

# Carbon Critical Design - Tools

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October 2008

**Plan Design Enable**

# Why are we here today?



The Brundtland Commission defined sustainable development as:

“development that meets the need of the present generation without comprising the ability of future generations to meet their needs”

This equates to 1.8 gha per person (2003).  
Biologically productive area per person

# Sustainability & Carbon



1. Zero Carbon
2. Zero Waste
3. Sustainable Transport
4. Local and sustainable materials
5. Local and sustainable foods
6. Sustainable water
7. Natural habitats and wildlife
8. Culture and heritage
9. Equity and fair trade
10. Health and happiness

# Why is it important?

- it's no longer about choice

***“For the first time, the majority of people are now making choices on ethical and environmental grounds”***

65%

of Western Europeans now style themselves as 'green or ethical consumers'

89%

agreed that knowing they were contributing to a more positive future for everyone would make them happier

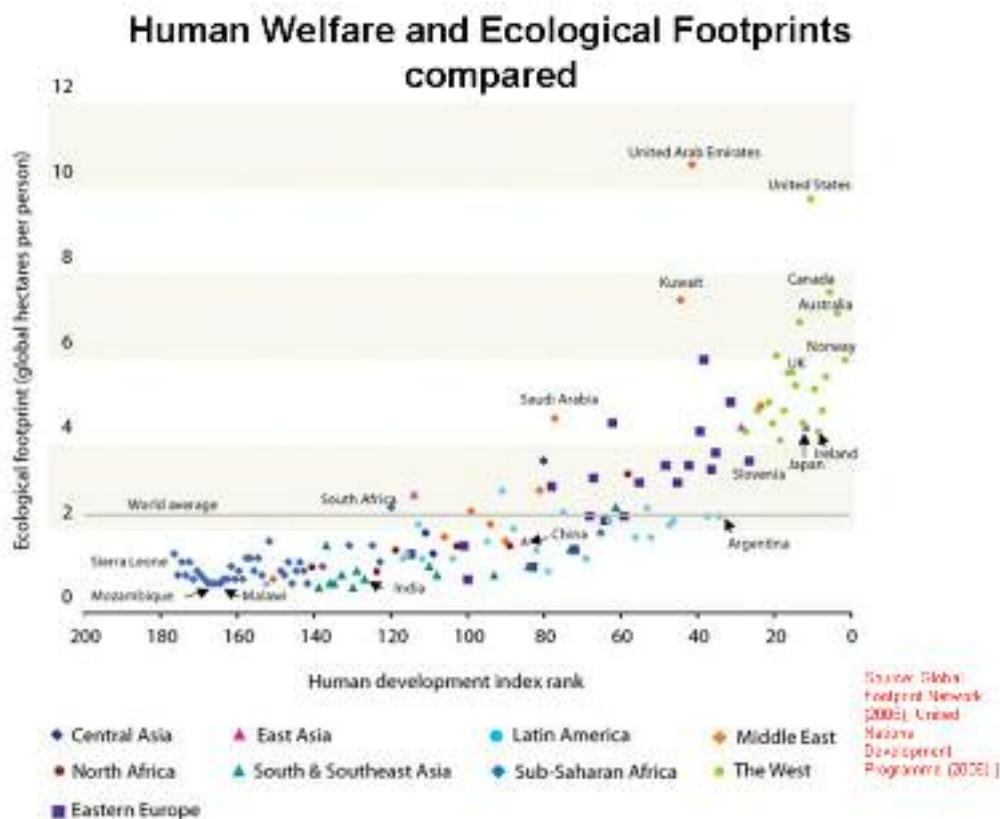
80%

said they'd prefer to work for a company with ethical guidelines

65%

had refused to buy a product or use a company for ethical or political reasons

# Current Performance



2.2 gha Global average

9.6 gha US average

5.45 gha UK average

3.2 gha Bedzed average



# The best Tool of all?

The Client, the Designer, the Contractor

Inspiration – to think differently  
Ambition – to make a difference  
Knowledge – to find solutions  
Passion – to make it happen



# Carbon Critical Design Mantra

**REDUCE** – minimise resource demand

**REUSE** – recycle and increase efficiency

**RENEWABLES** – zero carbon technology



TRADITIONAL LINEAR PATTERNS OF RESOURCE CONSUMPTION RESULT IN A REDUCTION IN THE EARTH'S RESOURCES AND CREATE OUTPUTS WHICH DAMAGE THE EARTH'S ABILITY TO REGENERATE AND PROVIDE NEW RESOURCES.



