Air Movement & Air Quality
Marren Engineering Limited
1 The Seapoint Building, Clontarf, Dublin 3
Tel: 01 - 833 4144 Fax: 01 - 833 4182
Email: info@marrenengineering.ie

Engineered HVAC Solutions

Innovation  Flexibility  Performance

Marren Engineering is all about innovation, flexibility and performance. Its ability to devise the most appropriate, tailored solution for each particular project is limitless. To that end it has a very strong trading partnership with all of the brand-leading names in the air movement sector. The result is an infinite choice of innovative products and systems which, when coupled with the Marren Engineering expertise, make for the perfect result every time.

Vision AHU  Dual Centrifugal  Screw  Water Source Heat Pump  Scroll  Fan Coil Unit
When is a Spec Not a Spec?

There was a time when the specification in relation to the building services on a project was sacrosanct. Once on the spec a supplier could rest easy, secure in the knowledge that a thorough appraisal of the project’s requirements had led to that particular solution being arrived at. However, that is no longer the case ... that little phrase “or equivalent” appears to have as many interpretations as there are opinions.

There is no doubt that transparency in the marketplace is essential. However, paying lip-service to transparency without the attendant honesty and integrity is self-deceiving. When decision-makers choose an “equivalent” product to the one on the original spec they must do so on the basis of a genuine, like-for-like, comparison. There must be a level playing field.

Far too often when the spec is changed it is patently obvious that the chosen option is not “equivalent” in that it does not perform the same number of functions, or deliver to the same performance levels.

Price is important and it is vital that clients get value for money. However, going with the cheapest price on the job does not necessarily mean value for money. Indeed, experience demonstrates only too well that, in very many cases, value for money is forsaken when the cheapest price route is chosen.

The imminent enforcement of the Energy Performance in Buildings Directive (EPBD) will undoubtedly force the industry to take a hard look at itself. It will inevitably highlight — and penalise — price-led decision-making that ignores the design objective.

Far better that the industry address this thorny issue itself, while it still can, rather than have some external body impose a control mechanism which may be restrictive. Self-regulation is always best.
Security of Energy Supply Cause for Concern

Ireland’s dependency on imported energy, currently running at 87%, is significantly higher than the EU average of 50%, according to the findings of a new report published today by Sustainable Energy Ireland (SEI). The report is an aggregation of metrics (statistics and forecasts) relevant to energy security of supply, and is the first of its kind in Ireland. The report, which will be issued annually, includes 34 metrics on areas including — supply and demand of gas, electricity, coal, peat and oil, as well as metrics on system infrastructure and market signals.

Security of supply has been the focus of considerable attention by governments and the media in recent years. Sustained high oil and gas prices are putting ever-increasing pressure on global economies and their ability to deliver goods and services. The new SEI report illustrates various issues that might impact Ireland’s security of supply in future years.

Contact: www.sei.ie

Snickers To Wear ... Not Eat!

Professional tradespeople need functional clothing that transports moisture away from the skin and keeps them cool and dry, even in the most trying conditions. The new polo shirt from Snickers Workwear is the perfect solution as it is produced in a material that is lightweight, breathable, and keeps the wearer dry and comfortable during hard activity. The range is available in a modern two-tone look in colours black, grey and navy.

Contact: David Macken, Snickers Workwear. Tel: 01 - 409 8400; email: david.macken@snickers-workwear.com

PPG specialises in the design, manufacture and installation of glass-reinforced plastic water storage tanks. The range is extensive and comprises one-piece, pre-insulated break tanks, with sealed covers, which are perfect for storing potable water.

Apart from the standard range, PPG can also produce one-piece specials in any shape, size or configuration, and at short lead times.

Main features and benefits of the PFG range are:
— Long-term resistant to corrosion and degradation;
— Tanks are completely watertight;
— Water quality is taint-free;
— Fully draining base for efficient cleaning and disinfecting;
— Capacity is easily expanded;
— Algae growth prevented by tank opacity;
— Screened air vents;
— Screened overflow;
— Screened overflow warning pipes;
— Insulation across complete panel face;
— Internal and external access ladders;
— Non-slip walkways on roof panels;
— Internal baffles or dividers.

Contact: Graham Fay, Calpeda Pumps (Ireland). Tel: 01 - 825 8212; email: calpeda@eircom.net

Obel — Northern Ireland’s Tallest Building

Work has begun at Donegall Quay in Belfast’s city centre on the creation of Obel — a landmark building that will consist of a 26-storey residential tower, a 144-bed hotel, 41,000 sq ft of office space and a double basement car park.
53 new models for 2006

During 2006, SANYO will be launching an unprecedented number of new products into Ireland to provide the all round air conditioning solution. All of the new products will utilise R410A refrigerant and feature our very latest energy saving and acoustic technologies. For example, the new Aire 75 wall unit, which has just won the Japanese Good Design Award, has a COP of 5.0 and operates at just 22dB(A).

Product introductions include:

- Next generation 2 pipe heat pump ECOi with COPs of 4.1
- New expanded range of 2 pipe ECO G R410A Gas Heat Pump VRF
- New range of 3 pipe ECO G R410A Gas Heat Pump VRF
- New range of SPW DC inverter commercial split systems: 2 - 10HP
- New range of SAP DC inverter small split systems: 2.2 - 6.2kW
- New range of SAP online split systems 2.2 - 7.0kW

In addition, we will also be opening our new European production facility in Hungary which should ensure we can maintain our position as Ireland's fastest growing Japanese air conditioning manufacturer.
BL Makes Changes For Future Expansion

BL Refrigeration, established in 1977, has grown to become one of the leading refrigeration and air conditioning companies in Northern Ireland. Due to this continued growth and now with a workforce of over 50, BL has restructured its board and management team. Two people who have benefited from the changes are:

Keith Elliott, a buildings services graduate from the University of Ulster joined BL in 1995. Initially Keith was an applications engineer and in 2002 was promoted to Technical Manager. As part of the restructuring of the company Keith has been appointed Technical Director.

Glenn McGregor joined BL from Lisburn Technical College in 1991 as an apprentice. He has since become a fully qualified refrigeration and air conditioning engineer. In 2002 Glenn was made Maintenance Supervisor and, as part of the latest changes, has been promoted to Maintenance Manager.

Digihelic Differential Pressure Controller

The Dwyer Series DH digihelic differential pressure controller from Manotherm is a three-in-one instrument combining a digital display gauge, control relay switches and a transmitter with current output. It is ideal for pressure, velocity and flow measurements, achieving 0.5% full scale accuracy on ranges from 5in to 100in w.c.

The Digihelic allows the selection of pressure, velocity or volumetric flow operation in several commonly-used engineering units. Two SPDT control relays, with adjustable dead bands, are provided along with a scaleable 4-20mA process output. It also provides extreme flexibility in power usage by allowing 120/220 VAC and also 24 VDC power which is often used in control panels.

Programming is easy using the menu key to access five simplified menus which provide access to — security level; selection of pressure; velocity or flow operation; selection of engineering units; K-factor for use with flow sensors; rectangular or circular duct for inputting area in flow applications; set point control or set point alarm operation; automatic or manual alarm reset; alarm delay; view peak and valley process readings; and field calibration.

Applications include clean room pressure, filter status, SCFM flow in ducts, fume hood air flow, damper control, fan control, static pressure in ducts or buildings, dust collection bag filters, and pharmaceutical or biomedical glove box pressures.

Contact: Bob Gilbert, Noel Walsh or Robert Gilbert, Manotherm. Tel: 01 - 452 2355; email: info@manotherm.ie

Smarthomes at Adamstown

Smarthomes has been awarded the contract by Castlethorn Construction to provide a unique cabling system for home technologies for Adamstown Castle, the first phase of the new town at Adamstown. This new urban district is located 10 miles from the centre of Dublin on the main Kildare rail line, and will grow to become an important new town with a full range of transport, educational, shopping and social facilities.

As part of the deal Smarthomes will supply a specially-designed advanced cabling system which will enable residents to access new technologies in each room of their homes when they move in. In December 2005 Smarthomes was named Ireland’s fastest growing technology company by Deloitte. It is only one of a long list of national awards the company has for its professional and pioneering approach to business, including the 2004 All-Island Intertrade-Ireland Seedcorn competition, and the 2005 “Innovator of the Year” from the Small Firms Association.
INTERNAL TECHNICAL/APPLICATIONS ENGINEER

Mitsubishi Electric is looking to appoint an Internal Technical/Applications Engineer. Main functions will be to assist in the application of all Mitsubishi Electric air conditioning products to consultants, designers and customers in all technical aspects.

The successful candidate will be an experienced third level engineer with a knowledge of AutoCAD and a broad experience in mechanical/building services industry.

He/she will also need to be a self-starter.

EXTERNAL TECHNICAL BUSINESS DEVELOPMENT

The ideal candidate for the post of External Technical Business Development at Mitsubishi Electric — to be based in the southern region — will have at least five years experience in a technical environment, preferably within the building services sector.

The successful applicant will be self-starter capable of working on his/her own initiative, and of dealing with consultants and specifiers alike.

Please forward CV’s for both positions, in confidence, to Paul Sexton, Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24.

Tel: 01 - 419 8838; Fax: 01 - 419 8890; email: paul.sexton@meir.mee.com.

CONTRACTS MANAGER

Mechanical services contractor F Field Ltd seeks an experienced Contracts Manager. The company operates primarily in the commercial and industrial sectors of the HVAC industry.

The successful candidate will be a team player, with proven experience in all aspects of project management.

Salary is negotiable, based on experience.

CV’s to F Field Ltd at email: ffieldltd@eircom.net

Due to continuing expansion Precision Heating Ltd has a number of vacancies within its organisation. These include:

INTERNAL SALES PERSON

Responsible for taking internal sales calls and ensuring they are followed through to completion in a professional manner. Duties will include generating quotations in a timely manner and identifying new opportunities while dealing with customers.

The ideal candidate will have either a design service or sales engineering background gained within the HVAC industry and have experience dealing with architects, specifiers and consultants. Experience of working in a busy sales environment is desirable.

INTERNAL TECHNICAL SUPPORT ENGINEER (TRAINEE)

The successful applicant will be given excellent training from world-leading companies in the manufacturing of heating products. Upon completion of this comprehensive training the candidate will join the technical team as a Technical Support Engineer. This position would ideally suit a just-qualified apprentice in plumbing/heating. Experience within the heating and plumbing industry would be a distinct advantage.

The remuneration package for both positions will be commensurate with the experience and qualifications of the successful applicants. Full training will be provided at Precision’s Dublin office, with suppliers training academies, and on the job.

Applications with CV to info@precisionheating.ie or to Alan Hogan, Precision Heating Ltd, Unit 4B, Northwest Business Park Phase II, Mitchelstown Road, Dublin 15.
Cylon Strengthens Management Team

Rosemary Keogh, Financial Controller and Company Secretary, Cylon Controls

As a key part of its strategic business plan which will see turnover double over the next five years, Cylon Controls has made three new appointments.

Rosemary Keogh has been appointed Financial Controller and Company Secretary; James Cleere Product Development Manager; and Stiofáin Ó Flannabhra Technical Sales Representative for Ireland.

Commenting on the appointments, Sean Giblin Managing Director at Cylon said: “2006 marks the introduction of the Energy Performance of Buildings Directive which now places building controls centre stage in delivering on a truly A-rated building. These new appointments strengthen our management and sales team, facilitating our ambitious growth plans.”

Rosemary Keogh is now responsible for Finance and HR at Cylon. She brings over 12 years experience in senior finance roles across a broad spectrum of Irish and multinational industries.

James Cleere is responsible for Product Development at Cylon. He has 10 years experience managing software development in multinationals and Irish-owned firms with an international focus.

Stiofáin Ó Flannabhra is responsible for sales in the Irish market. He brings many years of practical experience working in the mechanical sector, particularly with HVAC systems.

Contact: Alan Kearney, Business Manager for Ireland, Cylon Controls. Tel: 01 - 245 0500; email: alan.kearney@cylon.com

Spectacular Design for Grand Canal Square

A stunning design for a major new public space — Grand Canal Square — in Dublin’s Docklands has been unveiled by the Dublin Docklands Development Authority. At 10,000 sq metres, the Square, located at the west end of Grand Canal Dock facing on to the water, will be one of the largest paved public spaces in the city. The new Grand Canal Theatre and Le Meridien 5-star hotel will both face on to the Square, as well as shops, cafés and restaurants at ground floor level.

Imperial Bathrooms Expands Irish Operation

Leading bathroom manufacturer Imperial Bathrooms has strengthened its market position in Ireland with the appointment of Sam Brown as Sales Manager. Covering both Northern Ireland and the Republic, Sam will be responsible for developing relationships with new and existing retailers and merchants.

