green Manager who has his/her authority to implement the agreed actions, and all management and support staff need to be made aware of the importance of the programme.
- **Develop new benchmarking standards.** As discussed previously, new benchmarks need to be developed to allow for a deeper understanding of the dynamics of the activity flow of Irish hotels that will integrate food covers served and users of spas and leisure centres into the benchmark data.
- **Create further incentive to implement environmental programmes.** Even though hotels paid to be part of this programme, some of them failed to achieve the levels of reduction of resources possible – in fact, some hotels did not progress at all. One of the findings is that some form of award scheme, whereby recognition would be given for success, would help to motivate businesses better.

### 6.3 Continuation of the Project

The consultants to the *Greening Irish Hotels* programme wish to continue to build on the momentum of this programme throughout the hospitality industry. An existing programme running in six counties (Green Fáilte Award) provides an opportunity to deliver the knowledge learned, within a structured framework, to the sector.

However, this development is incumbent on financial backing, as the level of support required to initiate actions within hospitality businesses necessitates a great deal of hands-on support, workshops, training and continued research and benchmark development.

#### **6.4 Continuation of Cleaner Greener Production**

Officially, the programme has ceased since the conference date and member hotels are now left to their own actions. However, many of the participant hotels have expressed a keen interest in continuing the CP programmes, as many of them were only starting to implement some of the core principles towards the end of the programme.

CTC and HSC would like to continue a CP programme and continue to deliver support, training, advice and benchmarking to existing members, and to expand the target market to encompass the hospitality industry as a whole.

The findings from the programme identified the need for such a service and that success comes from close interaction between the experts and the businesses.

## 7 Sources and References

### 7.1 Sources (from which the benchmarks were derived)

- International Hotel Environmental Initiative [www.ihei.com](http://www.ihei.com)
- Accor Hotels
- BenchmarkHotel ([www.benchmarkhotel.com](http://www.benchmarkhotel.com))
- International Business Leaders Forum/WWFUK (IBLF)
- Green Globe
- Green Seal
- Nordic Swan
- Office of Energy Efficiency, Natural Resources Canada (OEE Canada)
- Green Fáilte Award ([www.greenfailteaward.ie](http://www.greenfailteaward.ie))
- Waste Watch UK
- Waste & Resources Action Programme UK (WRAP)
- GreenBiz.com
- Action Energy UK
- US EPA Energy Star Program
- Caribbean Association of Sustainable Tourism
- The Carbon Trust
- Business Research Establishment (BRE) UK
- Environmental Protection Agency
- Sustainable Energy Ireland
- European Environment Agency
- Austrian Hotels Green Initiative

### 7.2 References

- Hotel & Catering International Management Association (HCIMA)
- Hospitable Climates UK
- CIBSE UK
- EU Ecolabelling Board
- US Environmental Protection Agency
- Race against Waste, Department of the Environment
- Repak
- Chartered Institute of Waste Management UK
- Envirowise UK
- Green Fáilte Awards Ireland
- Clean Technology Centre, CIT, Ireland
- Philips Plc
- Jurys Doyle Hotels Plc
- NIFES Consulting Group
- Oxford Brooks University, UK
- Green Agenda, CERT
- Fáilte Ireland
- A Natural Shade of Green, Institute of Technology, Tralee
- Irish Hotels Federation, Waste Management Programme
- ISO 14001, NSAI
- ESB Customer Supply
- Fairmont Hotels