TO BECOME SUSTAINABLE, PATTERNS OF CONSUMPTION NEED TO BECOME INCREASINGLY CYCLICAL IN NATURE. THIS WILL REQUIRE MORE INTEGRATION AS THE WASTE PRODUCTS OF ONE PROCESS BECOME THE INPUTS TO ANOTHER PROCESS.

# The big picture

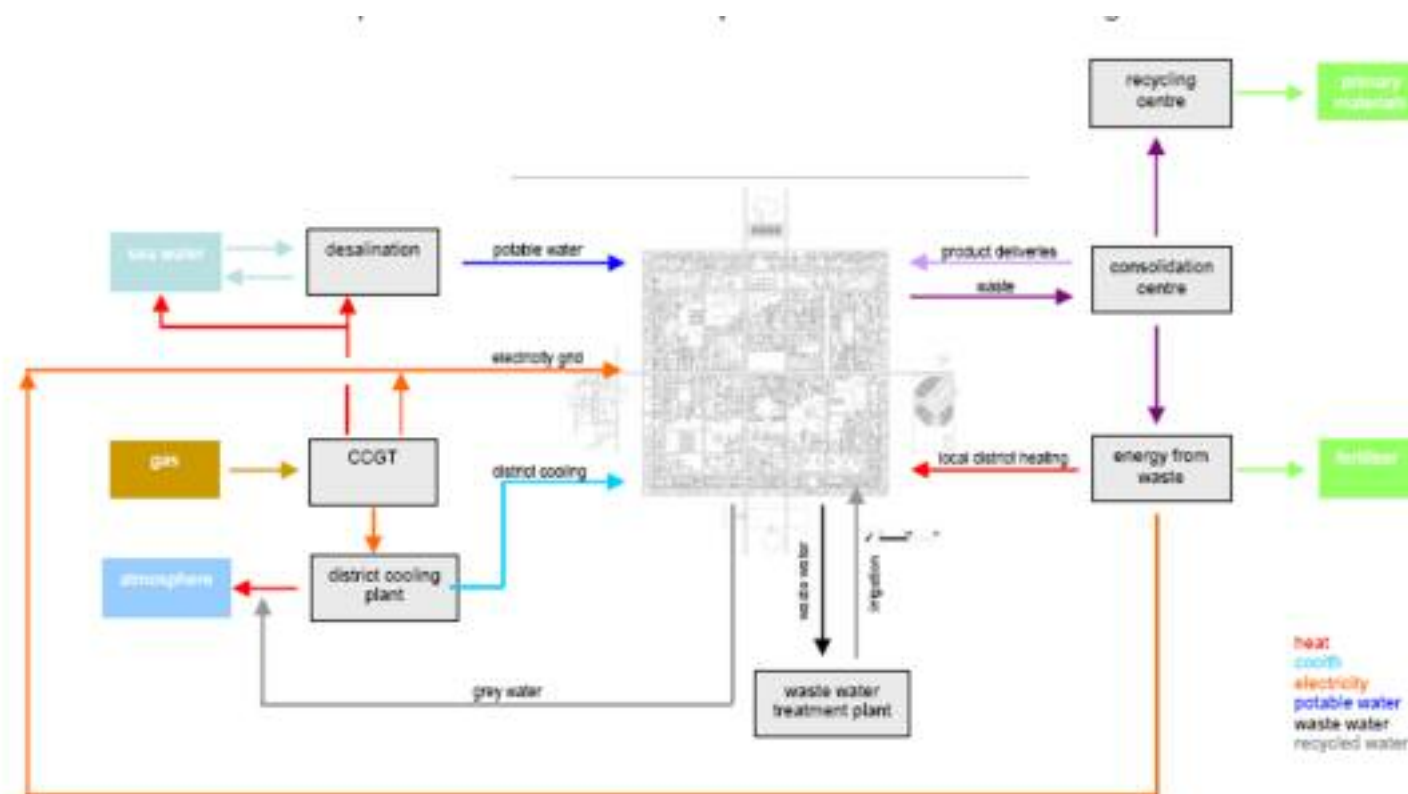
New Cities vs Established Cities





# Integrated Infrastructure

“Joined up” Utilities



# Buildings vs Neighbourhoods

## STRATEGIC ADVICE - TOWARDS ZERO CARBON



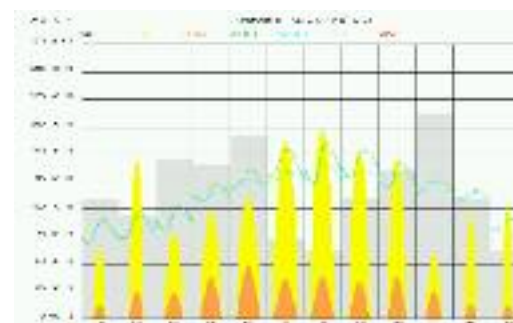
