

SCALA
STUDY DAY

3 June 2011

what is sustainable design?

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dumbest green buildings on earth

<http://greenbuildingelements.com/2009/02/16/the-10-dumbest-green-buildings-on-earth/>



London's first ecological tall building

'...its profile reduces the amount of wind deflected to the ground compared with a rectilinear tower of similar size, helping to maintain pedestrian comfort at street level, and creates external pressure differentials that are exploited to drive a unique system of natural ventilation.'

The atrium spaces 'are a natural social focus places for refreshment points and meeting areas - and function as the buildings lungs, distributing fresh air drawn in through opening panels in the facade.

This system reduces the towers reliance on air conditioning and together with other sustainable measures, means that the building is expected to use up to half the energy consumed by air-conditioned office towers.'

Foster & Partners website







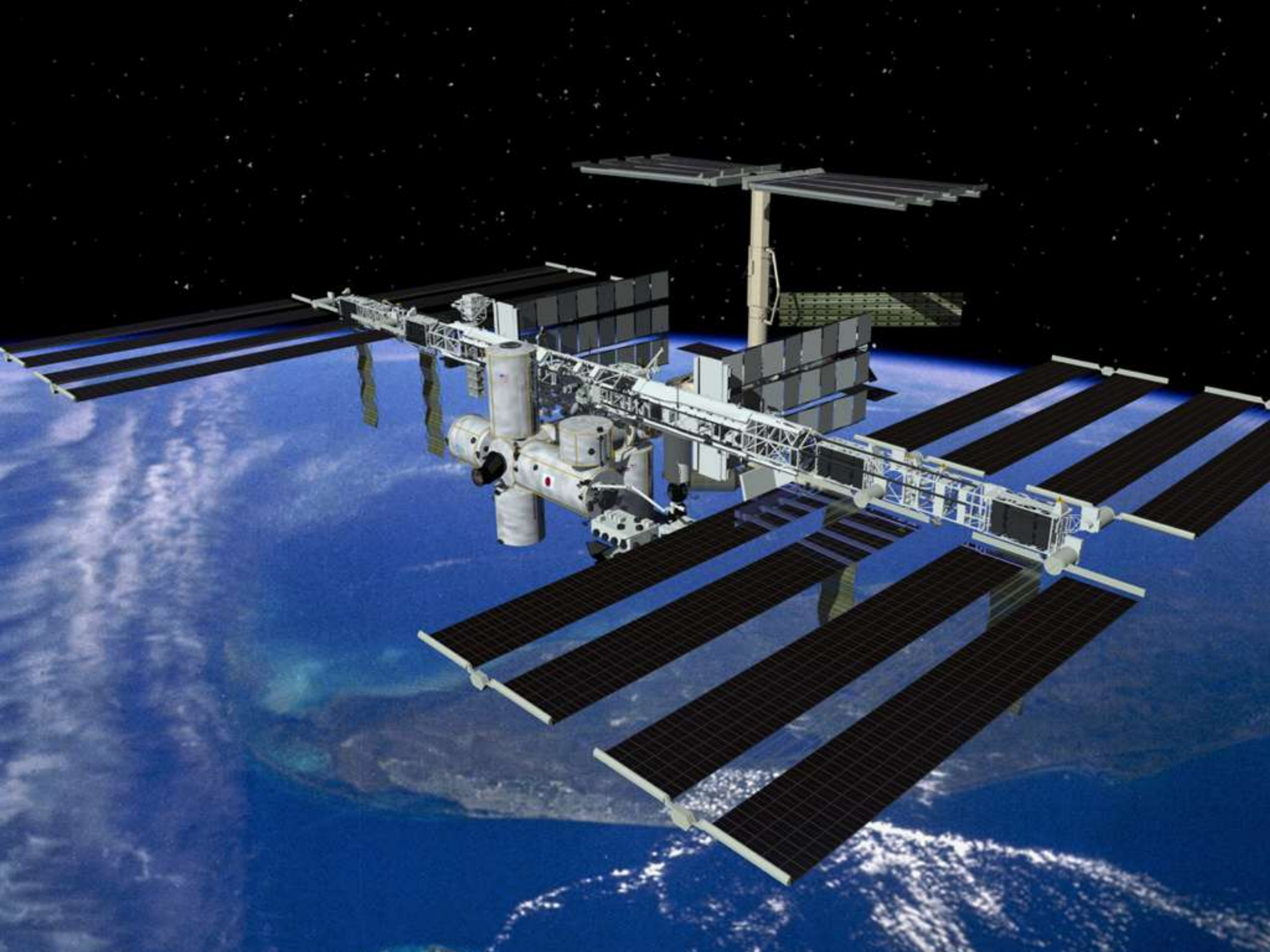


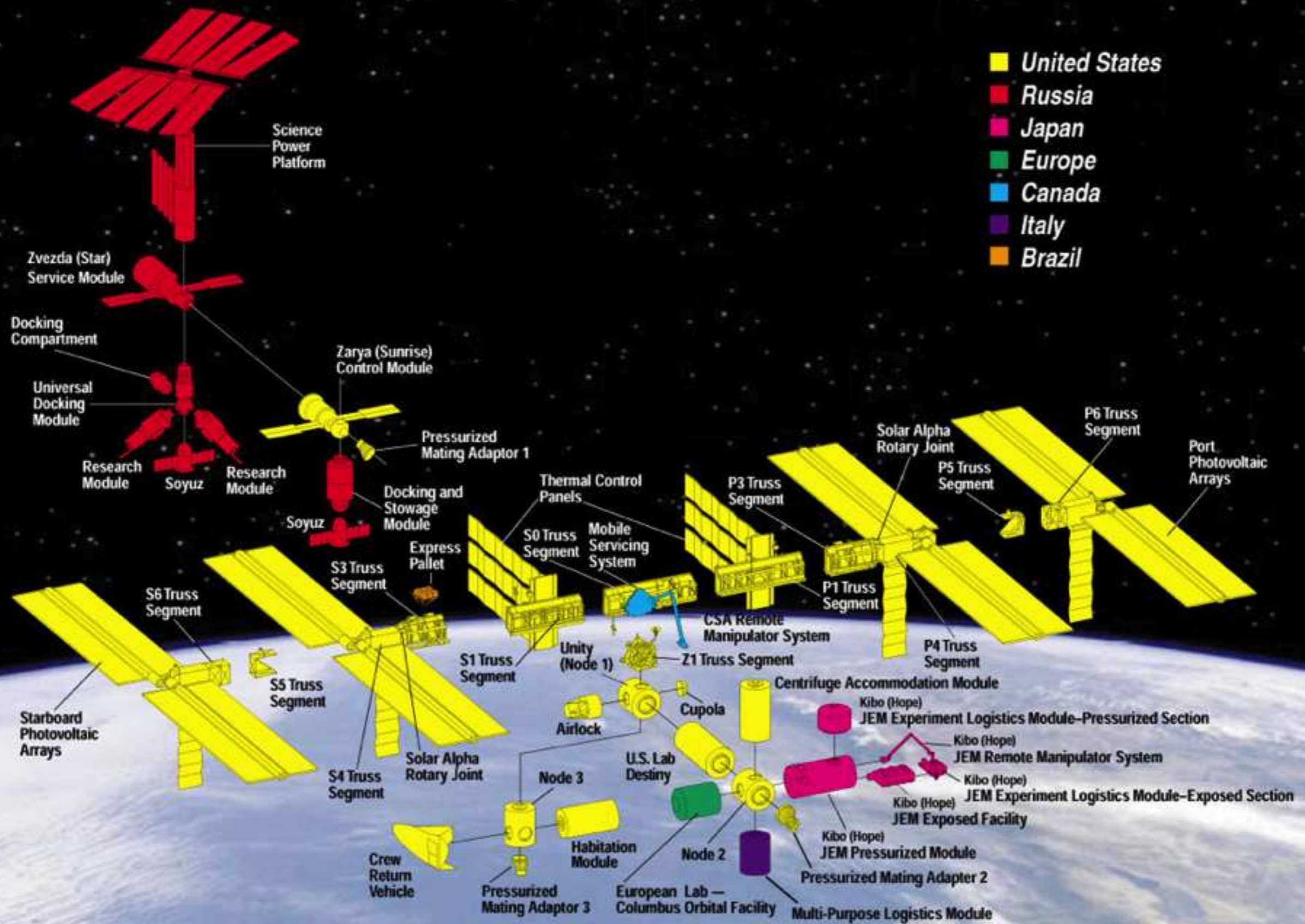
CONTEXT



ENERGY

building - and architecture - is
constrained by the availability of
energy







SPEED
LIMIT
17500

28000
KMPH







Shuttle launch energy

20 terajoules

20,000,000,000,000 J

Hiroshima bomb

60TJ

34 US Shuttle
and 67 Russian
journeys to ISS

ISS embodied transport embodied

energy

100 x 20TJ

= 2,000TJ

UK Annual energy consumption

10,000TJ





Selfridges (Future Systems) Birmingham UK 2003



The Building in Use: Energy Inputs

- Artificial lighting
- Heating
- Cooling
- Appliances and equipment
- Hot water