## Appendix 1 List of Participant Hotels and Analysis

**Table A1.1. Participating hotels in the CGPP.**

<b>Core hotels</b>	<b>Non-core hotels</b>
Abbey Court Hotel, Nenagh	Brandon House Hotel, Wexford
Abbey Hotel, Roscommon	Bunratty Shannon Shamrock Hotel, Bunratty
Ashdown Park Hotel, Gorey	Cabra Castle, Dublin
Ballynahinch Castle Hotel	Castlecourt Hotel, Westport
Blooms Hotel, Dublin	Dingle Skellig Hotel, Dingle
Brooklodge Hotel, Wicklow	Four Seasons Hotel, Dublin
Bush Hotel, Carrick-on-Shannon	Great Southern Hotel, Dublin
Castle Oaks Hotel, Limerick	Lansdowne Hotel, Dublin
Clanard Court Hotel, Athy	Druids Glen Marriott Hotel, Wicklow
Claregalway Hotel, Claregalway	Perys Hotel, Limerick
Clarion Hotel, Sligo	Slieve Russell, Cavan
Connemara Coast Hotel, Galway	Stillorgan Park Hotel, Dublin
Derrynane Hotel, Kerry	Radisson SAS St. Helens Hotel, Dublin
Dooley's Hotel, Waterford	Radisson SAS Farnham Estate, Dublin
Ferrycarrig Hotel, Wexford	Paramount Hotel, Temple Bar
Fitzpatrick's Castle, Dublin	Plaza Hotel, Tallaght
Heritage Hotel, Portlaoise	Whitford House Hotel, Wexford
Hotel Issacs, Dublin	
Hotel Westport, Westport	
Inishbofin House, Day's Hotel, Inishbofin	
Kelly's Resort Hotel, Rosslare	
Kilkenny River Court Hotel, Kilkenny	
Killashee House Hotel, Naas	
Merrion Hotel, Dublin	
Mespil Hotel, Dublin	
Morrison Hotel, Dublin	
Old Ground Hotel, Ennis	
Ramada Hotel and Suites at Lough Allen, Drumshanbo	
Riverside Park Hotel, Enniscorthy	
Setanta House Hotel, Kildare	
Seven Oaks Hotel, Carlow	
Shannon Oaks, Portumna	
Trinity Capital Hotel, Dublin	
Tullamore Court Hotel, Tullamore	
West County Hotel, Ennis	
Sligo Park Hotel, Sligo	
Westin Hotel, Dublin	
Westport Woods Hotel, Westport	
Woodlands House Hotel, Adare	

### Core Hotel Analysis

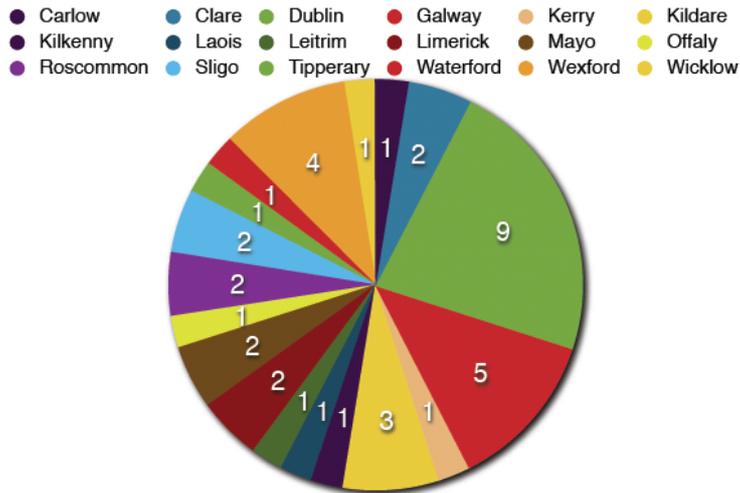


Figure A1.1. Number of CGPP core hotels per county.

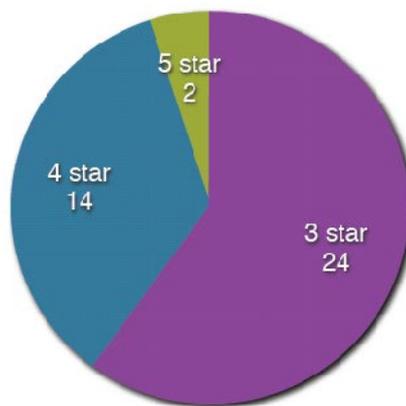


Figure A1.2. Star rating analysis of CGPP core hotels.

