

Dear Reader,

Political support is crucial to increasing wider public acceptance of environmental technologies. This holds true for green roofs as well as for renewable energies. In Germany, for example, the Renewable Energy Sources Act created more than 200,000 new jobs and the world championship in solar energy utilisation. The current newsletter specifies how green roofs and photovoltaics can be combined and that the joint investment leads to mutual advantages.

In addition, fantastic green roofs projects in Spain, the UK and Singapore are awaiting you. Not to be forgotten are the green roof events in London (September 2008) and Stuttgart/Nürtingen (May 2009).

Have fun reading!

Wolfgang Ansel
Director IGRA

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Preview

Worth Seeing:

The Green Roof Landscape at the Expo Zaragoza 2008

One of the most spectacular green roof projects in the world has been installed this year as part of the World Fair EXPO in the Spanish city of Zaragoza. Complementing the exposition's motto of 'Water and Sustainable Development', the landscaped roofs point to the future in terms of dealing responsibly with this valuable resource.

Those wanting to really get to know Spain need to look beyond the tourist 'highlights' of sun, sand and Flamenco. The World Fair gives people wanting to gain an insight into the country and its people the opportunity to experience the cultural diversity and

regional contrasts. Spain is not the only country in which uneven rainfall distribution leads to conflict and massive environmental problems. Dealing with water in a responsible and sustainable way is the central message of the biggest water festival on earth.



'Aguas Compartidas' means 'Distributed Water'

Open-air Pavilion N° 6 'Aguas Compartidas' with a Landscaped Pitched Roof

Pavilion N° 6 of the world exposition proposes a fair distribution of water. Rainwater is collected on various rooftops, with slopes of up to 18°, and then diverted into the flourishing rooftop gardens. One of the aspects that the pavilion touches upon is the controversial project currently in discussion, in which it is suggested that excess water from the Ebro River could be diverted into the dry regions around Valencia and Murcia, thus turning them into fertile agricultural land.



The lush vegetation, intersected by narrow strips of gravel, highlights the image of the rooftop garden



The looping rooftop landscape of the 'Pavilion of Nations'



Benches and quiet zones flank the paths

A Landscaped Park on the 'Pavillones de las Naciones'

Visitors wandering over the spacious roofs of the 'Pavilion of Nations' are likely to start to forget that they are actually 'up on the roof'. Looping stilted wooden paths, event zones and quiet areas with benches, all surrounded by lush lawns and picturesque flowerbeds, complete the illusion of a large landscaped park. It isn't until you come across the breathtaking views of the city of Zaragoza with its world-famous cathedral, 'El Pilar', that you remember where you are, 10 metres above the ground, on a hall roof. The initiators and organisers of this prime example aim to use the concept to demonstrate the

benefits of having green areas and gardens on the rooftops of our towns, with regard to their ecological and economical advantages. Pieces of land in Spanish conurbations are becoming more and more expensive, so why not make use of the rooftops, including collecting and reusing the excess rainwater?

You have until mid-September to experience the biggest water festival on earth.

Further information can be found at the Expo's website: www.expozaragoza2008.es

Hans-Joachim Seeger, IGRA

Natural Stormwater Management with Green Roofs

In recent years flood disasters have become 'an inconvenient truth' for many people. On a local scale this problem is very often man-made due to the paving over of open land. As a result, the natural water cycle is interfered with and, during a rainstorm, most of the precipitation is immediately routed into overloaded storm-sewer pipes. Moreover, the impacts of global warming and the attendant stronger storms with more rainfall have intensified the situation.

This means that, at present, public water authorities are at a crossroads. They could try to solve the problem conventionally by costly end-of-pipe interventions, e.g. the extension of stormwater collection, storage and treatment facilities. However, these efforts fail to address the source of the problem – impervious surfaces. Therefore, modern stormwater management policies need to go upstream and manage the problem in a sustainable way by using green roofs for temporary water storage.

Green roofs play an outstanding part in the array of preventive stormwater management techniques, this not least being due to the fact that 40-50% of sealed surfaces in urban agglomerations represent roofs. In fact, green roofs are real all-rounders in both an economical and ecological sense. Depending on the green roof system build-up and substrate, the immediate water runoff from vegetated roofs can be reduced by 50-90%. A large part of the water returns into the

natural water cycle by plant transpiration and evaporation from the substrate. The accompanying cooling effect of this process contributes to a better microclimate and a decrease in the 'urban heat island effect'.

The remaining excess rainwater drains from green roofs with a substantial lag time so the peak flow rates are reduced. Due to the natural drainage pattern of green roofs less or smaller-dimensioned sewerage systems can be installed on new development areas or large projects. Innovative stormwater masterplans include the combination of green roofs with cisterns, so the roof water not absorbed by the green roof build-up is captured and provides grey water for other uses (e.g. irrigation, flushing toilets). As stormwater volume reduction benefits the municipalities' budgets, many water authorities promote the opening of scaled surfaces with financial incentives. In Germany, for example, property owners receive a special discount on their annual stormwater taxes for areas which are covered by green roofs.