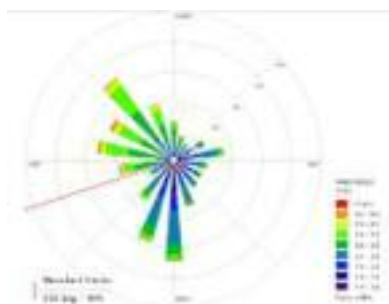
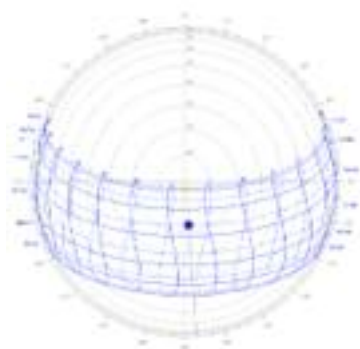
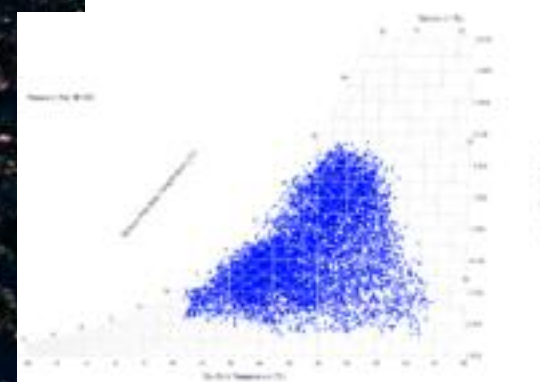
# Responsive to Environment

No 2 locations are the same.

Ambient Environment

Water Resources

Energy Sources



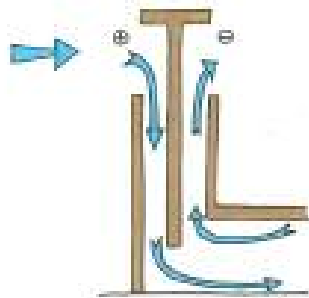
# The Vernacular

History will have solved the problem before and with less technology

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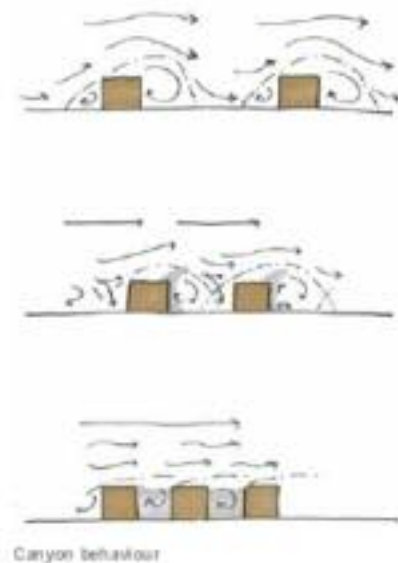
Historical photograph of a wind tower



