



Sustainable Energy Development Office
Government of Western Australia

Planning For Energy Smart Buildings; *An overview of the Sustainable Energy Development Office's Energy Efficiency Programs*

Sustainable Energy Development Office (SEDO)

Sept 2007



Overview

- Who is SEDDO?
- Energy Smart
- Energy Efficient Houses
- Energy Efficient Lot Design
- Renewable Energy
- GreenPower





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The Sustainable Energy Development Office





Establishment of SEDO

- Established in November 2001
- The Sustainable Energy Development Office is focused on delivering the Government of Western Australia's sustainable energy policy.
- Our key objectives include the increased uptake of energy efficient products, best practice energy management and greater use of renewable energy





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Energy Smart Programs

- Key Initiatives





Energy Smart Programs

Energy Smart Government

- WA government leads by example in adopting best practice energy management and sustainable energy technologies

Energy Smart Community

- Increased uptake of energy efficient products and practices and renewable energy by WA households

Energy Smart Business

- Best practice energy management in the WA business sector





House Energy Rating Software

- *FirstRate* – First generation continuing for time being, Second generation under development
- *AccuRate* – Working well and shown to promoting passive solar house design

Building Code of Australia -
5 Star measures and 5 Star Plus

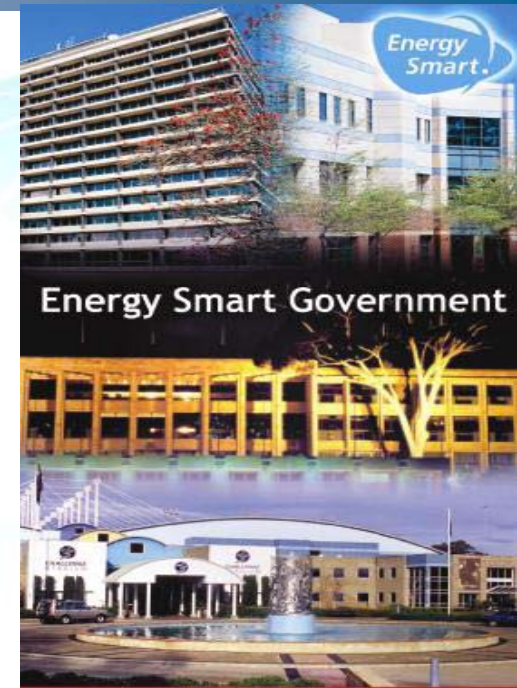




Energy Smart Government Program

- Requirement for agencies with 25 FTEs and above to reduce energy consumption by 12% over 5 years, began in 2002/2003
- Facilitation grants provided for audits, technical advice, help to build a business case etc
- Reporting period underway for final year
- 2006/07

Policy development is being completed for phase two of program - the next 5 years.



Reducing energy use





Energy Smart Government Program

2005/06 Results

63 participating agencies

- 27 achieved 10% target
- 2.9% energy reduction
- Program saved \$10.9 Million
- 40,000 tonnes GHG avoided

*Energy use per Government
employee reduced by 15%*





Commercial Buildings

Australian Building Greenhouse Rating

- Introduced and promoted the Australian Building Greenhouse Rating
- WA Government buildings – Office leasing policy developed, Government owned Buildings rated.