By invitation of the International Federation of Landscape Architects, IGRA presented the numerous advantages of green roofs within the field of stormwater management at the 45th IFLA World Congress in Appeldorn/Netherlands.

Wolfgang Ansel, IGRA

Coming soon: 17-18th September 2008

The 2008 World Green Roof Congress in London



High profile line-up announced for World Green Roof Congress (WGRC)

Supported by the Greater London Authority, the European Federation of Green Roof Associations, International Green Roof Association, Green Roofs Healthy Cities, CIWEM and Allen & Overy LLP this inspiring Congress promotes the implementation of green roofs providing a greater appreciation of their benefits, through education shifting their implementation from 'quirky' exceptions to the mainstream rule.

The two-day programme will present expert keynote speakers representing more than ten countries including the USA, Hong Kong, New Zealand and the UK.

Organised by CIRIA in partnership with Livingroofs.org, the 2008 World Green Roof Congress is the first event of its kind to showcase green roofs in the UK. Day one of the Congress offers an overview of green roof implementation, application and benefits and highlights successful projects in the UK and around the world; day two provides insight with work streams on green roof performance and lifecycle implementation. The Congress will highlight latest innovations, research and practice to support the effective delivery of green roofs.

The World Green Roof Congress will take place on 17-18th September 2008 in London.

To find out more and to book a place visit:
www.worldgreenroofcongress.com/

CIRIA

Alumasc Green Roof Takes Centre Stage at WGRC

UK Green Roof experts Alumasc, in conjunction with specialist Green Roof manufacturer ZinCo, have recently announced their joint sponsorship of the World Green Roof Congress which takes place in London on 17-18 September 2008.

The Congress, being held at the prestigious city centre offices of Allen and Overy LLP at Bishops Square, will deliver a full programme of events including a drinks reception on the roof – an impressive green roof which incorporates state of the art green roof components as part of its key specifications. The water storage and drainage board was specified to be laid under the roofing substrate at Bishops Square, enabling aeration and allowing stored water to evaporate with any excess being drained away through channels on the underside. A variety of specialist substrates is available to suit specific plantings and hard landscaping elements may also be constructed directly on the board.

Bishops Square is located in the historically-sensitive Spitalfields district of the city, which once housed one of Europe's largest fruit, vegetable and flower markets. The project architects were Foster and Partners of London, Townshend Landscape Architects were the sub-consultants and the contractor was Willerby Landscapes of Edenbridge.



WGRC at Bishops Square

For further information please visit:
www.alumasc-exterior.co.uk

ALUMASC EXTERIOR BUILDING PRODUCTS LTD

Planning and Application: Green Roofs and Photovoltaics



More than a visual highlight – the combination of PV and green roofs

Green roofs work well in combination with the use of solar energy systems. This applies to solar thermal heating and solar power systems. However, a few issues need to be addressed when designing and installing this trendsetting technology.

Solar panel efficiency is improved with a Green Roof

The efficiency of solar panels declines as temperatures increase. Temperatures on non-protected or gravel roofs can reach up to 60-80°C on hot summer days, whereas green roofs do not exceed temperatures of more than 35°C. The green roof build-up allows natural cooling of the solar panels and therefore reduces the loss of energy production. The green roof build-up also plays a major role during the installation of the solar panels.

Installation and technical requirements

The solar panels have to be installed above the vegetation level so that the panels are not shaded. Special frames made of aluminium or robinia wood guarantee a minimum distance of 30 cm from the substrate level. Nevertheless, on roofs with solar panels, only low growing vegetation can be planted.

Normally solar systems are attached to the roof by penetrating the roof membrane or by concrete bases which carry high single point loads and both of these practices pose a potential danger to the waterproofing. With the solar panels mounted on the plastic boards of the Green Roof system the load distribution is spread over a large area and this prevents the roof construction from being damaged by point loads. The profiled plastic boards also allow rain water to drain through thus allowing plants to grow underneath the solar panels.

Incentives for the investor and the environment

Germany's feed law permits investors to connect their solar power systems to the grid and pays them a fair price for their electricity. The legal framework is the German Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz – EEG). This simple system has led Germany to world leadership in solar electricity generation. During the last few years, the feed-in tariff system based on the EEG model has been spreading rapidly. Along with 18 EU countries, India and even China have introduced comparable support instruments.

