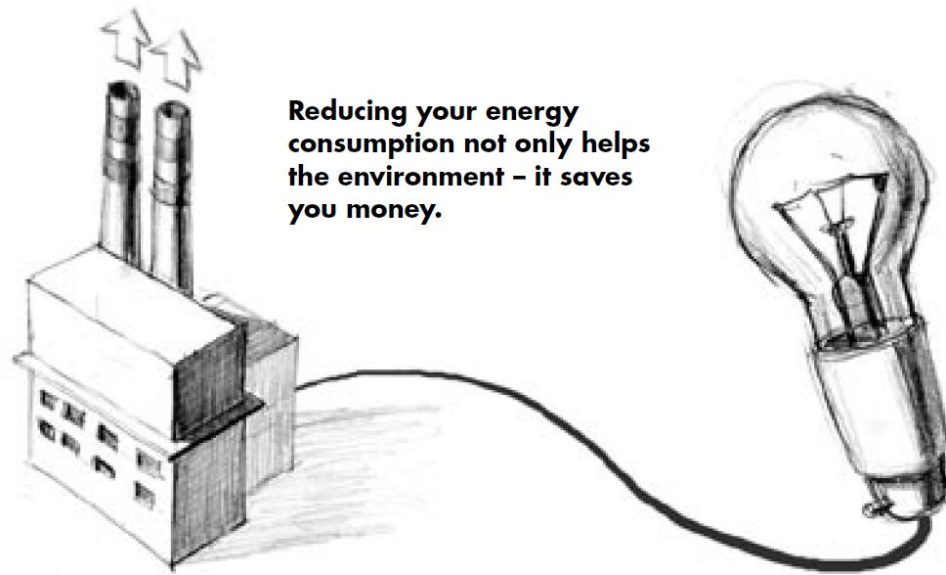


Energy Efficiency for Champions & Energy Managers

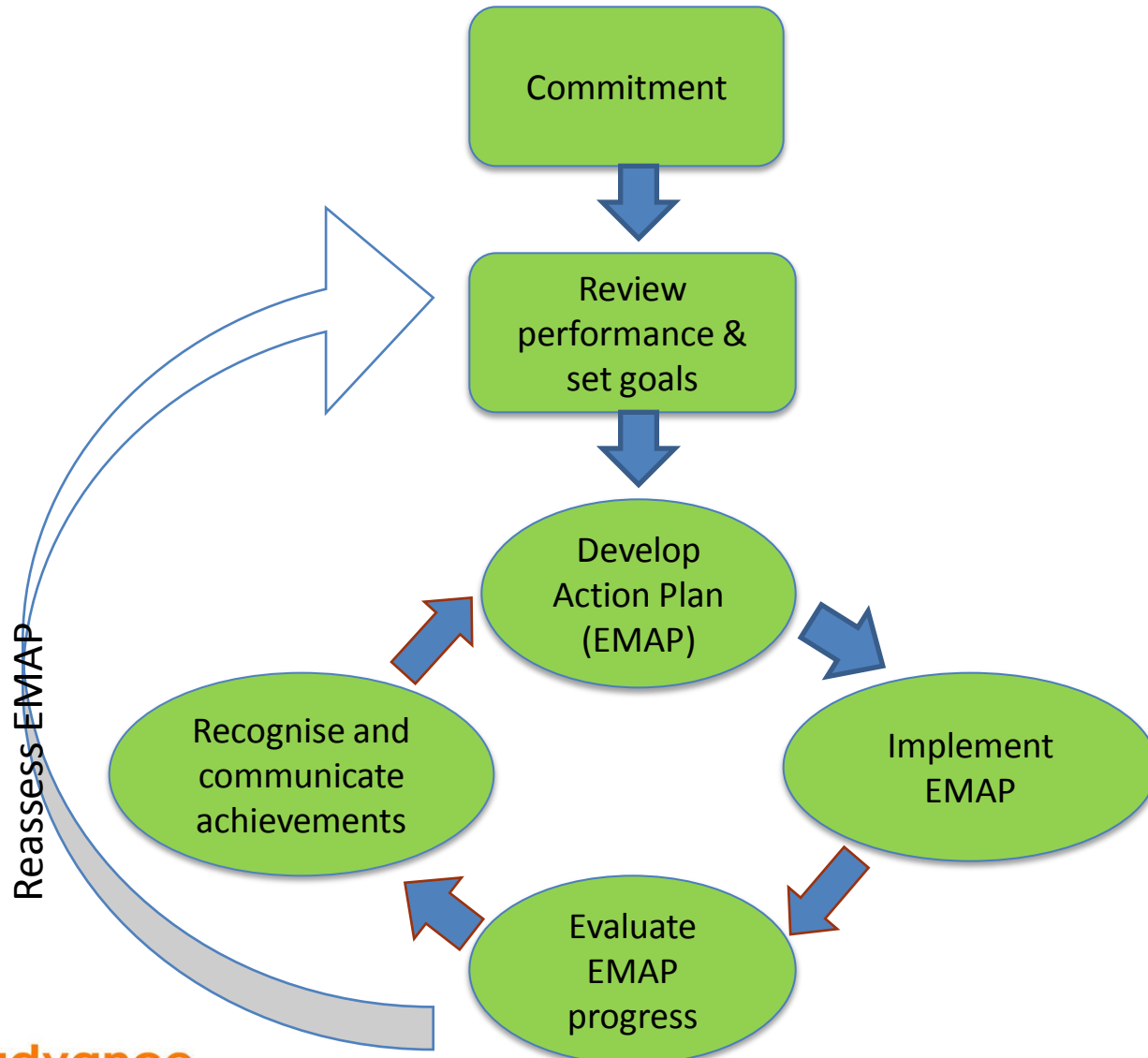
Insert company name and logo here



Developed by Perth Region NRM and EcoAdvance
with support from the State Government's Office of Energy

Insert company
logo

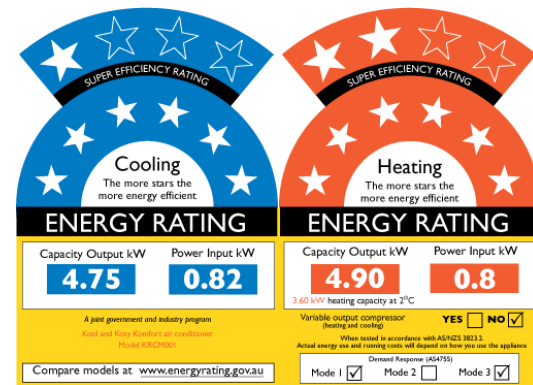
Planning for Energy Efficiency



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logo

Purchasing Policies

- Avoid purchasing halogen lights for offices and low ceiling areas
- Use L.E.D. or fluorescent alternatives



- When purchasing equipment, **ALWAYS** check energy labels and see if an energy star compliant version is available

Check out the Energy Rating website: www.energyrating.gov.au

Minimum Lighting Requirements

Recommended minimum light levels

Minimum Illuminance (lux)	Task difficulty and examples
40	Corridors, walkways.
