GLASS SPECIALIST

CI/SfB
Ro
January 2008

PowerGLAZ®
ENERGY IN GLASS

With governments around the world adopting 'green' policies to reduce carbon emissions, renewable energy sources are getting pushed further up the agenda. Over half the energy consumed in the UK is used in buildings and much of this is used for heating or cooling. The UK government target is a reduction of carbon emissions of 60% by the year 2050 and other countries are also adopting similar targets.

These are changing times and to respond to this Romag has invested in a new photovoltaic (PV) manufacturing facility and by the middle of 2008 will have a total capacity of 28MWp. Our range of building integrated photovoltaic (BIPV) panels and standard PV modules, both of which are featured in this brochure, are marketed under the registered trade name of PowerGlaz® and the benefits of PowerGlaz® have extended beyond the UK with orders secured worldwide.

[PowerGlaz® decorative canopy]

PowerGlaz® BIPV

Building Integrated Photovoltaic (BIPV) is the fastest growing sector of the PV market. The principle of BIPV is that PV panels (or modules) are incorporated into the building envelope substituting standard glass and other cladding materials with glass/glass laminates encapsulating Photovoltaic cells within. The modules are then incorporated into the building façade or roof where they generate electricity at the 'point of use' thereby maximising energy efficiency by eliminating transmission losses incurred when electricity is supplied via the national grid. PowerGlaz® BIPV can be integrated into vertical glazing, pitched glazing to canopies or walkways, and glazed roofs such as atria. It can be single or double glazed, and will fit easily into most proprietary glazing systems.

The individual modules are connected together to form an 'array'. The energy produced from the array is then fed into the buildings power supply, via 'inverters', which convert the current from direct current (DC) to alternating current (AC). If excess power is produced it is fed back into the 'grid'.

The photovoltaic cells convert daylight into electricity. The cells measure 125mm x 125mm or 156mm x 156mm and are available in two options, 'mono-crystalline' and 'poly-crystalline'. (Poly-crystalline cells can also be referred to as 'multi-crystalline'). Each type has its own aesthetic appeal and their choice may depend on the designers or architects vision of the building as much as their efficiency.

The cells are laminated between two layers of glass using an interlayer which retains the cells

in position and also bonds the glass together. The glass is toughened or heat strengthened or possibly a combination of both. The glass may be 'heat soak tested' to help reduce the risk of spontaneous breakage. All glass processing is carried out 'in house' by Romag. The outer leaf of the laminate is 'low iron' glass, which improves light transmission, and therefore maximises the efficiency of the cells. The inner leaf of glass can be of virtually any glass type; for example it could be tinted, decorative or screen-printed to a specific design. The finished laminate can be double-glazed, or if it is to be fitted into a structural glazing system, a carrier frame can be bonded to the unit. Double glazing and structural bonding are also carried out by Romag.

Each panel is fitted with a proprietary connector to enable interconnection of the modules to create a Photovoltaic 'array'. The connectors simply 'push' together and this process is usually carried out by the glazing installers who do not necessarily need to have specialist electrical knowledge however, the connection of the electricity generated by the array, must be connected into the buildings power supply by a specialist electrician who, in the UK, must be registered under the DTI accreditation scheme for installing PV. Romag are able to arrange contact with an accredited installer.

On double glazed units connections exit from the edges of the unit, but single glazed modules offer the choice of either surface mounted or edge mounted connectors. The choice is largely dependent on the type of glazing system or aesthetic requirements.

The efficiency of PowerGlaz® BIPV depends upon a number of factors such as the latitude of the installation, the angle of incline of the modules and the direction that the array faces, but it does not have to face due south to be effective as long as it's aspect is generally south, east or west facing.