Operation of a traditional wind tower



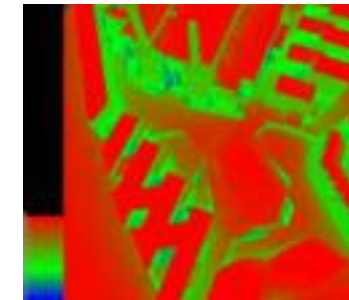
# Heat Island Effects



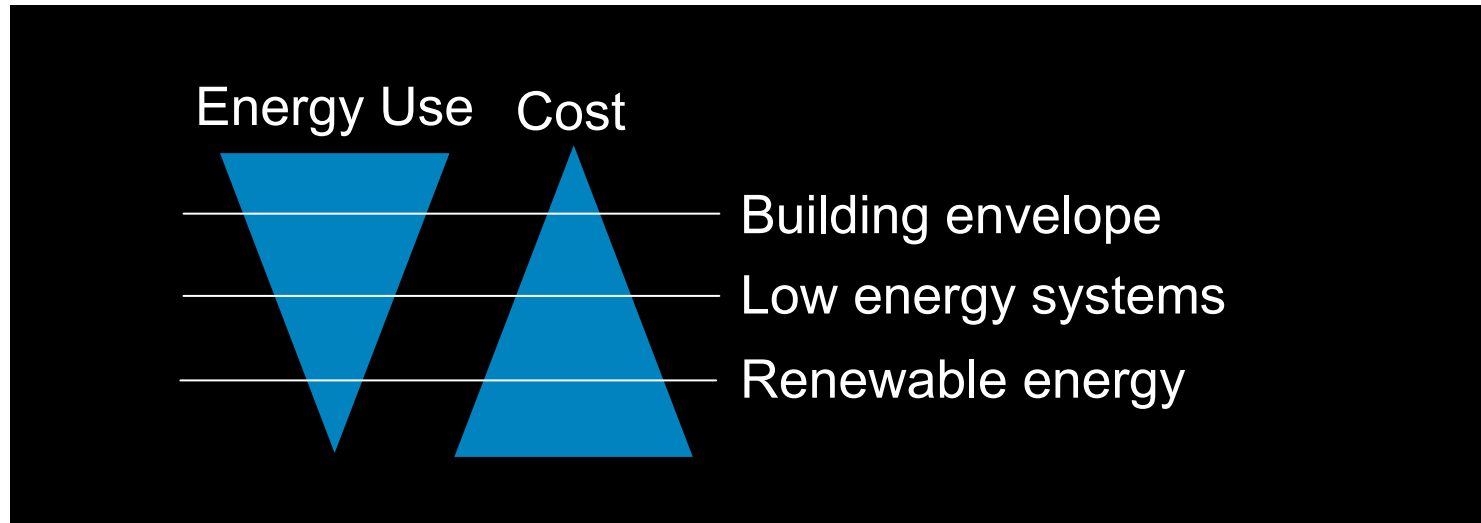
Avoid heat island effects

Flush cities with good air movement

Reduce surface radiation effects



# Cost as a driver



# Reduce Solar Gains

Passive Design solutions

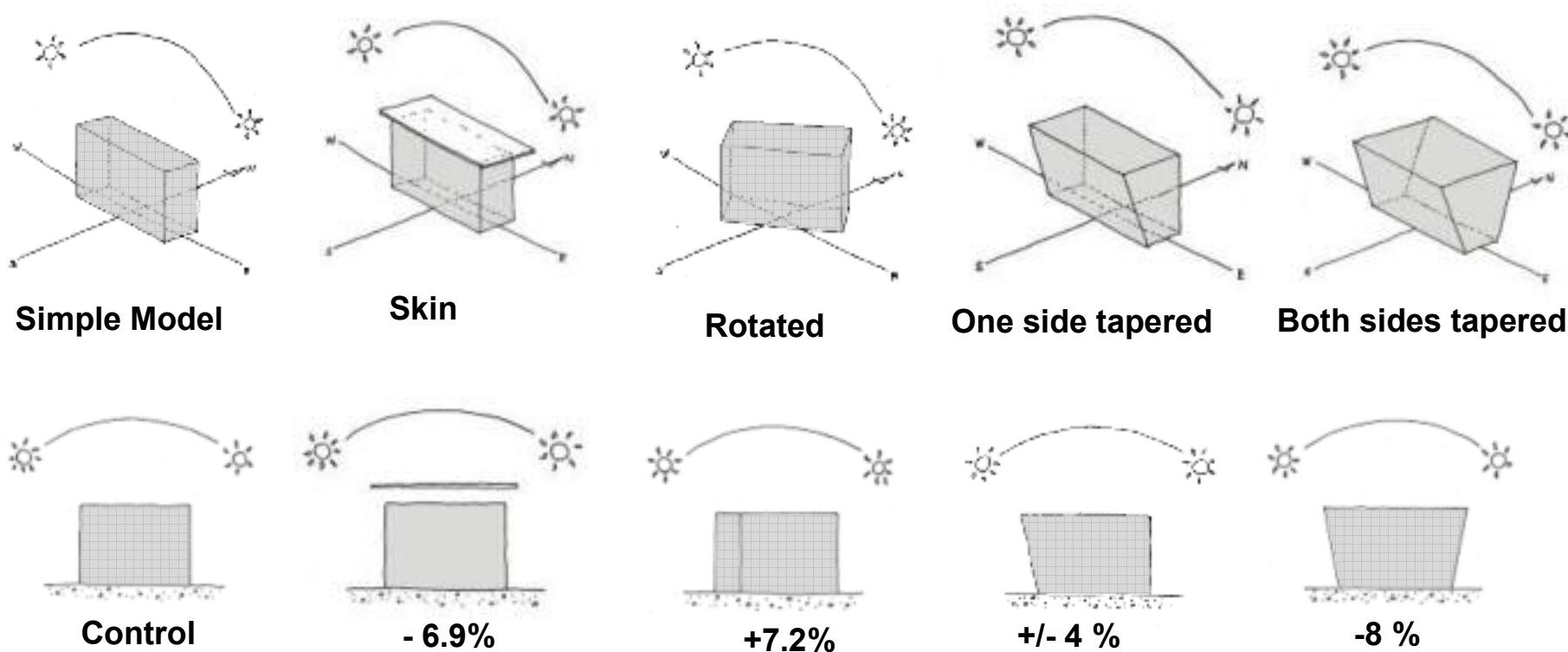
Solar shading

Fly roofs



# Building Form and Orientation

Significant reductions in thermal gains





# Reduce Thermal Losses



Understand the heating/cooling balance

Thermal Envelope Efficiency

Buffer Spaces



# Increase Thermal Mass

Concrete vs Steel

Exposed surfaces vs cladding/ceilings

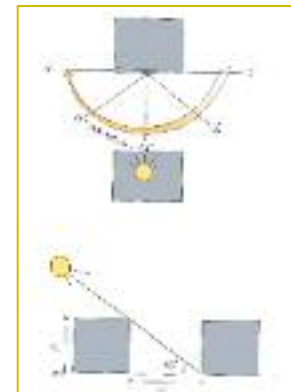
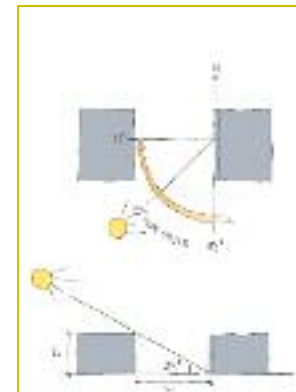




# Reduce Lighting Energy

Use daylight to best effect

Minimum and maximum daylight factors



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# Innovation



## RENEWABLE TECHNOLOGY

Solar Farm