Energy Efficiency Requirements in the Building Code of Australia





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Energy Efficient Houses

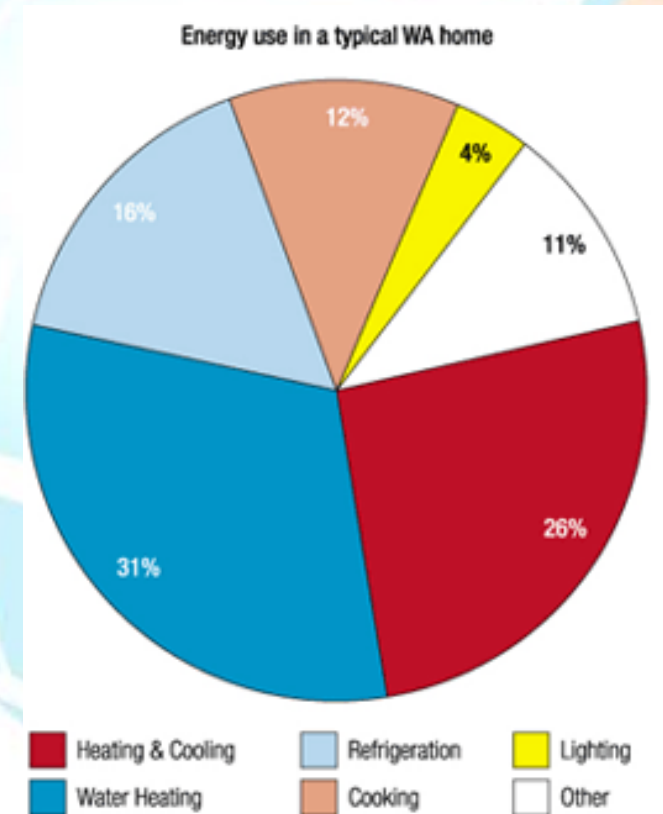




Where is energy used in your home?

- Water heating ~ 31%
- Heating and cooling ~ 26%
- Refrigeration ~ 16%
- Cooking ~ 12%
- Appliances ~ 11%
- Lighting ~ 4%

Source Sustainable Energy Development Office





Design for Climate and Comfort

- Design for human thermal comfort
 - Temperature
 - Humidity
 - Air movement (breeze or draught)
 - Exposure to radiant heat sources
 - Cool surfaces to radiate for cooling
- Sound building design can moderate these factors (except humidity)



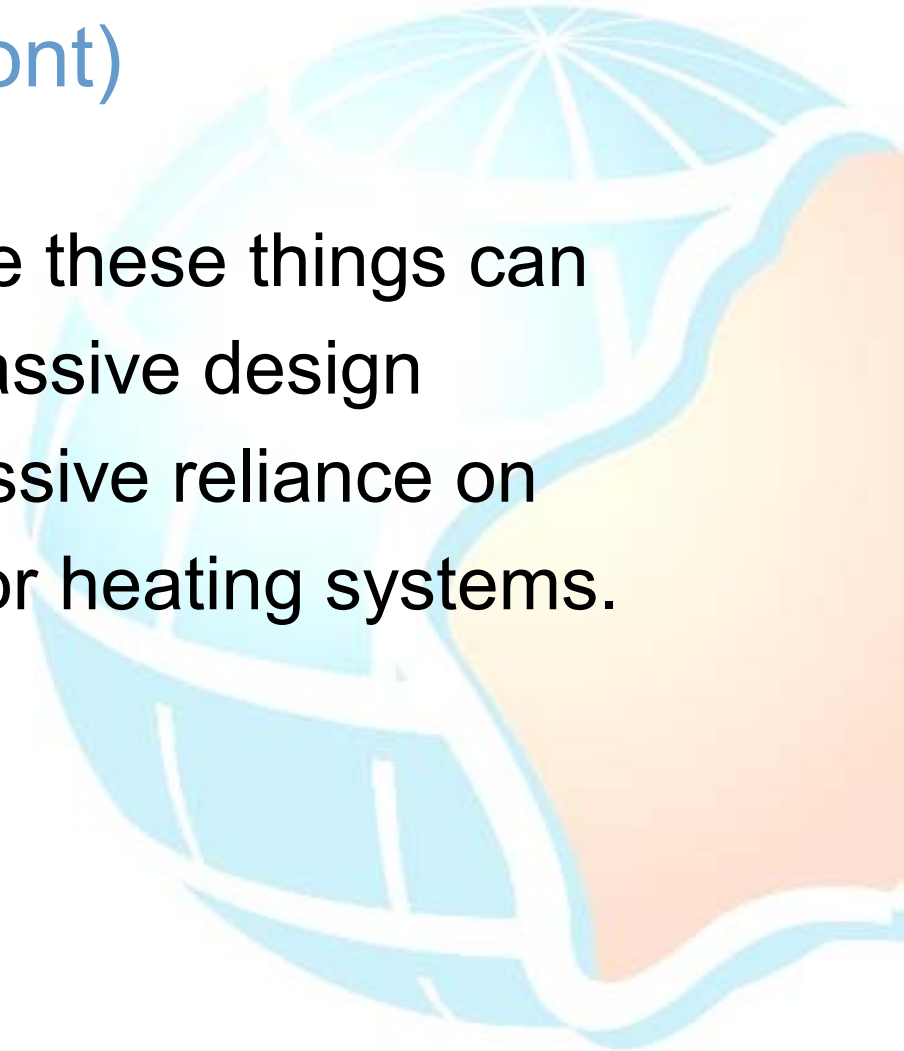
Design for Climate

Condition	Response
Too Hot and Humid	Shade Air Movement Cool Surfaces
Too Hot and Dry	Shade Cool Surfaces
Too Cold	Sun Warm Air Warm Surfaces



Design for Climate (Cont)

- In a well designed house these things can often be achieved via passive design strategies, without excessive reliance on supplementary cooling or heating systems.