[PowerGlaz® Preston Road Neighbourhood Development, Hull]

PowerGlaz® BIPV Technical Information

Maximum Panel Size: 3600mm x 2200mm

Glass Thickness: Minimum 9.5mm – Maximum to suit specific structural design parameters

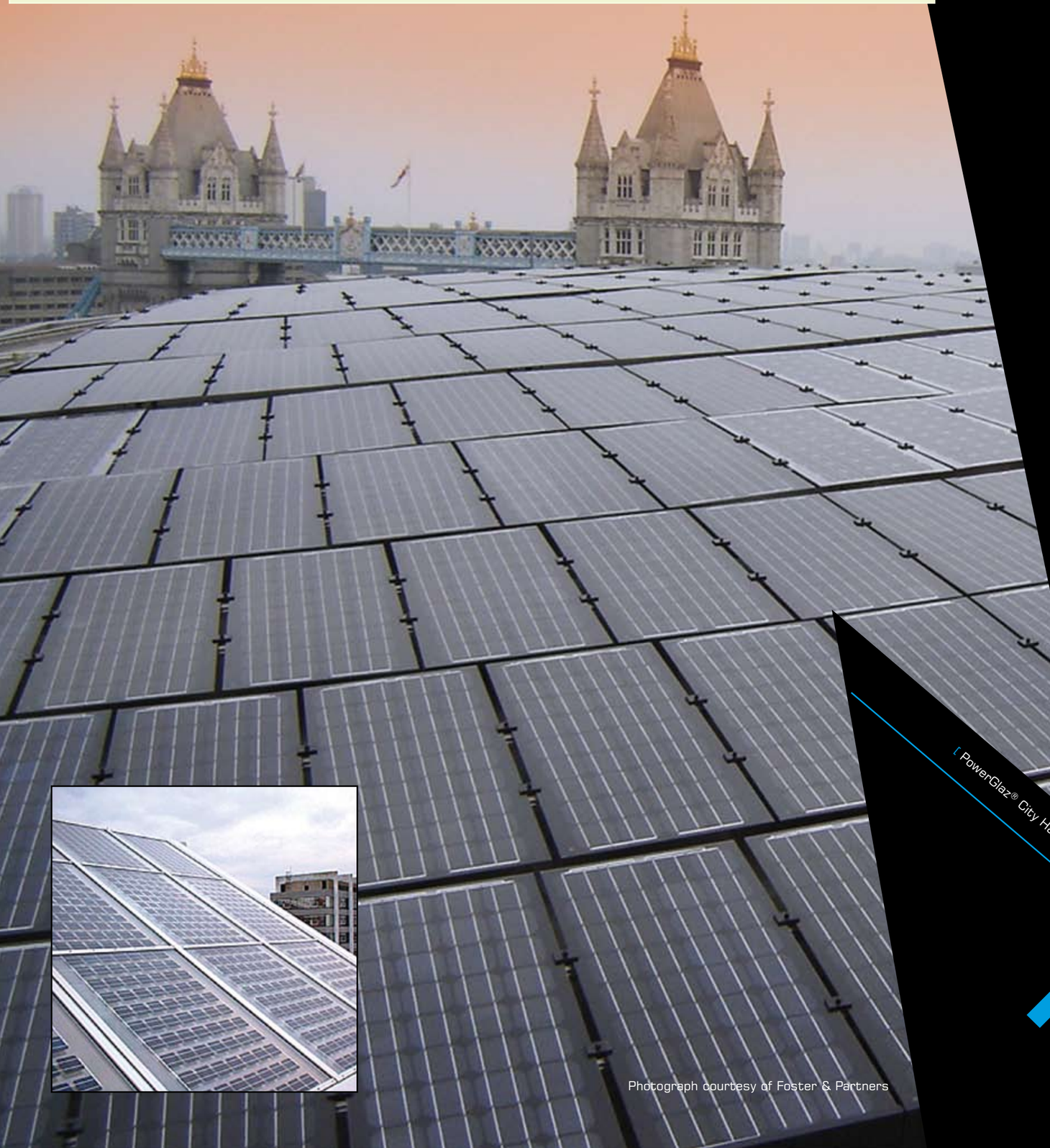
Dimensional Tolerance:
In accordance with BS EN 12543-5: 1998

Output: Electrical output is quoted specifically for each project, quoted output is subject to a tolerance of +/-5%. Electrical data is provided for individual projects.