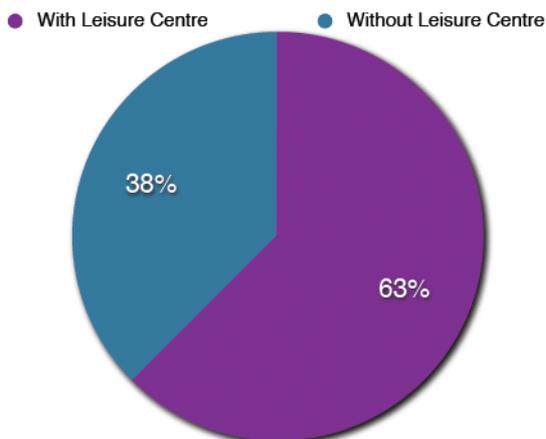


Figure A1.3. Leisure facilities analysis of CGPP core hotels.

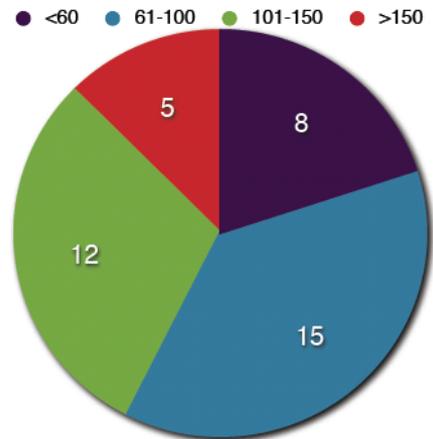


Figure A1.4. Bedroom number analysis of CGPP core hotels.

## Appendix 2 The Impact of Electricity Management

The CGPP *Greening Irish Hotels* programme has identified a number of opportunities for Irish hotels to substantially reduce their energy consumption and costs. Electricity plays a significant factor in this area as it accounts for 30% of total kWh and 55% of total energy costs (see [Figs A2.1 and A2.2](#)).

When reviewing the data, it is clear that hoteliers should prioritise actions that reduce electricity consumption first as it will have the greatest effect on cost reduction and CO<sub>2</sub> reduction for every kWh.

[Table A2.1](#) estimates the potential at peak demand (17:00–19:00 h daily) for the Irish hotel industry to reduce

demand from the generating stations in Ireland, coupled with the hotels utilising their generators to feed electricity into the national grid. Taking the production and transmission savings into account this equates to a CO<sub>2</sub> reduction potential of 92,400 t.

These data suggest that Irish hotels can contribute substantially to not alone reducing the CO<sub>2</sub> footprint ([Fig. A2.3](#)) but also in reducing demand and delivering electricity into the grid at a time when Ireland is approaching a potential shortfall in supply.

A methodology to encourage, motivate and reward hotels to implement best practice electricity management should

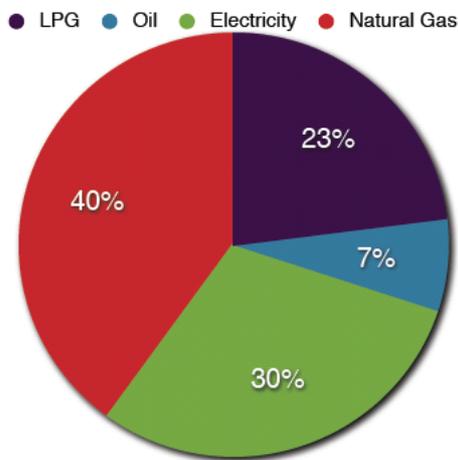


Figure A2.1. Energy consumption analysis of Irish hotels.