Feed-in Tariffs for solar power systems on buildings 2007*

System size (kWp)	(EUR/kWh)
<30	0.4675
30 to 100	0.4447
> 100	0.4398

*Contract duration of 20 years, constant remuneration

Further benefits of green roofs include, for example, the protection of waterproofing, reduced stormwater taxes, the improvement of the climatic environment as well as new natural habitats for flora and fauna. No other architectural style provides such a wide range of positive effects for buildings, inhabitants and the environment. Thus, green roofs and solar energy production meet one of the essential conditions of sustainable development the reconciliation between economy and ecology.

Wolfgang Ansel, IGRA



International Green Roof Congress

25-27 May 2009
Nürtingen/Germany

Focus on Green Roofs 2009:

The International Green Roof Congress in Germany

The Green Roof Event at a Glance

Hosts: Under the patronage of the German Federal Minister of Transport, Building and Urban Affairs, Wolfgang Tiefensee, the International Green Roof Association (IGRA) and the German Roof Gardener Association (DDV) are organising the 2nd International Green Roof Congress in Stuttgart/Nürtingen. Following on from the great success of the first congress, which itself contributed to the spread of the green roof concept across the globe, it is now time to invite the international green roof community to a new exchange of experiences.

Congress Programme: The latest technological developments of the last few years are one of the focal points of the discussions and lectures. Other key topics

include spectacular green roof projects designed by renowned architects and the international guidelines and standards relating to green roofs. Practical workshops and excursions to local green roof projects in and around Stuttgart and Freiburg will build upon the lecture series.

Target Audience: This congress is for everyone whose profession brings them into contact with green roofs and who wishes to learn about the latest technology and techniques relating to this field. This includes architects, landscape architects, planners, representatives of local authorities and environmental agencies, investors, manufacturers and installers. The 2009 congress will give you a great opportunity to make contacts and to develop new markets.



The 2009 Congress Programme: Compact and Efficient

Three Days of Lectures, Workshops, Presentations and Excursions

Monday, 25 May 2009: Excursions – All Day

Excursions in and around Stuttgart and the German solar capital, Freiburg, use individual case studies to show the various ways in which green roofs can be applied within the context of modern town planning.

Tuesday, 26 May 2009: Lectures and Workshops

Lectures – Morning Session

The lectures focus on recent technological developments and the role that green roofs can play in nature conservation, Green Building concepts and preventative climate protection.

Workshops – Afternoon Session

The practical workshops enable experts to share their knowledge and to answer questions and queries put forward by participants.

Workshop 1:

- An International Comparison of Funding and Support Programmes for Green Roofs

Creating a Best Practice Model – Guidelines for Local Authorities

Workshop 2:

- Planning, Installation and Maintenance of Green Roofs

From the Simplest Garage Landscaping to a 30,000 m² Landscaped Park

Wednesday, 27 May 2009: Presentations – All Day

Renowned architects present their innovative approaches for utilising the fifth facade. Projects to be presented include:

- Roof Landscaping as a Natural Cooler for Solar Panels, *University, Freiburg*
- Test Tracks for 4-Wheel Vehicles, *Subaru, Singapore*
- Allotment Gardens on the Sixth Floor, *Prenzlauer Berg, Berlin*
- Fancy Roof Garden with a Thames View, *New Providence Wharf, London*
- A Shelter for Biodiversity, *California Academy, San Francisco*
- Natural Rain Water Management with Rooftop Landscaping, *FiftyTwoDegrees, Nijmegen*

IGRA members will receive a special discount on all congress services.

For further information, please visit the website:
www.greenroofworld.com



Green Roof Leadership Award Goes to Landscape Architect Dorota Rudawa; Warsaw

On the occasion of the International Exhibition 'Green is Life' in Warsaw (August 2008, Poland) Dorota Rudawa from RS Architektura Krajobrazu was honored with the IGRA Green Roof Leadership Award. Dorota Rudawa's work reflects her enthusiasm for the green roof issue in various ways. Her projects are prime

examples for the integration of nature into architecture and vice versa. In addition, she not only quickly saw the potential of green roofs for her work, but was also substantially involved in the national promotion campaign

for the green roof idea, e.g. through her participation in the Polish Green Roof Guideline Working Group. Dorota Rudawa is invited speaker at the International Green Roof Congress 2009.



Wolfgang Ansel, Director of IGRA, presents the Leadership Award to Dorota Rudawa



Recreational Roof Gardens – landscape design by Dorota Rudawa

Softening the Urban Hardscape in Singapore Heartland

With a growing population of 4.5 million, occupying a tiny tropical island space of 700 sq km, and with all the rest of the latest '-tions' such as globalisation and urbanisation thrown in, wouldn't you ask Singapore if the nation's branding of 'City in a Garden' can ever be achieved? To Singapore, the answer is a definite 'YES!'. By bringing nature back to and thrive amongst the urban, built-up, concrete jungle, a fine balance between softscape and hardscape can be achieved.