PowerGlaz® BIPV Warranty

Bespoke glass/glass BIPV modules are covered by a limited warranty which guarantees 90% of original rated power output for ten years. The 'original rated output' is that detailed on our 'flash test' report and supplied to the customer at the time of manufacture.

PowerGLAZ®
ENERGY IN GLASS



Photograph courtesy of Foster & Partners

[PowerGlaz® City Hall, London]

PowerGlaz® Standard PV Modules.

The PowerGlaz® range of standard modules is designed to provide high efficiency and like all Romag products, the emphasis is on a quality product which stands out from the 'norm'.

Building Mounted Modules

The modules may be used for 'bolt on' building mounted applications to compliment our PowerGlaz® BIPV range and are often used to supplement output on BIPV installations particularly if there is insufficient area within the façade or roof glazing to achieve the required output. Building mounted standard modules are often positioned discreetly out of sight on the roof where they can be positioned and angled for maximum efficiency.

Solar Farms

As well as being mounted onto buildings, PowerGlaz® standard modules are also installed into 'solar farms' or 'solar fields' and PowerGlaz® is installed for this application throughout Europe. These dedicated solar power stations require modules of optimum efficiency which may be installed onto devices which track the sun to generate maximum power output. PowerGlaz® modules utilise cells obtained from market leaders and we only use cells which fall into the higher efficiency bands. This means that PowerGlaz® modules may exceed the performance of most modules on the market.

PowerGlaz® modules utilise 5inch (125mm x 125mm) cells and the latest 6inch (156mm x 156mm) variants. They are also available with either mono crystalline or polycrystalline cells.

equipped system, AC loads. Enhanced efficiency poly-crystalline or mono-crystalline silicon cells are connected in series and will charge 24-volt batteries efficiently in virtually any climate. With variants producing from 155Wp to 220Wp or more of nominal maximum power, PowerGlaz® modules are ideally suited to either utility grid-supplemental systems, or dedicated systems such as remote telecommunication stations, water pumping stations and land-based aids to navigation etc.

Materials

PowerGlaz® standard modules use Romag's extensive glass processing experience to produce high quality photovoltaic modules using the latest materials. Textured low iron glass is used as the outer component of the laminate to maximise the light transmission to the cells. The PV cells are connected in series and are encapsulated in EVA bonded to the glass sheet. A final layer of Tedlar is laminated to the rear of the module to complete the weather protection.

PowerGlaz Quality	PowerGlaz Benefits
TUV approved to IEC 61215 edition 2	High efficiency modules using high output mono crystalline or poly crystalline cells
Certified as Class II equipment for use in Systems up to 1000 VDC	Textured low iron glass maximises light transmission to the cells
Factory certified to BS EN ISO 9001:2000	Bypass diodes to counteract shading effects
Repetitive cycling between -400C and +850C at 85% relative humidity	Junction box with 'push together' connectors enable quick and easy site connection
Simulated impact of 25mm hail at terminal velocity	Aluminium frame for ease of installation
2200 VDC frame/cell string isolation test	Limited warranty
Static Loading, front and back, of 2400 Pascals (50 psf)	All glass processing is carried out 'in house' by Romag for maximum dependability.
	Standard and bespoke modules

www.tuv.com TÜVRheinland ID: 0000021201

- Qualified, IEC 61215
- Safety tested, TUV-Spec 931/2.572.9
- Periodic Inspection