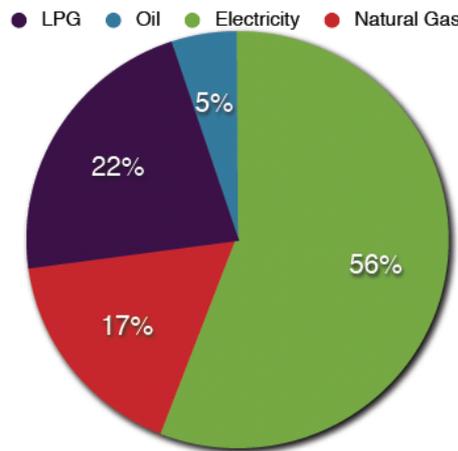
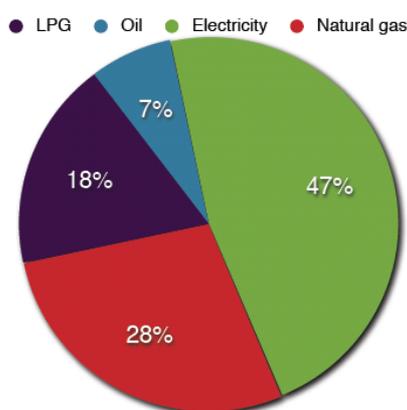


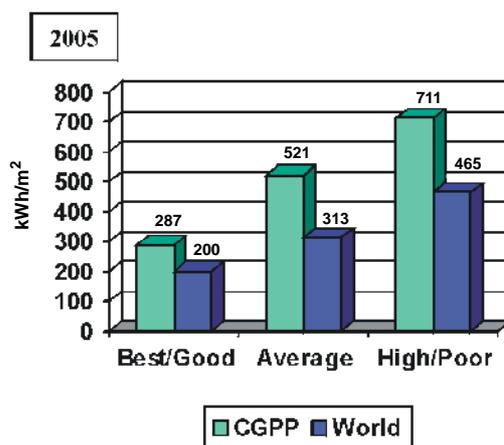
Figure A2.2. Energy cost breakdown of Irish hotels.

**Table A2.1. Potential reduction in electricity consumption at peak demand – Irish hotels (base 2004).**

Total electricity consumption (kWh)	537 million per annum
Potential savings	40%
kWh	214,885,178
Megawatt hours from generation	214,885 MWh
Allow for production and transmission losses (60% ref. SEI)	537,213 MWh
365 days	1,472 MWh per day
24 hours	61 MWh per hour
Add 25% at peak consumption	
Potential reduction in demand during peak hours (17:00–19:00 h)	77 MWh per hour
Add 500 hotels with 300 kWh generators	150 MWh per hour at peak
Total potential reduction in demand during peak hours	227 MWh per hour at peak



**Figure A2.3. The CO<sub>2</sub> footprint of Irish hotels.**



**Figure A2.4. Irish hotels vs World – energy consumption per square metre per annum.**

be initiated coupled with support in linking hotel generators to the National Grid. Incentives could be offered with technical support to allow for an easy move towards this ideal. Coupled with the cost reductions, this should provide a powerful incentive for hotels to reduce their electricity consumption.

The *Greening Irish Hotels* data show that the average hotel in 2005 consumed 521 kWh/m<sup>2</sup> of total energy against a world average of 313 kWh/m<sup>2</sup> (Fig. A2.4). However, with one hotel achieving a low of 287 kWh/m<sup>2</sup> there is evidence that Irish hotels can improve their performance substantially. The initial target for Ireland

should be to achieve the world average.

As is seen in the data above, a clear focus on reducing electricity consumption should be one of the priorities adopted by hotels.

### **CGPP Electricity Management Best Practice**

The programme identified a number of initiatives that hotels should undertake directly linked to electricity:

- Develop an environmental management programme
- Senior management commitment and resourcing is required
- Set targets and action plans for each department
- Conduct a light audit
- Conduct a large-equipment audit
- Monitor and measure electricity consumption
- Install sub-meters and large-equipment meters and monitor
- Install a building energy management system
- Review the light audit and re-bulb immediately
- Review large-equipment audit and set operating standards/times
- Replace inefficient/oversized equipment
- Review tariffs
- Benchmark hotel and continue monitoring and measuring.