Imperial Bathrooms covers both traditional and contemporary design styles. All units are manufactured by skilled specialists and hand-finished to exacting standards.

Contact: Sam Brown
Imperial Bathrooms. Tel: 0044 870 60 61 62 63; email: sales@imperialbathrooms.co.uk

Wavin Appoints Sales Manager

Martin Groome has joined Wavin Ireland as Sales Manager with responsibility for managing the sales team and for maintaining and developing its business through builders and civil merchants. Martin has a wealth of managerial experience working around the world in the engineering, finance and construction sectors.

Contact: Martin Groome
Wavin Ireland.
Pump Solutions for Sanitary Applications

Bornemann Pumps have a tradition stretching back over 150 years and are renowned for devising innovative solutions for specialist applications, especially in the area of food production and other sanitary applications. They are distributed in Ireland by Consolidated Pumps who have just introduced the new SLH Series, a specially-designed pump adapted from Bornemann’s standard twin-screw design. Intended for the food, dairy, confectionery and brewing industries, the advantages of the SLH Series are:

- Pumping and cleaning processes with one pump;
- Low shearing to the pumped fluid, gentle handling;
- Self-priming;
- Product and CIP cleaning;
- Minimal maintenance;
- Saves space through this 2-in-1 technology;
- Abrasion-free and safe to run dry (option);
- Cost-effectiveness.

The conveying elements of this self-priming twin-screw pump are single-flow and have external bearings. Two non-contacting intermeshed transporting screws form closed chambers inside the pump housing, which conveys fluid from the suction to the discharge end.

The pumped fluid flows through the screws in an axial direction. Therefore, the pump imparts very low shear and little pulsation to viscous and shear-sensitive products. For this reason, SLH pumps are well suited for fluids with high or low viscosity, with lubricating or non-lubricating properties, and fluids containing some solids. Speeds range from 200rpm up to 3,600rpm. With this wide range it is possible to operate SLH not only on normal process sequences, but also cleaning and CIP operations as well, using only one pump.

Contact: Roy Tolan, Consolidated Pumps.
Tel: 01 - 459 3471; email: info©consolidatedpumps.com

PHEX 2006 Ireland

Since the launch of the PHEX domestic plumbing and heating exhibition in 1993, the series has grown in stature and is now comprehensively supported by the industry’s leading manufacturers and trade associations. From the outset the series format was devised to bring a roadshow feel to PHEX, the exhibition moving from venue to venue for the duration of the programme.

This year there are two events in Ireland — one in Belfast at the Kings Hall Conference Centre on 26 April (evening 6pm to 9.30pm) and on 27 April (11am – 3.00 pm); the other in Dublin at the Red Cow Conference Centre on 24 April (evening 6pm to 9.30pm) and on 25 April (11am to 3pm).

To attend simply complete the pre-registration ticket enclosed with this issue and send off (postage paid) for your entry ticket and your free buffet voucher. This will ease your entrance to your chosen venue.

To go with a party then either contact your nearest builder’s merchant to join their coach party – all the main merchant groups are participating — or, alternatively, if you know 12 or more people interested in going contact PHEX direct and they will provide a coach free of charge. All will be pre-registered.

Exhibitors at PHEX will present the latest developments in energy efficiency and design, and will be available to discuss particular needs and requirements.

A free buffet lunch and drink is available to all visitors pre-registering, and for the evening visitors there is a chance to win spot prizes at the PHEX Ireland Roulette evening.

Contact: Claire at Phex.
Tel: 0044 20 8680 4200.
Fresh LG Take on Ventilation

An energy-saving answer to poor indoor air quality has been unveiled by LG through its distributor in Ireland Core Air Conditioning.

The Eco V heat recovery ventilator saves energy in air conditioned buildings, while improving indoor air quality, with a particle collection filter efficiency of 80% that can trap particles smaller than tobacco smoke. In addition, the Eco V reduces commissioning time and allows greater flexibility in ductwork installation.

The Eco V saves energy in two ways — by using the expelled air to heat the incoming air via a high efficiency enthalpy heat exchanger; and by increasing the effectiveness of an air conditioning system by helping to reduce the overall load.

Low sound levels are also key as the Eco V allows air volume and external static pressure to be easily adjusted through its controller and phase motor control technology. The unit is entirely automatic – switching the ventilation mode according to the operating status of the air conditioner. In this way, a constant indoor air temperature is maintained – regardless of the external conditions.

Installing the Eco V couldn’t be simpler. It simply interlocks with any existing LG multi-split air conditioning system. There are four unit sizes to choose from, with nominal capacities ranging from 500 CMH to 2000 CMH.

Contact: Core Air Conditioning. Tel: 01 - 409 8912; email: info@coreac.com

Renewable Energy Continues To Grow

Latest figures from Sustainable Energy Ireland (SEI) show that, when compared with other fuels, renewable energy experienced the highest growth in 2004. The figures are contained in a new report entitled Energy in Ireland 1990-2004, Trends, Issues, Forecasts & Indicators, which is published by SEI’s Energy Policy Statistical Support Unit.

The report says that renewable energy increased its contribution to primary energy consumption in Ireland from 1.8% in 2003 to 2.2% in 2004, with wind accounting for most of the renewable energy growth. In fact, wind has now overtaken hydro in terms of renewable energy contribution to total primary energy requirement, with biomass remaining the largest contributor in 2004.

The total installed capacity of wind farms in Ireland in December 2005 was 495 Megawatt electrical (MWe), an increase of 46% (157 MWe) on 2004. The deployment in 2004 (171 MWe) was greater than the cumulative deployment from 1992 to the end of 2003 (167 MWe). The increasing importance of wind is also highlighted by the fact that installed incapacity of wind at 495 MWe was more than double that of hydro (241 MWe).

Energy Show 2006

Now firmly established as a major national showcase for energy in Ireland, the Energy Show will take place in the RDS Industries Hall, Ballsbridge, Dublin on 10/11 May 2006. It will follow the successful format of previous years — a 2-day trade exhibition coupled with a comprehensive and varied seminar programme.

Already 70% of exhibition space has been booked. Likewise, the seminars over the 2-day event have been confirmed. These will cover all aspects of energy efficiency and renewable energy relevant to Irish business. On renewables the topics will include — liquid biofuels; wind energy; renewable heating; and wood heating.

On the issue of energy efficiency, topics will include — energy efficiency techniques and technologies; energy-efficient buildings; building for the future; and energy management.

Organised by SEI, the event is specifically designed as a forum for suppliers and customers of more sustainable energy technologies and services to meet and conduct business.

Contact: email: energyshow@sei.ie; www.sei.ie
**Astoria Deco From Imperial**

Epoch wall-mounted basin stand, or a new range of timber and marble-top wash-stations. Alternatively, they may be simply wall-mounted.

Astoria Deco is the first in a series of new product launches for 2006 from Imperial that encompasses sanitaryware, cast-iron baths, brassware, tiles, wash-stands and wash-stations, furniture and ancillary fittings.

Covering the spectrum of both traditional and contemporary design styles, all Imperial Bathrooms’ products are manufactured in-house by skilled specialists and are hand-finished to exacting standards that set the benchmark for quality throughout the bathroom industry.

**Air Appoints McEneaney**

Stephen McEneaney has been appointed Technical Sales Executive, Anglo Irish Refrigeration

**Bathroom Trends 2006**

Brendan Whooley, Managing Director of Shires, predicts that: “a sleek and minimalist aesthetic will continue to be the hallmark look for bathrooms in 2006. The biggest design influence in bathrooms at present is a move towards European styling and the hallmarks of this trend are interesting shapes, subtle curves and of course the ubiquitous clean lines”, he continued.

The Catalano range from Shires embodies this trend. According to Brendan, the hottest trend in bathroom design continues to be above-counter sinks. While square basins continue to rise in popularity, unique basins in fresh, organic shapes are also presenting as hot new choices. Such basins create streamlined focal points for modern bathrooms. Shires have a basin to suit every taste in these styles.

Discreet and stylish, the wall-mounted pan will continue as a favourite through 2006. The Shires Remo wall-hung suite is a perfect example of how wall-mounted pans can create more space and give the bathroom an uncluttered look.

“The long rectangular tub is out”, says Brendan. "If you have the space, free-standing and whirlpool baths are a must in 2006. Free-standing, deep bathtubs with rounded, organic shapes are tipped as favourites. Our Adagio or Icon ranges are a case in point".

Turning to showers, models with multiple showerheads and increased water pressure are very popular at the moment. Brendan remarked: “these luxurious showers are the new way to bathe and relax. New technology can now deliver and distribute water for such showers and they are continually growing in popularity. Another big mover is the rainwater shower head. Often fitted into the ceiling, the wide circular head gives the effect of showering in the rain.”
Unistrut Ireland is the new name for Tyco Building Services Products Ireland, which in 1999 was itself a reincarnation of Irish Building Services, a company originally established in 1964. Incredibly, the link with Unistrut goes back to that date as Irish Building Services has been the sole distributor in Ireland for Unistrut since then, along with a vast range of allied products. Indeed, its original core business of supplying quality mechanical and electrical support systems has remained the dominant activity of the organisation throughout.

In 1999, Irish Building Services was bought by Tyco International and became part of the Tyco Building Services Products division. More recently, as part of Tyco's ongoing commitment to provide unparalleled service and quality products to the mechanical, electrical and ventilation installation sector, the company has become the direct sales and distribution outlet in Ireland for Unistrut manufacturing.

Having distributed and been associated with Unistrut products for over 40 years, the company now is Unistrut.

**quality products and service**

Being part of one of the world's leading industrial groups has many advantages, from access to extensive R&D facilities to implementing first-class health and safety, environmental and quality programmes.

Unistrut Ireland's goal is to provide "quality products, quality service and total customer satisfaction". Staff training and development form an essential part of the company's activities, ensuring that staff are "on top of our game" at all times.

**design service**

Unistrut is more than a support system for electrical and mechanical services. It is typically used as a framework for ceilings, floors and walls, or providing the structural elements to form complex walkways, racking, roof trusses, and load-bearing modular ceilings.

Unistrut's in-house engineering department can also assist with the design of installations, help with material take-off, and with selecting the right product for the right application. There is also a specially-designed software package for calculating loads on channels.
support systems

The expanded new range of support systems available from Unistrut Ireland is the result of close cooperation between manufacturer, engineer, distributor and installers. The extensive range of support system products includes:

- Unistrut Channels and Support Brackets;
- Unistrut Pipe Clips and Pipe Supports;
- Unistrut Pipe Slide Guides and Pipe Fix Points;
- Unistrut Cable Tray, Cable Ladder and Basket;
- Unistrut Ventilation Duct Clamp;
- Unistrut Ventilation Duct Supports with Sound Absorbers;
- Kwikstrut Metal Framing System;
- Grinnell Grooved Pipe Products;
- Lindapter Fixing Systems;
- Threaded Rod and Support Fixings.

With well over 10,000 different products in stock from the company’s Dublin warehouse, Unistrut Ireland can offer solutions to every problem you may have to support or fix electrical, mechanical and sprinkler services.

This, coupled with the company’s ability to manufacture custom-made materials at very short notice and its technical advisory support back-up, are the key ingredients that make Unistrut a number one choice.

where next?

Unistrut Ireland has recently concluded a transport partnership agreement with Securi Speed, who will handle the nationwide distribution of customers’ orders. This will give Unistrut greater control and flexibility of shipments and ultimately lead to a better service for its customers.

Towards the end of 2006, Unistrut Ireland will be moving to a brand new purpose-built facility that will double the current office and warehouse space, allowing the company to hold more stock of the existing product range and allow the introduction of new ranges, such as electrical trunking, into the product portfolio.
Following on from the article which appeared in BSNews (November 2005) the EPA — with the assistance of URS Ireland consultants — have prepared draft guidance notes for sectors covered by Regulation EC No 2037/2000 on substances that deplete the ozone layer. Guidance notes have been prepared for the following industrial sectors:

- Air conditioning, refrigeration and heat pump sector – CFCs and HCFC phase out;
- Pest control sector – methyl bromide phase out;
- Fire fighting sector – halon phase out;
- Pharmaceutical sector – ozone-depleting solvents phase out.

The guidance notes are available for download from the EPA website.

www.epa.ie/technical-guidanceandadvice/ODS. The EPA would like to thank Enda Hogan and John Murphy of the Institute of Refrigeration of Ireland (IRI) for their contributions and advice during the preparation of the guidance note.