80	Change rooms, loading bays, bulky storage.
160	Simple tasks. Waiting rooms, rough bench work, general fabrication.
240	Moderately easy tasks. Food preparation areas, medium woodworking.
320	Moderately difficult tasks. Routine office work.
400	Moderately difficult tasks. Fine woodwork.
600	Difficult tasks. Drawing boards, inspection tasks, fine machine work, fine painting, colour matching.
800	Very difficult tasks. Fine inspection tasks, colour matching of dyes.
1200	Extremely difficult tasks. Graphic arts inspection, extra-fine bench work.
1600	Exceptionally difficult tasks. Jewellery, watch making.

Source: Extract from Table 3.1 AS 1680.1 - Recommended Maintenance Illuminances for Various Tasks, Activities or Interiors (Courtesy of Office of Energy)

Lighting Levels - Delamping

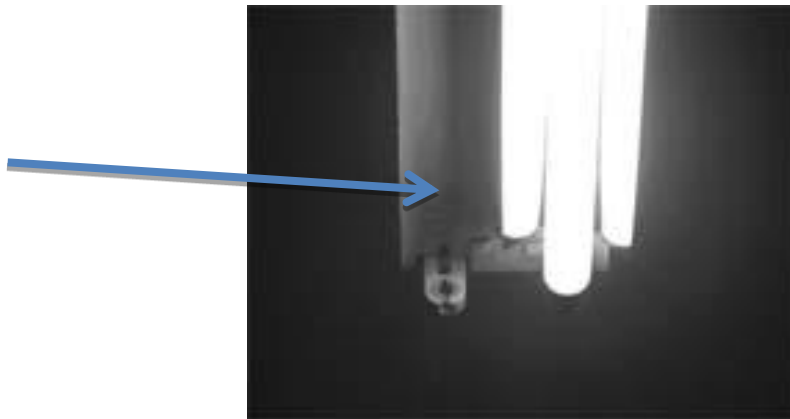


Have you got excessive lighting?