Roof Gardens in MSCPs

One prominent feature that played a very important role in this is – the **multi-storey car parks**, or commonly known to Singaporeans as MSCPs. These are low-rise reinforced concrete structures of 4-5 storeys high. The top most deck of the MSCP is often a plain, flat roof slab or an exposed car parking deck. For the latter, it was soon realized that these areas are under-utilised because of their exposed environment. 15 to 20 years ago, these top decks of MSCPs were designed at the planning stage to carry not vehicles, but **roof gardens!** From that instance, MSCPs conceived another purpose – to provide the residences with an alternative venue to interact with nature, and it is right 'at their doorsteps'. Since then, roof gardens, or **intensive-type green roofs**, have made their in-routes through new MSCPs and into Singapore's heartland.

They have since been enthusiastically welcomed by the heartlanders, regardless of age, race, gender or religion. In these gardens, deep planters of up to 1.0 m high, as well as shallow planter boxes of about 0.4 m high, were constructed to sustain growth of vegetation – trees and palms of up to 4.0 m tall are grown alongside shrubs, ground-covers and turf. Features such as children's playgrounds, trellises, pebble walkways, patios and other streetscape furniture also found their existence in these gardens.



Roof gardens located at the Punggol housing estate



What about the existing and perhaps old MSCPs that possess a parking deck at the top – can that space be converted into a garden too? The answer is a definite 'YES!' and that was exactly what happened to two MSCPs at Edgedale Plains in the Punggol housing estate in the north-eastern area of Singapore. The once under-utilised car-parking deck at the top (though it was partially covered by metal-canopies), has recently been converted into a simple roof garden. As the existing deck is already designed to carry a maximum live-load of 250 kg/sq.m., we designed a **semi-intensive-type green roof system** of just under 200 kg/sq.m., sufficient to sustain the growth of the specified vegetation – pearl grass (or axonopus compressus 'pearl') and a climber, *tristellateia australasiae*.



The existing old MSCP was transformed into a roof garden for the public's enjoyment.

Extensive-type Green Roofs in MSCPs

What about the roofs of MSCPs that have not been designed to carry heavy loads, can those be converted into roof gardens too? The answer is again a definite 'YES!'. But rather than a semi-intensive-type green roof as in the MSCP at Edgedale Plains, an extensive-type green roof that is very lightweight and shallow can be implemented on those roofs. Besides lightweight and shallow, **extensive-type green roofs** are characterized by low cost, low maintenance, mostly ground covering and drought tolerant plants and usually with restricted access. The green roof on top of the MSCP at the Sengkang housing estate is about 1,300 sq.m. Being close to the shore line, the landscape architect for the project adopted a seaside theme as its landscape design. Through the use of granite chippings and vegetation that include *sansevieria trifasciata*, *tradescantia pallida*, *tradescantia spathacea*, *zephyranthes*, *sedum mexicanum* and *furcraea gigantea*, features such as the humble seashell and starfish are created.

The green roof at Tah Ching Road, Jurong housing estate is also of a similar size. Instead of seaside, the landscape design adopted a basketball as its focus. The landscape architect probably has the International Olympic Council's inaugural Youth Olympics in mind and ahead of time (Singapore hosts the event in 2010). At this green roof, by using just 3 plant species – *axonopus compressus* 'Pearl', *cyanoptis cristata* and *tradescantia pallida*, the features of the 'basketball' are clearly exhibited.

For us it is the corporate philosophy to design the green roof system to last as long as the life of the structure on which it rests! Once that is in place, the focus of the maintenance programme can then be shifted and centred on the next major item high on the maintenance list – the vegetation itself. After all, our slogan for Asia is **'We make life at the top ... beautiful!'**

Ho Wan Weng, ZinCo Singapore



Singapore's first, large scale, extensive-type green roof on top of the MSCP's at Sengkang East Avenue (left, middle) and at Tah Ching Road (right).

Free Download:

The New IGRA Brochure 'A Quick Guide to Green Roofs'.

This small pocket-size brochure (20 pages) presents the advantages of green roofs in a catchy way. The brochure is, of course, not a substitute for technical guidelines but it will provide an easy introduction to the green roof theme.

The content includes the 'added bonus for the building owner and the environment', 'types of green roofs', 'green roof technology' and green roof policies.

Download your free copy at:

www.igra-world.com/links_and_downloads/index.php

The next IGRA-newsletter will feature the following topics:

- Masterpiece: Fusionpolis – Skyscraper with Tree Tenants
- Green Roof Policies and Funding – Evaluation Criteria
- New: IGRA Research Database for Green Roofs

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The International Green Roof Association (IGRA) is a global network for the promotion and dissemination of Green Roof topics and Green Roof technology.

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