The aim of the guidance notes is to inform the different industrial sectors of the main obligations and requirements of the ODS Regulation. From information received thus far, it is apparent that the industry as a whole has been proactive with regard to the ODS Regulation.

However, it is important to emphasise through the guidance notes the timelines for the phase out and restrictions on use of certain ODS substances. The guidance notes are in draft form at the moment and we would welcome any comment on them from readers. A user comment form is included in the guidance notes.

It is intended that the guidance notes will be revised and updated when the ODS Regulation is transposed into Irish Law by the Department of Environment, Heritage and Local Government (DOEHLG) later this year.

For further information and advice regarding compliance with the ODS regulation see the following web link — www.epa.ie/technical-guidanceandadvice/ODS or contact David Dodd, Inspector, Environmental Protection Agency, Environmental Planning and Guidance, Johnstown Castle Estate, Co Wexford.

Tel: 053 – 60600;
Fax: 053 – 60699;
email: wasteinfo@epa.ie;
www.epa.ie/technical-guidanceandadvice/ODS

Seminars on ODS Regulation

A series of evening technical seminars will be run in March for the refrigeration/air conditioning sector on the topic of the ODS Regulation. The seminars will be jointly run by the EPA and IRI and will be hosted at locations around the country.

Copies of the guidance notes for the air conditioning, refrigeration and heat pump sector will be available at the technical seminars. Please see the following websites for further information regarding these events.

www.epa.ie/technical-guidanceandadvice/ODS
www.instituteofrefrigerationireland.ie
Precision Cooling for Business-Critical Continuity
COMFORTABLE AND HIGHLY EFFICIENT
Check out the benefits!

At last, a unique control system that provides flexible, energy saving air conditioning that’s perfect for hoteliers everywhere!

The Mitsubishi Electric Programmable Logic Controller® (PLC) connects to our G50 control systems to provide maximum control for hotels everywhere. By simply programming the indoor air conditioning units to work in conjunction with existing key card systems, the PLC achieves the highest level of control.

When the hotel room is

- Occupied with key card inserted. The air conditioning is initially set to ‘Auto’ mode and 21°C*. From this point onwards the guests then have full control.
- Occupied with the key card inserted and a window open. When using the optional window sensor, the air conditioning is automatically switched off to save maximum energy.
- Unoccupied with no key card inserted. The air conditioning is automatically set to ‘Night Set Back’ mode which maintains the room temperature between 16°C* and 26°C*.

Using the PLC with our advanced control systems (G50 or Baby G50), enables all guest rooms to be easily monitored and/or controlled from a central point in the hotel, ensuring utmost comfort and maximum efficiency throughout.

It also:

- Ensures maximum comfort and efficiency by preventing guest rooms being too hot or too cold prior to occupation.
- Saves energy by avoiding guests inadvertently setting the wrong mode (i.e. Heating/Cooling instead of Auto).

for more control than ever call 01-4198800

or visit www.mitsubishelectric.ie

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Email: sales.info@meir.mee.com
www.mitsubishelectric.ie

* No dedicated computer is required.
* Setpoint and temperatures are configurable.
Irish Fan Distributors is introducing a new range of air conditioning units and accessories from the Air Trade Centre (Belgium). This is to complement the existing ventilation product range successfully marketed in Ireland for the past number of years.

Offering a wide range of air conditioning systems, Irish Fan Distributors is now in a position to supply to the commercial market for new buildings and retrofit. This range includes environmentally-friendly refrigerant R407C and R410A with all models, including heat pumps, and maximum capacity of 13kW.

In addition to the mainline products, there is a comprehensive range of Air Trade Centre matching accessories that includes pre-insulated pipe, outdoor condenser brackets, condensate pumps, roof outdoor cassette mounting blocks, anti-vibration mounts and air conditioning tools.

Also available from the Air Trade Centre is a full range of mounting ducts for concealment of refrigerant pipework and maintenance tools.

Products now available from Irish Fan Distributors include wall and floor grilles; ceiling diffusers; swirl grilles; curved grilles for spiral duct; door and transfer grilles, including fire types; filter grilles; air valves; external weather louvres; and fire dampers. A wide range of flexible duct for ventilation through to pneumatic conveyance, and duct tapes, along with insulation and a comprehensive range of air handling units, is also included.

This complements totally the Dynair range of industrial fans and the Maico range of commercial and domestic fans and accessories.

While Irish Fan Distributors have been manufacturing spiral duct for some years now, with the full range of accessories from the Air Trade Centre, they are now the complete one-stop-shop for all heating ventilation, air conditioning and heat recovering requirements.

Contact: Billy Wright, Irish Fan Distributors. Tel: 051 858404; email: bwright@irishfandist.com

In the search for durability and the optimum in price and quality, ATC has changed the specification of its insulated flexible ducts and, in the process, also done away with the problems associated with handling traditional ducting material.

Irritation of the skin (itching hands), lots of dust in the air when mounting it, and the time-consuming job of getting the stiff flexible duct around a steel connection have all been eliminated with the introduction of ATC’s new pink insulation. This has been specially designed for the flexible duct application and is more user-friendly, better performing and less polluting for the environment. Important characteristics of this organic glass wool — which is compressed from 32mm to 25 mm thickness in the production process — are its light weight, flexibility and elasticity. It has an effective density of 15 kg/m³.

Contact: Billy Wright, Irish Fan Distributors. Tel: 051 858404; email: bwright@irishfandist.com
CROSS TECHNICAL SOLUTIONS
SPECIALIST REFRIGERATION ENGINEERING

ENERGY-EFFICIENT HVAC EQUIPMENT -- ALREADY PROVEN IN THE TALLEST BUILDINGS IN THE WORLD -- IS NOW AVAILABLE FOR THE IRISH MARKET

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Innovation • Technology • Environment

With the advent of the Energy Performance of Buildings Directive (EPBD) from the start of this year, the need for greater system efficiencies has created a demand for more innovative building services solutions. Indeed, this new culture, driven no doubt by the new regulatory controls, suggests that a single, efficient, compact solution for heating and air-conditioning is the inevitable future for most buildings. There is of course the need also for that solution to be ecological, easy-to-install, simple-to-use, and service. The good news is that such a solution already exists.

Gas-Fired Heat Pumps — Gas Utilisation Efficiencies up to over 150%

There is a common misconception within the HVAC sector that all heat pumps comprise electrically-driven compressor devices. That is not the case. The Robur absorption chiller and heat pump range from Tempar does not incorporate a compressor. It is based on a single, modular, gas-fired, machine capable of using renewable energy from the environment, with extremely high-efficiency, to heat and cool a building.

The Core Principles — Modular • Flexible • Reliable

The basic chiller and heat pump module consists of a fully-packaged, gas-fired, absorption machine — in air cooled or water cooled type — that will deliver chilled water down to a temperature of 3°C and heating water up to a temperature of 60°C (heat pump heating mode). The chiller module is also available in a version that has an integrated gas-fired heating section that will deliver heating water up to a temperature of 80°C, and also in another version that incorporates a heat recovery system for simultaneous heating and cooling operation. These machines have no refrigerant compressors installed as they operate on the "absorption" principle using a small charge of ammonia/water mix within a stainless steel, fully-welded, refrigeration system. A small gas burner takes the place of the conventional compressor. The only moving parts are a condensor fan in the case of the air-cooled type, and a small solutions pump. Not a lot to go wrong or maintain or that makes noise.
Module Versions
- Gas Fired Air Cooled Chiller (19kW Cooling);
- Gas-Fired Air Cooled Chiller with incorporated gas fired heater (19kW cooling/35kW heating);
- Gas-Fired Air Cooled Chillers with Heat Recovery (19kW cooling/25kW heat recovery);
- Gas-Fired Heat Pumps — Air to Water (non-reversible — 36kW heating);
- Gas-Fired Heat Pumps — Air to Water (reversible — 18kW cooling/35kW heating);
- Gas-Fired Heat Pumps — Water/Ground Water (18kW cooling/38kW heating);
- Gas-Fired Air Cooled Liquid Chiller (25% ethylene glycol down to minus 12°C) (13kW cooling at outlet liquid minus 10°C).

Heating & Cooling — ‘Tailored’ Modules to Meet Clients’ Needs
Being modular, all of the above versions can be "tailored" as required and provided in factory-assembled "packages" to meet specific cooling and heating requirements up to a max of five modules per factory-assembled "package". This is due solely to transport limitations. The modules are provided on a special base with all mechanical and electrical interconnections carried out in the factory. Any number of these factory-assembled "packages" can be linked on site to cater for very large cooling and heating needs.

Robur — Key Advantages
- Uses only natural fluids — ammonia and water — zero environmental risk;
- High energy efficiency — G.U.E.'s of up to 150%;
- High reliability, long working lifespan, constant performance over time and low noise operation;
- Minimal spare parts requirement — There are only two electro-mechanical components;
- Micro-processor control and self-diagnostics system;
- Modularity — "Tailoring" of modules to meet cooling/heating requirements;
- No internal space required for boiler plant;
- No flues required;
- Minimum electrical power requirement — 0.8kW per module.

Environmental Management Certification
Robur’s Environmental Management System is certified to UNI EN ISO 14001:2004. Robur obtained this international certification in recognition of its attention to developing, maintaining and improving an environmental policy and management system in compliance with the principles of Total Quality and the rules of international standards.

Robur is one of the first companies in its field to receive this international certification, and it marks an important achievement for a company which is dedicated to the principles of sustainable development, leading-edge technology and low environmental impact.
The role of precision cooling has always been essential to the protection and successful operational continuity of business-critical applications such as datacentres. As new datacentre technology and architecture developed, so too did the cooling solutions offered, providing modularity and scaleability which matched the linear growth of data processing environments.

However, that gradual growth pattern to the expansion of data processing technology has dramatically changed with the introduction of high-density solutions such as blade servers and grid solutions. This evolutionary leap in datacentre technology has resulted in a gigantic leap forward in data processing speed, provided vastly-improved management and monitoring systems, and requires a smaller footprint.

The result of this development is massive power consumption which, in turn, generates corresponding protection and cooling system requirements which the traditional methods simply cannot satisfy. Inadequate cooling solutions would result in processors and switches operating in dangerously-high temperatures, reducing performance and life-span but, perhaps even more important still, operational failure and costly downtime.

International statistics indicate that one in every 500 datacentres has a server disaster at least once a year. Some analysts suggest that the failure rate is even greater but that datacentre operators don’t reveal this damaging information. Of those acknowledged failures some 40% take a day or longer to get back on stream with 7% taking more than a week. The cost implications runs into billions of euros.

“At Liebert”, says Austin McDermott, Managing Director of Core Air Conditioning who distributes Liebert throughout Ireland, “system designers have responded to this evolving need and developed new, adaptive solutions which also deliver lower costs in such mission-critical applications.

“Called Liebert X-treme, this innovative range of solutions and services meets the requirements of modern datacentres, providing all necessary tools to support their evolution, and especially the enormous pace of this evolution, while also reducing operational costs.”

Liebert X-treme is made up of the Liebert XD and the Liebert XDFN families, providing datacentre managers and system designers with maximum flexibility. Key features of the solutions offered are:
- System-adaptable approach;
- Standard platform for global technologies;
- Scaleability and availability;
- Management of high-density technologies;
- Modular and scaleable platforms;
- Possibility of on-site configuration;
- System control technologies;
- Optimised rack positioning and datacentre configuration.

“In essence”, says Austin McDermott, “Liebert X-treme is a platform of solutions and services that includes technologies for power protection, precision cooling and monitoring to ensure effective business-critical continuity. It constantly aligns and re-aligns performance, availability and total cost of ownership control in datacentres in direct correlation to the expansion needs and business growth of the application concerned”.

Contact: Austin McDermott, Core Air Conditioning.
Tel: 01 - 409 8912; email: info@coreac.com
Our air conditioning solutions are successfully used in domestic applications, offices, shops and shopping malls. We offer the best quality at reasonable prices, units available on stock, with up to 3-year warranty options. Result-oriented solutions are our business! Check out our broad HVAC product range and you will discover that Air Trade Centre has a lot more to offer...!

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The right flexible ducts and accessories for all HVAC solutions

A custom-made solution for any HVAC problem. That is what you are looking for! Good news for installers, maintenance companies and contractors! Inspired by our Single Sourcing corporate strategy, Air Trade Centre offers one-stop-shopping solutions in terms of Heating, Ventilation and Air Conditioning (HVAC).

You are looking for flexible ducts and accessories? Air Trade Centre has a complete product range. Available on stock and with high sound attenuation values. It is the ideal solution when combined with our diffusers, air volume control dampers and fire dampers! Air Trade Centre has the most complete range of HVAC components. We are the only party to supply very many (tens of thousands) products, 80% of which are available on stock.