- Check lighting levels with a Lux meter
- Ensure that levels meet user needs and are above AS requirements
- See if some lights can be switched off
- Partial de-lamping can be an option

Partial de-lamping

One or two of the lamps can be removed from a multiple fitting



Day-Lighting

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- Install sky lighting panels for general lighting, wherever possible
- Turn lights off during the day if there is sufficient natural lighting from windows and skylights
- Suspend lights closer to the point of use instead of at ceiling height



Use task lighting instead

Portable LED task light



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logo

Lighting Retrofit Options

High output T5
fluorescent



High output CFL



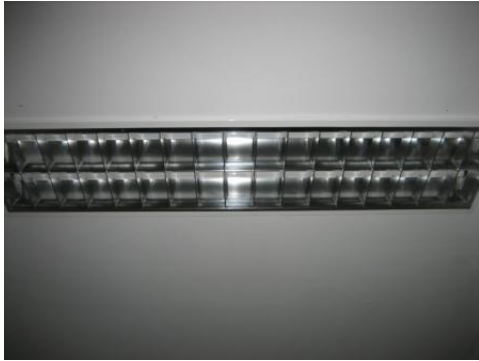
LED High Bay



Induction lamp

Reflectors & Separate Switching

Reflectors



- Install specular (silver mirrored) or glossy white reflectors
- Clean reflectors regularly to keep them shiny
- Paint the walls a pale colour to reflect light

Separate switching

- Allows for zoning
- Better control of lighting
- Save energy by turning off lights in unoccupied area
- Switches should be labeled



Motion & Photo Sensors

Motion sensors are suitable for:

- Security lights
- Areas with low and intermittent occupancy, e.g. stores, toilets



Photo sensors are suitable for:

- Areas with a combination of artificial and natural lighting
- Turning off lights when there is sufficient daylight
- Dimming lights to preset levels

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Voltage Reduction Systems

- Reduce voltage to banks of fluorescent lights (usually ≥ 100 lamps)
- Reduces light output by 6-10%



Voltage reduction system for fluorescent lamps

- Use in conjunction with higher efficiency fluorescent lamps e.g. Triphosphor or Quadphosphor

Timers

Hardwired, or installed at power points, timers can be use to :

- Turn on and off lighting e.g. security lighting
- Turn on and off appliances or equipment e.g. hot water heaters, soft drink/beer fridges, air compressors, battery chargers



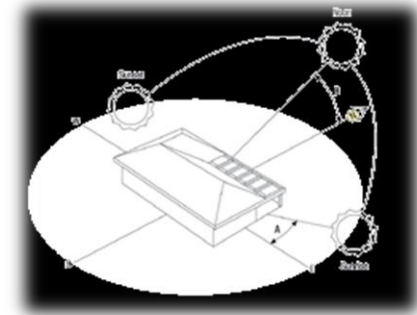
Low cost timer fitted
onto hot water urn



Building Design (1)

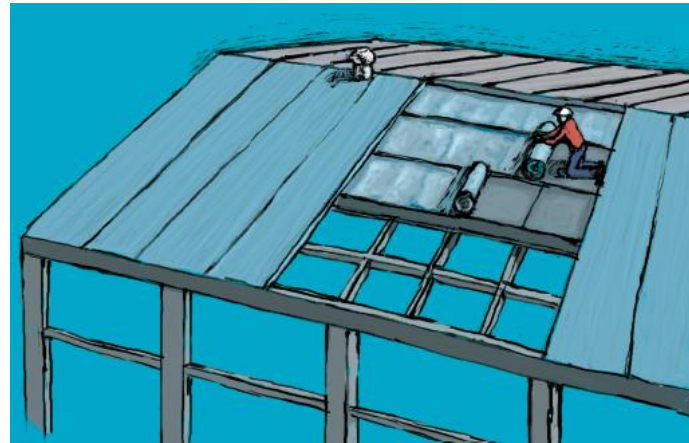
Building Design considerations

Consider **Life Cycle Cost** not just **Initial Cost**



An energy efficient building has the following considerations:

- Thermal mass
- Passive solar design
- Appropriate insulation
- Natural ventilation
- Natural lighting