- Cooking
- Appliances and equipment
- People - metabolic energy
- Solar gain

The building in use: heat losses

- Fabric Losses -- conduction and radiation through walls floors, roof, windows, doors etc
- Infiltration/ exfiltration -- uncontrolled air movement
- Ventilation -- controlled air movement
- Used hot water

Reducing carbon emissions

Building carbon emissions can only be reduced by:

- design of building fabric
- design of building systems
- fuel choice
- behaviour

ENERGY CONSUMPTION

	Kwh/m ² /year			CO ₂ emissions ka/m ² /year		
	fossil fuel	electricity	total	fossil fuel	electricity	total
"average" house 1985 Building Regulations	200	40	240	38	18.4	56.4
2000 Building Regulations	90	30	120	17.1	13.8	30.9
BedZed	42	33	75	8	15.2	23.2
typical primary school	171	24	195	32.5	11	43.5
good practice primary school	121	17	138	23	7.8	30.8
typical air conditioned office	211	358	569	40.1	164.7	204.8
normally ventilated open plan	154	85	239	29.3	39.1	68.8
BRE Environment Building	47	38	85	8.9	16.6	25.5
typical supermarket	257	911	1168	49	419	468
good practice supermarket	142	663	805	27	305	332

Personal Carbon footprint

– Energy in the home	14%
– Space heating	4%
– Hot water	4%
– Embodied energy	3%
– Appliances	3%
– Personal transport	18%
– Waste and consumer items	13%
– Food	23%
– Shared services	12%
– (running schools, hospitals, banks etc)	
– Shared infrastructure	20%
– (construction of schools , hospitals etc)	

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is green design
always more expensive?

is a high BREEAM score
always best value for client and
planet?

creating the conditions for
success