Result-oriented solutions are our business! Our product selection covers a wide range of HVAC components and enables us to offer a swift and reliable service. Check out our broad product range and you will discover that Air Trade Centre has a lot more to offer...!
Mitsubishi Electric presents its globally patented BMS control system G50 which regulates and controls air-conditioning units and systems. The G50 represents a new type of controller with web function, which allows connection of up to 50 air-conditioning systems through G50 controllers and associated software. In total, a maximum of 2000 air-conditioning units can be interconnected in this way. The G50 is an open system, which also allows for the later introduction of additional control functions, such as for other building components or other units. The units are controlled via the LCD-display of the G50 or via Internet Explorer on a PC. The PC or the G50 can be located in the immediate vicinity of the unit but can also be operated by remote control via the normal phone network. This fact and the Mitsubishi Electric software make it practically impossible for hackers to gain unauthorised access to the system.

If an error occurs an error message is sent via SMS to a mobile phone with the correct error code, allowing engineers to correctly diagnose, and in some cases alleviate, the problem without ever visiting the site. This has the benefit of decreasing costs of site visits and engineer time, and also decreases downtime for the system.

**Drawbacks of Ventilation**

One of the main drawbacks of using mechanical ventilation is that it exhausts and supplies untreated air, and may cause discomfort, and also higher heating bills due to insufficient heating in winter or insufficient cooling in summer.

**Lossnay Ideal Solution**

One of the most ideal solutions is a heat recovery ventilator, such as a Lossnay unit from Mitsubishi Electric, which recovers heating or cooling energy from stale air to heat or cool the incoming fresh air, thereby helping to reduce overall energy costs. Lossnay is a fixed-plate design offering both sensible (heat) and latent (humidity) exchange. Additionally, there are no moving parts in the energy exchange process. There is nothing to wear out and less to maintain, and no cross-contamination.

In the Lossnay energy exchange core, the exhausted stale air and the fresh ventilation air pass through multiple air passages separated by an engineered partition plate. Sensible heat transfers from the warmer to the cooler stream. Also, latent energy (water vapour in the gas state) transfers from the wetter to the drier air stream. The fresh incoming air is automatically preheated or precooled depending on the season. This dramatically reduces the energy costs of ventilation.

In order to maximise the efficiencies of the building design and minimise the running costs thereafter, we should be employing the benefits of Lossnay systems. Otherwise we will see the real cost of not having good indoor air quality.

**Lossnay – The Ideal Solution for Home Applications**

Modern homes by their nature are designed to be heavily insulated, airtight structures with little or no natural ventilation. As a result the Indoor Air Quality (IAQ) can suffer dramatically due to the absence of ventilation. This unnatural environment leads to headaches, dry throats and/or general discomfort. Fresh air is therefore essential to a home’s overall comfort level.

**The new Mitsubishi Electric G50 Controller**

Lack of ventilation can lead to lower levels of concentration and lower achievement; it can help increase the spread of colds and viruses and does nothing to improve general well-being.

All Mitsubishi Electric Lossnay filters are rated to BS3 and BS57 standard.

Contact: Air Conditioning Sales, Mitsubishi Electric Ireland.
Tel: 01-4198800;
email: sales.info@meir.mee.com

https://arrow.dit.ie/bsn/vol45/iss2/1

![0°C fresh cold outside air](image1)

Stale air expelled outside 4.6°C

Stale room air extracted 20°C

The Lossnay heat recovery unit from Mitsubishi Electric is a fixed-plate design offering both sensible (heat) and latent (humidity) exchange.
Energy saving air handling units

100% Fresh Air & Exhaust with up to 70% Heating or Cooling Recovery

Sophisticated Fitted Controls Package for Maximum Energy Saving

Ecovent Plus is a comprehensive range of ventilation and heat recovery units providing fresh air via a plate heat exchanger, which extracts the heat from the exhaust air.

- Units available flat or stacked, in plantroom or weatherproof construction;
- Ecovent Plus units have no cross contamination of moisture, smells or fumes;
- All electrical items are prewired to an external terminal box on Ecovent Plus sizes 1-4, and optional on belt driven units sizes 5-8;
- Filters to inlet and exhaust intakes;
- All Ecovent Plus units are tested to BS 848 Part 1 and the specific fan power recorded at each duty point.
- Step controlled electric heater or hot water heater.

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Sanyo To Unveil 53 New Products Across Seven Ranges

“It is safe to say that 2006 will be a hugely exciting year for Sanyo Air Conditioners”, so said Bob Cowlard, Vice-President, Sanyo Air Conditioners Europe, when he spoke to BSNews recently.

“Aiming to capitalise on our continued successes”, he went on, “I am delighted to reveal that this year we will introduce no less than 53 products across seven ranges. The fact that we are building a new production facility just outside Budapest is also a signal of our intentions and ambitions for the air conditioning sector in Europe.

“We will be revealing full details of the new products as they come on stream, but I can tell you now that our SAP and SPW ranges will be extended and expanded to an extent where they will match, or exceed, any of our competitors’ market offerings and hopefully our customers’ expectations.

“There will also be two exciting high-end and top specification models added to the Sanyo SAP range, one of which will feature interior design possibilities as yet unseen in the air conditioning industry. More on that in the coming weeks! However, I can divulge that the SAP range additions will be fully RoHS compliant, as well as offering market-leading efficiency levels at ‘Energy A’ standard and above!

“Energy is going to be at the forefront of everyone’s minds with the Energy in Buildings Performance Directive coming into force. Sanyo is truly ahead of the game in this area, and 2006 will see the launch of the next generation of our leader ECOi range. As well as exciting new technological updates, the next generation will feature all new units and models, and a multi-functional remote controller, offering several unique facilities, which will help end-users improve their energy efficiency.

“Internet-based air conditioning control will also become a reality for Sanyo customers this year, with the launch of our latest ‘Intelligent Controller’, providing the ultimate in convenience and control.

“Another area in which we anticipate considerable activity is that of gas-powered technology. Our revolutionary GHP range will see further expansion in 2006. New models coming on stream will extend market leading COP levels and thermal performance ratings which will see this unique range go from strength to strength after the excellent 2005 sales results which saw Sanyo with in excess of 65% of the European market.

“All in all, Sanyo Air Conditioners is in a great position to offer the market the complete, all-round air conditioning solution, a brief synopsis of the portfolio being as follows”.

— ECOi R410A electric VRF in both 2 and 3-pipe versions;
— Next generation 2-pipe heat pump ECOi with COP’s of 4.1;
— ECO G GAS VRF systems;
— New expanded range of 2-pipe ECO G R410A gas heat pump VRF;
— New range of 3-pipe ECO G R410A gas heat pump VRF;
— SPW range of advanced, energy-efficient, commercial air conditioners;
— New range of SPW DC inverter commercial split systems: 2 - 10HP;
— SAP extensive range of single and multi-split systems;
— New range of SAP DC inverter small split systems: 2.2 - 6.2kW;
— New range of SAP online split systems 2.2 - 7kW.

Contact: Barry Hennessy or Sinead Duffy, Sanyo Air Conditioners.
Tel: 01 - 403 9900; email: barryhennessy@sanyoaircon.com; sineadduffy@sanyoaircon.com
30th Anniversary

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THE NATURAL CHOICE

HAVING PERFECTED OUR APPROACH TO THE REFRIGERATION SECTOR OVER THE LAST 30 YEARS, WE NOW FEEL THAT THE AIR CONDITIONING INDUSTRY AS A WHOLE COULD BENEFIT FROM OUR EXPERTISE. WITH THE RESOURCES AVAILABLE TO US FROM DESIGN TO COMMISSIONING WE CAN OFFER A FULL AND COMPLETE AIR CONDITIONING PACKAGE TO THE CUSTOMER.

OPERATING AN AIR CONDITIONING SYSTEM WITHOUT A DEGREE OF REGULAR MONITORING CAN COST MONEY. YOU CAN LOOK FORWARD TO ENHANCED LEVELS OF ENERGY-EFFICIENCY WITH THE SPECIFICATION OF MITSUBISHI CONTROLS EQUIPMENT, IMPLEMENTED BY OUR IN-HOUSE TECHNICIANS.

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IN ORDER FOR US TO FULFIL OUR COMMITMENT TO DELIVERING A QUALITY PACKAGE WE HAVE A DEDICATED DESIGN TEAM AT YOUR DISPOSAL.
Only Mitsubishi Electric lets you control up to 2000 air conditioning units from the comfort of your computer.

Introducing the amazing new G50 centralised controller with TG 2000 software, the world’s first internet technology based control system specifically designed for air conditioning specialists.

Using Internet Explorer as its local or remote browsing software, the G50 enables you to monitor and operate all your control functions, at the push of a button.

You can even programme it to notify you by email or text message to your mobile phone in the event of any malfunction.

What’s more, it’s simplicity itself to use. And it’s "future proofed" to make software upgrades even easier.

With the ability to control up to 2000 air conditioning units over the internet, the new G50 can only be from Mitsubishi Electric.
There are three distinct operations within Marren Engineering — Marren Contracting, Marren Sales and Marren Maintenance. Engineering excellence is endemic to all, the result being utter professionalism. However, that does not preclude flexibility. No matter what the circumstances a solution can be devised. Moreover, it is done in a cost-effective, energy-efficient and environmentally-friendly manner. Brief details of the scope and range of the portfolio are as follows:

Unitary Products (Fan Coil Units) — McQuay’s unitary range is all-embracing and designed for hotels, healthcare facilities, apartments, retail centres and offices. Advanced design and innovative technology provide a host of installer and end-user benefits such as excellent energy performance, low noise and easy installation.

Split Water Sourced Pump (2kW to 16kW) — McQuay’s split water sourced pump systems provide simultaneous heating and cooling with water loop temperatures kept between 10°C and 35°C.

Available in concealed, ducted, cassette and wall-mounted units, they are ideal for hotel and office applications as the motor and condensor can be positioned away from the indoor unit, thereby reducing noise levels to NR20.

The wide choice of McQuay products available from Marren Engineering

**Water Sourced Heat Pumps (2kW to 78kW)** — McQuay’s water sourced heat pumps are highly-engineered and incorporate cutting-edge technology, the Effinity package units range from 2kW to 78kW, operate on R410, and are available for both horizontal and vertical application. Lower power consumption than conventional air conditioning systems makes for lower operational and maintenance costs while the compact design and low height profile allow maximum use of space.

**McQuay Chillers (BkW to 10mW)** — Advanced designs, cutting-edge technology and innovative features are the hallmarks of the McQuay chiller portfolio. Incorporating both air and water cooled ranges, most of the models feature McQuay’s renowned single-screw compressor technology and, in conjunction with R134a refrigerant, make for the most efficient and quiet chiller selections available on the market today.

**Absorption Chillers (300kW to 5500kW)** — Absorption chillers are the perfect answer to today’s urgency in respect of energy and environmental conservation. They are extremely efficient, using waste or on-site heat to generate chilled water.

**McQuay Screw Chillers (300kW to 2000kW)** — McQuay air-cooled screw chillers help increase comfort and reduce operating costs in hospitals, offices and other buildings.

Aerodynamic fan blades, low rpm motors and the unique single screw compressor design make for reduced noise levels.

Stepless control means smooth, efficient performance when moving from 100% to 10%.

**McQuay Scroll Chillers (8kW to 145kW)** — McQuay air-cooled scroll compressor chillers deliver high energy efficiency for reduced operating costs, and low noise emissions.

Advanced compressor technology provides quiet, efficient operation while innovative controls provide easy integration with most building automation systems.

**McQuay Centrifugal Chillers (350kW to 10MW)** — McQuay centrifugal chillers provide chilled water for both air conditioning and process cooling applications for either new construction or renovation projects. The single compressor centrifugal chiller offers superior part load efficiency with a variable frequency drive. With the smallest footprint in the industry they optimise equipment room space and lower installation costs.

**Contact:** Tom Marren, Marren Engineering. Tel: 01 - 833 4144; email: info@marrenengineering.ie
VRF Commissioning Hints & Tips From LG

As VRF and mini-VRF air condition systems continue to dominate the comfort cooling sector, the need for accurate and professional commissioning of these systems has never been greater. Here Tony Gittings of LG – which is distributed in Ireland by Core Air Conditioning – gives some useful advice on how to get the best out of VRF systems.

As every competent ac installer and engineer knows, getting it right at the commissioning stage is absolutely vital if VRF systems are to perform at their optimum levels. Poor commissioning results in costly call backs, client dissatisfaction and ultimately a loss of repeat business. Taking extra time and care at this crucial stage will have a positive effect on future business and will help to maintain standards of good practice throughout the industry.