Building Design – 6 Main Points

- Type of Construction/Building materials (including thermal mass)
- Site and orientation (including internal room layout)
- Windows
- Airflow/Ventilation
- Shading (including landscaping)
- Insulation



Building Design: Solar Design

Active Systems

- Solar hot water
- Photovoltaic energy
- Solar air heater



Source: Solar Dwellings

Passive Systems

Heat and air moves by natural means.

The building structure acts as:

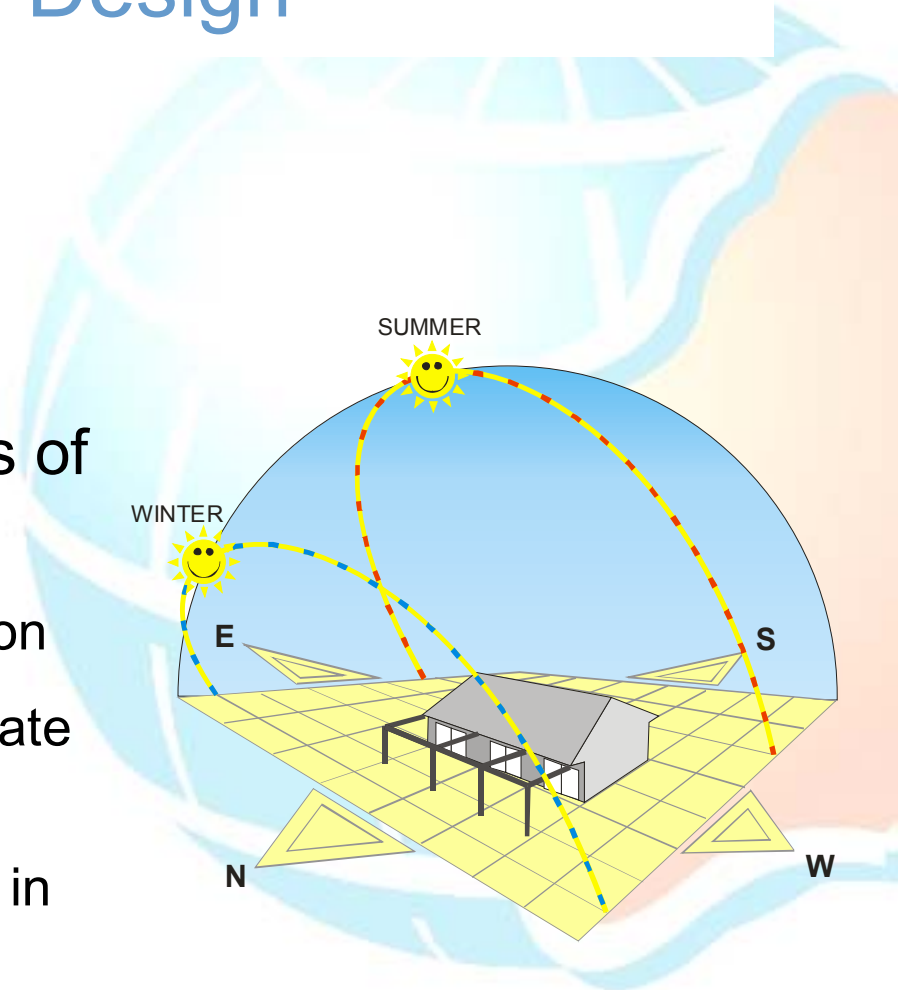
- Solar collector
- Heat energy storage
- Heat energy transfer mechanism
- Cross ventilation control
- Minor role by occupants or mechanical systems (open/close windows and drapes)



Building Design: Passive Design

Orientation is a key design feature for all climates.

- Ideally buildings should be orientated to within 15 degrees of North to:
 - prevent summer sun penetration
 - direct cooling breezes to ventilate the building
 - keep the home naturally warm in winter (cooler climates).