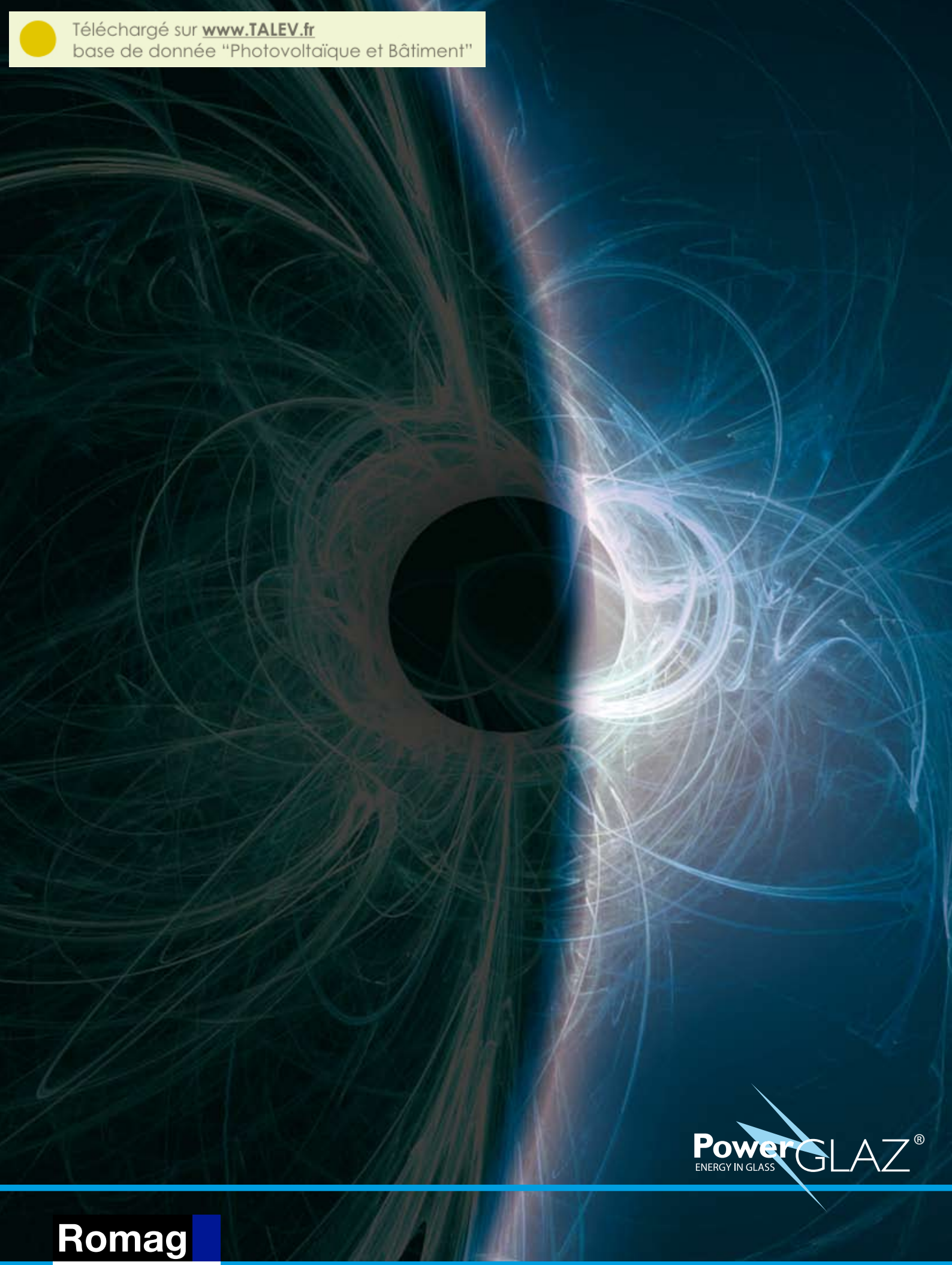
The PowerGlaz® range of standard modules is regularly updated and for our latest available options please visit our website at www.powerglaz.co.uk or contact Romag's technical department.

Warranty

Limited warranty for 80% power output for 25 years. Freedom from defects in materials and workmanship for 2 years.

The Choice is Yours

Romag's philosophy has always been to 'make what the customer wants' and PowerGlaz® photovoltaic modules are no exception. Our 'standard' range of modules are reviewed regularly and are posted on our website which means that we may have modules available that will match your requirements but if not don't be put off. Contact us as we are happy to produce bespoke 'glass/Tedlar' modules to suit your individual requirements – don't forget 'THE CHOICE IS YOURS'.



PowerGLAZ®
ENERGY IN GLASS

Romag
GLASS SPECIALIST

Romag Ltd, Leadgate Industrial Estate, Leadgate, Consett, County Durham DH8 7RS
T: 01207 500 000 F: 01207 591 979 E: kmorrison@romag.co.uk W: www.romag.co.uk