There are six main parts to the commissioning process and each is vital in its own right.

1. Refrigerant Testing

As R410a, which has higher operating pressures than other refrigerants, makes careful pressure testing very important. Therefore, a strength test and also a 24-hour pressure drop leak test should be carried out using oxygen-free nitrogen to ensure the integrity of the installed refrigeration pipework. Care should be taken to ensure no OFN is allowed to enter the outdoor unit and contaminate the outdoor unit refrigerant charge, as OFN contamination will result in excessive high pressure and the complete replacement of refrigerant charge will become necessary.

2. Evacuation

For best results the triple evacuation method can be used to evacuate the installed refrigeration pipework. A suitable vacuum meter should be used to ensure that the correct vacuum has been achieved. A final vacuum pressure rise test is useful to ensure that there are no moisture or pipe leaks present. It will not be possible to accurately ensure that all moisture has been removed from the system unless an accurate vacuum meter is used. This is critical for the long-term reliability of the system as moisture contamination will cause oil acid contamination and this will result in premature compressor failure.

3. Refrigerant Trim Charge

Careful measurement of the installed refrigeration pipe needs to be carried out and refrigeration trim charge calculated following the manufacturer’s recommendations. VRF systems are charge critical and therefore the correct trim charge calculation is essential for correct operation of the system. Ideally, the trim charge should be added to the installed refrigeration pipework before the final opening of the outdoor unit service valves and test operation of the system.

4. Power Supply

For inverter control systems the correct connection of the power supply is very important to prevent damage to the inverter. Before making the final connection of the power supply to the outdoor unit a careful check of the installed power supply is a worthwhile precaution to ensure correct voltage at the live connection and also that the neutral is correctly connected.

5. A Valuable Investment

All power supply to the outdoor unit and refrigeration trim is turned on. Remember, a record of the system operation and set up is absolutely vital if there are no moisture or terminal, or the neutral is poorly connected, then live voltage will be present on the neutral and this can cause serious, and costly, damage to the inverter.

6. Control Wiring and Address Setting

A final check of the interconnecting control wiring and also of the remote control wiring is important to ensure correct connection before test operation. When address settings are needed to be made, this should be carried out before the power supply is turned on. Remember, do so carefully and according the manufacturer’s instructions.

Test Run

It is essential to test all indoor units in both heating and cooling modes before a system is handed over. Take careful ‘air on coil’ and ‘air off coil’ measurements to ensure correct operation of each indoor unit in turn. Carry out a full load test in cooling and heating to ensure correct operation of the complete system, giving careful consideration to running current and suction/discharge pressures to the outdoor unit.

Commissioning Report

Take some time to prepare and complete as much detail about the system as possible on the commissioning sheets. This need not be time-consuming if a record of relevant data has been recorded during the commissioning process. It will prove to be a valuable record of the system operation and set up details for future use.

Contact: Austin McDermott, Core Air Conditioning.
Tel: 01 - 409 8912; email: info@coreac.com
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A Breath of Fresh Air

Thermo Air Ireland Ltd is a subsidiary of the Dutch-based Thermo Air International, the renowned innovative specialist in the design and production of air heating, air handling and environmental technology equipment. The parent company was established in 1947 and now has strategic representation in approximately 20 European countries throughout Europe.

Thermo Air Ireland was set up in 1980, originally with something like 80% of production going to the parent company and 20% directly into the Irish market. Over the years that has gradually changed and is now at the point where the home market accounts for 50% plus of the Irish company’s output.

Operating out of purpose-designed premises in Carlow, Thermo Air’s objective is to produce an extensive portfolio of products that contribute to the improvement of the internal living environment. Typical characteristics of the current portfolio are innovation, quality, energy-efficiency, and standard/regulation compliance.

To that end the Carlow complex includes a research and development laboratory; state-of-the-art production facilities; ISO-certified quality control procedures; advanced testing mechanisms; and a team of highly-qualified design and production personnel who are totally committed to the ideal of delivering product excellence across the entire range.

Meeting delivery schedules is becoming more and more critical with today’s fast-track construction methods calling for greater flexibility and an ability to respond to last-minute changes. Thermo Air is perfectly geared to provide total customer satisfaction because of the large stock of essential components held and the ease with which production runs can be adapted.

Technical Engineering Support

While extremely innovative, high-performing and cost-effective, Thermo Air is not about products alone. Equally important is ensuring the correct specification and installation of those products. Hence the emphasis on providing technical engineering support on all projects especially at the early design stage.
Air Heating
Air curtains
Reheat coils
Heat exchangers
Electrical heating
Heat recovery units
Heat circulation units
Direct-fired air heaters
Indirect-fired air heaters
Domestic heating and ventilation
Heating and cooling systems for suspended ceilings
Unit heaters — both gas and low-pressure hot water

Fans
Direct-driven centrifugal fans
High-performance fans
V-belt driven centrifugal fans
Direct-driven axial fans
Electric motors

Ventilation
Roof intake units
Intake hoods
Roof exhaust units
Fan boxes

Air Treatment
Compact air treatment units
Modular air treatment units
Air mixing units
VES manufactures a wide range of ventilation products for public, commercial and industrial buildings. These include air handling units, duct mounting fans, roof extract units, twin fan units, control panels, high temperature fans, silencers and condensing units.

In all there are 24 product lines with a substantial research and development programme resulting in new products constantly coming on stream from Redbro Ltd, the company’s distributors for Ireland.

One of the latest is the Ecovent Plus range of ventilation and heat recovery units which provide fresh air via a plate heat exchanger which extracts heat from the exhaust air. These units have no cross-contamination of moisture, smells or fumes; have a recuperator with an efficiency of 70%; are maintenance free; and come with all electrical items pre-wired to an external terminal box on Ecovent Plus sizes 1 - 4 and optional on belt-driven unit sizes 5 - 8.

Other features and benefits include:
- Fitted control system;
- Twin extract fans with auto-changeover system;
- Heavyweight panel infill to further reduce noise breakout;
- Fitted cooling or heat pump coils;
- Increased corrosion protection for coastal, swimming pool or food processing applications;
- Special BS or RAL colour options;
- Drain pan to recuperator exhaust can be specified in high-humidity applications;
- Optional larger units.

All Ecovent Plus units are tested to BS 848 Part 1 and the specific fan power recorded at each duty point.

In addition, the fitted controls package has been designed to maximise energy saving and heat recovery under all conditions. This new generation of microprocessor controls has been developed by VES to optimise the heating/cooling recovery of the Ecovent Plus range.

A remote wall-mounted controller is supplied for temperature adjustment, time clock programming, and required set-point temperature display. It has a 4-wire, low-voltage, screened cable connection to the panel and is designed to fit on to a single-gang wall box or to be surface mounted.

The air temperature is monitored using sensors which constantly check the fresh air intake supply, supply air duct and extract or room temperature. From this the face and bypass damper on the plate heat exchanger is automatically adjusted for heat recovery, free cooling or cooling recovery.

Should a DX heat pump coil be fitted, an additional sensor will be located after the plate heat exchanger to ensure an air temperature of at least 12°C on to the heat pump coil is provided in heating mode. In this situation a hot water or electric heater must be fitted between the plate heat exchanger and the DX coil. These control panels can be fitted and pre-wired or supplied for remote location. BMS volt free contacts for any number of signals can be provided.

Further details on the Ecovent Plus, along with the entire VES range, are available directly from Redbro Ltd.

Contact: Paul Brophy, Redbro. Tel: 01 - 408 1255; email: pbrophy@redbro.ie; www.redbro.ie
Harmon Air Conditioning is a leading supplier of air conditioning solutions with a portfolio of prime brands selected to ensure comprehensive coverage of all applications. These include Mitsubishi Electric and Climasystem.

Mitsubishi Electric is a recognised market-leader in quite a number of air conditioning sectors, City Multi — its answer to large scale VRF applications — being a typical case in point. The efficiency of City Multi, and in particular the R410A YGM-A Series models, is second to none and offers a substantial increase in energy efficiency with corresponding EER/COP ratings.

City Multi offers a simple and flexible solution where there is a demand for a changeover capability between heating and cooling, helping to ensure a constant, comfortable indoor climate. With a wide range of 60 indoor units, up to 32 (depending on the capacity available) can be connected to a single City Multi Y Series outdoor unit.

Models in this range include 12hp and 14hp options, as well as Mitsubishi Electric’s “Replace Multi” system which enables the replacement of existing VRF systems while utilising existing pipework.

Mitsubishi Electric also has the ability to provide simultaneous heating and cooling through its R2 and WR2 systems.

Climasystem is based in Milan, Italy and has been manufacturing precision air conditioning for over 20 years. It has a particularly strong reputation in providing solutions for computer rooms, printing rooms, digital telephone exchanges, laboratories (especially where sophisticated electronic equipment is in use) and other similar temperature and humidity-sensitive environments.

The strength of its reputation in this area has now led to broader application fields, particularly in the commercial office sector where the demand for better indoor air quality and comfort levels requires precision control.

Climasystem’s “next generation” range includes ac units with internal compressor and water-cooled condenser; units with internal compressor and separate air-cooled condenser; chilled water air-cooled units; split ac units with external air-cooled or water-cooled condensing; “Dual Cool” ac units with two cooling modes — direct expansion and chilled water, air-cooled, or direct expansion and chilled water, water-cooled version; Ac unit with internal compressor and remote glycol-water cooler.

Other models in the new generation Climasystem range include heat pumps and “Cool Recovery”, an air conditioning unit with free-cooling mode.

Taken together, the Harmon portfolio represents a formidable armoury of potential air conditioning solutions which, when combined with the design and engineering skill of Harmon personnel, mean that virtually any conceivable application can be catered for.

Contact: John Harmon, Harmon Air Conditioning Services.
Tel: 01 - 456 4233; email: harmon@iol.ie

Climasystem’s “next generation” range includes ac units with internal compressor and water-cooled condenser; units with internal compressor and separate air-cooled condenser; chilled water air-cooled units; split ac units with external air-cooled or water-cooled condensing; “Dual Cool” ac units with two cooling modes — direct expansion and chilled water, air-cooled, or direct expansion and chilled water, water-cooled version; Ac unit with internal compressor and remote glycol-water cooler.
Tempar Ltd is a private company established in 1982 as a building services maintenance company. It expanded its activities over the years and now includes the supply and installation of heating, ventilation and air conditioning products.

The main activities of Tempar are:
- Site survey and HVAC system design;
- HVAC equipment sales and installation;
- HVAC equipment commissioning;
- Planned maintenance of HVAC equipment;
- Emergency servicing of HVAC equipment.

Tempar Ltd is a member of the Construction Industry Federation and is also accredited to NSAI Standard IS EN ISO 9002. It currently employs 30 people of which 21 are involved in equipment installation, commissioning, maintenance and servicing.

Tempar’s marketing slogan — “The Complete Package” — perfectly represents its all-round ability and commitment to provide for, and to satisfy, the ongoing needs of its clients.

Efficient administration and prompt client response is at the heart of the equipment maintenance and service operation.

Tempar maintenance and service personnel have the skills and experience to cater for an extensive range of building mechanical services equipment which includes:
- Air conditioning water chillers;
- Air handling units;
- Boilers (gas and oil fired);
- A/C terminal units (fan coils, VAV, induction, etc);
- Split-type and packaged A/C systems;
- Variable refrigerant volume A/C systems;
- Computer room close control A/C Systems.

Ancillary equipment such as pumps, compressed air units, fire fighting equipment, plumbing equipment, catering equipment, building management systems and electrical and electronic panels and controls are also covered.

Tempar maintenance and service personnel are constantly updated on new technology through a series of refresher courses and ongoing information and training sessions with product manufacturers. They ensure that equipment is used correctly, to the specified criteria, and that it is maintained in a manner that promotes optimum equipment efficiency and reliability, thereby maximising its working lifespan.

Tempar organises clients’ reporting systems to suit the specific needs of each client, bearing in mind safety, security and paperwork requirements, in addition to optimising performance outputs and energy usage. Tailored contract procedures and documentation have been devised to achieve that objective. Problems are therefore speedily identified and quickly resolved.

On the product supply side, Tempar is the Irish distributor for the following:
- Condensers and condensing units; Close control air conditioners;
- Robur — A range of gas-fired absorption-type (ammonia/water) modular chillers for a/c & refrigeration purposes;
- Sabiana — Fan coil units (all configurations) and air handling units.