Some specific actions noted include:

- Re-bulbing with CFLs (where possible) in one go after carrying out cost-benefit analysis
- Movement sensors in corridors, stairwells, back offices, etc.
- Reviewing level of light in each area and de-bulbing where necessary
- Review quality of luminaries and improve/replace if needed
- Train staff to understand how they can affect consumption by turning off lights and equipment or not turning them on in the first place
- Initiate start-up and close-down procedures on all electrical equipment with agreed set temperatures – replace equipment that consumes excessive kWh
- Plan life-cycle costings when purchasing new equipment and buy A-rated appliances/equipment
- Shift loads to off-peak hours if possible – look at making ice between 23:00 and 08:00 h
- Shut down areas of hotel not in use – bedroom floors, function rooms and equipment
- Install timers on vending equipment – cigarette machines, drinks machines, etc.
- Improved controls within leisure centres – jacuzzi, pumps, sauna, fans, etc.
- Improved control over HVAC.

## Appendix 3 Selected Case Studies

### Woodlands Hotel, Adare, Co. Limerick

**Contact:** David Fitzgerald, General Manager

**Title:** Energy Efficiency in Kitchens

#### *Background*

Woodlands Hotel is a busy 100-bedroom banqueting hotel, operating two busy restaurants and catering for up to 140 functions per annum.

Woodlands Hotel serves in excess of 200,000 covers per annum. This requires the back-up of a well-managed kitchen, employing 20 staff. Energy efficiency at the hotel especially in the kitchen is key to the economic sustainability of the business.

#### *Energy-efficient equipment*

Part of the energy management programme for Woodlands Hotel is the review of the energy consumption of key kitchen equipment. Recently, two key equipment items have been replaced for environmental and economic reasons.

The dishwasher was replaced with a new flight wash dishwasher. The capital cost of the dishwasher was €85,000. Purchased on a 5-year leaseback it is currently costing the hotel €19,500/annum.

#### *Cost benefit*

However, the Fitzgeralds are smiling as this dishwasher has reduced costs by €53,000/annum and has also resulted in reducing their environmental emissions through reduced electrical, hot water and chemical demand (Table A3.1). The new machine has in-built intelligence so that it determines precisely the level of detergent needed and will only operate when full.

Table A3.1. Dishwasher cost–benefit analysis

	Cost/annum	Benefit/annum
<b>Lease</b>	€19,500	
<b>Electricity</b>		€6,000
<b>Hot water</b>		€10,000
<b>Chemicals</b>		€5,000
<b>Breakages</b>		€4,000
<b>Labour</b>		€28,000
<b>Total</b>	€19,500	€53,000

**Annual savings (Years 1–5) = €33,500**

**Annual savings (Year 5+) = €53,000**



Figure A3.1. A smiling Mr. Fitzgerald outlining the benefits of his new dishwasher.

#### *Other energy initiatives*

Replaced all bulbs in corridors and lamps from 50–75 W bulbs to 7 W CFLs. This reduced lighting energy consumption by 80%.

## Westport Woods Hotel, Westport, Co. Mayo

**Contact:** Michael Lennon, General Manager

**Title:** Environment as a Business Driver

### Background

Prior to the *Greening Irish Hotels* programme, Westport Woods Hotel already had a significant EMS in place and was working towards ISO 14001. The GIH programme dove-tailed perfectly with the environmentally responsible direction that the hotel was already taking and ISO 14001 was abandoned “due to excessive paperwork requirements” according to General Manager Michael. Michael found that the *Greening Irish Hotels* programme had a more practical approach and found the benchmarking particularly attractive.

The big ‘hook’ for getting involved was the reduction in costs that arise from being more environmentally friendly.

Michael feels that there is significant marketing value in telling his customers about the hotel’s ‘Green’ approach. Key areas that Westport Woods Hotel have focused on during the GIH programme are described below.

### Waste management

In 2002, Westport Woods Hotel sent 240 t of waste to landfill. In 2005, this was reduced to 40 t. By the end of 2006, the plan is to reduce waste to landfill to 20 t or 0.68 kg/sleeper which surpasses the international average benchmark of 1.5 kg/sleeper.

The key to this waste management success has been waste segregation at source, especially food waste and composting this in an in-vessel compost system (Fig. A3.2).