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Energy Efficient Lot Design





Passive Design - Orientation is key

- Orientate the building so that the longer axis is east-west, with living areas to the north
- Minimise windows to the east, west and south
- Shade the east, west and the ground around it
- Design for unobstructed cross ventilation paths
- Rooms can be arranged with access from a long breezeway corridor with plenty of openable area



Site Considerations – advice under review

- Orientation (Within 15 degrees of north)
- Facing (or long axis) east-west
- Boundary lines and setback, Height restrictions
- Adjoining buildings and trees can affect airflow and solar access
- Prevalent wind direction (summer/winter)
- Check local council for design guidelines and R-codes



Other Consideration?

- No design covenants on Solar Water Heaters or Photovoltaics (PV) systems
- Watch this space for further advice on how to lay out lots for easy (read cheaper) Passive Solar Design – look at Wungong project *etc*



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National Australian Built Environment Rating System (NABERS)





NABERS – Wider Environmental Rating

- National commercialisation initiative of State and Territories (CSIRO development)
- Performance based – same as ABGR office tool
- Initially NABERS Office and NABERS Home
- NABERS Office Energy - is the ABGR Tool
- NABERS Water here now, with Waste and Indoor Air Quality available end of year.



NABERS – HOME

- Voluntary performance-based rating system for existing homes.
- NABERS rates a home on the basis of its measured operational impacts on the environment, compared to other homes
- Energy and Water at present – waste etc to follow, from next year onwards.



Mandatory Disclosure of House Energy Performance – *National Initiative*

- To create an agreed method for measuring building energy performance on a 'like-with-like' basis with a nationally consistent regime for mandatory disclosure of energy performance of residential and commercial buildings process in place no later than December 2007
- States to implement in following by 2009



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Renewable Energy



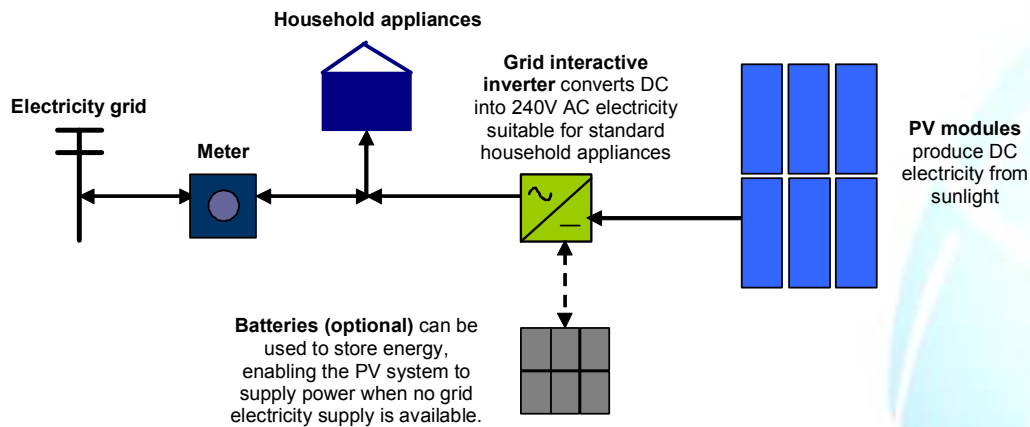


Types of Renewable Energy

- **Wind power** well established at medium to large scale, some issues to be considered for household rooftop systems.
- **Bio-energy systems** use biomass as a feedstock to generate electricity, e.g. landfill gas, plantation timber wastes.
- **Small-scale solar (photovoltaic or PV)** are well suited to installation on homes, but are relatively expensive.
- **Wave power, geo-thermal (hot rocks) and tidal power** being developed but not commercially proven.
- **Solar water heaters** are a practical, cost-effective for homes.