Tempar is also one of the main dealers in Ireland for Mitsubishi Electric. Range offered includes split-type ac systems; VRF City Multi Systems; Rooftop ac packages; Lossnay heat exchange ventilators.

“Our business is first and foremost about people”, says Managing Director Damien Parlour, “about effective communication ... about establishing relationships ... and, ultimately — through professionalism, competence and reliability — about consolidating trading partnerships”.

Contact: Damien Parlour, Tempar.
Tel: 01 - 460 4066;
email: tempar@eircom.net
The comfort of incredible flexibility

Multi F, with its single phase power supply and inverter technology, is ideal in applications of up to 9.0kW, whereas Multi FDX, a mini-VRF system, can be used in applications up to 16.0kW, thanks to its use of distributor boxes that allows several indoor units to be run from a single outdoor.

**MULTI F/FDX**

- Works with: Art Cool, Wall Mounted, Cassette, High & Low Static Ducted, Convertible
- Ranging from 4.0kW to 16.0kW
- Both systems allow maximum pipe runs of up to 25 metres for every indoor unit. Multi FDX allows extra pipe length with the use of distributor boxes
- Up to 8 indoor units to 1 outdoor
- Refrigerant: R410A
- Energy rating: Class “A” (Depending on system configuration)

As easy and flexible in their installation as they are in their operation, Multi F and Multi FDX typify the thinking that we’re putting into the Comfort Zone: to provide equipment and services that allow everybody – contractor, specifier, property manager and end user – to feel the benefit.

Whoever you are, welcome to the Comfort Zone...

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**Dean & Wood Ireland Ltd**
Tel: 01 - 451 4100
Email: dwi@dean-wood.com

**Core Air Conditioning Ltd**
Tel: 01 - 409 8912
Email: info@coreac.com

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**Pressline Ltd**
Carraig Court, George’s Avenue
Blackrock, Co Dublin
Tel: 01 - 288 5001  Fax: 01 - 268 6966

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**Contact:** pat@pressline.ie
**Visit:** www.pressline.ie
Mark BV is widely known and respected throughout Europe as a leading player in air movement technology (heating, ventilation and air conditioning). Its principal base is in Holland (60 years old in August 2005) but it has a wholly-owned subsidiary, Mark Eire BV, which has operated out of Coolea, Macroom, Co Cork since 1986.

New products and new applications are the lifeblood of any business. In Mark Eire’s case this philosophy is taken to extremes with fully-qualified graduates continuously working on ground-breaking projects which are gradually brought to the marketplace. Particular emphasis is placed on life-cycle costs and eco-friendly features.

Mark also invests major sums in plant and equipment. The latest €2 million development programme resulted in all production, office and warehouse facilities being combined within the one, covered 65,000 sq ft complex. This makes for far greater quality control, more streamlined production efficiencies, and dedicated delivery schedules.

Flexibility and an ability to customise the end product required is another critical feature of the service provided. This strength is further reinforced by the fact that longevity of service is common within the company. Staff tend to remain with Mark Eire, thereby creating a wealth of experience, expertise and technical know-how that is invaluable.

Over the last 20 years Mark Eire has carved out a sizeable share of the air movement sector in Ireland, capitalising on its ability to bring innovative, cost-effective, solutions to an ever-changing market environment. For most of that time Michael Keane has been Mark’s Area Technical Sales Manager, working closely with consulting engineers and mechanical contractors. By listening to their suggestions and identifying their needs and concerns, Michael can then guide Mark’s production and R+D engineers and indicate key areas of focus. In recent years this has also meant a greater emphasis on sustainable technologies.

Its innovative Infra Aqua warm water radiant panels are a typical case in point. These are high-output, low weight, aluminium panels which are delivered in 6m lengths. There are eight standard models with a maximum width of 1200mm. Special versions such as illumination and ventilation can also be provided, along with a galvanised version for the headers for wet room applications.

Being completely flat they are also the ideal complement to interior aesthetics. Standard finish is polyester colour RAL 9010 but other colours are available on request.

Another example of Mark Eire’s sustainability drive is the Ecofan destratification unit. With a claimed 25% saving on fuel heating costs over comparable, conventional systems, Ecofan is perfectly suited to applications in factories, workshops, garages, warehouses, showrooms, hotels, retail outlets, gymnasiums, exhibition halls and churches.

Contact: Michael Keane, Mark Eire BV. Tel: 026 - 45334; Mobile: 086 - 252 8325; email: sales@markeire.com
Dunham-Bush is a worldwide manufacturing company in the air conditioning, refrigeration, heating and ventilation industry. Besides factories in the USA, Europe, PR China and Malaysia, the Dunham-Bush Group has regional offices in Singapore, various cities in PR China, Dubai (UAE), Amersfoort (The Netherlands), USA and UK. In Ireland Dunham-Bush is represented by Cross Technical Solutions (CTS).

The Dunham-Bush portfolio is acclaimed worldwide for its quality, innovation, performance outputs and energy efficiencies. Throughout the world it is installed primarily in large-scale, multi-billion euro, developments where virtually the entire building services requirement is provided by the one single system.

Using the experience gained on such systems, and retaining the core strengths and innovative qualities they entail, Dunham-Bush has now designed a specially-developed range for the European market. These packaged air-cooled, scroll and screw chillers, with shell and tube evaporators, are available in two versions — Series ACS-ESP (nominal cooling capacity from 40kW - 286kW) and Series AFHX-ESR (nominal cooling capacity from 300kW to 1.9 Megawatts).

Key technical specifications are:
- Multiple scroll/screw compressors;
- Patented shell and tube evaporator (flooded evaporator for AFHX);
- High system COPs;
- Low maintenance cost;
- Low noise;
- Optional hydraulic pack;
- Integrated oil management system (no oil pump);
- Large air cooled condenser coils with large heat-exchange surface;
- Strong structural design;
- Long life-cycle.

These new units extend still further the scope and applications capability of the existing Dunham-Bush portfolio which includes advanced compressors, ultra-quiet packaged chillers, wall-mounted and ceiling-exposed split air conditioners, new-age air handling equipment, ice thermal storage, and architecturally-oriented cooling equipment.

Every single unit is manufactured by Dunham-Bush in Malaysia and comprehensively tested prior to shipping using the only Air Conditioning and Refrigeration Institute (ARI)-accredited test facility outside of the US. This ensures relatively quick start-up and commissioning by CTS engineering technicians. Long term support for installed equipment is also assured since most of the major components are designed and manufactured in-house by Dunham-Bush or one of its subsidiaries.

Dunham-Bush and CTS make for a unique partnership. Combining tradition, experience, technical expertise and innovation, they work together to devise dynamic, pro-active, custom-engineered, air conditioning and refrigeration solutions.

Apart from the quality of the products themselves, CTS also provides comprehensive design and installation support, including project management, to ensure that each engineered solution is installed as per specification, on time, and within budget.

Contact: David Killalea, Kevin Myler, CTS.
Tel: 01 - 405 6777;
email: sales@crosstechnicalsolutions.ie
Mitsubishi Heavy Industries continues to make advances in technology and efficiency, with the extension of the KX4 inverter VRF systems. Both 2-pipe and 3-pipe systems are now available, with cooling capacities up to 136kW.

MHI KX4 VRF systems offer many advantages over standard systems. This latest development technology provides the requirements of high-efficiency, high-performance cooling and heating, together with many of the items requested by designers, installers, and commissioning engineers, to facilitate easy application, operation and control of these advanced systems.

For example, all standard remote controllers now have 7-day/24-hour programmable on/of timer, with different temperature settings for each operational period. It is also possible to access operational data from the remote controller, making life easier for the service engineer or site manager.

Compressors are all inverter type, meaning no high start currents from fixed-speed compressors. The footprint size has been kept compact, reducing installation space and minimising costs where steel decking is required. The largest single outdoor unit is now 68kW, having a footprint of only 720mm x 1350mm, and connectivity to 40 indoor units.

The larger outdoor units have also been totally re-designed, with the compressor compartment separated from the air-side. This reduces noise break out and simplifies service and maintenance operations.

Reliability is also considerably improved when there is one, or two, inverter compressors running in tandem. This helps to contain the oil within the compressor, significantly improving long-term reliability.

The high efficiency is derived from the new design of compressors, heat exchangers and refrigerant monitoring devices. The “fuzzy logic” technology constantly monitors and controls the refrigerant temperatures and pressures throughout the system, and ensures the correct amount of refrigerant is available at each indoor unit to meet the cooling or heating requirements of the internal areas.

On the KXR4 3-pipe systems, energy is recovered from the warm areas of a building, and utilised to provide heating for the cool areas, thus reducing running costs.

The controls packages have now been extended to include PC Windows-based control and monitoring, a new touch-screen control, and Gateways for LON and BACnet connection.

The MHI FDCA140 Compact VRF outdoor unit is ideal for small applications - 14kW cooling/16kW heating. Up to eight indoor units can be connected. The outdoor unit is pre-charged for up to 100m of pipe length, which reduces installation time and costs.

Looking to the immediate future, MHI will unveil a continuous stream of advanced inverter units over the coming months. MHI was the first manufacturer to launch its range of commercial specification products (cassettes, ducted, wall and ceiling systems) in 2004 and they have proved extremely popular. The smaller systems were launched as inverters, and now the larger sizes will be available as high-performance inverters, starting in May 2006.

Split systems up to 15kW will be launched, plus large capacity inverter outdoor units of 20kW & 25kW - these are applied to twin/triple/quad multi-systems, and to new large-capacity, high-static, horizontal ducted units.

3D Air Sales Ireland Ltd is the distributor in the Republic of Ireland for the new 4th generation of Mitsubishi VRF systems. In addition to product, it provides applications advice, design assistance, equipment selection, pipework and control schematics, and technical support.

Contact: Michael Clancy or Darren Lowndes, Tel: 01 - 462 7570; email: micclan1@eircom.net; www:3dair.co.uk
The Christmas RACGS outing held in Rosslare Golf Club was one of the best of the year with the large attendance turning in some unusual scores playing off the forward tees.

Overall winner was Billy Queally with a score of 50 points, playing off 15. He capped his day with a hole-in-one on a short PAR 4!

The top five scorers all exceeded 40 points on the day with outgoing Captain Liam Hoctor clinching Golfer of the Year.

Main sponsor for the day was Streamline Enterprises, who were represented by Pat Lowry.

The Society's AGM took place immediately afterwards in the clubhouse and the following venues were subsequently agreed upon for the 2006 outings:—
- Carlow (April);
- Fota Island (May);
- Heritage (August);
- Hermitage (October);
- Rosslare (December).

Officers and Committee members elected for 2006 were:—
- President — Frank O'Sullivan;
- Captain — Domnick Ward;
- Treasurer — Brian Carty;
- Secretary — Mark Keily;
- Handicaps — Roland Bradley/Liam Hoctor;
- Competitions — Dave Kilalea/Michael Clancy.

New members are welcome and can email domnick@crystalair.ie for application forms.
**The Future of Sustainable Design in Building Services**

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<tr>
<td>8.15am</td>
<td>Registration &amp; Coffee</td>
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<tr>
<td>8.45am</td>
<td>Opening Address &amp; Welcome</td>
<td>Terry Wyatt, Past President, CIBSE</td>
<td>Kevin Kelly, Chairman, CIBSE Republic of Ireland Branch</td>
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<td>9am</td>
<td>The Name for Sustainable Design in Building Services</td>
<td>Mike Murphy, Dean of President, DIT</td>
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<td>9.25am</td>
<td>Renewable Energy Systems</td>
<td>Brian Norton, President, DIT</td>
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<td>9.50am</td>
<td>Green Buildings, Productivity &amp; Work: Some Myths &amp; Realities.</td>
<td>Adrian Leaman</td>
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<td>11am</td>
<td>Sustainable Building &amp; Fabric Design — Criteria &amp; Options, Facts &amp; Figures</td>
<td>Ken Beattie, DIT</td>
<td>Michael Mc Nerney, Past Chairman, CIBSE Republic of Ireland Branch</td>
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<td>11.25am</td>
<td>Sustainable Building &amp; Fabric Design — The Glucksmann Gallery, Cork</td>
<td>Paul Burgess, UCD</td>
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<td>11.50am</td>
<td>Building Log Books</td>
<td>Phil Jones</td>
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<td>12.30am</td>
<td>Lunch</td>
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## CIBSE Symposium

**The Future of Sustainable Design in Building Services**

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<tr>
<td>2pm</td>
<td>Trends in Sustainable Lighting Design</td>
<td>Tommy Govén</td>
<td>Kevin O’Rourke, Sustainable Energy Ireland</td>
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<td>2.25pm</td>
<td>Combined Heat &amp; Power</td>
<td>Aidan McDonnell</td>
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<td>Open Discussion</td>
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<td>3pm</td>
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<td>3.15pm</td>
<td>Integrated Sustainable Design</td>
<td>Jay Stuart</td>
<td>Greg Traynor, Past Chairman, CIBSE Republic of</td>
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<td>Ireland Branch</td>
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<td>3.50am</td>
<td>Renewable Energy Systems in Large Buildings — Tools for the Design</td>
<td>Xavier Dubuisson,</td>
<td>Brian Geraghty, Vice-Chairman, CIBSE Republic of</td>
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<td>Team &amp; Facility Managers</td>
<td>Sustainable Energy</td>
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<td>4.15pm</td>
<td>Open Forum</td>
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<td>Kevin Kelly, Chairman, CIBSE Republic of</td>
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<td>Ireland Branch</td>
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<td>4.39pm</td>
<td>Close of Symposium</td>
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For further details contact **Tony McKinley at Tel: 01 - 202 7915 or Jim Fogarty at Tel: 01 - 409 2800**
When a visionary entrepreneur decided to turn a gigantic blimp hangar near Berlin in Germany into a tropical paradise resort destination, he turned to ITT Lowara to provide pump systems and expertise to power the water supply system. Colin Au, a businessman and entrepreneur from Malaysia, bought the gigantic hangar where dirigibles used to be built and converted it into a sort of Prussian tropics, complete with a rainforest of about 40,000 imported plants, a Balinese gate, Indian dancers and a "South Sea" beach.