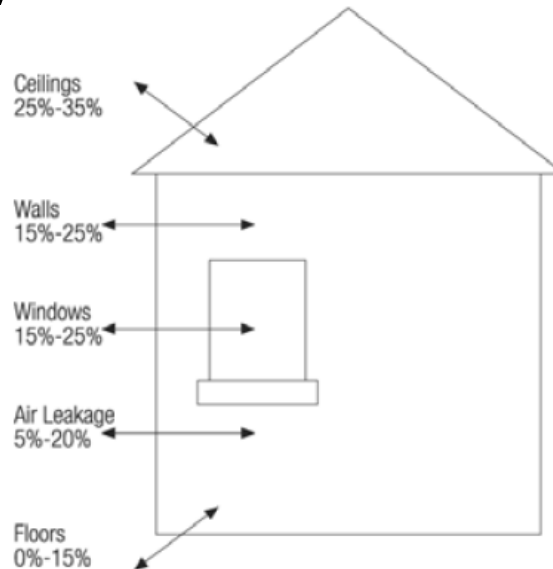
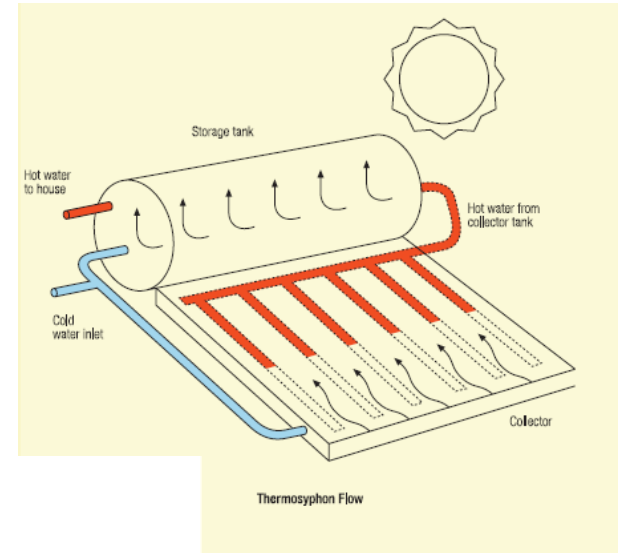


Building Design (2)

Other matters to consider at Design:

- Reducing heat gain
- HVAC and EE Lighting
- PV and co-generation opportunities

- Water Efficiency



Actual heat transfer will depend on many factors including wall and floor construction, size and orientation of windows, the amount of air leakage and whether insulation is installed.

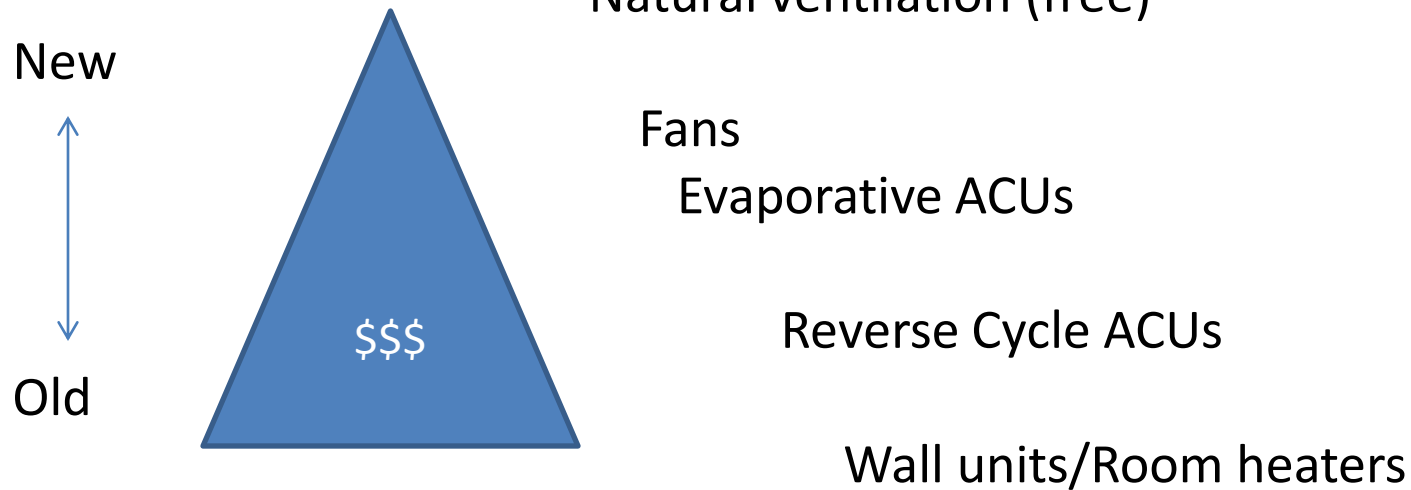
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Heating, Ventilation & Air Conditioning (HVAC 1)

Accounts for 70% of energy consumption in commercial buildings in Australia and typically between 40 – 50% of energy bill costs.