Renewable Energy in the Home – Solar Power

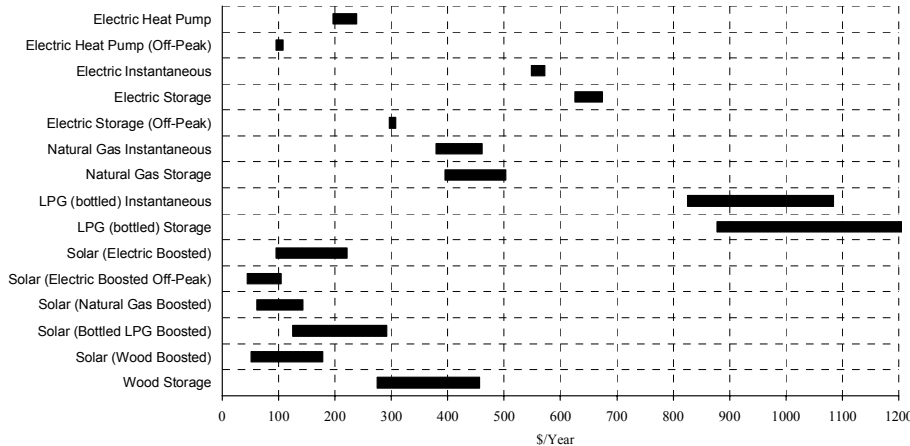


- **1.5kW grid-connect PV system costs around \$15-20,000.**
- **Meets about half of an average WA household's power demands, but could meet all of the power needs of a well designed, energy efficient home.**
- **For main urban areas, rebate of \$8,000 available through Photovoltaic Rebate Program, but limited to owner occupiers and not available to developers.**
- **Rebates of 50% of PV system cost available in certain regional areas.**

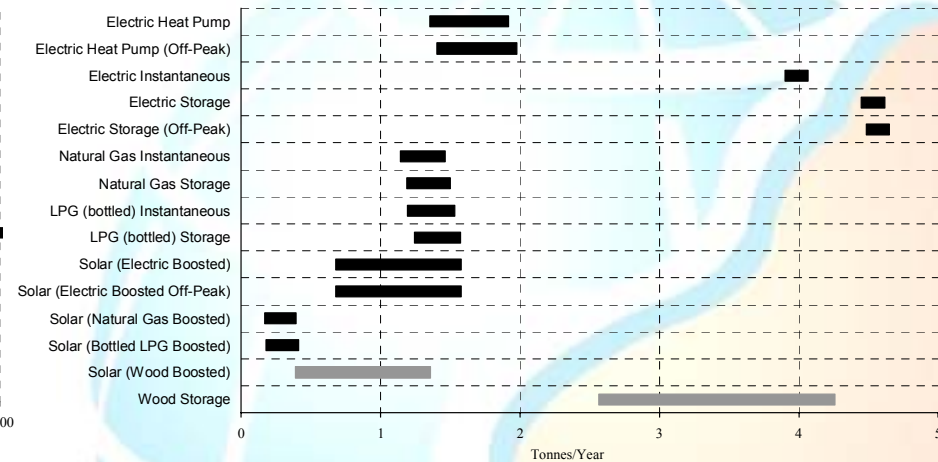


Renewable Energy in the Home – Solar Water Heater

Approximate Annual Running Costs



Approximate Annual Greenhouse Gas Emissions



- **Gas-boosted solar water heaters have the lowest running costs and greenhouse gas emissions of all common water heaters, but do cost more to purchase and install than other water heaters.**

- **Rebates of \$500 available through WA Solar Water Heater Subsidy scheme.**



Renewable Energy in the Home - *GreenPower*

- **GreenPower is accredited renewable energy that is separate to renewable energy generation required under government mandatory renewable energy target schemes.**
- **Individual households (with their own meter) can choose to purchase GreenPower.**
- **Very practical way for home owners to utilise renewable energy in their home.**
- **User pays slightly more per kWhr to purchase the GreenPower option.**



Renewable Energy in the Home – *GreenPower*

- **Currently not possible for a developer to say install a large wind turbine and supply households within a development (unless ‘off-grid’), as at present households can only buy electricity from Synergy.**
- **Developers could potentially require households in a new development to purchase a proportion of GreenPower for a certain period of time, e.g. recent ACCC ruling.**
- **Developers could also potentially purchase GreenPower to offset emissions from electricity use by households within a development, as GreenPower rights can be purchased separately from electricity – cost around \$250 per home per year.**



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SEDO tools for Industry - Summary





Tools for Industry

- Small business brochures
- *“The Energy Smart Directory”*
A Directory of products and services
- *“The Energy Smart Toolbox”*
An on-line package of information and resources
- Case Study Promotion

Looking for
Energy
Smart
Solutions?



Visit Energy Smart Directory at:
www.energysmartdirectory.com





Further Information

- Sustainable Energy Development Office
 - www.sedo.energy.wa.gov.au
- Australian Building Greenhouse Rating
 - www.abgr.com.au
- National Australian Built Environment Rating System
 - www.nabers.com.au
- Energy Smart Toolbox
 - www.energysmart.com.au/sedatoolbox
- Energy Smart Directory
 - www.energysmartdirectory.com





QUESTIONS?