### Energy

The hotel uses a comprehensive monitoring and measuring of electricity usage service which allows for energy usage in strategic business units to be managed effectively. The hotel has progressively reduced energy consumption during the *Greening Irish Hotels* programme to a 280 kWh/m<sup>2</sup> compared with the Irish national average of 524 kWh/m<sup>2</sup> (Table A3.2).



**Figure A3.2.** Michael Lennon feeding the ‘Big Hannah’ compost vessel.

This has been achieved through improved technology and energy awareness projects. The hotel has reduced electricity usage by 17,000 kWh/annum with the use of efficient CFL light bulbs. The newly opened spa features 250 lights, each of which has a 1 W LED bulb.

A recent extension to the hotel utilised a combination of solar power and a wood chip boiler to reduce fossil fuel and its CO<sub>2</sub> footprint. The hotel also plans to run its generator on bio-diesel.

**Table A3.2.** Energy benchmark improvements.

Year	kWh/sleeper	kWh/m <sup>2</sup>	Cost/sleeper €
2004	59	360	3.02
2005	45	292	2.86
2006	45	280	3.22

Note: Sleeper numbers reduced in 2006 due to construction works.

### Environmental management system

All environmental management programmes are driven by the ‘light’ EMS introduced by the GIH. This includes the establishment of a Green Team, comprising representatives of management and various departments that meet regularly to ensure that environmental plans are implemented smoothly. Benchmark figures for electricity, water and waste are continuously reviewed and environmental improvement assessed on this basis.

## Case Study – Tullamore Court Hotel

**Contact:** Philip O'Brien

**Title:** Fuel Switching and CHP

### *Installation of CHP plant and switching of fuel*

This hotel joined the *Greening Irish Hotels* programme whilst a further development of the hotel was being planned. The hotel was adding 33 new bedrooms and extending the conference and banqueting facilities – an almost 50% increase in the hotel's capacity.

The existing plant was a combination of oil and LPG boilers which serviced the hotel, public areas and the indoor leisure centre and swimming pool, and the initial plan was to extend the capacity of these to cater for the increased load.

However, the owners were able to see the potential benefits from a change in the thermal energy provision following a review of the property, and commissioned a feasibility study from Noel Lawler Consulting Engineers. This review convinced them to change the plans to include a combined heat and power plant together with a fuel switch from oil/LPG to natural gas. (Tullamore Town had joined the Natural Gas network in recent years and a mains supply was accessible, within a reasonable distance.)

The hotel agreed to install a 125 kVA combined heat and power plant (Fig. A3.4) and change all other equipment to run on natural gas. The total cost of this project was €411,750, which was outside the construction budget.

The feasibility study showed that both projects would have reasonable paybacks (see Table A3.3) but when combined would deliver a 3.04-year payback on a simple payback basis.



**Figure A3.4. Typical CHP unit installed.**

The strength of these projections convinced management and the owners to proceed with the project and the plant was commissioned in November 2006 with first-month results available for December 2006. The plant needs to operate for a number of months to allow for a 'settling-down' period and for operational management to learn the operating parameters and controls of the systems.

A key part of this project will be a post-installation review to identify actual savings against the projections and against actual business levels. This underlines the importance of benchmarking hotels, as different levels of business will require varying quantities of energy – heat and electricity.

The feasibility study also identified an interesting aspect to the investment in purely economic terms. The base year taken for calculation showed a total energy cost of €315,472. Following the development and with a hotel approximately 50% larger, the energy cost would be €293,579 – a reduction of €21,893. With energy inflation well above the CPI the Tullamore Court Hotel is well placed to minimise their energy costs over future years.

**Table A3.3. Paybacks arising from the installation of a CHP unit and switching to natural gas.**

	Capital cost	Annual cost reduction	Simple payback	Simple annual rate of return
<b>CHP unit</b>	€278,653	€53,910	5.17 Years	19%
<b>Fuel switch</b>	€133,023	€81,536	1.63 Years	61%
<b>Combined projects</b>	€411,676	€135,446	3.04 Years	33%