Selecting the right type of system – www.energyrating.gov.au

Efficiency:



HVAC (2)

- Use appropriate thermostat settings:

Summer – 24°C - 26°C

Winter – 17°C - 19°C

- Perform regular maintenance of units and delivery system
- Minimise heating and cooling losses



Close up
air gaps

Use plastic
strip curtains



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HVAC (3)

- Location – Shady and well ventilated



Refrigeration (1)

- Consider number and sizes – reduce if possible
 - Timers for drink fridges
- Choose energy efficient refrigerators
 - www.energyrating.gov.au
- Maintenance
 - replace worn seals
 - replace missing freezer doors
 - regularly defrost freezers
 - regularly defrost evaporators
 - ensure adequate ventilation of coils by leaving sufficient space and cleaning routinely to remove dust



Refrigeration (2)

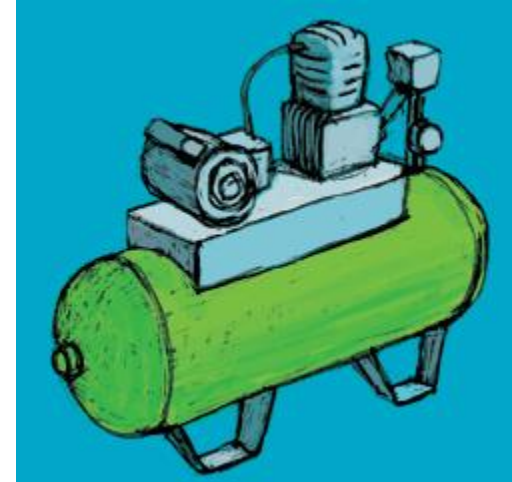
- Locate away from heat sources
 - Ovens/fryers
 - Windows
- Use plastic strips or covers for open units
- Ventilation
 - Avoid enclosing fridges
 - Leave sufficient space for ventilation
- Insulate refrigerant deliver lines



Compressed Air Systems (1)

- Choosing the right type of system:

- Reciprocating
- Vane
- Screw
- Centrifugal



- Responsible for about 10% of all industrial electricity consumption
- The majority of energy in compressing air is converted into heat.
Can this be reused?

Compressed Air Systems (2)

- Adequately sized and set
- Maintenance
- Location
- Appropriate Use
- Turn off whenever possible
- Energy efficiency options



locate compressors in a cool location
(out of direct sunlight)

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Compressed Air Systems (3)

Annual energy
saving from
reducing air
pressure

Reduction in air pressure at the compressor	50 kPa	100 kPa	150 kPa	200 kPa
	Energy Saving (kWh/y)			
Comparative Average Load (kW)				
4	320	640	960	1 280
7.5	600	1 200	1 800	2 400
11	875	1 750	2 625	3 500
15	1 195	2 390	3 583	4 780
22	1 755	3 510	5 265	7 020
30	2 390	4 780	7 170	9 560
37	2 945	5 890	8 835	11 780
55	4 380	8 760	13 140	17 520
75	5 975	11 950	17 925	23 900
110	8 760	17 520	26 280	35 040
160	12 750	25 500	38 250	51 000

¹ Sustainable Energy Authority Victoria, Energy Smart Compressed Air Systems, 2001

Compressed Air Systems (4)

Table 2. Typical additional costs for drying compressed air

Pressure Dewpoint	Dryer type	Added Energy Cost
+10°C	Deliquescent	1%
+3°C	Refrigeration	5%
-20°C	Membrane	28%
-20°C	Sorption	3-5%
-40°C	Desiccant Heatless	10-15%
-40°C	Desiccant heated	8-12%
-70°C	Desiccant Heatless	21%