Wind Farm

Waste to heat

Small scale PV

Flexible Infrastructure

# Case Studies

The Atkins logo is a dark blue, downward-pointing triangle with the word "ATKINS" written vertically in white, uppercase letters inside it.

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# Northumberland Uni

Integrated solar thermal



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# Bahrain World Trade Centre

Integrated wind turbines  
1300 MWh per annum

3x39m Wind Turbines  
15% of building load





# Lighthouse Project

High efficiency façade

Daylight control

Integrated solar electric to deliver  
14% of load

Solar thermal collectors to drive  
absorption chillers

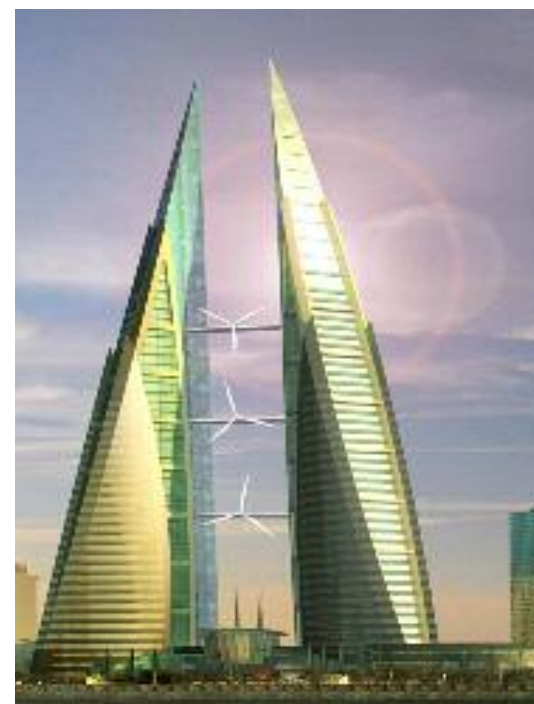
Passive cooling systems



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# It is up to all of us?

**We are the tools for sustainable development**





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