Known as "Tropical Islands", Europe’s only tropical paradise was opened in December of 2004 in the world’s largest self-supporting hall. It comprises an attractive recreational area of 6,6, hectares (66,000 sq m) in size, featuring shows, entertainment, swimming, sports activities, a children’s club, beach parties, restaurants and souvenirs.

The massive hall — 360 meters long, 210 meters wide and 107 meters high — presents authentic tropical vegetation with 500 different plants and allows insights into the cultures of Brazil, Bali, Thailand, Malaysia and Kenya. Well-known international interior decorators, landscape gardeners and botanists have participated in the project.

Obviously, with an enterprise of this scale the supply and management of water is of paramount importance. That it also features a rainforest of about 40,000 imported plants and a "South Sea" beach makes it even more critical. When making their final decision the consultants opted for pump systems from ITT Lowara for water supply and water pressure throughout the resort. From a seven kilometres long water pipe a Lowara booster unit (GT 30 HV SV 4602 F75T series) is used to pump the water under constant pressure into two intermediate reservoirs with a capacity of 300 cubic meters each.

Tropical Islands needs 180 cubic meters of drinking water per day and also the daily refilling of the pools, which is demanded by sanitary regulations. This daily demand is supplied by means of two vertical multistage pumps (GT 40 HV SV 6603/1 F 150 T / series), with a constant pressure of 6-bar. Both pumps are monitored by a Hydrovar® control system which, by way of its rpm control, operates in a very energy-efficient way.

The Hydrovar® control module makes it possible to compensate for varying levels of water demand by changing the rpm. The systems are laid out in such a way that they can cover the needs of future outside expansion. After a certain running time the operational pumps are exchanged automatically so that the load is equally distributed among the reserve pumps as well.

The water supply system is integrated into the central control system of the Tropical Islands resort through a collective malfunction notice. The system controls regarding pump-in-operation notice, running time, water pressure and water volume, are computerised and operated by the employees.

The resort has its own power station with a capacity of 2 x 3.5 MW that supplies heating and energy. Thus, an overall air temperature of 25-28°C is maintained, in some parts even up to 35°C. The temperature of the 6000 cubic meters of water is 28°C (in the "South Sea") or 32°C (in the "Lagoon"). The tropical ocean’s surface amounts to 4000 sq m but this is set to grow further by the addition of an outside recreational area of 500 hectares (five million sq m).
Dublin-based mechanical contracting company McGrattan & Kenny Ltd, with over 36 years experience in the field, is currently involved in a variety of commercial, residential and industrial projects. These include a 145-bed hotel in Dunboyne incorporating conference facilities and one of Dublin’s largest commercial developments on Hatch Street for Clancourt Ltd.

Throughout the years McGrattan & Kenny has always embraced, and indeed pioneered, the latest trends and innovations in building services. This is especially so today with sustainability and the importance of “green buildings” becoming more and more dominant.

The implementation of the EPBD and building energy audits will further reinforce this development.

It was against this background that McGrattan & Kenny were awarded the contract for the Daintree Building which is located on Pleasant’s Place, off Camden Street, in Dublin. Just recently completed, this multi-function construction comprises seven apartments, offices, café and a retail unit.

The buildings timber-frame construction has considerable benefits in terms of building insulation. Materials make-up includes sheeps’ wool insulation, while an additional 38mm of wood fibre insulation aids heat retention. This is 33% better than building regulations of 0.19W/m²K.

Also, internal walls and floors are insulated with cellulose insulation and acoustically-isolated with rubber cork-based matting. This all contributes to U values which are well above the required building regulations.

Mechanically the building is heated by a combination of underfloor heating on the basement and ground floor, while low surface temperature radiators provide space heating in the offices and apartments.

The retail and café areas, along with the basement storage area, are heated by two manifolds supplying a total of 24 underfloor heating loops embedded in the screed. Their heat source is three 120m-deep bore holes drilled at the outset of the project. The three circuits are looped through to a heat pump which is rated at a COP of 3.

The heating system is operated on two separate headers which are linked by an injection circuit. Typically the buildings space heating and water heating will be accommodated by the Green header which is fed by the heat pump. This header operates at a Delta T 45°C. Should the building demand be in excess of the heat pump supply, a high-efficiency, low-energy, gas condensing boiler will act as back up.

Hot water requirements for the building are met by the six solar panels (17.5sq m) which are integrated into the buildings upper reaches through purpose-made balconies. All toilets on the project are dual flush concealed cistern type which are fed from an individual tank in the plant room. This grey water tank collects water from the grass roofs along with surface run off from the café forecourt.

The installed BMS system will be used for accurate metering and monitoring of this highly-efficient building which stands as a model for future building development. However, it will be 12 months or so until sufficient data has been accumulated for detailed analysis to determine precisely just how “green” the building is now.
Kevin Kelly began his career as a 15-year old apprentice electrician. When he completed his apprenticeship he entered Varming Mulcahy Reilly Associates to begin his training as a design engineer. At that time there were no electrical services engineering graduates so VMRA hired electricians who were continuing their education at night. He went on to work as an engineer with McGrattan & Kenny before becoming a whole-time lecturer in 1983.

"I was teaching part-time in Kevin St while working with McGrattan & Kenny but I saw the economy going into depression in 1983 and, with a new mortgage and interest rates at 16%, I thought I better get a secure job", he laughs.

Kevin first entered the College of Technology in 1971 on a block release apprentice course and now, 35 years later, is researching for his Doctorate in the Dublin Institute of Technology (DIT) as it is now known. "The DIT is now a vastly different place from what it was then but it afforded me and many others opportunities that we may not have gotten elsewhere".

As Head of Learning Development for the Faculty of Engineering, Kevin is in a good position to judge. He cites DIT President, Professor Brian Norton (a CIBSE Honorary Fellow) who proudly proclaims DIT as the largest third level institute in Ireland. There are a total of 22,000 students, 8000 of whom are apprentices and 4000 are part-time students. "We are especially proud of our multi-level status covering apprentice courses to post doctoral research", says Kevin.

Throughout his career Kevin has always been a staunch supporter of the CIBSE and he is currently the 23rd Chair of the Republic of Ireland Branch. He is enjoying his year in the hot seat but stresses that he would not have been able to take the job on were it not for the quality of the present committee, the the contribution of his predecessors.

"We have a tremendous committee who somehow find time outside their day jobs to contribute significantly to the very full and top-rate CPD programme operating in Dublin, Waterford and Cork. The committee is a great mix of experience and youth. They are also a very nice bunch of people to work with", Kevin enthuses.

CPD events are divided evenly between mechanical and electrical. However, with an increasing number of events in sustainable engineering effectively crossing the divide, the entire programme is of interest to all. Indeed, such is the importance of sustainable engineering that CIBSE is hosting an international conference on Sustainable Engineering in Dublin on 9 March next.

In Dublin the mechanical events are generally held on the last Thursday of the month in Bolton St with electrical on the first Thursday of the month in Kevin St. "We seem to have finally raised the status of electrical services", says Kevin. "People now realise it is more than a few lights and sockets. Evidence of this is in the tremendous success of the Electrical Services Engineering programmes in DIT Kevin St. They have an excellent team who respond to the demands of students and industry with innovative student-centred programmes on a part-time, as well as a whole-time, basis.

"There are 150 electricians studying for degrees at present on an accelerated programme that recognises their prior learning. Likewise in Bolton St the highly-successful Building Services programme is being re-accredited by Engineers Ireland as a fully-
semesterised and modularised programme with emphasis on student learning outcomes. There are also good-quality programmes operating successfully in the Cork Institute of Technology. The building services industry is lucky to have such high-quality graduates coming through.

The central focus for the CIBSE committee this year is the Sustainable Engineering conference scheduled for this coming March. Venue is Clontarf Castle in Dublin and the speaker line-up comprises recognised experts in their respective fields (see pages 42 & 43).

Sustainable Energy Ireland is very much a pro-active partner in this venture and there will also be a high DIT involvement.

Kevin explains that the speaker line-up will reflect the dissolving demarcation lines between mechanical and electrical as the challenges of the modern economy demand a holistic approach to building design. “If we are to meet the challenges of Kyoto”, he says, “then we have to design, build and use our built environment in a sustainable way so as not to deny future generations their share of the planet’s resources.”

“Companies and engineers can insulate themselves by ensuring they learn as organisations and individuals. The DIT has devised innovative programmes which will enable them to respond to societal needs and the increasing numbers of staff required to be involved in research.

Kevin takes up the point: “Ireland now has the fourth highest GDP in the world. We are no longer the beggarman described by the Economist magazine in 1987. Ireland had the highest levels of growth in the OECD in the 1990s – averaging over 6%. It is hard to believe that we had unemployment levels of 15% as recently as 1993.

“The Irish economy has changed with globalisation to a knowledge society and a modern company must ensure its knowledge base is expanded so that it can meet the demands of the changing external environment. For this reason it is important for companies to support their staff as they seek to update their knowledge, enhance their qualifications, and research areas of interest to the sector.”

That said, Kevin cautions against becoming complacent. “Many young graduates have only known the good times but, with one of the most open economies in the world, Ireland is susceptible to a shock from outside. A downturn in the US economy or a change in their corporation tax for multi-nationals could have serious implications.

“Companies and engineers can almost zero emissions, is another nettle that Irish society generally may have to consider as the quantities of non-renewable resources reduce. Island community energy supply networks such as that developed by Woking Borough Council in the UK provide a lead for research and development in this country that will be a challenge to engineers.

According to Kevin, all of this is creating a demand for research engineers and opportunities for post-graduate degrees. He believes that higher education must respond to these needs with appropriate programmes suited to the needs of industry and working engineers.

As BSNews interviewed Kevin in his office in DIT, Mike Murphy, the Director of Engineering, dropped into the office. Mike was enthusiastic about developments in both electrical and building services departments and commented in this regard. “We are developing post-graduate programmes in response to demand from industry”, he said, “along with part-time masters programmes in energy management and building services which are delivered in a flexible format. This will help engineers meet new challenges as well as increasing their academic credentials for the new economy.”

Kevin takes up the point: “The future for the building services sector looks good thanks to the combined efforts of the DIT and the ROI Branch of CIBSE”.

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Research in Fuel Cell Engineering at Dublin Institute of Refrigeration

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With the support of a TERS’ (Team Research Scheme) €50,000 research grant, awarded in January 2003, an international research team in Fuel Cell Technology was established within the Faculty of Engineering at Dublin Institute of Technology, with the intent of engaging in collaborative research projects in fuel cell engineering.

The TERS scheme is designed to support small research teams wishing to embark on a new element of research within their existing discipline. The initiative arose from Erasmus linkages between Dr Heinz Schmidt-Walter of the University of Applied Science Darmstadt (formerly Fachhochschule Darmstadt), Germany, and Dr Eugene Coyle of the School of Electrical Engineering at Dublin Institute of Technology. Dr Schmidt-Walter had already commenced research in fuel cell technology at Darmstadt and he had supervised a number of undergraduate students for the work of their final-year degree project.