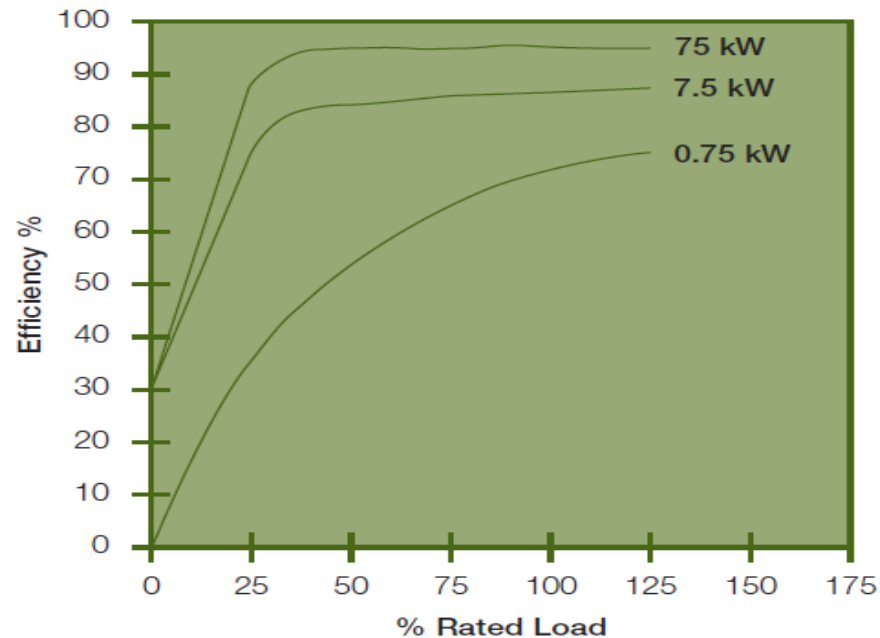
Source: UK Department of Environment Transport and Regions 1998 Good practice Guide 216

Dryer selection:
Over sizing can
waste energy

Pumps and Motors (1)

- Appropriate number and size

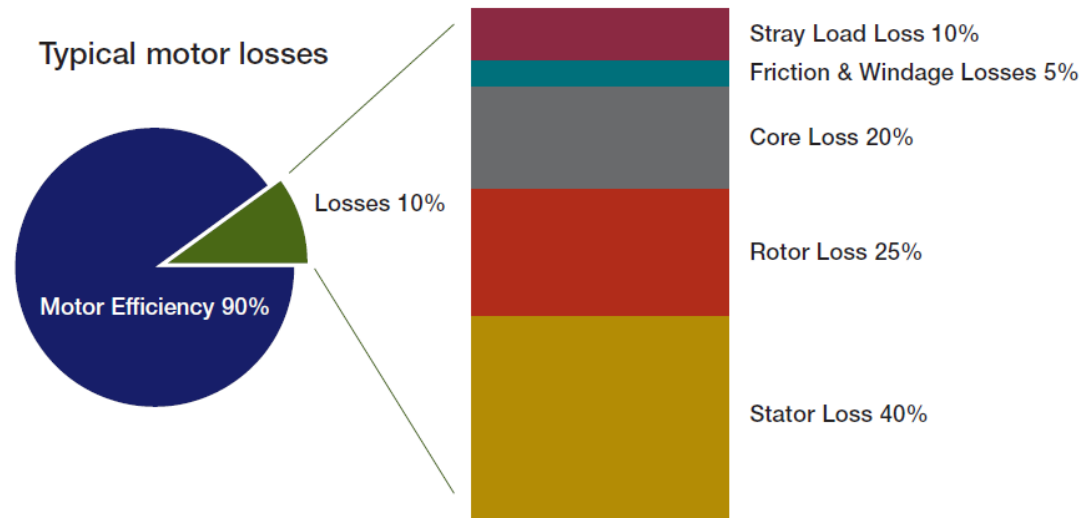
Typical Motor Efficiency at
different loads



- Variable Speed Drives (V.S.D.)

Pumps and Motors (2)

- High Efficiency Motors



- Maintenance
- Turn off when not in use

Hot Water Systems

- Type – Storage vs Instant
 - Solar, Electric and Gas
 - Energy labels (for gas systems)
- Appropriate number and size
 - Select type depending on demand
 - Keep pipe-work as short as possible
- Insulation for storage and delivery system
- Other tips
 - Flow restrictors
 - Turning off storage units during Christmas break
 - Setting a thermostat setting of 60°C
 - Whole of Life Costings



Renewable Energy

- Drivers? E.g. Cost, PR, offsetting emissions
- Options – Green Power vs on-site generation
- Solar Credit (up to 1.5kW), but no feed-in tariff as yet for businesses
- Improve Energy Efficiency first
- Appropriate technology and sizing
- Hybrid systems for RAPS

