DESIGN & INSTALLATION OF GREEN ROOFS

ECO FORUM
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GREENROOFS AUSTRALASIA
History of Green Roofs

- Hanging Gardens of Babylon in 6th Century BC
- Traditional Sod Roofs
- Pre 1960s, vernacular building practice
  - Le Corbusier
  - Frank Lloyd Wright
- 1960s, green roofs as a ‘green solution’ Nth Europe
  - Germany 10 – 18% roof area greened. 15 – 20% growth rate
  - 75 European municipalities provide green roof incentives or requirements
Green Roof Categories

- **Extensive**
  - Shallow < 300mm
  - Light
  - Low maintenance
  - < species diversity
  - Retrofit opportunity
  - < cost installation & maintenance

- **Intensive**
  - Deep > 300mm
  - Heavy
  - High maintenance
  - > species diversity
  - > benefits /marketing
  - > cost installation & maintenance.
Green Roof Systems

- Modular
  - Light weight
  - Pre planted
  - Cost effective, drainage cell included

- Loose Laid
  - Flexible
  - Visually aesthetic
  - Design opportunity
What type of Green Roof?

- Every Green Roof is Site Specific
- The type of green roof will depend on:
  - Structural load bearing
  - Budget
  - Client
  - Access
  - Design intent
Why Green Roofs?

Green roofs may not be a familiar site in our cities. International examples show they make a unique contribution to the quality of our urban environment.

green roofs can address many of the challenges presented by urbanisation
Benefits of Green Roofs

Green Roofs generate a wide range of social, economic and environmental benefits, both public and private. The key to success is finding the right mix of benefits for a client and their project.

- **Public**
  - Storm water
  - Energy
  - Urban Heat Island
  - CO2
  - Air Quality

- **Private**
  - Membrane /Roof protection
  - Noise reduction
  - Fire resistance
  - Food production
  - Marketing/sales
Intelligent Design

Ecologically intelligent design must be integrated, mimicking nature to harvest energy from the sun, produce oxygen, sequester carbon, manage water and provide habitat. To achieve this through design, there needs to be an understanding of the unique local climate and how to preserve, support and enhance the sense of place.

Academy of Science - San Francisco
Common Benefits -
Storm Water Management & Urban Heat Island

Many of these benefits are still to be qualified for the Australian climate. There are a number of North American reports available.
Energy

- Carbon Dioxide
  - Reducing energy consumption by increasing thermal mass and reducing need for heating & cooling.
  - Evapo transpiration
  - Plant sequestration
  - Soil sequestration

- Photo Voltaic cells
  - Dropping ambient air temperatures increasing efficiency
Sound Insulation & Air Quality

The type of benefit is largely a function of budget, design, structure and site conditions. Some benefits are a function of ALL green roofs so considered to be a common benefit others are a direct response to the design and are specific benefits.
Additional

- Amenity Space
- Sales & marketing
- Education & Health
Barriers

- Cost
- Fear
- Failure
- Maintenance
- Governments
- Education
- Skill

Millennium park - Chicago
Cost

Always the first question and biggest hurdle - ‘How long is a piece of string’??

Like all projects, green roofs are site specific and a number of variable will affect the cost, these can often be weigh up against the benefits depending on the client.

- Structural load bearing
- Access
- Design brief and intent
- New build or Retrofit
- Professionals required
- Plant selection & availability
- Maintenance
Maintenance

One of the most important components of Green Roof Design & vital for the long term success.
North America is promoting the inclusion of a 5 year maintenance contract with all Green Roof installations.

There are only 2 things that can fail -
• Waterproofing
• Plants
Integrated Design

Few technologies have ever had so much to offer by way of improving the health and well being of urban residents, while contributing to the development of restorative, high performance buildings.

- Increased energy yield – PV cells
- Grey Water management
- Condensate / improved efficiency
- A/C units
Who can have a green roof?

Low cost DIY garage roof

Bus Stop - UK

Chicago City Hall

Chook Farm - Switzerland

Dog Kennel - Sweden
Green Walls

- reduce the urban heat island effect,
- cool ambient temperatures,
- filter the air &
- provide habitat.
A living wall is a building envelope system where plants are actually planted, irrigated and grown in a modular system secured and integrated with a wall.
King George Square – Green Wall
Case Studies

Judiciary Square
Washington DC
$100k US total
1 month install
9th floor

Drainage cell
Geo
100mm growing medium
Jute – wind control
16,000 plants
Finished Nov 07
If we can make our cities healthier, they will become places where people will want to live, play, and work – and economic growth will follow naturally.

One of the biggest green roof in the world - 10.4 acres
Helped save the adjacent Rouge River, 50 years ago faced environmental disaster due to toxic chemicals leaking into it from the factory.
Green design need not hinder economic development. Beauty and sustainable design can inspire creative and forward-thinking developers who might actually drive further competition.
Lift overrun and stair access - intensive greenroof above
Air Conditioning units
Retrofitted domestic extensive roof storm water management with the inclusion of a dry creek bed
Stuttgart & Berlin – Germany

"green roofs are the greenest thing one can do in construction except not to build at all." - Architect Patrick Carey
CH2 – Melbourne
Parliament House – Canberra
DPI – Queenscliff VIC
M Central - Sydney
The Future?

Green Roofs meet one of the essential conditions of sustainable development, the reconciliation between economy and ecology.”

George Irwin, CEO for Rochester based Green Living Roofs, LLC
A not-for-profit membership organisation with an elected committee that draws together the various governmental, organisational and business groups and individuals interested in being kept informed about green roof science, technology, practice, regulations and specifications.

www.greenroofsaustralia.com.au