In creating a successful research grant application, a proposal was made whereby two German-based research students – Steffen Schudt and Gerhard Sauer, and one Irish-based researcher – Jim Brunton – would register for Master of Engineering degrees under the supervision Dr Eugene Coyle and Dr David Kennedy (Department of Mechanical Engineering, DIT; Dr Schmidt-Walter of Darmstadt; and a further research collaborator, Dr Jim Hamilton, Professor of Chemical Engineering at the University of Wisconsin, Platteville, USA.

The international team also includes a small company, Gasketel GmbH, located in Kassel in Germany, wherein both Gerhard and Steffen have conducted the majority of their research to date under the guidance of Mr H. Kohnke.

Background
It is generally believed that today’s batteries will not provide the needed energy density for mobile devices such as music players, computers, telephones, motor vehicles, moving machinery and electric wheelchairs. It is predicted that there will be a $2 billion market for portable power cells by 2011.

Companies such as Motorola, NEC, Panasonic, Samsung, Sanyo, Sony and Toshiba are currently undertaking research on fuels such as hydrogen, metal hydrides, ethanol and methanol for this technology.

Developments on display at the Hanover Fair in Germany in 2004 demonstrated a sub-notebook powered by a fuel cell using methanol and oxygen as the fuel. It is envisaged that PDAs (personal digital assistants) will soon be powered by methanol fuel cells, replacing lithium ion batteries.

In the motors sector Toyota launched a new emission-free, one-person vehicle (Fine-N Personal Mobility), powered by a hydrogen fuel stack at the Tokyo motor show in 2004.

Benefits associated with fuel cell technology include zero emissions; clean technology; greater power than batteries; lifelong supply; compact size; and cost-effectiveness. Many believe that fuel cells will be the energy of the future for all mobile and stationary equipment.

What is a Fuel Cell?
A fuel cell is a device that generates electricity by a chemical reaction. Fuel cells are not new ... Sir William Robert Grove, a Welsh judge, inventor and physicist, designed the first one in 1839. During the 1960s fuel cells powered the Gemini spacecraft, and have been used extensively in the Space Shuttle and other space missions.

Every fuel cell has two electrodes, one positive and one negative, called, respectively, the cathode and anode. The reactions that produce electricity take place at the electrodes. Every fuel cell also has an electrolyte, which carries electrically-charged particles from one electrode to the other, and a catalyst, which speeds the reactions at the electrodes. Hydrogen is the basic fuel, but fuel cells also require oxygen.

One great appeal of fuel cells is that they generate electricity with very little pollution—much of the hydrogen and oxygen used in generating electricity ultimately combines to form water. A single fuel cell generates a tiny amount of direct current (DC) electricity. In practice, many fuel cells are usually assembled into a stack. Cell or stack, the principles are the same.

There are several kinds of fuel cells, and each operates a bit differently. In general terms, however, hydrogen atoms enter a fuel cell at the anode where a chemical reaction strips them of their electrons. The hydrogen atoms are now ionised and carry a positive electrical charge. The negatively-charged electrons provide the current through a circuit. If alternating current (AC) is needed, the DC output of the fuel cell must be routed through a conversion device, i.e. an inverter.

Oxygen enters the fuel cell at the cathode and, in some cell types, combines with electrons returning from the electrical circuit and hydrogen ions that have travelled through the electrolyte from the anode. In other cell types...
Research within the DIT international fuel cell group has focused to date on two fuel cell types — the Proton Exchange Membrane (PEM) fuel cell and the Alkaline fuel cell. The electrical characteristic of a typical fuel cell is shown in Figure 1.

Fuel cells are typically low voltage, high current, power sources. Cells are stacked together to create the required current and voltage rating. The PEM fuel cell shown in Figure 2 comprises 20 cells with 10V, 50A, 500W combined rating. In order to test and operate the fuel cell a test rig was constructed at the Darmstadt electrical engineering laboratory. A PEM (Proton Exchange Membrane, also called Polymer Electrolyte Membrane) fuel cell uses a simple chemical reaction to combine hydrogen and oxygen into water, producing electric current in the process. It works something like electrolysis in reverse: Hydrogen and oxygen inputted via the anode and cathode of the cell respectively results in production of electrical energy and formation of water as an extract.

A compressed 1-litre, 200bar (0.6 kWh) hydrogen cylinder, with pressure reducer, an air compressor and humidifier, and a condenser (cooler unit and circulating pump) were required in order to run and carry out tests on the fuel cell. The design and construction of the test rig in itself is a non-trivial task, but is essential in order to be able to effectively operate and monitor fuel cell performance. An evaluation was carried out with intent on comparing a standard lead acid battery to a PEM fuel cell, for use in powering an electric wheelchair. The effective use of Hydrogen as a fuel source as an alternative to a typical battery power source is explored in Table 1.

Table 1 - Hydrogen V Electric Battery

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Hydrogen</th>
<th>Electric Battery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery weight ca. 80 kg</td>
<td>Weight of 10 litre gas bottle ca. 14 kg</td>
<td></td>
</tr>
<tr>
<td>Weight of the fuel cell ca. 5 kg</td>
<td>Total weight &lt; 30 kg</td>
<td></td>
</tr>
<tr>
<td>Charging State - difficult to monitor</td>
<td>Gas pressure - provide estimate of bottle content</td>
<td></td>
</tr>
<tr>
<td>Charging time - long, usually over night</td>
<td>Refilling of gas bottle - few minutes</td>
<td></td>
</tr>
</tbody>
</table>

There are many examples of successful prototype designs of fuel cell powered motorcycles, automobiles and buses (fuel cell history web site http://rmi.org/). The Chinese Dalian Institute of Chemical Physics (DICP) presented a 30kW PEM fuel cell bus in December 2002.

There are significant challenges in designing a fuel cell-propelled electric wheelchair or similar sized four-wheel transporters. However, there are many examples of successful prototype designs of fuel cell powered motorcycles, automobiles and buses (fuel cell history web site http://rmi.org/). The Chinese Dalian Institute of Chemical Physics (DICP) presented a 30kW PEM fuel cell bus in December 2002.
An extended period of research resulted in the creation and testing of a range of electrodes of varying chemical composition, and analysis was carried out using gas chromatography. Feed gas and exhaust gas from the oxygen side and the hydrogen side were analysed (Figure 5). Slight traces of CO₂ were

![Figure 3: Internal ion transport of an AFC (courtesy American History website)](https://arrow.dit.ie/bsn/vol45/iss2/1)

Figure 3: Internal ion transport of an AFC, enabling long-term operation using air and hydrogen in place of pure oxygen and hydrogen. It is commonly postulated that an AFC cannot be operated with air in place of pure oxygen. A difficulty which can arise is that the CO₂ of the air will cause problems for the AFC because of the creation of carbonate. Reaction water created can also present problems in the cell when operated over an extended period of time. Researchers Steffen Schudt and Gerhard Sauer set out to solve both of these problems.

The functional principle of an AFC is based upon the controlled electrochemical reaction of hydrogen with oxygen to water with the production of electrical energy.

\[ H₂ + 1/2 O₂ \rightarrow H₂O \]

Water is produced by the chemical reaction.

If not acted upon, the reaction water will dilute the electrolyte. If this occurs the electrical conductivity of the KOH solution will decrease and with it the efficiency of the cell. In addition, the electrolyte volume will increase and eventually result in a cell overflow. The CO₂ contained in the air will react with the KOH solution and form potassium carbonate.

The electrodes in an AFC are gas diffusion electrodes (GDE), and the structure can be compared with a micro-porous sponge. If not addressed, the pores would become clogged by the carbonate generated thus blocking the reaction.

In the mass transport cycle of an APC the water has to move from the anode to the cathode, and OH- ions have to move from the cathode to the anode. On their way they have to pass parts of the electrodes and the electrode separator, which is placed between the anode and the cathode. A system has been specially devised by the Gaskatel company to measure KOH concentration, using the Densoflex sensor, while the fuel cell is running (as seen in Figure 4). The end plates of the fuel cell had to be adapted for the use of the concentration sensor. Hence it was possible to measure the hydroxide concentration inside the electrolyte chamber. Furthermore, the electrolyte volume in each electrolyte chamber was measured.
designed an alkaline fuel cell test rig at DIT Bolton Street in order to enable dynamic testing of both single cell and fuel cell stacks. Jim is researching the viability of utilising AFC cells for automotive applications and in particular he is working on system requirements to enable regulated vehicle start up, cell response under varying load and analysis, and observation of cell recovery. To assist in Jim’s research, an electronic regulated variable load is being developed by Kevin Gaughan and Finbarr O’Meara at DIT Kevin Street, for use with the test rig.

Following upon these excellent test results the research is ongoing in a positive manner and our team of researchers will be graduating in the coming months. It is the team intention to design a gas compartment for operation with air, to prevent the drying up of KOH and blocking of the air inlet, and to develop a self-controlled system with an air operated AFC.

The carbonate concentration of the electrolyte was measured by titration. After 1000 hours of operation in a half-cell at a current density of 50 mA/cm², tests showed that the carbonate concentration of the KOH solution was 50 g/l. This is far below the solubility limit of K₂CO₃ in 7 mol/l KOH, which was experimentally determined to be 461 g/l at 25 degrees centigrade. By modifying the ingredients it has been possible to manufacture electrodes which are suitable for operation with air containing CO₂. It proved possible to run an oxygen electrode for more than 5000 hours. From this research it can be concluded that, under appropriate experimental circumstances, the presence of carbonate brings no disadvantage to the capacity of the electrode and does not deteriorate fuel cell performance.

Jim Brunton has also detected in the exhaust gas of the hydrogen side.

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Jim Brunton has

Figure 6: AFC Test Rig - Jim Brunton at DIT Bolton Street

With the release of the Online version of the BSNews Building Services Product Specification Guide just four weeks ago, new members have been joining at an astonishing rate.

Sourcing a particular product or brand takes just three clicks!

The printed version of the Guide — in continuous publication since 1964 — is the Specifiers Bible for all those in building services.

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Have you tapped in to this invaluable resource? If not simply log on to www.bsnewsbuyerguide.com and follow the simple steps.

Should you need any assistance with this please contact Louise on
tel: 01 - 2885001
email: louise@pressline.ie
Heard it on the grapevine ...

PIG E N AIR MONITORS
Thanks to fiendishly-small microprocessor technology 20 pigeons wearing tiny backpacks containing air-pollution sensors are now monitoring the smog-filled skies above San Jose in California. Apparently, the packs also contain satellite-tracking devices (which makes sense) and mobile 'phones (which makes you wunder!).

SUSTAINABLE DESIGN
The future for sustainable design in building services will be debated in great depth at the forthcoming CIBSE international Conference in Clontarf Castle, Dublin, on 9 March next. It is an event which will undoubtedly influence the whole design process in relation to buildings. If you want to be part of that process then be there ... it really is that simple. Just call Gerard Keating at Tel: 01 - 205 6300 to book your place.

AN ILL WIND?
I'm all in favour of renewable energy but, the proposal by Green Party councillors in Brighton, in the UK, to position wind turbines on the roofs of homes is taking things just that bit too far in my opinion.

SPEECHES ... WHAT SPEECHES?
What a breath of fresh air the speeches at the recent CIBSE Biennial Ball were. They were brief to the the point of being non-existent. Congratulations to all concerned. BSNews will have a full report, with photographs, in the March edition.

BEWARE NAKED MOTHCATCHERS
Have you heard the one about the former CIBSE President's wife and the naked mothcatcher in the bath? Ask Donald Leeper, current CIBSE President ... he seems to have the inside track!

NO MORE 'ACTS OF GOD'
According to some weather scientists human influences on climate change will have surpassed natural ones by the year 2050. Essentially, there will be no more "Acts of God", only man-made ones.

JAM JAR POWER
Scientists in the US have concluded that recycling one glass jar saves enough energy to watch TV for three hours. When you consider that glass never wears out, can be recycled an infinite amount of times and takes one million years to decompose, why is glass recycling not compulsory?

E100 SPEND AT THE CURRAGH
An investment of almost €100 million over the next three years will see The Curragh transformed into a unique new facility that will be open for business all year round. A particular feature will be the spectacular new grandstand. The first phase - the Round Tower - will be built close to the existing parade ring. Designed on five levels - each over a quarter of an acre in size - the new facility will feature extensive hospitality features, including a panoramic 900-capacity restaurant on the top floor.

MILE HIGH CLUB
Those of you wishing to join the mile high club — without having to evade other passengers and snoopy cabin crew — can now do so thanks to an enterprising pilot in Israel. He provides a 45-minute flight around the skies above Tel Aviv while you get on with the business in hand. He even provides chocolates, wine and condoms. Only snag is the €145 price does not include a partner, you have to bring him/her yourself.
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